PEM

WIRING DEVICES FOR SUBMERSIBLE LIGHTFIXTURES

INDEX 2013-8

SUPERSEDES 2008-1

PEM

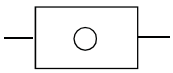
***** Also custom bored & threaded to given specifications: **Please Enquire**

CONDUIT MOUNTED SUBMERSIBLE JUNCTION BOXES U.L. & CSA

PEM Junction Boxes are of cast bronze, stainless steel fitted and with a Neoprene cover gasket. They are NPT tapped for mounting upon PEM J60 Series Pool Conduits. Outlets are NPT tapped for PEM 1/2" or 3/4" NPT Cordseals and for Internal and External ground (earth) connections.

PEM Junction Boxes must be installed in conformance with all applicable electrical codes. For NEMA installations, the junction box cavity must be filled with a UL listed compound (3M or other). All supply conduits into a pool must be self draining in a visible location outside of the pool. All threaded conduit connection(s) as well as all cordseals must be installed with an approved watersealing thread seal.

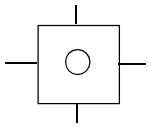
J 1



#363-1110, CSA / UL
Max. 2 x 1/2" Outlets
1 x Max. 3/4" Conduit

#363-1120*
1 x 3/4" Outlet
1 x Max. 3/4" Conduit

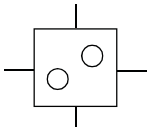
J 2



#363-1210, CSA / UL
Max. 4 x 1/2" Outlets
1 x Max. 3/4" Conduit

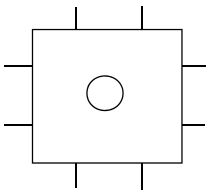
#363-1220 *
Max. 4 x 3/4" Outlets
1 x Max. 3/4" Conduit

J 2-2



#363-1310, CSA / UL
Max. 4 x 1/2" Outlets
2 x Max. 3/4" Conduits

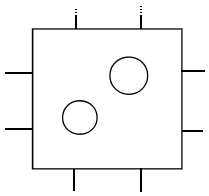
J 3



#363-1410, CSA / UL
Max. 8 x 1/2" Outlets
Max 1 x 1" Conduit

#363-1420 *
Max. 4 x 3/4" Outlets
Max. 2 x 1" Outlets
1 x Max. 1" Conduit

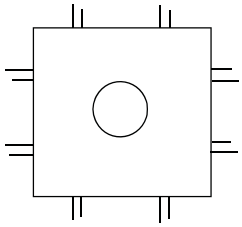
J 4



#363-1510, CSA / UL
Max. 8 x 1/2" Outlets
2 x Max. 1" Conduit

#363-1520 *
Max. 4 x 3/4" Outlets
2 x Max. 1" Conduit

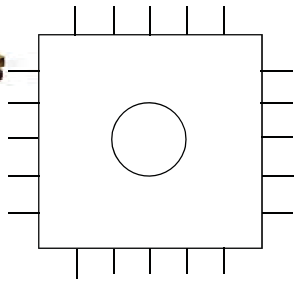
J 5



#363-1610, CSA / UL
Max. 16 x 1/2"Outlets
Max. 1 x 2" Conduit

#363-1620 *
Max. 8 x 3/4" Outlets
1 x Max. 3" Conduit

J 6



#363-1710, CSA / UL
Max. 20 x 1/2" Outlets
1 x Max. 2 " Conduit

#363-1720 *
Max. 12 x 3/4" Outlets
Max. 1 x 4" Conduit

#363-1730*
Max. 4 x 1 1/2" Outlets
Max. 1 x 4" Conduit

ALL TAPPINGS ARE NPT UNLESS SPECIFIED OTHERWISE.

All Boxes have 1 (one) internal ground (earth) connection for each conduit connection & 1 (one) external ground connection

Conduit number and size must be specified. Outlets must be specified as to number and size (1/2" or 3/4").

Orders without outlet specifications will be supplied with maximum number of 1/2" NPT outlets. Unused openings must be closed with brass or stainless steel NPT threaded plugs.

NEMA Cubic Content Requirements per conductor:		
#16 AWG =	1.75	in.3
#14 AWG =	2.0	in.3
#12 AWG =	2.25	in.3
#10 AWG =	2.5	in.3
#8 AWG =	3.0	in.3
#6 AWG =	5.0	in.3
in.3 = Cubic Inch		

Dimensions (OD) : Outside Dimensions

PEM	Length (OD)	Width (OD)	Height (OD)	Cubic Content
J1	108mm 4.25"	83mm 3.25"	83mm 3.25"	160 cm3 11.0 in.3
J2	111mm 4.375"	111mm 4.375"	83mm 3.25"	260 cm3 17.0 in..3
J2-2	111mm 4.375"	111mm 4.375"	83mm 3.25"	279 cm3 17.0 in.3
J3	143mm 5.625"	143mm 5.625"	86mm 3.375"	590 cm3 36.0 in.3
J4	143mm 5.625"	143mm 5.625"	86mm 3.375"	590 cm3 36.0 in.3
J5	179mm 7.0"	179mm 7.0"	140mm 5.5"	1852 cm3 113.0 in.3
J6	203mm 8.0"	203mm 8.0"	114mm 4.5"	2245 cm3 137.0 in.3

In cold freezing climates:
For winterizing submersible lights, do not disconnect but place light fixtures and/or small submersible pump close around box and cover all with a plywood box, bolted to pool floor. Ascertain that the pool can drain off rain & melting snow

FOR ELECTRICAL CABLE CONNECTIONS FROM OUTSIDE OF A POOL TO THE INSIDE

CABLE ENTRIES PEM

PEM J Series Cable Entries are designed to provide sealed cable sleeve terminations for electrical cable(s) that are to be submersed. Cable sleeves carry the electrical cable outside of the pool to the junction boxes or directly to the power control / supply center.
PEM J Series Cable Entries are made of cast bronze, brass and stainless steel fitted.
For **PEM** Cable Entries the cordseals are extra to permit choice of cable size. Select cordseals from **PEM Cordseals.**

It must be noted that Cable Entries are NOT junction boxes. Their sole purpose is to seal the end of a sleeve carrying single or multiple electrical cable(s) from the pool to the power supply. The electrical cable(s) are fed through the cordseal and cable entry into the carrying sleeve.

Cordseals are normally not installed into the cable entry prior to feeding the cable through but are slipped onto the cable to the approximate point of entry or the threaded part facing toward the cable entry. It must be remembered, that cordseals consist of 4 parts that must fit together properly to seal. The thread of the cordseal(s) must be taped up with teflon thread tape to provide a water tight connection.

NOTE:
When using American type (5MA) ground fault (earth leakage) protection (GFCI). The massing of cables in a long sleeve can cause nuisance tripping due to inductance interaction between the cables. To overcome this, cables must be separated by spacers or grounded foil shielding. The current load of each cable must be well within its limits to avoid overheating and deterioration of cables in the sleeve.

Sleeves are usually plastic pipe with long radius bends. A sleeve must always terminate into the bottom of the control or power supply to prevent water falling on the electrical gear in case of accident or negligence during installation or servicing.

PEM J41, **J53**, **J54** and **J56** Cable entries are normally installed into pool walls. **PEM J58** and **J59** are installed into the pool floor.

Where required suitable (CONDUIT SIZE), standard PEM J type submersible junction boxes can be used to serve as pool bottom mounted cable entries without internal splicing.

Submerged electrical cable exposed to Ozone Water Purification might be affected by same. No warranty applies to Ozone Water Purification caused equipment damages.

The installation of the cable entries and cable sleeves must conform to all applicable electrical codes.
It is recommended to lubricate all cables with an approved for the purpose pulling lubricant, also to put identifying numbers on each cable within the cable entry and at its termination point to permit the identification of individual cables should the need arise.

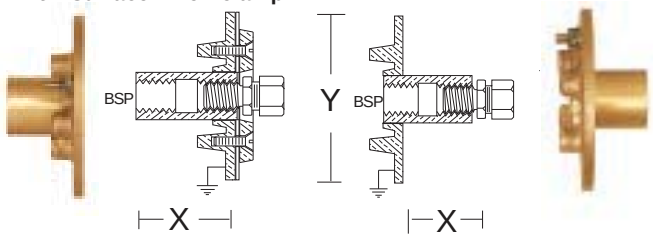
For **PEM J58 and J59** cables are usually drawn single or in pairs into the sleeve. Care is to be taken that the cable(s) is (are) not forced over the right angle turns when entering the sleeve.

For **PEM J54 and J56** Cable entries the cover must be slipped over the cable(s) as all cables are drawn at once into the sleeve.

Cordseals extra, not included !

PEM J41- B
With surface liner clamp

PEM J41- A



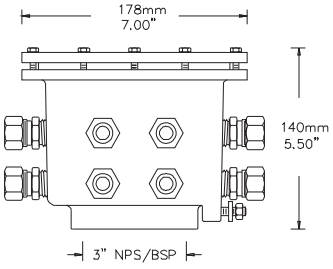
PEM	#	TYPE	BSP	'X'	'Y'
J41-10	**377-0010**	**A**	1/2"	40mm	102mm
J41-11	**377-0020**	**B**	1/2"	40mm	102mm
J41-12	**377-0040**	**A**	3/4"	42mm	102mm
J41-13	**377-0050**	**B**	3/4"	42mm	102mm
J41-14	**377-0070**	**A**	1"	45mm	134mm
J41-15	**377-0080**	**B**	1"	45mm	134mm
J41-16	**377-0100**	**A**	1 1/4"	50mm	134mm
J41-17	**377-0110**	**B**	1 1/4"	50mm	134mm
J41-20	**377-0120**	**A**	1 1/2"	60mm	152mm
J41-21	**377-0140**	**B**	1 1/2"	60mm	152mm
J41-23	**377-0160**	**A**	2"	80mm	152mm
J41-24	**377-0170**	**B**	2"	80mm	152mm

PEM J53

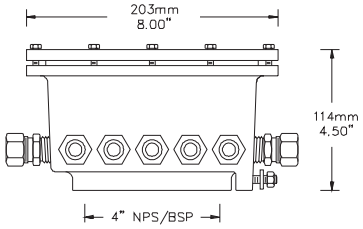
PEM J54

PEM J56

PEM J58



PEM J59



PEM	#	Sleeve	Tappings
J53-1	**377-1210**	1 1/2"	2 x 1/2"
J53-3*	**377-1220**	1 1/2"	2 x 1/2"
J54-1	**377-1310**	1 1/2"	5 x 1/2"
J54-3*	**377-1320**	1 1/2"	5 x 1/2"
J54-4	**377-1330**	1 1/2"	3 x 3/4"
J54-5*	**377-1340**	1 1/2"	3 x 3/4"
J56-1	**377-1410**	3"	9 x 1/2"
J56-3*	**377-1420**	3"	9 x 1/2"
J56-4	**377-1430**	3"	5 x 3/4"
J56-5*	**377-1440**	3"	5 x 3/4"
J58-1	**377-2210**	3"	16 x 1/2"
J58-2*	**377-2230**	3"	8 x 3/4"
J59-1	**377-2610**	4"	20 x 1/2"
J59-2*	**377-2630**	4"	12 x 3/4"

*** with membrame clamp**

TILE MASKS
Natural bronze or brass
Approx. 25mm / 1.0" wide
x 3mm / 0.125" high
To be Epoxy fitted to tiles

J41-10-9	377-0019
J41-12-9	377-0049
J41-14-9	377-0079
J41-16-9	377-0109
J41-20-9	377-0129
J41-23-9	377-0169
J53-9	377-1209
J54-9	377-1309
J56-9	377-1409

PEM J11

SUBMERSIBLE, SHALLOW, FLUSH MOUNTED JUNCTION BOX

363-30050 SERIES

Cubic Content of J11=
540 cm^3 / 33 cubic inches

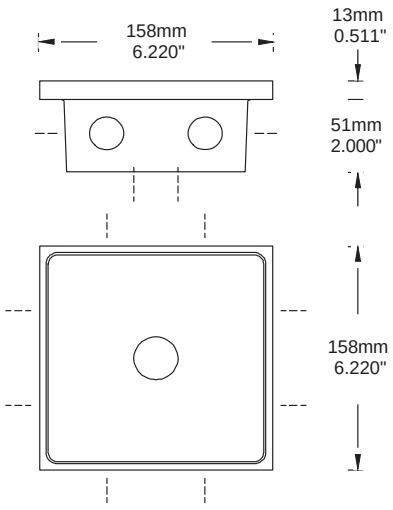
The **PEM J11 JUNCTION BOX** is very shallow and has a square grout frame to permit best integration into ornamental square tiled surfaces. The power supply can enter the box from the bottom or the side. (Junction Box interconnection of several boxes is possible with 20mm / 3/4" PVC conduit.)

The **PEM J11 JUNCTION BOX** is made of cast bronze and is stainless steel fitted. Each has a cast gasket in place and internal and external ground / earth connections. The Junction box is equipped with grout frame for flush surface installation. Chrome-plating of box is available at extra cost.

BOTTOM TAPPING - 1 Hole
CONDUIT INLET- 1/2", 3/4", 1" or 1 1/2"
SIDE TAPPINGS - Max. of 8 but not adjacent to a conduit
Max. 8 x 1/2" NPT / BSP SIDE OUTLETS
Max. 8 x 3/4" NPT / BSP SIDE OUTLETS
SPECIAL TAPPING FOR METRIC ELECTRICAL THREADS OF SIMILAR SIZE - SPECIFY SIZE

Cordseals are additional & extra

IMPORTANT:
All tappings should be specified.
All connected supply conduits must be self draining in visible locations.
All threaded connections must have a suitable watertight thread sealant.



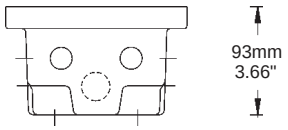
PEM J34 UL

SUBMERSIBLE, FLUSH MOUNTED JUNCTION BOX

363-40000 SERIES

Cubic Content of J 34 =
700 cm3 \ 42.72 Cubic Inches

The **PEM J34 JUNCTION BOX** is made of cast bronze, with a Neoprene cover gasket, and is stainless steel fitted. It is equipped with a grout frame for flush installation into concrete and a separate grounding connection for each outlet. All tappings are NPT unless specified otherwise. When box is ordered without tapping specifications, a blank box without tappings will be supplied (PEM #375-4000).



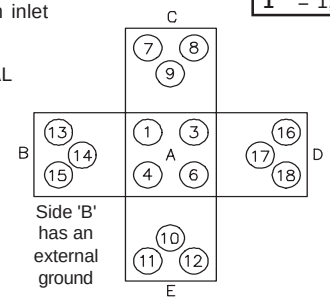
POSSIBLE TAPPINGS
9/8"-18 SIDE (PEM Cordseal J13-8)
Max. of 8 but not adjacent to a conduit.
1/2" SIDE (PEM J14 Cordseals)
Max. of 8 in any position but not adjacent to a conduit.
3/4" SIDE (PEM J13-4 Cordseals)
Max. of 8 in any position but not adjacent to a conduit.
1" SIDE (PEM J13-6 Cordseals)
Max. of 4 : # 9, 10, 14 and / or 17 with bottom inlet
BOTTOM - Max. 1"
Max. of 4 : # 1, 3, 4, 6
SPECIAL TAPPING FOR METRIC ELECTRICAL THREADS OF SIMILAR SIZE - SPECIFY SIZE

Cordseals are additional & extra

Requirements per conductor:

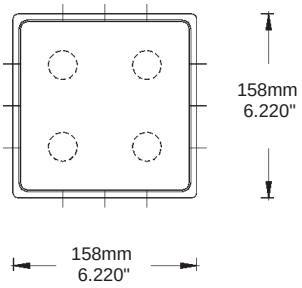
16 AWG = 1.75 Cubic Inches
14 AWG = 2.0 Cubic Inches
12 AWG = 2.25 Cubic Inches
10 AWG = 2.5 Cubic Inches
8 AWG = 3.0 Cubic Inches
6 AWG = 5.0 Cubic Inches
For # 6 AWG use as terminal

Diagram of Tapping Positions



PEM J34 SUGGESTED TAPPINGS

1/2" = Any position
3/4" = Any position
9/8"-18 = 7,8,11,12,13,15,16 and / or 18
1" = 1, 3, 4, 6, 9, 10, 14 and / or 17



PEM J35

SUBMERSIBLE, FLUSH MOUNTED JUNCTION OR PULL BOX

363-50000 SERIES

J35 with specified cordseals attached

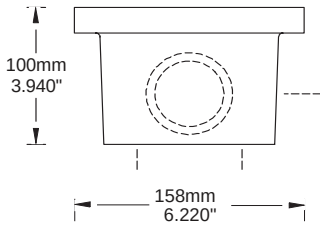
Ground (Earth) Connections:
1 x External
4 x Internal

The **PEM J35 JUNCTION BOX** is custom made of cast bronze, is stainless steel fitted and comes with a Neoprene cover gasket. It is equipped with a grout frame for flush installation into concrete. The **PEM J35** Submersible Pull or Junction Box is designed for flush installation into concrete pool floors, walls or decks. The design of the junction box permits a great variety of custom made inlet and outlet combinations.

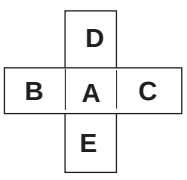
IMPORTANT:
All threaded connections must have a suitable watertight thread sealant.
All connected supply conduits must be self draining in visible locations.

All tappings must be specified.
When box is ordered without tapping specifications a blank box without tappings will be supplied (PEM #375-5000).

Cordseals are additional & extra

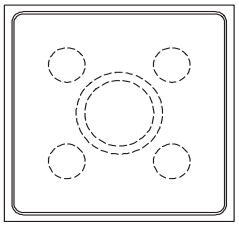


See diagram below for tapping positions



PEM J35 SUGGESTED TAPPINGS
Maximum number of conduit connections per side

Size	Side	No. of Holes
1/2"	B, C, D, E	3
3/4"	A	3
1"	A	4
1"	B, C, D, E	2
1 1/4"	A, B, C, D, E	1 (centered)
1 1/2"	A, B, C, D, E	1 (centered)
2"	A, B, C, D, E	1 (centered)



Cubic Content of J 35:
806 cm3 / 49.19 Cubic Inches

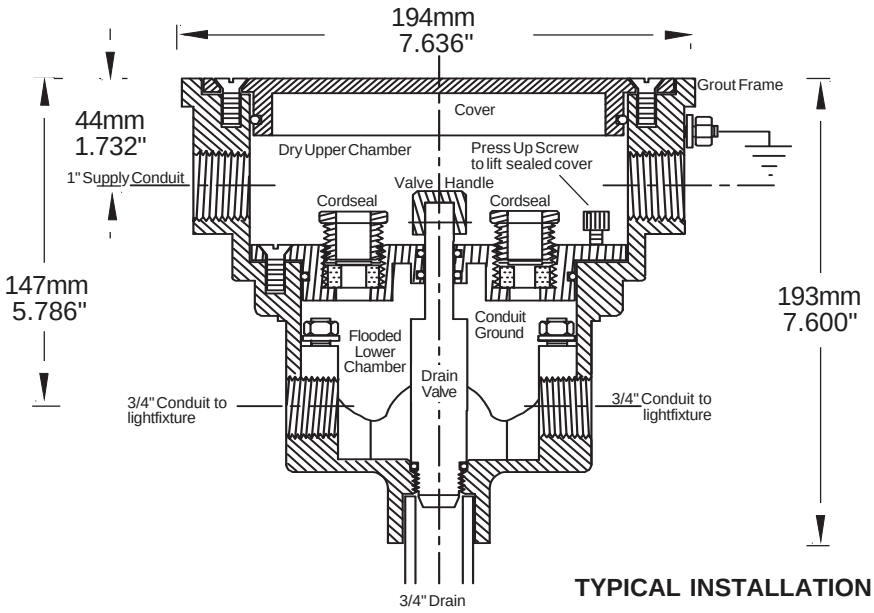
SUBMERSIBLE ELECTRICAL JUNCTION BOX

PEM J36

SUBMERSIBLE ELECTRICAL JUNCTION BOX WITH DRAINABLE CONDUIT COMPARTMENT
FOR IN-FLOOR MOUNTED, UP-LIGHTING WITH NON METALLIC CONDUIT CONNECTIONS

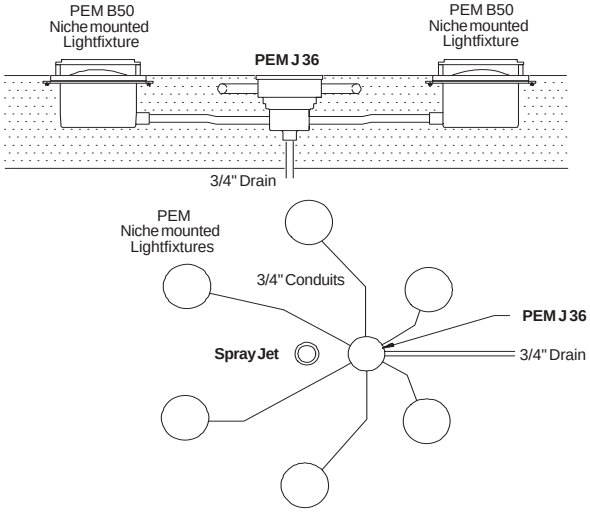
UL Listed

376-1010 SERIES



TYPICAL INSTALLATION FOR 6 LIGHTS AROUND A SPRAY JET

ELECTRICAL COMPARTMENT
(Dry upper chamber)



PEM J36 Submersible Junction Box is designed for use with non-metallic conduits for submersible lightfixture niches installed into pool floors. It permits internal in conduit bonding of fixtures / fixture niches to the main ground in addition to internal fixture grounding. The junction box receives open 3/4" conduits (max. of 6) with fixture cable and bare ground wire providing connection for the ground wires in the flooded lower chamber conduit compartment and for the electrical cables to the power supply in the dry sealed watertight upper compartment. There is an internal drain valve for the conduit compartment with an operating handle extending into the upper electrical compartment permitting the draining of the flooded conduit compartment. This permits fixture replacement or service work without water entering the electrical junction box and supply conduit. To operate = Drain the pool. The area around the junction box cover must be dry. Open junction box and open the drain valve with a screw driver. Observe water in niches draining out. Once dry, open all cordseals, disconnect grounds, then with lift bolts open the conduit compartment. Test completed replacement , then close the cover. If necessary grease the 'O' ring seal, close the cordseals, re-connect the grounds, make the electrical connections and close the cover. A 3/4" female NPT / BSP drain connection is provided The drain pipe shall be 1 1/2" or larger. The supply conduit(s) shall be self-draining in a visible location. The threaded NPT supply conduit connections must be made watertight with suitable thread sealant or teflon tape. Potting compounds must be the approved non shrinking and completely removable type. In freezing climates the conduits from the niches, the lower part of the PEM J36 Junction box and the drain to below frost level must be heat wire traced. **(For winter maintenance - drain the pool, open the junction box, open the drain and then close junction box, DO NOT FORGET TO CLOSE THE DRAIN AGAIN IN THE SPRING !)**

PEM J36 is custom made to given specifications:
Specify: Number and size of supply conduits (Max. 1") / number of niche conduits (Max. of 6). If less than 6 niche conduits are specified please specify C ... numbers for location of conduits. Non-corrosive NPT plugs must be used to close unused cordseal openings.
NOTE: The installation of this junction box must conform to all electrical codes applicable.

PEM A470/480

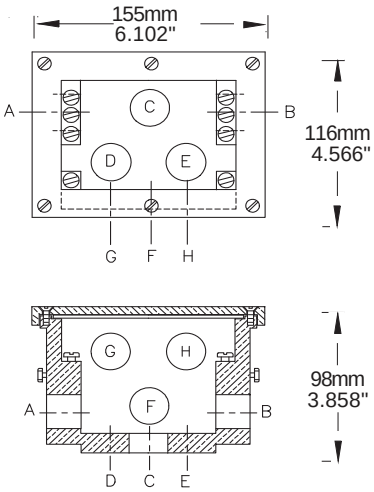
DECK / JUNCTION BOXES

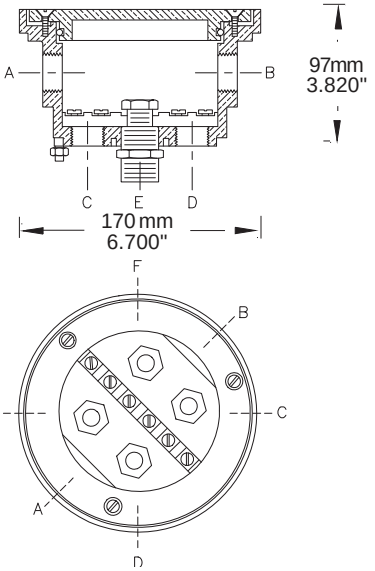
The installation of deck boxes must conform with all electrical codes applicable.

Not available for USA

PEM A480 CSA *

376-52200 SERIES
SUBMERSIBLE
FLUSH MOUNTED JUNCTION BOX
2 X CONDUITS / 4 X LIGHTFIXTURES





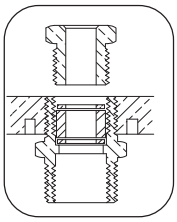
PEM A470

376-51100 SERIES

ABOVE GROUND JUNCTION BOX
2 X CONDUIT / 6 X LIGHTFIXTURES

A470

PEM 13-5
Conduit Seal



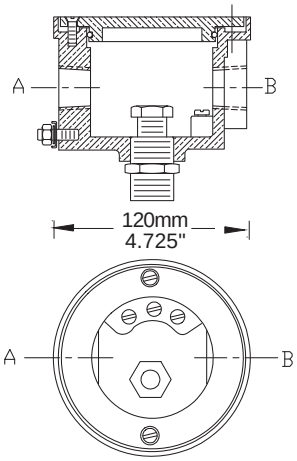
PEM A470
Tappings are custom made.
Location, size and number of tappings must be specified otherwise box will be shipped blank - without any tappings.
Tappings are normally NPT unless specified otherwise.
For conduits leading into pool use (Optional) PEM J13-5
Conduit seals with 3/4" male and 1/2" female NPT Connections.
Conduit: A & B - Maximum 1" NPT / BSP.
Outlets: C to H - 3/4" female NPT.

PEM A480
Conduit tapping (A & B) is standard: 1" NPT / BSP).
4 x 3/4" NPT Standard Bottom Outlets for optional conduit seals (J13-5) for 16/3 AWG size cable are standard.
(Deck Boxes for niche connections with cable and the #8 Ground. See PEM J34 / J13-8).
Bottom connections with J13-5 conduit seals are 3/4" male and 1/2" female NPT.
CSA approved PEM A482 has 3 bottom connections of 3/4" female NPS.

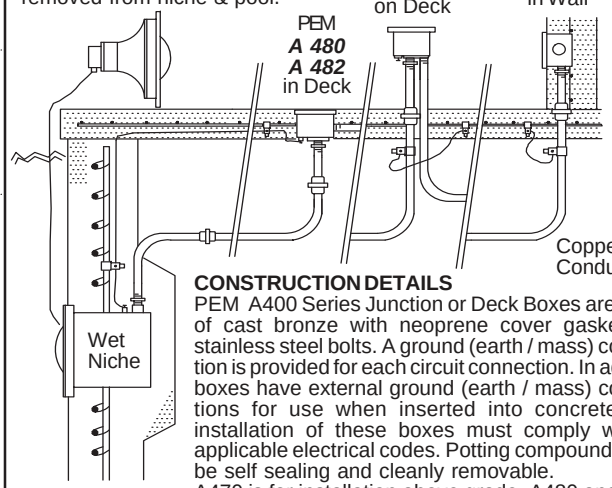
PEM A482
Conduit tapping (A & B) is standard 3/4" NPT (Maximum is 1").
1 x 3/4" NPT Standard Bottom Outlet for optional conduit seal (J13-5) for 16/3 AWG size cable is standard. Bottom connection with J13-5 conduit seal is 3/4" male and 1/2" female NPT.
Optional & extra is 9/8 x 18 niche plastic conduit connection with J13-8 cordseal for cable and separate # 8 ground wire. CSA approved PEM A 482 has 3/4" female NPS bottom connection.

PEM A482, CSA,

376-53400 SERIES
SUBMERSIBLE, FLUSH MOUNTED JUNCTION BOX,
2 X CONDUITS / 1 X LIGHTFIXTURE



APPLICATION SUGGESTIONS:



CONSTRUCTION DETAILS
PEM A400 Series Junction or Deck Boxes are made of cast bronze with neoprene cover gasket and stainless steel bolts. A ground (earth / mass) connection is provided for each circuit connection. In addition boxes have external ground (earth / mass) connections for use when inserted into concrete. The installation of these boxes must comply with all applicable electrical codes. Potting compounds must be self sealing and cleanly removable.
A470 is for installation above grade. A480 and A482 are for flush installation into deck or submerged in the pool floor or wall. Maximum submersion is 2 ft / 60 cm.

UL Listed UL #E96980

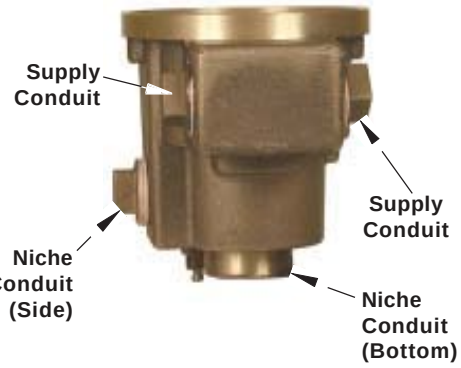
PEM A483 - 16-3
For 3-16 AWG
STWA / SOW Cable
Strain Relief
Assembly

PEM A483 - 12-3
For 3-12 AWG
STWA / SOW Cable
Strain Relief
Assembly

PEM A483 - 10-3
For 3-10 AWG
STWA / SOW Cable
Strain Relief
Assembly

Upper Chamber

Lower Chamber



Internal volume of wiring chamber: 24.10 Cubic inches, (395 cm3)

PEM A483 Submersible Deck Boxes are designed to provide a safe electrical power supply and its grounding to a submersible lightfixture and wet niche when properly installed. This deck box permits the use of non metallic electrical conduit with internal, in conduit bonding (grounding) of a fixture wet niche ground to the junction box in addition to the internal in cable fixture grounding of supply and light fixture. The junction box has one 1" conduit NPT connections in the bottom and the side to connect a non metallic conduit to a wet niche fixture that contains STWA / SOW fixture cable and a #6 to #8 AWG size stranded bare copper ground wire.
This deckbox provides separate chambers for the connection of the wet niche ground wire (within the flooded lower chamber conduit compartment) and for the electrical cable to the power supply in the dry sealed watertight upper compartment.
The supply conduit to this deckbox shall be self-draining in a visible location. 2 x 1" NPT supply conduit connections on opposite sides are provided for through wiring of supply. The threaded 1" NPT connections must be made watertight with suitable thread sealant . Potting compounds in upper chamber must be of the approved non shrinking and completely removable type. In freezing climates the niche, the conduit from the niche and the lower part of the PEM A483 Deckbox must be drained or freeze protected. The installation of this deck box must conform to all electrical codes applicable. A torque socket wrench set for for 30 Lbs Inch (3.3NM) is mandatory for installation of deck box.

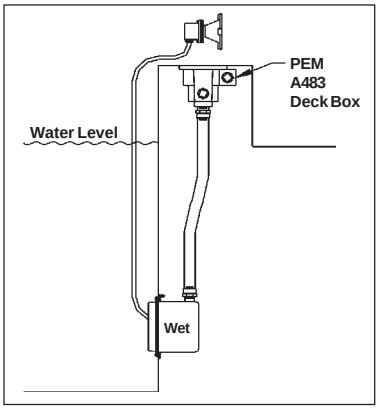
PEM A 483 DECK BOX

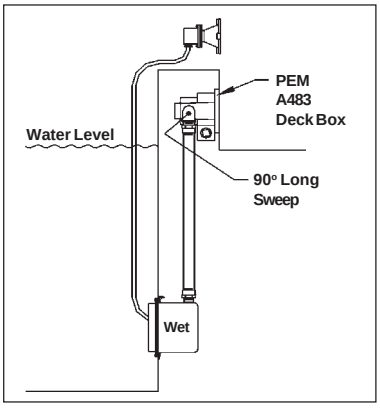
Size of supply conduit connections (2): 1" NPT
Size of niche conduit connections (2) : 1" NPT
2 x 1" NPT threaded bronze plugs are provided with Deck Box to close unused openings.
To connect smaller size conduit use NPT threaded reducer bushing(s).

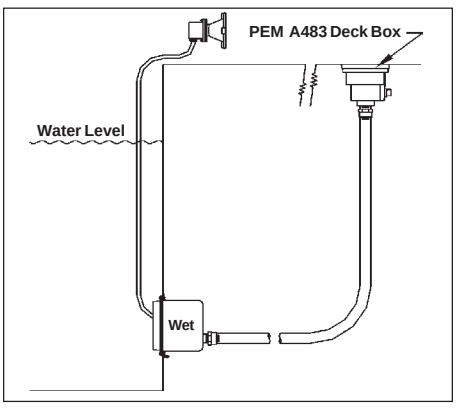
TYPES OF PEM A 483 U.L. DECK BOXES

PEM A483 - 3-16 AWG, #376-2001
For 16/3 STWA or SOW cable (9 / 11 mm OD.)
PEM A483 - 3-12 AWG, #376-2012
For 12/3 STWA or SOW cable (12.7 / 15.9 mm O.D)
PEM A483 - 3-10 AWG, #376-2023
For 10/3 STWA or SOW cable (15.9 / 19 mm O.D)

APPLICATION SUGGESTIONS:



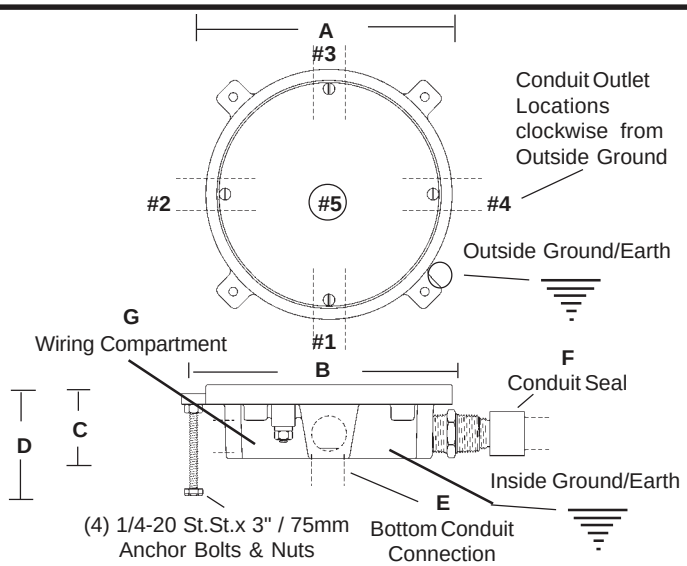




PEM A460-1 & A460-2

376-3100 SERIES
376-3120 SERIES

A460-1 Submersible Junction Box
with leg bolts for height elevation / anchoring adjustments



PEM A 460-1 JUNCTION BOX

DIMENSIONS

A	Outside Diameter of Junction Box	170 mm / 6.70"
B	C. x C. Diameter of 4 Leg Bolts	187 mm / 7.36 "
C	Height from Bottom of Box to Top of Box:	51mm / 2.00"
D	Height,Top of Box: Adjustable with bolts above base surface:	
E	Bottom Conduit Connection: 3/4" NPT	
F	Side Conduit Connection: 3/4" NPT x 1/2" NPT	
G	Wiring Compartment Cubic Volume: 375 cm3 / 22.9 Cubic Inches	

PEM A 460-2 JUNCTION BOX

DIMENSIONS

A	Outside Diameter of Junction Box	170 mm / 6.70"
B	C. x C. Diameter of 4 Leg Bolts	187 mm / 7.36 "
C	Height from Bottom of Box to Top of Box:	60mm / 2.362"
D	Height,Top of Box: Adjustable above base surface.	
E	Bottom Conduit Connection: 1" NPT	
F	Side Conduit Connection: 1" NPT x 3/4" NPT	
G	Wiring Compartment Cubic Volume: 468 cm3 / 28.6 Cubic Inches	

SUBMERSIBLE JUNCTION BOXES FOR INTO POOL FLOOR INSTALLATION, TO CONNECT TO POWER SUPPLY PEM SUBMERSIBLE LIGHTFIXTURES WITH PEM B30-1 or B32-1 SHALLOW NICHE MOUNTING

PEM A 460-1 & A460-2 Junction Boxes are custom made for installation into the concrete floor finishing of fountain ponds above concrete base slabs, installed flush with the floor surface of the pond.

PEM A 460-1 & A460-2 Junction Boxes are made of cast bronze with stainless steel fasteners, Neoprene 'O'ring seal, include (4) 1/4-20 UNC x 3" - 75mm height adjustable Stainless Steel leg bolts / anchors with lock nuts for precise height elevation adjustment and/ or anchoring

PEM A 460-1 Junction Box is available as standard with 4 x maximum size 3/4" NPT side conduit connections and 1 x 3/4" NPT maximum size bottom conduit connection.

PEM A 460-1 Junction Box requires: **(4) PEM J13-5 Conduit Seals** to connect incoming 1/2" electrical Conduits from shallow niches with female NPT threaded PVC adapter .

Conduit number and size when other than standard, must be specified as to number,size & location (1/2" or 3/4").

Orders without Conduit Connection specifications will be supplied with maximum number of 5 x 3/4" NPT connection outlets.

Unused openings must be closed with brass (were approved) or stainless steel (NEMA) with NPT threaded plugs (supplied by others).

PEM A 460-2 Junction Box is available as standard with 4 x maximum size 1" NPT side conduit connections and 1 x 1" NPT maximum size bottom conduit connection.

PEM A 460-2 Junction Box requires: **(4) PEM J13-5 Conduit Seals** to connect incoming 3/4" electrical Conduits from shallow niches with female NPT threaded PVC adapter .

Conduit number and size when other than standard, must be specified as to number,size & location (1/2", 3/4" or 1").

Orders without Conduit Connection specifications will be supplied with maximum number of 5 x 1" NPT connection outlets.

Unused openings must be closed with brass (were approved) or stainless steel (NEMA) with NPT threaded plugs (supplied by others).

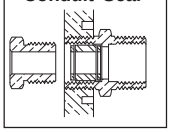
PEM A 460-1 & A460-2 Junction Boxes have 6 (six) internal ground (earth) connections, sufficient for each conduit connection plus one spare & 1 (one) external ground (earth) connection

PEM A460-1 & A460-2 Junction Boxes must be installed in conformance with all applicable electrical codes. For NEMA installations, the junction box cavity must be filled with a UL listed compound. All supply conduits into a pool must be self draining in a visible location outside of the pool. All threaded conduit connection(s) as well as all cordseals must be installed with water sealing thread sealant (Teflon Tape)

.

OPTIONAL : Conduit Seals (at extra cost)
PEM J13-5-0, # 378-0150, Brass
PEM J13-5-1, # 378-0151 Stainless Steel (NEMA)
3/4" x 1/2" NPT, conduit seal for 0.435" size cable in 1/2" (0.5") electrical conduit

PEM 13-5 Conduit Seal



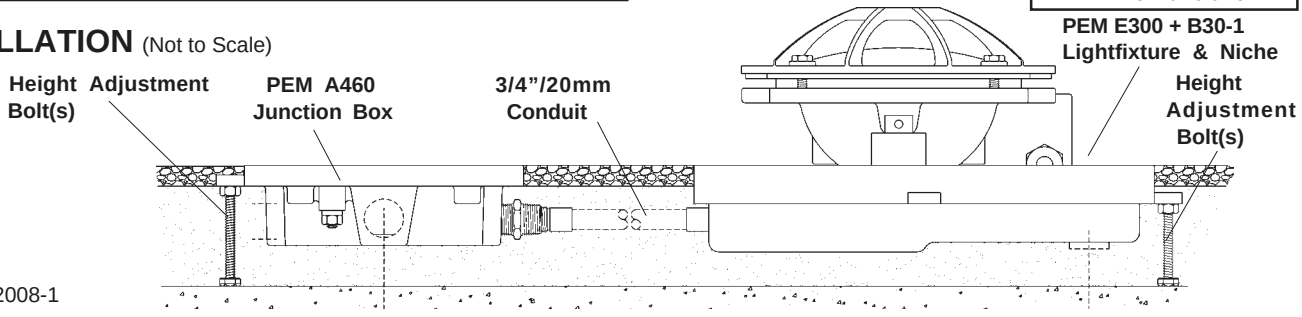
CONDUCTOR COUNT IN JUNCTION BOX (AS PER NEMA)

3 x. (+), (-) & Ground (Earth) for Supply
2 x (+), (-) For each Light Fixture.
(Ground (Earth) of Light fixtures is not counted as connected into box. For 4 light fixtures the total number of conductors to be accounted for = **11**.

NEMA Cubic Content Per conductor:		
#16 AWG =	1.75	in.3
#14 AWG =	2.0	in.3
#12 AWG =	2.25	in.3
#10 AWG =	2.5	in.3
# 8 AWG =	3.0	in.3
# 6 AWG =	5.0	in.3

in.3 = Cubic Inch
1 x in.3 = 6.45 cm3

INSTALLATION (Not to Scale)



FOR DETAILS OF LIGHTFIXTURES
See applicable PEM Lightfixtures

PEM
B30-1 & B32-1
SHALLOW NICHES

350-03200 SERIES

PEM B30-1 & B32-1 Custom Made Shallow Niches are designed to retain the connecting electr ical cable of the lightfixture beneath the same in order to prevent the unsightly (*for some*) mess of electrical cable and stubbed up junction boxes in the bottom of an ornamentally finished fountain pond but also to prevent possible injury and or damage to equipment by the exposed cable and junction boxes. Niches are normally supplied with brass conduit & drain connection. For NEMA - USA requirements, Stainless Steel connections are supplied at extra cost.

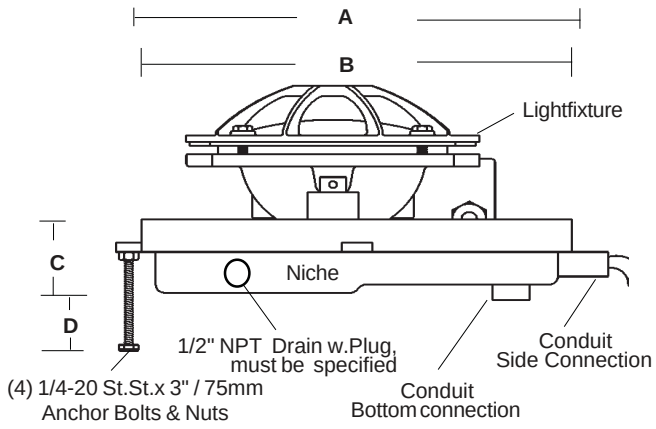
SHALLOW NICHES PEM B 30-1 & B32-1 CONSTRUCTION
Cast bronze with Epoxy joined Molded Kydex 100 Niche, Brass or Stainless Steel (NEMA) connections , including: PEM 13 Series Conduit seal, (4) 1/4"-20 UNC x 3" / 76mm Stainless Steel Bolts w. Locknuts for legs and/or anchors and precise elevation adjustment prior to pouring of concrete (Surplus length of Stainless Steel leg bolts to be cut off flush at top surface of niche bracket after adjustment)

LIGHTFIXTURE LOCKABLE DIRECTIONAL ADJUSTMENT ON NICHE:
After Installation, the lightfixture can be tilted up to a limited angular position, depending on fixture and exposed cable in niche. Lightfixture can also be rotated horizontally by appr. 45° after installation and locked into position.

OPTIONAL, EXTRA & ADDITIONAL:

NICHE DRAIN, side mounted, only supplied when specified with order!
Requires self draining tube system connection to 1/2" NPT/ BSP (specify) at niche! Drain tubing must be heat traced for outdoor ponds in freezing climates to prevent water freeze up in niches & drains with consequent possible structural damages.

CONDUIT & DRAIN CONNECTION, 304 Stainless Steel (NEMA,USA requirement.



PEM B 30-1 SHALLOW NICHE

DIMENSIONS

A	Outside Diameter of Niche	273mm /	10.750"
B	C. x C. Diameter of 4 Leg Bolts	288mm /	11.375"
C	Height, Bottom to Top of Niche :	51mm /	2.000"

D Height,Top of Niche : Adjustable with bolts above base surface:
For PEM Standard Yoke Mountable Lightfixtures with
Fixture Cable Outside Diameter of maximum 0.435" / 11 mm
Conduit Connection, Side or Bottom = 1/2" NPT (Female)
Drain Connection at side of niche, 1/2" NPT (female) with 3/8"NPT Plug
To conduit connect to: PEM A 460-1 Junction Box

PEM B 32-1 SHALLOW NICHE

DIMENSIONS

A	Outside Diameter of Niche	273mm /	10.750"
B	C. x C. Diameter of 4 Leg Bolts	288mm /	11.375"
C	Height, Bottom to Top of Niche :	60mm /	2.362"

D Height,Top of Niche : Adjustable with bolts above base surface:
For PEM Standard Yoke Mountable Lightfixtures with
Fixture Cable Outside Diameter maximum 0.625" / 15.9mm
Conduit Connection, Side or Bottom = 3/4" NPT(male)
Drain Connection at side of niche, 1/2" NPT (female) with 3/8"NPT Plug
To conduit connect to: PEM A 460-2 Junction Box

FOR DIMENSIONAL DETAIL DRAWINGS OF THE VARIOUS CUSTOM MADE NICHE AND LIGHTFIXTURE COMBINATIONS:
Contact supplier and request quotation stating:
Quantity, Model of Lightfixture, Voltage, Cable Type & Length

PEM E B30-1 + E300F w. 16/3 AWG Cable

PEM E B30-1 + E500 w. 16/3 AWG Cable

PEM B32-1 + C 133-1 w. 10/3 AWG Cable

PEM B32-1 + C 133-6 w. 16/9 AWG Cable

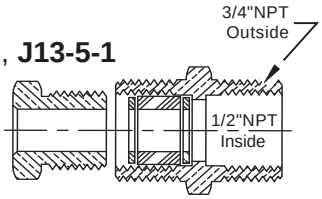
PEM SUBMERSIBLE ELECTRICAL CORDSEALS

An epoxy type, non releasing thread sealant is recommended for all cordseal NPT threads.

PEM J Series Cordseals are made of brass or 304 Stainless Steel and fitted with Neoprene glands.
All Cordseals can be supplied at extra cost in 316 Stainless Steel for use in seawater / saltwater.
Stainless Steel Cordseals are mandatory for USA. Be aware of grounding regulations for Wet Niches in USA.
Electrical cable must be lubricated for slipping through cordseal gland.

J13-5 Conduit Cordseal for 10mm Cable

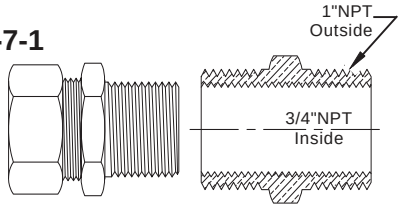
In Brass #378-0150, **J13-5-0**
In 304 Stainless Steel #378-0151, **J13-5-1**



Combination Seal for sealing of brass or copper conduit entries carrying 16/3, 12/2 or 3 x 1.5mm size niche cable into junction or deck boxes with an internal (in box) compression seal. Available in 1/2" female or 3/4" male NPT threads on both sides. Will fit 3/4" NPT tappings of junction box or niche.
For 3/4" unsealed plastic conduit use brass coupling to connect but remove cordseal parts to permit passage of ground wire.
For 3/4" sealed plastic conduit see PEM 13-8.

J13-7 Conduit Cordseal for 17mm Cable

In Brass #378-0170, **J13-7-0**
In 304 Stainless Steel #378-0171, **J13-7-1**



Combination Seal for sealing of brass or copper conduit entries carrying niche cable into junction or deck boxes with internal (in box) compression seal. Available in 3/4" female or 1" male NPT threads on both sides.
Tappings into junction box are 1". For 1" unsealed plastic conduit use brass coupling to connect removed cordseal parts (E500-LV / UL and CSA-12V max. 300W).
Assembly includes PEM J15-42 Cordseal.

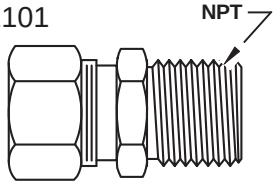
J13-8 Conduit Cordseal for 10mm Cable with additional #8 AWG insulated or bare ground wire.

In Brass #378-0210
In 304 Stainless Steel #378-0211

Combination Seal for the sealing with an internal (in box) compression seal of 3/4" plastic conduits into junction or deck boxes carrying 16/3 AWG cable to niches with required additional #8 AWG size solid bare or insulated ground wire.
Conduit Cordseal has 9/8"-18TPI connection.
Used in boxes A480 / max. 4 x A482 / max.1 x J34 / max. 8 x and J35 / max. 8x.
Also used in all corresponding niches to seal conduit / cable entries.

J14 UL & CSA listed Cordseal for 10mm Cable

In Brass #378-1100
In 304 Stainless Steel #378-1101



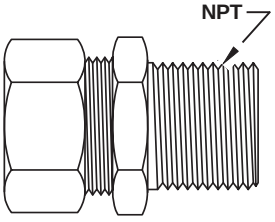
PEM J14 Cordseals are used to connect most PEM submersible lightfixtures with 16/3, 12/2 and 3 x 1.5mm cable to junction boxes or cable lead-outs.

PEM	#	Cable O.D.in.	Cable O.D.mm	NPT
J14	378-1100	0.350" / 0.435"	9 to 11mm	1/2"

J15 Cordseals for various Cable Sizes

In Brass #378-2000
In 304 Stainless Steel #378-3000

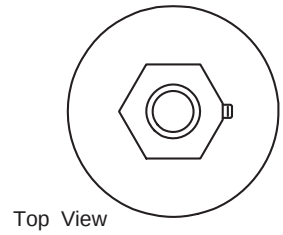
J15-32



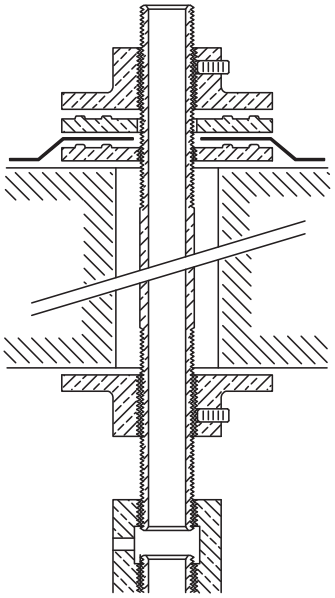
PEM	#	Cable O.D. in.	Cable O.D.mm.	NPT	MATERIAL
J15-21*	378-2210	0.394" / 0.470"	10.0 / 12.0mm	1/2"	Brass
	378-3210	"	"	"	St.St.
J15-32	378-2320	0.500" / 0.625"	12.7 / 15.9mm	3/4"	Brass
	378-3320	"	"	"	St.St.
J15-42**	378-2420	0.625" / 0.750"	15.9 / 19.0mm	3/4"	Brass
	378-3420	"	"	"	St.St.
J15-52	378-2520	0.750" / 0.875"	19.0 / 22.23mm	1"	Brass
	378-3520	"	"	"	St.St.
J15-62	378-2620	0.875" / 0.995"	22.23 / 25.3mm	1 1/2"	Brass
	378-3620	"	"	"	St.St.
J15-64	378-2640	1.000" / 1.187"	25.4 / 30.0mm	1 1/2"	Brass
	378-3640	"	"	"	St.St.
J15-72	378-2720	1.125" / 1.375"	28.6 / 35.0mm	2"	Brass
	378-3720	"	"	"	St.St.

Exact Cable Outside Diameter must be stated when ordering J15 Cordseals.
* = Normally for 3 x 2.5mm H0R7N-F cable ** = Normally for PEM E500A-LV with 10/3 cable.

For custom made CORD SEAL sizes or configurations not shown, please enquire with specifications.



Top View



WATERPROOFING PIPE PENETRATIONS

PEM 6370

611-1300 SERIES

3/4" & 1" RETROFIT

RETROFIT PIPE PENETRATIONS, 3/4" & 1" NPT/BSP RED BRASS PIPE.

BRONZE FITTINGS with red brass pipe, for core drilled holes in existing concrete slabs.

PEM 6370A & B can be used as electrical conduit or water pipe penetration through water proofing membranes. Care is to be taken to use a suitable pipe thread sealant on the submerged liner side.

Overall Lengths other than shown above can be custom made to given specification. Overall outside diameter of fittings: 102mm \ 4.0".

Fittings are NPS/BSP threaded. Connections are NPT/BSP.

PEM 6372A

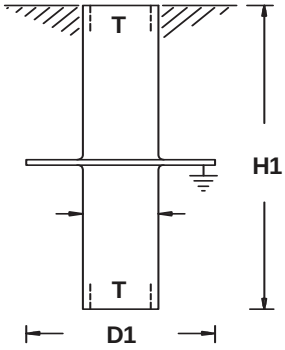
#	PEM	Pipe Size	Hole Size	Overall Length
611-1301	**6371**	3/4"	30mm\1.25"	Fittings only
611-1303	**6371A**	3/4"	30mm\1.25"	355mm\14"
611-1306	**6371B**	3/4"	30mm\1.25"	457mm\18"
611-1322	**6372**	1"	40mm\1.50"	Fittings only
611-1324	**6372A**	1"	40mm\1.50"	355mm\14"
611-1326	**6372B**	1"	40mm\1.50"	457mm\18"

ALL CAST BRONZE NO LEAK PIPE COUPLINGS FOR CONCRETE POOLS

PEM 63730

611-1330 SERIES

PEM 6373 Series No Leak Pipe Couplings are made of pressure tested cast bronze.



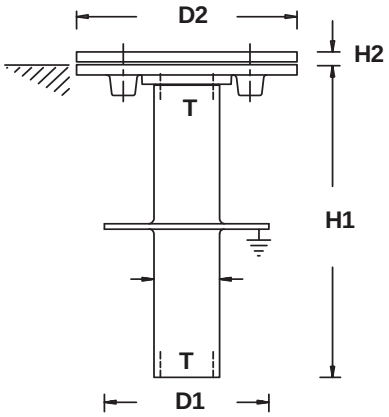
#	PEM	T	H1 mm	D1 mm
611-1331	**637311**	**1"**	200	100
611-1332	**637312**	**1 1/2"**	200	100
611-1333	**637313**	**2"**	200	150
611-1334	**637314**	**2 1/2"**	200	150
611-1335	**637315**	**3"**	200	200
611-1336	**637316**	**4"**	200	200

ALL CAST BRONZE NO LEAK PIPE COUPLINGS FOR LINER POOLS

PEM 63740

611-1340 SERIES

PEM 6374 series No Leak Pipe Couplings with liner clamp are made of pressure tested cast bronze, stainless steel fitted, with Neoprene Gasket



#	PEM	T	H1 mm	H2 mm	D1 mm	D2 mm
611-1341	**637421**	**1"**	200	6	100	134
611-1342	**637422**	**1 1/2"**	200	10	100	152
611-1343	**637423**	**2"**	200	10	150	152
611-1344	**637424**	**2 1/2"**	200	10	150	203
611-1345	**637425**	**3"**	200	10	200	203
611-1346	**637426**	**4"**	200	10	200	203

PEM 6380 SERIES

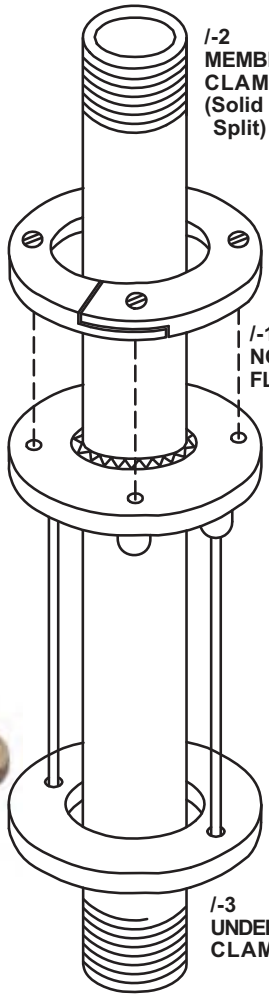
WATERPROOFING PENETRATION FITTINGS for BRASS PIPE 3/4" TO 4"

6380-A Series, STUB UPS include 355mm \ 14" length of pipe with specified fitting or combination thereof or custom made length as specified. Normally used to extend plastic pipe through concrete and into pool

Also available custom made as 6390-A Series, STUB UPS with 355mm\14" length of copper tube 'L', with specified fitting or combination thereof or custom made as specified. Normally used to extend plastic pipe through concrete and into pool. Available copper tube sizes up to 4.125"

PEM 6384A-1

PEM 6387A-1-2
with custom length pipe



NO LEAK FLANGES (BRAZE ON)(NO PIPE)

#	PEM	Pipe Size	O.D. of Flange	Thickness of Flange
611-1401	**6381/-1**	3/4"	102mm\4.00"	6mm\0.25"
611-1402	**6382/-1**	1"	134mm\5.25"	6mm\0.25"
611-1403	**6383/-1**	1 1/4"	134mm\5.25"	6mm\0.25"
611-1404	**6384/-1**	1 1/2"	152mm\6.00"	7mm\0.28"
611-1405	**6385/-1**	2"	152mm\6.00"	7mm\0.28"
611-1406	**6386/-1**	3"	203mm\8.00"	8mm\0.32"
611-1407	**6387/-1**	4"	203mm\8.00"	8mm\0.32"

FLANGES w. MEMBRANE CLAMP(NO PIPE)

#	PEM	Pipe Size	Type of clamp
611-1421	**6381/-1/-2**	3/4"	Solid
611-1422	**6382/-1/-2**	1"	Solid
611-1423	**6383/-1/-2**	1 1/4"	Solid
611-1424	**6384/-1/-2**	1 1/2"	Split
611-1425	**6385/-1/-2**	2"	Split
611-1426	**6386/-1/-2**	3"	Split
611-1427	**6387/-1/-2**	4"	Split

FLANGES w. UNDERDECK CLAMP(NO PIPE)

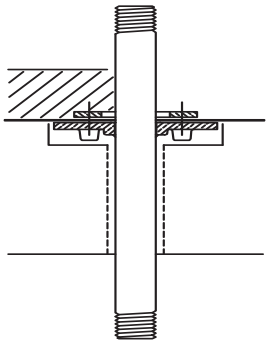
#	PEM	Pipe Size	Hole Size
611-1441	**6381/-1/-3**	3/4"	65mm\2.5"
611-1442	**6382/-1/-3**	1"	100mm\2.5"
611-1443	**6383/-1/-3**	1 1/4"	100mm\4.0"
611-1444	**6384/-1/-3**	1 1/2"	120mm\4.5"
611-1445	**6385/-1/-3**	2"	120mm\4.5"
611-1446	**6386/-1/-3**	3"	160mm\6.5"
611-1447	**6387/-1/-3**	4"	160mm\6.5"

FLANGES w. MEMBRANE CLAMP & UNDERDECK CLAMP

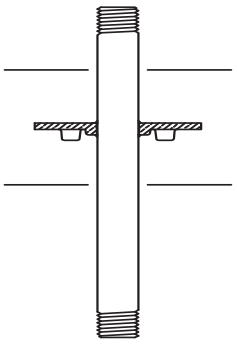
#	PEM	Pipe Size	Hole Size
611-1461	**6381/-1/-2/-3**	3/4"	65mm\2.5"
611-1462	**6382/-1/-2/-3**	1"	100mm\2/5"
611-1463	**6383/-1/-2/-3**	1 1/4"	100mm\4.0"
611-1464	**6384/-1/-2/-3**	1 1/2"	120mm\4.5"
611-1465	**6385/-1/-2/-3**	2"	120mm\4.5"
611-1466	**6386/-1/-2/-3**	3"	160mm\6.5"
611-1467	**6387/-1/-2/-3**	4"	160mm\6.5"

NOTE: Braze on brass pipe size fittings are used to provide watertight penetration of waterproofing membranes without joints within concrete. Fittings are made of cast bronze , stainless steel and brass fitted. Flanges are normally braze fit , flanges are also useable for braze on to stainless steel piping (specify exact O.D. of pipe).

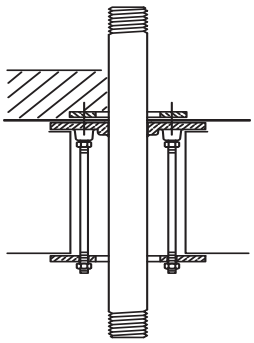
6380A/-1/-2
FLANGE w. MEMBRANE CLAMP



6380A/-1
NO LEAK FLANGE
Braze fit.



6380A/-1/-2/-3
FLANGE w. MEMBRANE CLAMP & UNDERDECK CLAMP



/-3 UNDER DECK CLAMP is standard for max. 200mm\8" deck, custom made for other dimensions.)

*NOTE: WHEN ORDERED WITHOUTETTER "A" NO PIPE WILL BE SUPPLIED

RED BRASS CONDUIT STUB UPS FOR SUBMERSIBLE JUNCTION BOXES

PEM J60

PEM J60 Series Stub Ups are made from red brass, schedule 40 pipe, a cast bronze base brazed to a conduit, cast bronze, brass and stainless steel fitted ground connection. Membrane Clamp base has blind threaded openings for clamp bolts.

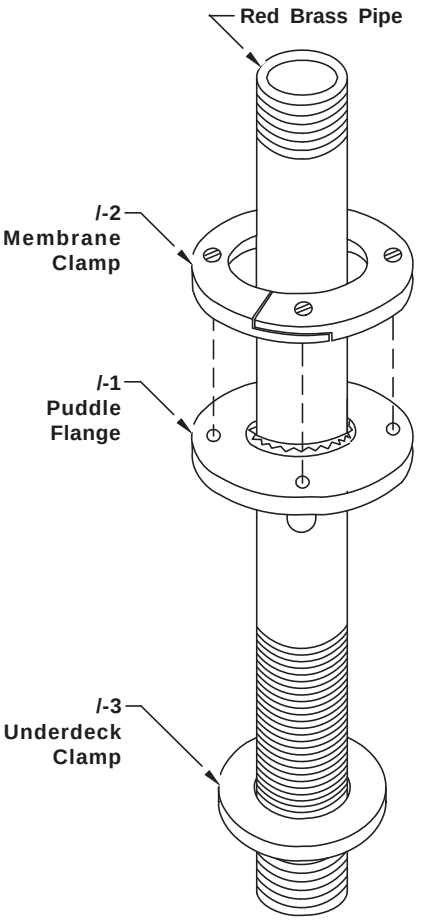
For waterproofing membrane puddle flanges and flanges with clamps but without brass pipe see PEM 6380 Series Fittings

For copper tube waterproofing fittings see PEM 6390 Series Fittings.

For custom made stub ups specify all dimensions applicable .

Also available - Custom made with double membrane clamp.

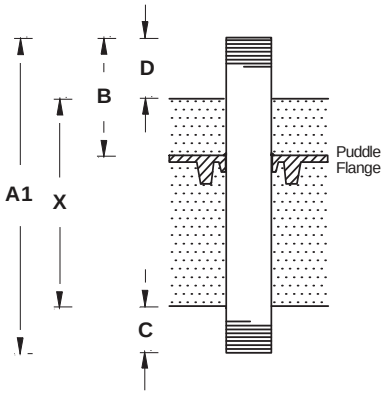
Obtain quotation for custom made stub ups before placing an order.



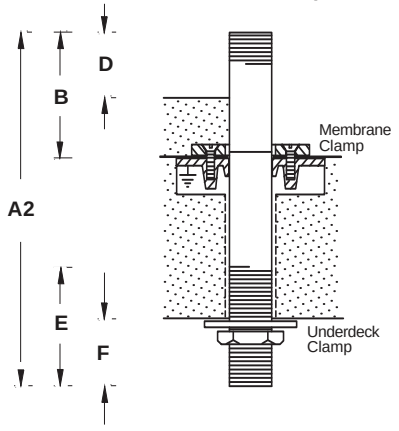
STUB UP WITH PUDDLE FLANGE (/-1)

DIMENSIONS

		mm	inches
A1	/-1 Overall Height	304	12.000"
A1	/-2 Overall Height	304	12.000"
A2	/-3 Overall Height	356	14.000"
B	Top to Flange	102	4.000"
C	/-1 NPT Stub Down	38	1.500"
D	NPT Stub Up	51	2.000"
E	/-3 Thread - NPS	102	4.000"
F	/-3 NPS Stub Down	51	2.000"
X	Concrete Slab	203	8.000"



STUB UP WITH MEMBRANE CLAMP & UNDERDECK CLAMP (/-1/-2/-3)



PEM CATALOG	#	SIZE OF CONDUIT	O.D.	PUDDLE FLANGE	MEMBRANE CLAMP	UNDER DECK CLAMP
J60/-1	381-1010	1/2"	102mm / 4.00"	X		
J60/-1/-3	381-1020	1/2"	102mm / 4.00"	X		X
J60/-1/-2	381-1030	1/2"	102mm / 4.00"		X	
J60/-1/-2/-3	381-1040	1/2"	102mm / 4.00"		X	X
J61/-1	381-1110	3/4"	102mm / 4.00"	X		
J61/-1/-3	381-1120	3/4"	102mm / 4.00"	X		X
J61/-1/-2	381-1130	3/4"	102mm / 4.00"	X		
J61/1/-2/-3	381-1140	3/4"	102mm / 4.00"		X	X
J62/-1	381-1210	1"	134mm / 5.25"	X		
J62/-1/-3	381-1220	1"	134mm / 5.25"	X		X
J62/-1/-2	381-1230	1"	134mm / 5.25"		X	
J62/-1/-2/-3	381-1240	1"	134mm / 5.25"		X	X
J63/-1	381-1310	1 1/4"	134mm / 5.25"	X		
J63/-1/-3	381-1320	1 1/4"	134mm / 5.25"	X		X
J63/-1/-2	381-1330	1 1/4"	134mm / 5.25"		X	
J63/-1/-2/-3	381-1340	1 1/4"	134mm / 5.25"		X	X
J64/-1	381-1410	1 1/2"	152mm / 6.00"	X		
J64/-1/-3	381-1420	1 1/2"	152mm / 6.00"	X		X
J64/-1/-2	381-1430	1 1/2"	152mm / 6.00"		X	
J64/-1/-2/-3	381-1440	1 1/2"	152mm / 6.00"		X	X
J65/-1	381-1510	2"	152mm / 6.00"			
J65/-1/-3	381-1520	2"	152mm / 6.00"	X		X
J65/-1/-2	381-1530	2"	152mm / 6.00"		X	
J65/-1/-2/-3	381-1540	2"	152mm / 6.00"		X	X

In North America INCH Sizes are normally TRADE SIZES

PEM
CONTROLS
2013-8
INDEX-10
400 SECTION

SUPERSEDES
2008-1

PEM L101-51

WATER MAKE UP AND/OR LOW LEVEL SAFETY SHUT OFF CONTROLS FOR FOUNTAIN PONDS

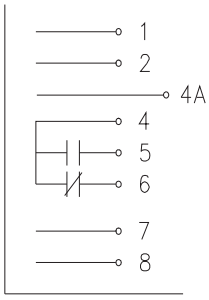
SINGLE LEVEL CONTROL PANEL

#441-1100 (120V - 60 C.)
#441-1200 (240V - 50 Hz.)

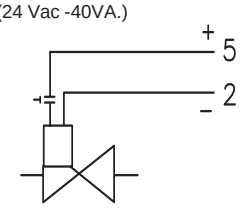
PEM L 101 - 51 CONTROL PANEL , when connected to a suitable PEM L 101 Series Single Sensor will provide a single stage waterlevel control system. This control panel will operate an automatic water make up solenoid fill valve to maintain a constant operational waterlevel within a 6.35mm - 0.250" differential in a fountain pond or could be used as a low level safety shut off switch for the electrical equipment in a fountain pond, should the waterlevel drop below safe operating level. Sensor float switch operates with 12 VAC. A 24 VAC - 50 VA safety power supply is included for the direct operation of a 24 V solenoid fill valve in the water make up circuit. The wall mounted control panel is within a NEMA Type 4 Corrosion resistant polycarbonate enclosure. Wiring to sensor requires 2 unshielded conductors.

TERMINALS & FUNCTIONS

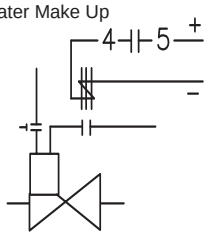
1 Sensor IN , 12 VAC
2 Sensor , OUT , 12 VAC
(Also common for 24VAC Valve circuit)
4 Common for controlled circuit.
Switch Rating :
Max.240 V. - 3 A. non inductive
(For 24 V,40VA Valve circuit - connect conductor 4A to Terminal 4) .
5 N.O. controlled circuit OUT
6 N.C. controlled circuit OUT
7,8 Power Supply
PEM # 441-1100 = 120V.,60Hz,3A.
PEM # 441-1200 = 240V.,50Hz,2A.



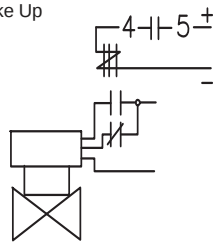
L 101 - 51 & 71, Direct connection for 24 VAC Solenoid Fill Valve, connecting conductor 4A to terminal 4 (24 Vac -40VA.)



L 101 - 51 & 71, Indirect Solenoid Valve Connection for Water Make Up



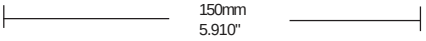
L 101 -51 & 71, Indirect Motorized Valve Connection for Water Make Up

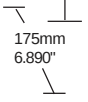


PEM L101- 71

DUAL LEVEL CONTROL PANEL

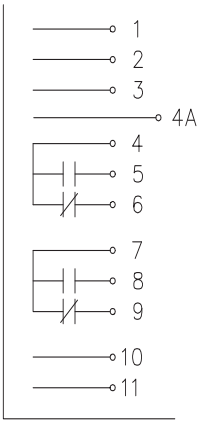
#443-3100 (120V - 60 C.)
#443-3200 (240V - 50Hz.)



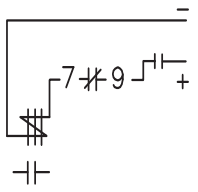


PEM L 101 - 71 CONTROL PANEL , when connected to a suitable PEM L 101 Series Dual Sensor will provide a dual stage waterlevel control system. This control panel will operate an automatic water make up solenoid fill valve to maintain a constant operational waterlevel within a 6mm - 0.250" differential in a fountain pond and in addition it has a low level safety shut off switch for the electrical equipment in a fountain pond, should the waterlevel drop below safe operating level. Sensor float switches (2) operate with 12 VAC. A 24V-50VA safety power supply is included for the direct operation of a 24 V solenoid fill valve in the water make up circuit. The wall mounted control panel is within a NEMA Type 4 Corrosion resistant polycarbonate enclosure. Wiring to sensor requires 3 unshielded conductors.

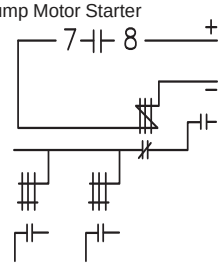
1 Lower Sensor IN, 12 VAC
(Low Level Safety Shut Off Sensor)
2 Sensors Common, 12 VAC
(Also common for 24 VAC Valve circuit)
3 Upper Sensor IN, 12 VAC
(Water Make up Sensor}
4 Common for Water Make Up circuit, IN
Switch Rating: (Dry switch)
Max.240 V - 3 A. , non inductive
(For 24 V, 40VA Valve circuit - connect conductor 4A to Terminal 4)
5 N.O. Water Make Up Circuit OUT
Connect 24 VAC fill valve to terminals 2 & 5
6 N.C. Water Make Up Circuit OUT
7 IN, Common for Low Level Safety Shut Off
Switch Rating: (Dry switch)
Max. 240 V - 3 A., non inductive
8 N.O. Safety Shut Off Circuit OUT
9 N.C. Safety Shut Off Circuit OUT
10 & 11 Power Supply
PEM # 443-3100 = 120 V, 60 Hz, 3A.
PEM # 443-3200 = 240 V, 50 Hz, 2A.



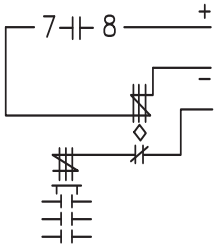
L101 - 71
Low Water Safety Shut Off for Illumination Contactor or Pump Starter



L101 - 71
Low Water Safety Shut Off for Illumination Contactor & small size Pump Motor Starter



L 101 - 71
Low Water Safety Shut Off with Time Delay Relay for larger size Pump Starters



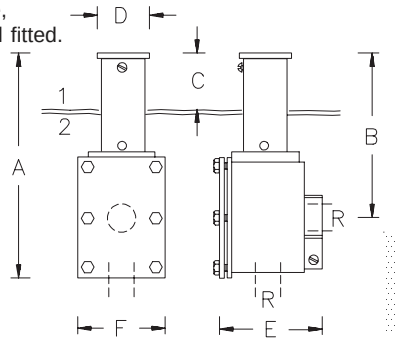
WATER MAKE UP & LOW LEVEL SAFETY SHUT OFF CONTROLS

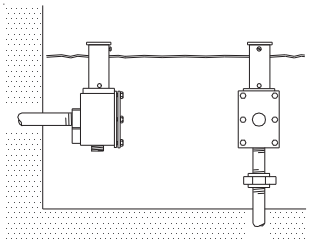
CONDUIT MOUNTED SINGLE SENSOR — PEM L101 - 01

#444-1010

CONSTRUCTION:
PEM L 101 - 01 is made of cast bronze, brass and copper and is stainless steel fitted.

DESCRIPTION: PEM L101 - 01 single float switch sensor operates on a 6mm/0.250" waterlevel differential. This sensor when connected to a PEM L 101 - 51 control panel will operate a solenoid fill-valve for water make up or when installed at a lower level can be used as safety shut off for electrical equipment in a fountain pond.
When two sensors are used, they are connected to a PEM L101-71 Control Panel, allowing for unlimited water make up or water make up and safety shut off.
As the sensor is not height adjustable, great care must be taken to install it to the final waterlevel elevation.
For U.L. listed controls,see PEM L 104.





ELECTRICAL RATINGS:
12 Vac., 20 VA Non Inductiv
Float switch is either N.C. or
N.O. by up-ending its float.

DIMENSIONS :

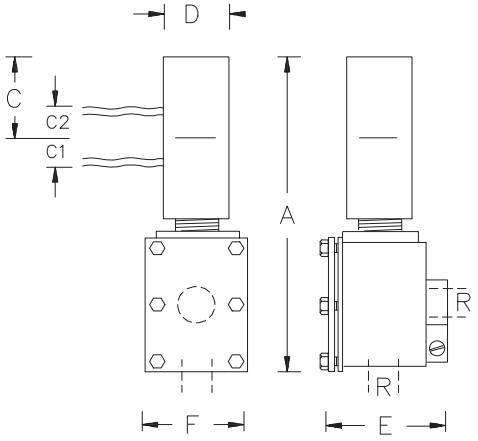
A	195mm	- 7.680"
B	140mm	- 5.500"
C	51mm	- 2.000"
D	54mm	- 2.125"
E	86mm	- 3.375"
F	83mm	- 3.250"
R	3/4" NPT	-BSP

CONDUIT MOUNT ADJUSTABLE SINGLE SENSOR — PEM L101 - 05

#444-2010

CONSTRUCTION:
PEM L 101 - 05 is made of cast bronze, brass and copper and is stainless steel fitted.

DESCRIPTION: PEM L101 - 05 single float switch sensor operates on a 6.35mm / 0.250" waterlevel differential. This sensor when connected to a PEM L101- 51 control panel will operate a solenoid fill valve for water make up or when installed at a lower level can be used as safety shut off for electrical equipment in a fountain pond.
When two sensors are used, they are connected to a PEM L101- 71 Control Panel, allowing for unlimited water make up or adjustable water make up & safety shut-off. The sensor is height adjustable by a total of 51mm - 2.0". Height adjustment, after pond is filled, by removal of sensor cover and sliding float switch mounted on brass stem up or down to suit. A locking collar preserves the adjustment.
For U.L. listed level controls, see PEM L104



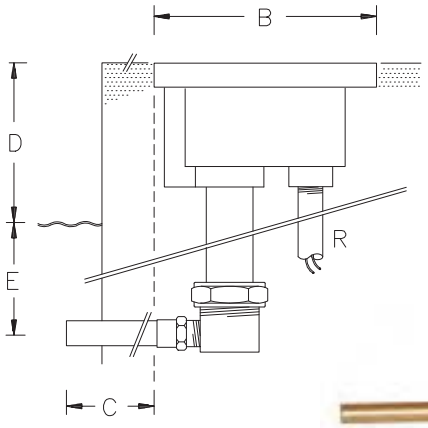
A	270mm	- 10.630"	**D**	51mm	- 2.000"
B	214mm	- 8.430"	**E**	86mm	- 3.375"
C	70mm	- 2.750"	**F**	83mm	- 3.250"
C1 *	25mm	- 1.000"	**R**	3/4" NPT	- BSP
C2 *	25mm	- 1.000"	* = Adjustment Range		

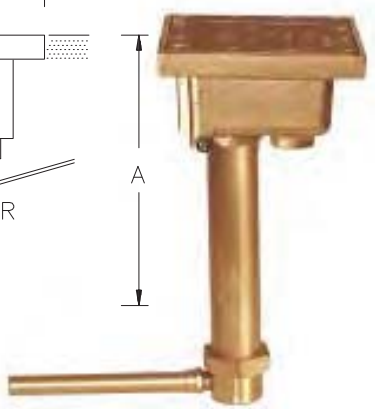
ELECTRICAL RATINGS :
12 Vac., 20 VA Non Inductive
Float switch is either N.C. or N.O. by up-ending its float.

WALL MOUNTED SINGLE SENSOR, TOP ACCESS — PEM L101 - 12

#444-3010

PEM L101-12 single float switch sensor (used by itself), operates on a 6mm/0.25" waterlevel differential. This sensor when connected to a PEM L101 - 51 control panel will operate a solenoid fill valve for water make up or when installed at a lower level can be used as safety shut off for electrical equipment in a fountain pond. When two sensors are used, they are connected to a PEM L101-71 Control Panel, allowing for unlimited water make up or water make up & safety shut off.
The sensor assembly is cast into a concrete wall or placed anywhere near the pond at the proper elevation (into a flowerbed), connected to the pond by a fill tube. Incorporated into the assembly housing is a vent to prevent air lock. The sensor float switch is suspended by a brass tube, allowing an adjustment of appr. 38mm - 1.5", however the brass tube can be shortened or replaced by a longer one to achieve the desired waterlevel elevation. PEM L101-12 is made of cast bronze, brass and copper, stainless steel fitted. PEM L101-12 Sensor assembly is extremely vandal resistant. For waterproofing the fill tube use **PEM 6390** surface flange or membrane clamp.





FOR INSTALLATION, THE VENT HOLES IN COVER MUST BE TAPED OVER !
This sensor can also be supplied at no additional costs with a vent tube into freeboard of pool to same length as 'C'. Specify : ..WITH VENT TUBE.

ELECTRICAL RATINGS: 12 Vac., 20 VA, Non Inductive
Float switch is either N.C. or N.O. by up-ending its float.

*** Can be customized at extra costs to given dimension specifications.**

DIMENSIONS :

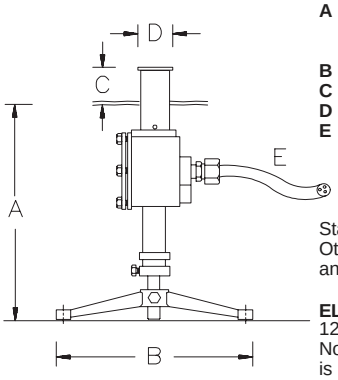
A	Standard *	305mm /12.000"	**D**	Standard *	230mm / 9.000"
	Minimum	150mm / 6.000"		Minimum	140mm / 5.500"
	Maximum	None		No Maximum, to fit into 'D' + 'E'	
B	Square Top	156mm / 6.125"	**E**	Minimum	76mm / 3.000"
C	Standard *	150mm / 6.000"	**R**	1/2" NPT / BSP	

For U.L. listed level controls,see PEM L 104 Series.

PEM L101-16

WATER MAKE UP & LOW LEVEL SAFETY SHUT OFF CONTROLS FREE STANDING SINGLE SENSOR

#444-4010



DIMENSIONS :

A 305/406mm-12"/16" Height Adjustable Stand
B 250mm - 10.000"
C 51mm - 2.000"
D 45mm - 1.750"
E Electrical Cable 16/3 STW or SOW

Standard Length: 2.7m/9ft. Other lengths optional and extra

ELECTRICAL RATINGS:
12 Vac., 20 VA , Non Inductive Float switch is either N.C. or N.O. by up-ending its Switch floats.

PEM L101-16 is made of cast bronze, brass and copper and is stainless steel fitted. **PEM L101 - 16** single float switch sensor (when used by itself), operates on a 6.35mm/ 0.250" waterlevel differential. This sensor, when connected to a **PEM L101 - 51** control panel, will operate a solenoid fill valve for water make up or when installed at a lower level can be used as safety shut off for electrical equipment in a fountain pond When two sensors are used, they are connected to a PEM L101-71 Control Panel, allowing for unlimited water make up or water make up & safety shut-off. Final waterlevel adjustment in a pool can be achieved when pond is filled by extending or contracting the sensor stand. In North America, the sensor must be fed through a separate conduit. Elsewhere, depending on codes, the sensor can be attached to a junction box, feeding underwater lights, or be supplied with long cable for outside of pool connection.
For U.L. listed water level controls, see PEM L104 Series.
For greater depths the sensor: **PEM L101-17** (**#444- 4110**) is custom made to given specifications. This sensor has a heavy duty, 300mm/ 12.0" tripod stand.

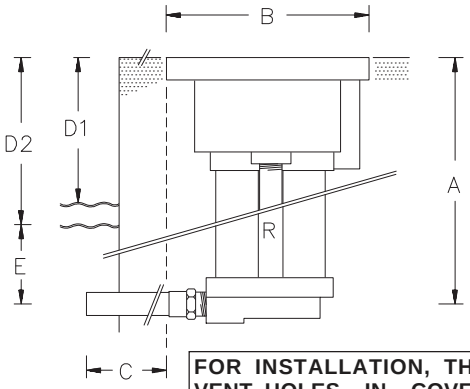
PEM L101-29

TOP ACCESS WALL MOUNTED DUAL SENSOR

#444-5020

*** Can be customized at extra costs to given dimension specifications.**

ELECTRICAL RATINGS :
12 Vac., 20 VA, Non Inductive Float switches are either N.C. or N.O. by up-ending the switch floats.



DIMENSIONS :

A Standard * 343mm/13.5"
Minimum 150mm/6.0"
Maximum None
B Square Top 156mm/6.125"
C Standard * 150mm/6.0"
D1 Water Make Up
Level Differential 6.35mm/0.250"
Standard * 230mm/9.0"
Minimum 140mm/5.5"
No Maximum, specify
D2 Safety Shut Off
Level Differential = 'D1'
Standard * 264mm/10.5"
Minimum 178mm/7.0"
No Maximum , specify
E Minimum 77mm/3.0"
R 1/2" NPT / BSP

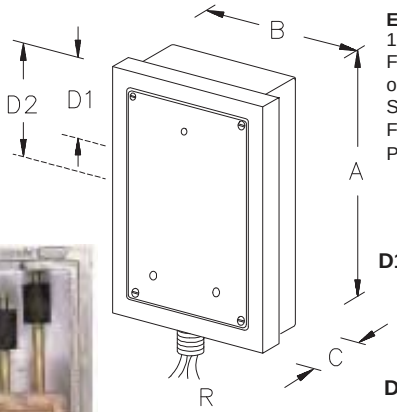
FOR INSTALLATION, THE VENT HOLES IN COVER MUST BE TAPED OVER !
This sensor can also be supplied at no additional costs with a vent tube into the free board of pool to same length as 'C'. Specify: ..**WITH VENT TUBE.**

PEM L101-29 is made of cast bronze, brass and copper and is stainless steel fitted. **PEM L101- 29** dual float switch sensor operates on a 6.35mm/0.250" waterlevel differential for water make up and on a 38mm / 1.500" differential (or as adjusted) for the low level safety shut off. This sensor when connected to a PEM L101 - 71 control panel will operate a solenoid fill valve for water make up and as safety shut off for electrical equipment in a fountain pond. The safety shut off circuit can also be used for pump up / pump down control or for a greater than 6mm / 0.250" level differential. The sensor assembly is cast into concrete or placed anywhere near the pool (into a flowerbed) with proper elevation, connected to the pool by a fill tube. Incorporated into the assembly housing is a vent to prevent air lock in the sensor housings. The sensor float switches are suspended by brass tubes, allowing sensor adjustments of appr. 38mm - 1.5", however the brass tubes can be shortened or replaced by longer ones to achieve the desired waterlevel adjustment. PEM L101 - 29 Sensor assembly is extremely vandal resistant. For fill tube waterproofing use PEM 6390 flange or membrane clamp. For U.L. listed level controls, see PEM L104 Series.

PEM L101-32

FRONT ACCESS WALL MOUNTED DUAL SENSOR

#444-6020



ELECTRICAL RATINGS :
12 Vac. ,20 VA , Non Inductive Float switches are either N.C. or N.O. by up-ending the .35.35 Switch Floats.
For U.L. listed level controls see: PEM L104 Series.

D1 Water Make Up
6.35mm/0.250" Differential Appr.(40-50mm/1.5"/2.0" Adjustment Range after installation)
D2 Safety Shut Off
Differential to D1 Appr.(50-76mm/2.0"-3.0" Adjustment Range after installation)
R 1" NPS / BSP

DIMENSIONS :

A 254mm / 10.000"
B 162mm / 6.375"
C 95.25mm / 3.75"

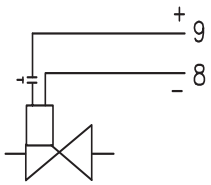
PEM L101 - 32 is made of cast bronze, brass and copper, stainless steel fitted with a Kydex or ABS forming niche. **PEM L101-32** dual float switch sensor operates on a 6mm / 0.250" waterlevel differential for water make up and on a 38mm/1.500" differential (or as adjusted) for the low level safety shut off. This sensor when connected to a **PEM L101 - 71 Control Panel** will operate a solenoid fill valve for water make up and as safety shut off for electrical equipment in a fountain pond .The safety shut-off circuit can also be used for pump up / pump down control or for a greater than 6.35mm / 0.250" level differential. The sensor assembly is cast into the face of concrete walls,showing only the face of the bronze frame and the stainless steel cover plate. The sensor float switches are mounted upon brass tubes, allowing sensor adjustments of approx. 254mm - 1.000" after pool is filled. This sensor assembly is also available with a single float switch as **PEM L101 - 31** (**# 444-6010**)

OPTIONAL & EXTRA
Tilemask **Add /-58**
WATERPROOFING OPTIONS
Surface Puddle Flange **Add /-60**
Surface Waterproofing Membrane Clamp **Add /-62**

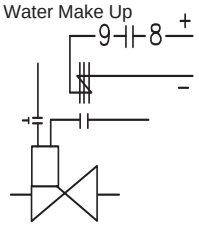
LOW LEVEL SAFETY SHUT OFF CONTROLS & WATER MAKE UP CONTROLS FOR FOUNTAIN PONDS

PEM L104-1
CONTROL MODULE
461-0010

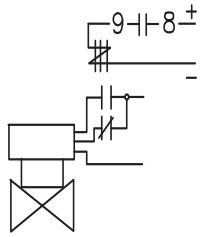
L104 - 100 ONLY, Direct Solenoid Valve Connection for 24 VAC Solenoid Valve Water Make Up



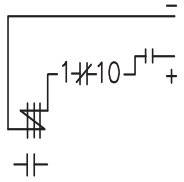
L104-1 ONLY, Indirect Solenoid Valve Connection for Water Make Up



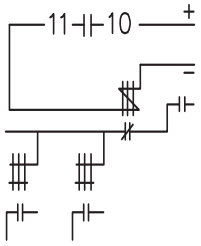
L 104-1 ONLY, Indirect Motorized Valve



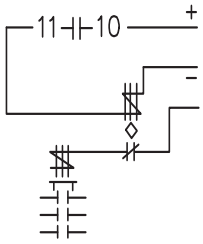
L104 - 1 & L 104 - 100, Low Water Safety Shut Off for Illumination Contactor or Pump Starter



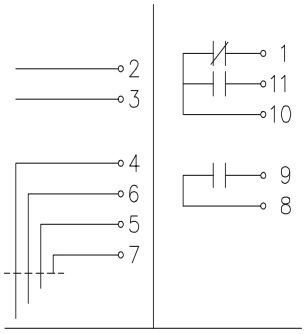
L 104 - 1 & L 104 - 100 , Low Water Safety Shut Off for Illumination Contactor & Small Size Pump Motor Starter



L 104 - 1 & L 104 - 100 Low Water Safety Shut Off w. Time Delay Relay for Larger Size Pump Starters



TERMINALS & FUNCTIONS



1. Output, N.C. from Safety Shut Off Circuit
2.3. Power Supply
4 Common for Float Switch Sensors,12 VDC
6. Return from Lowest Float Switch
5. Return from Intermediate Float Switch
7. Return from Highest Float Switch
8. Common for Water Make Up Circuit
9. Output, N.O. from Water Make UP Circuit
10. Common for Safety Shut Off Circuit
11. Output, N.O. from Safety Shut Off Circuit

ELECTRICAL RATINGS:
Power Supply: **250V/115V, 50/60Hz, 1A**
Output for Float Switch Sensors: 12 VDC
Switch Ratings for controlled circuits:
240 VAC / 120 VAC / 24 VAC - 0.5A.

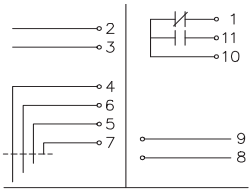
U.L. Recognized Component
E 110256

PEM L 104 - 1 CONTROL MODULE is designed for inclusion into approved for the purpose control panels. When connected to a suitable PEM L 104 Series Sensor Assembly, this dual stage water level control will operate a solenoid fill valve to maintain a constant operational waterlevel in a fountain pond and in addition has a low level safety shut off for the electrical equipment in a fountain pond should the waterlevel drop below normal operating depth.
PEM L 104 - 1 Control Module is within a corrosion resistant polypropylene housing and has an 11 pin plug and socket. Indicating lights provide immediate status display. Green light is for Power 'ON', Yellow light indicates water make up circuit is engaged. Red light indicates that the low level safety shut off circuit is engaged and will not disengage until normal operating waterlevel is re-established. This control has a safety transformer for the sensor float switches, providing 12 VDC . Time delayed 'ON' action of the water make up as of the safety shut off prevents rapid cycling due to wave action in a fountain pond. Wiring to sensor assembly requires 4 unshielded # 18 AWG size conductors.

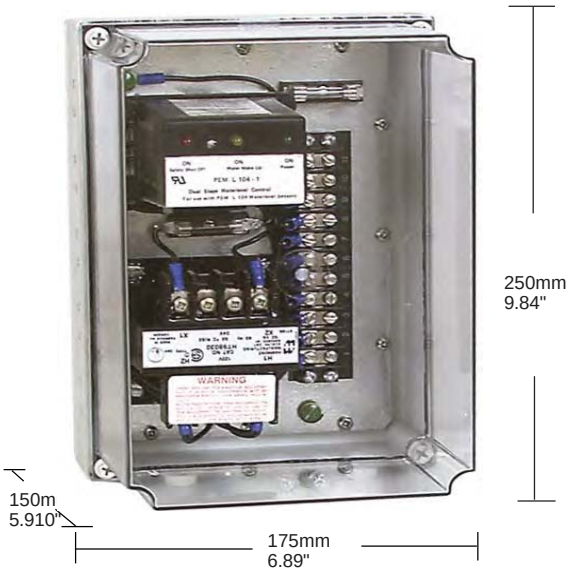
CONTROL PANEL WITH TRANSFORMER

PEM L104-100
L104-100A, 115V #462-0010
L104-100B, 240V #462-0020

TERMINALS & FUNCTIONS



L104-100-115V.
U.L. Listed :
E 110256



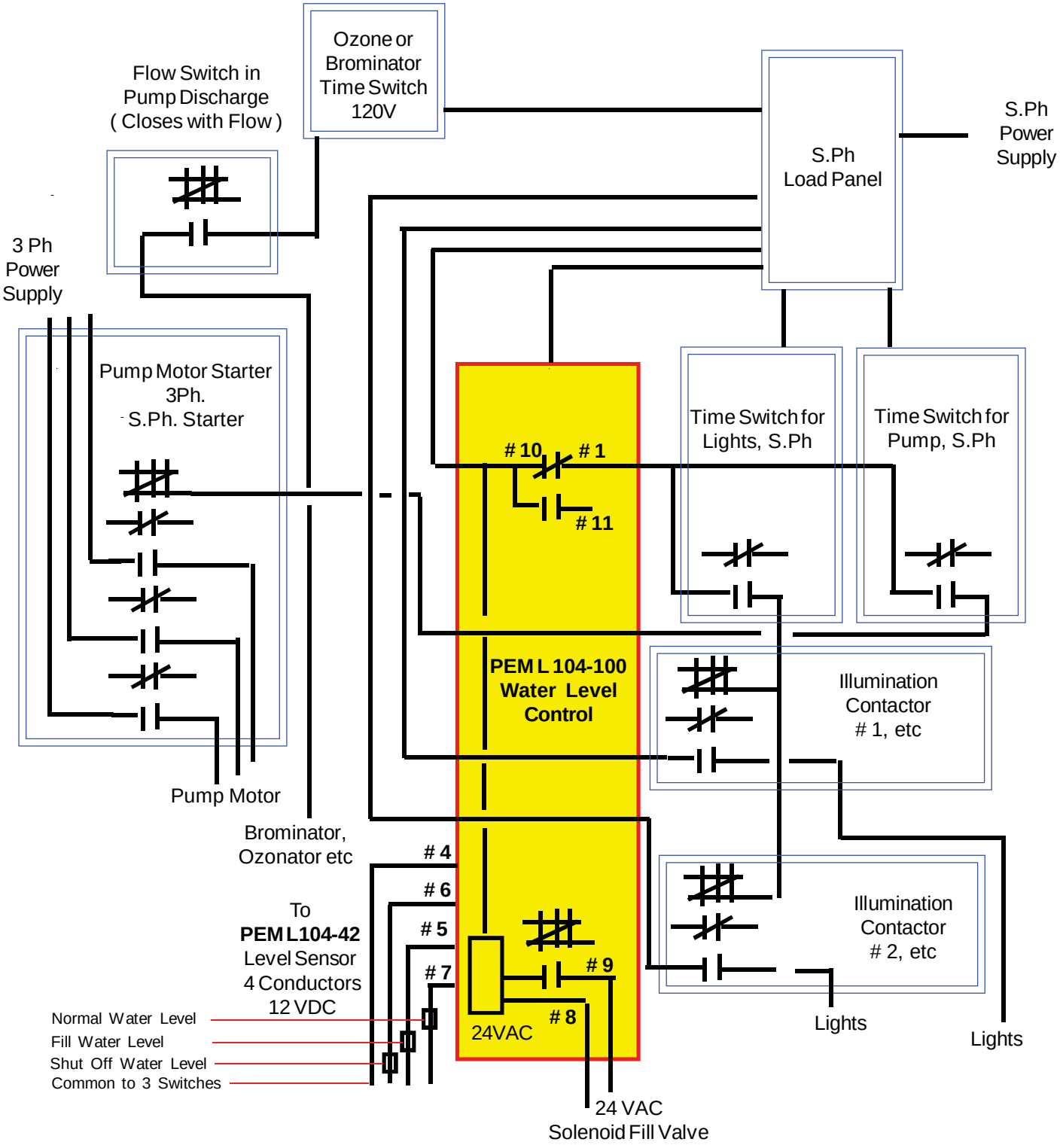
1. Output, N.C. from Safety Shut Off Circuit
2.3. Power Supply
4. Common for Float Switches Sensors, 12 VDC
6. Return from Lowest Float Switch Sensor
5. Return from Intermediate Float Switch Sensor
7. Return from Highest Float Switch Sensor
8. (-)24 VAC Output for Water Make Up Circuit
9. (+)24 VAC Output for Water Make UP Circuit
10. Common for Safety Shut Off Circuit
11. Output, N.O. from Safety Shut Off Circuit

ELECTRICAL RATINGS:
Power Supply:
L104-100A, 115V - 60Hz, 3 Amp.
L104-100B, 240V - 50Hz, 2 Amp.
Output for Float Switch Sensors: 12 VDC
Switch Ratings for Safety Shut Off Circuit:
240 VAC / 120 VAC / 24 VAC - 0.5A.
Output for Solenoid Valve:
24 VAC, 50/60 Hz, 1 Amp.

PEM L104 - 100 CONTROL when connected to a suitable PEM L104 Series Sensor will provide a dual stage waterlevel control system. This control will operate a solenoid fill valve to maintain a constant operational waterlevel in a fountain pond and in addition it has a low level safety shut off for the electrical equipment in a fountain pond, should the waterlevel drop below normal operating depth. PEM L104 - 100 has a 24V-50VA safety power supply included for the direct operation of a 24V solenoid fill valve in the water make up circuit. Indicating lights provide immediate status display. Green light is for Power 'ON', Yellow light indicates water make up circuit is engaged. Red light indicates that the low level safety shut off circuit is engaged and will not disengage until normal operating waterlevel is re-established. This control has a safety transformer for the sensor float switches, providing 12 VDC . Time delayed 'ON' action of the water make up as of the safety shut off prevents rapid cycling due to wave action in a fountain pond. The wall mounted control panel is within a NEMA Type 4 corrosion resistant polycarbonate enclosure. Wiring to sensor assembly requires 4 unshielded #18 AWG size conductors.

The installation must conform to all applicable electrical codes.

SUGGESTED CONTROL SCHEMATIC
FOR
PEM L 104-100 WATERLEVEL CONTROL
WITH 3 PHASE PUMP



CONDUIT MOUNTED SENSOR **PEM L104-42**

#463-0400

PEM L104-42 is made of cast bronze, brass and copper and stainless steel fitted.
Bottom conduit connection for mounting upon 3/4" metallic, non corrodible metal.
Float Switches are plastic and are reed switch activated by perma-magnets embedded in the switch float.

ADJUSTMENT RANGES:

X1 Top of enclosure to maximum waterlevel
38.1mm - 1.500"

X2 Adjustment range for normal waterlevel
from top of enclosure:
38.1mm - 1.500" to 65mm - 2.560"

X3 Adjustment range of low level shut off
from top of enclosure:
55mm 2.170" to 80mm - 3.150"

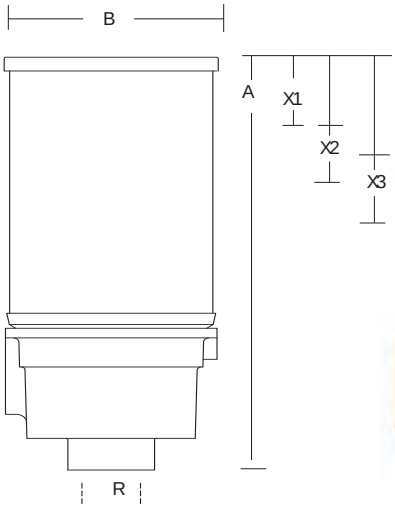
After removal of cover , each float switch is adjustable within the above range by unlocking the collar by loosening the set screw and sliding the switch stem up or down from base, then locking the collar again.

DIMENSIONS:

A	Height	220mm / 8.661"
B	Diameter	94mm / 3.700"
R	Conduit Size	3/4" NPT / BSP

ELECTRICAL RATING:

12 Volts DC, 10 Volt Ampere (VA) Max.



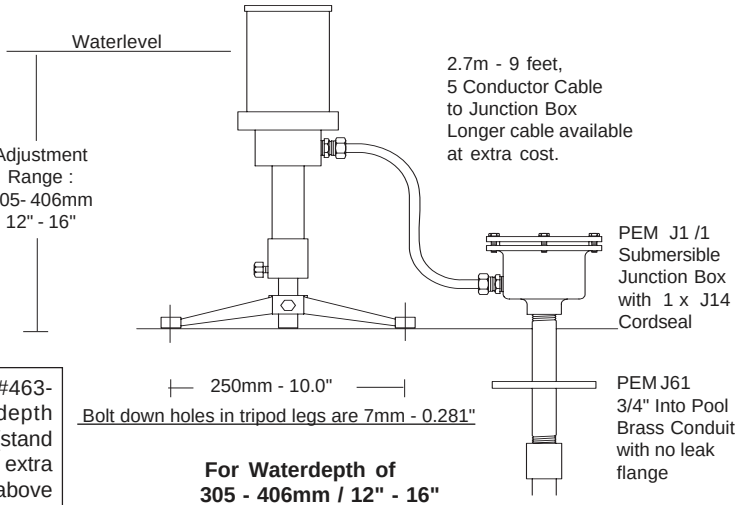
FREE STANDING SENSOR **PEM L104-56**

#463-0520

PEM L104-56 is made of bronze, brass and copper, stainless steel fitted.
Electrical cable is Type St 18/5 AWG.

Junction Box with cordseal and into-pool Conduit are not part of Sensor, They are optional and extra!

Electrical Rating, Diameter of Sensor and Waterlevel adjustment ranges of sensor float switches are same as PEM L104 - 42 in addition to height adjustment of stand.



For Waterdepth of 305 - 406mm / 12" - 16"

Also available as **PEM L104-56A** (#463-0510) for 150-175mm/6"-7" Waterdepth mounted on 150mm/ 6" Diameter plate (stand not height adjustable). Custom made at extra cost for any water depth between the above and the **PEM L104-56.**

FREE STANDING SENSOR **PEM L104-57**

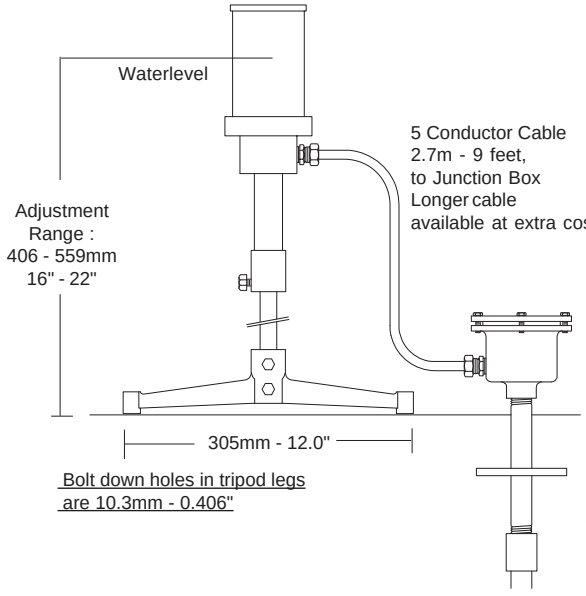
#463-0600

PEM L104 - 57 is made of bronze, brass and copper, stainless steel fitted.
Electrical cable is Type St 18/5 AWG.

Electrical Rating, Diameter of Sensor and Waterlevel adjustment ranges of sensor float switches are same as **PEM L104 - 42** in addition to height adjustment of stand.

***** For water depths other than standard, custom made sensors are available at extra cost.
Suggested maximum water depth is 2.43m - 8 feet.

STANDARD* Waterdepth:
406 - 559mm / 16" - 22"



PEM L104-48-6

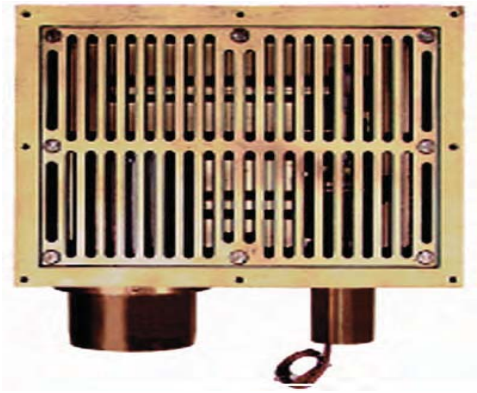
Wall Mounted Dual Waterlevel Sensor & 100mm/ 4” Overflow

For: Concrete Ponds
With Plastic Niche:
463-0820 **PEM L104-48-6**
With Stainless Steel Niche:
463-0821 **PEM L104-48-7**

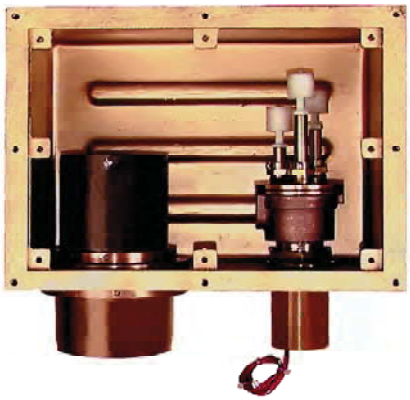
For: Surface Liner Ponds
With Plastic Niche:
463-0824 **PEM L104-48-6 +/-62**
With Stainless Steel Niche:
463-0825 **PEM L104-48-7 +/-62**

CONSTRUCTION:

The assembly has Cast Bronze Frame, Grating, Internal Fittings & Surface Liner Clamp fitted with stainless steel overflow tube and fasteners. The concrete forming niche can be supplied in plastic or in stainless steel See above specification.
Either forming niche serves solely to form the concrete niche for the internal equipment and is watertight.
The overflow tube has a 40mm vertical adjustment after installation.
The dual waterlevel sensor permits adjustment of water make up levels also safety shut off in case of low waterlevel. For description of the dual waterlevel control & sensor see :
PEM L104-100 and PEM L104 - 42 , catalog pages 405 & 406
The overflow is suggested for a water surface of 25 m2 \ 270 Sqft.
The Overflow Weir length is 0.32m \ 1.05 Ft.



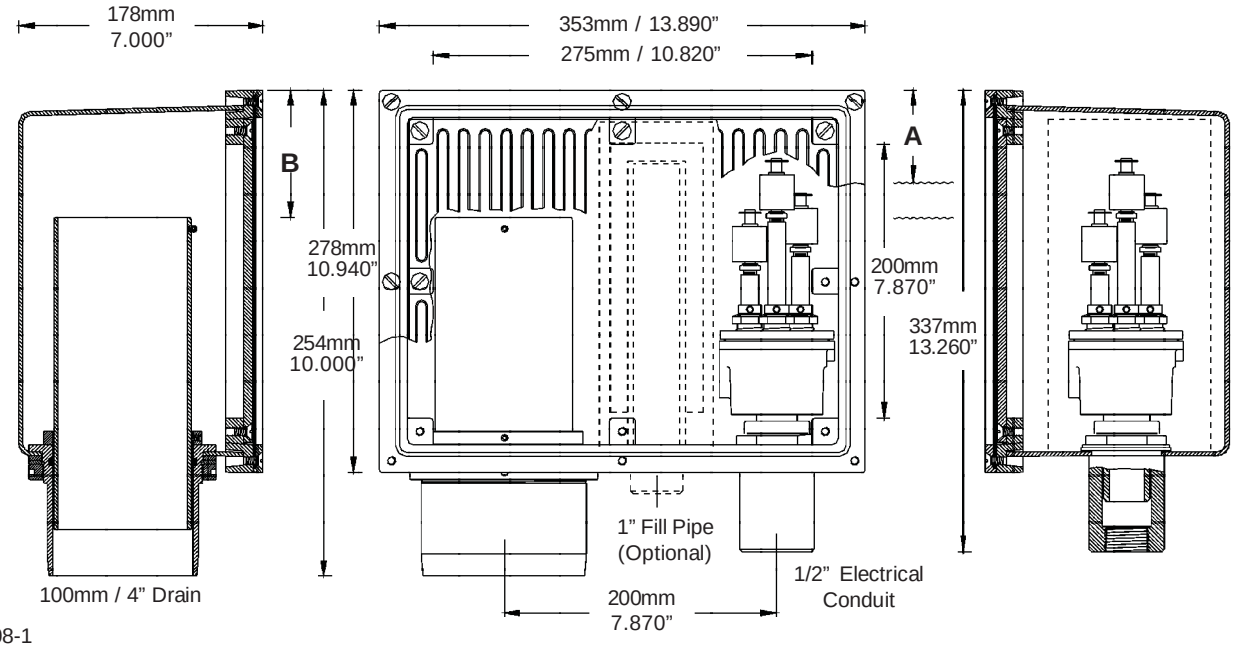
Front View (Closed)



Front View (Open)

Side View

DIMENSIONS



WATER MAKE UP & LOW LEVEL SAFETY SHUT OFF CONTROLS

PEM L104-46

SENSOR
In Wall Mounted
#463-0700

The **PEM L104-46** is made of cast bronze, brass with a stainless steel cover and fasteners. The Float Switches are plastic.

PEM L 104 - 46 Multiple Float Switch Level Sensor is mounted flush into the front of a wall, access is behind a solid stainless steel cover. The sensor monitors the normal waterlevel, the water make up and the safety low level shut off when connected to **PEM L 104 - 1 or L 104 - 100 Waterlevel Controls.**

OPTIONAL & EXTRA
Tilemask: **Add/-58**
WATERPROOFING OPTIONS
Surface Puddle Flange
Add/-60
Surface Membrane Clamp
Add/-62

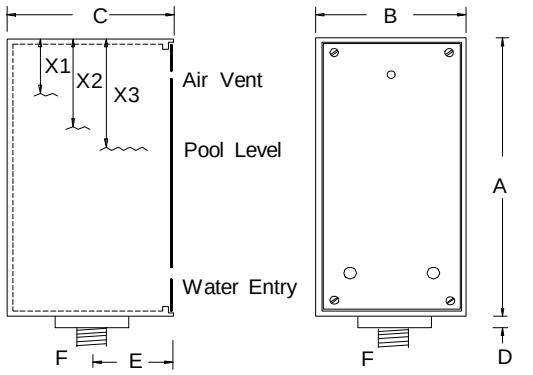
ADJUSTMENT RANGES:

X1 Top of enclosure to maximum waterlevel 38.1mm - 1.500"
X2 Adjustment range for normal waterlevel from top of enclosure: 38.1mm - 1.500" to 65mm - 2.560"
X3 Adjustment range of low level shut off from top of enclosure: 55mm 2.170" to 80mm - 3.150"

Each float switch is adjustable by unlocking collar and sliding the switch stem up or down from base, then locking the collar again.

DIMENSIONS:

A	Height	205mm 8.070"
B	Width	103mm 4.055"
C	Depth	112mm 4.400"
D	Conduit Socket	17mm 0.670"
E	Center of cond. to face	57mm 2.244"
F	Conduit Size	1/2" NPT / BSP



ELECTRICAL RATING: 12 Volts DC, 10 Volt Ampere (VA)

Combination Overflow, Level Sensor & Fill Inlet

PEM L104-48

SENSOR
In Wall Mounted
#463-0800

The **PEM L104 - 48** is made of cast bronze, brass and copper. It is stainless steel fitted and with a Neoprene 'O' ring seal. The **PEM L104 - 48** wall mounted **Multiple Float Switch Level Sensor** combines 4 separate control devices in a compact unit with all components hidden from sight:

1. Adjustable Overflow, height adjustable, with 220 mm/8.66" overflow lip.
2. Automatic Water Make Up Float Switches, height adjustable 3.81mm/1.500"
3. Low Water Level Safety Shut Off Float Switches, height adjustable 38.1mm/1.500"
4. 3/4" Inlet for solenoid controlled water supply (Max.15 PSI, 1 Kpa, 1 bar.)

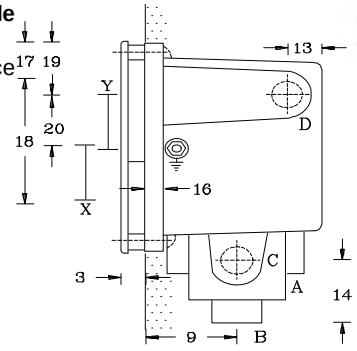
PEM L104- 48 Sensors are to be connected to **PE L104-1 or L104 - 100** Waterlevel Controls. Sensors operate with safe 12 volts, low voltage. **PEM L104-48 Sensors** are available with waterproofing Surface Flanges **(601)**, or **Tile Mask(-58)** or **Surface Membrane Clamp (60-2)**.

PEM L 104 - 48 are supplied as standard in natural bronze, chrome plating of face plate and Tile Mask is available at extra cost (Specify with order!).

Installation must conform to all applicable electrical & plumbing codes.

L104-48

L104-48 without cover



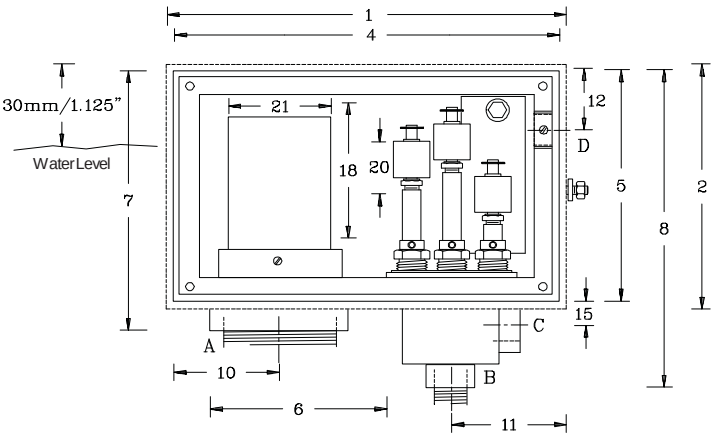
OPTIONAL & EXTRA
Tilemask : **Add/-58**
WATERPROOFING OPTIONS
Surface Puddle Flange
Add/-60
Surface Membrane Clamp
Add/-62

DESCRIPTION:

A 3"NPS/BSP Overflow Pipe Connection
B 1/2" NPT/BSP Conduit Connection for Waterlevel Sensors
C 1/2" NPT/BSP Alternate Conduit Connection (Specify !)
D 3/4" NPT/BSP Solenoid Valve controlled Fill Connection (Max.15 PSI/1KPA/1 Bar,use pressure reducer in supply!)
Y Range of Water Make Up Sensor (Appr. 40mm-1.500")
X Range of Low Level Shut Off Sensor (Appr. 40mm-1.500")

DIMENSIONS:

1	Cover , width	270mm	10.630"
2	Cover , height	170mm	6.693"
3	Extension of cover	18mm	0.710"
4	Width of niche	265mm	10.433"
5	Height of niche	165mm	6.500"
6	Depth of niche	121mm	4.764"
7	3"pipe entry from top	180mm	7.087"
8	1/2"conduit entry from top	230mm	9.055"
9	Cntr of pipe & conduit from niche face	61mm	2.403"
10	Cntr of 3" pipe from left side of niche	72mm	2.835"
11	Cntr. of 1/2" cond. right side of niche	75mm	2.953"
12	Cntr. of 3/4" pipe top of niche face	42mm	1.654"
13	Cntr. of 3/4" pipe from back of niche	25mm	0.985"
14	Cntr. of alternate 1/2" conduit from base entry	46mm	1.811"
15	Cntr. of altern. cond.from niche face bottom	12mm	0.472"
16	Opening between wall & face plate	10mm	0.394"
17	Max.waterlevel from top of niche	24mm	0.945"
18	Adjustment range of overflow	100mm	3.937"
19	Max. Make Up level from top of niche	50mm	1.969"
20	Adjustment range of make up sensor	35mm	1.378"
21	Diameter of overflow	70.2mm	2.785"



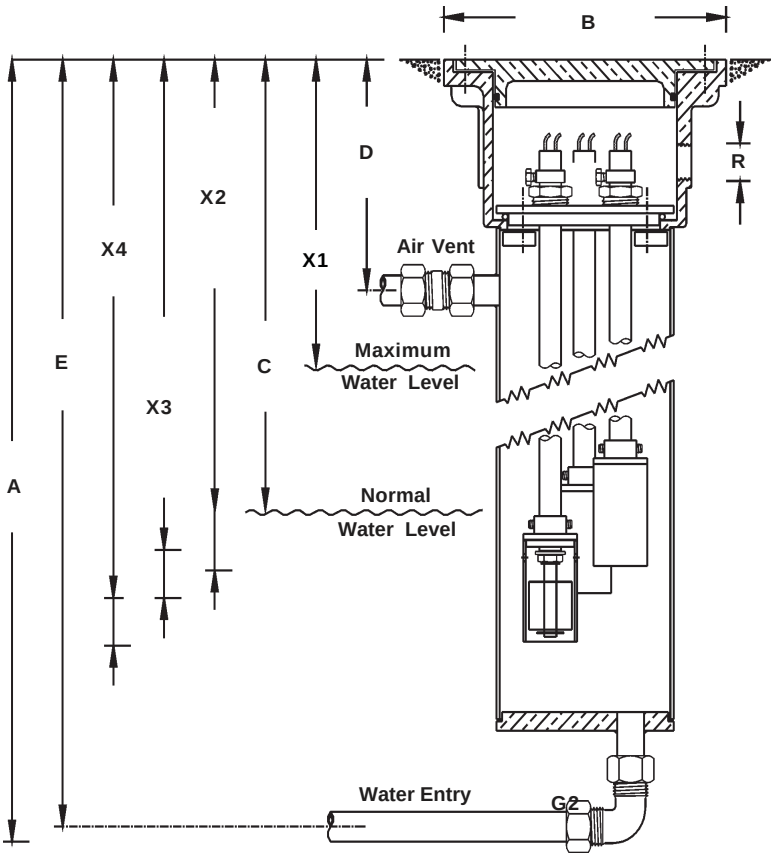
PEM (REMOTE) WATER MAKE UP & LOW LEVEL & ALARM SENSOR (X4)

L104 - 49 TOP ACCESS SENSOR

#463-0900

L104-49
Sealed w/Cover

L104-49
Float
Switches



CONSTRUCTION:

PEM L104-49 is made of cast bronze, brass and copper and stainless steel fitted. Junction box and float-switch tubes have Neoprene 'O' ring seals. Float Switches are plastic with the reed switch activated by perma magnets embedded in switch float. Float switches are encased in protective enclosure. Most Sensors assemblies are custom made to given dimensional specifications. Also recommended for remote sensor installation with connecting tube into pool. Plaza overflow fountains can be controlled with remote sensor in planter box near fountain at same or higher elevation (connecting tubing must not develop air locks).

Custom made sensors with an additional 4th (X4) Floatswitch are available where an extra alarm circuit is required, either for very low water level or very high water level. All float switches are accessible after installation for adjustment.

ADJUSTMENT RANGES OF STANDARD SENSORS:

X1 Top of enclosure to maximum waterlevel
152mm - 6.000"

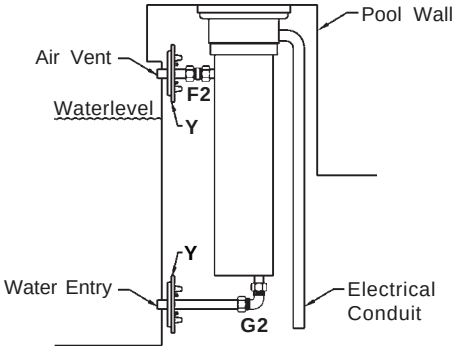
X2 Adjustment range for normal waterlevel
from top of enclosure:
152-178mm - 6.000"-7.000"

X3 Adjustment range of low level shut off
from top of enclosure:
190-216mm - 7.500"-8.500"

X4 Possible extra float switch above normal waterlevel
for high waterlevel alarm.

FOR CUSTOM MADE SENSORS SPECIFY:
ADJUSTMENT RANGES -X1, X2, X3, (X4)
DIMENSIONS: C, D, E, F2, G2,
(**Y**, if required, placement at job site by soldering)
(Note: 'X' Dimensions cannot be less than shown for 'D')

TYPICAL INSTALLATION



ELECTRICAL RATING:

12 Volts DC , 10 Volt Ampere (VA) Max.

Installation must conform to all applicable electrical codes.

(Optional and extra, requires additional 2 conductors and Waterlevel control panel relay).

After removal of cover, each floatswitch is adjustable within the above range by unlocking the collar by loosening the set screw and sliding the switch stem up or down in base, then locking the collar again. If sensor tubes become too high for enclosure, they can be removed from housing, the float switch assembly removed, cut the brass tube with a tube cutter and ream out. Care is to be taken, to use new thread sealant when re-installing the float switch assembly.

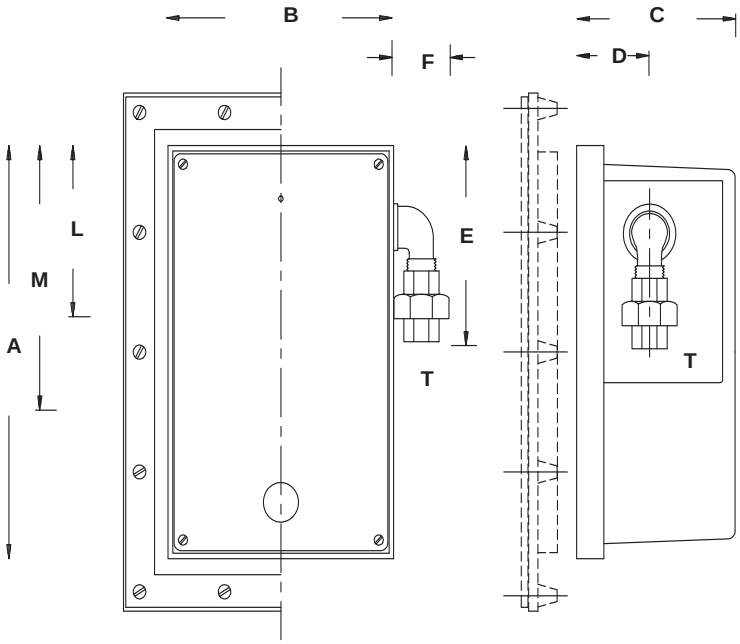
PARTS & DIMENSIONS OF STANDARD SENSOR:

A	Overall Height	305mm - 12.000"
B	Diameter of top with grout ring	170mm - 6.700"
C	Distance from top to max. normal waterlevel	152mm - 6.000"
D	Distance top to center of air vent tube	140mm - 5.500"
E	Distance top to center of water inlet	292mm - 11.500"
F1	Tube size of air vent compression coupling (O.D.)	16mm - 0.625"
F2	Length of 16mm O.D. copper tube supplied with sensor	305mm - 12.000"
G1	Tube size of water inlet, compression elbow (O.D)	16mm - 0.625"
G2	Length of 16mm O.D, copper tube supplied with sensor	305mm - 12.000"
R	Conduit Size (Requires formed or long 90 degrees elbow)	1/2"NPT / BSP

Y Optional & Extra, PEM 6390 waterproofing membrane flanges and clamps, for sealing of surface or subsurface membrane penetrations, supplied for job site installation.

Pool Filler PEM R1291

For : CONCRETE PONDS
 # 480-111, PEM R1291 - 1
For : LINER PONDS
 # 480-112 PEM R1291 - 2



R1291 & R1292
with Cover

T : 1/2" NPT/BSP

DIMENSIONS: R1291-1

	A	B	C	D	E	F	L	M
mm	264	164	115	54	126	40	100	170
" *	10.4	6.5	4.5	2.1	5.0	1.6	4.0	6.7

* - Rounded Up

DIMENSIONS: R1291-2

	A	B	C	D	E	F	L	M
mm	328	226	121	59	160	40	144	204
" *	12.9	8.9	4.8	2.3	6.3	1.6	5.7	8.1

* - Rounded Up

PEM R1291 is made of a cast bronze frame with a stainless steel cover, Kydex niche, bronze, brass and stainless steel fitted. The **PEM R1291-2** , has Liner clamp of cast bronze, stainless steel fitted and Paste Gasket. The **PEM R1291** Auto Pond Filler is for concrete ponds with up to 20 m² pond surface area. Fill level is adjustable between **'L'** & **'M'** , not to exceed **'L'.**

PEM R1291 employs a sanitary 22 L/min float valve that can be disconnected above waterlevel and permits waterlevel adjustment after installation. For servicing the float valve can easily be removed from the housing. The float of the valve has been made surface pollution resistant. For manual service pool filling use separate, larger size pipe with **PEM R1240 / R1260 Fill Spouts.**

Combination Pond Filler & 65mm 2 1/2" OVERFLOW PEM R1292

For : CONCRETE PONDS
 # 480-115, PEM R1292 - 1
For : LINER PONDS
 # 480-116 PEM R1292 - 2

PEM R 1292 Auto Pond Filler and Overflow Combination for concrete ponds up to 20 m² pool surface area.
Overflow level is adjustable between **' N '** & **' O '** but not to exceed **' N '** !
Fill level is adjustable between **' L'** & **'M'** , but not to exceed **' L'.**

PEM R 1292 employs a sanitary 22 L/min float valve that can be disconnected above waterlevel and permits waterlevel adjustment after installation. For servicing, the float valve can easily be removed from the housing.The float of the valve has been made surface pollution resistant.
For manual service pond filling use separate, larger size pipe with PEM R1240 / R1260 Fill Spouts.
PEM 1292
is made of cast bronze frame, stainless steel cover, Kydex niche, brass & stainless steel fitted
PEM R1292-2,
has Liner clamp of cast bronze, stainless steel fitted and Paste Gasket.

T : 1/2" NPT/BSP - Overflow: 1 1/2" N PT/BSP

DIMENSIONS: R1292 - 1

	A	B	C	D	E	F	G	H	J	K	L	M	N	O
mm	264	164	115	54	126	40	35	55	76	50	100	170	165	125
" *	10.4	6.5	4.5	2.1	5.0	1.6	1.4	2.2	3.0	2.0	4.0	6.7	6.5	5.0

* - Rounded Up

DIMENSIONS: R1292 - 2

	A	B	C	D	E	F	G	H	J	K	L	M	N	O
mm	328	226	121	59	160	40	35	89	80	50	144	204	197	157
" *	12.9	8.9	4.8	2.3	6.3	1.8	1.4	3.5	3.2	2.0	5.7	8.1	7.8	6.2

* - Rounded Up

All Systems on this page are for Separated Water Supplies only!

PEM R1293-1

#480-3030

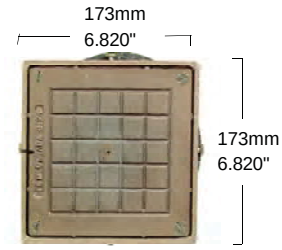
REMOTE POND FILLER & OVERFLOW

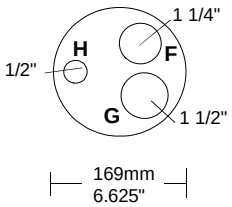
The **PEM R1293-1** Remote Pond Filler & Overflow is designed for small pools to maintain a desired waterlevel. The unit must be installed at the same level as the pond. The square cover fits into tiled pavement. The pond must have separate manual water supply for service fill up. Max. suggested pressure = 50 PSI, 344 KPA, 115 Ft Head, 35.22m Head or 35 bar.

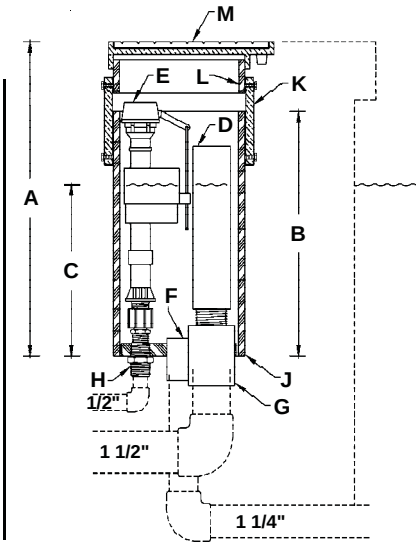
PEM R1293-1 is made of fabricated PVC and cast bronze, stainless steel fitted.

DIMENSIONS :

A 305mm to 356mm\12.0-14.0"
B 254mm\10.0"
C 152mm-200mm\6.0"-8.0"
D 40mm / 1 1/2", 228mm\9.0"
E Float valve with level adjustment. .
F 1 1/4" NPT/BSP connection to pool.
G 1 1/2" NPT/BSP pipe connection to pool drain.
H 1/2" NPT/BSP pipe connection for Water Supply
J PVC Enclosure to dimension 'B'
K PVC Slip sleeve with stainless steel set bolts
L PVC Enclosure extension
M Square Cast bronze access cover

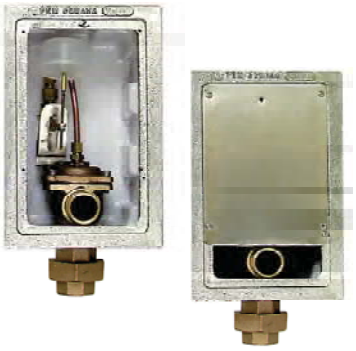






PEM R1294 ENCLOSED 1" AUTO POND FILLER

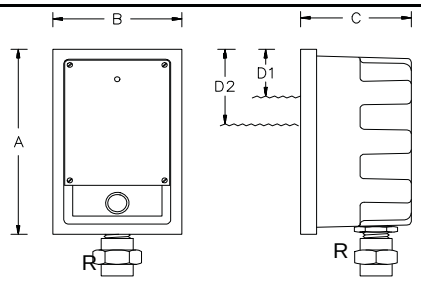
#480-4010



PEM R1294 wall mounted enclosed automatic pool filling device for medium to larger size fountain ponds. Can be adjusted after installation to fill pond to desired water level from shown minimum to maximum level and automatically maintains the same within a 10mm - 0.400" level differential. The device operates on a hydraulic / float valve mechanism and provides a full flow of a 1" valve. Maximum water pressure : 50 PSI /3 bar .

This device must be protected from freezing while supply pipe is filled with water, install a drain valve.

This unit is not suitable for installation into swimming or other pools in freezing climates that are subject to flooding of this water make up device. Cover is stainless steel in a bronze frame. Forming Niche of Kydex or ABS, with Brass, bronze valving, stainless steel and neoprene fitted.



DIMENSIONS :

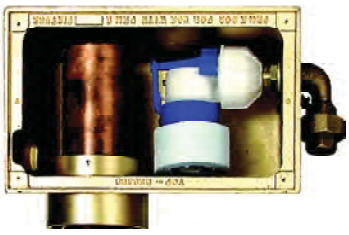
A 254mm / 10.0"
B 162mm / 6.375"
C 143mm / 5.625"
D1 Max. Adj. Water Level: 76mm - 3.0"
D2 Min. Adj. Water Level: 150mm - 6.0"
R 1" NPT - BSP,

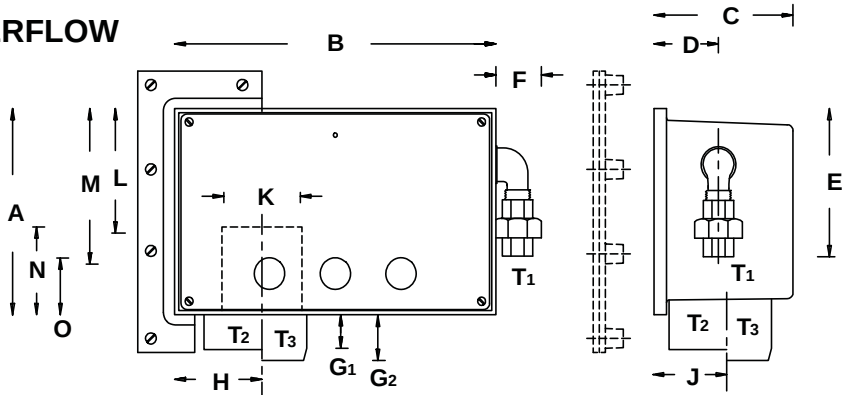
OPTIONAL & EXTRA: Tilemask: **Add /-58**
Surface Puddle Flange : **Add /-60**
Surface Liner Clamp : **Add /-62**

PEM R1295 AUTO FILLER & OVERFLOW

#480-4020

For: Concrete Ponds
480-221, **PEM R1295 - 1,** 3" (**T2**)
480-223, **PEM R1295 - 3,** 75mm PVC (**T3**)
For: Liner Ponds
480-222, **PEM R1295 - 2,** 3" (**T2**)
480-224, **PEM R1295 - 4,** 75mm PVC (**T3**)





DIMENSIONS: R1295-1 & -3

T1	T2	T3	A	B	C	D	E	F	G1	G2	H	J	K	L	M	N	O
		PVC	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
1/2"	3"	75	164	267	117	54	119	38	28	37	73	61	65	100	125	70	46

DIMENSIONS: R1295 - 2 & 4

T1	T2	T3	A	B	C	D	E	F	G1	G2	H	J	K	L	M	N	O
		PVC	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
1/2"	3"	75	226	329	122	59	150	38	28	37	104	67	65	131	156	101	77

PEM R 1295 Auto Pond Filler and Overflow Combination for concrete ponds up to 30 m^2 surface area. Overflow level is adjustable between **'N'** & **'O'**, not to exceed **'N'.** Fill level is adjustable between **'L'** & **'M'** , but not to exceed **'L'.**

PEM R 1295 Combinations are made with cast bronze niche, stainless steel cover, bronze, brass and stainless steel fitted.

T3 : 75mm PVC Slip Fit for DIN 19 534 PVC Pipe. **PEM R 1295-2 & -4** have liner clamp of cast bronze, stainless steel fitted with Paste Gasket. For manual service pool filling use separate, larger size pipe with **PEM R1240 / R1260** Fill Spouts.

THIS DEVICE REQUIRES A SEPARATED WATER SUPPLY

PEM R1296

Wall mounted 1" Auto Filler & 110mm/4" Overflow Combination

For: Concrete Ponds
With Plastic Forming Niche
480-331 **PEM R 1296 - 1**
With Stainless Steel Forming Niche
480-332 **PEM R 1296- 2**

For: Surface Liner Ponds
With Plastic Forming Niche
480-333 **PEM R 1296 - 3**
With Stainless Steel Forming Niche
480-334 **PEM R1296- 4**

Side View

Front View (Open)

Front View (Closed)

CONSTRUCTION:

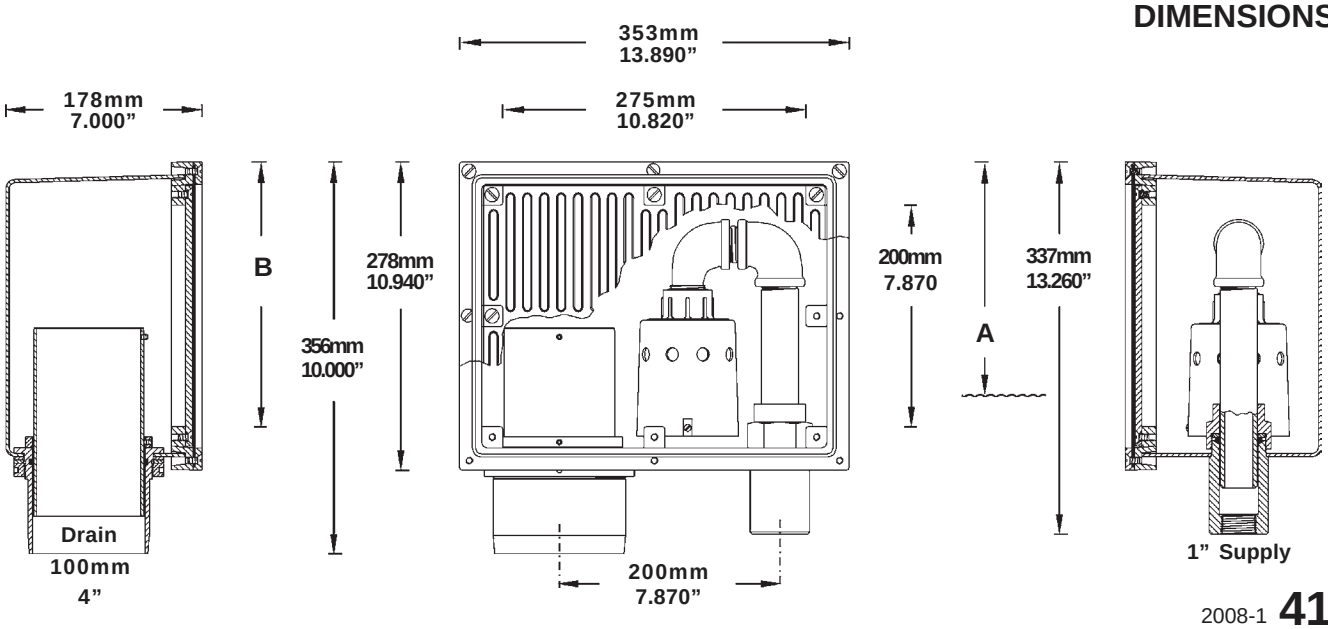
The assembly has cast bronze Frame, Grating, Internal Fittings & Surface Liner Clamp fitted with stainless steel overflow tube, piping & fasteners. The Auto Filler (Float Valve) is made of ABS plastic with neoprene seal and is stainless steel fitted. The concrete forming niche can be supplied in plastic or in stainless steel, see above specification. Either forming niche serves solely to form the concrete niche for the internal equipment and is watertight. The overflow tube and the Auto Filler (Float Valve) have a 40mm vertical adjustment after installation. The 1" Auto Filler is for a suggested max flow of 57 L/min \ 15 USPGM X Max. 138 bar / 60 PSI water pressure, but also for minimum pressure of 1.2 bar \ 5 PSI with reduced flow as in separated water supplies.

The overflow is suggested for a water surface of 25 m2 \ 270 Sqft. The Overflow Weir length is 0.32m \ 1.05 Ft.

A = +/- 133/168mm - 5.230/6.610"

B = +/- 150/240mm - 5.900"/9.440"

DIMENSIONS

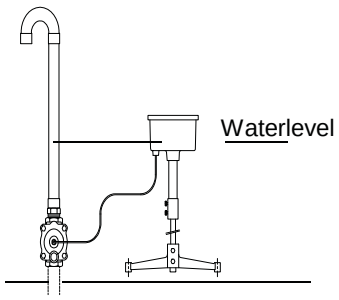


PEM R1300

The systems on this page are for separated water supplies only

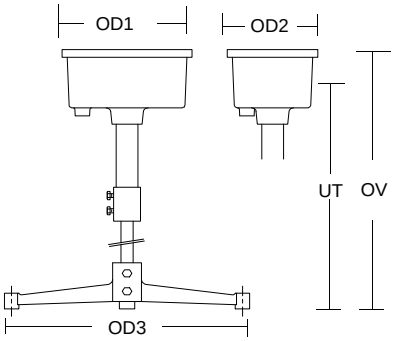
NON ELECTRIC POOL FILL SYSTEM

PEM 1300 Hydraulic Water Make Up System consists of a **PEM R1311 Waterlevel Sensor** to monitor a set waterlevel and should this drop below the adjusted height, the sensor which is connected with a hydraulic tube to a **PEM Select R1320 series** hydraulic fill valve in the water supply, will activate this fill valve until the set waterlevel is restored. Water is discharged through a **PEM R1340 Goose Neck Fill Spout** This automated water make up is operated by the pressure in the water supply and controlled to a set waterlevel by means of a float valve in the sensor, that is opened by the lowering of the waterlevel and in turn releases the pressure in the upper diaphragm chamber of the hydraulic fill valve causing this to open. When the set waterlevel is restored, the sensor float valve closes and in turn closes the hydraulic valve. The waterlevel differential maintained is appr. 19.1mm / 0.75".
This hydraulic water make up system can be retro fitted to most water supplies, terminating into a pool, pond or lake.
When used for multi level cascade systems, install the sensor into the lowest, the base pool and have the water supply discharge into the upper most pool, that assures, that all the upper pools of the cascade system are filled before the base pool is filled.



PEM R1311 HYDRAULIC WATER MAKE UP SENSOR

#480-5510



DIMENSIONS:
OD1 165mm\6.50"
OD2 114mm\4.50"
OD3 300mm\12.0"
OV* 396>470mm\15.6">18.5"
UT* 356>430mm\14.0">17.0"

*Height adjustable tripod stand.

PEM 1311 is made of cast bronze, brass, copper and is stainless steel fitted. The **PEM 1311** Waterlevel Sensor will monitor a waterlevel with a small internal float valve that controls a PEM 1320 Hydraulic Valve to maintain a set waterlevel in a pool or pond. The waterlevel will be maintained within a 20mm/ 0.75" differential.

Maximum water pressure is 50 PSI , 115 ft-head, 3.5 bar or 35m head.

The sensor is supplied with 1.5m \5 feet of 6mm\0.250" copper tubing .

PEM R1320 HYDRAULIC FILL VALVES

480-6000

#	PEM	NPT BSP	Suggested max. Flow L/min	USGPM	Overall Length mm	Inches
480-6030	R1321	3/4"	38	10	96mm	3.75"
480-6040	R1322	1"	68	18	100mm	4.00"
480-6050	R1323	1 1/4"	132	35	127mm	5.00"
480-6060	R1324	1 1/2"	227	60	127mm	5.00"
480-6070	R1325	2"	300	80	153mm	6.00"

PEM Select R1320 Hydraulic Fill Valves are cast bronze, normally open diaphragm valves activated by a pressure differential in the upper chamber of the valve.
Maximum water pressure is 50 PSI, 115 ft. head, 3.5 bar or 35 meter head. The valves are supplied with 6.35mm\0.250" copper tube compression fitting.
These valves might be noisy when closing.

PEM R1340 CHROMED GOOSE NECK FILL SPOUTS

480-7000

#	PEM	NPT/BSP
480-7030	R1343	3/4"
480-7040	R1344	1"
480-7050	R1345	1 1/4"
480-7060	R1346	1 1/2"
480-7070	R1347	2"

Overall height of each goose neck is : 457mm \ 18.00"

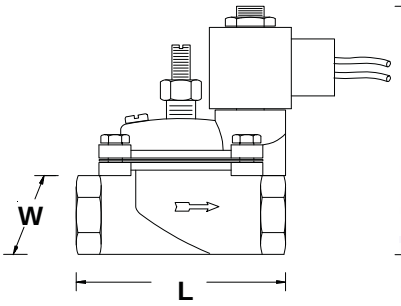
PEM R1340
Gooseneck Fill Spouts are designed to comply with plumbing codes, that require the discharge of a water supply into a pool to terminate at a specified distance above the highest possible waterlevel in a pool.
PEM R1340 Fill Spouts are made of copper and are chrome plated.
Where the above plumbing code requirement does not apply, the valve can discharge directly into the pool.

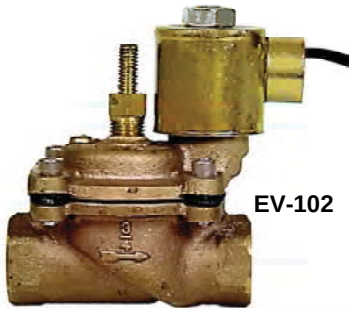
SELECT BRONZE SOLENOID FILL VALVES

PEM EV-100 #462-0100

PEM Select EV100 - Bronze Solenoid Valves are suggested for use with PEM L101 and L104 Waterlevel Control Systems to serve as fill valves.

PEM Select EV100 - Bronze Solenoid Valves are designed for use with clean water. Operating voltage is 24VAC 50/60Hz,12W. Valves are diaphragm type with solenoid operated pilot valve, stainless steel fitted. Solenoid coil is epoxy encapsulated. Valves are equipped with slow closing orifice, manual by pass opening (with screw driver), adjustable micrometric flow control to regulate flow through valve and threaded 1/2" NPS/BSP electrical conduit connection. Pipe thread connections are either NPT or BSP as specified. Maximum pressure rating of valves: 75 PSI - 55 bar. The suggested flow rate for these valves is between the pressure loss of approximately (**A**) 2 PSI-0.15 bar and the suggested maximum pressure loss of (**B**) 10 PSI - 0.7 bar. For best performances select valve for flow rate from values given below. For fountains, the pool overflow shall always match in absorption rate the inflow rate of the water supply.





NOTE: These Valves might require suitable Backflow Preventers.

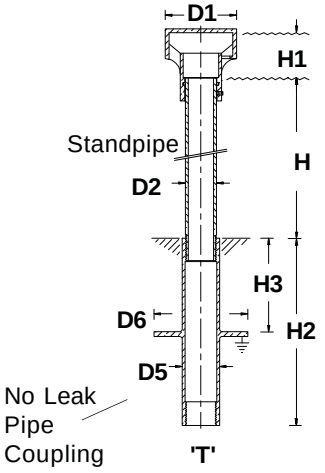
#	PEM select	PIPE size	Flow Range L/min (A) (B)	Flow Range GPM (A) (B)	L mm	L inch.	H mm	H inch.	W mm	W inch.
462-0120	**EV102**	3/4"	38 / 95	10 / 25	92.0	3.625"	113.6	4.470"	71.5	2.813"
462-0130	**EV103**	1"	57 / 151	15 / 40	98.4	3.875"	115.1	4.531"	71.5	2.813"
462-0140	**EV104**	1 1/4"	84 / 265	22 / 70	124.0	4.875"	139.7	5.500"	90.1	3.578"
462-0150	**EV105**	1 1/2"	151 / 340	40 / 90	124.0	4.875"	143.7	5.656"	90.1	3.578"
462-0160	**EV106**	2"	246 / 568	65/150	147.7	5.813"	149.2	5.875"	119.1	4.688"

Fill Spouts for Concrete Ponds

R1240/60 PEM

The Fill Spouts are designed to fill ponds without undue splashing, noise or disturbance from well above highest possible water level.

The Fill Spouts consist of 3 basic parts:
1. Cast bronze **PEM 6374 series No Leak Pipe Coupling** with pipe threads. Flange & Liner Clamp mounted to top of coupling to seal surface pool liner.
2. Brass standpipe with pipe threads.
3. Cast bronze deflector head, with 'O' ring seal and stainless steel lock screw to fasten to stand pipe. Threaded pipe connections must have the threads securely sealed with Teflon Tape or Thread Sealer.

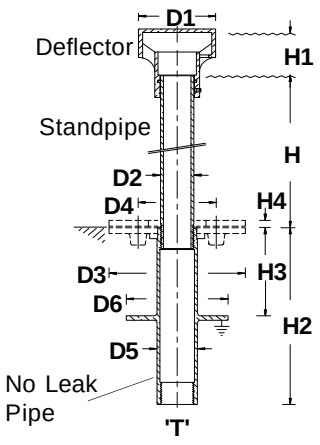


DIMENSIONS: #	PEM	T	H mm	H1 mm	H2 mm	H3 mm	D1 mm	D2 mm	D5 mm	D6 mm
466-011	**R1241**	**1"**	**500**	48	200	100	76	33.4	40	100
466-014	**R1244**	**1"**	**1000**	48	200	100	76	33.4	40	100
466-021	**R1261**	**1 1/2"**	**500**	50	200	100	90	49.0	55	100
466-024	**R1264**	**1 1/2"**	**1000**	50	200	100	90	49.0	55	100

Fill Spouts for Liner Ponds

R1240/60 PEM

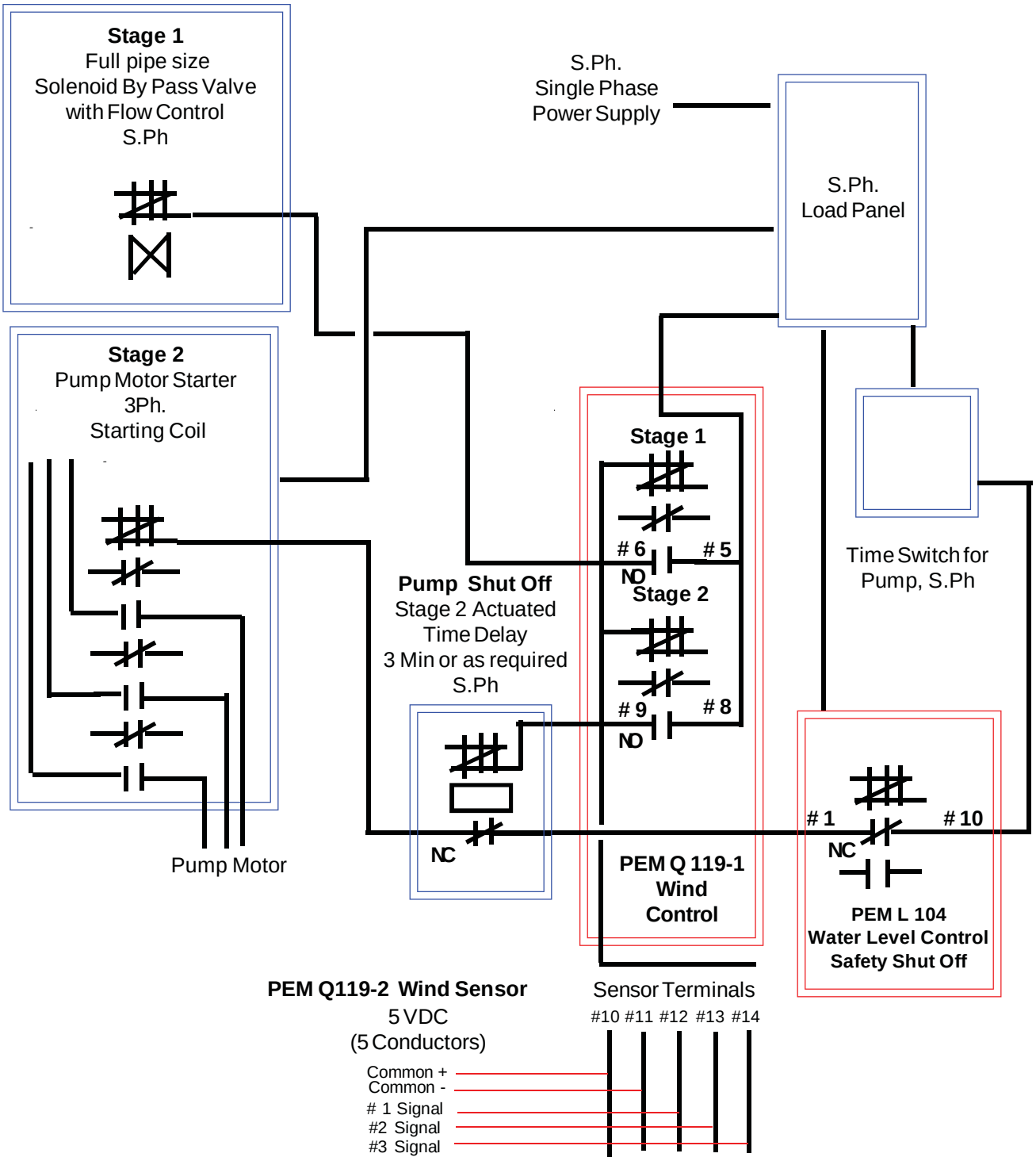
The Fill Spouts are designed to fill ponds without undue splashing, noise or disturbance from well above highest possible water level.
The Fill Spouts consist of 3 basic parts:
1. Cast bronze **PEM 6374 series** No Leak Pipe Coupling with pipe threads Flange & Liner Clamp mounted to top of coupling to seal surface pool liner.
2. Brass standpipe with pipe threads.
3. Cast bronze deflector head, with 'O' ring seal and stainless steel lock screw to fasten to stand pipe.
Threaded pipe connections must have the threads securely sealed with Teflon Tape or Thread Sealer.



DIMENSIONS: #	PEM	T	H mm	H1 mm	H2 mm	H3 mm	H4 mm	D1 mm	D2 mm	D3 mm	D4 mm	D5 mm	D6 mm
466-013	**R1243**	**1"**	**500**	48	200	100	6	76	33.4	134	76	40	100
466-016	**R1246**	**1"**	**1000**	48	200	100	6	76	33.4	134	76	40	100
466-023	**R1263**	**1 1/2"**	**500**	50	200	100	6	90	49.0	152	95	55	100
466-026	**R1266**	**1 1/2"**	**1000**	50	200	100	6	90	49.0	152	95	55	100

SUGGESTED STANDARD CONTROL SCHEMATIC FOR USE WITH PEM Q119 WIND CONTROL

The Wind Control Sensor (Anemometer) must always be installed up wind and in relationship to the object to be controlled.



The Solenoid By Pass Valve or solenoid actuated pressure reducing valve used for lowering the sprayheight of spray effects during period of light wind must be of full pipe size of the manifold pipe, as the friction loss of the flow through this valve transforms the pressure lost (reduced) to the pressure this valve cannot lose. If, for example as a bypass valve a smaller pipe size solenoid valve is used, the reduction in flow & pressure of the spray manifold can be insufficient to lower the spray effect (s) as specified.

PEM Q119

SINGLE or DUAL STAGE WIND CONTROL #477-0350

PEM Q119 WIND CONTROL is an electronic device to monitor wind velocities.
At 2 selected wind velocities the control can be set independently to activate separate control circuits on rise of wind velocity above the set point and automatically de-activate upon lowering of the wind velocity to below the set point . The control can use up to 3 anemometers to provide multiple zone sensing and increased reliability. The highest wind speed detected from up to three anemometers is displayed in a digital LED display and used for control purposes. Built in adjustable time delay function prevents the fast cycling of controlled circuits due to gusty winds.
The basic wind control consists of 2 parts: Control panel and Anemometer(s) interconnect with low voltage, shielded 3 conductor cable. The anemometer(s) normally installed up wind from the object to be protected in relationship to same and beyond the reach of vandals. The anemometer(s) is/are of the optical interruptor type, with a 3 cup impeller spinning on ball bearings. The anemometer and cups are made of aluminum.
The anemometer is mounted offset on an aluminum junction box with 3/4" conduit connection (NPT/BSP).The mounting configuration permits the installation of the anemometer close to solid objects. The control panel is enclosed in a NEMA/CEMA type 12 (4), moisture and dust proof polycarbonate enclosure with clear cover.
Wiring between anemometer and control panel to be with 3 shielded conductors for each anemometer.
Recommended wire sizes: Up to 150m,500 feet = # 18 AWG,1.6mm^2 shielded (1.5mm3)

Q119-2 # 477-0352, 5 VDC ANEMOMETER

MONITORED WIND VELOCITY RANGE FOR BOTH STAGES:
2.0 - 62 mp/h - 3.2 to 100 km/h - 1.7 to 54 Nautical mp/h

DIMENSIONS:
Control Panel Enclosure,
185mm / 7.280" - Width, 175mm / 6.89"- Height, 100mm / 3.930"- Depth. (Conduit openings to suit by installer.)
Sensor:
220mm / 8.660"-Height, 150mm / 5.900" - Width, 170mm / 6.690" - Depth
Cable supplied with control :
30m / 100 feet of 18/3 AWG, 1.6mm^2, shielded 3 wire cable

Basic Control Assembly PEM Q 119 #477-0350 consists of:
1 x Q119-1
1 x Q119-2
30m/100' cable
Additional Anemometers Q119-2 & cable extra & additional

Q119-1 # 477-0351,CONTROL PANEL 120/240VAC , 50/60 Hz. , 1 A.

U.L. Listed , 2003.
c.U.L. Listed, 2003.

APPLICATIONS:
Normal application of PEM Q119 Wind Control for fountains is in the control of spray effects, that the same will not be carried out of the fountain pool by winds causing distress and hazards to passers-by.
Used as a 1 Stage Control
Normally used to shut off the fountain pump(s).
Used as 2 Stage Control
Stage 1 of the wind control is used to lower the spray effects to suitable heights during periods of light winds by means of electrical controlled by-pass valves or shutting off parts of a multiple pumping system. Stage 2 of the wind control is used to shut off the spray effects completely during periods of high winds.
Once the winds subside, the wind control automatically returns the spray effects to normal operation.
This system shall not be used in fountains where people might walk across covered (dry surface) fountains during periods of high winds when the control shuts down the sprays.
Other applications are to monitor the wind velocities and engage alarms or other protective devices at 2 separate, adjustable, wind velocities. Other applications can be found at marinas, high bridges, greenhouses and inflatable covers over pools and tennis courts among many.

FUNCTIONS:

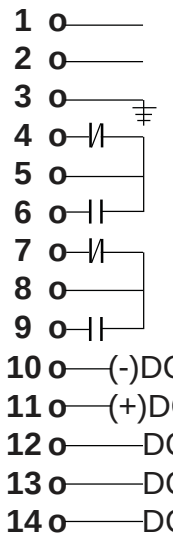
A. Individual stage set points
B. Auto - Off - Manual Switches
C. Indicator lights for activated stage(s)
D. Swing out cover to access terminals
E. Adjustable Time delay for each stage
F. LED read outs of actual wind velocities

TERMINALS:

1	(+) Power Supply, 120V/240Vac-50/60Hz
2	(-) Power Supply, 120V/240Vac-50/60Hz
3	Earth / Ground
4	1. Stage Normally Closed Contact, **OUT**
5	1. Stage Common,Max.240V.,10 Amp., **IN**
6	1. Stage Normally Open Contact, **OUT**
7	2. Stage Normally Closed Contact, **OUT**
8	2. Stage Common,Max.240V.,10 Amp., **IN**
9	2. Stage Normally Open Contact, **OUT**
10	Anemometer Power, 5 VDC (-) (OUT)
11	Anemometer Power, 5 VDC (+) (OUT)
12	Anemometer # 1 Signal (IN)
13	Anemometer # 2 Signal (IN)
14	Anemometer # 3 Signal (IN)

* The shield of the sensor cable must be grounded at control panel only, insulated at anemometer.

TERMINALS :



ELECTRICAL RATINGS:
Q119-1 # 477-0351 = 120/240VAC , 50/60 Hz. , 1.0Amp.
Q119-2, # 477-0352 = 5 VDC
Switch Ratings = Max. 240V, 10 A. - 120V, 10A. Non Inductive (Dry switch circuits , common(s) must be supplied)

CONTROLS PARTS

#	PEM	DESCRIPTION
491-0110	L101-51/-05	Transformer,120V
491-0120	L101-51/-06	Transformer, 240V
491-0130	L101-51/-08	Green Indicator Lamp,12V
491-0150	L101-51/-09	Relay, 12V
491-0160	L101-51/-10	Circuit Breaker,12V
491-0210	L101-71/-05	Transformer,120V
491-0202	L101-71/-06	Transformer, 240V
491-0230-	L101-71/-07	Red Indicator Lamp,12V
491-0240	L101-71/-08	Green Indicator Lamp,12V
491-0250	L101-71/-09	Relay (2) ,12V
401-0260	L101-71/-10	Circuit Breaker,12V
401-0410	L101-20	Float Switch Assembly
401-0510	L101-28/-1	Set of Box Cover bolts, for L101-01,-05-,-16.-31 or -32
401-0520	L101-28/-2	Set of Cover Bolts for L101-12 or -29
401-0530	L101-28/-3	Set of Plate Bolts for L101-31 or -32
401-0610	L101-61	Brass hanger for -12, -29 Floatswitch, custom made to order
402-0000	L104-1	Requires new Unit
402-0100	L104-100/-01	Replacement Plug In Processor
402-0110	L104-100/-05	Transformer,120V
402-0120	L104-100/-06	Transformer, 240V
402-0140	L104-100/-11	Fuse , 24V/2.5A.
402-0300	L104/-30	Single Float Switch Assembly *
402-0320	L104/-32	Safety Cut Off Brass Riser for Floatswitch (Not for -49)
402-0330	L104/-33	Water Make Up Brass Riser for Floatswitch (Not for -49)
402-0340	L104/-34	Operating Level Brass Riser for Floatswitch (Not for -49)
402-0360	L104/-36	Locking collar for Brass Riser for Floatswitch
402-0410	L104/-41	Complete cover for L104-42, -56 or -57
402-0510	L104-46/-1	Stainless Steel Cover with bolts
402-0520	L104-46/-2	Set of bolts for cover
402-0540	L104-48/-1	Cover with bolts
402-0546	L104-48/-6-1	Cover with bolts
402-0547	L104-48/-6-1-2	Set of bolts for cover
402-0548	L104-48/-1-5	Set of 3 Float switches
402-0549	L104-48/-6-5	Set of 3 Float switches
402-0550	L104-49/-2	Set of bolts for cover
402-0620	L104-49/-1	Brass hanger for -49 Floatswitch, custom made to given specs.
403-0100	Q117 Panel	Replace with new Q118 panel & sensor
403-0510	Q118 Panel	Requires complete new unit
403-0610	Q118/-07	Anemometer Assembly with brass base, less junction box
403-0620	Q118/07A	Anemometer Assembly without brass base (broken off Cup(s))
404-0110	R1290/-03	Internal Valve Assembly
404-0210	R1291/92-03	Internal Valve Assembly
404-0250	R1291/92/-05	Stainless Steel Cover with bolts
404-0260	R1291/92/-06	Set of bolts for cover
404-0320	R1293/-03	Internal Valve Assembly
404-0350	R1293/-05	Cover with bolts
404-0360	R1293/-06	Set of bolts for cover
404-0520	R1294/-01	Floatvalve assembly
404-0530	R1294/-02	Float for floatvalve
404-0550	R1294/-04	Main Valve Cover (If frozen Up)
404-0560	R1294/-05	Main Valve Diapraghm
404-0580	R1294/-07	Cover with bolts
404-0590	R1294/-08	Set of bolts for cover
404-0620	R1296/-01	Floatvalve assembly
404-0680	R1296/-07	Cover with bolts
404-0690	R1296/-08	Set of bolts for cover
404-0710	R1311/-05	Internal Floatvalve assembly
404-0730	R1311/-07	Tubing to Fill Valve (1.5m\5 feet)
404-0740	R1321/-10	(R1251/R1252) Fill Valve Diaphragm
404-0750	R1323/-10	(R1253) Fill Valve Diaphragm
404-0760	R1324/-10	(R1254) Fill Valve Diaphragm
404-0770	R1325/-10	(R1255) Fill Valve Diaphragm
404-0790	R1211/-07	Repair kit for R1211 Sensor Valve

PEM

SPRAY EQUIPMENT

INDEX 2013 - 8

SUPERSEDES 2008-1

Supersedes all previous editions & specifications.

CATALOG CODES FOR PEM SPRAY EQUIPMENT

ENGLISH

V	:	Spray Height
H	:	Spray Diameter
FL	:	Flow
L	:	" in L/min
G	:	" in USGPM
MC	:	Nozzle Pressure
m	:	Meters
Ft	:	Feet
T	:	Threaded Pipe Size (NPT,NPT or BSP)
Fl	:	Flange (ASA or BSP)
OV	:	Overall Height
OD	:	Overall Diameter
X	:	Nozzle Orifice
OX	:	Stream Size
Y	:	Number of Nozzles
UT	:	Submersion/Immersion
SS	:	Suction Strainer Orifices & Open Area required
F	:	Extent of solid sheet of water

FRANCAIS

V	:	Hauteur du jet
H	:	Diamètre du poussiere d'eau
FL	:	Courant d'eau
L	:	" L/min
G	:	" USGPM(E.U.)
MC	:	Pression au orifice
m	:	Meters
Ft	:	Feet(E.U.)
T	:	Filetage des tubes (NPT,NPT/BSP)
Fl	:	Brides (ASA or BSP)
OV	:	Hauteur
OD	:	Diametre
X	:	Calibre de l'adjutage
OX	:	Diametre du jet d'eau
Y	:	Nombre des adjutages
UT	:	Submersion/Immersion
SS	:	Filtre de Succion Grandeur d'orifice & m2
F	:	L'etendue solide d'eau

DEUTSCH

V	:	Springhoehe
H	:	Sprengdurchmesser
FL	:	Durchfluss
L	:	" in L/min
G	:	" in USGPM
MC	:	Duesen Druck
m	:	Meter
Ft	:	Feet
T	:	Rohrgewindegroesse (NPT,NPT/BSP)
Fl	:	Flanschgroesse (ASA/BSP)
OV	:	Hoehe
OD	:	Aussendurchmesser
X	:	Duesenbohrung
OX	:	Strahlstaerke
Y	:	Duesenanzahl
UT	:	Einbautiefe
SS	:	Ansaugfilter/Pumpe Lochgroesse & m2
F	:	Abbruch der Wasserhaut

ESPANOL

V	:	Altura del rocio
H	:	Diametro de rocio
FL	:	Caudal d'agua
L	:	" L/min
G	:	" USGPM(E.U.)
MC	:	Carga de presion
m	:	Metro
Ft	:	Feet(E.U.)
T	:	Rosca de tuberia (NPT,NPT or BSP)
Fl	:	Brida (ASA or BSP)
OV	:	Altura de rociadora
OD	:	Diametro de rociadora
X	:	Tamano del orificio
OX	:	Dia. de agua encima de chorro
Y	:	Numero de los chorros
UT	:	Inmersion de rociadora
SS	:	Cesta de aspiracion de bomba Orificio et m2 de orificios
F	:	Extension de rocio solido

HUNGARIAN

V	:	Vizsuga'r Magasse'g
H	:	Vizsuga'r A'tme'ro
FL	:	A'ta'ramló Vizmennyiség
L	:	A'ta'ramló Vizmennyiség L/min
G	:	A'ta'ramló Vizmennyiség US Gallon/min
MC	:	Fuvóka Viznyoma's
m	:	Méter
Ft	:	La'b
T	:	Menetes Csőméret (BSP)
Fl	:	Csőkarima (BSP)
OV	:	Teljes Magassa'g
OD	:	Külső Átmérő
X	:	Fuvóka Nyilás
OX	:	A'ramlat Mérete
Y	:	Fuvóka'k Száma
UT	:	Beépitési Mélysa'g
SS	:	Szivószűrők Nyila'sa és Szabad Tér Igény
F	:	Összefüggő Vizfüggöny Kiterjedése

RUSSIAN

V : Высота распыления
H : Диаметр распыления
FL : Расход
L : в л/мин
G : в УСГПМ
MC: Давление в сопле
m : в метрах
Ft : в футах
T : Диаметр трубы с резьбой (НПТ, НПТ или БСП)
Fl : Фланец (АСА или БСП)
OV: Общая высота
OD: Общий диаметр
X : Сопротивление в сопле
OX: Выходной размер струя
Y : Число сопол
UT: Погружение
SS : Всасывающая сетка — отверстия и свободная площадь
F : Размер слоя воды (глубина)

CHINESE

V 噴射高度
H 噴洒直徑
FL 流量
L 公升/分
G 美加侖/分
MC 噴咀出口壓力
m 公尺水柱
Ft 英呎水柱
T 管牙管徑 (公制或英制)
Fl 法蘭 (英制或英制)
OV 噴咀全高
OD 噴咀頭視直徑
X 噴咀出水直徑
OX 水柱噴出直徑
Y 噴咀數量
UT 噴咀底至水面的高度 (UT1 : 噴咀頂淹沒深度)
SS 濾網
濾孔及孔總面積要求
F 喇叭花造形噴出水膜不破的部分

PEM 01050
NPT PIPE FLOW STRAIGHTENERS

PEM 01050 Series Flow Straighteners can be fitted into the inflow of same size PEM Jets affected by turbulence in the supply pipe such as : PEM 02-1, 02-2, 02-6, 14 Series, 15-6, 28 Series, 31 Series,34, 52, 53, 60 Series, 80 Series, 90 Series, 626, 700 Series, 840 Series, 870 Series, 950 Series, 1400 Series, 1560 Series, 1570 Series , 1610 Series.
These flow straighteners work best at lower spray heights, with all of the above jets and nozzles as well as others.
PEM 01050 Series Flow Straighteners are not for use with **PEM 800 Series Brass Stream Jets**, which already have the flow straighteners incorporated.
Marked improvements in spray effects can be achieved at low sprayheights with Clear Stream Jets .
These flow straighteners are ideal for use with water switches when connected with vertical checkvalve to the water switch. Spray effect performance can improve dramatically. Retro fitted to existing installations can improve the spray effects.

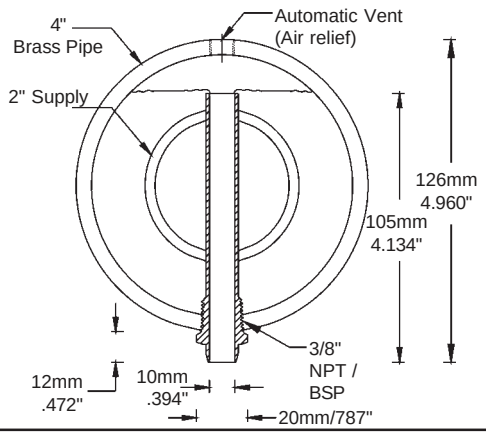
PEM 01050 Series Flow Straighteners are not designed for high water pressure and debris loaded water .

PEM #	**01053 503-6013**	**01054 503-6014**	**01055 503-6015**	**01056 503-6016**	**01057 503-6017**	**01058 503-6018**
T(NPT)	**1/2"**	**3/4"**	**1"**	**1 1/4"**	**1 1/2"**	**2"**
OV mm	30mm	39mm	41mm	43 mm	45mm	54mm
OV Inches	1.181"	1.535"	1.614"	1.675"	1.771"	2.152"
FL L/min*	70	170	230	305	400	450
FL GPM*	18	45	60	80	106	120
PR *m(appr.)	2.8m	2.8m	2.5m	2.2m	2.0m	2.0m
PR * Ft Head	9.3'	9.3'	8.3'	7.3'	6.6'	6.6'
SS	3mm\0.125"	3mm\0.125"	3mm\0.125"	3mm/0.125"	3mm\0.125"	3mm\0.125"

T = Pipe Size with (male) outside NPT pipe thread also suitable for BSP pipe.
OV = Overall Height/Length of fitting
FL* = Suggested maximum flow
PR* = Pressure loss through fitting at maximum flow
SS = Suction Strainer maximum size orifice openings
PEM 01050 Series Flow Straighteners are made of Virgin Metal Red Brass Pipe, with ABS molded nozzle flow straightener, secured with a stainless steel bolt to pipe.

PEM 0114
RAIN CURTAIN NOZZLE
#503-9020

PEM 0114 Nozzle is designed for medium size free falling rain curtain effects to provide an even outflow of all nozzles over the length of a rain curtain effect. PEM 0114 is made of brass and has 3/8" NPT male pipe thread. The discharge manifold to be 4" pipe size. The 0114 nozzles are threaded into the bottom of the discharge manifold pipe. Care is to be taken, that all nozzles are inserted to the same depth.



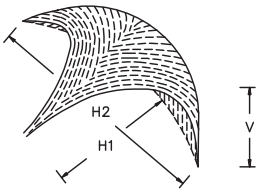
The discharge manifold must have provisions for adjustment to a perfect horizontal balance throughout the full length of the pipe as the nozzles act as overflows within the discharge pipe. Supply pressure must be valve regulated. On regular intervals the discharge pipe also to have air vents on the top, automatic for pressure filled discharge pipe or just open vents for non pressure filled pipe (water does not rise to top of discharge pipe). The water effect discharged is a ragged, broken stream of droplets depending in size on the head of water overflowing into the nozzle. The less head the finer and further apart the droplets. At full pressure a ragged stream of water is ejected.

Closest spacing of nozzles: 25 mm \ 1.0" center to center.

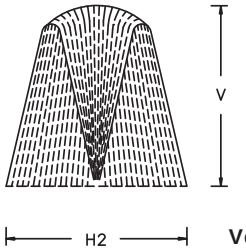
Flow requirements range from 1 Liter /Quart per minute for 10 nozzles to app. 25 L/min \ 6.6 USGPM per nozzle.

Basic Rule : The less water, the better the equal horizontal alignment of all nozzle intakes must be. **SS = 3mm\0.125"**

PEM 02-1 & 02-2
FAN JETS
#504-1100, PEM 02-1, T = 3/4"
#504-1200, PEM 02-2, T = 1"



45⁰



Vertical

Performances at 45⁰

H1	H2	V	FL	MC
m	m	m	L	m
0.50	1.20	0.25	13	2.20
1.00	2.80	0.60	39	2.70
1.50	4.40	0.95	56	3.60
2.00	6.00	1.30	71	7.00
Ft	**Ft**	**Ft**	**G**	**Ft**
2.0	*4.9*	*1.1*	*4.8*	*6.9*
3.0	*8.2*	*1.2*	*8.8*	*8.1*
4.0	*11.2*	*2.5*	*11.9*	*10.0*
5.0	*14.4*	*3.2*	*14.8*	*14.2*
6.0	*17.8*	*3.9*	*17.2*	*16.9*
7.0	*21.0*	*4.5*	*19.6*	*17.4*

Vertical Performances

V	H2	FL	MC
m	m	L	m
0.5	2.0	35	1.10
1.0	5.0	62	1.60
1.5	8.0	84	2.70
Ft	Ft	G	Ft
2.0	*9.2*	*11.9*	*4.0*
3.0	*14.8*	*15.6*	*5.3*
4.0	*21.0*	*19.1*	*6.3*
5.0	*26.2*	*22.2*	*8.9*

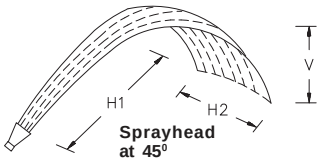
PEM 02 Series Fan Jets are made of cast bronze. Best solid sheet performances are at lower performances shown. Water supply to jet must be undisturbed, non turbulent. For directional adjustment use PEM 500 series Swivel Union. Use PEM 02-1, 3/4" for lowest performances only.

X = 4mm x 76mm/0.156" x 3.0" SS = 3mm/0.125"

PEM 02-6 NARROW FAN JET

For directional adjustment use PEM 500 series Swivel Union.
X: 5mm\0.2" X 120mm\4.72", SS:3.0mm/0.125"

#504-1610, PEM 02-6-1, T= 1 1/2"
#504-1620, PEM 02-6-2, T= 2" (Male)

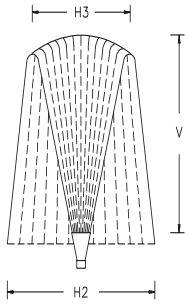


Sprayhead at 45⁰

Performances at 45⁰

H1	H2	V	FL	M C
m	m	m	L	m
0.5	0.23	0.10	95	0.4
1.0	0.48	0.30	126	0.7
2.0	0.95	0.60	260	1.1
3.0	1.45	1.00	281	1.7
4.0	2.00	1.50	350	2.3
Ft	**Ft**	**Ft**	**G**	**Ft**
2	0.92	0.70	26.7	1.5
4	1.81	1.35	38.6	2.5
5	2.37	1.80	46.0	3.0
10	4.74	3.30	76.1	5.8
12	5.68	4.80	87.2	6.9

Sprayhead Vertical



Vertical Performances

V	H3	H2	FL	MC
m	m	m	L	m
0.5	0.40	0.50	180	0.7
1.0	0.64	1.00	252	1.2
2.0	1.42	2.30	420	2.2
3.0	2.65	4.20	570	3.2
Ft	**Ft**	**Ft**	**G**	**Ft**
2	1.48	2.00	54	3.0
4	3.00	4.00	78	6.0
5	4.00	5.70	92	7.0
10	8.70	13.80	154	12.0

PEM 02-6 Fan Jets are made of cast bronze. Best solid sheet performances are at lower performances shown. Water supply to jet to be undisturbed, non turbulent.

#504-2300 PEM 03-4
Clear Stream Jet with Pressure Equalizer

PEM 03-4 Swivel mounted Clearstream Jets are for the creation of exceptional clear stream performance spray rings or other spray manifolds that require all equally even unbroken streams of water. The built in pressure reduction in each jet equalizes the output of a number of jets on a common spray manifold.

Minimum pipe size for equalizing spray manifold = 3" - 76mm. For strainer size check technical information in back of catalog. Pipe Connection is 1/2" Male NPT. Included angle of directional adjustment of jet = 30°

Due to its construction this jet is to be used solely in vandal free locations.

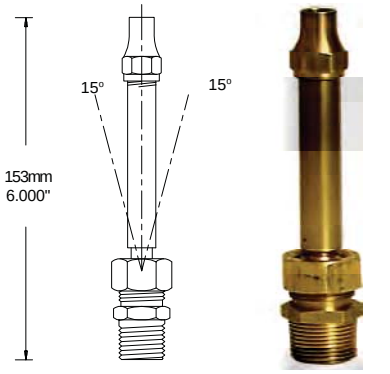
PEM 03-4 is made of brass, chrome plating is available at an extra cost.

DIMENSIONS :

OV	153mm\6.000"
SS	3mm\0.125"
T	1/2" NPT (male)

PERFORMANCES :

V	Fl	MC
m	**L**	**m**
1.00	14.0	4.9
1.50	17.0	6.9
2.00	19.0	8.5
3.00	23.0	11.7
4.00	26.0	13.8
5.00	29.0	15.6
6.00	31.0	18.3
Ft	**G**	**Ft**
5.0	*4.2*	*23*
10.0	*6.3*	*39*
15.0	*7.3*	*48*
20.0	*8.2*	*60*



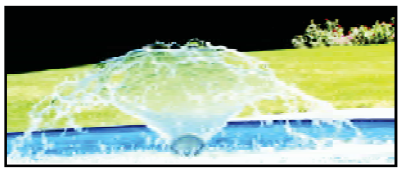
#504-3100 PEM 07-1
90° Sheet of Water Jet

PEM 07-1 is made of cast bronze and stainless steel fitted. For vertical performances convert H1 to V and reduce 50% approximately and increase H2 to 200% approximately. Watersupply to jet must be non turbulent for solid sheet of water effect with straight inflow pipe length of 10 x pipe size. Best solid sheet performances are up to-H1 = 0.75 m \ 2.5 Ft.

For vertical, high, spray effect on vertical riser pipe, use a 90 degree street elbow to mount jet.

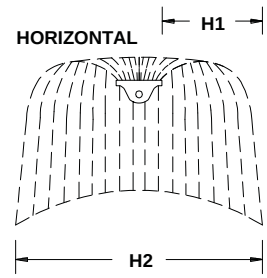
DIMENSIONS :

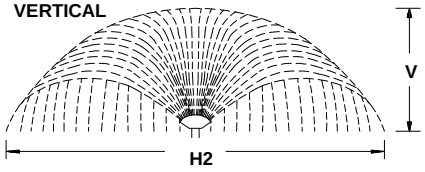
OV	93mm\3.670"
OD1	191mm\7.520"
OD2	124mm\4.890"
SS	3mm\0.125"
T	**# 504-3110 / 07-1-1**:1 1/2"
T	**# 504-3120 / 07-1-2**:2"

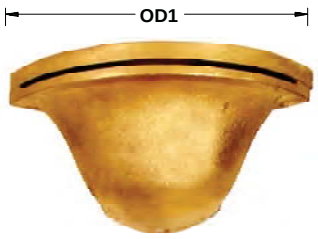


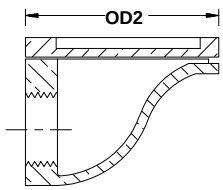
PERFORMANCES IN WALL MOUNTED, HORIZONTAL OUTPUT POSITION
0.5 M \ 20" ABOVE WATERLEVEL.

H1	H2	Fl	MC
m	**m**	**L**	**m**
0.25	0.45	57	0.70
0.50	0.80	110	1.50
0.75	1.10	152	2.30
1.00	1.30	185	3.05
1.50	1.80	246	4.70
2.00	2.40	314	7.30
Inches	**Inches**	**G**	**Ft**
12"	*21"*	*19*	*2.5*
24"	*27"*	*33*	*5.7*
36"	*49"*	*45*	*9.0*
48"	*59"*	*55*	*12.3*
60"	*70"*	*65*	*15.4*
72"	*82"*	*75*	*18.8*









#504-3200 PEM 07-3
170° Sheet of Water Jet

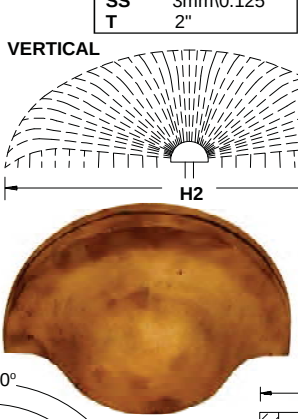
PEM 07-3 is made of cast bronze and is stainless steel fitted. For vertical performances convert H1 to V and reduce 50% approx. and increase H2 to 160% approx. Best solid sheet performances are up to H1 = 0.75 m \ 2.5 Ft.
Water supply to jet must be non turbulent for solid sheet of water effect with straight inflow pipe length of 10 x pipe size. For vertical, high, spray effects on vertical riser pipe, use a 90 degree street elbow to mount jet.

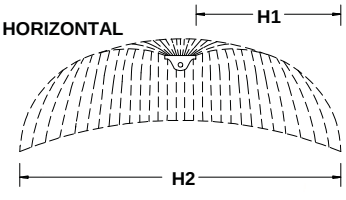
DIMENSIONS :

OV	94mm\3.710"
OD1	210mm\8.270"
OD2	117mm\4.610"
SS	3mm\0.125"
T	2"

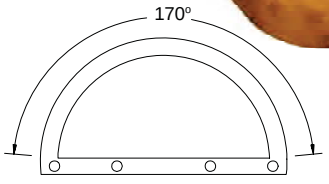
PERFORMANCES IN WALL MOUNTED, HORIZONTAL OUTPUT POSITION 0.5 M \ 20" ABOVE WATERLEVEL.

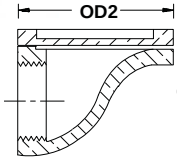
H1	H2	Fl	MC
m	**m**	**L**	**m**
0.25	0.70	120	0.70
0.50	1.20	230	1.50
0.75	1.70	318	2.30
1.00	2.20	382	3.05
1.50	3.20	516	4.70
2.00	4.20	660	7.30
Inches	**Inches**	**G**	**Ft**
12"	*35"*	*37*	*2.5*
24"	*55"*	*66*	*5.7*
36"	*79"*	*98*	*9.0*
48"	*99"*	*117*	*12.3*
60"	*120"*	*138*	*15.4*
72"	*150"*	*159*	*18.8*

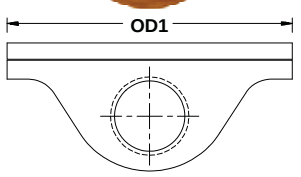




07-3
Side view and Top View







PEM 08

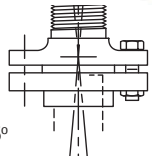
DIRECTIONAL ADJUSTMENT FLANGES

#504-4000

PEM 08 Series Adjustment Flanges are made of cast bronze, stainless steel fitted. **PEM 08 Series** Adjustment Flanges are designed to permit limited directional adjustment of spray jets or nozzles that do not have swivel bases. Maximum 5º of adjustment from center line is possible.

08-2
3/4"

08-12
8"



Max. Adjustment
Off Centerline: 5º

#	PEM	T "	O V mm	O V Inches	OD mm	OD Inches
504- 4010	08-1	1/2"	57	2.244"	84	3.310"
504- 4020	08-2	3/4"	57	2.244"	84	3.310"
504- 4030	08-3	1"	62	2.450"	84	3.310"
504- 4040	08-4	1 1/4"	65	2.560"	110	4.330"
504- 4050	08-5	1 1/2"	70	2.760"	110	4.330"
504- 4060	08-6	2"	80	3.150"	118	4.645"
504- 4070	08-7	2 1/2"	80	3.150"	130	5.120"
504- 4080	08-8	3"	90	3.544"	162	6.375"
504- 4090	08-9	4"	96	3.780"	170	6.688"
504- 4100	08-10	6"	104	4.090"	308	12.130"
504- 4200	08-12	8"	155	6.110"	343	13.500"

To adjust: Loosen bolts on opposite side to intended direction of adjustment and tighten bolts in line of intended adjustment, then lock all bolts.The adjustment flanges are for submersed installation. For above water adjustment use **PEM 500** series Ball Swivel Unions.

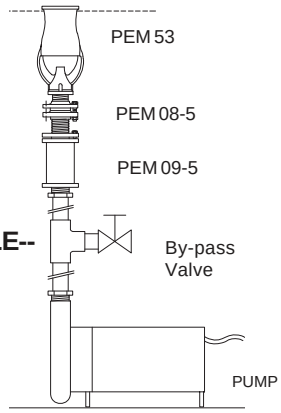
PEM 09

ELEVATI0N ADJUSTMENTS

#504-4200

09-4

EXAMPLE--



PEM 09 Series Elevation Adjustments are made of bronze, brass and copper, stainless steel fitted. **PEM 09** Series Jet & Nozzle Adjustments are designed primarily for use with waterlevel dependent cascade, geyser or foam jets to change or alter nozzle immersion AFTER INSTALLATION. By decreasing the nozzle immersion, the sprayheight increases and the spray effect gets lighter, by increasing the nozzle immersion the sprayheight decreases and the spray effects gets heavier. The use of this adjustment permits a better matching of the jet to available pump performances. Sprayheights of water-level dependent spray effects can be increased without changing the pump manifolding. The adjustment range is appr. 50 mm/2.000", sufficient for most applications that might arise. The elevation adjustments are for use below waterlevel only.

A locking device assures permanence of adjustment. For ease of installation, the device must be in locked position prior to mounting of jet.

#	PEM	T"	mm	OV Inches
504- 421	09-1	1/2"	130	5.120"
504- 422	09-2	3/4"	130	5.120"
504- 4230	09-3	1"	130	5.120"
504- 4240	09-4	1 1/4"	150	5.910"
504- 4250	09-5	1 1/2"	150	5.910"
504- 4260	09-6	2"	200	7.870"
504- 4280	09-8	3"	200	7.870"

Maximum extension over 'OV' = 50mm/2.0",

Extension riser nipple has screw adjustment with positive lock.

Pipe connections, NPT or BSP, must be specified.

PEM 14 #504-5000

WATERLEVEL INDEPENDENT AERATING JETS

14-3

14-6

14-7

PEM #	14-3 504-5010		14-6 504-5030		14-7 504-5050	
T	1"		1 1/2"		2"	
OX	51mm \ 2.0"		51mm \ 2.0"		76mm \ 3.0"	
OV	166mm \ 6.5"		170mm \ 6.7"		248mm \ 9.8"	
OD	73mm \ 2.9"		73mm \ 2.9"		110mm \ 4.3"	
X (+/-)*	2mm \ 0.08"		3mm \ 0.12"		4mm \ 0.16"	
SS	1.7mm \ 0.065"		2mm \ 0.08"		3mm \ 0.125"	
V	FL	MC	FL	MC	FL	MC
m	L	m	L	m	L	m
0.50	76	2.5	87	2.75		
1.00	91	4.3	106	4.58		
1.50	106	5.9	129	6.10	269	3.4
2.00	118	7.1	144	7.62	311	4.0
2.50	163	8.1	163	9.15	347	5.1
3.00			182	10.70	383	6.1
4.00			238	13.70	440	7.7
5.00					485	9.8
6.00					526	12.2
Ft	G	Ft	G	Ft	G	Ft
2	22	10	24	10		
3	24	13	27	13		
4	26	17	31	17		
5	28	20	33	20	71	11
6	30	23	37	23	79	13
8	34	29	42	29	90	15
10	43	48	48	35	101	20
12			56	42	111	23
15			73	53	123	31
20					139	41

PEM 14 Series Waterlevel Independent & Flow Adjustable Aerating Jets are made of cast bronze and brass, stainless steel fitted and are for installation above water level. The complete jet has to be above waterlevel.
For installations into fountain pools use **PEM 14-10 Series immersible** jets.
All **PEM 14 Series Jets** have an adjustable after installation flow control.

* - 'X ' Output is adjustable after installation .
Performances shown are with shown 'X' opening.

PEM #	14-12 504-5220		14-14 504-5240		14-16 504-5260	
T	1"		1 1/2"		2"	
O X	51mm\2.0"		51mm\2.0"		76mm\3.0"	
OV	166mm\6.5"		170mm\6.7"		248mm\9.77"	
OD	76mm\3.0"		76mm\3.0"		130mm\5.1"	
UT	126mm\5.0"		132mm\5.2"		152mm\6.0"	
X (+/-)*	2mm\0.08"		3mm\0.12"		4mm\0.16"	
SS	1.7mm\0.065"		2mm\0.08"		3mm\0.125"	
V	FL	MC	FL	MC	FL	MC
m	L	m	L	m	L	m
0.50	76	2.5	87	2.75		
1.00	91	4.3	106	4.58		
1.50	106	5.9	129	6.10	269	3.4
2.00	118	7.1	144	7.62	311	4.0
2.50	163	8.1	163	9.15	347	5.1
3.00			182	10.70	383	6.1
4.00			238	13.70	440	7.7
5.00					485	9.8
6.00					526	12.2
Ft	G	Ft	G	Ft	G	Ft
2	22	10	24	10		
3	24	13	27	13		
4	26	17	31	17		
5	28	20	33	20	71	11
6	30	23	37	23	79	13
8	34	29	42	29	90	15
10	43	48	48	35	101	20
12			56	42	111	23
15			73	53	123	31
20					139	41

* - 'X ' Out put is adjustable after installation . Performances shown are with shown 'X' opening.

#504-5200 PEM 14-10

WATERLEVEL INDEPENDENT PARTIAL IMMERSIBLE AERATING JETS

14-16

14-14

14-12

PEM 14-10 Series Jets are made of cast bronze, brass and copper, stainless steel fitted and have an adjustable after installation flow control. **PEM 14-10** Series Waterlevel Independent, Immersible and Flow Adjustable Aerating Jets are for installation into the water of a pool with only the top of the jet protruding above the water. For installations out of the water use **PEM 14** Series jets. Dimension **'UT'** is maximum immersion of jet.

PEM #	15-3 504-6010		15-6 504-6020	
V	FL	MC	FL	MC
m	L	m	L	m
0.25	48	2.1		
0.50	68	3.2		
1.00	87	4.9	198	1.48
1.50	103	6.4	223	2.74
2.00	116	7.7	260	3.44
2.50	128	8.4	295	4.15
3.00	139	9.9	335	4.99
4.00	151	11.8	452	6.90
Ft	G	Ft	G	Ft
1	15.1	7.5		
2	18.3	11.2		
3	22.5	15.4	50.5	6.5
4	24.9	18.0	56.1	7.4
5	27.0	21.0	59.0	9.0
6	29.6	23.9	65.0	10.9
8	33.6	28.5	76.9	13.2
10	37.0	32.5	88.6	16.4
12	40.5	36.7	105.7	19.7

#504-6000 PEM 15-0

WATERLEVEL INDEPENDENT PARTIAL IMMERSIBLE CASCADE JETS

PEM 15 Series Jets are made of cast bronze, brass and copper. PEM 15 Series Waterlevel Independent Cascade Jets are designed for use with 'dirty' water as they can digest solids to the orifice size shown. These jets have the best foaming / white water spray effect in the lower sprayheights.

The air intake has to be well above waterlevel if the jets are centered in a smaller pool to avoid surge oscillation.

PEM #	15-3 504-6010	15-6 504-6020
T	1"	1 1/2"
OX	35mm / 1.378"	50mm / 2.00"
OV	92mm / 3.622"	149mm / 5.87"
OD	42mm / 1.660"	60mm / 2.37"
SS	8mm / 0.325"	18mm / 0.71"
UT	67mm / 2.640"	129mm / 5.08"

15-6

15-3

PEM #	16-3 504-7010		16-7 504-7030			
T	1" Male		3" Female			
OX	51mm/2.000"		76mm/3.000"			
OV	133mm/5.236"		381mm/15.000"			
OD	87mm/3.430"		114mm/4.490"			
X	4mm/0.160"		8mm/0.320"			
UT	93mm/3.670"		331mm/ 13.040"			
V	FL	MC	FL 'A'	MC 'A'	FL 'B'	MC 'B'
m	L	m	L	m	L	m
0.25	68	3.3				
0.50	88	4.7				
1.00	124	7.0				
1.50	155	9.0	410	3.30		
2.00	182	10.7	450	4.90	490	5.8
2.50	207	12.3	505	5.30	570	7.0
3.00	226	13.7	560	8.10	655	8.1
4.00	256	16.3	660	10.20	755	10.2
5.00			745	12.60	848	12.6
6.00			810	14.40	920	14.4
Ft	G	Ft	G	Ft	G	Ft
1	19.3	11.2				
2	24.9	15.7				
3	32.8	22.0				
4	36.2	25.3				
5	41.1	29.5	108	12		
6	45.9	33.9	125	15	148	19
8	54.7	39.4	135	19	162	21
10	59.7	44.9	148	24	173	27
12	64.8	50.2	164	29	190	31
15			185	34	211	34
20			214	40	243	47

#504-7000 PEM 16-0

WATERLEVEL INDEPENDENT PARTIAL IMMERSIBLE CASCADE JETS

PEM 16 Series Jets are made of cast bronze, brass and copper.

PEM 16 Series jets require suction straining as indicated. The air intake has to be well above waterlevel if the jets are immersed into a pool to avoid surge oscillation.

PEM 16-7 is supplied with internal adjustment to provide either effect **'A'**, a slender aerated cascade spray, using less water & pressure or type **'B'**, a heavy very impressive cascade spray using more water & pressure. Low to intermediate spray heights are most recommended.

16-7

16-3

PEM 18-1

BELL JETS

#504-8100

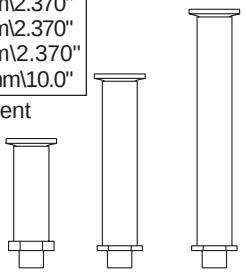
PEM 18-1 are made of copper, brass and bronze, stainless steel fitted.

#	PEM	T	OV	OD
504-8110	**18-1A**	1/2"	152mm\6.00"	60mm\2.370"
504-8120	**18-1B**	1/2"	229mm\9.00"	60mm\2.370"
504-8130	**18-1C**	1/2"	305mm\12.00"	60mm\2.370"
504-8140	**18-1S**	1/2"	89mm\3.500"	254mm\10.0"

PEM 18-1A with PEM 18-1S

PEM 18-1S
Tripod Stand w/ 1/2" T

Performance Range for all 18-1, variable due to adjustment
H: 0.2-0.8m \ 8.0"-30"
FL: 6-30 L \ 1.6-8.0 G
MC: 0.8-1.2m \ 2.5-4.0 Ft + elevation above waterlevel
X: (Average) 3mm \ 0.125" could be smaller or larger.
SS: 1.5mm\0.065"
Deflector plate is adjustable for diameter of bell.
Chrome plated finish is standard.
Also available:
504-8190 Series, 18-1X, custom made height & pipe connection



18-1A **18-1B** **18-1C**

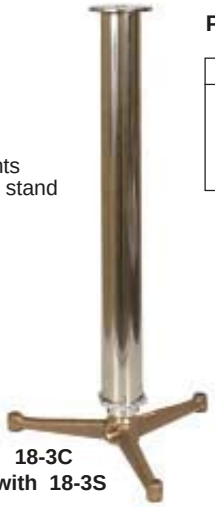
PEM 18-3

BELL JETS

#504-8200

Jet mounts directly on stand

18-3S
Tripod Stand with 3/4" T

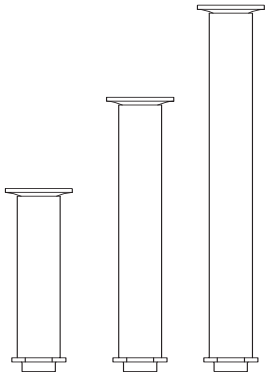


18-3C with 18-3S

PEM 18-3 are made of copper, brass and bronze, stainless steel fitted.

#	PEM	T	OV	OD
504-8210	**18-3A**	1"	305mm\12.00"	84mm\3.310"
504-8220	**18-3B**	1"	457mm\18.00"	84mm\3.310"
504-8230	**18-3C**	1"	610mm\24.00"	60mm\3.310"
504-8240	**18-3S**	1"	51mm\2.00"	305mm\12.0"

Deflector plate is adjustable for diameter of bell.
Performance Range for all 18-3 , variable due to adjustment
H = 0.6-1.2m \ 2..0'-4.0'
FL = 10-50 L \ 2.5-14 G
MC = 0.8-1.2m \ 2.5-4.0 Ft + Elevation above waterlevel
X = (Average) 3mm \ 0.125" could be smaller or larger.
SS = 1.5mm\0.065"
Chrome plated finish is standard.
Also available:
504-8290 Series 18-3X,
custom made height and pipe connection



18-3A **18-3B** **18-3C**

PEM 20

MINI BELL JETS

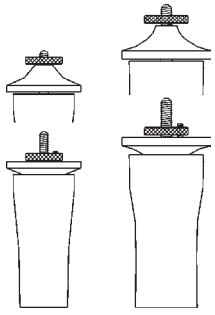
#504-9100

PEM 20 Series are made of brass and bronze, stainless steel fitted, finish is machined bronze.

PEM 22

PEM	22	24
#	**504-9110**	**504-9120**
T	3/4"	1"
OV	115mm\4.530"	144mm\5.670"
OD	51mm\2.000"	61mm\2.410"
PERFORMANCE RANGES:		
H	20-50cm\8"-20"	30-80cm\12"-30"
FL	5-20L\1.4-5.3G	6-40L\1.6-10
MC	10-60cm\1-3Ft	10-60cm\1-3Ft
X	3mm\0.125" +/-	3mm\0.125" +/-
SS	1.5mm\0.065"	1.5mm\0.065"

Deflector plate is reversible for mushroom type spray or bell spray,
Deflector plate is adjustable (lockable) for diameter of spray.
(Suction strainer is required, see inside back cover of catalog.)



22 **24**

PEM 29

SPRAY APRON SPRAYHEAD

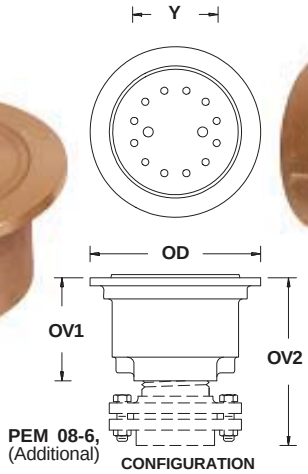
#505-0100

PEM 29 spray apron sprayhead is made of cast bronze with 'O' ring seal.

DIMENSIONS:

T	2"
OV 1	92mm\3.630"
OV 2	150mm\5.910"
OD	152mm\5.990"

PEM 29



PEM 08-6, (Additional)
CONFIGURATION 'A'

29-5
505-0250
2 PRONG WRENCH

29-4
505-0240
SOLID WINTER COVER

CONFIGURATION 'A' # 505-0110
Y 12 x 6.35mm\0.250"
Diam. of Y 76.2mm\3.000"
Angle of Y 5 Degrees off vertical center line
CONFIGURATION 'B' # 505-0120
Y 24 x 4.8mm\0.187"
Diam. of Y (2x12) 76.2mm\3.000"
Angle of Y 5 & 8 degrees off vertical center line
CONFIGURATION 'C' # 505-0130
Y 48 x 3.18mm\0.125"
Diam. of Y (2 x 24) 76.2mm\3.000"
Angle of Y 5 & 10 degrees of vertical center line

PERFORMANCES: CONFIGURATION (Other configurations custom made)

	'A'	'B'	'C'		5^0	8^0	10^0
V	**FL**	**FL**	**FL**	**MC**	**'H'**	**'H'**	**'H'**
m	L	L	L	m	m	m	m
1.5	168	200	101	2.1	0.9	1.6	2.3
2.0	192	226	130	2.8	1.2	2.0	2.8
3.0	225	264	183	4.2	1.6	2.6	3.7
4.0	256	298	221	5.6	2.1	3.6	4.8
Ft	**G**	**G**	**G**	**Ft**	**Ft**	**Ft**	**Ft**
5	*45*	*53*	*27*	*9.0*	*3*	*5*	*8*
8	*52*	*62*	*39*	*12.0*	*5*	*7*	*10*
10	*60*	*70*	*49*	*14.0*	*6*	*9*	*12*
15	*70*	*83*	*63*	*21.0*	*10*	*14*	*18*

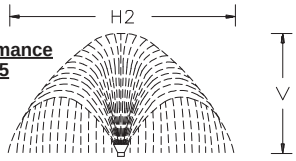
PEM 31

FINGER JETS

#505-1000

The **PEM 31** Finger Jets have a large clean out access cover. **PEM 31** are made of cast bronze and brass, stainless steel fitted. Performances with 13 Jets are appr. 50% of: H, H2 & FL, 100% of other dimensions. Finger Jets require perfect suction straining, **SS**: 2.4mm\ 0.125"

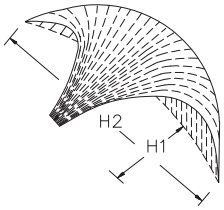
V= Vertical	H2	FL	MC
m	m	L	m
0.5	1.6	28	1.5
1.0	2.4	44	2.4
1.5	3.8	59	3.4
2.0	5.4	73	5.0
Ft	**Inches**	**G**	**Ft**
2	47"	8.2	5.4
3	91"	10.6	7.4
4	122"	13.3	9.4
5	154"	15.6	11.5
6	189"	17.7	14.7



Performance with 25 Jets

31-13A **31-13B** **31- 25**

V = 45°	H1	H2	FL	MC
m	m	m	L	m
0.4	1.0	1.5	27	1.0
0.6	1.5	2.5	35	1.7
0.7	2.0	3.5	44	2.2
0.9	3.0	4.5	66	3.7
Ft		**Inches**	**Inches**	**G**
Ft				
1	31"	43"	6.4	2.9
2	63"	102"	9.6	5.7
3	122"	181"	17.5	12.4
4	205"	291"	25.2	22.7



DIMENSIONS :

#	PEM	T	Y	OV	OD (All)
505-1010	**31-13A**	1"	13	157mm\6.180"	152mm\6.000"
505-0120	**31-13A+541**	1"	13	210mm\8.250"	x
505-1030	**31-13B**	1"	13	157mm\6.180"	29mm\ 1.140"
505-1040	**31-13B+541**	1"	13	210mm\8.250"	
505-1110	**31-25**	1"	25	157mm\6.180"	
505-1120	**31-25+541**	1"	25	210mm\8.250"	

31-13A
Nozzles in double row

31- 25
Nozzles in double row

31-13B/ 541
Nozzles in single row

31-25/ 541
Nozzles in double row

PEM 32

Spray Apron Spray Head

#505-2100

PEM 32 Spray Apron Spray Heads are designed to be cast into concrete, flush with surface installation in unsupervised public playgrounds. The spray head is vandal resistant, requires a special wrench to remove nozzle plate from the body. For ease of installation, the spray heads are to be mounted upon **PEM 538**, 3/4" swivel unions. Before pouring the concrete, the spray heads are to be set to proper level, then enclosed with a 200mm / 8.0" form. After concrete is cured, remove forms, turn on water and adjust spray heads to suit, then grout in spray heads so that they are appr. 1.5mm \ 0.065" above concrete surface. Spray Aprons are usually supplied with city water going to waste (**PEM 6094/ 6212**, 4" Drain in center of apron). **PEM 32** Spray Heads are made of Brass and Bronze. Standard Spray Configuration: 12 x 2.4mm\0.094" orifices in a circle of 35mm\1.375" bored with an outside angle of 5 degrees off vertical. (Other configurations including single adjustable swivel jet within the flow capability can be custom made).

PERFORMANCES

V	H	FL	MC
m	m	L	m
1.0	0.7	35	1.6
1.5	0.9	46	2.2
2.0	1.2	57	2.8
3.0	1.6	86	4.9
Ft	**Ft**	**G**	**Ft**
4	2	10.0	6.0
5	3	12.0	7.0
6	4	14.0	8.0
8	5	18.0	11.0
10	6	22.0	16.0

PEM 32-2
505-2140
Solid Winter Cover

DIMENSIONS :

PEM #	32 505-2110	32+538 505-2120
T	3/4"	3/4"
OV	51mm \ 2.00"	108mm \ 4.25"
OD	64mm \ 2.50"	64mm \ 2.50"
Y	12	
X	2.4mm\0.094"	

PEM
With Swivel Union PEM538

PEM 32

PEM 32-H

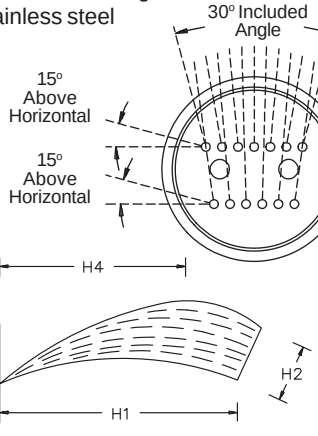
Angular Fan Spray Head

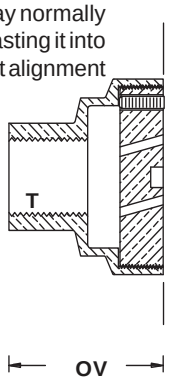
#505-2200

PEM 32 H Angular Fan Spray Head is designed for flush installation into the free board of swimming pools in warm climates to spray low over the pool and cool the pool water by evaporation. The spray normally is operated by the filter return. This sprayhead can also be used for decorative purposes by casting it into walls. The face of the spray head is smooth, the face plate is equipped with a set screw to permit alignment of spray. The face plate can only be removed with **PEM 32-1**, 2 Prong Wrench.
The spray head is made of bronze and brass, with stainless steel set screws and a natural machined finish.
Chrome plating is extra.

PERFORMANCES

H1	H2	V	H4	FL	MC
m	m	m	m	L	m
1.0	0.70	0.26	0.70	33	1.7
1.5	1.00	0.33	0.75	39	2.4
2.0	1.30	0.39	1.04	47	3.1
3.0	1.90	0.46	1.50	61	4.7
4.0	2.50	0.67	1.96	76	6.4
5.0	3.20	1.06	2.60	93	8.1
6.0	3.80	1.15	3.10	108	9.4
Ft	**Ft**	**Ft**	**Ft**	**G**	**Ft**
5	3.0	0.9	2.3	7.5	7
10	5.8	1.4	4.8	11.5	12
15	8.4	2.8	7.2	16.0	18
20	11.6	3.5	9.6	21.0	24





DIMENSIONS :

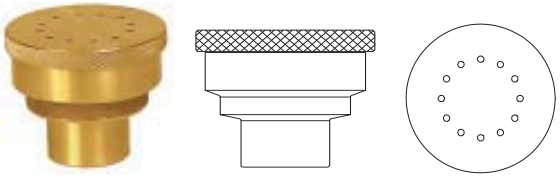
T	3/4"NPT/BSP
OV	51mm \ 2.00"
OD	64mm \ 2.50"
Y	13
X	2.4mm \ 0.094"

32-H

PEM 33 #505-3010

Ring Cluster Sprayhead

PEM 33 is made of cast bronze, machined finish. The Ring Cluster sprayhead provides a ring of jets spraying up and slightly out. The spray effect is that of fine and lacy jets of water creating an outside dropping ring of sprays.



Standard spray angle is 5 degree off vertical center line, outside drop.

T	3/4"
OV	60mm \ 2.360"
OD	70mm \ 2.760"
Y	12
X	2.4mm\0.094
SS	1mm\0.040"

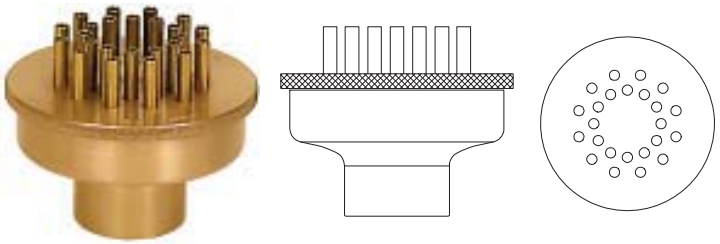
PERFORMANCES

V	H	FL	MC
m	m	L	m
1.0	0.7	35	1.6
1.5	0.9	46	2.2
2.0	1.2	57	2.8
3.0	1.6	86	4.9
Ft	Ft	G	Ft
4	2	10.0	6.0
5	3	12.0	7.0
6	4	14.0	8.0
8	5	18.0	11.0
10	6	22.0	16.0

PEM 34 #505-3020

Columnar Cluster Sprayhead

PEM 34 is made of cast bronze and brass, machined finish. PEM 34 Columnar Cluster Jet is designed for the creation of a low pressure but highly visible column of spray. This spray effect usually accompanies spray rings or other multiple jet manifolds as the pressure and flow requirements are similar.



DIMENSIONS:

T	1 1/4"
OV	90mm\3.540"
O	111mm\4.370"
Y	24 (70mm\2.76" Diam.)
X	4.8mm/0.187"
SS	2mm \ 0.080"

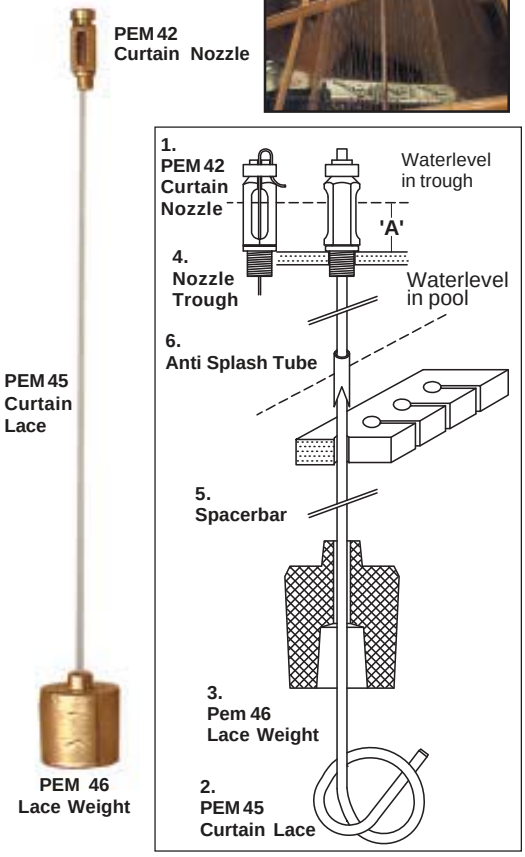
PERFORMANCES:

V	FL	MC
m	L	m
1.0	100	1.5
1.5	120	1.9
2.0	152	2.5
2.5	173	3.7
3.0	190	3.9
4.0	231	5.6
Ft	G	Ft
3	25.9	3.8
4	31.2	5.3
5	35.7	6.3
6	38.4	7.9
8	44.2	10.2
10	50.2	12.8
12	56.3	16.1
15	66.6	21.0

PEM 40

Curtain Fountain Components

#505-4000



PEM 42 Series Curtain Fountain Equipment consists of the following parts:

1. PEM 42 #505-4020

Curtain nozzle and lace holder, consisting of nozzle body, lower body washer and upper slip on lock ring, all made of brass. The nozzle body has a UNF 0.375" x 24 TPI thread (if necessary a tap drill and tap can be provided at cost). The nozzle body is normally threaded from the top into a stainless steel trough (#4) (by others). The curtain lace is fed through the nozzle from the bottom up into and through the slot in the top of the nozzle and looped over to one side, then the lock ring is slipped over the lace and top of the nozzle, locking the lace. The slot in the top of the nozzle to align with the row of nozzles. The bottom of the nozzle must protrude beneath the pan by a minimum of 3mm\0.125" to prevent the water from spreading out horizontally causing overspray and splash. Normal spacing between nozzles is appr. 38mm \1.5" between centers. For double rows (with apparent 20mm/0.75"side view spacing) the nozzle spacing is 20mm \ 0.750" between rows, but off set. SS = 1mm / 0.040" Nozzle Flows: 'A' : 13mm / 0.5" = 0.25 L/min\ 4 GPH, 'A' : 20mm / 0.75" = 0.40 Lmin\6GPH

2. PEM 45 #505-4050

Curtain Lace is made of stretch resistant, near unbreakable, clear mylar plastic of 0.26mm\0.010" thickness and 4mm\ 0.156" width. Lace is supplied in bulk length , ranging from 60m\200' to 150m\500' as available. Add 10% to length of lace for ends. As all impurities in the water , mineral or otherwise will cling to the lace and discolor it. Curtain Fountains should be operated with filtered mineral free water if they are to retain their beauty for any length of time.

3. PEM 46 #505-4060

Lace Weight, Cast Bronze Weight for each lace of app. 0.580 kg\1.160 lbs. This weight is normally sufficient for heights up to 10m\33 feet, therefore when hung in angles, increase the weights until the lace is as taut as a violin string . Normally , similar weights are obtained locally from fishermen or others.

4. Trough for curtain nozzle, by others:

Commonly made of stainless steel at least 3mm - 0.125" thickness ,100mm \ 4" width & height, material must permit nozzle to protrude at least 3mm\0.125" beneath the trough . With screw type turnbuckle suspension to permit horizontal adjustment of entire trough. The trough to have access from above for installation and must have on opposite sides overflow tubes (12mm\0.50"). The water depth usually is 20-25mm \ 0.750 - 1.000") over bottom of side opening in nozzles . Water supply into trough must be even and is best through a plastic pipe laid over nozzles with 3mm-0.125" holes on 40mm \ 1.500" centers at the 1700hr and 1900 hr position in the pipe. Water flowing over or through the nozzles will disrupt nozzle discharge and must be avoided.

5. Spacerbar in base pool, by others:

Usually made of clear acrylic plastic (Plexiglass) app. 20mm\0.75" thick x 50-100mm\2-4" width, the spacer bar rests on the lace weights. Holes for laces(6mm\0.250") to pass through, must be drilled together with those in trough, then saw - slip-ins at 90 degrees angle from the side. Normally the curtain weights are tied to lace first then the lace is slipped through the slip in into its hole in the spacerbar. As nozzle slots in trough are parallel to row of laces, the slip ins are at 90 degrees to same, the lace normally is locked into its hole in the spacerbar.

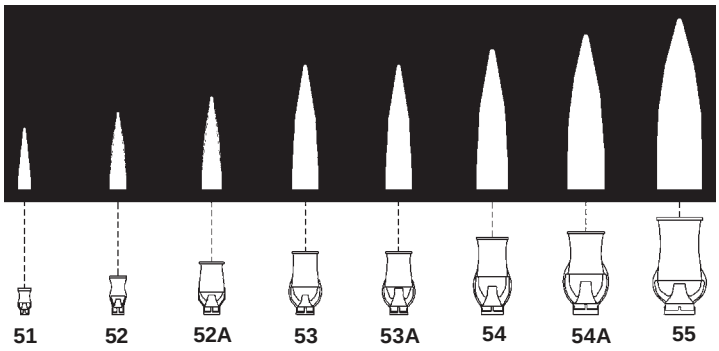
6. Anti Splash Tubes, by others:

These are cut from 0.26mm\0.010" clear or black electrical tubing , 10mm \ 0.375" inside diameter cut to length to rest on spacer bar and extend appr. 13mm \ 0.500" above waterlevel. 2 x V shape angle to be cut into lower end of tubing to permit larger outflow than inflow. The anti splash tubes are used for water curtains in very narrow base pools to avoid splash.

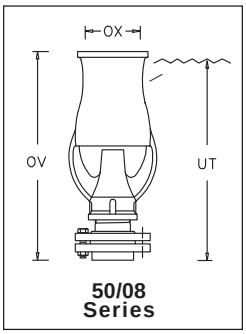
PEM 50 Series Cascade Jets will provide highly visible frothing and foaming 'White Water' spray effects. PEM 50 Series Jets are one piece bronze castings. PEM 08 Adjustment Flanges are of cast bronze and are stainless steel fitted. **PEM Series Cascade Jets** require a PEM flow straightener, a constant waterlevel and are subject to pool surging.

For Pinnacle Cascade Jets see : PEM 1600 series Jets

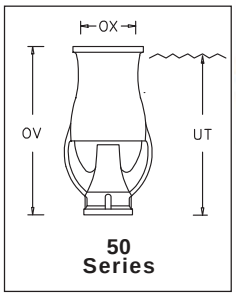
#505-5000 PEM 50 SERIES
CAST BRONZE CASCADE JETS



PEM 54 and 53 Fountain Spray



50/08 Series



50 Series

PERFORMANCES are based on **'UT'** and **'UT / 08'** dimensions, showing immersion of the jets. The effect diameter at base is approximately 30% - 35% of spray height.
The use of PEM Flow Straightener is recommended.
To change appearance of spray effects, change **'UT'** or **'UT 08',** decrease = lighter, increase = heavier,
(proportional) '**FL**' and '**MC**' values below.

PEM #	51 505-5110	52 505-5120	52A 505-5130	53 505-5140	53A 505-5150	54 505-5170	54A 505-5180	55 505-5190
PEM #	51/08 505-5210	52/08 505-5220	52A/08 505-5230	53/08 505-5240	53A/08 505-5250	54/08 505-5270	54A/08 505-5280	55/08 505-5290
T	1/2"	3/4"	1 1/4"	1 1/2"	1 1/2"	2"	2 1/2"	3"
OD/Jet	50.8mm 2"	66.7mm 2.625"	104mm 4.125"	120.6mm 4.75"	120.6mm 4.75"	140mm 5.5"	165mm 6.5"	195mm 7.68"
OX/Jet	38mm 1.500"	51mm 2.000"	70mm 2.755	76mm 3.000"	76mm 3.00"	102mm 4.00"	120mm 4.724"	152mm 6.00"
SS	6 mm 0.250"	8mm 0.32"	8mm 0.320"	10mm 0.320"	1 6mm 0.40"	16mm 0.625"	18mm 0.700"	22mm 0.875"
OV	96mm 3.750"	140mm 5.50"	191mm 7.519"	229mm 9.000"	229mm 9.00"	280mm 11.00"	300mm 11.811"	356mm 14.00"
OV+08	141mm 5.560"	190mm 7.49"	236mm 9.291"	280mm 11.03"	280mm 11.03"	342mm 13.420"	348mm 13.700"	425mm 16.74"
UT	90mm 3.500"	134mm 5.25"	185mm 7.280"	220mm 8.50"	229mm 9.00"	268mm 10.50"	287mm 11.27"	341mm 13.50"
UT +/08	135mm 5.320"	184mm 7.25"	230mm 9.05"	270mm 10.700"	279mm 10.99"	330mm 10.99"	336mm 13.22"	409mm 16.11"

PERFORMANCES:

V	FL	MC	FL	MC	FL	MC	FL	MC	FL	MC	FL	MC	FL	MC	FL	MC
m	L	m	L	m	L	m	L	m	L	m	L	m	L	m	L	m
0.5	34	10.5	59	7.1	85	6.4	99	2.9	93	2.2						
1.0	46	16.8	76	11.1	100	7.9	122	6.6	114	3.1						
1.5	57	21.6	88	15.2	117	9.5	135	9.9	137	4.3	292	7.6	396	7.0	500	6.1
2.0	66	27.4	103	19.5	131	14.0	160	12.6	156	6.5	320	9.3	425	9.5	560	8.1
2.5			114	23.4	142	17.1	174	15.2	182	7.7	354	11.1	490	13.0	609	9.3
3.0			125	27.2	153	19.8	190	16.1	209	9.2	380	13.4	530	16.0	645	10.7
4.0					174	24.0	224	23.4	239	12.0	420	19.1	590	22.0	743	14.6
5.0									269	15.0	467	23.5	640	27.0	844	17.4
6.0									292	18.0	489	26.9	700	32.0	930	19.9
8.0											570	33.0	850	41.0	1132	34.6
10.0											720	39.0	1050	55.0	1390	46.9
12.0													1190	64.0	1552	57.0
15.0															1980	75.0
Ft	G	Ft	G	Ft	G	Ft	G	Ft	G	Ft	G	Ft	G	Ft	G	Ft
2	10.1	42	17.5	30	23.0	22	27.8	15	26.7	8						
3	11.7	52	19.3	34	26.0	25	29.4	20	31.4	11						
4	13.5	62	21.1	43	29.0	28	32.3	27	34.9	13	71.4	21	96	19		
5	15.7	72	23.3	51	30.9	31	35.7	33	37.8	17	77.2	25	105	22	133	20
6			25.7	61	32.5	40	39.9	37	42.7	20	85.9	30	114	25	143	26
8			29.6	77	36.5	54	46.5	50	46.6	25	93.6	36	127	37	157	32
10			33.1	83	40.4	65	50.2	60	54.8	30	100.4	45	141	48	171	36
15							67.4	83	67.7	44	107.0	57	163	77	211	56
20									77.0	57	129.2	90	185	98	246	66
30											164.0	110	245	135	330	134
40													315	168	410	174
50															524	229


PEM 55


PEM 54A


PEM 54


PEM 53A


PEM 53


PEM 52A


PEM 52

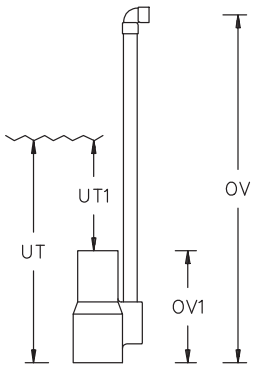

PEM 51

PEM 60 SERIES FOAM GEYSER JETS

#505-6000

60 61 62 63 64 65 66 66A

DIMENSIONS :



PEM 60 Series Jets are designed to provide in their lowest sprayheights white mounds of water, while at greater sprayheights to provide highly visible fluffy white spray effects. **PEM 60 Series** Jets are made of cast bronze with hard copper air snorkels. The dimensions **'UT'** have to be maintained to repeat the performances set out below. By reducing the dimension **'UT1'** the spray effect will be higher and thinner. By increasing **'UT1'**, the sprayeffect will be lower and heavier. **PEM 09 Series** Vertical Adjustments may be used to control the sprayeffects of all jets but 66A, which has a built in **'UT1'** adjustment. **PEM 08 Series** vertical adjustment flanges are a must to provide perfect vertical alignment of single or multiple applications. The air intake snorkel has to protrude out of the water at all times, where this is not possible, the jets can be supplied custom made, with side outlet(s) for the breather pipe(s) or tube(s) which must slope up slightly and have no air traps. Suggested remote air intake fitting on the inside freeboard of a pool is PEM 6315A. For multiple installations a combined breather manifold of suitable size can be used.The use of PEM Water Make Up Controls is suggested to maintain the required constant waterlevel. These jets must be protected from pool surging where they might oscillate (jump).In circular pools,a surge wall terminating just below waterlevel must enclose the falling spray. To animate a number of 60 jets in a pool, the same can be designed to introduce rythmic oscillation (Example: 4m\13' square pool x 1m\3' depth with 5 x 63 jets,one in center, the other 4 equidistant from center to corners. After the fountain operates for a few minutes, peripheral jet # 1 will jump, then # 3 then # 4 then #2 etc, while the center jet, that creates the surging oscillates the least. In circular pool the spray of a ring of 60 jets can be be induced to oscillate in a continuous clockwise wave motion.

PEM #	60 505-6110	61 505-6120	62 505-6130	63 505-6140	64 505-6150	65 505-6160	66 505-6210	66A* 505-0620	66A** 505-6220
T	1/2"	3/4"	1"	1 1/4"	1 1/2"	2"	3"	3"	3"
OX	12mm 0.50"	20mm 0.75"	25mm 1.0"	32mm 1.25"	38mm 1.5"	51mm 2.0"	76mm 3.0"	76/88mm 3.0/3.5"	76/88mm 3.0/3.5"
SS	3.2mm 0.125"	4.8mm 0.187"	6.4mm 0.25"	8.3mm 0.325"	9.6mm 0.375"	12.7mm 0.50"	19mm 0.75"	19mm 0.75"	38mm 1.5"
OV	177mm 7.00"	241mm 9.50"	286mm 11.26"	355mm 14.0"	407mm 16.0"	457mm 18.0"	533mm 21.0"	533mm 21.0"	533mm 21.0"
OV1	83mm 3.25"	89mm 3.50"	108mm 4.25"	121mm 4.75"	134mm 5.25"	178mm 7.0"	254mm 10.0"	254mm(-adj.) 10.0"	318mm(+adj.) 12.5"
UT	134mm 5.25"	152mm 6.0"	184mm 7.25"	222mm 8.75"	260mm 10.25"	254mm 10.0"	330mm 13.0"	330/406mm 13/16.0"	330/406mm 13/16.0"
UT1	51mm 2.00"	64mm 2.50"	76mm 3.0"	101mm 4.0"	127mm 5.0"	76mm 3.0"	76mm 3.0"	89mm 3.5"	152mm 6.0"

PERFORMANCES :

V	FL	MC	FL	MC	FL	MC	FL	MC	FL	MC	FL	MC	FL	MC	FL	MC	FL	MC
m	**L**	**m**	**L**	**m**	**L**	**m**	**L**	**m**	**L**	**m**	**L**	**m**	**L**	**m**	**L**	**m**	**L**	**m**
0.5	27	3.4	48	3.1	72	2.6	99	2.5	133	2.5	216	2.2						
1.0	36	5.8	61	4.8	88	4.6	125	4.5	171	4.9	262	3.9	360	3.1	405	4.0	455	5.2
1.5	46	8.0	72	5.9	99	5.8	148	6.7	205	6.9	303	5.2	424	4.3	462	5.5	530	7.3
2.0			84	8.3	114	7.0	171	8.0	231	8.4	337	6.3	470	5.5	504	7.7	621	10.4
2.5			99	9.6	125	8.6	186	8.9	258	11.6	364	7.4	508	7.1	553	9.5	769	12.9
3.0					133	11.0	194	10.7	281	17.1	383	8.2	534	8.3	644	11.0	837	15.0
4.0							224	14.7	337	21.1	432	9.9	648	9.8	746	13.5	932	18.0
5.0									379	23.5	473	11.6	769	11.9	844	16.5	981	21.1
6.0											515	13.2	852	15.6	928	19.6	1068	26.6
8.0													1091	24.7	996	22.6	1170	30.8
10.0			**Spray diameter (H) -**										1150	28.5	1280	32.0	1470	44.2
12.0			**Appr. 50% of Sprayheight**										1300	30.0	1500	35.0	1720	52.0
15.0															2250	44.0	2140	60.0
Ft	**G**	**Ft**	**G**	**Ft**	**G**	**Ft**	**G**	**Ft**	**G**	**Ft**	**G**	**Ft**	**G**	**Ft**	**G**	**Ft**	**G**	**Ft**
1	6	7	11	7	17	7	23	8	32	8	51	5	67	5	80	7	88	8
2	8	14	14	13	20	12	28	13	38	13	60	9	80	7	92	10	105	12
3	9	19	16	15	22	15	32	16	44	16	67	12	91	9	104	13	117	17
4	11	23	17	19	24	17	36	19	49	20	73	15	102	12	114	17	128	20
5	12	26	19	23	26	19	39	22	54	23	80	17	112	14	122	19	140	24
6			21	26	29	22	42	24	58	27	85	19	121	17	132	24	155	29
8			25	30	32	26	48	29	66	37	93	23	132	21	149	28	195	40
10					35	36	51	35	74	56	101	26	141	26	170	36	221	50
15							62	56	95	73	120	35	198	35	210	49	249	63
20									121	86	136	43	225	55	245	65	282	86
30											163	61	290	74	306	88	359	129
40													344	95	397	113	455	170
50															595	144	566	197

***Sleeve up** ****Sleeve down**

CODES > PAGE 500-B

PEM 80 SERIES

160⁰ Fan Jets

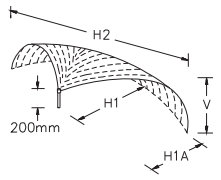
#505-7000

PEM 81, 82 and 83 are made of bronze and brass and are stainless steel fitted.
PEM 80 Series Fan Jets have built in ball joints that permit directional adjustment to 15° off center line. For wall mounted gargoyle fountains, the jets are installed horizontal, with mouth of jet pointing up, the movable part of the jet depressed 5° downward, directing the outflowing water up and forward over the tip of the jet, hiding the same. Only lowest performances are used for these small but enchanting solid sheet of water spray effects.

DIMENSIONS :

PEM #	81 505-7110	82 505-7120	83 505-7130
T	1/2"(male)	3/4"(female)	1"(female)
OV	76mm\3.0"	96mm\3.75"	114mm\4.49"
OD*	22mm\0.87"	37mm\1.46"	46mm\1.81"
SS	3.2mm\0.125"	4.8mm\0.187"	6mm\0.25"

* = Top of Nozzle only



PEM 83 Fountain Spray

PERFORMANCES :

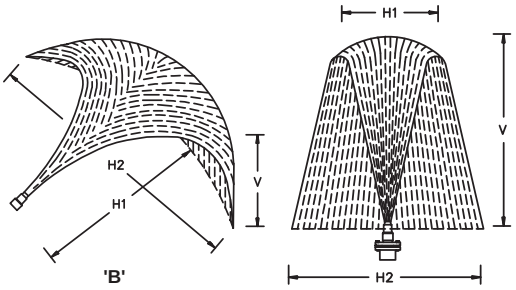
PEM H1	81 H2	81 H1A	81 V	81 FL	81 MC	82 H2	82 H1A	82 V	82 FL	82 MC	83 H2	83 H1A	83 V	83 FL	83 MC
(A) (Old Style)		(B)	(C)	(D)			(B)	(C)	(D)			(B)	(C)	(D)	
m	m	m	m	L	m	m	m	m	L	m	m	m	m	L	m
0.60	0.60	0.36	0.18	10	1.2	1.53	0.46	0.18	19	1.2	2.15	0.46	0.18	38	1.2
1.20	1.53	0.51	0.28	14	1.9	2.15	0.54	0.28	35	1.9	2.44	0.51	0.26	65	1.6
1.80	2.40	0.69	0.51	17	2.5	2.75	0.64	0.46	38	2.5	3.05	0.66	0.41	88	2.2
2.40	3.30	0.87	0.66	20	3.1	3.35	0.77	0.61	46	2.8	3.66	0.77	0.56	103	2.8
3.00	4.60	1.10	0.77	21	3.7	4.27	0.94	0.74	53	3.4	4.30	0.95	0.66	114	3.4
Ft	Ft	Inch.	Inch.	G	Ft	Ft	Inch.	Inch.	G	Ft	Ft	Inch.	Inch.	G	Ft
2	2	14"	7"	2.6	4.0	5	18"	7"	5.0	4.0	7	18"	7"	10	4.0
4	5	20"	11"	3.5	6.0	7	21"	11"	9.0	6.0	8	20"	10"	17	5.0
6	8	27"	20"	4.4	8.0	9	25"	18"	10.0	8.0	10	26"	16"	23	7.0
8	10	34"	26"	5.1	10.0	11	30"	24"	12.0	9.0	12	30"	22"	27	9.0
10	15	43"	30"	5.5	12.0	14	37"	29"	14.0	11.0	14	37"	26"	30	11.0

(With Jet in Vertical Position and orifice 200mm\7.88" above waterlevel):

PEM 90 SERIES

50⁰ Fan Jets

#505-8000



PEM 90 Series Fan Jets are made of cast bronze and brass, stainless steel fitted. **PEM 90 Series Fan Jets** have a built in ball joint, permitting directional adjustment to 15° off center line, also full rotational adjustment of nozzle.

DIMENSIONS :

PEM #	91 505-8110	92 505-8120	93 505-8130	94 505-8140	95 505-8150	96 505-8160
T	3/4"	1"	1 1/4"	1 1/2"	2"	3"
OV	90mm\3.500"	100mm\3.950"	135mm\5.300"	140mm\5.500"	210mm\8.300"	250mm\9.800"
SS	2.0mm\0.079"	3.2mm\0.125"	4.7mm\0.187"	6.0mm\0.250"	8.3mm\0.325"	9.6mm\0.375"

For best performances the jets must be operated with undisturbed & linear flowing water supply.

The use of PEM flow straighteners is recommended. For solid sheet of water effects see the lowest performances.

PERFORMANCES with Vertical Flat Orifice ('A'):

PEM	91				92				93				94				95				96			
V	H1	H2	FL	MC	H1	H2	FL	MC	H1	H2	FL	MC	H1	H2	FL	MC	H1	H2	FL	MC	H1	H2	FL	MC
m	m	m	L	m	m	m	L	m	m	m	L	m	m	m	L	m	m	m	L	m	m	m	L	m
0.50	0.20	0.40	7	0.80	0.30	0.50	12	0.70	0.4	0.60	15	0.70	0.30	0.50	26	0.70	0.50	0.80	40	0.70	0.60	1.20	106	0.70
1.00	0.80	1.20	9	1.50	0.80	1.50	17	1.40	0.8	1.50	19	1.40	1.20	1.60	38	1.30	1.00	2.00	63	1.30	1.50	2.40	152	1.30
1.50	1.80	3.20	13	3.00	2.00	3.50	34	2.50	1.5	2.50	34	2.50	1.60	2.40	52	2.30	1.60	2.60	74	2.20	2.00	3.60	231	2.20
2.00									2.0	3.00	45	3.20	2.00	3.80	69	3.10	3.00	4.20	87	3.00	3.20	5.00	300	3.10
3.00									3.5	5.00	75	4.30	4.00	6.00	98	4.20	4.00	6.00	114	4.20	4.00	6.50	448	4.10
Inches	Inch.	Inch.	G	Ft	Inch.	Inch.	G	Ft	Inch.	Inch.	G	Ft	Inch.	Inch.	G	Ft	Inch.	Inch.	G	Ft	Inch.	Inch.	G	Ft
20"	8"	16"	1.9	2.7	10"	20"	3.2	2.3	16"	24"	4.0	2.3	12"	20"	7	2.3	20"	31"	11	2.3	24"	47"	28	2.3
40"	31"	47"	2.4	5.0	31"	59"	4.5	4.7	31"	59"	5.1	4.5	47"	63"	10	4.3	39"	79"	17	4.3	59"	94"	41	4.3
60"	71"	126"	3.5	10	79"	138"	6.9	8.7	59"	98"	9.0	8.3	63"	94"	14	7.7	63"	102"	20	7.3	79"	142"	61	7.3
80"									79"	118"	12	11	79"	150"	19	11	118"	165"	23	11	126"	197"	80	11
120"									138"	197"	20	15	157"	236"	31	14	157"	236"	26	15	157"	256"	119	14

PERFORMANCES with Flat Jet Orifice at Waterlevel and at 45° ('B')

H1	V	H2	FL	MC	V	H2	FL	MC	V	H2	FL	MC	V	H2	FL	MC	V	H2	FL	MC	V	H2	FL	MC
m	m	m	L	m	m	m	L	m	m	m	L	m	m	m	L	m	m	m	L	m	m	m	L	m
0.50	0.05	0.08	5	0.60	0.10	0.10	8	0.60	0.15	0.30	16	0.60	0.10	0.15	20	0.50	0.15	0.30	29	0.5	0.12	0.50	80	0.50
1.00	0.15	0.20	7	1.00	0.15	0.20	11	1.00	0.25	0.80	24	0.90	0.25	0.60	24	0.90	0.30	0.60	46	0.9	0.20	0.80	102	0.90
1.50	0.25	0.50	8	1.30	0.30	0.40	13	1.30	0.50	1.20	28	1.30	0.30	0.90	30	1.30	0.50	1.30	60	1.2	0.40	2.10	136	1.20
2.00	0.60	1.20	12	2.40	0.60	1.00	27	2.30	0.90	2.50	30	2.10	0.60	2.00	44	2.10	0.90	3.20	87	2.0	1.20	3.80	178	2.00
3.00									1.20	3.60	43	3.10	1.20	3.60	60	3.00	1.50	4.40	110	3.0	1.50	5.60	260	3.00
Inches	Inch.	Inch.	G	Ft	Inch.	Inch.	G	Ft	Inch.	Inch.	G	Ft	Inch.	Inch.	G	Ft	Inch.	Inch.	G	Ft	Inch.	Inch.	G	Ft
20"	2"	3"	1.3	2	4"	4"	2.2	2	6"	6"	4.3	2	4"	6"	6	2	6"	12"	8	2	5"	20"	22	2
40"	6"	8"	1.9	4	6"	8"	3.0	4	10"	31"	6.4	3	10"	24"	7	3	12"	24"	13	3	8"	31"	27	3
60"	10"	20"	2.2	5	12"	16"	3.5	5	18"	47"	7.4	5	12"	35"	8	5	18"	51"	16	4	16"	83"	36	4
80"	24"	47"	3.2	8	24"	39"	7.2	8	35"	98"	8.0	7	24"	79"	12	7	35"	126"	23	7	47"	150"	48	7
120"									47"	142"	12	11	47"	142"	16	10	59"	173"	30	10	59"	220"	69	11

Performances beyond the given values are normally not considered to be decorative fountain spray effects.

PEM 107A

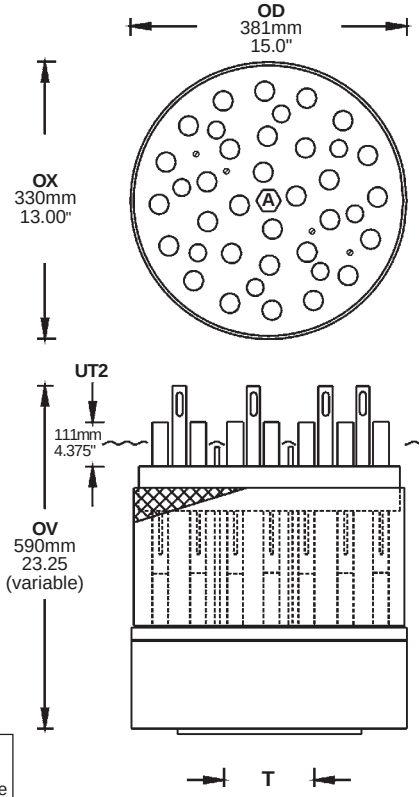
FOAM COLUMN SPRAYHEAD

#505-9100

PEM107A

505-9110 / 107A-1: 4" NPS/BSP
505-9120 / 107A-2: 4" ASA/BSP Flange
505-9130 / 107A-3: 6" ASA/BSP Flange
Suggested feed pipe size
for sprayheights:
Below 4.5m/15Ft: 4"
Above 4.5m/15Ft: 6"

See back of catalog for strainer sizing. This fountain head must only be operated with proper suction straining (**SS**).



DIMENSIONS:

OX	330mm\13.000"
OV	590mm\23.250(Variable)
OD	381mm\15.000"
UT	432mm\17.000"
UT2	111mm\4.375"
SS	8mm\0.325"
T	4" or 6" (see below)

PEM 107A Foam Column Sprayhead produces a massive 'White Water' column with a 'Mushroom Top'. This foam column is waterlevel dependent and must only be installed into pools, that are specially designed and built to prevent surge action of the water in the pool.
A surge wall with an approximate inside diameter of 75% of the spray height of the jet, terminating approximately 12mm/0.50" below waterlevel, must surround the perimeter of the falling spray to prevent it from oscillating due to surging. The surge wall must have small openings at the base to permit the balancing of waterlevels.The depth of the pool outside of the surge wall does not influence the sprayhead.
Installation depth of pool for this sprayhead must be not less than appr. 1.0m or 3 feet.The sprayhead must be securely mounted upon a metal pipe, the weight of the sprayhead is app. 100 kg\220lbs to which must be added the back thrust of the jets. The suction intake of the pump operating the sprayhead must be protected from falling spray introducing air into the suction flow (Use greatest possible waterdepth plus anti vortex cover over suction intake!).

PERFORMANCES:

V	FL	MC
m	**L**	**m**
2.0	1340	11.0
3.0	1500	21.0
4.0	1670	28.0
5.0	1820	34.0
6.0	1990	38.0
8.0	2190	46.0
10.0	2410	52.0
12.0	2580	58.0
15.0	3100	66.0
Ft	**G**	**Ft**
8	*375*	*50*
10	*397*	*69*
12	*426*	*89*
15	*468*	*102*
20	*526*	*125*
30	*600*	*161*
40	*682*	*194*
50	*793*	*217*

The use of a PEM 08 Series Adjustment Flange 4" or 6" in riser pipe is recommended for perfect vertical alignment of sprayhead.

A built in, after installation, adjustment **(A)** permits the adjustment of dimension **UT2** that controls the water to air ratio of the foam produced.
The spray effect can be adjusted to an app. 50% higher by increasing **UT2** and lighter spray effect or to a 50% heavier and lower spray effect by decreasing **UT2**.

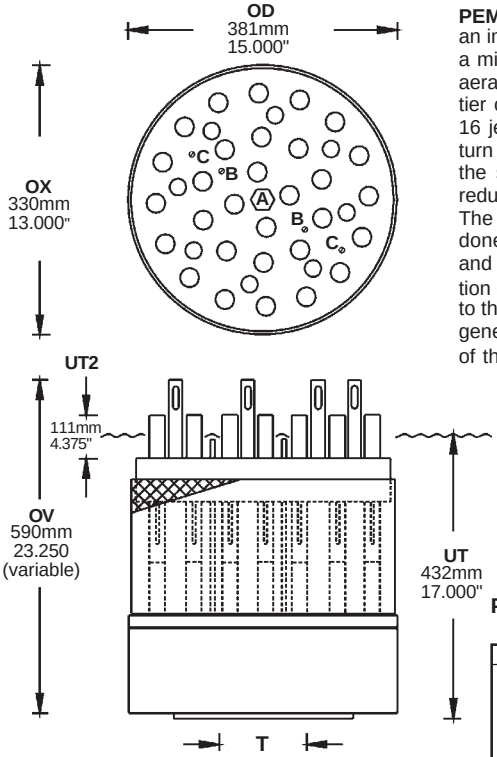
Performances can be highly variable due to air/water ratio adjustment

PEM 107B

FOAM PINNACLE SPRAYHEAD

#505-9210

See back of catalog for strainer sizing. This fountain head must only be operated with proper suction straining (**SS**).



DIMENSIONS:

OX	330mm\13.000"
OV	590mm\23.250(Variable)
OD	381mm\15.000"
UT	432mm\17.000"
UT2	111mm\4.375"
SS	8mm\0.325"
T	4" BSP\NPS

PEM 107B Foam Pinnacle Sprayhead was designed to create an impressive,white water sculpture effect for confined areas with a minimum of noise and splash. The spray effect consists of 30 aerating jets arranged in a three tier spray effect with the center tier of 4 jets,an intermediate ring of 10 jets and an outer ring of 16 jets. The center tier drops into the intermediate tier which in turn drops into the bottom tier,reducing the actual fall height of the spray to 1/3 or less of its overall height with consequent reduction of splash and noise.
The sprayhead is shipped without tiers adjusted , which must be done after installation to suit requirements.The intermediate and peripheral rings of jets are height adjustable after installation **(B) & (C),** the center effect is supply controlled. In addition to the flow adjustments of the rings,the air/water ratio of the foam generated by the sprayhead can be altered by raising or lowering of the air chamber **(A)**.

Suggested minimum water depth for installation = 0.8m / 31 inches, the sprayhead weighs appr. 100 kg \ 220 lbs, it has to be securely mounted on metal pipe. For perfect vertical alignment use **PEM 08-9**, 4" ADJUSTMENT FLANGE in the pipe under the jet.
The pool into which the **PEM 107B** is to be installed must have a constant waterlevel,fluctuating not more than 12mm / 0.5 inch. Use PEM water make up controls to maintain a constant waterlevel.

PERFORMANCES:

V	FL	MC
m	**L**	**m**
3.0	850	11
3.0	1000	21
4.0	1440	29
5.0	1650	34
6.0	1800	38
Ft	**G**	**Ft**
8	*230*	*50*
10	*265*	*69*
12	*349*	*86*
15	*410*	*102*
20	*476*	*125*

Performances (1991) are for the shown **UT2** airbox immersion and highly variable due to height as well as air/water ratio adjustments.
Adjustment **(A)** varies dimension **UT2**,by increasing it , the spray effect will be lighter and higher,by decreasing it , the spray effect will be heavier and lower.
Adjustment **(B)** varies the sprayheight of the middle and peripheral tiers.
Adjustment **(C)** varies the sprayheight of the peripheral tier.

#506-2100 PEM 108-210
COLUMNAR SPRAYHEAD

PEM 108-210 is made of cast bronze and brass and is stainless steel fitted.

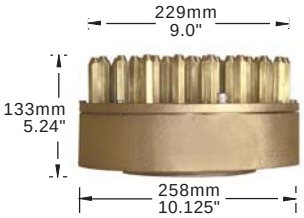
PEM 108 - 210 Columnar Spray Effect Assembly is designed to provide a near solid 250mm\10.0" diam.columnar spray effect made up of many clear streams of water for various sprayheights. In the upper range of the suggested spray performances the streams tend to break up giving the spray effect a feathered column like appearance.

PERFORMANCES

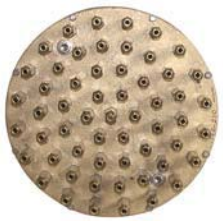
V	FL	MC
m	L	m
1.0	568	1.6
2.0	739	3.1
3.0	943	4.3
4.0	1098	5.5
5.0	1306	7.1
6.0	1424	8.3
Ft	G	Ft
8	*225*	*12*
10	*249*	*14*
15	*317*	*20*
20	*376*	*27*

DIMENSIONS:

OX	229mm \9.0"
OV	133mm \5.24"
OD	258mm \10.125"
T	4.0"
Y	57
SS	3mm \0.125"



PEM 108-210 Side View



PEM 108-210 Top View

#506-3750 PEM 108-375
COLUMNAR SPRAYHEAD

PEM 108 - 375 is made of cast bronze brass and is stainless steel fitted.

PEM 108 - 375 Columnar Spray Effect Assembly is designed to provide a narrow, hollow, columnar spray effect made up of many clear streams of water for low to intermediate sprayheights.

In the upper range of the suggested spray performances the streams tend to break up giving the spray effect a candle like appearance.

Due to the break up of the spray at greater sprayheights, the use of a PEM Wind Control is advisable.

For greater sprayheights , the slightly larger PEM 108-376 could be suggested, pressure requirements are slightly lower than for this assembly due to the larger size pipe connection.

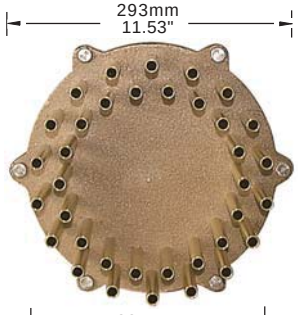
The pressure ratings (MC) given are pressures at the spray nozzles.

108-375 Columnar Fountain Sprays

PERFORMANCES :

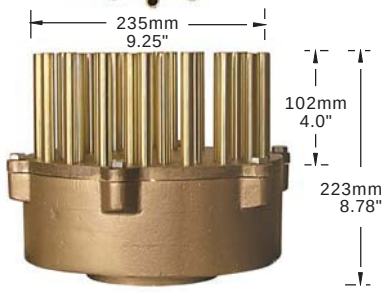
V	FL	MC
m	L	m
2 .0	881	4.0
3 .0	1100	5.4
4 .0	1268	6.8
Ft	G	Ft
5	*190*	*11*
10	*290*	*17*
15	*360*	*27*

For Performance beyond the above, see **PEM 108-376.**



DIMENSIONS:

OX	235mm \9.25"
OV	223mm \8.78"
OD	293mm \11.53"
T	4"
Y	36
SS	4.5mm \0.187"



#506-3760 PEM 108-376
COLUMNAR SPRAYHEAD

PEM 108 - 376 is made of cast bronze and brass and is stainless steel fitted.

PEM 108 - 376 Columnar Spray Effect Assembly is designed to provide a narrow columnar, hollow, spray effect made up of many clear streams of water for intermediate to greater sprayheights.

In the upper range of the suggested spray performances the streams tend to break up giving the spray effect a candle like appearance.

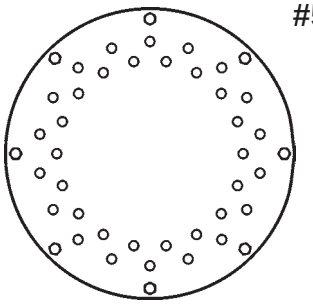
Due to the break up of the spray at greater sprayheights, the use of a PEM Wind Control is advisable.

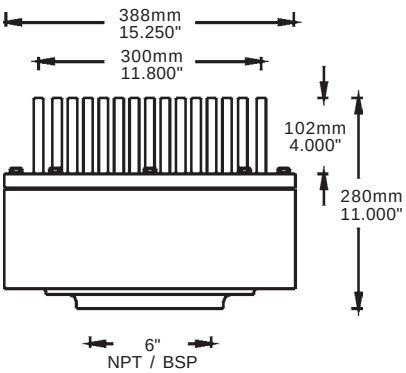
For lower sprayheights , the slightly smaller PEM 108-375 could be suggested , pressure requirements are slightly higher than for this assembly due to the smaller size pipe connection.

The pressure ratings (MC) given are pressures at the spray nozzles.

PERFORMANCES

V	FL	MC
m	L	m
4.0	1268	6.4
5 .0	1450	7.9
6 .0	1590	8.9
7 .0	1790	10.6
8 .0	1884	11.9
9 .0	2006	13.2
10.0	2130	14.4
12.0	2385	17.1
15.0	2673	21.0
18.0	2970	26.0
Ft	G	Ft
15	*360*	*24*
20	*420*	*29*
25	*480*	*39*
30	*530*	*43*
35	*580*	*49*
40	*630*	*56*
50	*707*	*68*
60	*785*	*85*





DIMENSIONS:

OX	300mm \ 11.8"
OV	280mm \ 11.0"
OD	388mm \ 15.25"
T	6.0"
Y	36
SS	4.5mm \ 0.187"

For Performances below 4.0m \ 15Ft.
Suggest use of PEM 108-375 with 4" pipe connection.

PEM 250

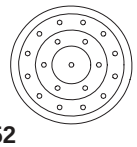
1/4"- 3 TIER FOUNTAIN HEADS

#506-5310 /PEM 252

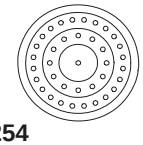
#506-5320 /PEM 254

Proper suction straining (SS) must be used.

PEM 250, 3 Tier, Watercastle or Fleur de Lis Fountainheads are made of cast bronze with copper flow diverters.

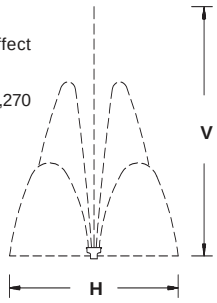


PEM 252



PEM 254

Typical Sprayeffect for PEM 250,260,270 & 280



DIMENSIONS:

PEM #	252 506-5310	254 506-5320
T	1/4"	1/4"
OV	51mm\2.000"	51mm\2.000"
OD	51mm\2.000"	51mm\2.000"
Y	19	37
SS	1mm\0.032"	1mm\0.032"

PERFORMANCES:

V	H	FL	MC	H	FL	MC
m	m	L	m	m	L	m
0.6	0.4	6	1.5	0.3	10	1.7
1.0	0.6	8	2.3	0.5	13	2.3
1.5	0.8	10	3.3	0.7	17	3.6
Ft	Ft	G	FT	Ft	G	Ft
2.0	*1.4*	*1.6*	*5*	*1.2*	*2.7*	*6*
3.0	*2.0*	*2.2*	*7*	*1.8*	*3.5*	*8*
5.0	*2.7*	*2.7*	*11*	*2.4*	*4.5*	*12*

PEM 260

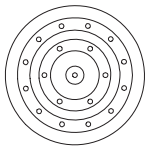
1/2"- 3 TIER FOUNTAIN HEADS

#506-5410 /PEM 262

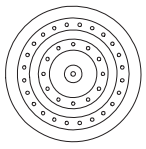
#506-5420 /PEM 264

Proper suction straining (SS) must be used.

PEM 260, 3 Tier, Watercastle or Fleur de Lis Fountainheads are made of cast bronze with copper flow diverters.



PEM 262



PEM 264

Dimension 'H' is diameter of falling spray.

For sizing of small pools use this formula: *2 x Sprayheight equals minimum diameter of pool.*

Proper suction straining (SS) must be used.

PEM 262 Fountain Spray

DIMENSIONS:

PEM #	262 506-5410	264 506-5420
T	1/2"	1/2"
OV	63mm\2.500"	63mm\2.500"
OD	63mm\2.500"	63mm\2.500"
Y	19	37
SS	1.5mm\0.065"	1mm\0.032"

PERFORMANCES:

V	H	FL	MC	H	FL	MC
m	m	L	m	m	L	m
1.0	0.8	17	2.3	0.6	18	2.4
1.5	1.2	25	3.2	0.8	24	3.3
2.0	1.5	35	4.4	1.1	33	4.5
Ft	Ft	G	Ft	Ft	G	Ft
3.0	*2.4*	*4.5*	*7.0*	*2.0*	*4.3*	*8*
5.0	*3.9*	*6.7*	*11*	*2.7*	*6.4*	*12*
6.0	*4.7*	*8.5*	*13*	*3.3*	*7.7*	*17*

PEM 270

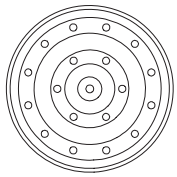
3/4"- 3 TIER FOUNTAIN HEADS

#506-5510 /PEM 272

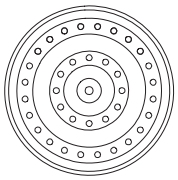
#506-5520 /PEM 274

Proper suction straining (SS) must be used.

PEM 270, 3 Tier, Watercastle or Fleur de Lis Fountainheads are made of cast bronze with copper flow diverters.



PEM 272



PEM 274

Dimension 'H' is diameter of falling spray.

PEM 272 Fountain Spray

For sizing of small pools use this formula : *2 x Sprayheight equals minimum diameter of pool.*

DIMENSIONS:

PEM #	272 506-5510	274 506-5520
T	3/4"	3/4"
OV	94mm\3.700"	94mm\3.700"
OD	85mm\3.385"	85mm\3.385"
Y	19	37
SS	2mm\0.094"	1.5mm\0.065"

PERFORMANCES:

V	H	FL	MC	H	FL	MC
m	m	L	m	m	L	m
1.5	1.9	62	2.5	1.7	65	2.9
2.0	2.7	82	2.9	2.5	84	3.5
2.5	3.2	95	3.3	3.1	96	4.1
3.0	3.8	104	3.8	3.6	106	4.3
Ft	Ft	G	Ft	Ft	G	Ft
5	*6.6*	*16.4*	*8*	*5.9*	*17.2*	*9*
6	*8.1*	*19.6*	*9*	*7.6*	*20.1*	*10*
8	*10.8*	*24.3*	*11*	*10.0*	*24.8*	*12*
10	*12.8*	*27.5*	*13*	*12.0*	*28.1*	*14*

PEM 280

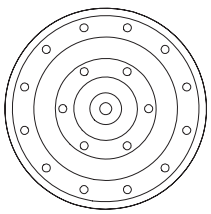
1 1/4"- 3 TIER FOUNTAIN HEADS

#506-5610 /PEM 282

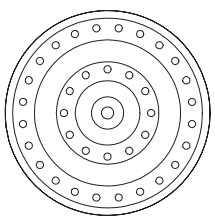
#506-5620 /PEM 284

Proper suction straining (SS) must be used.

PEM 280, 3 Tier, Watercastle or Fleur de Lis Fountainheads are made of cast bronze.



PEM 282



PEM 284

These fountain heads have no internal flow diverters.

Dimension 'H' is diameter of falling spray .

For sizing of small pools use this formula : *2 x Sprayheight equals minimum diameter of pool*.

Proper suction straining (SS) must be used.

DIMENSIONS:

PEM #	282 506-5610	284 506-5620
T	1 1/4"	1 1/4"
OV	66mm\2.600"	66mm\2.600"
OD	108mm\4.250"	108mm\4.250"
Y	19	37
SS	2mm\0.094"	1.5mm\0.065"

PERFORMANCES:

V	H	FL	MC	H	FL	MC
m	m	L	m	m	L	m
1.5	1.5	80	2.6	1.1	120	3.5
2.0	2.0	92	3.5	1.5	135	4.0
3.0	4.4	115	6.5	3.0	165	9.0
4.0	5.5	141	9.0	4.5	190	11.5
5.0	7.0	176	12.6	6.0	230	15.0
6.0	8.8	220	15.8	7.4	280	19.5
8.0	12.0	350	24.0	10.5	445	31.0
Ft	Ft	G	Ft	Ft	G	Ft
5	*5.1*	*22*	*9*	*3.6*	*33*	*12*
8	*9.2*	*27*	*15*	*6.3*	*39*	*24*
10	*14.5*	*31*	*22*	*9.9*	*44*	*30*
12	*16.4*	*35*	*27*	*13.2*	*48*	*35*
15	*20.4*	*42*	*35*	*17.4*	*56*	*46*
20	*28.9*	*59*	*52*	*24.3*	*74*	*64*
25	*35.5*	*82*	*73*	*29.6*	*105*	*91*

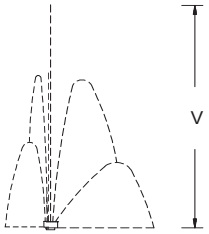
PEM 290
DIAMETER ADJUSTABLE
3 TIER - 1 1/4" FOUNTAIN HEAD

#506-6200

PEM 291 Sprayheads are made of brass and bronze.
H = Spray Diameter is variable due to adjustments from 10% to 100% of 'V' Spray Height.
All jets are directional adjustable .

PERFORMANCES:

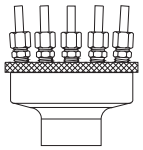
V	FL	MC
m	L	m
2.0	77	3.0
3.0	95	4.2
4.0	115	5.3
5.0	140	6.9
6.0	170	9.5
Ft	G	Ft
8	*22*	*12*
10	*26*	*14*
12	*28*	*17*
15	*34*	*21*
20	*45*	*32*

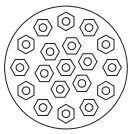


Typical Spray Effects with Directional Jet Adjustments

DIMENSIONS:

PEM #	290 506-6200
T	1 1/4"
OV	123mm \ 4.850"
OD	110mm \ 4.340"
SS	3.0mm \ 0.125"
Y	19 x 4mm 19 x 0.157"



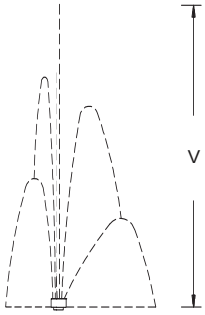


PEM 292
DIAMETER & HEIGHT ADJUSTABLE
3 TIER - 2" FOUNTAIN HEAD

#506-6300

PERFORMANCES:

V	FL	MC
m	L	m
2.0	160	3.4
3.0	200	5.1
4.0	240	6.9
5.0	270	8.4
6.0	310	10.0
8.0	370	13.2
Ft	G	Ft
8	*48*	*14*
10	*53*	*17*
15	*69*	*26*
20	*82*	*32*
25	*95*	*41*



Typical Spray Effect with Flow & Directional Jet Adjustments


PEM 292 Fountain Spray

DIMENSIONS:

PEM #	292 506-6300
T	2"
OV	180mm\7.10"
OD	180mm\7.10"
SS	3mm\0.125"
Y	1x12.7mm-18x6mm 1x 0.5"-18 x 0.25"

' V ' Sprayheight
Center Jet is 100%,
Median Jets are 75%
Outer Jets are 50%

PEM 294
DIAMETER & HEIGHT ADJUSTABLE
3 TIER - 2 1/2" & 3" FOUNTAIN HEADS

#506-6430 /PEM 294A

#506-6440 /PEM 294B

#506-6450 /PEM 294C

PERFORMANCES:

PEM #	294A 506-6430		294B 506-6440		294C 506-6450	
V	FL	MC	FL	MC	FL	MC
m	L	m	L	m	L	m
2.0	300	3.0			330	2.4
3.0	360	3.0			392	4.0
4.0	420	6.5	560	6.0	438	4.8
5.0	480	7.5	740	7.5	482	6.0
6.0	530	10.0	900	8.2	521	7.2
8.0	640	13.5	1160	11.8	604	9.6
10.0	730	18.5	1400	14.7	690	12.0
12.0	830	20.0	1600	17.5	770	14.4
15.0			1890	21.5		
FT	G	Ft	G	Ft	G	Ft
6	*76*	*11*			*101*	*10*
10	*96*	*17*			*107*	*12*
15	*119*	*25*	*172*	*20*	*130*	*18*
20	*140*	*33*	*196*	*26*	*162*	*24*
30	*183*	*49*	*341*	*43*	*204*	*36*
40	*220*	*63*	*423*	*58*	*271*	*48*
50			*499*	*70*		

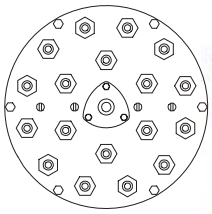
' V ' Sprayheight
Center Jet is 100%,
Median Jets are 75%
Outer Jets are 50%

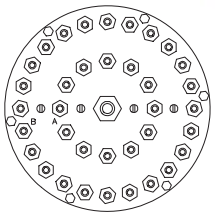
DIMENSIONS:

PEM #	294A 506-6430
T	2 1/2"
OV	185mm \ 7.30"
OD	260mm \ 10.24"
SS	3mm \ 0.125"
Y	1 x 12mm -18 x 8mm 1 x 0.472" - 18 x 0.315"

PEM #	294B 506-6440
T	3"
OV	185mm \ 7.30"
OD	260mm \ 10.24"
SS	3mm \ 0.125"
Y	1 x 12mm -18 x 10mm 1 x 0.472" - 18 x 0.394"

PEM #	294C 506-6450
T	3"
OV	185mm \ 7.30"
OD	260mm \ 10.24"
SS	3mm \ 0.125"
Y	1 x 12mm - 36 x 6.0mm 1 x 0.472" - 36 x 0.236"





PEM 295
DIAMETER & HEIGHT ADJUSTABLE
3 TIER - 4" & 6" FOUNTAIN HEADS

#506-6520 /PEM 295A

#506-6550 /PEM 295B

PERFORMANCES:

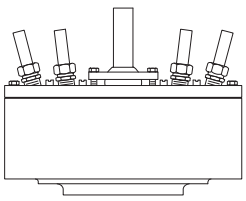
PEM #	295A 506-6520		295B 506-6550	
V	FL	MC	FL	MC
m	L	m	L	m
3	1062	3.9	1944	3.9
4	1278	5.2	2316	5.2
5	1476	6.5	2682	6.5
6	1618	7.8	2926	7.8
8	1914	10.4	3460	10.4
10	1716	13.0	3952	13.0
15	2268	19.5	4618	19.5
20	3120	26.0	5128	26.0
30	3251	39.0	5590	39.0
Ft	G	Ft	G	Ft
10	*281*	*13*	*514*	*13*
15	*387*	*20*	*661*	*20*
20	*428*	*26*	*773*	*26*
30	*496*	*39*	*992*	*39*
50	*599*	*65*	*1220*	*65*
60	*712*	*78*	*1320*	*78*
80	*817*	*104*	*1395*	*104*
100	*859*	*130*	*1477*	*130*

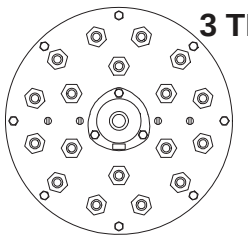
' V ' Sprayheight
Center Jet is 100%,
Median Jets are 75%
Outer Jets are 50%

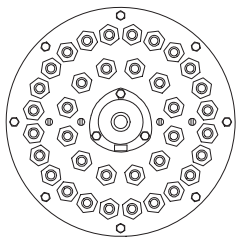
DIMENSIONS:

PEM #	295A 506-6520
T	4"
OV	280mm \ 11.000"
OD	388mm \ 15.280"
SS	8mm \ 0.325"
Y	1 x 22.3mm -18 x 12mm 1 x 0.875" - 18 x 0.472"

PEM #	295B 506-6550
T	6"
OV	280mm\11.000"
OD	388mm\15.280"
SS	8mm\0.325"
Y	1 x 22.3mm -36 x 12mm 1x 0.875" - 36 x 0.472"







Description: PEM 292, 294 & 295 Sprayheads
Spray diameter (H) is fully adjustable from 10% to over 100% of sprayheight (V). All jets are directional adjustable to affect spray diameter. The center jet is supply flow controlled. The intermediate ring of jets and the outer ring of jets are individually adjustable with flow controls located in the top of the sprayhead. The Sprayheads are made of brass and bronze, stainless steel fitted with Neoprene and EDM seals.

PEM 320 SERIES

CALYX JETS

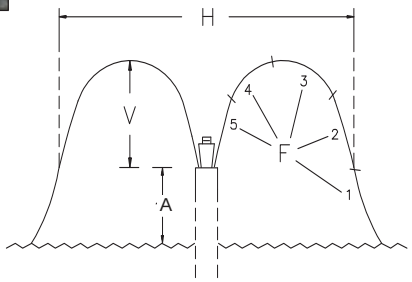
#506-9000

325-25 326-45 327-25 328-25 329-25

PEM 329 Fountain Spray

PERFORMANCE CODES IDENTIFICATIONS

A	Height of orifice above waterlevel: 300mm\12.0"	**m**	Meter
H	Diameter of spray at orifice level	**L**	Liter
V	Height of spray above orifice	**"**	Inches
X	Opening of orifice ring	**G**	US Gallon
		Ft	Feet Head
MC	Manometric Head Pressure at orifice ring	**F**	Break up point of solid sheet of water



PEM Calyx jets are made of cast bronze, brass and stainless steel fitted, the plugs have thread protection and vandal resistant lock bolts.
The construction of the jets with cast in center rod holder and female pipe connection permits direct mounting to all types of threaded pipe.
For best performances use undisturbed water supply,always mount jets on pipe risers of minimum length of 5 x nominal pipe size .
Dimension 'A' indicates the most common installation height, however this dimension can vary.
The larger jets with widest plugs are ideal for above waterlevel supplies for multilevel cascade pools, as they will prevent backflow without check valves, while at the same time enhance the overall appearance of the water feature, the flow can be increased by opening of **'X'**. Suction Strainer '**SS**' to have openings maximum 50% of **'X'**. Different spray performances & appearances are achieved by altering the break up point ' F '. Flow and Performance can be varied by the opening/closing of orifice. PEM 320 Series Calyx Jets produce calyx or mushroom style spray effects created by the deflecting of a flow of water at various angles from a circular orifice.

PEM #		**325** 506-9100		**326** 506-9200		**327** 506-9300		**328** 506-9400		**329** 506-9600	
DIMENSIONS :											
T		1 1/2"		2"		3"		4"		6"	
OV		203mm 8.000"		230mm 9.000"		305mm 12.000"		356mm 14.000"		406mm 16.000"	
SPRAY ANGLE	**PERFORMANCES** At F1-F2 Break Up Point of solid water skin:										
20⁰	**H**	0.36m	14"	0.46m	18"	0.92m	36"	1.53m	60"	1.83m	72"
	V	0.41m	16"	0.46m	18"	0.61m	24	0.77m	30"	0.92m	36"
	X	7.7mm	0.3"	10.2mm	0.4"	12.7mm	0.5"	12.7mm	0.5"	12.7mm	0.5"
	FL	76-L	20-G	156-L	41-G	493-L	130-G	757-L	200-G	1370-L	360-G
	MC	0.92m	36"	1.22m	48"	1.53m	60"	1.83m	72"	2.14"	84"
25⁰	**H**	0.41m	16"	0.61m	24"	1.53m	60"	2.14m	84"	2.44m	96"
	V	0.36m	14"	0.41m	16"	0.51m	20"	0.72m	28"	0.82m	32"
	X	7.7mm	0.3"	10.2mm	0.4"	12.7mm	0.5"	10.2mm	0.4"	10.2mm	0.4'
	FL	76-L	20-G	133-L	35-G	379-L	100-G	644-L	170-G	832-L	220-G
	MC	0.61m	24"	0.92m	36"	1.22m	48"	1.53m	60"	1.83m	72"
30⁰	**H**	0.46m	18"	0.77m	30"	1.68m	77"	2.29m	90"	2.54m	100"
	V	0.34m	13"	0.36m	14"	0.46m	18"	0.61m	24"	0.77m	30"
	X	7.7mm	0.3"	10.2mm	0.4"	12.7mm	0.5"	10.2mm	0.4"	10.2mm	0.4"
	FL	84-L	22-G	152-L	40-G	455-L	120-G	682-L	180-G	871-L	239-G
	MC	0.61m	24"	0.92m	36"	1.22m	48"	1.53m	60"	1.83m	72"
35⁰	**H**	0.61m	24"	0.92m	36"	1.83m	72"	2.44m	96"	2.75m	108"
	V	0.31m	12"	0.31m	12"	0.41m	16"	0.51m	20"	0.67m	26"
	X	7.7mm	0.3"	10.2mm	0.4"	12.7mm	0.5"	10.2mm	0.4"	10.2mm	0.4"
	FL	95-L	25-G	152-L	40-G	493-L	130-G	720-L	190-G	947-L	250-G
	MC	0.61m	24"	0.61m	24"	1.22m	48"	1.22m	48"	1.53m	60"
40⁰	**H**	0.69m	27"	1.07m	42"	1.98m	78"	2.75m	108"	3.05m	120"
	V	0.26m	10"	0.26m	10"	0.36m	14"	0.41m	16"	0.51m	20"
	X	10.2mm	0.4"	12.7mm	0.5"	12.7mm	0.5"	10.2mm	0.4"	12.7mm	0.5"
	FL	106-L	28-G	190-L	50-G	568-L	150-G	871-L	230-G	1250-L	330-G
	MC	0.61m	24"	0.61m	24"	0.92m	36"	1.22m	48"	1.53m	60"
45⁰	**H**	0.77m	30"	1.22m	48"	2.44m	96"	3.05m	120"	3.36m	132"
	V	0.18m	7"	0.21m	8"	0.31m	12"	0.36m	14"	0.41m	16"
	X	10.2mm	0.4"	12.7mm	0.5"	12.7mm	0.5"	12.7mm	0.5"	12.7mm	0.5"
	FL	137-L	36-G	228-L	60-G	720-L	190-G	1290-L	340-G	1590-L	420-G
	MC	0.61m	24"	0.61m	24"	0.92m	36"	1.22m	48"	1.53m	60"

AVAILABLE OUTPUT PLUGS FOR ALL SIZES:

Degrees:	20⁰	25⁰	30⁰	35⁰	40⁰	45⁰
Add to # :	2	3	4	5	6	7

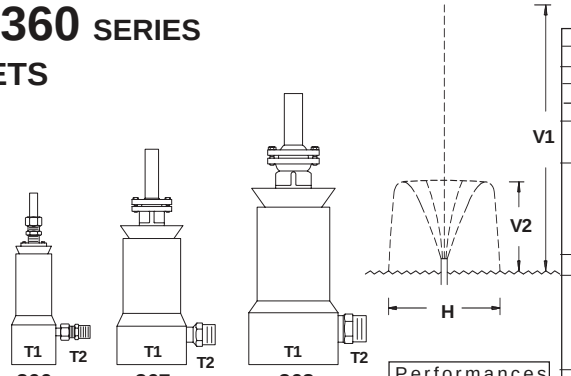
The spray angle must be specified, otherwise 25⁰ will be supplied.

PEM 360 SERIES

PICALY JETS

#507-0000

PEM 366



366 367 368

PEM 360 Picaly Jets are a combination of a calyx and a directional adjustable clear stream jet, both effects requiring different water supplies.

Performances shown are only to be indicative of suggested spray effects

It must be noted, that with a solid calyx effect, the falling spray of a vertical clearstream will disrupt the calyx effect. The calyx effect will remain perfect with the center jet falling outside of the calyx.

'F' Break up point of solid Calyx effect is as shown at 320 Series. Suction Strainer **(SS)** openings size are 50% of 'X'

PEM #		**366** 507-0020			**367** 507-0030			**368** 507-0040		
T1		2"			3"			4"		
T2		1/2"			1"			1 1/2"		
OV		280mm/11.0"			350mm/13.78"			460mm/18.11"		
X Calyx		11.5mm/0.45"			12.7mm/0.5"			19.05mm/0.75"		
X Jet		9.53mm/0.375"			12.7mm/0.5"			19.05mm/0.75"		
V1		**FL**	**MC**		**FL**	**MC**		**FL**	**MC**	
m		**L**	**m**		**L**	**m**		**L**	**m**	
1.5		35	2.8		50	2.5		80	2.5	
2.0		40	3.3		55	3.2		100	3.1	
2.5		44	3.9		61	3.9		115	3.7	
3.5		49	5.2		72	5.1		151	5.1	
4.5		55	6.5		83	6.4		193	6.4	
Ft		**G**	**Ft**		**G**	**Ft**		**G**	**Ft**	
5		9	10		13	9		21	9	
8		11	13		14	13		29	12	
10		12	14		18	14		35	14	
12		13	18		20	17		42	17	
15		15	22		22	21		51	21	
V2	**F**	**H**	**FL**	**MC**	**H**	**FL**	**MC**	**H**	**FL**	**MC**
m		**m**	**L**	**m**	**m**	**L**	**m**	**m**	**L**	**m**
0.50	1-2	1.17	178	0.58	1.65	455	0.81	2.14	947	0.61
0.75	2-3	1.48	231	0.83	2.44	606	1.04	3.30	1117	0.92
1.00	2-3	2.16	291	1.07	3.48	795	1.31	4.58	1400	1.68
1.50	4-5	3.69	443	1.71	5.72	1250	1.89	8.23	1969	2.44
Ft		**Ft**	**G**	**Ft**	**Ft**	**G**	**Ft**	**Ft**	**G**	**Ft**
2	1-2	5	51	2.2	8	114	2.8	9	260	2.3
3	2-3	8	73	3.5	13	119	4.0	15	370	3.5
4	3-4	12	95	4.5	18	126	5.1	25	670	5.0
5	4-5	15	117	5.6	22	133	6.2	27	800	6.5

PEM 360 Series Picaly Jets are made of brass and bronze, stainless steel fitted.

PEM 370 SERIES
VERTI-CALYX JETS
#507-1000

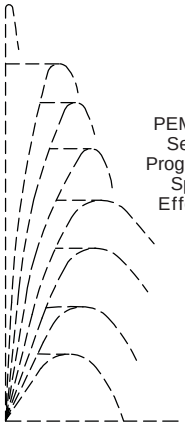
PEM Verti Calyx Jets are flow and angle adjustable from a 35° Calyx or Mushroom to a vertical stream / ring nozzle type spray effect with all intermediate spray pictures. Micro meter adjustments are lockable.
This type of jet is the only one, that offers such wide range of spray effects that can be altered at any time after installation. The jets are made of cast bronze, brass and stainless steel fitted.

PEM	372	373	374	376
#	507-1110	507-1120	507-1130	507-1180
T	2"	3"	4"	6"
OV	260mm	330mm	380mm	470mm
	10.240"	12.990"	14.960"	18.510"
OD	72mm	115mm	146mm	220mm
	2.840"	4.530"	5.750"	8.660"

PERFORMANCES:

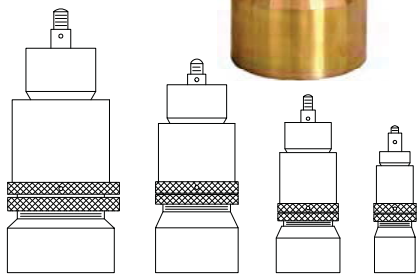
V	F	FL	H	F	FL	H	F	FL	H	F	FL	H	MC
m	*	L	m	*	L	m	*	L	m	*	L	m	m
0.5	2	87	1.2	2	186	1.5	1	436	2.1	1	833	2.4	1.1
1.0	3	118	2.0	3	247	2.4	3	493	3.5	2	985	4.0	2.3
1.5	4	152	3.0	4	334	3.2	4	757	4.2	3	1514	4.8	3.4
3.0	0	264		0	588		0	1325		0	2650		6.5
4.0	0	342		0	682		0	1552		0	3180		8.6
5.0	0	436		0	871		0	2006		0	3975		11.0
6.0	0	511		0	985		0	2461		0	4921		13.0
Ft		G	Ft		G	Ft		G	Ft		G	Ft	FT
2	*2*	*25*	*4*	*2*	*53*	*6*	*1*	*120*	*7*	*1*	*250*	*8*	*6*
3	*3*	*30*	*6*	*3*	*60*	*8*	*3*	*175*	*11*	*2*	*350*	*13*	*8*
5	*4*	*48*	*10*	*4*	*88*	*11*	*4*	*200*	*13*	*3*	*400*	*16*	*12*
10	*0*	*70*		*0*	*155*		*0*	*350*		*0*	*700*		*20*
15	*0*	*105*		*0*	*220*		*0*	*500*		*0*	*1000*		*30*
20	*0*	*135*		*0*	*260*		*0*	*650*		*0*	*1300*		*40*

* = Break Up Point of spray as per PEM 320 Series



PEM 370 Series Progressive Spray Effects

PEM 373



376 374 373 372

PEM 500 SERIES
DIRECTIONAL SWIVEL UNIONS
#507-2000

PEM 500 Series Directional Swivel Unions are used to align those jets and nozzles, that do not have a swivel base incorporated and require directional adjustment beyond 5° to maximum 15° off center line. For lesser directional adjustment use PEM 08 Series Adjustment Flanges.

#	PEM	Male x Female	OV	Appr. added height to riser
507-2160	**536**	1/2" x 1/2"	68mm\2.7"	42mm\1.66"
507-2170	**537**	1/2" x 3/4"	70mm\2.8"	43mm\1.70"
507-2180	**538**	3/4" x 3/4"	76mm\3.0"	48mm\1.89"
507-2190	**539**	1/2" x 1"	76mm\3.0"	45mm\1.78"
507-2200	**540(550)**	3/4" x 1"	80mm\3.2"	48mm\1.89"
507-2210	**541**	1" x 1"	85mm\3.4"	49mm\1.92"
507-2220	**551**	1" x 1 1/4"	96mm\3.8"	60mm\2.37"
507-2230	**552**	1 1/4" x 1 1/4"	105mm\4.2"	69mm\2.72"
507-2240	**553**	1 1/4" x 1 1/2"	115mm\4.6"	79mm\3.12"
507-2250	**554**	1 1/2" x 1 1/2"	120mm\4.8"	84mm\3.31"
507-2260	**555**	1 1/2" x 2"	135mm\5.4"	98mm\3.86"
507-2270	**556**	2" x 2"	145mm\5.7"	107mm\4.22"
507-2280	**557**	2 1/2" x 3"	179mm\7.1"	129mm\5.08"
507-2290	**558**	3" x 3"	185mm\7.3"	133mm\5.42"
507-2300	**559**	4" x 4"	220mm\8.7"	162mm\6.38"

558 556 540 538

PEM 531 - 535 are made of brass, PEM 536 - 541 are made of brass and bronze, while all larger ones are made of cast bronze. All bolts are of stainless steel.

PEM 626
FILIGRAN SPRAY JET
#507-3000

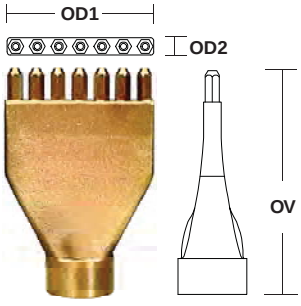
VERTICAL PERFORMANCES

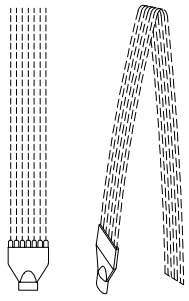
V	FL	MC
m	L	m
1	77	1.2
1.5	98	1.8
2	112	2.4
3	131	3.6
4	150	4.8
5	163	6.0
6	175	7.2
Ft	G	Ft
3	*19*	*4*
5	*26*	*6*
8	*31*	*10*
10	*35*	*12*
15	*41*	*18*
20	*47*	*24*

At an angle

For directional adjustment use PEM 08-5 Adjustment Flange or 554 Directional Swivel Union.

Vertical





DIMENSIONS:

T	1 1/2"
OV	206mm\8.10"
OD1	136mm\5.35"
OD2	16mm\ 0.63"
Y	7 x 6.35mm\0.25"
SS	4.8mm\0.187"

PEM 626 Filigran Jet is designed to provide a multi stream spray of app 130mm\5.0" width, that in its lower spray heights gives a filigran type effect, especially within an angle pattern, where the spray 'folds' over itself, actually crossing the streams. In the greater spray heights this jet in its greater width can give from one side the appearance of a large, full stream jet whilst only using a fraction of the flow. PEM 626 is made of cast bronze with brass nozzles. This jet can be adapted for salt water use.

PEM 740 SERIES

AERATING JETS "WHITE WATER" JETS

PEM 740 Series Aerating Jets represent one of the most widely used spray effects in the world. This type of jet evolved over a period of time as to be one of the most effective and flexible, yet least flow demanding "White Water" spray effect jet.

#507- 4000

Stainless Steel

Chrome Plated

742A 743A 744A 745A 746B 747A 748B 749A

PEM 740 Series Aerating Jets are extremely economical to use as they provide with a least possible flow of water, the maximum in visibility of spray effects. They are the "White Water' Jets .The jets are submerged to their ' UT ' immersion. Built in swivel bases permit directional adjustment to appr. 15^0 off center line. Micrometric adjustment of the air intake sleeve permits changing the ratio of water drawn from the pool and air , thereby changing the appearance of the spray and its height. Adjustment rules : 1. Air Intake Sleeve UP ,spray heavier and lower . 2. Air Intake Sleeve DOWN , spray lighter and higher.

PEM 740B Series Aerating Jets are offered with suction strainer around the intake ports of the jet,to prevent leaves or debris from plugging up these ports,causing the jet orifice to spray unimpeded to the height of the operating head pressure. PEM 740-A Series Jets are offered without the suction strainers for locations where they are not required or desired. These aerating jets require a constant water level with a differential not exceeding 20mm\0.750" plus or minus. 'UT' = From pipe connection up. 'SS' designates suggested orifice sizes for pump suction strainers.

PEM (No Strainer) #	**742A 507- 4010**	**743A 507- 4020**	**744A 507- 4030**	**745A 507- 4040**	**746A 507- 4050**	**747A 507- 4060**	**748A 507- 4070**	**749A 507- 4080**
PEM (With Strainer) #	**742B 507- 4110**	**743B 507- 4120**	**744B 507- 4130**	**745B 507- 4140**	**746B 507- 4150**	**747B 507- 4160**	**748B 507- 4170**	**749B 507- 4180**

DIMENSIONS :

T	3/4"	3/4"	1"	1 1/4"	1 1/2"	2"	2 1/2"	3"
OX (Stream O.D.)	19mm 0.750"	25mm 1.000"	32mm 1.250"	39mm 1.500"	52mm 2.000"	65mm 2.500"	76mm 3.000"	90mm 3.500"
X (Output Tube I.D.)	16mm 0.625"	19mm 0.750"	25mm 1.000"	32mm 1.250"	39mm 1.500"	52mm 2.000"	63mm 2.500"	76mm 3.000"
SS	3mm 0.125"	4mm 0.187"	5mm 0.200"	6mm 0.250"	8mm 0.325"	12mm 0.500"	12mm 0.500	16mm 0.625"
OV1	191mm 7.500"	197mm 7.750"	242mm 9.500"	267mm 10.500"	343mm 13.500"	394mm 15.500"	455mm 17.920	547mm 21.500"
UT	160mm 6.300"	162mm 6.400"	200mm 7.875"	227mm 8.900"	292mm 11.500"	343mm 13.500"	355mm 13.980"	487mm 19.185"
OV2 (Strainer)	127mm 5.000"	146mm 5.750"	165mm 6.500"	203mm 8.000"	222mm 8.750"	267mm 10.500"	267mm 10.500"	330mm 13.000"
OD (Strainer)	89mm 3.500"	89mm 3.500"	89mm 3.500"	114mm 4.500"	140mm 5.500"	191mm 7.500"	191mm 7.500"	229mm 9.000"

PERFORMANCES : (Most impressive , minimum break up of spray effect performances are within the lower 1/3 to 1/2 of sprayheight)

V	**FL**	**MC**	**FL**	**MC**	**FL**	**MC**	**FL**	**MC**	**FL**	**MC**	**FL**	**MC**	**FL**	**MC**	**FL**	**MC**
m	**L**	**m**	**L**	**m**	**L**	**m**	**L**	**m**	**L**	**m**	**L**	**m**	**L**	**m**	**L**	**m**
1.0	10	7.4	17	5.7	25	3.9	34	3.4	38	3.2						
1.5	14	10.4	21	7.9	29	6.1	41	4.7	44	4.5	90	3.0				
2.0	16	13.7	25	10.2	34	7.8	46	5.9	55	5.2	118	3.8	200	8.5	320	7.7
3.0	21	20.5	31	14.3	41	11.0	55	8.2	72	7.2	141	5.5	260	10.0	380	8.5
4.0			36	17.0	46	14.4	61	10.5	86	8.7	165	7.0	310	11.5	415	10.5
5.0					52	17.8	67	12.9	97	10.4	180	8.3	340	13.0	470	12.9
6.0							72	17.8	107	12.2	210	9.8	380	14.5	500	14.5
8.0									121	15.6	230	12.5	440	17.0	570	18.0
10.0									130	19.2	250	15.6	510	20.0	620	22.0
12.0									137	22.5	270	18.0	560	23.0	670	26.0
15.0											290	21.5	630	28.0	750	32.0
20.0													720	36.0	850	41.0
30.0															1030	59.3
Feet	**G**	**Ft**	**G**	**Ft**	**G**	**Ft**	**G**	**Ft**	**G**	**Ft**	**G**	**Ft**	**G**	**Ft**	**G**	**Ft**
3	2.2	21	4.0	16	6.1	13	8.5	12	10.3	11						
5	3.4	35	5.6	10	7.7	20	10.9	16	12.5	15	26	10				
8	4.5	53	7.2	30	9.8	30	13.3	22	16.4	20	36	16	63	30	90	27
10	5.6	66	8.2	36	10.9	36	14.6	27	19.1	23	40	18	69	33	98	30
15			10.1	54	13.0	54	17.2	39	24.1	32	46	26	88	40	119	39
20					14.6	70	19.6	50	28.3	40	53	33	101	48	135	48
25							22.2	61	31.0	49	59	40	117	55	146	57
30							24.4	73	33.3	61	65	46	127	63	156	66
40									36.2	74	72	59	148	76	177	82
50											77	71	166	92	199	102
60													183	109	217	120
80															246	157
100															275	195

For fresh water use: PEM 740 Series Aerating Jets are made of cast bronze, brass and copper, stainless steel fitted

For saltwater use: PEM 740 Aerating Jets are available in the "A' version only (without suction strainers), made out of seawater bronze and stainless steel tubing - at extra cost.

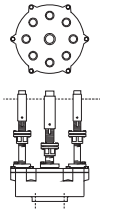
PEM 740-400 SERIES
AERATING JET ASSEMBLIES
#507- 6000

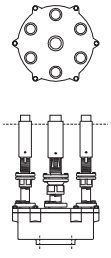
PEM 740-400 Series Aerating Jet assemblies are designed as center effects in substantial water displays, such as floating fountains in lakes or ponds. The spray effects are fully directional and height adjustable.The spray can be adjusted from a vertical column to a Fleur de Lis (Watercastle) pattern with a splash diameter equal to sprayheight.**PEM 740-400 Series Aerating Jet Assemblies** are made of bronze, red brass, brass and copper and are stainless steel fitted.

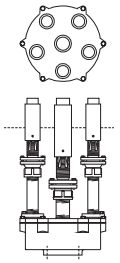

PEM 740-401

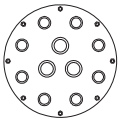
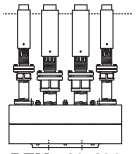

PEM 740-405

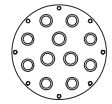
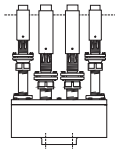

PEM 740-416

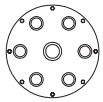
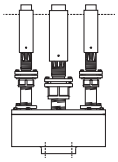

PEM 740-401

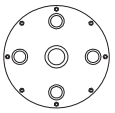
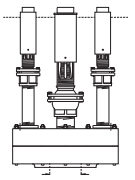

PEM 740-402

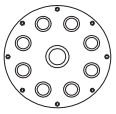
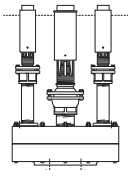

PEM 740-403

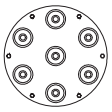
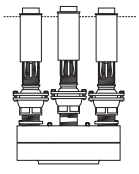


PEM 740-406

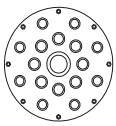
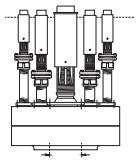


PEM 740-404



PEM 740-405



PEM 740-407



PEM 740-408



PEM 740-409



PEM 740-416

All assemblies require constant water level, use PEM Waterlevel Controls also PEM Wind Control for sprays in confined areas. Other assemblies are custom made to given specifications.Center Jets are not valved, all other jets are mounted on valving, lockable risers.

Sprayeffect adjustments: See PEM 740 Series Aerating Jets, in addition each peripheral jet is individually flow adjustable.

Performances below are for center jet = 100%, single Ring 50%, double rings, Ring 1 =70%, Ring 2 = 50% of given sprayheights.

ASSEMBLY DESCRIPTION & DIMENSION :

PEM	740-401	740-402	740-403	740-404	740-405	740-406	740-407	740-408	740-409	740-416
Old Cat.#	108-1	108-2	108-3	108-4	108-5	108-6	108-7	108-8	108-9	108-16
#	507- 6210	507- 6220	507- 6230	507- 6240	507- 6250	507- 6260	507- 6270	507- 6280	507- 6290	507- 6310
Center	1x744A	1X745A	1X746A	3X746A	1X747A	3X747A	1X749A	1X749A	1X749A	1X749A
Ring1	8x743A	6x744A	5x745A	8x745A	6x746A	8X746A	4X747A	8X747A	6X749A	8X747A
Ring 2										8x746A
Base	1008	1010	1010	1013	1013	1018	1018	1018	1018	1018
T	3"	4"	4"	4"	4"	6"Fl.	6"Fl.	6"Fl.	6"Fl.	6"Fl.
OV	356mm 14.000"	438mm 17.250"	514mm 20.240"	571mm 22.490"	622mm 24.490"	652mm 25.670"	805mm 31.700"	805mm 31.700"	805mm 31.700"	650mm 25.600"
OD	258mm 10.125"	293mm 11.500"	293mm 11.500"	388mm 15.300"	388mm 15.300"	534mm 21.000"	534mm 21.000"	534mm 21.000"	534mm 21.000"	534mm 21.000"
UT	336mm 13.230"	408mm 16.070"	474mm 18.660"	531mm 20.910"	582mm 22.920"	612mm 24.100"	755mm 29.730"	755mm 29.730"	755mm 29.730"	600mm 23.630"
X	6.35mm 0.250"	8.26mm 0.325"	9.53mm 0.375"	9.53mm 0.375"	12.7mm 0.500"	12.7mm 0.500"	19.05mm 0.750"	19.05mm 0.750"	25.40mm 1.000"	12.7mm 0.500"

PERFORMANCES :

V	FL	MC	FL	MC	FL	MC	FL	MC	FL	MC	FL	MC	FL	MC	FL	MC	FL	MC	FL	MC
	L	m	L	m	L	m	L	m	L	m	L	m	L	m	L	m	L	m	L	m
2m	170	8	196	6																
3m	209	11	229	9	277	8	656	8	405	6	775	6	740	9	1100	9	1880	9	1676	9
4m	246	15	229	11	316	9	754	9	495	8	935	8	887	11	1359	11	2335	11	1983	11
5m			313	13	372	11	827	11	560	9	1052	9	990	13	1510	13	2630	13	2298	13
6m					417	13	897	13	642	10	1206	10	1064	15	1628	15	2780	15	2476	15
8m									746	13	1378	14	1230	18	1890	18	3060	18	2938	18
10m									832	16	1526	16	1340	22	2060	22	3440	22	3156	22
15m													1630	32	2510	32	4050	32	3695	32
20m													1850	41	2850	41	4570	41	4190	41
30m													2190	60	3350	60	5530	60	4766	60
	G	Ft	G	Ft	G	Ft	G	Ft	G	Ft	G	Ft	G	Ft	G	Ft	G	Ft	G	Ft
8Ft	49	30	61	22	65	20	125	20	103	16										
10Ft	56	36	68	27	75	23	146	23	115	18	220	18	202	30	306	30	512	30	486	30
15Ft	61	54	79	39	86	32	180	32	139	26	262	26	255	39	391	39	611	39	587	39
20Ft					104	40	202	40	168	33	312	33	295	48	455	48	723	48	656	48
30Ft									210	46	388	46	340	66	524	66	870	66	773	66
40Ft											443	59	389	82	601	82	987	82	924	82
50Ft													435	102	671	102	1075	102	1023	102
60Ft													477	120	791	120	1153	120	1100	120
80Ft													534	157	822	157	1338	157	1192	157
100Ft													583	195	891	195	1469	195	1323	195

PEM 750 SERIES

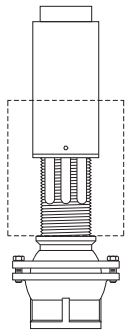
4" AERATING JETS

#507-7100

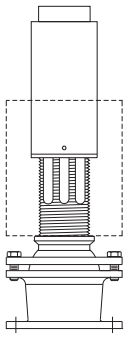
Sleeve UP-Spray down & heavier.
Sleeve DOWN -Spray up & lighter.

PEM 750-1 Series Aerating Jets are made of brass, bronze and copper, stainless steel fitted. **PEM 750 Aerating Jets** are waterlevel dependent. The narrow columnar 'White Water' spray effect is adjustable as to appearance and spray height by altering the water to air ratio with the lowering or raising of the lower part of the air intake sleeve. Best, solid 'White Water' spray effects are within the lower 2/3 range of 'V". The UT immersion of PEM 750-1 is affected by the air sleeve adjustment. The UT immersion of PEM 750-2 will not be affected by the new for 1992 water to air ratio adjustment. These jets have to be protected from pool surging. **Debris strainers for 750-1** are made of bronze and brass, are required where floating debris is encountered. (Not available as standard for PEM 750-2 but can be custom made, please enquire). Ball swivel mounting permits directional adjustment (up to 17 degrees off centerline).

PEM 750-1T

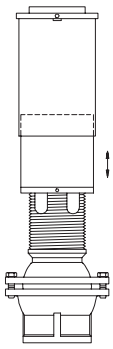


750-1T
507-7120

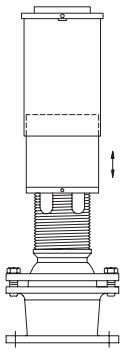


750-1F
507-7140

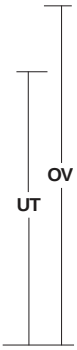
PEM 750-2T



750-2T
507-7160



750-2F
507-7170



PEM #	750-1AT 507-7110	750-1T 507-7120	750-1AF 507-7130	750-1F 507-7140	750-2T 507-7160	750-2F 507-6170
T	4"	4"	4"Flange	4"Flange	4"	4"Flange
OX	95mm 3.750"	95mm 3.750"	95mm 3.750"	95mm 3.750"	102mm 4.000"	102mm 4.000"
OV	635mm 25.0"	635mm 25.0"	635mm 25.0"	635mm 25.0"	690mm 27.170"	690mm 27.170"
OD	210mm 8.270"	210mm 8.270"	229mm 9.000"	229mm 9.000"	210mm 8.270"	229mm 9.000"
UT	553mm 21.750"	553mm 21.750"	553mm 21.750"	553mm 21.750"	566mm 22.280"	566mm 22.280"
OD (Strainer)	- -	229mm 9.000"	- -	229mm 9.000"	- -	- -
SS	20mm 0.750"	20mm 0.750"	20mm 0.750"	20mm 0.750"	25mm 1.000"	25mm 1.000"

PEM 750-1

Micrometric airsleeve adjustment permits fine control of spray effect appearance as well as of sprayheight.

PERFORMANCES :

	750-1		750-2	
V	FL	MC	FL	MC
m	L	m	L	m
2	360	5.9	550	4.8
3	470	7.2	650	5.5
5	640	10.5	870	10.0
10	900	19.1	1160	15.5
15	1100	26.2	1430	22.0
20	1250	36.5	1700	31.0
25	1410	46.5	1920	42.0
30	1560	56.5	2150	51.5
40	1880	73.8	2630	76.0
50			3100	99.0
Ft	G	Ft	G	Ft
8	*106*	*21*	*154*	*17*
10	*130*	*24*	*172*	*19*
15	*162*	*30*	*207*	*25*
20	*188*	*41*	*232*	*33*
30	*230*	*58*	*288*	*47*
40	*262*	*74*	*333*	*60*
50	*288*	*87*	*378*	*73*
80	*365*	*146*	*495*	*130*
100	*413*	*186*	*586*	*169*
150	*542*	*306*	*700*	*288*

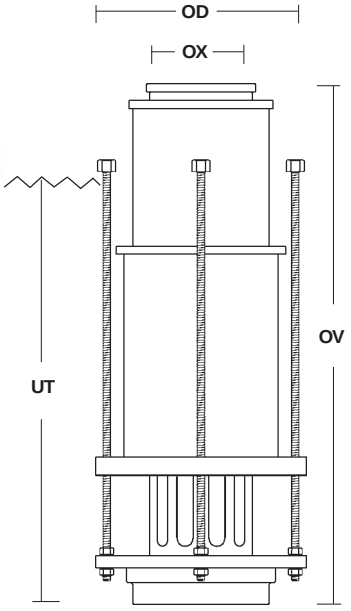
PEM 760

6" & 8" AERATING JETS

#507-7400

PEM 760 Aerating Jets are waterlevel dependent and produce a narrow , solid , columnar 'White Water' spray effect.The spray effect is adjustable as to appearance (density) and height by a proportioning of the pond water to air ratio drawn in by the jet . The adjustment does not affect the 'UT' as in most smaller aerating jets . The ratio adjustment can be affected from above waterlevel by turning the lift bolts (4) with a wrench clockwise (1/2 turn each,one after the other) to lower the spray,counter clockwise to raise the spray. These jets must be protected from pool surging. Best ,solid , spray effects are within the lower 2/3 of the shown sprayheights . PEM 760 Aerating Jets are made of brass and bronze,stainless steel fitted.

PEM 766



DIMENSIONS :

PEM #	766 507-7440		768 507-7460	
T	6"		8"	
OX	152mm\6.000"		200mm\8.000"	
SS	32mm\1.250"		45mm\1.750"	
OV	813mm\32.000"		914mm\36.000"	
OD	350mm\13.780"		400mm\15.750"	
UT	660mm\26.000"		760mm\30.000"	
PERFORMANCES:				
V	FL	MC	FL	MC
m	L	m	L	m
3	1404	6	2200	6
6	2000	11	3000	12
10	2500	18	3900	20
15	3000	27	4900	30
20	3500	36	5700	40
30	4200	54	7000	60
50	5100	90	8300	100
Ft	G	Ft	G	Ft
10	*350*	*18*	*600*	*20*
20	*530*	*36*	*900*	*40*
50	*760*	*90*	*1300*	*100*
80	*990*	*144*	*1600*	*160*
100	*1200*	*180*	*1900*	*200*
150	*1360*	*270*	*2150*	*300*

NOTE:
Pressures greater than shown might damage jets.

The performances shown are for undisturbed, linear inflow into jet at given 'UT' immersion and shown sleeve adjustment position . Performances are extremely variable due to different 'UT' immersions and air to water ratio adjustment. Maximum height with exclusion of pond water can reach up to appr. within 20% of nozzle pressure . Minimum height with entry ports fully open can be appr. less than 50% of shown values. For directional adjustment combine Jet with 08-10 Adjustment Flange. Riser pipe for PEM 768 must be flow sized with reduction at jet.

PEM 776

6" LAKE CASCADE JET

#507-7510

PEM 776 Lake Cascade Jet is waterlevel dependent and produces an intermediate diameter , 'White Water' spray effect that is highly visible for long distances. Normal application is in floating lake fountains and lake aerators that require a highly visible spray effect with an approximate spray width at its base of up to 1/3 of sprayheight.

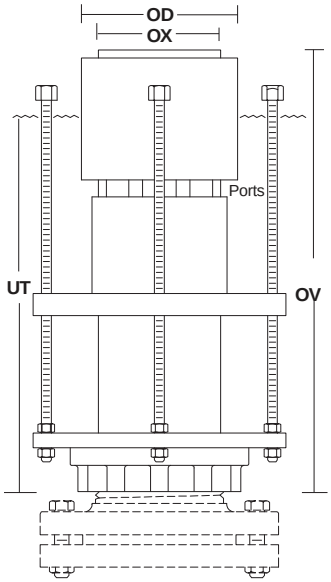
The spray effect is adjustable as to appearance (density) and height by a proportioning of the pond water drawn in by the jet . The air intake is fixed . The adjustment does not affect the 'UT' . The water intake ports adjustment can be affected from above waterlevel by turning the lift bolts (4) with a wrench clockwise (1/2 turn each,one after the other) to raise the spray,counter clockwise to lower the spray. **PEM 776 Lake Cascade Jets** are made of brass and bronze, stainless steel fitted.

These jets must be protected from pool surging when used in smaller pools or ponds. Best, solid, spray effects are within the lower 2/3 of the shown sprayheights .

For vertical alignment the use of PEM 08-10, 6" Adjustment Flange is recommended.

PERFORMANCES :				
Ports Open :	32mm\1.250"		51mm\2.0"	
V	**FL**	**MC**	**FL**	**MC**
m	**L**	**m**	**L**	**m**
3	155	7	1900	9
6	2230	15	2600	18
10	2850	25	3200	30
15	3500	38	4100	45
20	4200	50	4600	60
30	4900	75	5200	90
Ft	**G**	**Ft**	**G**	**Ft**
10	*410*	*25*	*500*	*30*
20	*590*	*50*	*600*	*60*
50	*925*	*125*	*1100*	*150*
80	*1200*	*200*	*1300*	*240*
100	*1300*	*250*	*1400*	*300*

DIMENSIONS :	
T	: 6"
OX	:153mm\6.0"
OV	:575mm\22.64"
OD	:330mm\13.00"
UT	500mm\20.0"



NOTE:
As this type of spray effect is usually operated without a control valve to limit the flow/pump output, it is recommended that the electrical motor starter for the pump be sized for the full flow amperage of the pump to avoid overloading and contact burn out.

Pressures greater than shown might damage jets.

PEM 776

The performances shown are for undisturbed, linear inflow into jet at given 'UT' immersion and shown port openings. Performances are extremely variable due to different 'UT' immersions and water intake adjustment. Maximum height with exclusion of pond water can reach up to appr. within 20% of nozzle pressure . Minimum height with entry ports fully open can be appr. less than 50% of shown values. For directional adjustment mount Jet on to 08-10 Adjustment Flange. Supply pipe must be flow sized .

PEM 796

6" LAKE GEYSER JET

#507-7710

PEM 796 Lake Geyser Jets are made of brass and bronze, stainless steel fitted. PEM 796 Lake Geyser Jet is waterlevel dependent and produces a wide, fluffy 'White Water Geyser ' spray effect that is highly visible for long distances. Normal application is in floating lake fountains and lake aerators that require a highly visible spray effect with an approximate spray diameter at its base of more than 50% of sprayheight . This jet can produce about the greatest spray filled volume of air of any single spray jet.

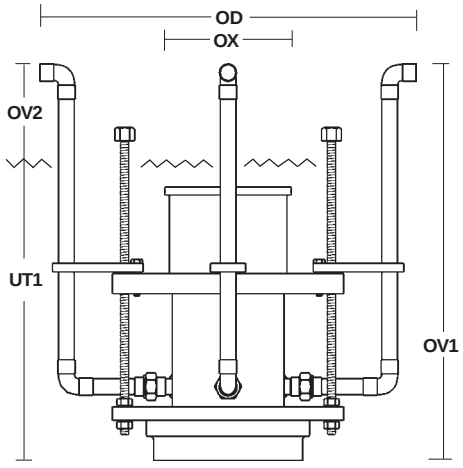
The spray effect is adjustable as to appearance (density) and height by adjusting the immersion of the jet discharge. The air intake snorkels (4) are fixed . The immersion ('UT2') adjustment of the discharge can be affected from above waterlevel by turning the lift bolts (4) with a wrench clockwise (1/2 turn each, one after the other) to raise the spray, counter clockwise to lower the spray.

These jets must be protected from pool surging when used in smaller pools or ponds.

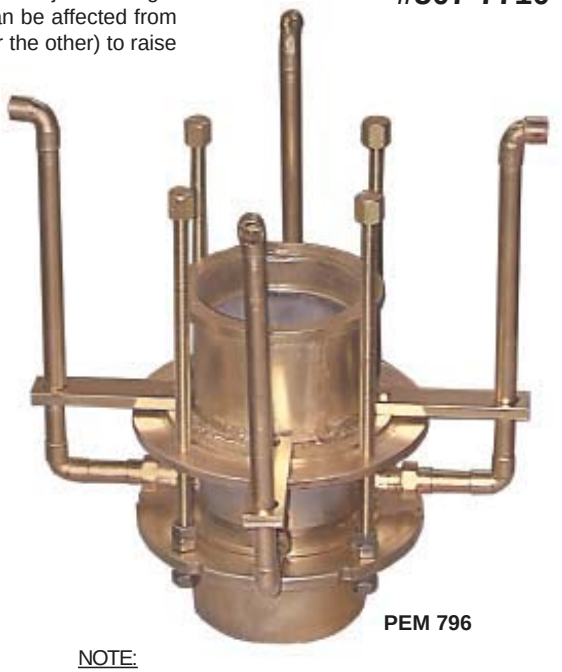
DIMENSIONS

T	:	6"
OX	:	153mm\6.000"
OV1	:	560mm\22.050"
OV2	:	100mm\3.940"
OD	:	540mm\21.260"
UT1	:	440mm\17.330"
UT2	:	Variable,see below
SS	:	40mm\1.500"

For vertical alignment the use of PEM 08-10. Adjustment Flange is recommended.



PERFORMANCES :				
UT2	51mm\2.000"		100mm\4.0"	
V	**FL**	**MC**	**FL**	**MC**
m	**L**	**m**	**L**	**m**
3	1400	6	2300	15
6	2100	12	3200	30
10	2600	20	4200	50
15	3200	30	4900	75
20	3700	40	5400	100
30	4600	60	5900	150
Ft	**G**	**Ft**	**G**	**Ft**
10	*370*	*20*	*590*	*50*
20	*540*	*40*	*840*	*100*
50	*800*	*100*	*1300*	*250*
80	*1100*	*160*	*1400*	*400*
100	*1200*	*200*	*1650*	*500*



PEM 796

NOTE:
As this type of spray effect is usually operated without a control valve to limit the flow/pump output, it is recommended that the electrical motor starter for the pump be sized for the full flow amperage of the pump to avoid overloading and contact burn out. Pressures greater than shown might damage jets.

The performances shown are for undisturbed, linear inflow into jet at given 'UT2' immersion. Performances are extremely variable due to different 'UT2' dimensions and sleeve adjustments. So greater the 'UT2' dimension, so heavier and wider the spray, but also so greater the intake pressure and flow requirements. If at an installation,the jet operates too high and thin, then lower the whole jet and extend the air snorkel tubes (3/4" American size copper tube) until the desired effect has been achieved. For directional adjustment, mount Jet onto 08-10, 6" Adjustment Flange. Supply pipe must be flow sized.

PEM 800 / 810

METRIC series
BRASS STREAM JETS

803 **805** **808** **812** **813** **815**

PEM Brass Stream Jets, directional adjustable with built in ABS Multi Vane Flow Straightener. For higher pressure or saltwater (sea water) applications please consult catalog for other PEM 800 Series Jets in Bronze or custom made in 316 Stainless Steel. Chrome Plating of jets is available at extra cost, please request quotation.

PEM		**803**	**804**	**805-1**	**805-2**	**805-3**	**808-1**	**808-2**	**808-3**	**812-1**	**812-2**	**813-1**	**813-2**	**815-1**	**815-2**	**815-4**	**815-5**
# 507-		**-7800**	**-7810**	**-7820**	**-7822**	**-7823**	**-7830**	**-7832**	**-7833**	**-7890**	**-7892**	**-7910**	**-7912**	**-7920**	**-7922**	**-7924**	**-7925**
T (NPT)		1/4"	1/4"	3/8"	3/8"	3/8"	1/2"	1/2"	1/2"	3/4"	3/4"	1"	1"	1 1/2"	1 1/2"	1 1/2"	1 1/2"
Dimensions		mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
X		3	4	4	5	6	6	8	10	12	14	12	14	16	17	19	20
OV		56	56	71	71	71	88	88	88	100	100	110	110	155	155	155	155
OD		10	10	23	23	23	27	27	27	36	36	40	40	56	56	56	56
C		30	30	30	30	30	30	30	30	14	12	30	30	30	30	30	30
SS		1.5	2.0	2.0	2.5	3	3	4	5	6	7	6	7	8	8	9	9
V - m																	
0.5m	**FL**	0.7	1.5	1.6	4.0	5.9	6.5	10	15	22	28	18	33	40	45	55	60
	MC	0.8	0.9	0.8	0.9	0.8	0.8	0.7	0.8	0.8	1.2	0.8	0.9	0.7	0.7	0.7	0.7
1.0m	FL	1.2	3.0	3.2	6.0	7.1	8.5	14	21	30	38	32	43	55	62	78	85
	MC	1.6	1.6	1.2	1.6	1.3	1.5	1.3	1.5	1.5	2.1	1.5	1.4	1.3	1.2	1.2	1.2
1.5m	FL	2.0	4.8	4.8	7.0	8.2	10.5	17	27	38	45	38	52	68	75	92	105
	MC	2.4	3.1	1.9	2.2	2.0	2.2	1.9	2.2	2.6	3.2	2.0	2.1	2.0	1.9	1.9	1.8
2.0m	FL	2.8	5.5	5.5	8.0	9.5	12.0	20	31	43	55	45	60	80	84	110	130
	MC	2.9	4.2	2.2	2.9	2.7	2.9	2.7	2.9	3.2	3.9	2.7	2.7	2.8	2.4	2.4	2.4
2.5m	FL	3.7	6.2	6.2	9.0	10.7	13.5	22	34	48	64	49	69	90	197	120	145
	MC	3.6	5.0	2.9	3.5	3.3	3.6	3.3	3.6	4.0	4.8	3.1	3.5	3.3	3.0	3.0	3.0
3.0m	FL	4.3	7.0	7.0	10.0	11.9	14.4	25	37	53	70	55	75	100	110	132	155
	MC	4.6	5.0	3.3	4.2	3.9	4.2	4.0	4.4	4.9	5.5	3.8	4.5	4.1	3.9	3.8	3.8
4.0m	FL		8.4	8.9	12.0	14.8	16.2	29	40	62	86	65	93	115	129	159	182
	MC		7.0	4.6	5.4	5.5	5.3	5.4	5.4	6.2	7.0	5.1	6.0	5.9	5.3	5.1	5.1
5.0m	FL					17.4	18.9	33	49	70	104	75	111	130	145	183	208
	MC					6.9	6.5	7.0	6.5	7.9	8.3	6.3	7.5	7.2	6.8	6.6	6.8
6.0m	FL							38	56	80	118	81	126	145	162	210	237
	MC							8.7	7.7	9.4	10.0	7.7	9.0	8.9	8.1	8.1	8.0
8.0m	FL								68	100	141	106	148	175	201	262	287
	MC								9.9	12.5	13.0	10.8	12.0	11.7	11.0	10.8	10.8
10.0m	FL										161	127	171	205	235	318	345
	MC										15.8	13.0	14.7	15.0	14.0	13.7	13.7
12.0m	FL													235	271	368	393
	MC													18.1	16.9	16.6	16.6

T : Male NPT to fit Female BSP **/ X :** Nozzle Orifice **/ OV :** Overall Height **/ OD :** Outside Diameter **/ FL :** Flow **/ MC :** Nozzle Pressure / **SS :** Suggested Size of Suction Strainer Orifices / **V :** Spray Height / **C :** Included Angle of adjustment

PEM Brass Stream Jets replace PEM LC Type & PEM 800 / 810 Series Jets. PEM Brass Stream Jets can be supplied in quantity with custom bored orifices of different size, please enquire. PEM Brass Stream Jets have male (outside thread) NPT pipe connection, suitable for insertion into female (inside thread) BSP Pipe Fittings. PEM Brass Stream Jets are supplied with ABS molded multi vane Flow Straighteners in the pipe connection. PEM Brass Stream Jets are made of virgin, solid SAE-360 (B16) Brass.

PEM 800 / 810
AMERICAN series
BRASS STREAM JETS

815 813 812 808 805 804 802

PEM Brass Stream Jets, directional adjustable, with built in ABS Multi Vane Flow Straightener. For higher pressure or saltwater (sea water) applications please consult catalog for other PEM 800 Series Jets in Virgin Metal Bronze or custom made in 316 Stainless Steel. Gold or Chrome Plating of jets is available at extra cost, please request quotation.

AMERICAN DIMENSIONS & PERFORMANCES **(For Metric Dimensions & Performances : See PEM 800 / 810 SERIES, Page 1)**

PEM		804-1	804-2	805-1	805-2	805-3	808-1	808-2	808-3	812-1	812-2	813-1	813-2	815-1	815-2	815-4	815-5
#507-		-7800	-7810	-7820	-7822	-7823	-7830	-7832	-7833	-7890	-7892	-7910	-7912	-7920	-7922	-7924	-7925
T (NPT)		1/4"	1/4"	3/8"	3/8"	3/8"	1/2"	1/2"	1/2"	3/4"	3/4"	1"	1"	1 1/2"	1 1/2"	1 1/2"	1 1/2"
Dimensions		"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
X		.118	.157	.157	.197	.236	.236	.315	.394	.472	.551	.472	.551	.630	.669	.748	.787
OV		2.2	2.2	2.8	2.8	2.8	3.5	3.5	3.5	3.9	3.9	4.3	4.3	6.1	6.1	6.1	6.1
OD		.394	.394	.905	.905	.905	1.063	1.063	1.063	1.418	1.418	1.575	1.575	2.205	2.205	2.205	2.205
C		30	30	30	30	30	30	30	30	14	12	30	30	30	30	30	30
SS		.059	.079	.079	.098	.118	.125	.125	.125	.125	.125	.125	.125	.125	.125	.125	.125
V-Feet																	
3'	GPM	0.3	0.7	0.8	1.5	1.8	2.1	3.4	5.5	7.4	9.2	7.1	11.1	13.7	16.4	19.8	21.1
	FH	4.8	4.9	3.7	4.9	3.9	4.1	3.9	4.6	4.6	6.2	4.6	4.3	3.9	3.6	3.6	3.6
4'	GPM	0.4	1.0	1.0	1.7	2.0	2.3	4.0	6.3	8.5	10.3	8.7	11.6	15.9	18.0	21.7	24.3
	FH	6.4	6.5	4.9	6.1	5.2	5.3	5.2	5.9	6.6	8.5	6.6	5.6	5.2	4.9	4.9	4.9
5'	GPM	0.5	1.3	1.3	1.9	2.2	2.5	4.5	7.4	9.8	11.9	10.0	13.7	18.5	19.8	24.6	29.0
	FH	7.9	8.2	6.2	7.3	6.6	6.4	6.4	7.5	8.5	10.5	8.2	6.9	6.6	6.2	6.2	5.9
6'	GPM	0.7	1.4	1.4	2.1	2.4	2.9	5.0	7.9	10.8	13.2	11.4	15.0	20.6	22.0	27.7	32.2
	FH	8.6	9.5	7.2	8.8	8.0	7.9	7.9	8.9	9.8	12.1	9.8	8.2	8.2	7.2	7.2	7.2
8'	GPM	0.9	1.6	1.6	2.4	2.8	3.4	5.8	8.7	12.1	15.9	12.7	17.7	23.8	24.8	30.4	37.0
	FH	11.5	13.3	9.2	11.2	10.5	10.6	10.5	11.5	12.8	15.4	10.2	11.2	10.5	9.5	9.5	9.5
10'	GPM	1.2	1.9	1.9	2.7	3.2	3.9	6.4	10.0	13.7	18.5	14.8	20.0	26.1	29.0	35.1	41.0
	FH	15.4	16.7	11.0	13.9	13.0	13.3	13.4	14.4	16.4	18.4	12.8	15.1	13.8	13.1	12.8	12.8
12'	GPM		2.1	2.0	2.9	3.5	4.4	7.0	11.1	15.0	21.1	16.4	22.5	28.3	32.2	38.8	44.9
	FH		20.1	13.6	16.4	15.2	16.1	16.0	16.4	19.0	21.3	15.4	18.1	17.4	15.7	15.4	15.4
15'	GPM					4.6	5.0	8.2	12.4	17.4	25.6	18.5	25.6	32.5	36.2	44.9	51.5
	FH					19.2	20.3	20.7	19.7	23.6	25.2	19.0	22.6	21.6	20.3	19.7	20.0
20'	GPM							9.6	14.8	21.1	30.9	22.7	32.2	38.3	43.3	55.5	62.0
	FH							29.2	25.6	31.2	33.1	25.6	29.9	29.5	26.6	26.9	26.6
25'	GPM								17.4	25.6	36.2	26.7	36.5	44.4	50.1	67.4	72.7
	FH								31.2	39.0	40.6	33.5	37.4	36.7	34.1	33.8	33.8
30'	GPM										40.4	30.9	42.8	50.7	57.6	77.9	84.5
	FH										47.8	40.0	44.3	44.6	41.7	41.0	41.0
35'	GPM													26.8	64.7	88.5	93.8
	FH													49.2	49.2	48.2	48.2

T : Male NPT to fit Female BSP **/ Dimensions** : Inches **/ X :** Nozzle Orifice **/ OV :** Overall Height **/ OD :** Outside Diameter **/ FL :** Flow **/ MC :** Nozzle Pressure/ **SS :** Suggested Size of Suction Strainer Orifices / **V :** Spray Height / **C :** Included Angle of Adjustment

PEM 802 (507-7791) 1/8"NPT, 0.118" Orifice, OV -48mm, NO Flow Straightener - Similar Performances as **PEM 804-1**, 1/4" NPT (507-7800)

PEM Brass Stream Jets:

1.replace PEM LC Type & present catalog listed PEM 800 - 810 - 820 Series Jets, **2.** are most suitable for use with PEM Water Switches, **3**.can be supplied in quantity with custom bored orifices of different size (please enquire), **4.** have male (outside thread) NPT pipe connection, suitable for insertion into female (inside thread) BSP Pipe Fittings, **5.** are supplied with molded ABS multi vane Flow Straighteners in the pipe connection and **6.** PEM Brass Stream Jets are made of solid SAE-360 (B16) Brass.

PEM 840 SERIES

#507- 9000

INTERMEDIATE DIRECTIONAL ADJUSTABLE STREAM JETS

PEM 840 Series DIRECTIONAL ADJUSTABLE STREAM JETS are made of cast bronze, stainless steel fitted. Custom bored orifices to full millimeter or other size within the range of the jet barrel are available custom made at no extra costs. These jets require PEM Flow Straighteners for best cohe'rent stream effects. For best perfomance directional adjustment not to exceed 5 degrees off center line.

843C 844B 845B 846C 847B 849B

PEM	#	T	X	OV	OD
843B	507-9110	3/4"	6.35mm\0.250"	98mm\3.86"	67mm\2.64"
843C	507-9210	3/4"	9.52mm\0.375"	98mm\3.86"	67mm\264"
844B	507-9120	1"	9.52mm\0.375"	105mm\4.13"	67mm\2.64"
844C	507-9220	1"	12.7mm\0.500"	105mm\4.13"	67mm\264"
845B	507-9130	1 1/4"	12.7mm\0.500"	143mm\5.63"	85mm\3.35"
845C	507-9230	1 1/4"	15.9mm\0.625"	143mm\5.63"	85mm\3.35"
846B	507-9140	1 1/2"	15.9mm\0.625"	151mm\5.94"	93mm\3.66"
846C	507-9240	1 1/2"	19.1mm\0.750"	151mm\5.94"	93mm\3.66"
847B	507-9150	2"	22.3mm\0.875"	190mm\7.48"	115mm\4.53"
847C	507-9250	2"	25.4mm\1.000"	190mm\7.48"	115mm\4.53"
849B	507-9170	3"	28.6mm\1.125"	305mm\12.00"	176mm\6.93"
849C	507-9270	3"	31.8mm\1.250"	305mm\12.00"	176mm\6.93"

Suction Strainer 'SS' to have openings not larger than 50% of 'X'.

PEM 850 SERIES

LARGE DIRECTIONAL ADJUSTABLE STREAM JETS

#508- 0000

PEM 850 Series DIRECTIONAL ADJUSTABLE STREAM JETS are made of cast bronze, stainless steel fitted. Custom bored orifices to full millimeter or other size within the range of the jet barrel are available custom made at no extra costs.These jets require PEM Flow Straighteners for best solid stream effects.For best perfomance directional adjustment not to exceed 5 degrees off center line.

850T 850F

PEM	#	T	X	OV	OD
850AT	508-0110	4"	38.1mm\1.500"	410mm\16.140"	210mm\8.270"
850AF	508-0210	4"Fl.	38.1mm\1.500"	410mm\16.140"	229mm\9.000"
850BT	508-0120	4"	44.5mm\1.750"	410mm\16.140"	210mm\8.270"
850BF	508-0220	4"Fl.	44.5mm\1.750"	410mm\16.140"	229mm\9.000"
850CT	508-0130	4"	51mm\2.000"	410mm\16.140"	210mm\8.270"
850CF	508-0230	4"Fl.	51mm\2.000"	410mm\16.140"	229mm\9.000"

Suction Strainer 'SS' to have openings not larger than 50% of 'X' .

PEM 870 SERIES

#508-11/1200

STREAM JETS

870 871 872 873 874 875 876

PEM 870 SPRAY JETS are made of cast bronze. Bored orifices to full millimeter or other size within the range of the jet barrel are available custom made at no extra costs. Use PEM 08 adjustment flanges for minimal directional adjustment. Stainless steel nozzle barrel inserts are available at extra & additional cost, please enquire, stating cat.# and desired orifice size. Inserts are recommended for all 870 jets for sprayheights above 60m/200 feet, or for use with silted water The nozzle inserts are screwed into the jet body and locked into position. Wherever stainless nozzle inserts are requested, an extra replacement insert must be ordered.

870 Series jets can be supplied custom made at extra cost with full size flanged pipe connection for best perfomances.

For directional adjustment of not more than 5 degrees off center line - use **PEM 08 Directional Adjustment Flanges**.

PEM 873 to 876 Stream Jets require PEM Flanged Flow Straighteners installed as per manufacturer's direction for best cohe'rent stream effects.

DIMENSIONS

PEM	#	T	X	OV	OD
870B	508-1100	1"	12.7mm\0.500"	102mm\4.0"	45mm\1.77"
871B	508-1110	1 1/2"	15.9mm\0.625"	127mm\5.0"	60mm\2.36"
871C	508-1210	1 1/2"	19.1mm\0.750"	127mm\5.0"	60mm\2.36"
872B	508-1120	2"	22.3mm\0.875"	153mm\6.0"	83mm\3.27"
872C	508-1220	2"	25.4mm\1.000"	153mm\6.0"	83mm\3.27"
873B	508-1130	3"	28.6mm\1.125"	242mm\9.5"	108mm\4.25"
873C	508-1230	3"	31.8mm\1.250"	242mm\9.5"	108mm\4.25"
874B	508-1140	4"	38.1mm\1.500"	280mm\11.0"	135mm\5.32"
874C	508-1240	4"	44.5mm\1.750"	280mm\11.0"	135mm\5.32"
875B	508-1150	5"	50.8mm\2.000"	330mm\13.0"	165mm\6.50"
875C	508-1250	5"	63.5mm\2.500"	330mm\13.0"	165mm\6.50"
876B	508-1160	6"	63.5mm\2.500"	390mm\15.4"	190mm\7.48"
876C	508-1260	6"	76.2mm\3.000"	390mm\15.4"	190mm\7.48"

ALL PERFORMANCE VALUES GIVEN HERE ARE FOR NON TWISTING, NON DISTURBED AND LINEAR INFLOW IN TO THE JETS.

PERFORMANCES
PEM 840
PEM 850
PEM 870
Stream Jets

PEM Flow Straighteners are recommended for the proper inflow into the jets as per manufacturer's direction to achieve best possible solid stream cohe'rance.
See PEM Flow Straighteners on pages 501, 539 to 542

ALL PRESSURES GIVEN ARE NOZZLE PRESSURES; Pitot Tube measured within upper 20mm 0.75" of nozzle orifice opening. It is essential that all calculations for spray heights to include a safety factor of at least 10% to allow for unforeseen conditions. Nozzle pressure of 22% over spray height does not include pipe friction pressure losses. Pump pressure and Piping pressure losses must be calculated separately.

SUGGESTED FLOW PERFORMANCE FORMULA FOR OTHER SPRAY JET ORIFICES THAN SHOWN :
(V x 1.22) x 0.95 TND TND =' Theoretical Nozzle Discharge ' (Data by Pump Suppliers)

FLOWS IN LITERS PER MINUTE , FOR NOZZLE PRESSURE ADD 22% TO 'V' (V x 1.22)
X = NOZZLE ORICE SIZE **V** = SPRAYHEIGHT **L** : LPM - L/min

X,mm	6.4	9.6	12.7	15.9	19.1	22.3	25.4	28.6	31.8	38.1	44.5	50.8	63.5	76.2
V, m	L	L	L	L	L	L	L	L	L	L	L	L	L	L
1	11	13	34	40										
1.5	14	18	44	50										
2	16	24	53	70	95	119	145	181	270	397	504	576	1007	1475
3	19	33	66	90	116	149	191	252	324	504	612	756	1259	1907
4	22	42	77	110	137	190	231	310	397	576	792	936	1547	2266
5	24	50	88	140	163	203	275	361	486	666	900	1080	1799	2518
6		59	97	160	195	256	346	433	540	792	1116	1404	2230	3129
8					231	306	418	540	684	1007	1349	1691	2661	3813
10					252	346	469	576	792	1080	1511	1907	2985	4244
15					292	403	544	720	900	1295	1763	2230	3489	4927
20					339	454	611	792	1007	1440	1978	2518	3956	5610
30						494	749	971	1223	1763	2410	3165	4855	6941
40							856	1352	1404	2051	2770	3668	5646	8451
50							971	1330	1619	2302	2939	4136	6402	9206
60							1026	1798	1799	2590	3489	4567	7049	10250
80										2878	3884	5035	8089	11220
100	For vertical Spray Effects above 60 Meters consult Factory									3164	4137	5395	8271	11950
120												5755	9170	12770

FLOWS IN USGPM. U.S. GALLONS PER MINUTE **- FOR NOZZLE PRESSURE ADD 22% TO 'V' (V x 1.22)**
X = Nozzle Orifice Size **V** = Sprayheight **G** = USGPM

X "	0.250	0.375	0.500	0.625	0.750	0.875	1.000	1.125	1.250	1.500	1.750	2.000	2.500	3.000
V, Ft	G	G	G	G	G	G	G	G	G	G	G	G	G	G
3	*2.65*	*3.18*	*7.93*	*8,99*										
5	*3.70*	*4.76*	*11.63*	*13.22*										
8	*4.36*	*6.87*	*14.80*	*18.50*	*28*	*35*	*47*	*57*	*72*	*114*	*152*	*171*	*304*	*447*
10	*4.95*	*8.72*	*17.44*	*23.78*	*31*	*39*	*51*	*67*	*86*	*133*	*162*	*200*	*333*	*504*
15	*5.82*	*11.89*	*21.67*	*31.71*	*40*	*52*	*64*	*86*	*114*	*163*	*219*	*260*	*447*	*637*
20			*25.63*	*42.28*	*52*	*68*	*84*	*114*	*143*	*209*	*292*	*371*	*589*	*827*
30					*65*	*90*	*109*	*152*	*190*	*276*	*380*	*485*	*760*	*1083*
40					*72*	*99*	*121*	*171*	*219*	*314*	*428*	*542*	*840*	*1207*
50					*77*	*107*	*131*	*190*	*238*	*333*	*466*	*589*	*922*	*1302*
80					*95*	*129*	*159*	*228*	*285*	*418*	*551*	*713*	*950*	*1577*
100					*110*	*148*	*184*	*257*	*323*	*466*	*637*	*836*	*1283*	*1834*
150							*228*	*323*	*399*	*570*	*779*	*1026*	*1587*	*2288*
200							*371*	*475*	*466*	*684*	*922*	*1207*	*1862*	*2708*
250										*741*	*998*	*1302*	*1995*	*2898*
300	For vertical Spray Effects above 200 Feet consult Factory									*850*	*1120*	*1387*	*2128*	3154
400												*1520*	*2423*	*3373*

PEM 876 C/S
294 Feet
89.6m

PEM Stream Jets are very simple devices, having a large opening in the back where the pipe connects into and a small opening at front, the nozzle orifice where the water comes out. The stream ejected from a stream jet reflects the quality of the water inserted into the jet. If the feed water is twisting and/or turbulent, the stream will be twisting and breaking up close to the jet orifice. PEM Flow Straighteners intalled into the supply pipe to the jet as per manufacturer's direction might smoothen out most inflows, the single stage flow straightener such as PEM 01050 or 23 000 Series might solve the problems in many cases.

For extreme inflow turbulence and inflow twisting, the PEM 21 0 00 Series Dual Stage Flow Straighteners might be required. It must be realized, that every fitting or valve in the supply pipe to a jet or nozzle will introduce and/or multiply turbulence. Applications other than vertical, might require absolute flow straightening to achieve the results of Angular Spray Design Calculations Type 'A' on page 704 of this catalog.

BUT REMEMBER - What goes up, will also come down - sometimes with a vengeance.!
Give this some thought before sea water or water with a high mineral content (as from from deep wells) is to be thrown up high into the air!

PEM 950 SERIES

AERATED JETS

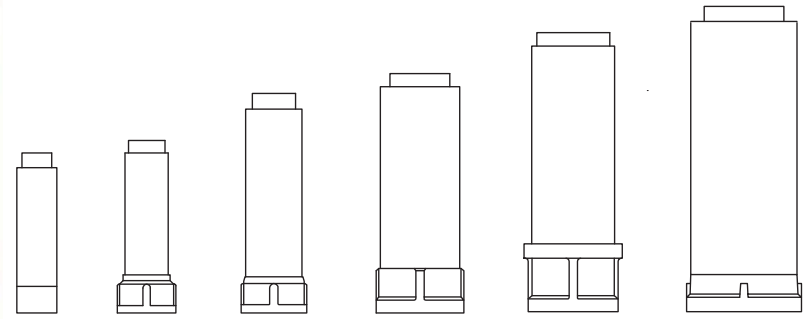
#508-3000

PEM 951

PEM 953

PEM 955

PEM 950 Series Aerated Jets are made of brass and bronze and they have no internal adjustments. **PEM 950 Series Aerated Jets**, are water level independent. These jets are designed for multiple spray jet effects similar to the water level dependent PEM 740 Series Aerating Jets.



951 952 953 954 954A 955

PEM 900 Series Jets

When selecting the **PEM 950 Series Jets**, care must be given to the special suction strainer requirements which are absolutely essential for the successful operation.

For custom made PEM 956 - 4" , 957 - 6" and 958 - 8". Please enquire.

The PEM 950 Series Jets have the advantage of not requiring linear/ laminar inflow into the jets.
The 950 jets at low height and in a vertical position might be oscillating due to spray falling back into the air intakes, a very minute incline off vertical will over come this. If required these jets can be custom made at extra cost with an air intake shield, however such disc type shields will be visible.

PEM #	951	952	953	954	954A	955
	508-3020	508-3030	508-3040	508-3050	508-3051	508-3060
PEM #	951/08	952/08	953/08	954/08	954A/08	955/08
	508-3120	508-3130	508-3140	508-3150	508-3151	508-3160

DIMENSIONS

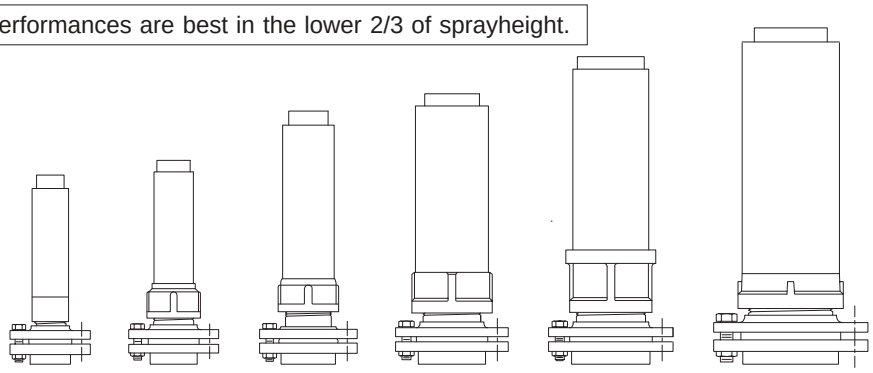
T	1"	1 1/4"	1 1/2"	2"	2 1/2"	3"
OX	25mm	32mm	38mm	51mm	65mm	76mm
	1.000"	1.250"	1.500"	2.000"	2.500"	3.000"
SS	1.5mm	2.5mm	3mm	4mm	4mm	5mm
	0.063"	0.100"	0.120"	0.160"	0.160"	0.200"
OV	153mm	165mm	210mm	229mm	267mm	292mm
	6.030"	6.500"	8.300"	9.020"	10.500"	11.500"
OV +/08	204mm	210mm	261mm	290mm	317mm	343mm
	8.040"	8.270"	10.250"	11.400"	12.500"	13.500"

PERFORMANCES

V	FL	FL	FL	FL	FL	FL	MC
m	L	L	L	L	L	L	m
1.0	40	59	88	106	144	243	4.4
1.5	48	69	99	129	182	273	5.8
2.0	53	76	110	152	216	303	7.4
3.0	65	88	129	194	281	379	10.7
4.0		99	144	235	326	436	13.2
5.0			163	269	371	477	15.9
6.0				303	417	530	18.3
8.0				364	492	621	22.0
10.0				424	561	720	26.3
12.0				494	617	910	29.9
Ft	G	G	G	G	G	G	FT
3	10	15	23	31	36	58	15
5	13	18	26	34	48	72	19
10	17	23	34	51	74	100	35
15			43	66	92	120	48
20				80	110	140	60
30				104	139	180	80
40					163	240	98

PEM 955-08

Spray performances are best in the lower 2/3 of sprayheight.

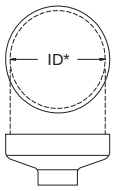


951/08 952/08 953/08 954/08 954A/08 955/08

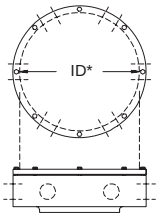
PEM 1000 SERIES

CAST BRONZE DISTRIBUTION CHAMBERS

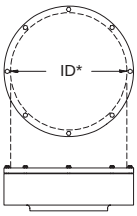
#509-0100



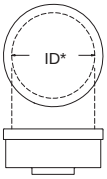
1009-1



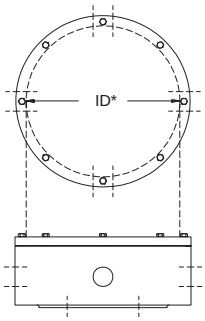
1008-2



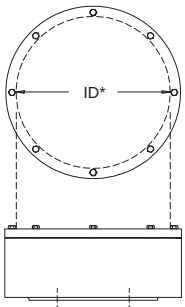
1008-1



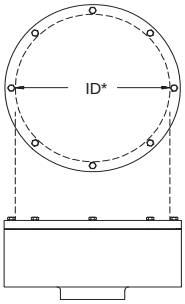
1006-1



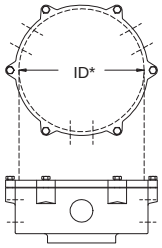
1015-2



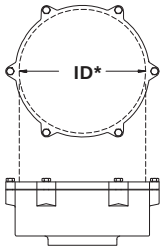
1015-1



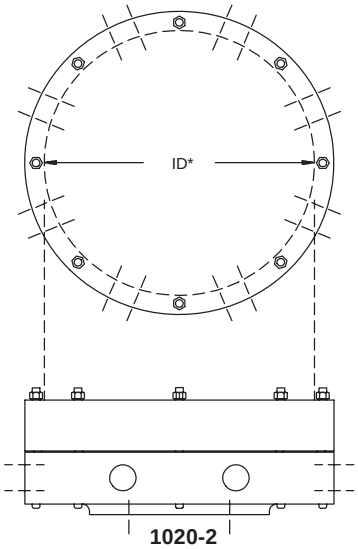
1013-1



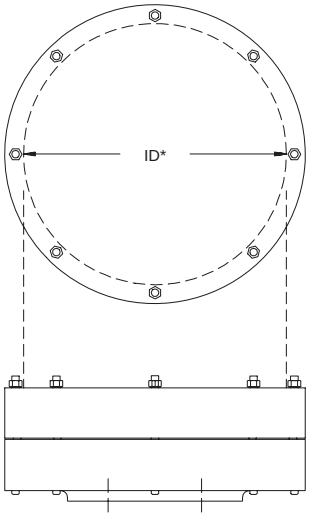
1010-2



1010-1

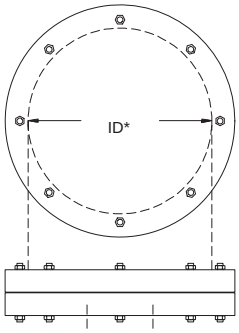


1020-2



1018-1

PEM 1000 Series Water Distribution Chambers are made of cast bronze, brass and or stainless steel fitted. Standard maximum operating pressure is 30m/3 bar/ 100 feet head, if units are to be operated at greater pressures, the expected operating pressure must be specified, so that special re-enforcements can be included in the construction. **(at extra cost-enquire).**



1012-1

PEM	#	T	FL	ID*	OD	OV	Max.SideOutlets	S. or D.
1006-1	**509 - 0110**	2"		150mm\5.91"	180mm\7.09"	80mm\3.15"	8x3/4"	S. & D.
1008-1	**509 - 0210**	3"		229mm\9.02"	258mm\10.16"	82mm\3.23"	8x1"	S. & D.
1008-2	**509 - 0220**	4"		229mm\9.02"	258mm\10.16"	82mm\3.23"	8x1"	S.& D.
1009-1	**509 - 0310**	2.5"		212mm\8.35"	232mm\9.14"	110mm\4.34"	8x3/4"	S. & D.
1010-1	**509 - 0420**	4"		241mm\9.49"	293mm\11.54"	121mm\4.77"		S. & D.
1010-2	**509 - 0430**	4"		241mm\9.49"	293mm\11.54"	121mm\4.77"	3x1 1/2"	S. & D.
1012-1 **	**509 - 0520**		4"	300mm\11.82"	375mm\14.77"	70mm\2.76"	16x3/4"	S.
1012-2 **	**509 - 0530**		6"	300mm\11.82"	375mm\14.77"	70mm\2.76"	16x3/4"	S.
1012-3 **	**509 - 0540**		8"	300mm\11.82"	375mm\14.77"	70mm\2.76"	16x3/4"	S.
1013-1	**509 - 0610**	4"		342mm\13.47"	388mm\15.28"	177mm\6.97"		S.
1015-1	**509 - 0640**		6"	342mm\13.47"	388mm\15.28"	164mm\6.46"		S.
1015-2	**509 - 0650**		6"	342mm\13.47"	388mm\15.28"	164mm\6.46"	4x2"	S.
1018-1	**509 - 0710**		6"	450mm\17.72"	515mm\20.28"	185mm\7.29"	16x1"	S.
1018-2	**509 - 0730**		6"	450mm\17.72"	515mm\20.28"	185mm\7.29"	8x1 1/2"	S.
1020-1	**509 - 0760**		8"	450mm\17.72"	515mm\20.28"	185mm\7.29"	12x1 1/2"	S.
1020-2	**509 - 0770**		8"	450mm\17.72"	515mm\20.28"	185mm\7.29"	8x2"	S.

***** **: Usable I.D. on Cover Plate for mounting of jets.**

****** **: This distributor not suitable for peripheral jets of 1 1/2" pipe size and larger.**

S. **: Submersible duty only**

D. **: Above water or submersible duty, with 'O' ring seal**

All PEM Water Distribution Chambers (Distributors) can be custom finished with outlets to suit (within possibilities). Flanged pipe connections are supplied with prescribed clearance holes on prescribed diameters. Custom made, tapped flange holes with suitable length stainless steel bolts are available at extra cost, obtain quotation.

PEM 1100 SERIES

SPHERES DE FLEURS "DANDELION SPHERES" #509-1000

These sprayheads must **NEVER** be operated without proper size suction straining!

PEM 1100 & 1200 Sprayheads are centerfed multiple solid water disc type spray effects , spherical arranged with small nozzle orifices requiring clean water to operate. The fine spray dispersion can create an enormous evaporative cooling effect with its fine spray filled airspace, the sprayheads can be used as attractive heat dispersion sprays in air cooling or swimming pool water cooling systems.

PEM 1123

PEM 1100 Dandelion / Sphere

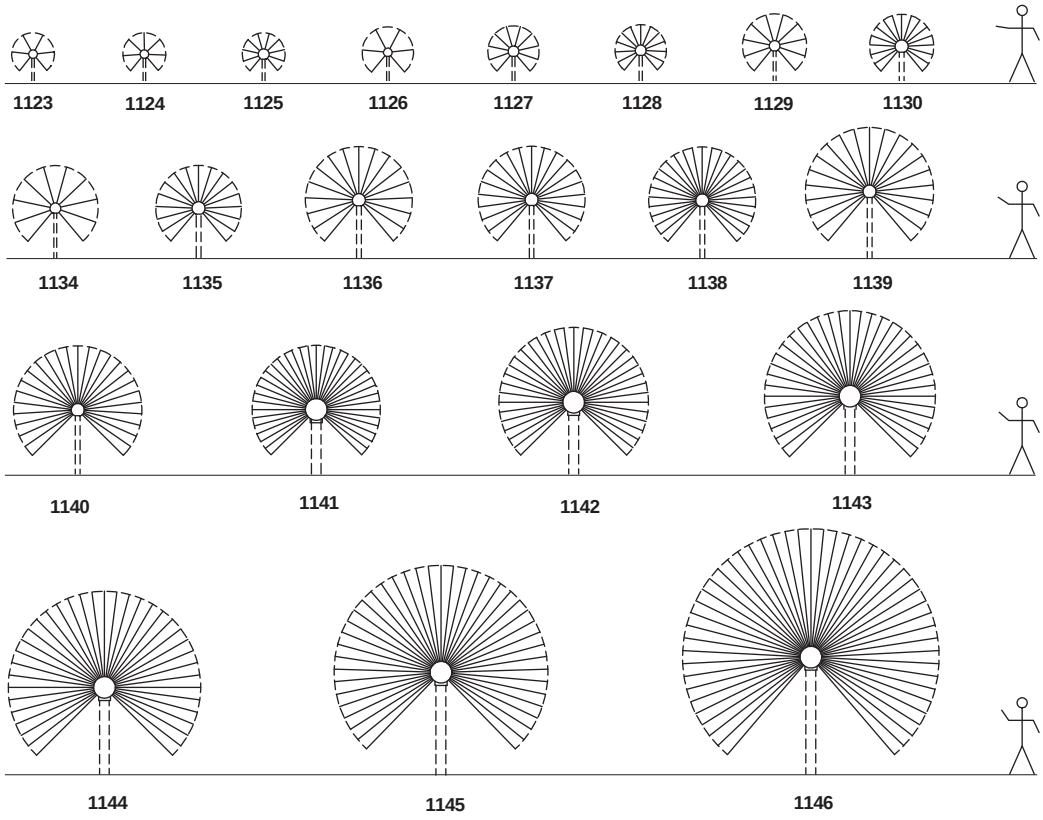
SS * = Suction Strainer openings for type **'A'** Arms = 1.5mm \ 0.063". Suction strainer for type **'B'** Arms = 3mm\0.125" in minimum square areas as listed.

OV = Overall Height from pipe connection to highest nozzle.

MC = Pressure in Hub, add elevation and friction loss for stand pipe.

APPLICATION CONSIDERATIONS :

Failure to comply with required minimum suction straining will cause failure of spray effect. In line strainers are usually useless due to insufficient strainer area. Due to the type of spray effect , the **minimum** distance from the most horizontal deflector plate to inside edge of pool shall equal its distance to the waterlevel but multiplied by 2. Due to the fine spray dispersion, the spray effects are extremely sensitive to air movements. So less arms create a spherical effect, so greater the pressure as each individual spray effect reaches its maximum spray diameter and consequently become more sensitive to air movement. So more arms create the same size spherical effect, so less pressure they require to fill it, and consequently are less sensitive to air movement.



All drawings made to scale with man at 1.8m \ 6Feet

FULL SPHERES		Sphere O.D.		Sphere OV		# of	Type	Hub Diam.		T	FL	FL	MC	FL	MC	SS*	
PEM	#	m	Ft	m	Ft	Arms	Arm	m m	Inch			L	m	G	Ft	m2	Sqft
1123	**509-1230**	1.00	3.3	0.61	2.0	29	A	204	8"	2"	-	290	1.5	77	5	1.4	15
1124	**509-1240**	1.00	3.3	0.61	2.0	37	A	204	8"	2"	-	370	1.5	9	5	1.7	18
1125	**509-1250**	1.00	3.3	0.63	2.1	61	A	254	10"	2.5"	-	610	1.8	162	6	2.8	30
1126	**509-1260**	1.20	4.0	0.70	2.3	29	A	204	8"	2"	-	290	1.8	77	6	1.4	15
1127	**509-1270**	1.20	4.0	0.73	2.4	61	A	254	10"	2.5"	-	610	2.1	162	7	1.7	18
1128	**509-1280**	1.20	4.0	0.73	2.4	79	A	254	10"	2.5"	-	790	2.1	209	7	3.6	39
1129	**509-1290**	1.50	5.0	0.88	2.9	61	A	254	10"	2.5"	-	610	2.4	162	8	1.7	18
1130	**509-1300**	1.50	5.0	0.90	3.0	127	A	305	12"	4"	-	1270	2.7	336	9	5.8	62
1134	**509-1340**	2.00	6.6	1.13	3.7	61	A	254	10"	2.5"	-	610	3.0	162	10	1.7	18
1135	**509-1350**	2.00	6.6	1.15	3.8	125	A	305	12"	4"	-	1250	3.0	331	10	5.7	61
1136	**509-1360**	2.50	8.4	1.40	4.6	127	A	305	12"	4"	-	1270	3.6	336	12	5.8	62
1137	**509-1370**	2.50	8.4	1.40	4.6	141	A	305	12"	4"	-	1410	3.6	373	12	6.5	70
1138	**509-1380**	2.50	8.4	1.40	4.6	173	A	305	12"	4"	-	1730	3.9	458	13	7.9	85
1139	**509-1390**	3.00	10.0	1.65	5.4	173	A	305	12"	4"	-	1730	4.2	458	14	7.9	85
1140	**509-1400**	3.00	10.0	1.65	5.4	253	A	305	12"	4"	-	2530	4.2	669	14	11.5	123
1141	**509-1410**	3.00	10.0	1.75	5.8	385	A	508	20"	-	6"	3850	4.4	1018	15	17.5	188
1142	**509-1420**	3.50	11.6	2.00	6.6	385	A	508	20"	-	6"	3850	5.0	1018	17	17.5	188
1143	**509-1430**	4.00	13.3	2.25	7.4	385	A	508	20"	-	6"	3850	5.7	1018	19	17.5	188
1144	**509-1440**	4.50	15.0	2.50	8.3	385	B	508	20"	-	6"	7700	6.3	2035	21	20.3	218
1145	**509-1450**	5.00	16.6	2.75	9.1	417	B	508	20"	-	6"	8340	6.9	2204	23	22.0	236
1146	**509-1460**	6.00	20.0	3.25	10.7	455	B	508	20"	-	6"	9100	8.2	2405	27	24.0	301

Square areas shown are minimum open areas of absolute tight fitting suction strainers required to operate sprayheads. In Line Strainers are not useable due to insufficient straining area.

These sprayheads must **NEVER** be operated without proper size suction straining.

PEM 1200 SERIES

HEMISPHERES DE FLEURS "DANDELION HEMISPHERES"

#509-2000

DESCRIPTION OF 1100 & 1200 SPRAYHEADS :
Dimensions of Arms Type 'A'
=Diameter of Arms is 15.9mm\0.625" with 38mm\1.50" diameter brass deflector plates.
Dimensions of Arms Type 'B '
=Diameter of Arms is 28.6mm\1.125" with 51mm\2.0" diameter bronze deflector plates.
Custom sized sprayheads are available.

For design considerations: Spacing of nozzles within the size of sphere, final number must be divisible by 4, plus 1 for top center. For hub size establish flow and use nearest flow sized pipe size connection. Flow requirements : Type 'A' = 9.52 L/min \ 2.52 USGPM , Type 'B' = 15.35 L/min \ 4.06 USGPM at pressures of 2.5 x 'OV'. As pressures within sprayheads can differ greatly between nozzles on top and bottom (Example: A 3m\10Ft Sphere has 2.7m\9Ft more pressure in its bottom nozzle than its top nozzle!), each arm is equipped with a valve, accessible by unlocking the deflector plate and turning the valve bolt. By removing the bolt and deflector plate , the valve can be washed out. The deflector plates on these PEM Sprayheads do not "squeeze out" the water,but rather guide it with an airspace between the water clinging to the underside of the concave machined deflector plate and the end of the arm tube.

OV = Overall Height from pipe connection to highest nozzle.
MC = Pressure in Hub, add elevation & friction loss for stand pipe.

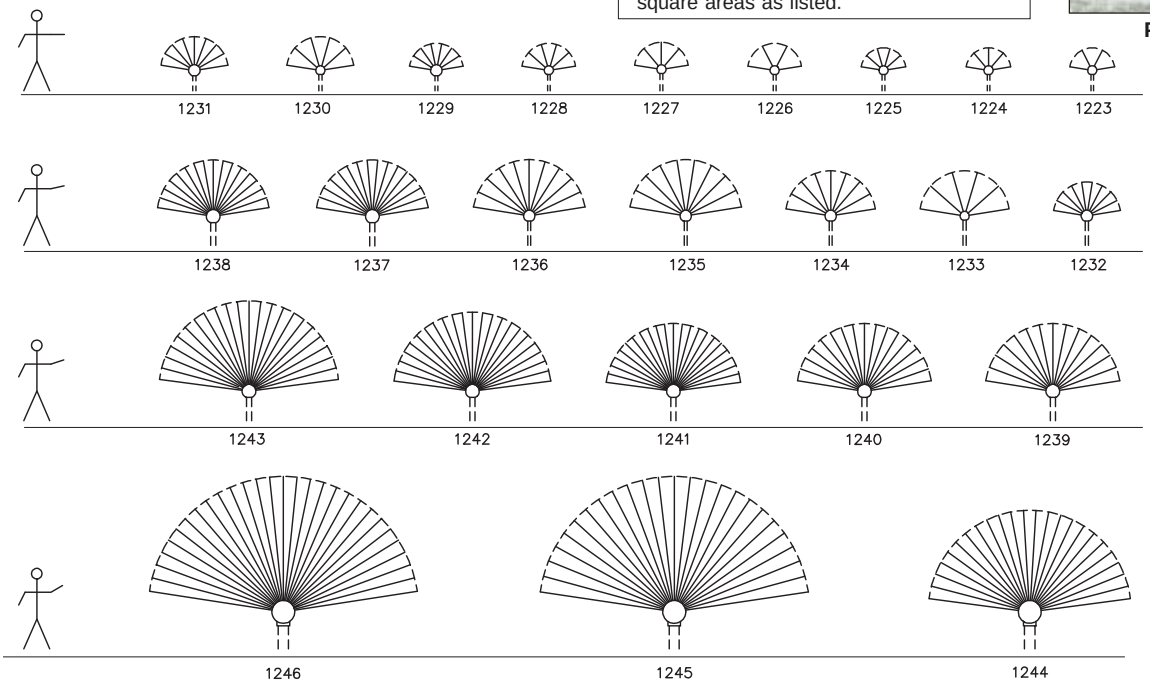
SS * = Suction Strainer openings for type:

'A' Arms = 1.5mm \ 0.063",

'B' Arms = 3mm \ 0.125" in minimum square areas as listed.

PEM 1200 Dandelion "Hemi-Sphere"

All drawings made to scale with man at 1.8m \ 6Feet



PEM 1100 & 1200 Sprayheads are made as following:
Hubs = Cast bronze,
Arms = Hard Copper (99.9% pure), screwed into hubs.

Type **'A'** arms have **brass nozzles & deflector plates** with stainless steel valve bolts.

Type **'B'** arms have **bronze nozzles and deflector plates** and stainless steel valve bolts.

HEMISPHERES		Sphere OD		Sphere OV		# of	Type	Hub	Diam.	T	T	FL	MC	FL	MC	SS*	
PEM	#	m	Ft	m	Ft	Arms	Arm	mm	Inch		FL	L	m	G	Ft	m2	Sqft
1223	**509-2230**	1.00	3.3	0.61	2.0	21	A	204	8"	2"	-	210	1.5	56	5	1.0	10
1224	**509-2240**	1.00	3.3	0.61	2.0	25	A	204	8"	2"	-	220	1.5	59	5	1.0	10
1225	**509-2250**	1.00	3.3	0.61	2.0	33	A	204	8"	2"	-	330	1.5	88	5	1.5	16
1226	**509-2260**	1.20	4.0	0.70	2.3	21	A	204	8"	2"	-	210	1.8	56	6	1.0	10
1227	**509-2270**	1.20	4.0	0.70	2.3	25	A	204	8"	2"	-	220	1.9	59	7	1.0	10
1228	**509-2280**	1.20	4.0	0.70	2.3	33	A	204	8"	2"	-	330	1.9	88	7	1.5	16
1229	**509-2290**	1.20	4.0	0.73	2.5	49	A	254	10"	2.5"	-	490	1.9	130	7	2.3	25
1230	**509-2300**	1.50	5.0	0.85	2.9	33	A	204	8"	2"	-	330	2.2	88	8	1.5	16
1231	**509-2310**	1.50	5.0	0.88	3.0	61	A	254	10"	2.5"	-	610	2.3	162	8	2.8	30
1232	**509-2320**	1.50	5.0	0.88	3.0	73	A	254	10"	2.5"	-	730	2.3	193	8	3.3	36
1233	**509-2330**	2.00	6.6	1.10	3.6	33	A	204	8"	2"	-	330	2.8	88	10	1.5	16
1234	**509-2340**	2.00	6.6	1.13	3.7	61	A	254	10"	2.5"	-	610	2.9	162	11	2.8	30
1235	**509-2350**	2.50	8.4	1.38	3.7	73	A	254	10"	2.5"	-	730	3.5	193	12	3.3	36
1236	**509-2360**	2.50	8.4	1.38	4.5	85	A	254	10"	2.5"	-	810	3.5	214	12	3.7	40
1237	**509-2370**	2.50	8.4	1.40	4.6	129	A	305	12"	4"	-	1290	3.6	341	12	5.9	64
1238	**509-2380**	2.50	8.4	1.40	4.6	145	A	305	12"	4"	-	1450	3.6	384	12	6.6	71
1239	**509-2390**	3.00	10.0	1.65	5.4	125	A	305	12"	4"	-	1250	4.2	331	14	5.9	64
1240	**509-2400**	3.00	10.0	1.65	5.4	141	A	305	12"	4"	-	1410	4.2	373	14	6.4	69
1241	**509-2410**	3.00	10.0	1.65	5.4	193	A	305	12"	4"	-	1930	4.2	510	14	8.8	95
1242	**509-2420**	3.50	11.6	1.90	6.3	193	A	305	12"	4"	-	1930	4.8	510	16	8.8	95
1243	**509-2430**	4.00	13.3	2.15	7.1	193	A	305	12"	4"	-	1930	5.4	510	18	8.8	95
1244	**509-2440**	4.50	15.0	2.50	8.3	201	B	508	20"	-	6"	4020	6.3	1063	21	11.0	118

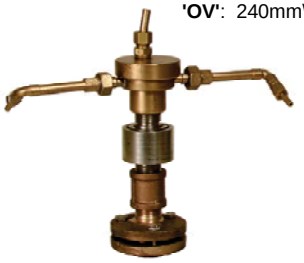
Square areas shown are minimum open areas of absolute tight fitting suction strainers required to operate spayheads .
In Line Strainers are not useable due to insufficient straining area.

PEM 1420

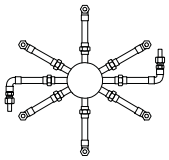
3/4" ROTATORS
#509-3200

PEM 1420 Series Rotators are designed for professional built water displays , where continuous rotation of the sprayhead is expected and propulsion is not by spray jets. The sprayheads are mounted on PEM all stainless steel, self cleaning bearings as well as 08-2 adjustment flanges. The spray assemblies to be installed perfectly vertical, showing only the top parts of the spray jets above waterlevel. The sprayheads are custom made of brass, bronze and copper. There are 2 drive jets, that can be adjusted to control the speed of rotation. Center jet is swivel mounted, peripheral jets can be flow and directional adjusted to suit. All single & center jets require non twisting water supply!

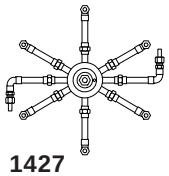
Standard diameter is 254mm \10.0", other diameters at extra cost. Pipe connection **' T '**: 3/4". Suction straining **(SS)** to be 1.5mm \ 0.065". **'X'** : Center Jet = 4.75mm\0.187", Peripheral & Drive Jets = 3.18mm\0.125". ***:** Single Jet is off center 'Lariat' or 'Spiral' type spray effect. **'OV'**: 240mm\9.450" -variable due to adjustments. **'UT'**: 200mm\7.880"



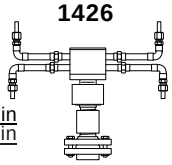
PEM 1421

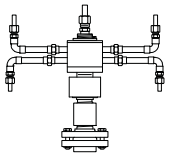


1426



1427





Rotators are designed to work in perfect vertical alignment within given 'MC' pressure ratings.

PERFORMANCES - All jets at full height of **'V'**:

#	PEM	V	1.0m	1.5m	2.0m	3.0m	3Ft	5Ft	8Ft	10Ft
		MC	1.3 m	2.0m	2.5m	3.9m	4Ft	8Ft	11Ft	14Ft
		FL	L	L	L	L	G	G	G	G
		Jets								
509- 3210	1421*	1	11	14	17	20	*2.6*	*3.7*	*4.6*	*5.3*
509- 3220	1422	2	6	10	12	17	*1.5*	*2.7*	*3.6*	*4.5*
509- 3230	1423	2+1	14	20	23	28	*3.4*	*5.3*	*6.9*	*7.4*
509- 3240	1424	4	9	14	18	25	*2.1*	*3.7*	*5.3*	*6.6*
509- 3250	1425	4+1	17	24	29	37	*4.1*	*6.4*	*8.2*	*9.8*
509- 3260	1426	6	12	20	24	34	*3.0*	*5.4*	*7.2*	*9.0*
509- 3270	1427	6+1	20	28	35	45	*4.7*	*7.4*	*9.9*	*11.9*
509- 3280	1428	8	15	24	30	42	*3.6*	*6.4*	*8.9*	*11.1*
509- 3290	1429	8+1	33	38	41	54	*5.6*	*9.1*	*11.8*	*14.3*

NOZZLE PRESSURE MUST NOT EXCEED 3.9M/14 FEET

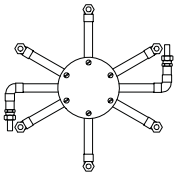
PEM 1440

1 1/2" ROTAT0RS

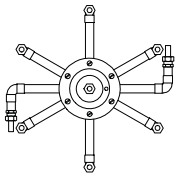
#509-3400

PEM 1441
Special
(Vandal resistant)

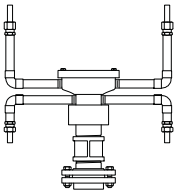
PEM 1440 Series Rotators are designed for use in medium size professional built water displays , where continuous rotation of the sprayhead is expected and propulsion is not by spray jets. The sprayheads are mounted on PEM all stainless steel , self cleaning bearings as well as 08-5 adjustment flanges. The spray assemblies must be installed perfectly vertical, showing only the top parts of the spray jets above waterlevel. The sprayheads are custom made of brass,bronze and copper. There are 2 drive jets,that can be adjusted to control the speed of rotation. Center jet is swivel mounted , peripheral jets can be flow and directional adjusted to suit. All single and center jets require non twisting water supply.

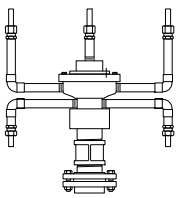


1446



1447





Rotators are designed to work in perfect vertical alignment within given, 'MC' pressure ratings.

Standard diameter is 300mm \12.000" ,other diameters at extra cost.
Pipe connection **' T '** : 1 1/2" .
Suction straining **(SS)** has to be 3mm \ 0.125".
'X' : Center Jet = 9.53mm\0.375" , Peripheral & Drive Jets = 6mm\0.250"
***:** Single Jet is off center 'Lariat' or 'Spiral' type spray effect.
'OV' :270mm\10.630" -variable due to adjustments. **'UT'** : 220mm\8.670"

PERFORMANCES - All jets at full height of **'V'**:

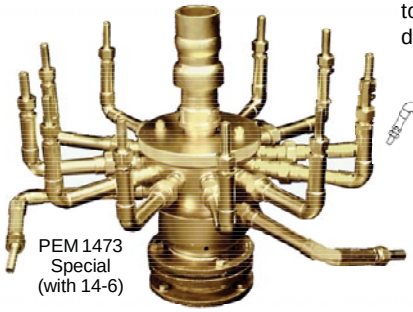
#	PEM	V	1.5m	2.0m	3.0m	4m	5Ft	8Ft	10Ft	15Ft
		MC	2.0m	2.5m	3.9m	5.2m	8Ft	11Ft	14Ft	19Ft
		FL	L	L	L	L	G	G	G	G
		Jets								
509-3410	1441*	1	59	62	79	95	*15.6*	*17.2*	*21.0*	*25.9*
509-3420	1442	2	62	71	83	94	*16.4*	*19.2*	*22.0*	*25.7*
509-3430	1443	2+1	76	86	113	137	*20.1*	*27.0*	*29.9*	*38.0*
509-3440	1444	4	93	106	124	141	*24.6*	*28.8*	*32.8*	*38.5*
509-3450	1445	4+ 1	121	157	162	189	*32.0*	*36.4*	*43.0*	*51.6*
509-3460	1446	6	124	142	166	188	*32.8*	*38.4*	*47.0*	*54.4*
509-3470	1447	6+1	135	168	203	236	*35.6*	*48.0*	*54.0*	*64.2*
509-3480	1448	8	155	177	207	235	*41.0*	*49.0*	*55.0*	*65.4*
509-3490	1449	8+1	183	219	245	283	*48.4*	*55.6*	*65.0*	*77.3*

NOZZLE PRESSURE MUST NOT EXCEED 5.2M/19 FEET

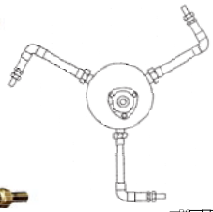
PEM 1460/70

3" ROTATORS
#509-3600 - #509-3700

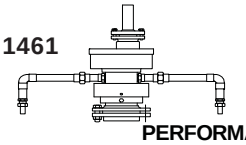
PEM 1460 Series Rotators are designed for use in larger size professional built water displays, where continuous rotation of the sprayhead is expected and propulsion is not by spray jets. The sprayheads are mounted on PEM all stainless steel, self cleaning bearings as well as 08-8 adjustment flanges. The spray assemblies must be installed perfectly vertical, showing only the top parts of the spray jets above waterlevel. The sprayheads are custom made of brass, bronze and copper. There are 3 drive jets, that can be adjusted to control the speed of rotation. Center jet is swivel mounted, peripheral jets can be flow and directional adjusted to suit. All single & center jets require non twisting water supply. Standard diameter is 460mm \18.0", other diameters at extra cost.



PEM 1473
Special
(with 14-6)



1461

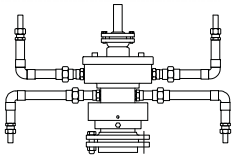


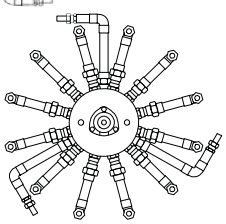
Pipe connection **' T '** : 3".
Suction straining **(SS)** has to be 5mm \ 0.187".
'X':Center Jet=15.88mm\0.625",
Peripheral & Drive Jets = 9.53mm\0.375"
'OV' : 370mm\14.570" variable due to adjustments.**'UT'** : 300mm\11.820"

***:**Single Jet is off center

'Lariat 'or ' Spiral' type spray effect.

1473





Rotators are designed to work in perfectly vertical alignment within given 'MC' pressure ratings.

PERFORMANCES - All jets at full height of **'V'** :

#	PEM	V	2.0m	3.0m	4m	6m	8Ft	10Ft	15Ft	20Ft
		MC	2.5m	3.9m	5.2m	7.9m	11Ft	14Ft	19Ft	28Ft
		FL	L	L	L	L	G	G	G	G
		Jets								
509-3610	1461*	1	157	208	260	371	*44*	*55*	*75*	*99*
509-3630	1463	3	159	218	278	390	*46*	*58*	*79*	*104*
509-3640	1464	3+1	236	317	399	566	*67*	*84*	*115*	*150*
509-3660	1466	6	238	327	416	585	*69*	*87*	*118*	*155*
509-3670	1467	6+1	316	426	537	761	*90*	*113*	*154*	*172*
509-3690	1469	9	291	400	509	714	*84*	*106*	*144*	*189*
509-3710	1471	9+1	368	499	630	890	*105*	*132*	*169*	*236*
509-3720	1472	12	397	545	694	975	*113*	*144*	*197*	*258*
509-3730	1473	12+1	474	644	815	1151	*134*	*171*	*233*	*395*

NOZZLE PRESSURE MUST NOT EXCEED 7.9M/28 FEET

PEM 1484

4" ROTATING LARIAT JET

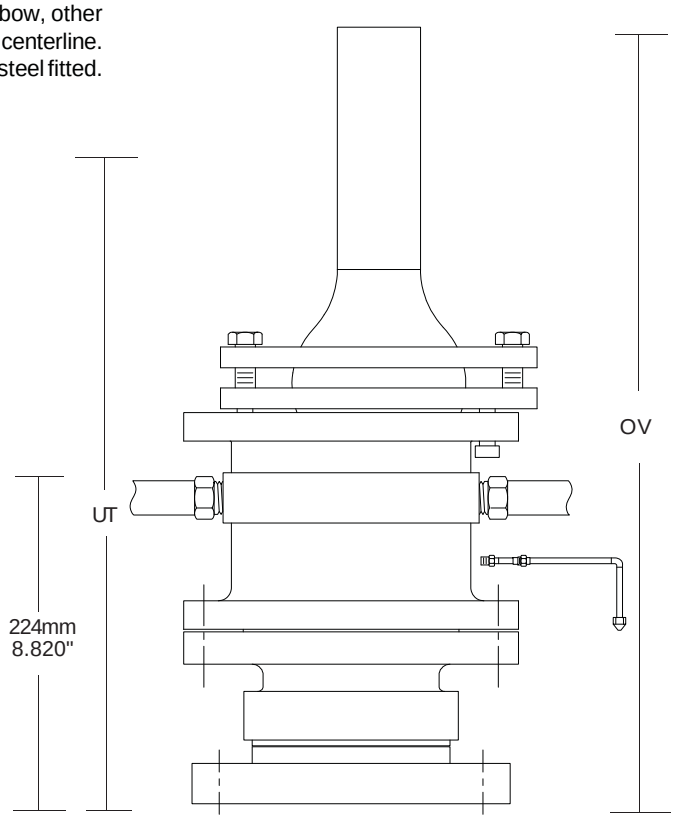
#509-5110

PEM 1484 Lariat Jet is designed to create a spiraling (Cork Screw) spray effect with its offset from center line nozzle.The spiral width and rotation of the spray effect is fully adjustable after installation. This jet requires an absolute linear/laminar or straight inflowing and undisturbed water supply. Flow straightening vanes of app. 1m\3feet length must be used in the riser pipe of minimum 1.5m\5 feet straight length under the jet. This jet will not perform when fed with disturbed water or when direct mounted upon a pipe elbow, other pipe fitting or pump. The ball mounted jet is directional adjustable to 12 degrees off centerline. **PEM 1484 Lariat Jet** is made of cast bronze, brass and copper and is stainless steel fitted.

The jet body must be installed perfectly vertical using a center point (bulls eye) liquid level. (Remove jet from base, place a clean plate upon base, center level on base and rotate. If base / riser pipe are not perfectly vertical, use PEM 08-9 with a threaded companion flange under the jet base. Due to the splash of the wash through of the drive bearings in the base and the appearance of the drive jets, it is best that only the Jet itself protrudes above waterlevel (UT). Drive jets are protected by a built in strainer.

PEM	**:**	**1484 (217-50)**
#	**:**	**509-5110**
T	:	4"Fl.
X	:	38.1mm\1.5"
Drive arms:		4
Circle of rotation:		1.2m\4.0Ft
OV	:	597mm\23.5"
UT	:	445mm\17.5"

PERFORMANCES:		
V	**FL**	**MC***
m	**L**	**m**
3	760	4.1
4	864	5.4
5	999	6.8
10	1620	14.0
15	1943	21.0
20	2160	27.0
30	2645	41.0
Ft	G	Ft
10	200	14
15	245	21
20	314	27
30	414	41
50	500	68
80	627	108
100	699	135



Due to its off balance nozzle rotation and weight, the riser pipe upon which the jet is mounted must be well anchored.

PEM 1491

4" ROTATING BASE

#509-5210

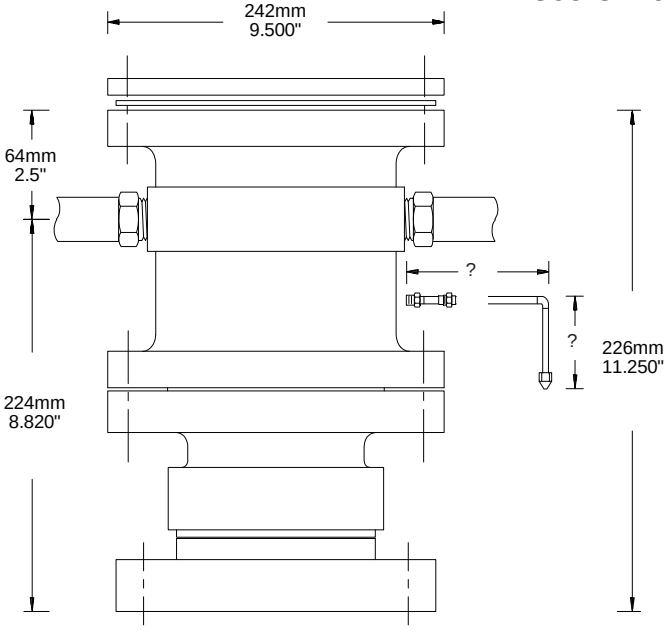
PEM 1491 Rotating Base is water driven. The rotator has 4" flange pipe (ASA or BSP) connection on top and bottom, with a full 76mm\3.0" through bore. The upper part with the drive arms rotates on the base on 2 sets of water lubricated stainless steel ball bearings. One set of bearings carries the load while the second set are guiding thrust bearings. The rotators can carry a suggested maximum balanced weight of app. 1000 kg (unbalanced load should not exceed 400kg), the number of drive arms and drive circle diameter depends on load carried.

PEM 1491 Bases are custom made to given performance specifications for installation into pools.

The rotator body must be installed perfectly vertical using a center point (bulls eye) liquid level , place it on top center and rotate. If base / riser pipe are not perfectly vertical, use PEM 08-9 with a threaded companion flange under the rotator. Due to the splash of the wash through of the drive bearings in the base and the appearance of the drive jets , it is best that only the part above the drive arms of the rotator protrudes above waterlevel. Drive jets are protected by a built in strainer.

For creating rotating spray effects use PEM 1000 Series Distribution Chambers with 4" pipe flanges and bolt to rotator (Allow for pressure loss in 76mm\3.0" flow through in base . For rotating sculptures, it must be mounted on a flat bottom base, that can be bolted to top flange with a waterproof gasket.

PEM 1491 Rotating Base is custom made to given specifications of cast bronze, brass & copper, stainless steel fitted.



SUGGESTED DRIVE REQUIREMENTS:

Balanced Weight	Drive arms	Drive Circle Dia.	FL L/min	MC* m	FL GPM	MC* Ft
100kg	4	1.2m/4Ft	230	4.2	60	14
300kg	4	1.5m/5Ft	300	6.0	80	20
500kg	6	1.8m/6Ft	600	8.4	160	28
1000kg	8	3.0m/10Ft	950	12.0	250	40

*: Nozzle Pressure

Due to its rotation and balanced/unbalanced weight , the riser pipe upon which the jet is mounted must be well anchored.

PEM 1500 SERIES

ARCHING CROWN SPRAYHEADS

#509-6000

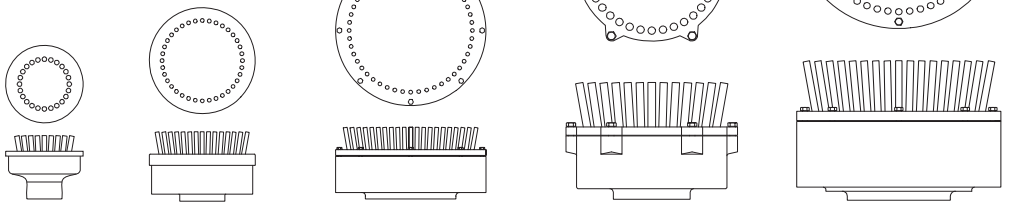
PEM 1500 Arching Crown Sprayheads are designed to create spray effects resembling that of an arching crown or reverse spray ring. The best performances are within the lower half of the shown sprayheights when the streams are crystal clear and show little break up. The spray effects can be operated much higher and wider, but without the ornamental value. **PEM 1500 Sprayheads** are made of cast bronze with brass jet, stainless steel fasteners and EDM elastomer seals.

PEM 1540

PEM 1520

PEM 1510

PEM 1520



1510 **1520** **1530** **1540** **1550**

PEM 1500 sprayheads require an absolutely non-turbulent inflow into the distribution chamber, flow straightening devices in the riser pipe to the sprayhead are a must. The control valve must be kept as far away as possible, if this is not possible, it should be a pipe size bypass valve to bleed pressure and turbulence off the supply pipe.

These sprayheads are available custom made with a different nozzle discharge angle (Max. 78 degrees off horizontal) to create spray effects to suit, or lesser number of jets. Narrow angle arching crown sprayeffects (87 degrees off horizontal) are very effective and different. For carousel type effects, the PEM 1530 or 1540 can be custom mounted on same pipe size PEM 1400 Rotators, please enquire. The construction of these sprayheads permits removal of the nozzle plate with nozzles for ease of cleaning.

For new installation, it is recommended, to remove the nozzle plates prior to testing the fountain and run the pump(s) for at least one hour to wash out all in system debris and only then mount the nozzle plates. The suction straining requirements as set out below are essential to operate the spray heads for a prolonged period of time without plugging up. Consult the technical section of the catalog for the sizing of the suction strainer. In line strainers are usually useless as they have insufficient screen area.

MC - Water Pressure in distribution chamber.

* - Discharge angle is off horizontal.

PEM #	1510 509-6110		1520 509-6130		1530 509-6150		1540 509-6170		1550 509-6190		
T	1 1/4"		2"		3"		4"		6"		
Y	24		36		48		36		48		
Spray Angle*	80.5°		80.5°		80.5°		80.5°		80.5°		
X	4.75mm 0.187"		4.75mm 0.187"		4.75mm 0.187"		9.52mm 0.375"		9.53mm 0.375"		
OV	87mm 3.430"		130mm 5.119"		132mm 5.197"		196mm 7.717"		277mm 9.449"		
OD	111mm 4.370"		180mm 7.090"		258mm 10.160"		293mm 11.54"		388mm 15.280"		
SS	3 mm 0.125"		3 mm 0.125"		3 mm 0.125"		4.75 mm 0.187"		4.75 mm 0.187"		
V	**H**	**FL**	**H**	**FL**	**H**	**FL**	**H**	**FL**	**H**	**FL**	**MC**
m	**m**	**L**	**m**	**L**	**m**	**L**	**m**	**L**	**m**	**L**	**m**
1	1.5	116	1.6	249	1.7	332	1.8	468	1.9	624	1.3
2	2.9	226	3.0	339	3.1	452	3.2	864	3.3	1152	2.6
3	-	-	4.4	396	4.5	528	4.6	1188	4.7	1584	3.9
4	-	-	5.8	461	6.1	615	6.2	1512	6.3	2016	5.2
5	-	-	-	-	-	-	7.4	1800	7.5	2400	6.5
Ft	**Ft**	**G**	**Ft**	**G**	**Ft**	**G**	**Ft**	**G**	**Ft**	**G**	**Ft**
3	4.6	42	4.8	62	5.1	83	5.2	115	5.5	153	4
5	7.4	53	7.6	80	7.9	106	8.0	172	8.3	229	7
8	11.6	62	11.6	93	12.1	124	12.2	248	12.5	330	11
10	-	-	14.6	105	14.9	140	15.0	314	15.3	419	13
15	-	-	-	-	-	-	22.0	429	22.3	570	20

PEM 1560 SERIES
WATER STARS

PEM 1560 Series Water Stars are designed to provide economically operated, yet substantial water spray effects. Each star jet is directional adjusted to achieve overall spray patterns as: Inside Drop, Outside Drop, Straight Up - forming a cylinder of spray, Hourglass or Cross Hatch. With the addition of the center jet a complete two tier, fully adjustable fountain spray effect is created.

PEM Water Stars are made of cast bronze, brass and copper, stainless steel fitted.

PEM 1561,1563 & 1565 create a spray ring with directional adjustable jets and are spray height adjusted with a valve in the supply pipe (by others).

PEM 1562, 1564 & 1566 have a center jet and valving added for the spray arms to achieve different spray heights for the two spray effects. The spray height of the center jet is controlled by a valve in the supply pipe (by others).

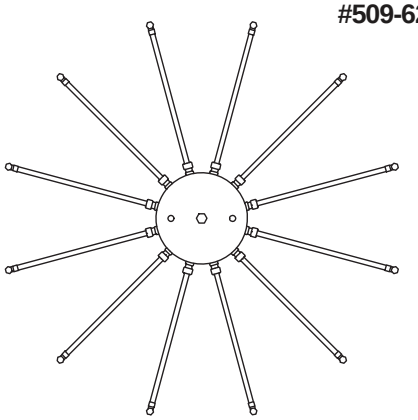
PEM Water Stars are supplied in parts, ready for assembly, with assembly and adjustment tools included. Proper, flow sized suction straining for the pump is an absolute must, strainers that enclose a pump are preferrable.

PEM "Water Stars" are available in 2 versions, Fixed or Rotating.

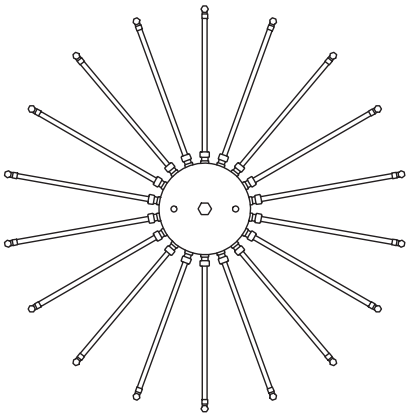
For rotating PEM Water Stars:See PEM 1570 Series (Page 540)

1561 & 1562

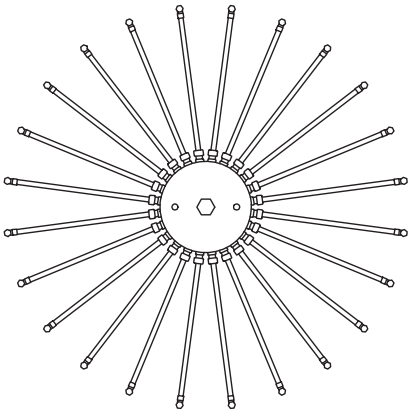
#509-6200

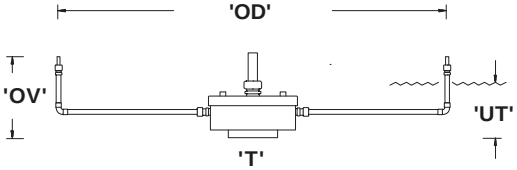


1563 & 1564



1565 & 1566





DIMENSIONS:

PEM #	1561 509-6210	1562 509-6220	1563 509-6230	1564 509-6240	1565 509-6250	1566 509-6260
T	**1 1/2"**	**1 1/2"**	**1 1/2"**	**1 1/2"**	**1 1/2"**	**1 12"**
Star Jets						
OD	800mm 32.0"	800mm 32.0"	800mm 32.0"	800mm 32.0"	800mm 32.0"	800mm 32.0"
# Jets	12	13	18	19	24	25
X	4mm 0.157"	4mm 0.157"	4mm 0.157"	4mm 0.157"	4mm 0.157"	4mm 0.157"
Center Jet						
X	- -	6mm 0.236	- -	8mm 0.314"	- -	10mm 0.393"
OV	200mm 7.874"	200mm 7.874"	200mm 7.874"	200mm 7.874"	200mm2 7.874"	00mm 7.874"
UT	130mm 5.118"	130mm 5.118"	130mm 5.118"	130mm 5.118"	130mm 5.118"	130mm 5.118"
SS	2mm 0.078"	2mm 0.078"	2mm 0.078"	2mm 0.078"	2mm 0.078"	2mm 0.078"

PERFORMANCES:

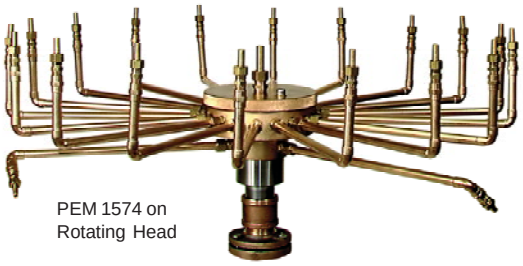
V	FL	MC	FL	MC	FL	MC	FL	MC	FL	MC	FL	MC
m	**L**	**m**	**L**	**m**	**L**	**m**	**L**	**m**	**L**	**m**	**L**	**m**
0.5	27	0.7	33	0.8	40	0.8	49	0.9	54	0.9	68	1.0
1.0	41	1.4	49	1.6	62	1.6	76	1.8	82	1.8	104	2.0
1.5	53	2.1	63	2.4	80	2.4	98	2.7	106	2.7	133	3.0
2.0	64	2.8	76	3.1	96	3.2	117	3.6	128	3.6	159	4.0
2.5	74	3.5	88	3.9	110	4.0	134	4.4	148	4.5	183	5.0
3.0	83	4.2	98	4.7	125	4.8	151	5.3	166	5.4	206	6.0
4.0			148	6.4	198	7.2	178	7.1	198	7.2	245	8.0
Ft	**G**	**Ft**	**G**	**Ft**	**G**	**Ft**	**G**	**Ft**	**G**	**Ft**	**G**	**Ft**
2	8.3	2.8	9.9	3.1	12.4	3.2	15.1	3.6	16.6	3.6	20.7	4.0
3	10.2	4.2	12.2	4.7	15.3	5.2	18.8	5.8	20.4	5.4	25.7	6.0
4	11.8	5.6	14.1	6.2	17.6	6.4	21.6	7.1	23.6	7.2	29.7	8.0
5	14.0	7.0	16.7	7.7	21.0	8.0	26.8	8.8	28.0	9.0	35.1	10.0
8	18.8	11.2	22.4	12.4	28.1	12.8	34.2	14.1	37.8	14.4	47.0	15.9
10	21.9	14.0	25.8	15.4	32.9	16.0	39.8	17.6	43.8	18.0	54.3	19.9
12	24.5	16.8	28.9	18.5	36.7	19.2	44.4	21.2	49.0	21.6	62.3	23.8

PEM 1570 SERIES

ROTATING WATER STARS #509-6300

PEM 1570 Series Rotating Water Stars are designed to add movement to the already spectacular **PEM 1560 Water Stars** spray effects. The entire fountain head is rotated by drive jets installed submersed below the spray jets . The pressure to the drive jets normally equals that of the center jet and is controlled by a valve in the supply pipe (by others). The speed of rotation can be controlled by the angular positioning of the drive jets also by the pressure in the supply. Each star jet is directional adjusted to achieve overall spray patterns such as:

Inside Drop, Outside Drop, Straight- Up - forming a cylinder of spray,
Hourglass or Cross Hatch with the addition of the center jet a complete two tier, fully adjustable fountain spray effect is created.

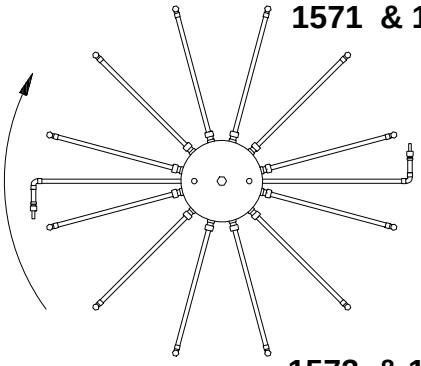


PEM 1574 on Rotating Head

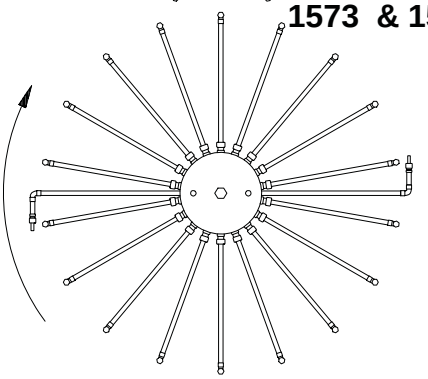
PEM 1571, 1573 & 1575 create a spray ring with directional adjustable jets and are spray height adjustable with built in valving .
PEM 1572,1574 & 1576 have a center jet added to the star jets to achieve different spray heights for the two spray effects.
PEM Water Stars are made of cast bronze, brass and copper, stainless steel fitted, mounted on a stainless steel rotation assembly and vertical adjustment by **PEM 08** flange. The spray height of the center jet is controlled by a valve in the supply pipe (by others).
PEM Water Rotating Stars are supplied in parts, ready for assembly, with assembly and adjustment tools included.Proper, flow sized suction straining for the pump is an absolute must, strainers that completely enclose a pump are preferable.

Pressures shown on table below must not be exceeded.
For Stationary (not rotating) PEM Water Stars: See PEM 1560 Series

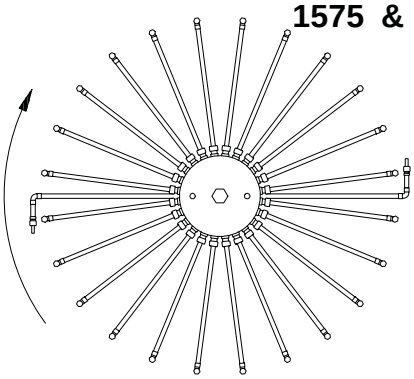
1571 & 1572

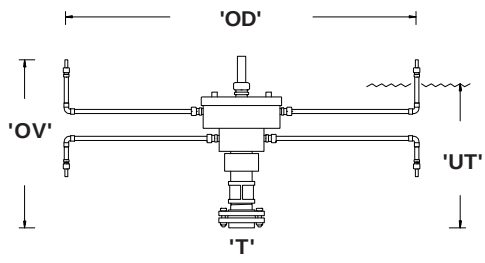


1573 & 1574



1575 & 1576





DIMENSIONS:

PEM #	1571 509-6310	1572 509-6320	1573 509-6330	1574 509-6340	1575 509-6350	1576 509-6360
T	**1 1/2"**	**1 1/2"**	**1 1/2"**	**1 1/2"**	**1 1/2"**	**1 1/2"**
Ring Jets						
OD	800mm 32.0"	800mm 32.0"	800mm 32.0"	800mm 32.0"	800mm 32.0"	800mm 32.0"
# Jets	12	13	18	19	24	25
X	4mm 0.157"	4mm 0.157"	4mm 0.157"	4mm 0.157"	4mm 0.157"	4mm 0.157"
Center Jet						
X	- -	6mm 0.236	- -	8mm 0.314"	- -	10mm 0.393"
Drive Jets						
	2	2	3	3	4	4
X	4mm 0.157"	4mm 0.157"	4mm 0.157"	4mm 0.157"	4mm 0.157"	4mm 0.157"
OV	370mm 14.566"	370mm 14.566"	370mm 14.566"	370mm 14.566"	370mm 14.566"	370mm 14.566"
UT	300mm 12.000"	300mm 12.000"	300mm 12.000"	300mm 12.000"	300mm 12.000"	300mm 12.000"
SS	2mm 0.078"	2mm 0.078"	2mm 0.078"	2mm 0.078"	2mm 0.078"	2mm 0.078"

PERFORMANCES:

V	FL		FL	MC	FL	MC	FL	MC	FL	MC	FL	MC
m	**L**	**m**	**L**	**m**	**L**	**m**	**L**	**m**	**L**	**m**	**L**	**m**
0.5	31	0.9	39	1.2	47	1.0	61	1.2	62	1.2	87	1.4
1.0	48	1.7	60	2.2	72	1.9	94	2.3	96.	2.1	135	2.6
1.5	62	2.6	78	3.3	93	2.9	121	3.4	124	3.2	174	3.8
2.0	75	3.4	94	4.3	112	3.8	146	4.5	148	4.2	208	5.0
2.5	86	4.2	108	5.3	129	4.6	168	5.6	171	5.1	240	6.2
3.0	97	5.1	122	6.4	145	5.7	189	6.8	194	6.3	272	7.5
4.0	115	6.8	144	8.5	173	7.3	225	9.0	230	8.3	323	10.0
Ft	**G**	**Ft**	**G**	**Ft**	**G**	**Ft**	**G**	**Ft**	**G**	**Ft**	**G**	**Ft**
2	9.7	3.4	12.2	4.3	14.5	3.8	18.9	4.8	19.3	4.6	27.1	5.8
3	11.9	5.1	14.9	6.4	17.8	5.7	23.2	7.2	23.7	6.9	33.2	8.7
4	13.7	6.8	17.2	8.5	20.6	7.5	26.8	9.4	27.4	9.0	38.4	11.3
5	16.3	8.4	20.4	10.5	24.5	9.3	31.9	11.7	32.6	11.2	45.7	14.0
8	21.9	13.5	27.4	16.9	32.8	14.9	42.7	18.7	43.7	17.9	62.2	22.4
10	25.6	16.8	32.0	21.0	38.3	18.5	49.8	23.2	51.1	22.2	71.6	27.8
12	28.5	20.2	35.7	25.3	42.8	22.3	55.7	27.9	57.0	26.8	79.8	33.5

PEM 1610 SERIES

PINNACLE CASCADE CAST BRONZE JETS

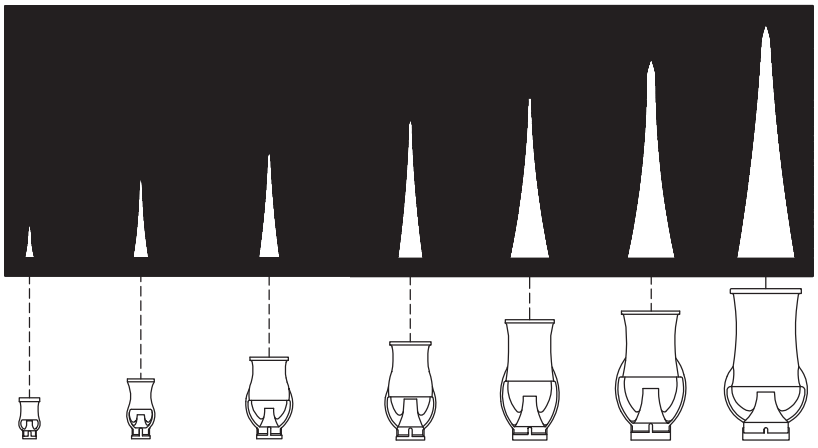
#509-6600
#509-6700

PEM 1610 Series Pinnacle Cascade Jets will provide highly visible frothing and foaming **'White Water'**. Pinnacles, cascading upon themselves. The spray effect diameter at base is approximately 20% - 25% of spray height. **PEM 1610 Series** Jets are one piece bronze castings. **PEM 08** Adjustment Flanges are of cast bronze, stainless steel fitted.

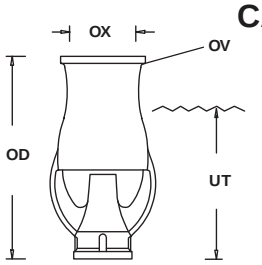
PEM 09 Series -Vertical Adjusters are used to alter spray effect appearances, to be heavier, lower & wider or lighter, higher & narrower.

For heavier, more rounded spray effects see: PEM 50 Series Cascade Jets see page 509 of this catalog.

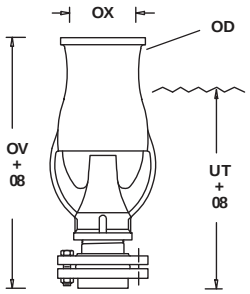
PEM 1610 Series Pinnacle Cascade Jets require a linear inflow, constant water level and might be subject to pool surging.



1611 1612 1614 1615 1616 1617 1618

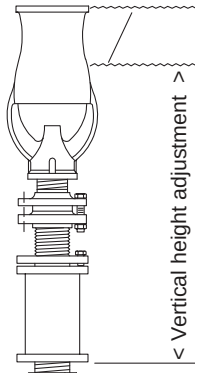


1610 Series



1610/08Series

PEM 1617/08



1615/08 with 09 Series Vertical Adjuster

PEM # / PEM #	1611 509-6610 1611/08 509-6710	1612 509-6620 1612/08 509-6720	1614 509-6640 1614/08 509-6740	1615 509-6650 1615/08 509-6750	1616 509-6660 1616/08 509-6760	1617 509-6670 1617/08 509-6770	1618 509-6680 1618/08 509-6780
T	**1/2"**	**3/4"**	**1 1/4**	**1 1/2"**	**2"**	**2 1/2"**	**3"**
OD/Jet	47mm 1.850"	64mm 2.519"	89mm 3.503"	96mm 3.779"	120mm 4.724"	140mm 5.511"	165mm 7.165"
OX/Jet	38mm 1.500"	51mm 2.000"	70mm 2.755	76mm 3.000"	102mm 4.000"	120mm 4.724"	152mm 6.000"
SS	6 mm 0.250"	8 mm 0.320"	8 mm 0.320"	10mm 0.400"	16mm 0.625"	18mm 0.700"	22mm 0.875"
OV	96mm 3.750"	140mm 5.500"	191mm 7.519"	229mm 9.000"	280mm 11.000"	300mm 11.811"	356mm 14.000"
OV+08	141mm 5.560"	190mm 7.490"	236mm 9.291"	280mm 11.030"	342mm 13.420"	348mm 13.700"	425mm 16.740"
UT	81mm 3.190"	120mm 4.720"	171mm 6.730"	204mm 8.030"	250mm 10.240"	270mm 10.630"	316mm 12.440"
UT+08	126mm 4.960"	170mm 6.690"	216mm 8.500"	255mm 10.040 "	310mm 12.200"	318mm 12.500"	405mm 15.950"

PERFORMANCES														
V	**FL**	**MC**	**FL**	**MC**	**FL**	**MC**	**FL**	**MC**	**FL**	**MC**	**FL**	**MC**	**FL**	**MC**
m	**L/min**	**m**	**L/min**	**m**	**L/min**	**m**	**L/min**	**m**	**L/min**	**m**	**L/min**	**m**	**L/min**	**m**
0.5	25	3.4	35	3.2	52	6.0	60	1.6						
1.0	40	4.1	46	4.0	72	8.0	88	3.0	155	3.0	239	2.9	342	3.2
1.5	60	6.1	56	6.1	88	10.0	109	4.5	185	4.3	280	4.5	400	4.2
2.0	90	9.1	65	8.2	103	12.0	124	6.2	212	5.7	335	6.0	475	5.6
2.5			72	10.3	114	14.0	139	7.5	235	7.0	370	7.2	520	7.2
3.0			79	12.4	125	16.0	152	9.2	259	8.5	400	8.5	570	8.2
4.0			92	16.7	188	20.0	176	12.3	296	11.3	455	11.5	665	10.5
5.0							197	15.1	331	14.0	507	14.2	750	13.0
6.0							216	18.2	362	16.7	555	17.0	810	15.5
8.0									416	22.0	642	22.5	940	20.5
10.0									473	27.5	722	28.0	1040	25.5
12.0									520	33.2	795	33.5	1150	31.0
15.0													1280	39.0
20.0													1450	52.0
Ft	**G**	**Ft**	**G**	**Ft**	**G**	**Ft**	**G**	**Ft**	**G**	**Ft**	**G**	**Ft**	**G**	**Ft**
2	6.1	12	9.5	7	14.5	21	17.7	6	31.7	6.6				
3	8.2	16	11.9	12	18.0	25	22.0	9	35.7	8.2	58	10	86	10
4	9.6	22	13.5	16	21.5	30	25.6	12	43.6	11.5	67	12	109	12
5	10.4	25	14.8	20	23.5	34	28.8	15	48.9	14.0	74	15	125	13
6	12.0	29	16.1	24	25.5	36	31.2	18	52.8	17.2	83	18	111	15
8			18.5	32	29.5	44	35.8	24	60.8	23.0	95	23	139	22
10			20.9	41	33.0	52	39.9	31	67.9	27.9	106	28	151	28
15					41.0	73	48.9	46	83.2	41.7	127	43	185	40
20							56.6	61	95.6	54.8	147	56	214	51
30									117.6	83.6	180	84	264	76
40											210	103	301	102
50													373	127
70													390	178

PERFORMANCES are based on **'UT'** and **'UT/08'** dimensions showing immersion of jets.
To change appearance of spray effects, change **'UT'** or **'UT/08' :**
Decrease = lighter.
Increase= heavier and (proportional) **'FL'** & **' MC'** values below.
'UT' & 'UT/08'
Dimensions given are critical for performances shown.

PEM 1640 SERIES

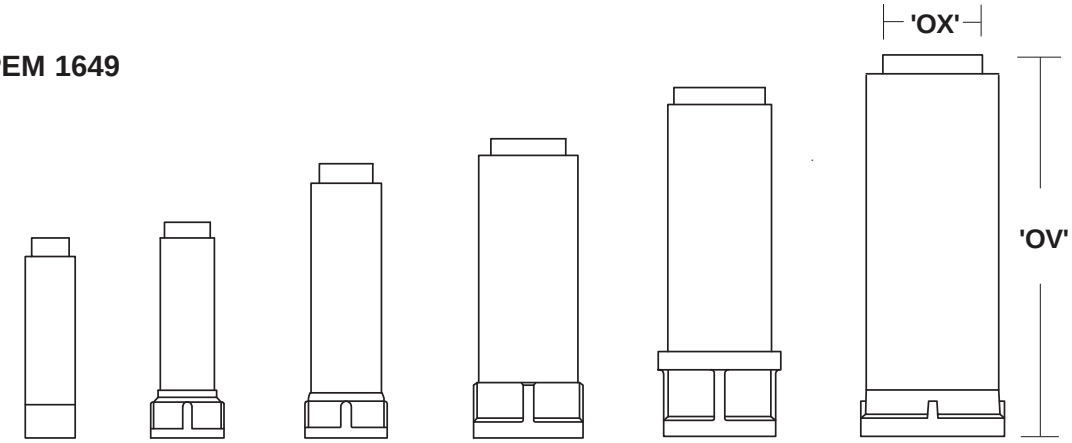
SHORT WATERLEVEL INDEPENDENT AERATED JETS FOR LOW SPRAYHEIGHTS IN VERY SHALLOW POOLS

#509-7000

PEM 1640 Series Waterlevel Independent Aerated Jets are made of brass, bronze and copper.
For greater spray heights use **PEM 950 Series Aerated Jets.**

The use of PEM 08 Series Adjustment Flanges or 500 Series Swivel Joints is recommended for directional adjustment after installation.

PEM 1649



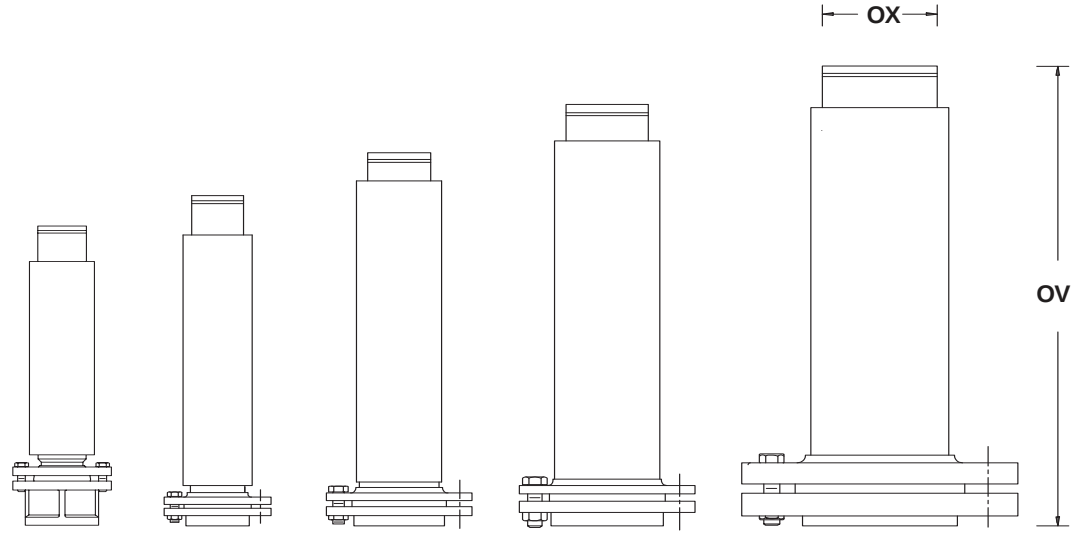
PEM #	1644 509-7140	1645 509-7150	1646 509-7160	1647 509-7170	1648 509-7180	1649 509-7190	
DIMENSIONS							
T	1"	1 1/4"	1 1/2"	2"	2 1/2"	3"	
OX	25mm 1.000"	32mm 1.25"	38mm 1.50"	51mm 2.0"	65mm 2.50"	76mm 3.0"	
OV	90mm 3.540"	95mm 3.75"	100mm 4.00"	120mm 4.750"	165mm 6.50"	215mm 8.500""	
SS	1.5mm 0.063"	2.5mm 0.10"	3mm 0.12"	4mm 0.160"	4mm 0.160"	5mm 0.20"	
PERFORMANCES							
V m	**FL L**	**FL L**	**FL L**	**FL L**	**FL L**	**FL L**	**MC m**
1.0	40	59	88	106	144	243	4.4
1.5	48	69	99	129	182	273	5.8
2.0		76	110	152	216	303	7.4
3.0			129	194	281	379	10.7
Ft	**G**	**G**	**G**	**G**	**G**	**G**	**FT**
3	10	15	23	31	36	58	15
5	13	18	26	34	48	72	19
10			34	51	74	100	35

* Suction Strainer Orifice is recommended size with strainer surface area to suit flow.

PEM 1700
SERIES
WATERLEVEL INDEPENDENT MAJOR AERATED JETS WITH DIRECTIONAL ADJUSTABLE BASE

 # 509-8000

PEM 1700 Series Waterlevel Independent Aerated Jets are designed to provide a filled out, more reflective single stream spray effect at greater heights, these jets will not operate effectively below the shown sprayheights, as a certain flow velocity through the jets is required to aerate the stream



PEM 1702A PEM 1702 PEM 1703 PEM 1704 PEM 1706

PEM 1706

.

PEM 1700 Aerated Jets are made of Cast Bronze, Brass and Red Brass and are stainless steel fitted. The jets have integral 5° Adjustment Bases for directional fine adjustment

PEM 1700 Aerated Jets are for use in lake fountains. Performances are attained by the air suction cavitation of the jet at the intermediate and higher sprayheights.

These jets may generate some noise and are not recommended for enclosed quarters.

DIMENSIONS:

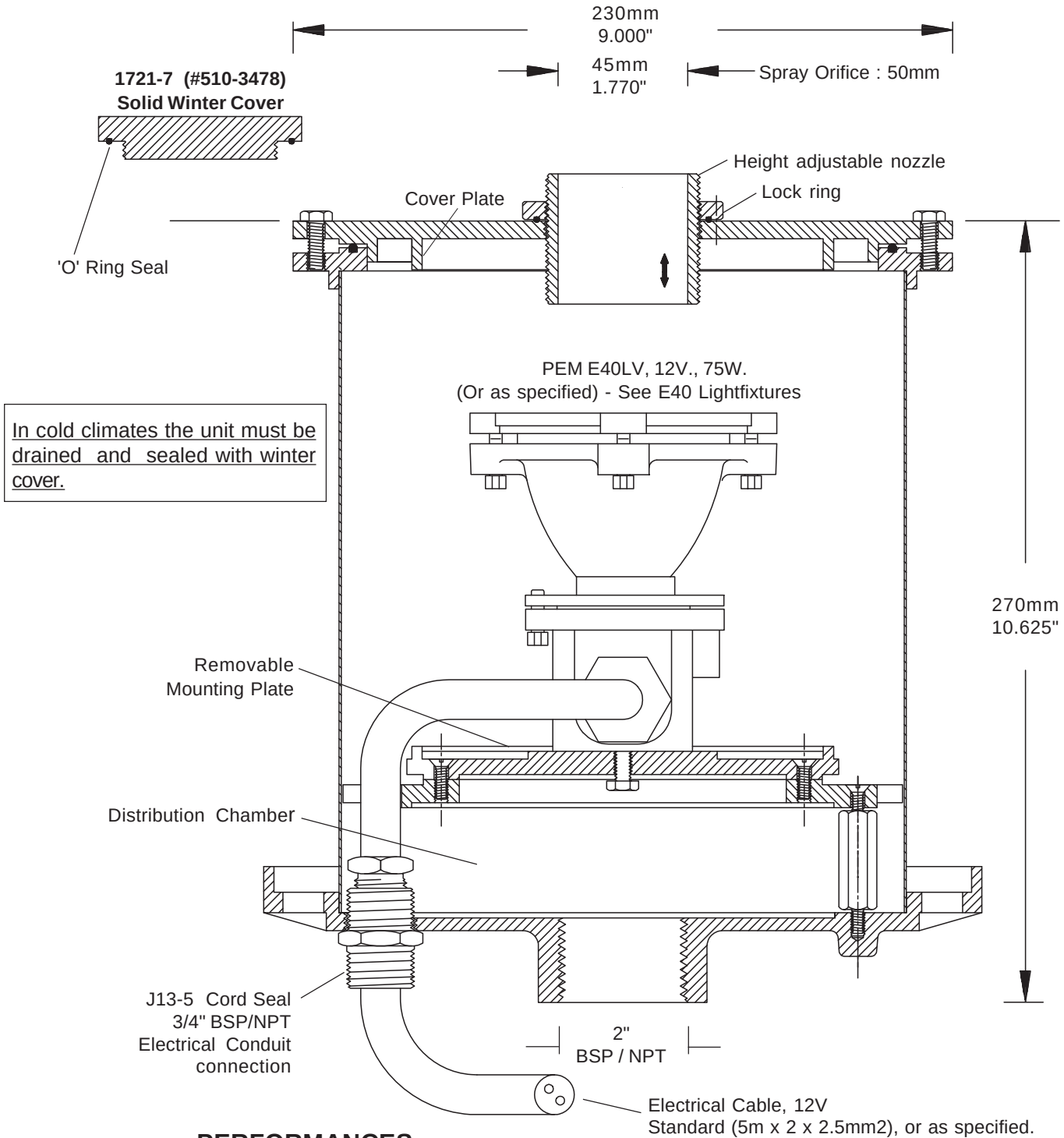
PEM #	**1702 & 1702A 509-8010/509-8020**		**1703 509-8030**		**1704 509-8040**		**1706 509-8060**	
T, Pipe Thread	2"		3"		4"		6"	
X	51mm\ 2"		76mm\ 3"		102mm\ 4"		127mm\ 5"	
OV	460mm\18"		510mm\ 20"		560mm\ 22"		610mm\ 24"	
Suction **S**trainer Size	6mm\ 0.250"		8mm\0.325"		10mm\0.375"		12mm\0.500"	
PERFORMANCES:								
V	**FLow**	**MC**	**FLow**	**MC**	**FLow**	**MC**	**FLow**	**MC**
m	**L/min**	**m**	**L/min**	**m**	**L/min**	**m**	**L/min**	**m**
10.0	530	13.0	760	23	910	18	1900	15.0
15.0	947	23.0	1290	34	1500	26	2300	25.0
20.0	1325	29.0	1550	38	1700	31	2800	30.0
30.0	1670	42.0	2050	61	2240	55	3900	61.0
40.0	-	-	-	-	3700	101	5300	98.0
Ft	**GPM**	**Ft**	**GPM**	**Ft**	**GPM**	**Ft**	**GPM**	**Ft**
30	130	39	195	65	245	49	490	45
40	195	49	260	98	343	66	560	59
50	255	64	340	106	395	88	610	77
60	325	88	390	115	427	101	690	91
80	395	112	450	149	480	122	900	149
100	445	129	520	186	590	180	1090	198
120	-	-	670	380	940	330	1290	320

PEM 1721

LIGHT EMITTING BUBBLE SPRAY EFFECT

#510-0072

PEM 1721 is made of cast bronze and brass, stainless steel fitted. For included light fixture see **PEM E40.** This light emitting spray effect is designed for insertion into extreme shallow or dry bed pavements over reservoir water features. At night each effect can illuminate up to 4m radius.
Large orifices keep from plugging up.



PERFORMANCES:

Spray height :	0.2m	0.3m	0.5m	8"	12"	18"
L/min	80	120	240			
MC/m	0.5	0.7	0.9			
GPM				21	32	63
Inches Head				19"	27"	35"

PEM 21000 Series custom made FLOW STRAIGHTENERS, are similar in design to modified 'Zanker' type double action flow straighteners and relate to the flow requirements & PEM Angular Spray Design Calculations as published by PEM .

All PEM spray design calculations are based upon linear, laminar and/or most of all, non-turbulent and/or twisting flow of water into the spray jet having minimum directional adjustment.

Where turbulence and/or twisting flow is present and better performance is desired, the use of flow straightening devices in the pipe riser to the jet can show dramatic sprayheight (distance) improvements.

For maximum spray performances and/or for use with silted water: Use custom made spray jets with flanged pipe connection and steel orifice sleeve.

PEM 21000 Series Flow Straighteners require orifice & flow sized pump suction strainers, see PEM Catalog Design Data for suction strainer sizing. Never use in line basket strainers in the pump suction except as protection for pump.

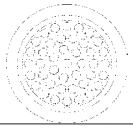
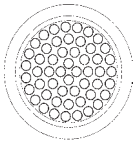
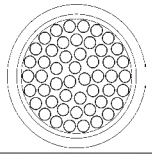
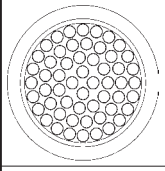
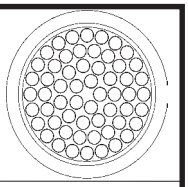
Suggested Suction Strainer sizes in red in table for maximum flows.

For more economic solutions or applications with lesser turbulence without water swirls see: **PEM 23000 Series Flow Straightening Flanges**

For smaller size Flow Straighteners see: **PEM 01050 Series**

ISO 9001: 2000 PEM REGISTERED

PEM
21000 Series
FLOW STRAIGHTENERS
 # 520-3000

PEM Serial	21025 520-3025	21030 520-3030	21040 520-3040	21060 520-3060	21080 520-3080	21110 520-3100	21120 520-3120
With order state: Inside pipe diam. & ASA or BSP flat Flange							
PIPE SIZE	**2-1/2"**	**3"**	**4"**	**6"**	**8"**	**10"**	**12"**
O.D. of Flange	127mm 5.000"	136mm 5.375"	175mm 6.900 "	229mm 9.000"	280mm 11.000"	340mm 13.375"	411mm 16.187"
Thickness of Flange	10mm 0.394"	10mm 0.394"	10mm 0.394"	10mm 0.394"	10mm 0.394"	10mm 0.394"	10mm 0.394"
Length of Unit in pipe	317mm 12.5"	381mm 15"	508mm 20"	762mm 30"	1016mm 40"	1270mm 50"	1524mm 60"
Fit into pipe O.D. of Unit	60mm 2.362"	74mm 2.913"	99mm 3.898"	150mm 5.905"	198mm 7.795"	251mm 9.882"	302mm 11.890"
# of Tubes	36	41	42	53	50	56	58
I.D. of Tubes	4.826mm 0.190"	6.477mm 0.255"	9.321mm 0.367"	14.097mm 0.555"	20.447mm 0.805"	24.892mm 0.980"	29.972m 1.180"
Suct.Str. Orifice Size	3.175mm 0.125"	4.826mm 0.187"	6.000mm 0.250"	9.525mm 0.375"	10.000mm 0.393"	12.700mm 0.500"	15875mm 0.625"
Suct.Str.Type	**'C'**	**'B'**	**'B'**	**'A'**	**'A'**	**'A'**	**'A'**
PEM 7280/90	**7299**	**7294**	**7298**	**7297**	**Multiple 7297**	**Multiple 7297**	**Multiple 7297**

Flow: GPM = USGPM

Flow Straighteners are made of 304 Stainless steel. Flow Straighteners are inserted into pipe between flat companion flanges with suitable size flange ring gaskets (2)

Flow GPM	Press. Loss Feet	Flow GPM	Press. Loss Feet	Flow GPM	Press. Loss Feet	Flow GPM	Press. Loss Feet	Flow GPM	Press. Loss Feet	Flow GPM	Press. Loss Feet	Flow GPM	Press. Loss Feet
50	0.207	50	0.188	150	0.604	400	0.951	500	0.720	800	0.980	1000	0.930
60	0.272	60	0.270	200	1.075	500	1.488	600	1.040	1000	1.520	1500	1.980
75	0.383	75	0.423	250	1.680	600	2.140	800	1.860	1200	2.190	2000	3.540
100	0.612	100	0.754	300	2.420	800	3.811	1000	2.900	1500	3.340	2500	5.540
150	1.080	150	1.527	350	3.290	900	4.890	1200	4.190	2000	5.940	3000	9.390
		200	2.610	400	4.480	1000	6.650	1600	7.450	2500	9.010	3500	10.870
L/min	**m.**	**L /min**	**m.**	**L/min**	**m.**	**L/min**	**m.**	**L/min**	**m.**	**L/min**	**m.**	**L/min**	**m**
189.0	0.063	189.0	0.057	567.78	0.184	1513.8	0.289	1892.4	0.219	2271.0	0.298	3785.4	0.283
226.8	0.083	226.8	0.082	757.2	0.326	1892.4	0.453	2271.0	0.317	3028.2	0463	5677.8	0.603
283.8	0.116	283.8	0.128	946.2	0.512	2271.0	0.652	3028.2	0.566	3785.4	0.667	7580.8	1.070
378.0	0.186	378.0	0.229	1135.2	0.737	3028.2	1.161	3785.4	0.883	5677.8	1.018	9463.2	1.680
567.6	0.329	567.6	0.465	1324.8	1.002	3331.2	1.490	4542.0	1.277	7566.0	1.810	11356.2	2.860
		756.0	0.795	1434.0	1.365	3785.4	2.026	6056.4	2.270	9463.2	2.740	13249.2	3.310

PEM 21000 Series

FLOW STRAIGHTENERS

 # 520-3000

Flow / Pressure Loss Formula for PEM 21000

$$h = V^2 (fL/D+k) / 2g$$

f=friction factor(Darcy-Wisbach formula)
L=pipe length , ft
D=inside pipe diameter
g=acceleration of gravity, 32.17 ft/s^2
k=0.45
V=velocity of the stream , ft/s

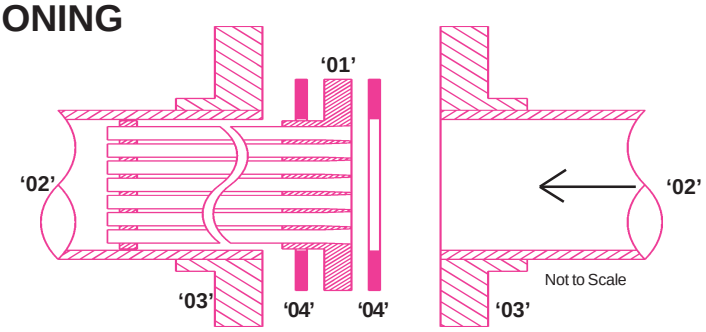
Comparison of PEM 874 with 4" identical ABS pipe riser of design length on 4", 90° Elbow Fitting
Sprayheight appr. 17 feet (5.1m) , 1.5" Orifice, 178 GPM (674 L/min) x 22.8 Ft (6.95m) Head

PEM 874B to 5.1m - 17 Ft ,
on 4" Elbow, No Flow Straightener

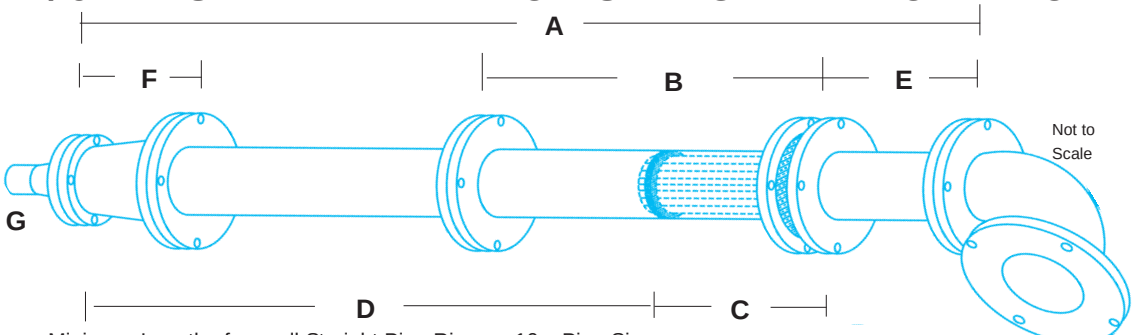
PEM 874B to 5.1m - 17 Ft, on 4" Elbow
with PEM 21040 Flow Straightener

FLOW STRAIGHTENER POSITIONING

'01' Flange of Flow Straightener
'02' Pipe (Inside Diameter to be specified)
'03' (2) Flat Face Pipe Flanges (ASA or BSP)
'04' (2) Flange Gaskets



NOZZLE / JET RISER PIPE WITH FLOW STRAIGHTENER ON ELBOW



A	=	Minimum Length of overall Straight Pipe Riser = 10 x Pipe Size
B	=	Center Part of Straight Pipe Riser, longer than Flow Straightener to permit insertion of same
C	=	Length of Flow Straigthener Unit in pipe , see page one.
D	=	Length of Straight Pipe Riser between end of flow straightener and nozzle = 3 to 10 times pipe size
E	=	Length of straight pipe between inflow elbow and flow straightener = 1 to 2 times pipe size
F	=	Nozzle or Jet, either with threaded or flanged pipe connection or flanged tapered pipe reducer from riser pipe size to nozzle pipe size terminating in threaded companion flange and close pipe nipple or plain pipe flange, depending on nozzle or jet pipe connection.
G	=	Nozzle or Jet, either with threaded or flanged pipe connection mounted on tapered reducer fitting.
H	=	Flanged inflow pipe elbow.

PEM 21000 Series custom made FLOW STRAIGHTENERS, are similar in design to modified 'Zanker' type double action flow straighteners and relate to the flow requirements of PEM Angular Spray Design Calculations on page 704 .

For Dimensions and Performances see Page 539

PEM 23000 Series Flow Straightening Flanges have special formed orifice configurations that will remove effectively most bulk profile flow distortion, except for multi swirl distortion. PEM 23000 Series Flow Straightening Flanges are made of virgin cast bronze or at extra cost of stainless steel

PEM 23000 Series Flow Straightening Flanges require orifice & flow sized pump suction strainers, see PEM Catalog Design Data for suction strainer sizing. Never use in line basket strainers in the pump suction except as protection for pump.

Suggested Suction Strainers sizes in red in table for maximum flows.

For best effectiveness allow minimum 1 - 2 times pipe size distance of straight pipe between the flow straightening flange and supply pipe fitting.

Allow at least 5 - 8 times pipe size distance of straight pipe between the flow straightening flange and the spray jet.

For maximum spray performances and/or for use with silted water:
Order spray jets with flanged pipe connection and steel orifice sleeves.

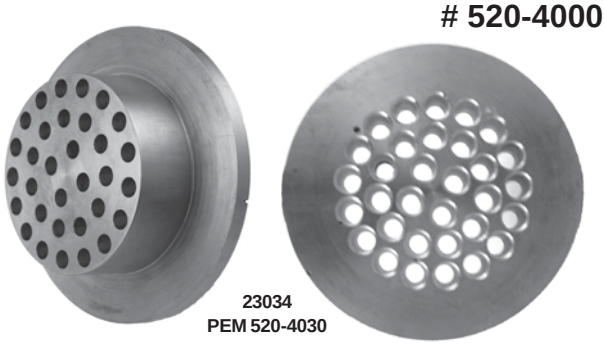
PEM 23000 Series FLOW STRAIGHTENING FLANGES are less effective to remove multiple swirl flow distortion (as caused by multiple closely connected pipe fittings and valves) than PEM 21000 Series Flow Straighteners but have a lesser pressure loss and are more convenient to install. For applications with maximum flow distortion use only PEM 21000 Series Flow Straighteners

For smaller pipe size Flow Straighteners see: PEM 01050 Series

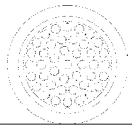
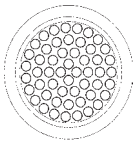
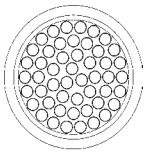
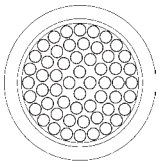
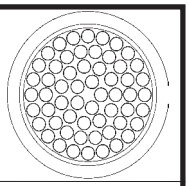
ISO 9001: 2000 PEM REGISTERED

PEM 23000 Series FLOW STRAIGHTENING FLANGES

520-4000



23034
PEM 520-4030

PEM Serial	23025 520-4025	23030 520-4030	23040 520-4040	23060 520-4060	23080 520-4080	23110 520-4100	23120 520-4120
With order state: Inside pipe diam. & ASA or BSP Flat Flange							
PIPE SIZE	**2-1/2”**	**3”**	**4”**	**6”**	**8”**	**10”**	**12”**
O.D. of Flange	127mm 5.000”	136mm 5.375”	175mm 6.900 ”	229mm 9.000”	280mm 11.000”	340mm 13.375”	411mm 16.187”
Thickness of Flange	10mm 0.394”	10mm 0.394”	10mm 0.394”	10mm 0.394”	10mm 0.394”	10mm 0.394”	10mm 0.394”
Length of Unit in pipe	18.6mm 0.725”	18.6mm 0.725”	18.6mm 0.725”	21.8mm 0.850”	21.8mm 0.850”	28.7mm 1.100”	28.7mm 1.100”
Fit into pipe O.D. of Unit	60mm 2.362”	74mm 2.913”	99mm 3.898”	150mm 5.905”	198mm 7.795”	251mm 9.882”	302mm 11.890”
# of Orifices	36	31	32	53	50	56	58
Lesser I.D. of Orifice	4.826mm 0.190”	6.477mm 0.255”	9.321mm 0.367”	14.097mm 0.555”	20.447mm 0.805”	24.892mm 0.980”	29.972m 1.180”
Suct.Str. Orifice Size	3.175mm 0.125”	4.826mm 0.187”	6.000mm 0.250”	9.525mm 0.375”	10.000mm 0.393”	12.700mm 0.500”	15875mm 0.625”
Suct.Str.Type PEM 7280/90	**‘C’** 7299	**‘B’** 7294	**‘B’** 7298	**‘A’** 7297	**‘A’** Multiple 7297	**‘A’** Multiple 7297	**‘A’** Multiple 7297

Flow : GPM = USGPM

Flow Straightening Flanges are made of virgin bronze or
At extra cost: Of # 316 alloy stainless steel for sea water or
Of hardened # 460 alloy stainless steel for silted water

Flow GPM	Press Loss Feet	Flow GPM	Press Loss Feet	Flow GPM	Press Loss Feet	Flow GPM	Press Loss Feet	Flow GPM	Press Loss Feet	Flow GPM	Press Loss Feet	Flow GPM	Press Loss Feet
50	1.018	50	0.223	150	0.594	400	0.453	500	0.172	800	0.157	1000	0.016
60	1.469	60	0.322	200	1.135	500	0.709	600	0.248	1000	0.247	1500	0.240
75	2.305	75	0.504	250	1.647	600	1.022	800	0.442	1200	0.356	2000	0.432
100	4.095	100	0.897	300	2.370	800	1.818	1000	0.691	1500	0.559	2500	0.675
150	9.230	150	2.021	350	3.230	900	2.301	1200	0.997	2000	0.992	3000	0.972
		200	3.549	400	3.585	1000	2.835	1600	1.771	2500	1.549	3500	1.325
L/min	**m.**	**L /min**	**m.**	**L/min**	**m.**	**L/min**	**m.**	**L/min**	**m.**	**L/min**	**m.**	**L/min**	**m**
189.0	0.310	189.0	0.068	567.7	0.181	514.0	0.138	1892.4	0.052	2271.0	0.047	3785.4	0.003
226.8	0.440	226.8	0.098	757.2	0.345	892.4	0.216	2271.0	0.076	3028.2	0.075	5677.8	0.073
283.8	0.702	283.8	0.153	946.2	0.501	2271.0	0.311	3028.2	0.554	3785.4	0.108	7580.8	0.131
378.0	1.248	378.0	0.273	1135.2	0.724	3028.2	0.554	3785.4	0.210	5677.8	0.170	9463.2	0.205
		750.6	1.095	1514.0	1.092	3785.4	0.864	6056.0	0.539	9463.2	0.472	1349.2	0.403

FOR INSTALLATION DIRECTIONS SEE PAGE 542

PEM 23000 Series

FLOW STRAIGHTENING FLANGES

 # 520-4000

Comparison of PEM 874B, 38.1mm / 1.500" Orifice on 4", 90° Elbow Fitting

PEM 874B Jet
directly on 4", 90° Elbow,
without Flow Straightening Flange & riser pipe

PEM 874B Jet with Riser Pipe
& PEM 21040 Flow Straightener
on 4", 90° Elbow (as below)

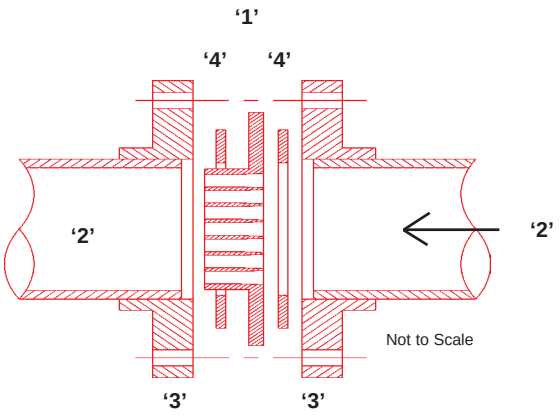
Flow / Pressure Loss Formula for PEM 23000

$$h = V^2 (fL/D+k) / 2g$$

f=friction factor(Darcy-Wisbach formula)
L=pipe length , ft
D=inside pipe diameter
g=acceleration of gravity, 32.17 ft/s^2
k=0.25
V=velocity of the stream , ft/s

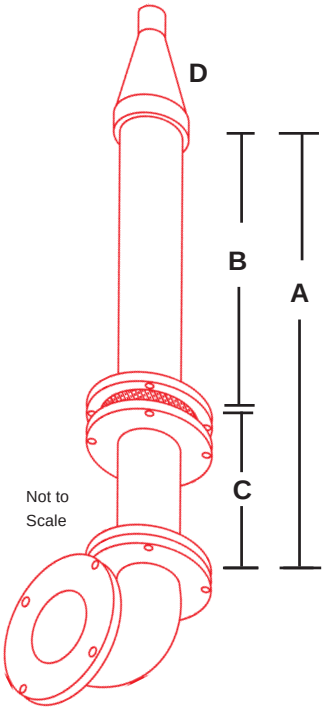
FLOW STRAIGHTENING FLANGE PLACEMENT

Flow Straightening Flanges are inserted into pipe between flat companion flanges with suitable size flange ring gaskets (2)



'1' Flange of Flow Straightener
'2' Pipe (Inside Diameter to be specified)
'3' (2) Flat Face Pipe Flanges (ASA or BSP)
'4' (2) Flange Gaskets

NOZZLE / JET RISER PIPE WITH FLOW STRAIGHTENING FLANGE ON ELBOW FITTING



A	=	Minimum Length of overall Straight Pipe Riser = 10 x Pipe Size
B	=	Length of Straight Pipe Riser between end of flow straightening flange and nozzle = 5 - 8 times pipe size
C	=	Length of straight pipe between inflow elbow and flow straightening flange = minimum. 1 - 2 times pipe size
D	=	Nozzle or Jet, either with threaded or flanged pipe connection or long tapered pipe reducer from riser pipe size to nozzle pipe size

For Dimensions and Performances see Page 541

POOL & PUMP FITTINGS

PEM
600 SECTION
INDEX 12
2013-8
SUPERSEDES 2008-1

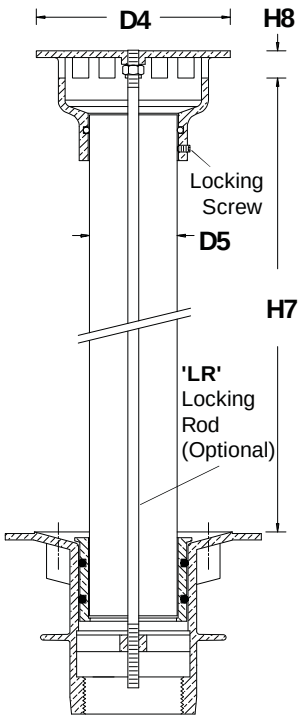
PEM METRIC POOL DRAINS & OVERFLOWS FOR DIN SIZE PVC PIPE

6015 / 6016 Series

 # 602 - 5000
 # 602 - 6000

PEM 6015 and 6016 Bases are designed for direct fit into type DIN 19 534 PVC Pipe with DIN 4060 Lip Seals. Fittings of same size are interchangeable on same size base, the liner clamp can be added where required. The Bases, Clamps, Gratings, Overflow Crown and Plugs are made of cast bronze, 85/5/5/5 copper alloy, the stand pipe and all fasteners are made of stainless steel, Flange Gasket is of Neoprene and DIN ISO 36 'O' ring seals are made of Buna-N.

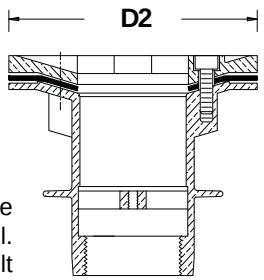
Base with ' LR' Overflow Standpipe



PEM	#	DESCRIPTION
6015	**602-5000**	**Fixture Base for 2" BSP & Fixture Base for 75mm DIN PVC Pipe***
6015-1	602-5010	Liner Clamp & Gasket
6015-3	602-5030	Cast Bronze Debris Grating
6015-4	602-5040	0.5m high x 50mm Overflow Standpipe
6015-5	602-5050	1.0m high x 50mm Overflow Standpipe
6015-6	602-5060	Bronze Drain Plug for 50 / 75mm Base
6016	**602-6000**	**Fixture Base for 100mm DIN PVC Pipe*** ***** To insert into Pipe
6016-1	602-6010	Liner Clamp & Gasket
6016-3	602-6030	Cast Bronze Debris Grating
6016-4	602-6040	0.5m high x 76mm Overflow Standpipe
6016-5	602-6050	1.0m high x 76mm Overflow Standpipe
6016-6	602-6060	Cast Bronze Drain Plug for 100 mm Base

Fixture Base and Fittings must be ordered together and are accounted for separately.

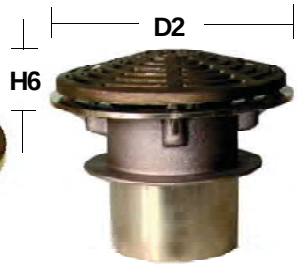
BASE WITH LINER CLAMP



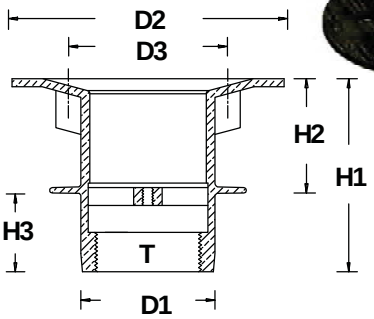
BASE WITH DEBRIS GRATE

Standpipes are equipped with double 'O' ring seal base. To adjust standpipe to a lower level, saw pipe off, bevel and smooth saw cut with file and reinstall. The drain bases can accommodate PEM 6200 Series Fittings with center bolt mounting such as PEM 6214/16. Most Fittings (Other than Liner Clamps) are interchangeable for replacement of similar ones of other make.

LINER CLAMP & GASKET for PEM Bases



Base



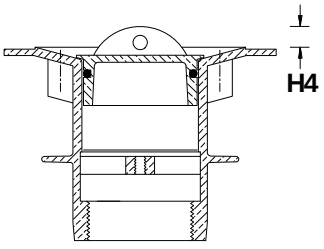
Drain Plug

Overflow Standpipes can be made **VANDAL RESISTANT** with locking rod (Optional & Extra) bolted to base, that requires the loosening of the lockscrew in the crown fitting, unscrewing of the same before the stand pipe can be removed from base. **To order add ' LR ' to catalog # of Overflow Stand Pipe also specify exact depth of water !**

DIMENSIONS

PEM T (BSP)	6015 2" mm	6016 - mm	60154 - mm	60155 - mm	60164 - mm	60165 - mm
H1	108	136				
H2	64	67				
H3	44	69				
H4	11	15				
H5	7	9				
H6	24	32				
H7	-	-	500	1000	500	1000
H8	-	-	10-20	10-20	10-25	10-25
D1	75	100				
D2	152	200				
D3	89	127				
D4	-	-	115	115	160	160
D5	-	-	52	52	76	76

Base with Drain Plug



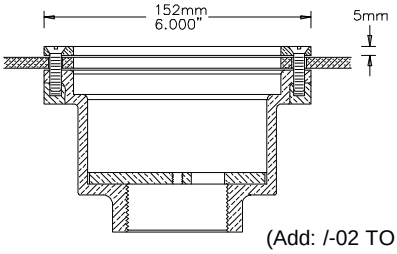
PEM 6090 SERIES

ONE PIECE CAST BRONZE BASES & BASE OPTIONS

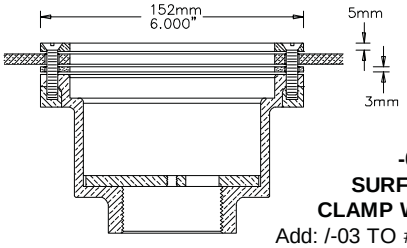
PEM 6090 Series, all cast bronze bases are designed for the mounting of **PEM 6200 Series** pool, drain and suction fittings. The bases are made of 85/5/5/5 cast bronze (B - Metal). The durability of this bronze is well known.

All pipes connecting into these bases to be of non corrodible material or plastic. As cement bonds well to clean natural cast bronze surfaces of the bases, normally no other no-leak devices are required on the pipes connecting into these bases.

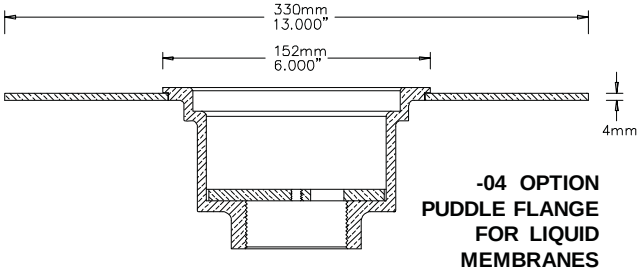
To specify & order a complete fixture:
Base + Option + Fitting
Example:
To order PEM 6093, with 02 membrane clamp and 6212 Fitting:
Specify : 6093/-02/-6212



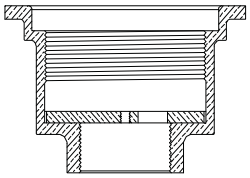
-02 OPTION SURFACE MEMBRANE CLAMP
(Add: /-02 TO # OF BASE)



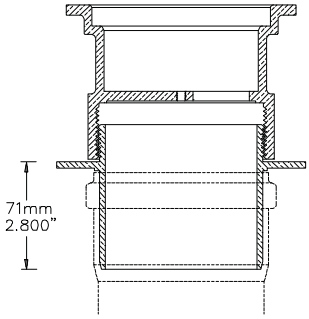
-03 OPTION SURFACE LINER CLAMP W. GASKET
Add: /-03 TO # OF BASE)



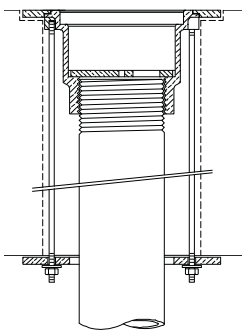
-04 OPTION PUDDLE FLANGE FOR LIQUID MEMBRANES
(Add:/ -04 TO # OF BASE)



-05 OPTION THREADED TOP
(Add:/-05 TO # OF BASE)



-007 OPTION 4" BSP/NPS ADAPTER FOR PEM 6094 BASE FOR DIN 19534 PVC PIPE WITH DIN 4060 LIP SEALS (DN :100mm)
(Add: /-07 TO # OF BASE)



-008 OPTION UNDERDECK CLAMP
(Add: -08 TO # OF BASE

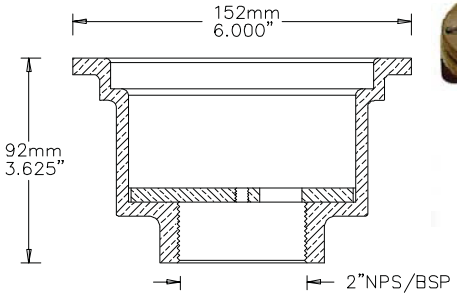
FOR STANDARD SLAB THICKNESS OF:
150mm\6" to 200mm\8"
Custom made
for other slab thickness.

O.D. of Base & Clamp: 190mm\7.5"
I.D. of Opening in concrete: 150mm\6"

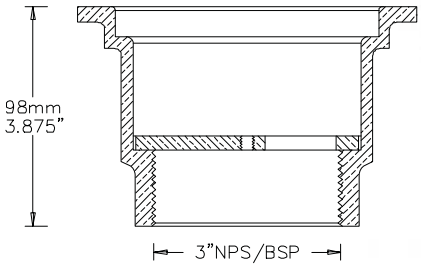
STANDARD BASE (SLIP IN TOP)

Pictures show Base with Liner Clamp

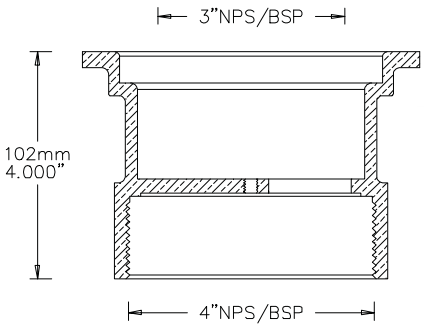
PEM 6092
#602-2000



PEM 6093
#602-3000



PEM 6094
#602-4000



PEM 6100 SERIES

HEIGHT ADJUSTABLE CAST BRONZE BASES & BASE OPTIONS

BASES FOR 6200 SERIES FITTINGS

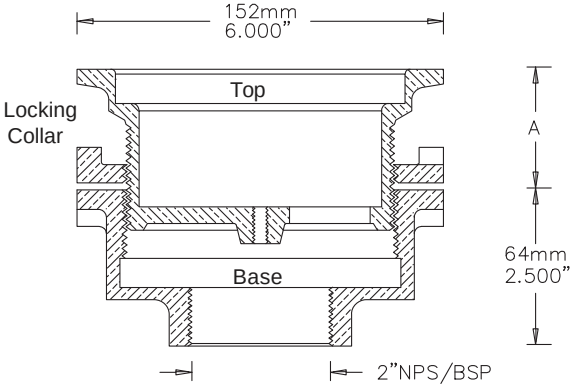
To specify & order a complete fixture:
Base + Options + Fitting
Example: To order PEM 6103, with 05 threaded top, 08 Under Deck Clamp, 09 Elevation Extension & 6222-5 Fitting:
Specify: 6103/-05/-08/-09/-6222-5

PEM 6103

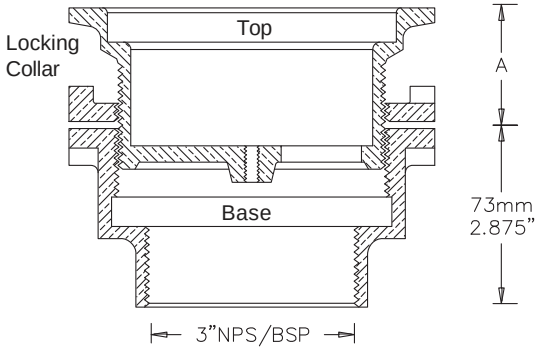
The PEM 6100 Series are designed for the mounting of PEM 6200 Series pool, drain and suction fittings and **are** all cast bronze adjustable bases. Levelling height adjustment permits ease of installation to final floor grade. All pipes connecting into these bases should be non corrodible. As cement bonds well to clean natural cast bronze surfaces, normally no other no-leak devices are required on connecting pipes. Threaded joints must have suitable thread sealant on threads.

STANDARD BASES (SLIP IN TOP)

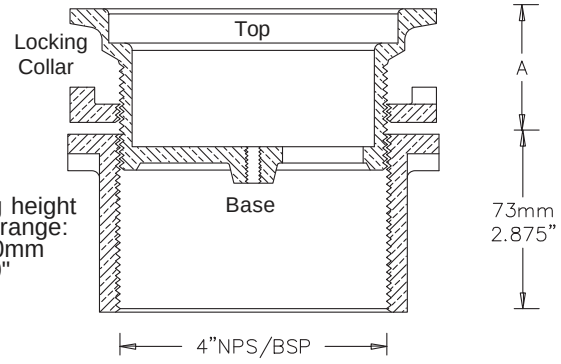
PEM 6102 / #603-2000



PEM 6103 / #603-3000

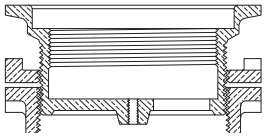


PEM 6104 / #603-4000

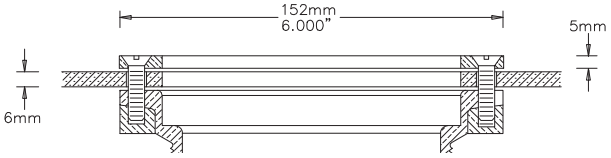


A =Levelling height adjustment range: 32mm to 50mm /1.25" to 2.0"

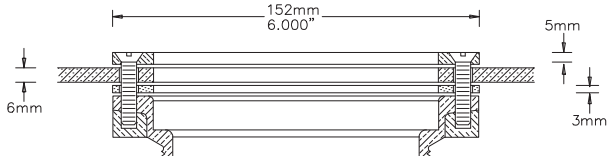
- 05 OPTION (Add: /-05 TO # OF BASE)
-THREADED TOP



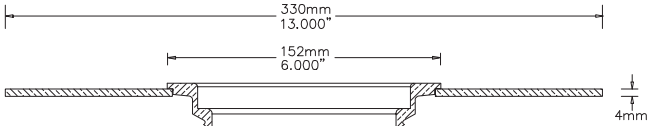
- 02 OPTION (Add: /-02 TO # OF BASE)
- SURFACE MEMBRANE CLAMP



- 03 OPTION (Add: /-03 TO # OF BASE)
- SURFACE LINER CLAMP w. GASKET

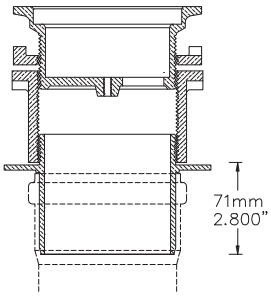


- 04 OPTION (Add: /-04 TO # OF BASE)
- PUDDLE FLANGE - For liquid membranes



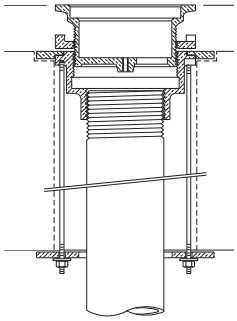
- 07 OPTION
(Add: /-07 TO # OF BASE)

4" BSP/NPS ADAPTER FOR PEM 6104 BASE FOR DIN 19534 PVC PIPE WITH DIN 4060 LIP SEALS (DN :100mm)



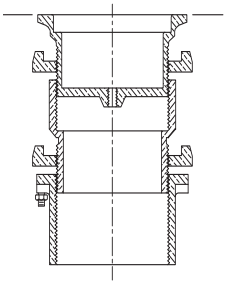
- 08 OPTION
(Add: /-08 TO # OF BASE)
UNDERDECK CLAMP

FOR STANDARD SLAB THICKNESS OF :150mm\6" to 200mm\8"
Custom made for other slab thickness.
O.D. of Base & Clamp:190mm \ 7.5"
I.D. of Opening in concrete:150mm \ 6"



- 09 OPTION -
(Add: /-09 TO # OF BASE)
ELEVATION EXTENSION

ADJUSTABLE EXTENSION
ADDITIONAL TO NORMAL
HEIGHT ADJUSTMENT:
45 to 80 mm \ 1.750" to 3.140"



PEM 6110 SERIES

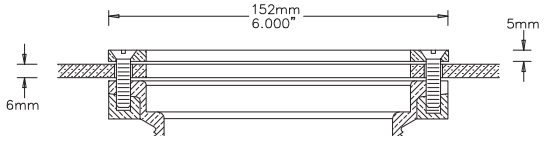
HEIGHT ADJUSTABLE CAST BRONZE BASES WITH SUBSURFACE MEMBRANE CLAMP & BASE OPTIONS

PEM 6100 Series, all cast bronze adjustable bases are designed for the mounting of PEM 6200 Series pool, drain and suction fittings.

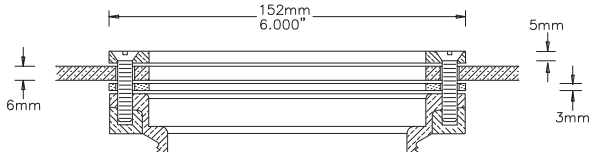
Levelling height adjustment permits ease of installation to final floor grade. All pipes connecting into these bases should be non corrodible. As cement bonds well to clean natural cast bronze surfaces, normally no other no-leak devices are required on connecting pipes. Threaded joint must have suitable thread sealant on threads.

To specify & order a complete fixture:
Base + Options + Fitting
Example: To order PEM 6114, with 05 threaded top, 08 Under Deck Clamp, 09 Elevation Extension & 6222-5 Fitting:
Specify: 6114/-05/-08/-09/-6222-5

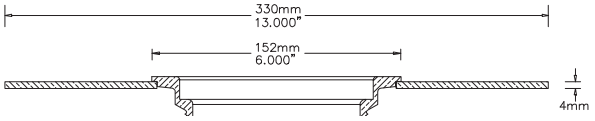
(Add: /-02 TO # OF BASE) -02 **OPTION**
- SURFACE MEMBRANE CLAMP

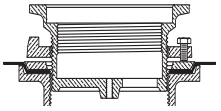


(Add: /-03 TO # OF BASE) **-03 OPTION**
-SURFACE LINER CLAMP w. GASKET

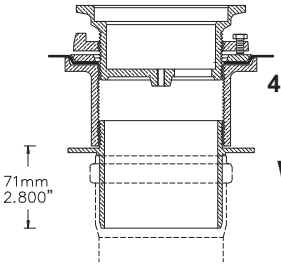


Add : /-04 TO # OF BASE**- 04 OPTION**
-- PUDDLE FLANGE For liquid membranes



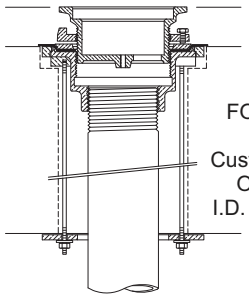


-05 OPTION
-(Add: /-05 TO # OF BASE)
THREADED TOP

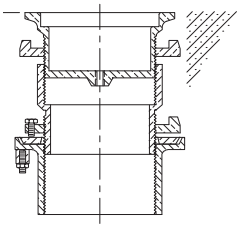


-07 OPTION
(Add: /-07 TO # OF BASE)

4" BSP/NPS ADAPTER FOR PEM 6114 BASE FOR DIN 19534 PVC PIPE WITH DIN 4060 LIP SEALS (DN :100mm)

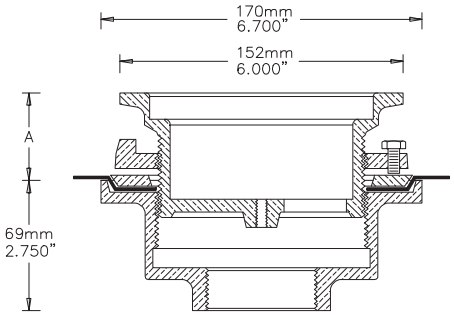


-08 OPTION
-(Add: /-08 TO # OF BASE)
UNDERDECK CLAMP
FOR STANDARD SLAB THICKNESS OF :150mm\6" to 200mm\8"
Custom made for other slab thickness
O.D. of Base & Clamp: 190mm\7.5"
I.D. of Opening in concrete: 150mm\6"

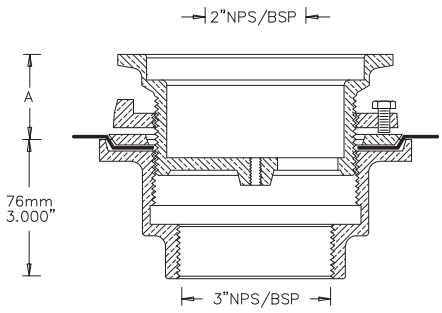


-09 OPTION
-(Add: /-09 TO # OF BASE)
ELEVATION EXTENSION
ADJUSTABLE EXTENSION ADDITIONAL TO NORMAL HEIGHT ADJUSTMENT:
45 to 80 mm\1.750" to 3.140"

STANDARD BASE (SLIP IN TOP)

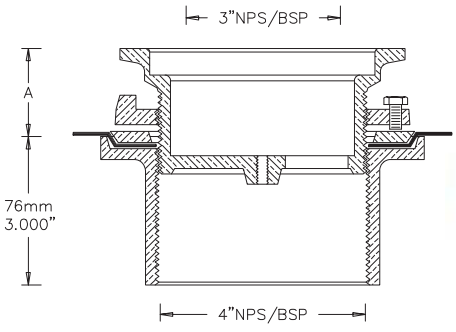


PEM 6112
#606-2000



PEM 6113
#606-3000

A = Levelling height adjustment range:
32mm to 50mm \ 1.250" to 2.0"



PEM 6114
#606-4000

PEM 6201 SERIES
#607-1000

CAST BRONZE BASES TO CONNECT DIRECTLY INTO FEMALE PIPE FITTINGS

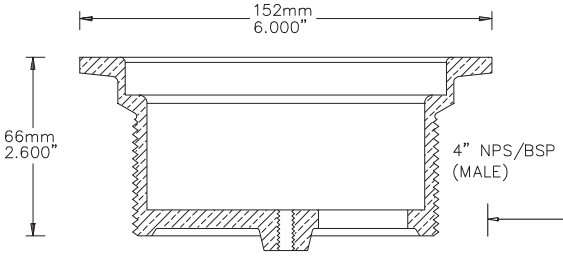
PEM 6201 cast bronze base is designed for the mounting of PEM 6200 Series pool, drain or pump suction fixtures. The bases have outside (male) 4" NPS or BSP pipe thread for mounting into suitable pipe fitting. When used with a 4", 90 degrees pipe elbow, the lead out pipe can be installed into or just below the pool floor concrete. The pipe thread must be well sealed with suitable pipe thread sealant.

Top View

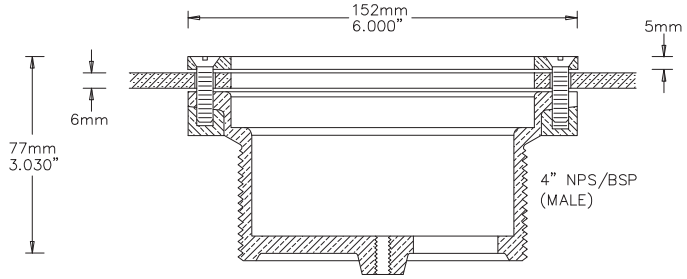
PEM 6201

Side View

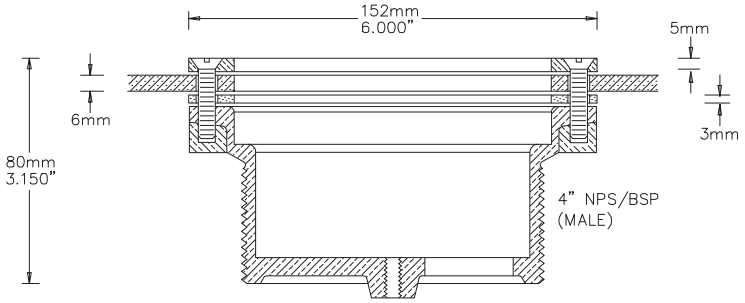
STANDARD BASE (SLIP IN TOP)



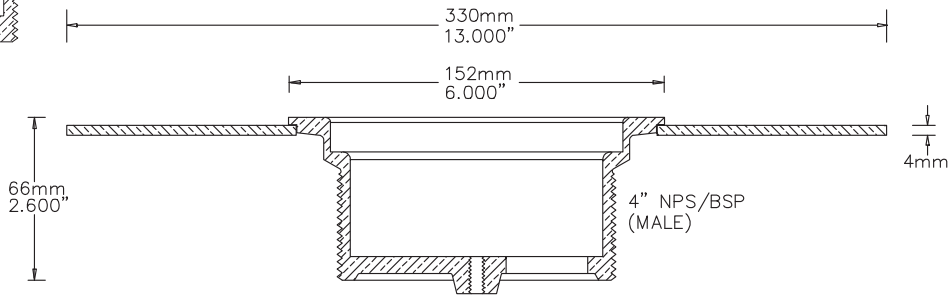
-02 OPTION , (Add: /-02 TO # OF BASE)
SURFACE MEMBRANE CLAMP



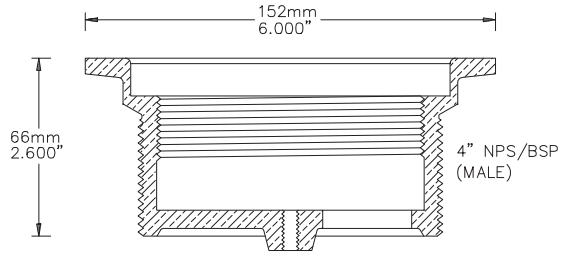
-03 OPTION , (Add: /-03 TO # OF BASE)
SURFACE LINER CLAMP



--04 OPTION, (Add: /-04 TO # OF BASE)
PUDDLE FLANGE



-05 OPTION (Add: /-05 TO # OF BASE)
THREADED TOP

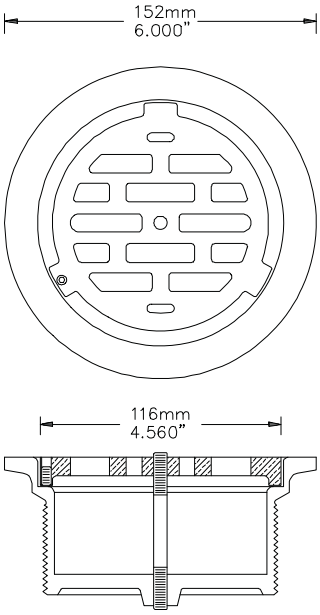


To specify & order a complete fixture:
Base + Options + Fitting
Example:
To order PEM 6201, with threaded top, Surface Liner Clamp and 6216 Fitting:
Specify: 6201/-3/-6216

The drawings on this page show a base , which is not included in fitting option. BASE, BASE-OPTION & FITTING TO BE ORDERED TOGETHER AS REQUIRED BUT ACCOUNTED FOR SEPARATELY.

SURFACE DRAIN PEM 6212

#610-3300



PEM 6212 Drain Fitting is made of cast bronze with brass center rod and stainless steel set screw.

Effective Open Area:
41.4 cm2 \ 6.2 sq. inches

Suggested maximum flow:
With 500mm\20" water over fitting
= 150 l/min \ 40 GPM

When used as suction fitting, vortexing is normal.

Due to its center support, the drain grate has increased load bearing capacity.

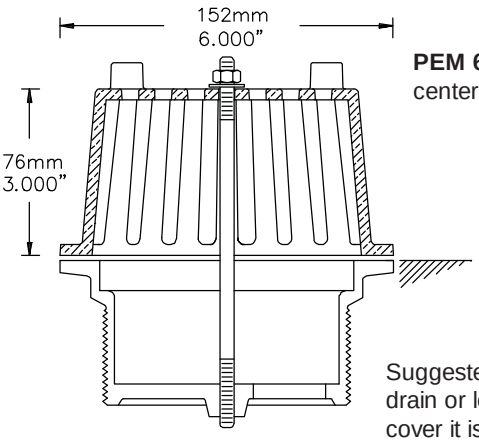
PEM 6212

The grate is vandal resistant, as it is screwed into position and locked with set screw.

TO SPECIFY & ORDER : Base + Base Option +Fitting

BALANCING PIPE INTAKE LEAF, PLANTER OR UNDER - DRAIN PEM 6214

#610-3400



PEM 6214 Fitting is made of cast bronze, brass center rod and stainless steel fitted.

Fitting is factory fitted.

Effective Open Area :
145 cm2 \ 22.5 sq. inches

Suggested maximum flow :
With 500mm \ 20" water over fitting
= 470 l/min \ 120 GPM

Width of slots : 9 mm \ 0.354"

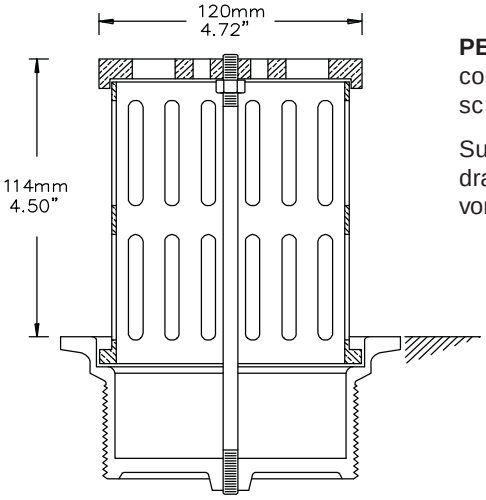
Suggested use is for balancing pipe intake, hidden drain or leaf drain. With additional screening and gravel cover it is an ideal planter drain or under - drain. When used as suction fittings, vortexing is normal.

PEM 6214

TO SPECIFY & ORDER : Base + Base Option + Fitting

LARGE CAPACITY BALANCING PIPE INTAKE ALSO LEAF, PLANTER OR UNDER - DRAIN PEM 6214A

#610-3410



PEM 6214A Drain Fitting is made of cast bronze and copper with brass center rod and stainless steel set screw.

Suggested use is for balancing pipe intake, hidden drain or leaf drain. When used as suction fittings, vortexing is normal.

Effective Open Area:
155 cm2 \ 24 sq. inches

Suggested maximum flow:
With 610mm\24" of water over fitting
= 950 l/min \ 250 GPM

Slot width : 9.53mm \ 0.375"

PEM 6214A

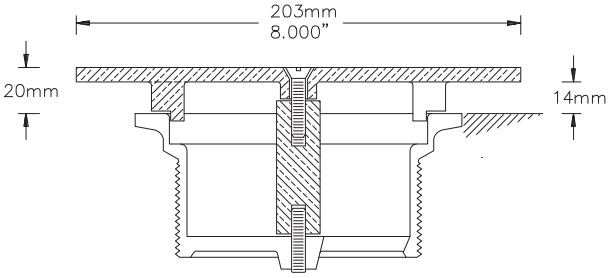
TO SPECIFY & ORDER : Base + Base Option + Fitting

PEM 6215 ANTI VORTEX SUCTION OR DISCHARGE FITTING FOR VERY SHALLOW POOLS.

#610-3500

PEM 6215 Fitting is made of cast bronze with brass center rod and stainless steel fastener. Suggested use is for shallow pools as suction or discharge fitting.

PEM 6215



Effective Open Area: 76 cm2 \ 11.9 sq. inches
Suggested maximum flow:
With: 100mm\4" water over fitting = 76 l/min \ 20 GPM
With 150mm\6" water over fitting = 113 l/min \ 30 GPM
With 200mm\8" water over fitting = 151 l/min \ 40 GPM
Width of opening: 14mm \ 0.56"

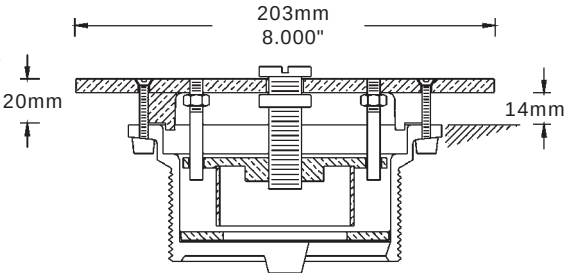
TO SPECIFY & ORDER :
Base + Base Option + /-6215

PEM 6215V VALVED ANTI VORTEX SUCTION OR DISCHARGE FITTING FOR VERY SHALLOW POOLS

#610-3510

PEM 6215V Fitting is made of cast bronze, brass and stainless steel fasteners - factory fitted to choice of base. Suggested use is for shallow pools as suction or discharge fitting

Flow regulating valve has non-rising stem and is used to balance flow if several fittings are used on a non balanced flow manifold.



Effective Open Area : 76 cm2\11.9 sq. inches
Suggested maximum flow:
With: 100mm \ 4" water over fitting = 76 l/min \ 20 GPM
With 150mm \ 6" water over fitting = 113 l/min \ 30 GPM
With 200mm \ 8" water over fitting = 151 l/min \ 40 GPM
Width of opening : 14mm \ 0.56"

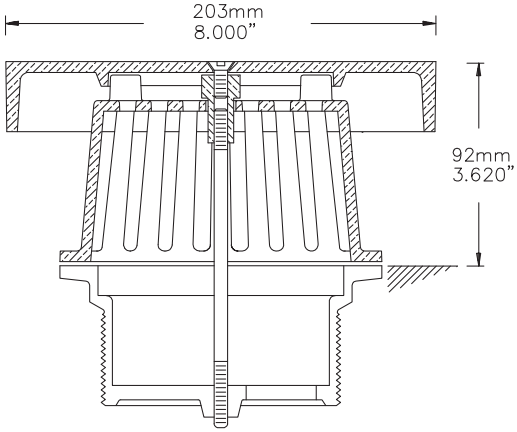
TO SPECIFY & ORDER :
Base + Base Option + Fitting

PEM 6215V Fitting is factory fitted.

PEM 6216 ANTI VORTEX SUCTION FITTING

PEM 6216-1 #610-3600
PEM 6216-2 #610-3601

PEM 6216-1 Fitting is made of cast bronze, brass center rod and stainless steel fitted. Suggested use is for shallow pools as suction or discharge fitting.
PEM 6216-2 Fitting as above but with formed plastic cover



PEM 6216-1

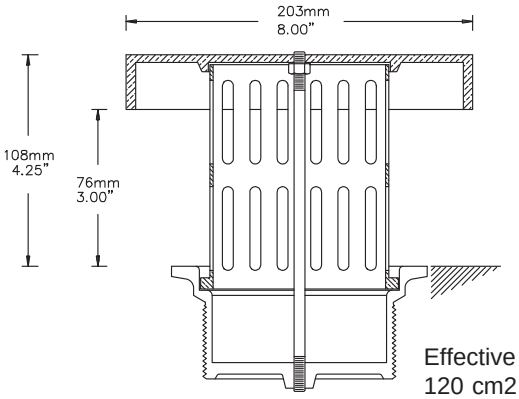
TO SPECIFY & ORDER :
Base + Base Option
+Fitting

Effective Open Area : 145 cm2 \ 22.5 sq. inches
Suggested maximum flow :
With: 100mm \ 4" water over fitting = 189 l/min \ 50 GPM
With 150mm \ 6" water over fitting = 227 l/min \ 60 GPM
With 300mm \ 12" water over fitting = 302 l/min \ 80 GPM
With 400mm \ 16" water over fitting = 454 l/min \ 120 GPM
With 500mm \ 20" water over fitting = 567 l/min \ 150 GPM
Width of slots 9 mm \ 0.354"

Fitting is factory fitted.

The drawings on this page show a base , which is not included in fitting option. **BASE, BASE-OPTION & FITTING TO BE ORDERED TOGETHER AS REQUIRED BUT ACCOUNTED FOR SEPARATELY.**

ANTI VORTEX SUCTION FITTING PEM 6216A



PEM 6216-1A Fitting is made of cast bronze and copper, brass and stainless steel fitted.
PEM 6216-2A Fitting as above but with formed plastic cover
Suggested use is as suction fitting in deep pools.

PEM 6216-1A #610-3610
PEM 6216-2A #610-3611

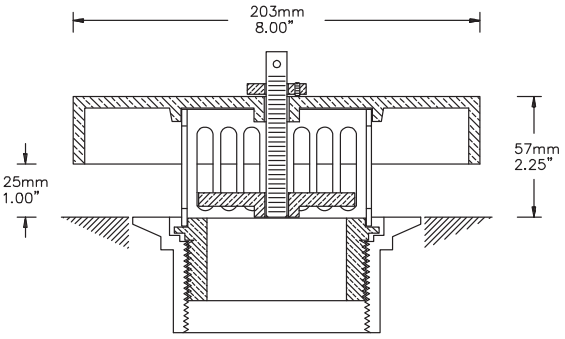
PEM 6216-1A

Effective Open Area:
120 cm2 \ 18.6 sq. inches
Suggested maximum flow :
With 400mm \ 16" water over fitting = 454 l/min \ 120 GPM
With 500mm \ 20" water over fitting = 567 l/min \ 150 GPM
With 800mm \ 32" water over fitting = 1135 L/min \ 300 GPM
Width of slots : 9.53mm \ 0.375"

TO SPECIFY & ORDER :
Base + Base Option + Fitting

VALVED ANTI VORTEX SUCTION FITTING PEM 6216V-05

Valve has a lockable rising stem. As the fitting screws into the base, the same must have the -05 'Threaded Top' option.



PEM 6216-1V-05 Fitting is made of cast bronze and copper, brass and stainless steel fitted.
PEM 6216-2V-05 Fitting as above but with formed plastic cover

PEM 6216-1-05 V #610-3630
PEM 6216-2-05 V #610-3631

PEM 6216-1V-05

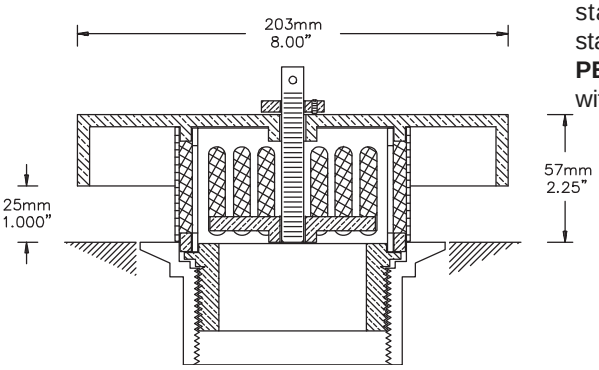
Effective Open Area:
60 cm2 \ 9.3 sq. inches
Suggested maximum flow :
With 100mm \ 4" water over fitting = 189 l/min \ 50 GPM
With 150mm \ 6" water over fitting = 227 l/min \ 60 GPM
With 300mm \ 12" water over fitting = 302 l/min \ 80 GPM
With 400mm \ 16" water over fitting = 454 l/min \ 120 GPM
With 500mm \ 20" water over fitting = 567 l/min \ 150 GPM
Width of slots : 9.53mm \ 0.375"

Suggested use is as flow adjustable suction fitting in non-balanced flow manifold to equalize suction.

TO SPECIFY & ORDER : Base + Base Option + Fitting

VALVED ANTI VORTEX FITTING WITH EXTRA STRAINER PEM 6216VS-05

Valve has a lockable rising stem. As the fitting screws into the base, the same must have the -05 'Threaded Top' option.



PEM 6216-1VS-05 Fitting is made of cast bronze and copper with perforated stainless steel strainer, brass and stainless steel fitted.
PEM 6216-2VS-05 Fitting as above but with formed plastic cover

PEM 6216-1-05 V #610-3650
PEM 6216-2-05 V #610-3651

PEM 6216-1VS-05

Effective Open Area:
100 cm2 \ 15.5 sq. inches
Suggested maximum flow :
With 100mm \ 4" water over fitting = 95 l/min \ 25 GPM
With 150mm \ 6" water over fitting = 189 l/min \ 50 GPM
With 300mm \ 12" water over fitting = 227 l/min \ 60 GPM
With 400mm \ 16" water over fitting = 302 l/min \ 80 GPM
With 500mm \ 20" water over fitting = 454 l/min \ 120 GPM
Strainer openings are 4.5mm \ 0.187"

Suggested use is as flow adjustable suction fitting in non balanced flow manifold to equalize suction in pools filled with stones and/or aquatic life.

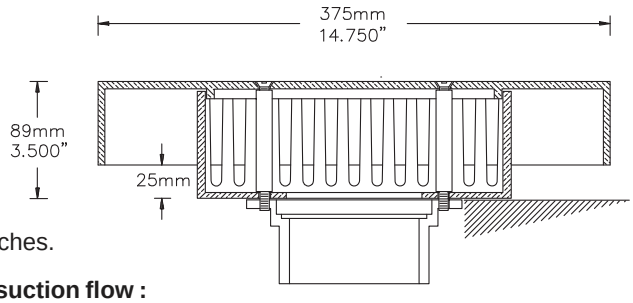
TO SPECIFY & ORDER : Base + Base Option + Fitting

PEM 6217 ANTI VORTEX SUCTION FITTING FOR SHALLOW POOLS

PEM 6217-1 # 610-3700
PEM 6217-2 # 610-3701

PEM 6217-1 Fitting is made of cast bronze, brass and stainless steel fasteners - factory fitted to choice of base. Suggested use is as pump suction and discharge fitting.
PEM 62217-2 Fitting is as above, but with formed plastic cover.

PEM 6217
(with 6103 Base)



Effective Open Area
: 265 cm2 \ 41.1 sq. inches.

Suggested maximum suction flow :
With 150mm \ 6" water over fitting = 450 l/min \ 120 GPM
With 300mm \ 12" water over fitting = 950 l/min \ 250 GPM
With 500mm \ 20" water over fitting = 1700 l/min \ 450GPM
Width of opening slots: 9.53mm \ 0.375"

TO SPECIFY & ORDER :
Base + Base Option + Fitting

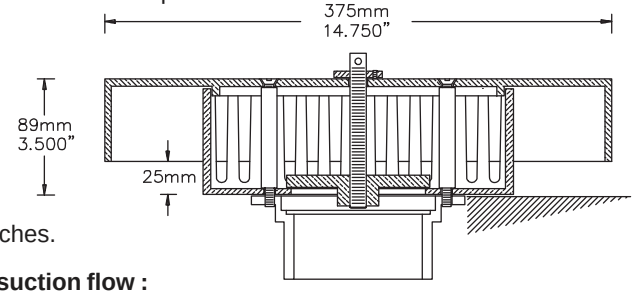
PEM 6217 Fitting is factory fitted to base:

PEM 6217V VALVED ANTI VORTEX SUCTION FITTING

PEM 6217-1V # 610-3710
PEM 6217-2V # 610-3711

PEM 6217-1 V Fitting is made of cast bronze, brass and stainless steel fasteners - factory fitted to choice of base. Suggested use is as pump suction and discharge fitting.
PEM 62217-2 V Fitting is as above, but with formed plastic cover.

PEM 6217V
(with 6201 Base)



Effective Open Area
: 265 cm2 \ 41.1 sq. inches.

Suggested maximum suction flow :
With 150mm \ 6" water over fitting = 450 l/min \ 120 GPM
With 300mm \ 12" water over fitting = 950 l/min \ 250 GPM
With 500mm \ 20" water over fitting = 1700 l/min \ 450GPM
Width of opening slots: 9.53mm \ 0.375"

The flow regulating valve has a lockable rising stem and is used to balance flow if several fittings are used on a non balanced flow manifold.

TO SPECIFY & ORDER :
Base + Base Option + /-6217V

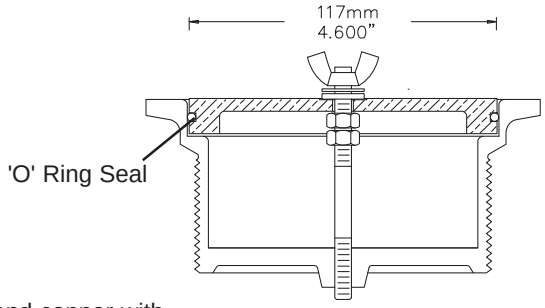
PEM 6217V Fitting is factory fitted to base.

PEM 6218 WINTER COVER FOR FITTING

#610-3800

PEM 6218

This cover is not recommended for use as drain plug.



PEM 6218 Fitting is made of cast bronze and copper with brass center rod and stainless steel fastener. Suggested use is to seal **PEM Bases** in colder climates to prevent entry of water that could cause freeze damage.

TO SPECIFY & ORDER :
Base + Base Option + Fitting

The drawings on this page show a base , which is not included in fitting option. **BASE, BASE-OPTION & FITTING TO BE ORDERED TOGETHER AS REQUIRED BUT ACCOUNTED FOR SEPARATELY.**

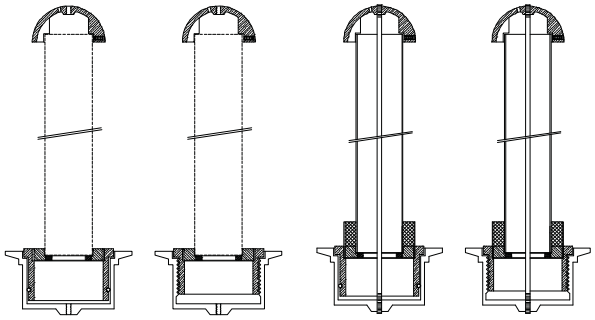
BASE, BASE-OPTION & FITTING TO BE ORDERED TOGETHER AS REQUIRED BUT ACCOUNTED FOR SEPARATELY. The drawings on this page show a base, which is not included in fitting option.

PEM 62202 SERIES

54mm / 2.125" O.D. OVERFLOW STANDPIPE

For suggested water surface of 10 m2 / 105 sq ft.
Overflow weir length = 0.16m \ 0.53 Ft

62202-X	62202-05-X	62202	62202-05
#610- 4220	#610- 4230	#610- 4200	#610- 4210

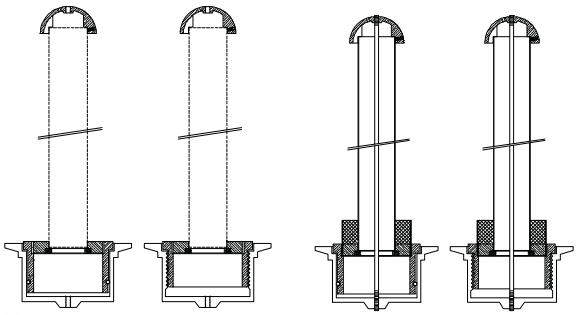


PEM 62201 SERIES

41mm / 1.625" O. D. OVERFLOW STANDPIPE

For suggested water surface of 5 m2 \ 50 sq ft.
Overflow weir length = 0.10m \ 0.40 Ft

62201-X	62201-05-X	62201	62201-05
#610- 4120	#610- 4130	#610- 4100	#610- 4110



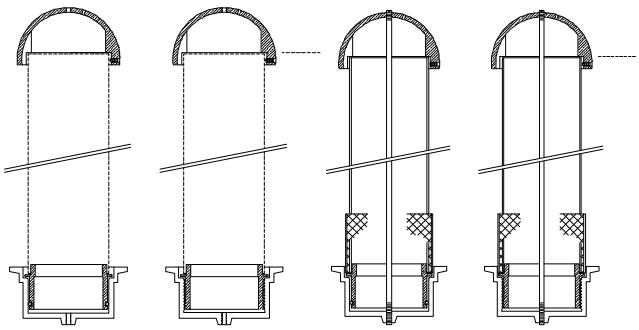
PEM 62201

PEM 62204 SERIES

105mm / 4.125" O. D. OVERFLOW STANDPIPE

For suggested water surface of 25 m2 \ 270 sq ft.
Overflow weir length = 0.32m \ 1.05 Ft

62204 X	62204-05-X	62204	62204-05
#610- 4420	#610- 4430	#610- 4400	#610- 4410

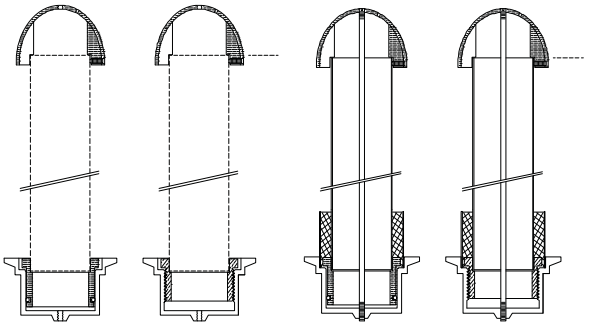


PEM 62203 SERIES

79mm / 3.125" O.D. OVERFLOW STANDPIPE

For suggested water surface of 15 m2 \ 160 sq.ft
Overflow weir length = 0.24m \ 0.79 Ft

62203-X	62203-05-X	62203	62203-05
#610- 4320	#610- 4330	#610- 4300	#610- 4310



PEM 6220 Series Overflow Stand Pipes & Drains are made of bronze, brass and/or copper and are stainless steel fitted. The domes are natural bronze, chrome plating of dome and/or stand pipe at extra cost.
For metric stainless steel stand pipes see page 621

Stand pipes 62201 & -05, 62202 & -05, 62203 & -05 also 62204 & -05 are supplied as standard for 400mm \ 16" water depth and with debris screen to fit into base. This is to keep bottom debris out of drain, when the stand pipe is lifted. For other water depths, the stand pipes can be custom made to suit at extra cost. **X-type** stand pipes and drains consist of base adapter with solder fit for copper tube plus the dome or cover. The copper tube and assembly is by supplier or contractor to suit.
For water depth's greater than 0.6m \ 2 Feet, the 05 threaded option is required to be able to remove the stand pipe. Standard stand pipes & drains have slip in joints with 'O' ring seals. Stand pipes & drains with 05 Options have threaded connections with O ring seal.
For absorption capacity use waterfall data x overflow weir length (as shown for each size) x maximum freeboard before overflowing. Where required use multiple overflows. The general purpose of the overflow stand pipe is to prevent the overflowing of the pool and when lifted to drain a pool. Base, pipe connection size can be tabulated from overflow rate x head pressure of water depth of pool. The absorption rates shown are average and might vary due to climatic conditions at the site. The overflow must be large enough to drain off the water in an emergency, should the make up water supply fail to close.

All stand pipes but the 'X' type, are made vandal resistant by bolting down the domes with center rods to the base. In addition the domes are secured with anti-theft lockscrews to prevent the unscrewing of the domes or covers.

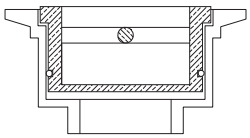
TO SPECIFY & ORDER :
Base + Base Option + Choice of Stand Pipe
(A threaded stand pipe requires a threaded Base (/-05)

PEM 6222

SLIP FIT DRAIN PLUG

 # 610-5020

PEM 6222



PEM 6222 , **Slip Fit Drain Plug** and choice of base are set flush into the pool floor. This drain plug is recommended for water depths of less than 400mm \ 16.000" at which slip in drain plugs become difficult to remove due to the water pressure.
PEM 6222 Slip Fit Drain Plug is made of brass and bronze with neoprene 'O' ring slip seal.

TO SPECIFY & ORDER: Base + Base Option + Fitting

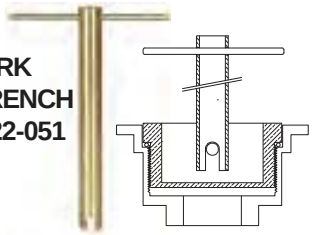
PEM 6222-05 & -051

THREADED DRAIN PLUG & Wrench

 # 610-5050

PEM 6222-05

#610-5060



FORK WRENCH 6222-051

PEM 6222 - 05, Threaded Drain Plug and choice of -05 type base are set flush into the pool floor. This threaded drain plug is a requirement for water depths greater than 400mm \ 16.000" at which slip in drain plugs become difficult to remove due to the water pressure. PEM 6222 - 05 threaded drainplug is made of brass and bronze with neoprene 'O' ring compression seal.

PEM 6222-051, Tee Handle Fork Wrench for PEM 6222-05
The optional, made of brass, fork wrench with T handle (PEM 6222 - 051) is supplied as standard with an overall height of 300mm \ 12.0", custom made handle lengths are available. (Some (curb stop valve) fork handles are also useable.

TO SPECIFY & ORDER: Base + Base Option + Fitting

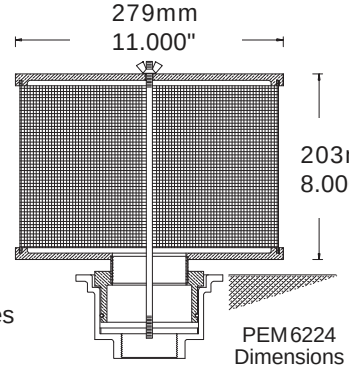
PEM 6224A

COARSE SUCTION STRAINER

#610-6100 FOR SLIP IN BASE
#610-6150 FOR -05 SCREW IN BASE

This coarse Suction Strainer is made of perforated stainless steel, cast bronze base and cover, brass and stainless steel fitted
Suction area: 1335 cm2 \ 207 square inches
Orifice size: 4.5mm \ 0.187"
Suggest maximum flow:
300 L/min \ 80 USGPM
with 500mm \ 20" of water over fitting.

TO SPECIFY & ORDER:
Base + Base Option + Fitting



PEM 6224
Dimensions

PEM 6224A
Coarse Suction Strainer

PEM 6224B

FINE SUCTION STRAINER

#610-6200 FOR SLIP IN BASE
#610-6250 FOR -05 SCREW IN BASE

This fine Suction Strainer is made of 41% open perforated stainless steel with cast bronze base and cover, brass and stainless steel fitted.
Suction area: 1335 cm2 \ 207 square inches
Orifice size: 1.5mm \ appro.. 0.0625"
Suggest maximum flow :
95 L/min \ 25 USGPM
with 500mm \ 20" of water over fitting.

TO SPECIFY & ORDER:
Base + Base Option + Fitting

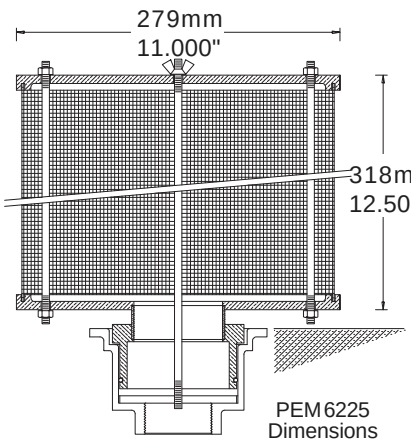
PEM 6225A

COARSE SUCTION STRAINER

#610-6300 FOR SLIP IN BASE
#610-6350 FOR -05 SCREW IN BASE

This coarse Suction Strainer is made of perforated stainless steel, cast bronze base and cover, brass and stainless steel fitted
Suction area:
2560 cm2 \ 397 square inches
Orifice size: 4.5mm \ 0.187"
Suggest maximum flow:
530 L/min \ 140 USGPM
with 500mm \ 20" of water over fitting.

TO SPECIFY & ORDER:
Base + Base Option + Fitting



PEM 6225
Dimensions

PEM 6225B

FINE SUCTION STRAINER

#610-6400 FOR SLIP IN BASE
#610-6450 FOR -05 SCREW IN BASE

This fine Suction Strainer is made of 41% open perforated stainless steel with cast bronze base and cover, brass and stainless steel fitted.

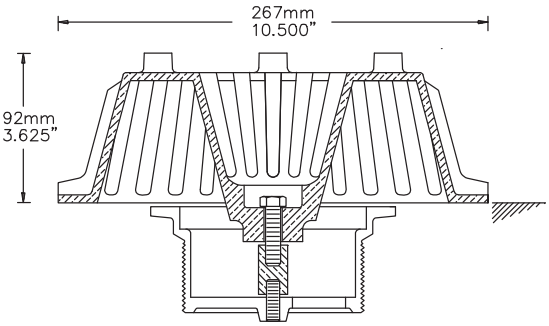
Suction area :2560 cm2 \ 397 square inches
Orifice size :1.5mm \ appro.. 0.0625"
Suggest maximum flow :
190 L/min \ 50 USGPM
with 500mm \ 20" of water over fitting.

TO SPECIFY & ORDER:
Base + Base Option + Fitting

The drawings on this page show a base , which is not included in fitting option. **BASE, BASE-OPTION & FITTING TO BE ORDERED TOGETHER AS REQUIRED BUT ACCOUNTED FOR SEPARATELY.**

BASE, BASE-OPTION & FITTING TO BE ORDERED TOGETHER AS REQUIRED BUT ACCOUNTED FOR SEPARATELY. The drawings on this page show a base, which is not included in fitting option.

CAST BRONZE SUCTION STRAINER **PEM 6284**



PEM 6284 Suction Strainer is made of cast bronze,

#610-7010

PEM 6284 is factory fitted to base :

Suggested use is as pump suction strainer or equalizing pipe fitting.
This suction fitting is subject to vortexing when used as pump suction strainer.
Factory fitted to choice of base.

Effective Open Area: 275 cm2 \ 42 sq. inches
Suggested maximum suction flow :
With 500mm \ 20" water over fitting =190 L/min \ 50 GPM
With 1000mm \ 39" water over fitting = 380 L/min \ 100 GPM

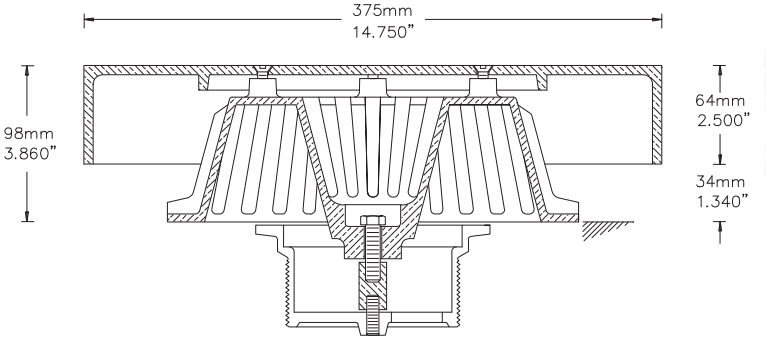
PEM 6284 with Base 6114

TO SPECIFY & ORDER :
Base + Base Option + Fitting

CAST BRONZE ANTI-VORTEX SUCTION STRAINER **PEM 6284 AV**

PEM 6284-1 AV Suction Strainer is made of cast bronze, brass and stainless steel fitted Factory fitted to choice of base. Suggested use also as discharge fitting.
PEM 6284-2 AV as above but with Formed Plastic AV Cover

PEM 6284-1 # 610-7020
PEM 6284-2 # 610-7021



PEM 6284 AV is factory fitted to base:

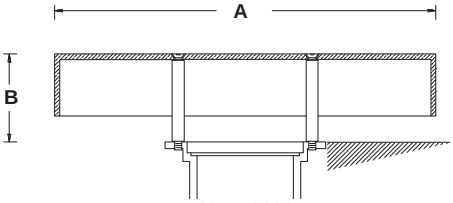
PEM 6284-1AV with Base 6114

Effective Open Area : 275 cm2 \ 42 sq. inches
Suggested maximum suction / discharge flow :
With 150mm \ 6" water over fitting : 450 l/min \ 120 GPM
With 300mm \ 12" water over fitting : 950 l/min \ 250 GPM
With 500mm \ 20" water over fitting : 1700 l/min \ 450GPM

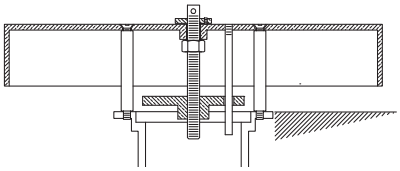
TO SPECIFY & ORDER :
Base + Base Option + Fitting

CAST BRONZE DISCHARGE / INLET FITTINGS **PEM 6290**

PEM 6290-1 # 610-7800
PEM 6290-2 # 610-7801



TYPE 6290



TYPE 6290 'V'
(WITH FLOW ADJUSTMENT)

PEM 6290-1 Fittings are made of cast bronze, brass and stainless steel fasteners - factory fitted to choice of base.
PEM 6290-2 Fittings are as above but with formed plastic cover.

PEM 6290 Discharge or Inlet Fittings with diffusing covers are designed for use as bottom water inlet without causing undue surface turbulence. For multiple installation these fittings can be supplied with flow regulators with non rising valving stems (V).

PEM 6293-1V with 6093 Base w. valve open

PEM 6293-1V with 6093 Base w. valve closed.

PEM	#	A	B	Max.FLOW
6291	610-7810	203mm\8.0"	64mm\2.5"	380L/min\100GPM
6291V	610-7820			
6293	610-7840	330mm\13.0"	89mm\3.5"	950L/min\250GPM
6293V	610-7850			
6296	610-7870	375mm\14.75"	89mm\3.5"	1700L/min\475GPM
6296V	610-7880			

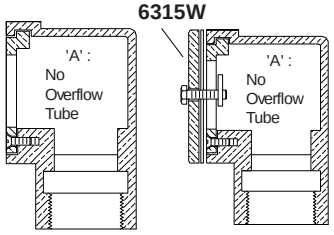
TO SPECIFY & ORDER : Base + Base Option + Fitting

PEM 6315 SERIES ADJUSTABLE WALL OVERFLOW

#611-0210 **6315,** 1 1/2" BSP/NPT
#611-0230 **6315A,** 1 1/2" BSP/NPT
#611-0240 **6315A,** 2" Copper
#611-0280 **6315-**TM Tile Mask
#611-0290 **6315-**WC Winter Cover

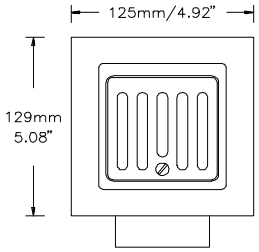
PEM 6315 Overflow is for installation into walls of pools. Overflow tube within fitting is height adjustable by 50mm\2.0". Overflow weir length is 100mm\3.94". Appr. absorption capacity:0.1m\0.33 Ft linear overflow weir, for flow see waterfall data.

PEM 6315

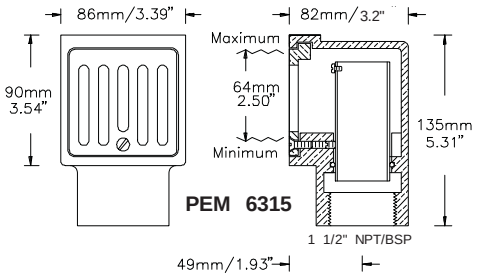


WINTER COVER 6315W

6315A **6315A**



TILE MASK 6315 TM

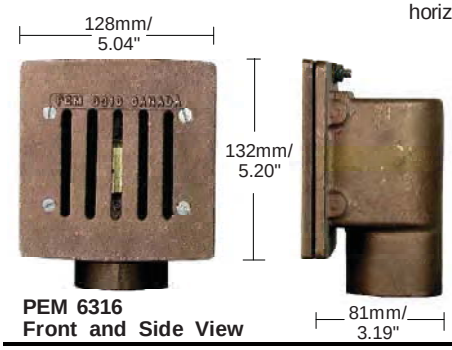


PEM 6315

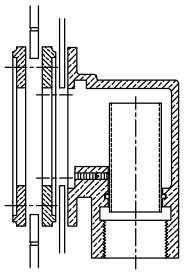
PEM 6316 SERIES ADJUSTABLE WALL OVERFLOW FOR SURFACE WATER PROOFING

#611-0410 **6316,** 1 1/2" BSP/NPT
#611-0430 **6316A,** 1 1/2" BSP/NPT
#611-0440 **6316A,** 2" Copper
#611-0480 **6316TM,** Tile Mask
#611-0490 **6316WC,** Winter Cover
#611-0510 **6316-112, 1** 1/2" BSP/NPT
#611-0520 **6316-112,** 2" Copper

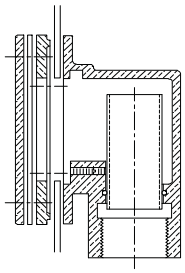
PEM 6316 Overflow is for installation into walls of pools with surface water proofing. Overflow tube within fitting is height adjustable by 50mm\2.0". Overflow weir length is 100mm/3.94". Approximate absorption capacity: 0.1m\ 0.33 Ft linear overflow weir, for flow see waterfall data. Suggested Suction flow: 40 L/min \ 10 GPM. Discharge flow: 80 L/min \ 20 GPM. **PEM 6316** is made of cast bronze, stainless steel and brass fitted. **PEM 6316-112 anti vortex suction or discharge fitting** is intended for use in small pools or troughs, where the supply must be horizontal within the concrete floor.



PEM 6316 Front and Side View

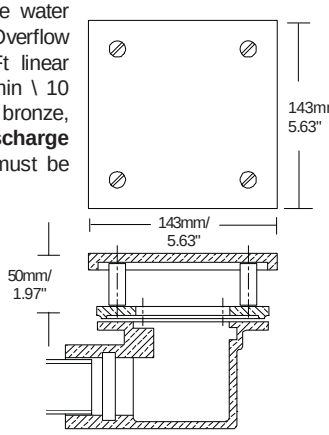


6316 TM TILE MASK



6316 WC WINTER COVER

6316-112



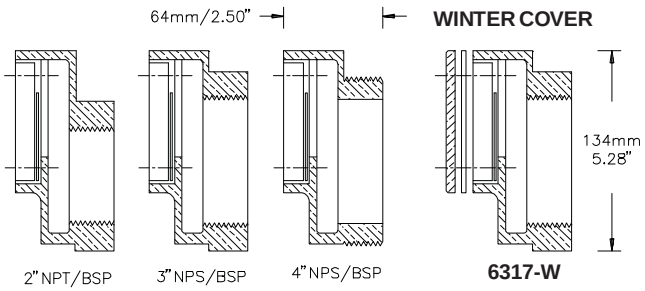
ANTI VORTEX SUCTION or DEFLECTOR DISCHARGE FITTING

PEM 6317 SERIES ADJUSTABLE WALL OVERFLOW

#611-0610 **6317**, 2" BSP/NP
#611-0620 **6317**, 3" BSP/NPT
#611-0630 **6317**, 4" BSP/NPT(Male)
#611-0680 **6317-TM,** Tile Mask
#611-0690 **6317-WC,** Winter Cover

PEM 6317 Overflow is for flush installation into walls of pools. Overflow weir within fitting is adjustable with trimming of weir plate by 50mm\2.00". Appr. absorption capacity: 0.1m\0.33 Ft linear overflow weir length. For flow rate see waterfall data. **PEM 6317** is made of cast bronze, brass, stainless steel weir plate and/or stainless steel fitted.

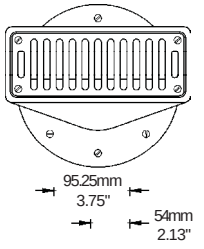
PEM 6317

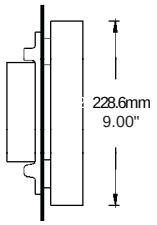


6317-W

#611-0790 **6317-65-2** w/Subsurface Membrane Clamp

#611-0770 **6317-65-1** w/Subsurface Flange



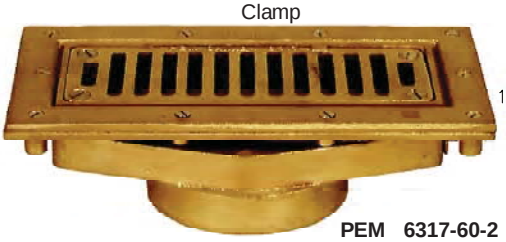


PEM 6317-65 for Sub-surface water proofing

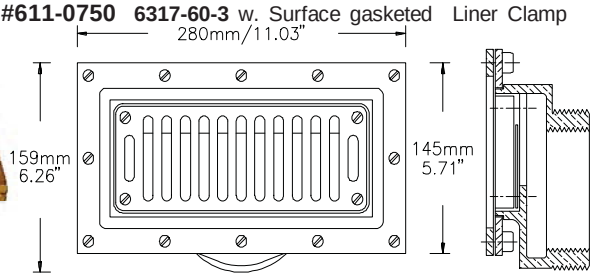
PEM 6317-60 SERIES FOR SURFACE WATER PROOFING

#611-0710 **6317-60-1** w. Surface Flange
#611-0730 **6317-60-2** w. Surface Membrane Clamp

#611-0750 **6317-60-3** w. Surface gasketed Liner Clamp



PEM 6317-60-2

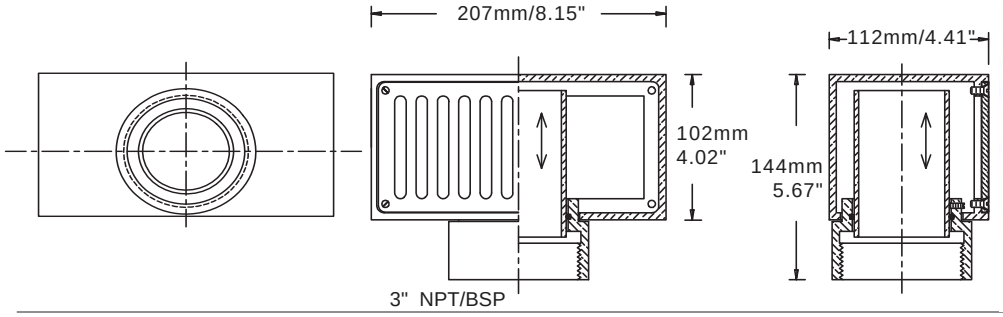


ADJUSTABLE WALL OVERFLOW 3"

PEM 6318A

#611-0801

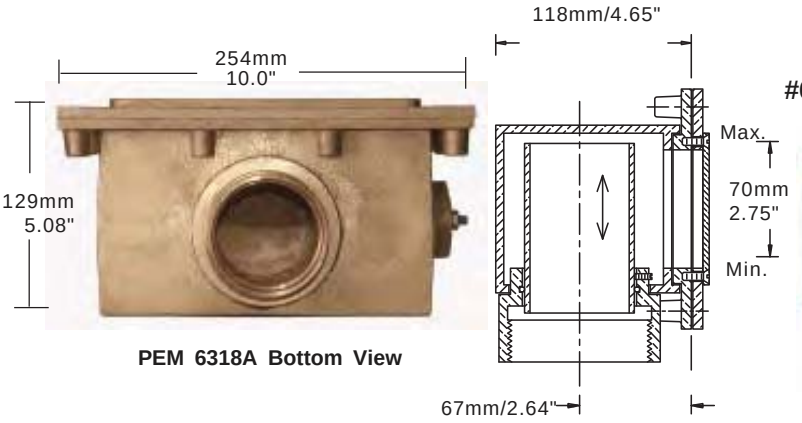
PEM 6318A Adjustable after installation overflow has a linear weir length of 202mm \ 7.97". For actual overflow capacity see Waterfall Flow Data. Total height adjustment is 7 0mm/2.76". The overflow is made of cast bronze, brass and copper, stainless steel fitted. A cast bronze grate protects the overflow tube.



PEM 6318A

PEM 6318A-60

#611-081, PEM 6318A -61, with Surface Flange
#611-082, PEM 6318A -62, with Surface Membrane Clamp



PEM 6318A Bottom View

PEM6318A
Side and Front View

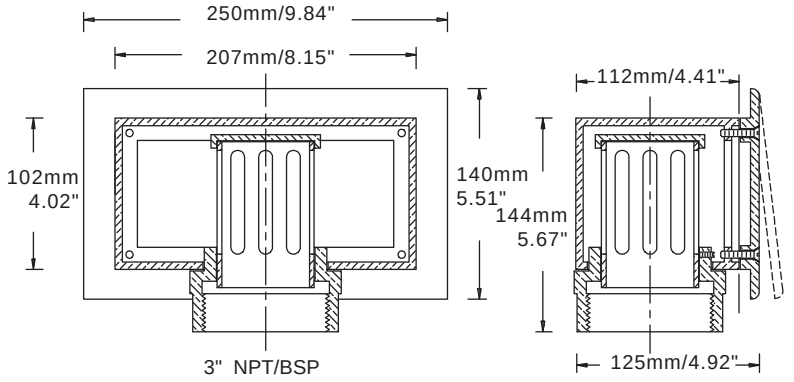
VALVED WALL SUCTION / DISCHARGE, 3"

PEM 6319

#611-0900

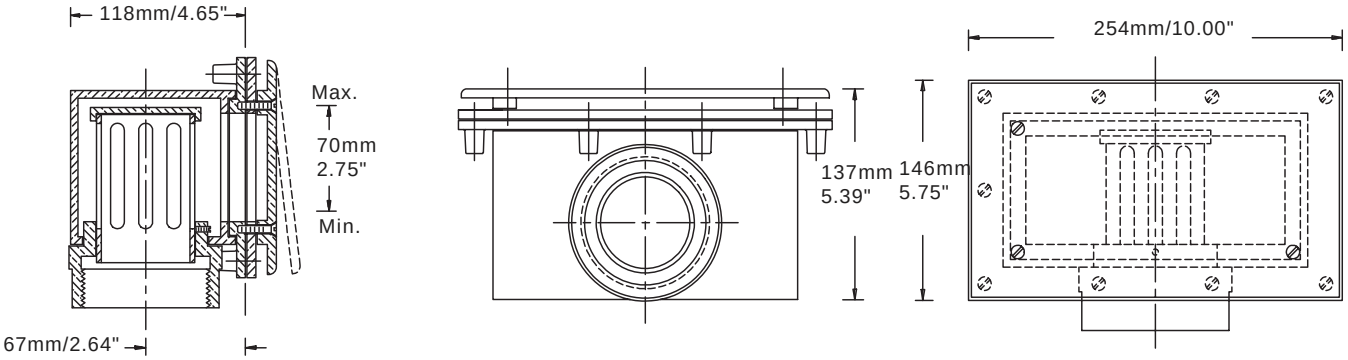
PEM 6319 is made of cast bronze, brass and copper, stainless steel fitted. The slotted suction tube with 8 x openings of 9.5mm\0.375" x max.60mm\2.37" can be screwed up or down, adjusting the flow. The solid cover normally offset by 7mm\0.280" from the fixture face, has built in adjustment for tilting to increase the bottom offset to max. 25mm, permitting a greater flow through bottom and sides of cover.

Straight cover for flows up to 200L/min\52GPM with 200mm\8.0" waterdepth over top of cover. With a 14mm/ 0.572" opening at bottom flows up to: 400 L/min\ 105 GPM with 380mm\15" water depth over top of cover. With a 25mm /1.0" opening at bottom flows up to: 600 L/min\158 GPM 500mm\20" water depth over top of cover. Friction loss with fully raised adjustment of tube is app. that of 2.4m\8feet of 3" pipe. Uncontrolled flow through the 63.5mm\2.5" I.D. flow tube can be achieved by removal of cover



#611-0910, PEM 6319 - 65, with Surface Flange
#611-0920, **PEM 6319 - 66**, with Surface Membrane Clamp

PEM 6319-60



PEM 6320 SERIES

OVERFLOW STAND
PIPE GRATE 3", 4" & 6"
PVC 75mm, 110mm & 160mm

#611-1180

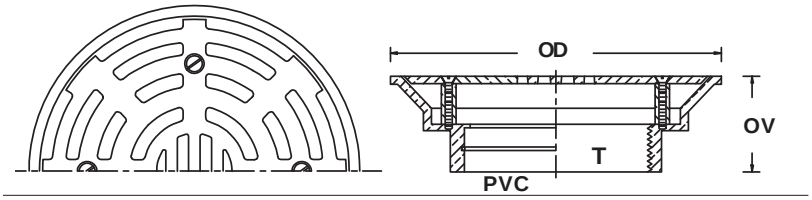
PEM 6320 Series Overflow Grates are designed for projects that incorporate a remote Reservoir Tank, to keep the waterdepth in the accessible pool to a minimum, the extra surface area permits largest possible water absorption, while not protruding above waterlevel. Vandal resistance is built into these grates. **PEM 6320 Series Overflow Grates** are made of cast bronze, brass and stainless steel fitted, with 'O'ring seal.

The '-1' Grate is screwed on to brass or stainless steel pipe, this method is preferred in public locations with heavy pedestrian access especially in the winter when exposed plastic pipe gets brittle. **The '-2 ' Grate** is installed onto DIN 19 534 PVC pipe, with an internal 'O' ring sealing the connection, set screws secure the grate.

PEM 6323-2

The total pipe manifolding to the Reservoir Tank must be sized in accordance with zero gravity pressure. The suggested flow rates are for 10mm overflow height over lip of grate. The Reservoir Tank used for storing the circulating water must be equipped with an automatic water make up device & overflow,. The pump discharge must include a flow switch to shut off the pump in case of no-flow. This is extremely important as public water displays may be subject to foam attacks by juveniles.

PEM 6326-2



#	PEM	T	PVC mm	OD mm	OV mm	Flow* L/min.	Flow* m^3/hr.
611-0831	**6323-1**	**3"**		220	64	172	10.3
611-0832	**6323-2**	**-**	75	220	64	172	10.3
611-0833	**6324-1**	**4"**		240	64	187	11.1
611-0834	**6324-2**	**-**	110	240	64	187	11.1
611-0835	**6326-1**	**6"**		290	89	227	13.6
611-0836	**6326-2**	**-**	160	290	95	227	13.6

* : 10mm Overflow height over lip of grate.

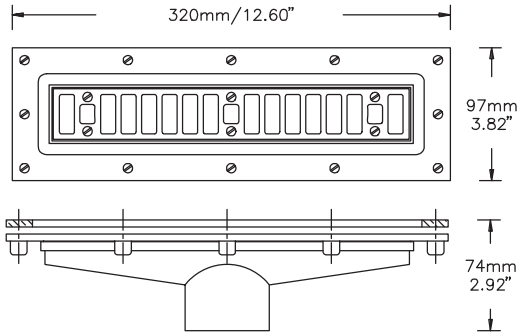
PEM 6321 ALL CAST BRONZE GUTTER DRAIN WITH GROUT FRAME, 1 1/2" NPT/ SP

PEM 6321- 61,**#611-1181,** with Surface Flange
PEM 6321- 62, **#611-1182,** with Surface Membrane Clamp

PEM 6321 is made of cast bronze, stainless steel fitted.

Open grating area: 40.3 cm2-6.25 Sq. In.

Suggest Max. Flow Rate: 45 L/min-12 USGPM with 300mm/12"head



PEM 6321-60

PEM 6338 VACUUM FITTING 1 1/2" X 1 1/2" NPT/BSP

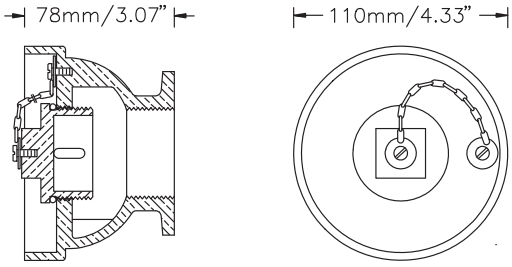
PEM 6338 & Plug

PEM 6338-62 with Plug

PEM 6338 are made of cast bronze & brass, stainless steel fitted.

For Sub Surface Liner Flange, Clamp & Tile Mask: See PEM 6345

#	PEM	DESCRIPTION
611-2100	**6338**	Standard Fitting
611-2110	**6338-61**	w. Surface Flange
611-2120	**6338-62**	w. Surface Liner Clamp
611-2150	**6338-65**	w. Subsurface Flange
611-2160	**6338-66**	w. Subsurface Liner Clamp
611-2103	**6338-TM**	Tile Mask



#	PEM	DESCRIPTION
611-2200	**6345**	Standard Fitting
611-2210	**6345-61**	w. Surface Flange
611-2220	**6345-62**	w. Surface Clamp
611-2240	**6345-65**	w. Subsurface Flange
611-2250	**6345-66**	w. Subsurface Clamp
611-2203	**6345-TM**	Tile Mask
611-2300	**6345A**	Standard Fitting
611-2310	**6345A-61**	w. Surface Flange
611-2320	**6345A-62**	w. Surface Clamp
611-2340	**6345A-65**	w. Subsurface Flange
611-2350	**6345A-66**	w. Subsurface Clamp
611-2303	**6345A-TM**	Tile Mask

ALL CAST BRONZE
1 1/2" NPT / BSP

PEM 6345 SERIES

EYE - BALL RETURN FITTING

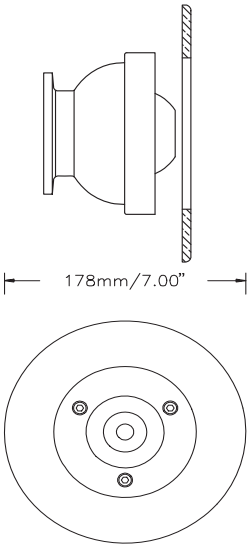
PEM 6345 is made of cast bronze. brass and stainless steel fitted. Custom bored orifice to maximum orifice size: 25mm\1.0"

Output angle is adjustable to 40° included angle.

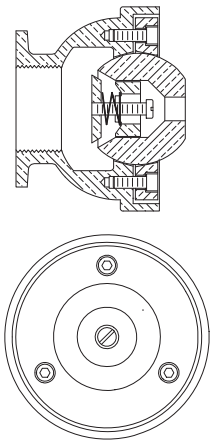
For flow rates consult PEM 800 series clearstream jets.

PEM 6345

PEM 6345 - TM
TILE MASK
To be Epoxy fitted

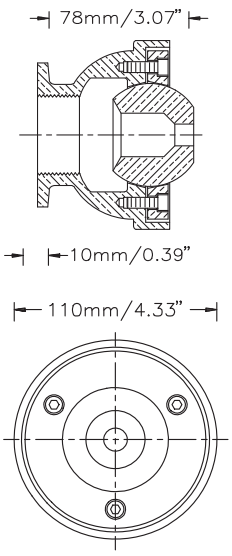


PEM 6345A
VALVED EYE BALL RETURN FITTING
Custom bored orifice to max. orifice size : 16mm-0.625"



Valve is accessible for adjustment through orifice.

PEM 6345



PEM 6345 - 62 WITH BRONZE SURFACE MEMBRANE CLAMP

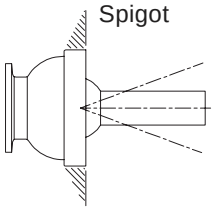
PEM 6345 - 66 WITH BRONZE SUB-SURFACE MEMBRANE CLAMP

PEM 6350 SERIES

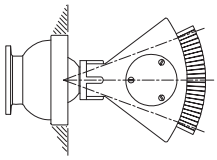
WALL MOUNTED JETS & NOZZLES

SWIVEL BASE AS SHOWN ABOVE

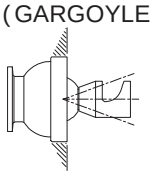
PEM 6350-847B
611-1287
Clear Stream Spigot



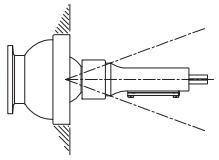
PEM 6350-31-25
611-1281
Finger Jet fan spray
Best at 45° diagonal tilt to max. 1.5m\5'

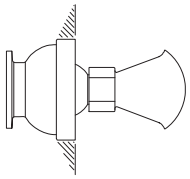


PEM 6350-83
611-1282
Fall over forward solid wide fan 30-50cm\12-20"
(GARGOYLE SPRAY)

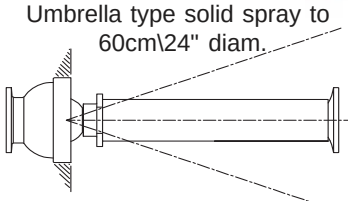


PEM 6350-02-2
611-1286
Solid fan spray to max. 30-50cm\12-20"

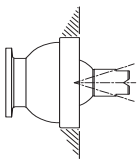




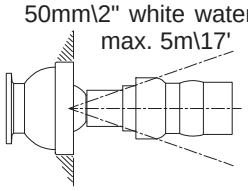
PEM 6350-18-3A
611-1288
Umbrella type solid spray to 60cm\24" diam.

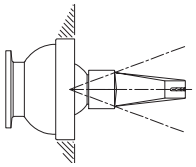


PEM 6350-94
611-1284
Narrow Fan 50cm\20"
(GARGOYLE) SPRAY

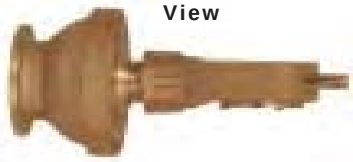


PEM 6350-14-3
611-1283
Wall mounted 50mm\2" white water jets max. 5m\17'





PEM 6350-02-2 Front and Side View



PEM 6350-31-25 Front and Side View

PEM 6380 SERIES

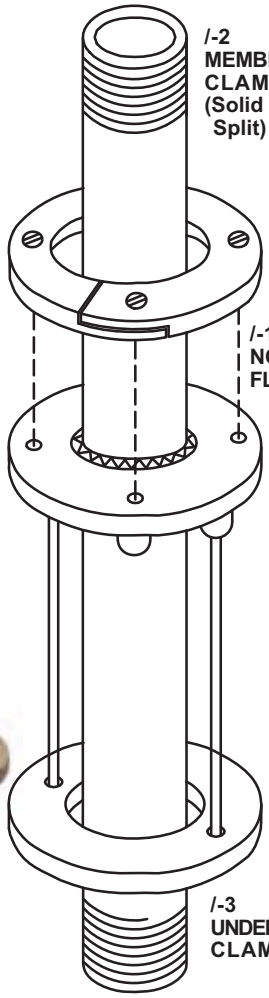
WATERPROOFING PENETRATION FITTINGS for BRASS PIPE 3/4" TO 4"

6380-A Series, STUB UPS include 355mm \ 14" length of pipe with specified fitting or combination thereof or custom made length as specified. Normally used to extend plastic pipe through concrete and into pool

Also available custom made as 6390-A Series, STUB UPS with 355mm\14" length of copper tube 'L', with specified fitting or combination thereof or custom made as specified. Normally used to extend plastic pipe through concrete and into pool. Available copper tube sizes up to 4.125"

PEM 6384A-1

PEM 6387A-1-2
with custom length pipe



NO LEAK FLANGES (BRAZE ON)(NO PIPE)

#	PEM	Pipe Size	O.D. of Flange	Thickness of Flange
611-1401	**6381/-1**	3/4"	102mm\4.00"	6mm\0.25"
611-1402	**6382/-1**	1"	134mm\5.25"	6mm\0.25"
611-1403	**6383/-1**	1 1/4"	134mm\5.25"	6mm\0.25"
611-1404	**6384/-1**	1 1/2"	152mm\6.00"	7mm\0.28"
611-1405	**6385/-1**	2"	152mm\6.00"	7mm\0.28"
611-1406	**6386/-1**	3"	203mm\8.00"	8mm\0.32"
611-1407	**6387/-1**	4"	203mm\8.00"	8mm\0.32"

FLANGES w. MEMBRANE CLAMP(NO PIPE)

#	PEM	Pipe Size	Type of clamp
611-1421	**6381/-1/-2**	3/4"	Solid
611-1422	**6382/-1/-2**	1"	Solid
611-1423	**6383/-1/-2**	1 1/4"	Solid
611-1424	**6384/-1/-2**	1 1/2"	Split
611-1425	**6385/-1/-2**	2"	Split
611-1426	**6386/-1/-2**	3"	Split
611-1427	**6387/-1/-2**	4"	Split

FLANGES w. UNDERDECK CLAMP(NO PIPE)

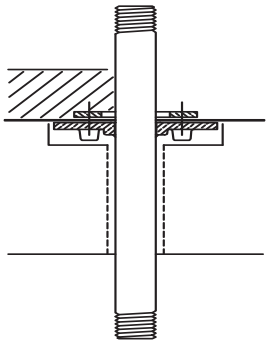
#	PEM	Pipe Size	Hole Size
611-1441	**6381/-1/-3**	3/4"	65mm\2.5"
611-1442	**6382/-1/-3**	1"	100mm\2.5"
611-1443	**6383/-1/-3**	1 1/4"	100mm\4.0"
611-1444	**6384/-1/-3**	1 1/2"	120mm\4.5"
611-1445	**6385/-1/-3**	2"	120mm\4.5"
611-1446	**6386/-1/-3**	3"	160mm\6.5"
611-1447	**6387/-1/-3**	4"	160mm\6.5"

FLANGES w. MEMBRANE CLAMP & UNDERDECK CLAMP

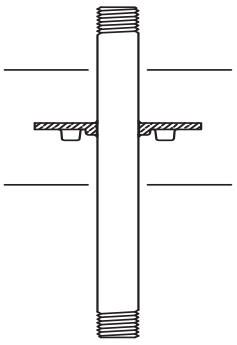
#	PEM	Pipe Size	Hole Size
611-1461	**6381/-1/-2/-3**	3/4"	65mm\2.5"
611-1462	**6382/-1/-2/-3**	1"	100mm\2/5"
611-1463	**6383/-1/-2/-3**	1 1/4"	100mm\4.0"
611-1464	**6384/-1/-2/-3**	1 1/2"	120mm\4.5"
611-1465	**6385/-1/-2/-3**	2"	120mm\4.5"
611-1466	**6386/-1/-2/-3**	3"	160mm\6.5"
611-1467	**6387/-1/-2/-3**	4"	160mm\6.5"

NOTE: Braze on brass pipe size fittings are used to provide watertight penetration of waterproofing membranes without joints within concrete. Fittings are made of cast bronze , stainless steel and brass fitted. Flanges are normally braze fit , flanges are also useable for braze on to stainless steel piping (specify exact O.D. of pipe).

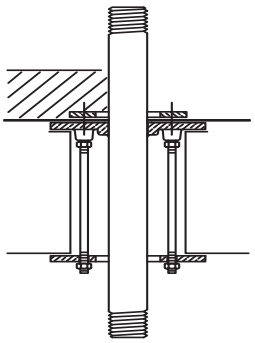
6380A/-1/-2
FLANGE w. MEMBRANE CLAMP



6380A/-1
NO LEAK FLANGE
Braze fit.

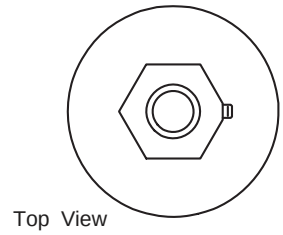


6380A/-1/-2/-3
FLANGE w. MEMBRANE CLAMP & UNDERDECK CLAMP

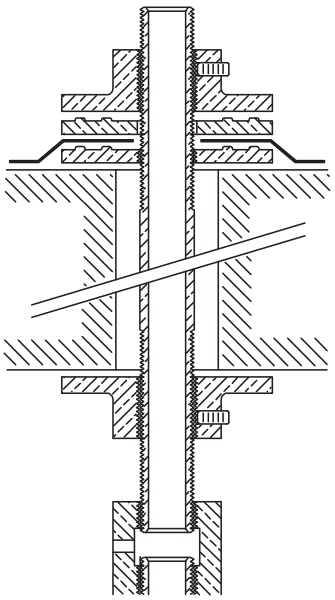


/-3 UNDER DECK CLAMP is standard for max. 200mm\8" deck, custom made for other dimensions.)

*NOTE: WHEN ORDERED WITHOUTETTER "A" NO PIPE WILL BE SUPPLIED



Top View



WATERPROOFING PIPE PENETRATIONS

PEM 6370

611-1300 SERIES

3/4" & 1" RETROFIT

RETROFIT PIPE PENETRATIONS, 3/4" & 1" NPT/BSP RED BRASS PIPE.

BRONZE FITTINGS with red brass pipe, for core drilled holes in existing concrete slabs.

PEM 6370A & B can be used as electrical conduit or water pipe penetration through water proofing membranes. Care is to be taken to use a suitable pipe thread sealant on the submerged liner side.

Overall Lengths other than shown above can be custom made to given specification. Overall outside diameter of fittings: 102mm \ 4.0".

Fittings are NPS/BSP threaded. Connections are NPT/BSP.

PEM 6372A

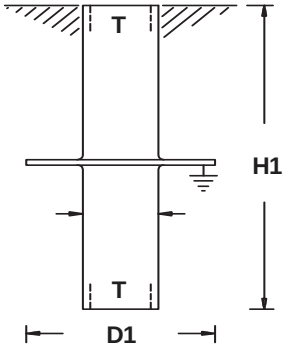
#	PEM	Pipe Size	Hole Size	Overall Length
611-1301	**6371**	3/4"	30mm\1.25"	Fittings only
611-1303	**6371A**	3/4"	30mm\1.25"	355mm\14"
611-1306	**6371B**	3/4"	30mm\1.25"	457mm\18"
611-1322	**6372**	1"	40mm\1.50"	Fittings only
611-1324	**6372A**	1"	40mm\1.50"	355mm\14"
611-1326	**6372B**	1"	40mm\1.50"	457mm\18"

ALL CAST BRONZE NO LEAK PIPE COUPLINGS FOR CONCRETE POOLS

PEM 63730

611-1330 SERIES

PEM 6373 Series No Leak Pipe Couplings are made of pressure tested cast bronze.



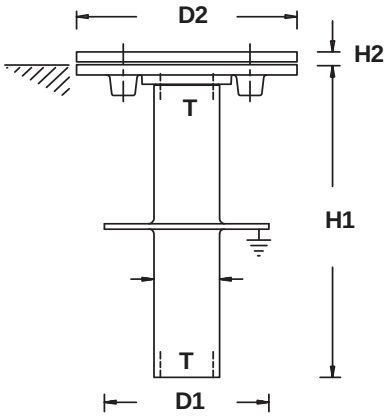
#	PEM	T	H1 mm	D1 mm
611-1331	**637311**	**1"**	200	100
611-1332	**637312**	**1 1/2"**	200	100
611-1333	**637313**	**2"**	200	150
611-1334	**637314**	**2 1/2"**	200	150
611-1335	**637315**	**3"**	200	200
611-1336	**637316**	**4"**	200	200

ALL CAST BRONZE NO LEAK PIPE COUPLINGS FOR LINER POOLS

PEM 63740

611-1340 SERIES

PEM 6374 series No Leak Pipe Couplings with liner clamp are made of pressure tested cast bronze, stainless steel fitted, with Neoprene Gasket



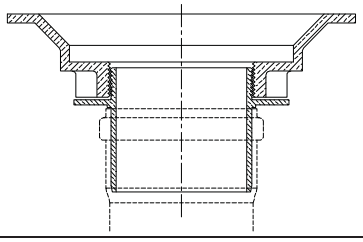
#	PEM	T	H1 mm	H2 mm	D1 mm	D2 mm
611-1341	**637421**	**1"**	200	6	100	134
611-1342	**637422**	**1 1/2"**	200	10	100	152
611-1343	**637423**	**2"**	200	10	150	152
611-1344	**637424**	**2 1/2"**	200	10	150	203
611-1345	**637425**	**3"**	200	10	200	203
611-1346	**637426**	**4"**	200	10	200	203

PEM 64037 SERIES

CAST BRONZE ADAPTERS
BSP / NPT PIPE <> PVC SLIP JOINT

(DIN 19 534 PVC PIPE WITH DIN 4060 LIP SEALS)

#	PEM	PIPE	PVC
643-0371	**641371**	1 1/2"	40mm
643-0372	**641372**	2"	50mm
643-0373	**641373**	3"	75mm
643-0374	**641374**	4"	110mm
643-0376	**641376**	6"	160mm

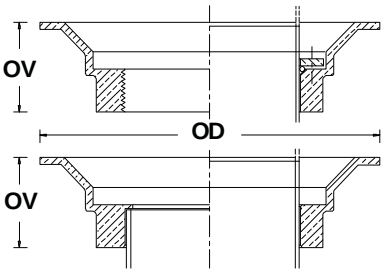


PEM 6440 SERIES

BASES CAST BRONZE WATER PROOFING MEMBRANE
PIPE PENETRATION BASES, 1 1/2" TO 8"

PEM 6440 / A-1

FOR USE IN CONCRETE OR CORED HOLE APPLICATIONS



PEM 6400 BASES are made of cast bronze and stainless steel fitted. 'O' ring seals are of Neoprene, as standard. If Ozone water purification is contemplated, please specify so and Viton, ozone resistant seals will be supplied at slight additional cost. For nonsealing applications, PEM 6400 A-1 Bases are ideal for mounting of major suction or discharge fittings in concrete pools, or concrete bases in lakes or ponds, as the pipe with connected fitting base terminates within the concrete protecting the pipe and is bolted to the base without interfering with the piping. This mounting also permits removal of fitting for servicing. This connection also provides an acceptable mounting as for example for a large size bronze suction strainer mounted with an 90° elbow upon a flexible plastic pipe.

PEM PIPE SIZE	**6441** 1 1/2"	**6442** 2"	**6443** 3"	**6444** 4"	**6446** 6"	**6448** 8"
STANDARD TYPE (Schedule pipe)	**64410**	**64420**	**64430**	**64440**	**64460**	**64480**
TYPE 'A-1' (Schedule pipe)	**64411**	**64421**	**64431**	**64441**	**64461**	**64481**
TYPE 'A-2' (Copper tube)	**64412**	**64422**	**64432**	**64442**	**64462**	**64482**
TYPE 'A-3' (Copper tube)	**64413**	**64423**	**64433**	**64443**	**64463**	**64483**
OVERALL HEIGHT (**OV**)	64mm 2.52"	64mm 2.52"	64mm 2.52"	64mm 2.52"	89mm 3.50"	95mm 3.740"
OVERALL DIAMETER (**OD**)	216mm 8.50"	216mm 8.50"	267mm 10.51"	267mm 10.51"	318mm 12.52"	380mm 14.960

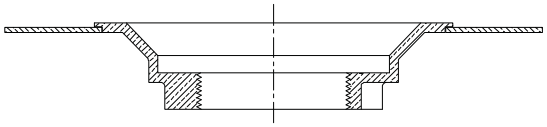
* Always specify exact outside diameter of clean, smooth pipe / tube for which the above bases are required. All sizes must be within the normal size range of above pipe / tube sizes. Also specify if 'A2 ' & ' A3 ' bases are to be brazed, soldered or silver soldered. This assures the proper clearances and acceptance chamfers.

NOTE: All fixture bases require straight pipe alignment at 90° right angle (to face of fitting) through the fitting base to permit it to seal. The pipe /tube must be centered throughout the full length of the clearance bore of the fitting base. Pipe or tube not at an 90° right angle passing through or into the fixture base are difficult to seal. For rigid plastic pipe or tube use type 6440, Standard bases, specify the exact outside diameter with order. Usually rigid plastic pipe does not remain round in storage and great care is to be taken to pass the pipe through the fitting base and not to use surface damaged pipe or tubes.

PEM 6440- 4 SERIES

PEM 6440- 4 PUDDLE FLANGE, addition to 6440 Series Bases is designed for liquid or mastic waterproofing to adhere to.

PUDDLE FLANGE
All Sizes



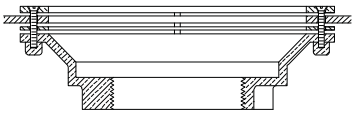
DIMENSIONS:

PEM	**6441**	**6442**	**6443**	**6444**	**6446**	**6448**
O.D.	416mm 16.375"	416mm 16.375"	441mm 17.360"	467mm 18.390"	518mm 20.390"	580mm 22.83"

To specify & order: Base +/- 4

PEM 6440- 6

LINER CLAMP
All Sizes



PEM 6440-06 LINER CLAMP addition to 6440 Series Base is designed to use with rigid fibreglass or metal pools or tank floors. It is also suitable for flexible waterproofing membranes. PEM 6440-06 Liner Clamps are made of cast bronze, stainless steel fitted with neoprene gasket. (**To specify & order: Base +/- 6)**

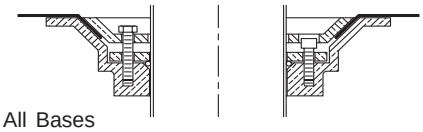
The drawings on this page show a base , which is not included in fitting option. **BASE, BASE-OPTION & FITTING TO BE ORDERED TOGETHER AS REQUIRED BUT ACCOUNTED FOR SEPARATELY.**

MEMBRANE CLAMP

PEM 6440- 05

PEM 6440 - 05 Membrane Clamp is designed to seal pipe penetrations unobstructed to the surface of the waterproofing membrane. **PEM 6440 - 05** is made of cast bronze and is stainless steel fitted. The membrane clamp fits into the fitting base. When used without additional fittings as in subsurface membrane sealing, the surface depression around the pipe is normally filled with suitable caulking.

To specify & order = Base + 05



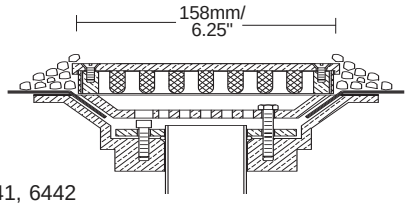
All Bases

MEMBRANE DRAIN

PEM 6440- 31

PEM 6440-31 MEMBRANE DRAIN is designed to collect and drain safely any seepage accumulated on the upper surface of a waterproofing membrane under a concrete slab, pavement and planter areas where a hydrostatic buildup must be avoided. The triple screening (2 x bronze screen and 1 x brass screen) plus all noncorrosive construction of cast bronze with stainless steel fasteners ensures safe installation and long service life. The drain fitting to be enclosed and covered with a layer of clean, round stones, drypacked no-fines concrete and or glass insulation.

To specify & order = Base + 0031



Base 6441, 6442

PEM 6440-36 DOUBLE WATERPROOFING MEMBRANE ASSEMBLY w/ PEM 6440- 32* MEMBRANE CLAMP & INSPECTION PLUG.

PEM 6440- 32

INSPECTION COVER

PEM 6440- 36

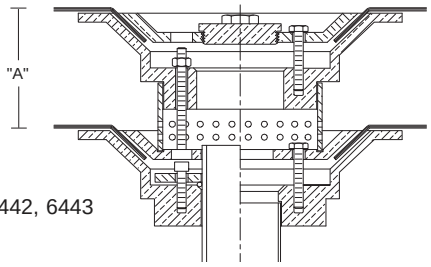
DOUBLE MEMBRANE DRAIN ASSEMBLY

PEM 6440-32 Membrane Clamp with inspection cover is designed for visual control of membrane lined insulation as found under ice rinks etc. and must be installed accessible for inspection. Normally installed into service areas adjacent to ice rink concrete slabs, concrete roofs or decks. **PEM 6440-36 Double Waterproofing Assembly** is designed to collect and drain seepage from either the insulated layer under a concrete slab only or from both membrane surfaces by using PEM 6440-31 Membrane Drain.

PEM 6440-36 Drain Assembly is made of cast bronze, copper tube with 1/8"- 3mm weep-holes, (Minimum height between membranes: 2 1/2 "-64mm) stainless steel fasteners and brass bolts. Standard unit include height between membranes up to 4" -100mm. For additional height add to price; 10% per each additional 1"-25mm.

"A"=This distance must be specified, otherwise the unit will be shipped for 4"-100mm height between membranes.

* 6440-32 is also separately available.



Base 644,16442, 6443

To specify & order = Base +Clamp + -36
Without waterproofing membrane, leave out Clamp(s) (-05)

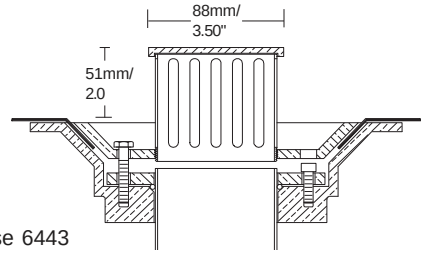
AREA DRAIN WITH DOME

PEM 6443- 33

PEM 6443-33 AREA DRAIN WITH DOME is designed for inaccessible areas above a waterproofing membrane that could require a quick drainoff of a large volume of water such as in service areas adjacent to ice rinks or in mechanical troughs etc. **PEM 6440- 33** is specially suited as pump suction strainer in liner pools or tanks, where all non- corrosive construction (brass, bronze and stainless steel) assures long service life.

PEM 6440-33 also finds application as roof drain in areas with high air pollution that would not permit the use of aluminium or cast iron fittings. The use of base addition -02 or -06 and the direct connection to plastic pipe, is recommended.

To specify & order = Fitting Base +Clamp + -33
Without waterproofing membrane, leave out Clamp(-05)



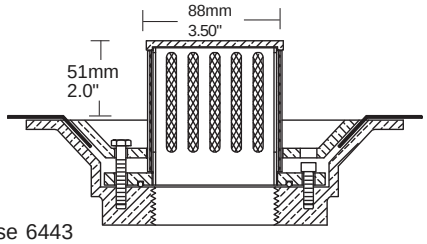
Base 6443

PLANTER DRAIN

PEM 6443- 34

PEM-6443-34 PLANTER DRAIN is designed for use in membrane lined planters. The planter drain is constructed of bronze, brass and stainless steel with a fine mesh polyplastic double layer screen. A layer of suitable clean gravel, broken pottery and/or glass fibre cloth over the drain will aid in the collection and draining off of any excess ground moisture. For planters and plain gravel beds without waterproofing membranes the planter drain will provide a service life in excess of the life expectancy of the structure if properly installed.

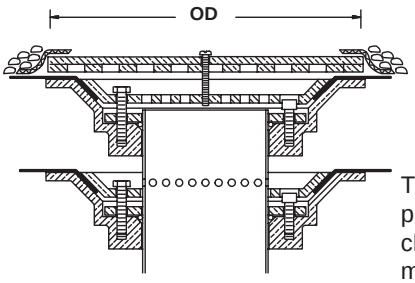
To specify & order = Fitting Base +Clamp +0034
Without waterproofing membrane, leave out Clamp (-05)



Base 6443

PEM 6440-37

SURFACE & SUBSURFACE DOUBLE LINER DRAIN



Base 64430, 64440

PEM 6440-37 Waterproofing Liner Clamp with Drain Cover is for insulated concrete, subject to temperature extremes not transmitted to other parts of the structure such as ice rink surfaces etc. The drain cover is designed to shear off the holding bolt and move with possible lateral movement of the concrete slab without causing strain to pipe or fitting. The drain cover to be overlaid with glass fibre cloth and clean aggregate to collect and drain off any seepage that could cause hydrostatic buildup under or within the concrete slab.

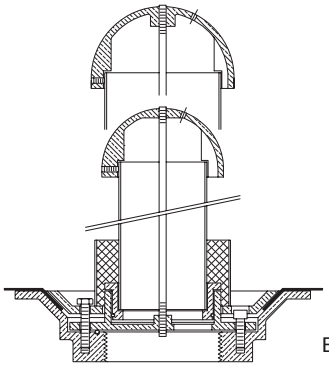
The illustration shows a typical double membrane installation as found under ice rinks. The pipe or tube is passed through the lower PEM base fixture 64430 or 64440 with 05 membrane clamp. Weepholes (1/4"-6mm) are drilled into the tube within the confinement of the membrane clamp at an angle of app. 45 degrees to collect and drain off any seepage between the membranes.

PEM	OD	OV
64430-0037	267mm / 10.500	13mm / 0.5"
64440-0037	267mm / 10.500	13mm / 0.5"

To specify & order = Base 64430 or 64440 + 05 + 0037
Without waterproofing membrane, leave out Clamp (-05)

PEM 6444-39

OVERFLOW STAND PIPE & DRAIN FOR SURFACE LINER POOLS.



Base, 64440

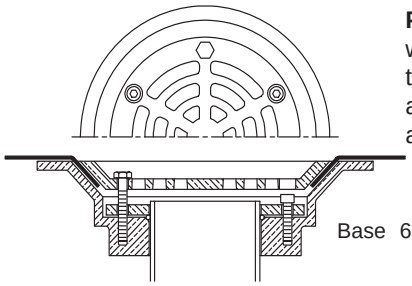
PEM 6440-39 fixture adapter to serve as drain and slip fit base for **PEM 6220 or 6221 Overflow Standpipes** in liner pools or tanks. The liner clamp is part of the base fixture. This base fixture cannot be supplied with compression fit connection. Only pipe thread or copper tube solder fits are available. The fixture is made of cast bronze with neoprene 'O' ring and stainless steel fastener and is for use with **fixture base PEM 64440(A-1).** It is recommended to install this type of pool fitting within reach from outside of the water to prevent damage to the liner.

.

To specify & order =
(Fitting with Overflow stand pipe, for water depth needed, stated in feet or mm.)
Base 64440 + 05 + 0039 + 6221, 4"
(or 62203,3" or 62202,2" or 62201, 1 1/2" Standpipe)
Without waterproofing membrane, leave out Clamp (-05)

PEM 6440-41

SURFACE LINER DRAINS.



Base 64430, 64440

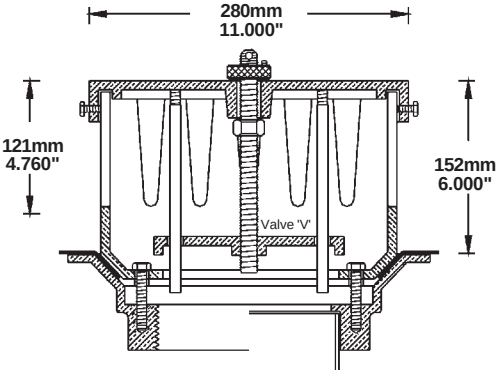
PEM 6440-41 Waterproofing Liner Surface Drain is suitable for bases PEM 64430 and PEM 64440. This drain clamp is designed for use in pools with liners or open to atmosphere waterproofing as found on roofs, in tanks etc. When overlaid with glass fibre cloth or matting, this drain clamp can be used under stone and gravel layers to carry off seepage in planting areas, under asphalt pavement, dry laid stone pavements on sand bed and many other applications. Outside dimensions are those of base fixtures.

PEM	Fitting Dia.	Free Area
64430-41	178mm / 7.0"	46cm^2 / 7 Sq."
64440-41	216mm / 8.50"	76cm^2 / 12 Sq."

To specify & order: Base 64430 or 64440 + 0041

PEM 6446-42

DIFFUSED DISCHARGE FOR SURFACE LINER POOLS



Fitting with Valve is shown Base 64460

PEM 6446-42 HEAVY DUTY DISCHARGE FITTING is designed for larger volume flows with minimum friction loss and flow interference. The optional built in valve can be adjusted from above the fitting to suit flow requirements and/or to balance multiple fittings installation. The openings are so arranged as to be able to cast the fitting into the finishing concrete above a waterproofing membrane, sealing the same. The fitting is made of heavy cast bronze and is stainless steel fitted.
PEM 6446 - 42 is for fixture base PEM 64460, 6" size.

MAXIMUM SUGGESTED FLOW THROUGH FIXTURE =
Appr. 2300 LPM-600 USGPM

To specify & order =
Fitting - **Base 64460 + 0042**
Fitting with Valve **- Base 64460 + 0042V**

PEM Discharge Fittings 6446-42V with valve is optional and extra.

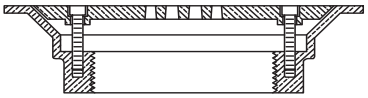
The drawings on this page show a base , which is not included in fitting option. **BASE, BASE-OPTION & FITTING TO BE ORDERED TOGETHER AS REQUIRED BUT ACCOUNTED FOR SEPARATELY.**

HEAVY DUTY FLOOR DRAIN

PEM 6440- 44 SERIES

PEM 6440-44 FLOOR DRAIN is designed for installation into concrete to serve as collector and drainoff for large size pools, travelled on areas and other applications. For example ornamental surface areas that require a nonstaining metal fitting. For areas with high heavy vehicular traffic the fitting can be supplied cast in nickel bronze or aluminium bronze at extra cost. The standard fitting is made of cast bronze 85/ 5/5/5 with stainless steel fastener. The fitting is not supplied for membrane clamping purposes and is most suitable for direct to threaded plastic pipe connection.

PEM	Fitting Dia.	Free Area
6443-44	195mm / 7.680"	65cm² / 10 Sq."
6444-44	222mm / 8.750"	84cm² / 13 Sq."
6446-44	275mm / 10.826"	167cm² / 26 Sq."



PEM 6443-44

Base 6443, 6444, 6446

To specify & order: Fitting **Base + - 44**

PUMP SUCTION STRAINERS FOR SURFACE & SUBSURFACE LINERS

PEM 6440- 48 SERIES

PEM 6440- 48 series **SUCTION STRAINERS** are designed for liner pools or pools lined with waterproofing membrane to serve as dry pump suction terminal fitting. In order to reduce flow velocity through the suction screen, the suction screen areas are between 7 and 9 times greater than the pipe size areas of the pipes they connect to. The reduced flow velocity will greatly reduce plugging up of screen and provide better service life. PEM 6440-48 series Suction Strainer Fittings are made entirely of cast bronze with brass and stainless steel fasteners.

The use of **PEM 6440- 48 SUCTION STRAINERS** eliminate the need for costly inline strainers. In selecting a suction strainer, select it for the flow required, never-ever by the pipe connection of the pump. If one strainer is insufficient, use more than one.

PEM 6440- 48 SUCTION STRAINERS are ideal for suction pads in lakes and ponds, having the base inserted into the concrete and the strainers bolted to it later. For very shallow water application see other PEM suction fittings such as PEM 6217.

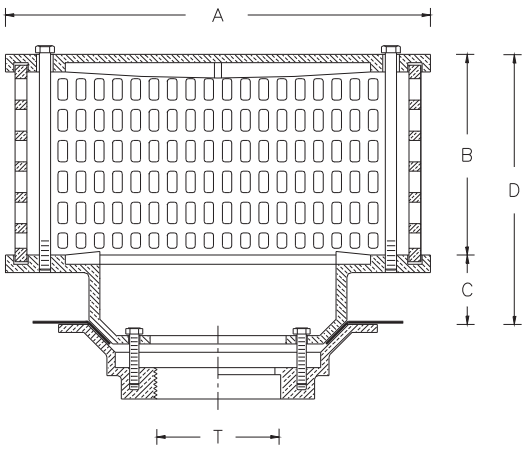
To specify & order: Base + - 48

Base, 6442, 6443, 6444, 6446, 6448

T =Pipe Size
A = Outside square dimension.
B = Height of screen & cover.
C = Floor finish above subsurface liner
D = B & C combined.
W = Minimum water over cover.

DIMENSIONS & PERFORMANCES

PEM	T	A	B	C	D	W	Free Area	Suggest/Flow
6442	2"	203mm 8.000"	95mm 3.750"	51mm 2.000"	146mm 5.750"	356mm 14.000"	186cm² 30 sq."	310 l/m 80 GPM
6443	3"	356mm 14.000"	127mm 5.000"	54mm 2.125"	181mm 7.125"	406mm 16.000"	426cm² 68 sq."	570 l/m 150 GPM
6444	4"	356mm 14.000"	184mm 7.250"	57mm 2.250"	241mm 9.500"	610mm 24.000"	656cm² 105 sq."	950 l/m 250 GPM
6446	6"	451mm 17.750"	292mm 11.500"	60mm 2.375"	352mm 13.875"	762mm 30.000"	1452cm² 229 sq."	1700 l/m 450 GPM
6448	8"	451mm 17.750"	470mm 18.500"	64mm 2.500"	534mm 21.o23"	915mm 36.000"	2500cm² 393 sq."	5000 l/m 1300 GPM



Size of screen opening : 8mm x 18mm (0.3" x.75") max.

For applications requiring direct threaded pipe connections see PEM 7160 series SUCTION STRAINERS.

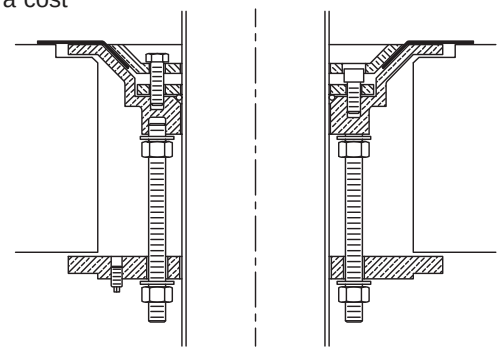
UNDERFLOOR CLAMPS

PEM 6440- 55 SERIES

PEM 6440-55 series **UNDERFLOOR CLAMPS** for PEM 6440 series FIXTURE BASES are for effectively sealed penetrations through existing concrete slabs provided with bored, cored or cast in openings to given specification. **PEM 6440-55 series UNDERFLOOR CLAMPS** are supplied as standard for concrete slab thickness up to 200mm-8" and at slight extra cost for heavier concrete slabs to given specification .

PEM 6440-55 series **UNDERFLOOR CLAMPS** consist of heavy cast bronze anchor plates machined to close pipe or tube opening tolerance, threaded brass bolts, stainless steel nuts and washers. The threaded clamping bolts insert into blind threaded opening in the bottom of the fixture base and extend through the anchor plate to draw both together, clamping the fixture securely to the concrete. The anchor plate is equipped with a 1/4" NPT access (plugged) opening to pump caulking or grout into the cavity around the pipe or tube within the concrete slab, filling it completely.

Base 6441, 6442, 6443, 6444, 6446, 6448



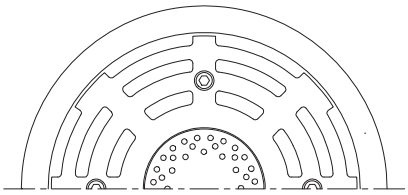
To specify & order:
Fitting with Under floor Clamp: **Base +05 + -55 + Thickness of concrete slab**
Without waterproofing membrane, leave out Clamp(-05).

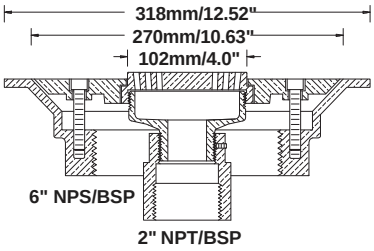
PEM 6446- 68

SPRAY & DRAIN COMBINATION

Base 6446

PEM 6446-68A with 6446 Base



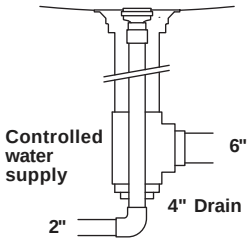


To specify & order:
Base 6446 (A-1) - 68 + A , B or C

PEM 6446(A-1) - 68 SPRAY & DRAIN COMBINATION is designed as a heavy duty, vandal resistant spray and drain unit for flush installation into concave spray aprons in public areas such as school yards etc. The sprays are usually manual operated with city water going to waste, or if need be with a recirculation pump system, underground tank with public swimming pool filtration & sanitation. Spray aprons edging must be above surrounding ground level to prevent surface washings.

The **spray & drain combination** is installed into the center of a spray apron.The riser pipe under the fixture is 6", terminating below frost level into a tee fitting , with a 3" or 4" drain connection into the side outlet of the 6" tee and a 2" through pipe connection coming up through the bottom of the tee. Connections are made with reducer bushings. For the 2" pipe, use 2" copper tube, ream out the stop within the 2" male pipe x copper adapter to permit the tube to pass through, then solder the joint. The internal height adjustment of the sprayhead permits tight fit into the fitting grate. It is advisable to pre-assemble the complete pipe & fixture combination prior to installation and connection to services. Nozzle orifices are as standard bored with the following outside drop pattern : **'A'** Single nozzle ring (12) is at 6° off center. **'B'** dual nozzle rings (24) are at 6° & 4° off center. **'C'** triple nozzle rings (48) at 6°, 4° & 2° off center line. Other spray angles are custom made to order, maximum spray angle is 10° off center line. Standard orifices are 24 x 4.8mm/0.187", other orifices as listed below or as per PEM 800 Series orifice performances.

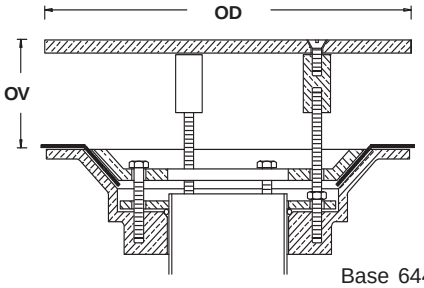
SUGGESTED INSTALLATION



PERFORMANCES:			FL	FL	FL
Spray Height	Spray Diam.	Nozzle Press.	Orifices A : 12 x	Orifices B : 24 x	Orifices C : 48 x
V	H	MC	6.0mm (0.250"	4.8mm (0.187"	48x3.2mm (0.125")
2.0m	2.6m	2.4m	192 L/min	228 L/min	154 L/min
3.0m	3.5m	3.5m	228 L/min	262 L/min	192 L/min
4.0m	4.5m	4.6m	264 L/min	292 L/min	----------
5Ft	7Ft	10Ft	43.2 GPM	52.8 GPM	33.6 GPM
10Ft	13Ft	20Ft	60.0 GPM	69.6 GPM	52.8 GPM
15Ft	19Ft	30Ft	72.0 GPM	79.2 GPM	----------

PEM 6440- 71 SERIES

LIGHT DUTY SUCTION OR DISCHARGE FITTING



Base 6442, 6443, 6444

PEM 6440-71, LIGHT DUTY SUCTION or **DISCHARGE FITTING** is made of cast bronze, brass and stainless fitted. Composition of fitting illustrated: PEM 6440 (Standard compression type base) with 6440-05 membrane clamp and 6440-71 cover assembly. Threaded or soldered connection of base also suitable, but not height adjustable.

To specify & order: Base + 05 + 0071
Without waterproofing membrane, leave out Clamp (-05)

PEM	T	OD	OV*	FL**	
6442-71	2"	216mm / 8.500"	50mm / 1.970"	155 L/min	40 GPM
6443-71	3"	267mm / 10.500	50mm / 1.970"	340 L/min	90 GPM
6444-71	4"	267mm / 10.500"	50mm / 1.970"	490 L/min	130 GPM

* : Standard Dimensions, other dimensions as specified.
**: Suggested max. flow

PEM 6440- 72 SERIES

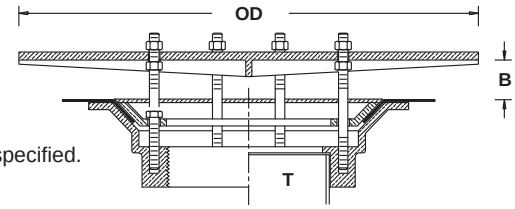
HEAVY DUTY ANTI - VORTEX SUCTION OR DISCHARGE FITTING

Base 6442, 6443, 6444, 6446, 6448

PEM 6448-72
With 6448 Base

PEM 6440-72, SUCTION or **DISCHARGE FITTING** is made of cast bronze, brass, stainless fitted. The standard compression type base permits installation on all standard O.D. schedule size pipes and permits limited vertical height adjustment to match the pool floor elevation.

When using PVC pipe, the pipe riser is to be anchored to the concrete slab (by painting the pipe with PVC cement and spreading dry sand upon it) to prevent slipping out of the fitting when pressurized.)



* Standard Dimensions, other dimensions as specified.
Add appr. 25mm/1.0" for overall height (OV)
**Suggested maximum flow.

PEM	T	OD	B*	FL**	
6442-72	2"	203mm/ 8.00"	50mm/1.97"	310 L/min	80 GPM
6443-72	3"	356mm/14.00"	50mm/1.97"	680 L/min	180 GPM
6444-72	4"	356mm/14.00"	75mm/2.96"	950 L/min	250 GPM
6446-72	6"	451mm/17.75"	100mm/3.94"	1290 L/min	340 GPM
6448-72	8"	451mm/17.75"	100mm/3.94"	2650 L/min	700 GPM

To specify & order:
Fitting with Cover = **Base + 05 + -72**
Fitting with Cover & Valve **= Base + 05 + -721**
Without waterproofing membrane, leave out Clamp (-05)

The drawings on this page show a base , which is not included in fitting option. **BASE, CLAMP & OPTION TO BE ORDERED TOGETHER AS REQUIRED BUT ACCOUNTED FOR SEPARATELY.**

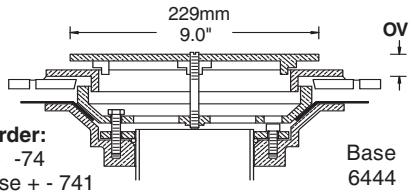
BASE, CLAMP & OPTION TO BE ORDERED TOGETHER AS REQUIRED BUT ACCOUNTED FOR SEPARATELY. The drawings on this page show a base , which is not included in fitting option.

PEM 6440- 74 SERIES FLOOR SUCTION or DISCHARGE FITTING

PEM 6444-74 SUCTION or **DISCHARGE FITTING** is designed for mosaic tiled shallow pools that have a subsurface membrane waterproofing protection. Also to move a maximum flow of water at minimum of turbulence through a floor hugging fitting. The mortar and tile setting height may vary between 20mm/0.75" & 50mm/2.0" should be specified as the hold down rod of the cover is for the given maximum height. This fitting can also be supplied with an additional mosaic tile pan of 300 x 300x10mm (12" x 12" x 0.375") square dimensions. This to hide the fitting completely. Specify **6444-741** Dimension 'OV' increases to 30mm (1.190") Chrome plating of the visible parts is suggested at slight extra cost if light colored tiling is used in the pool, for dark tiles do not chrome plate.

PEM	T	OD	OV	FL**	
6444-74	4"	267mm / 10.500"	19mm / 0.750"	235 L/min	60 GPM

**: Suggested maximum suction flow with 150mm/6.000" water depth over fitting



To specify & order:
Fitting: Base + -74
With tile pan: Base + - 741

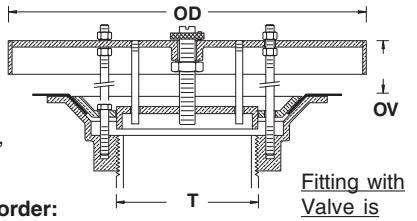
PEM 6440- 75 SERIES ANTI VORTEX SUCTION or DISCHARGE FITTING

PEM 6440-75 HEAVY DUTY ANTI VORTEX SUCTION or **DISCHARGE FITTING** is designed for larger volume flows with minimum friction loss and flow interference. The optional built in valve can be adjusted from above the fitting to suit flow requirements and/or to balance multiple fitting installation. The **fitting has cast bronze base with Anti Vortex Covers in cast Bronze - 1 , in formed plastic -2**

PEM 6444-751 (with valve) is available, optional and extra with -1 cover only!

*Standard Dimensions. Add appr. 25mm/1.0" for overall height (OV) for Valve
**Suggested maximum discharge flow at appr. 300mm/12.0" water over fitting. For Suction Flow rate 10% for every 150mm/6.0" under 1000mm/39.4" waterdepth over fitting.

PEM	T	OD	OV*	FL**	
6442-75	2"	203mm / 8.0"	50mm / 1.97"	300 L/min	80 GPM
6443-75	3"	330mm / 13.0"	64mm / 2.50"	700 L/min	180 GPM
6444-75	4"	330mm / 13.0"	75mm / 2.96"	1000 L/min	250 GPM
6446-75	6"	406mm / 16.0"	100mm / 3.94"	1900 L/min	500 GPM
6448-75	8"	610mm / 24.0"	100mm / 3.94"	2700 L/min	700 GPM



Base, 6442, 6443, 6444, 6446, 6448

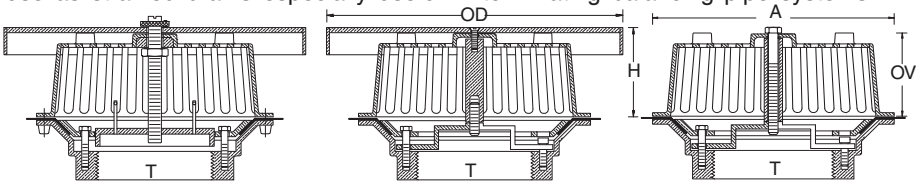
Fitting with Valve is shown

To specify & order:
Fitting **Base + 05 + -75 -1 or -2**
Fitting with Valve **Base + 05 + -751 - 1 only**
Without waterproofing membrane, leave out Clamp(-05)

PEM 6440- 841 SERIES DRAIN FITTING

PEM 6440-84 HEAVY DUTY BASKET DRAIN AND ANTI VORTEX SUCTION FITTINGS WITH CAST BRONZE STRAINER BASKET are designed for larger volume flows with minimum friction loss and flow interference. The fittings without Anti Vortex Cover are for use as strained drains especially useful in terminating balancing pipe systems.

Base, 6442, 6443 6444, 6446, 6448



PEM 6440-843-1, Bronze
PEM 6440-843-2, Plastic

PEM 6440-842-1, Bronze
PEM 6440-842-2, Plastic

PEM 6440-841-1

PEM 6443-841

Anti Vortex Covers in cast Bronze - 1 , in formed plastic -2

With Anti Vortex Cover the suction fittings become efficient for shallow pools. With optional built in valve the flow can be adjusted from above the fitting to suit requirements and/or to balance a multiple suction fitting installation such as in narrow and long pools. The fitting is made of heavy cast bronze, brass and stainless steel fitted.

PEM 6440- 842 SERIES ANTI VORTEX SUCTION STRAINER

PEM 6443-842

PEM Base	T	A	OD	OV	H	W	Free Area	Max. Flow (1)	Max. Flow (2)
6442	2"	216mm	203mm	88mm	92mm	102mm	145cm²	310 L/min	95 L/min
		8.50"	8.0"	3.47"	3.75"	4.0"	23 sq."	80 GPM	25 GPM
6443	3"	267mm	330mm	92mm	98mm	102mm	275cm²	680 L/min	227 L/min
		10.51"	13.0"	3.625"	3.86"	4.0"	42 sq."	180 GPM	60 GPM
6444	4"	267mm	330mm	92mm	98mm	102mm	275cm²	680 L/min	227 L/min
		10.51"	13.0"	3.625"	3.860"	4.0"	42 sq"	180 GPM	60 GPM
6446	6"	318mm	406mm	117mm	123mm	254mm	600cm²	1290 L/min	380 L/min
		12.52"	16.00"	4.61"	4.840"	10.0"	92 sq"	340 GPM	100 GPM
6448	8"	318mm	610mm	117mm	123mm	254mm	600cm²	2650 L/min	380 L/min
		12.52"	24.0"	4.61"	4.84"	10.0"	92 sq"	700 GPM	100 GPM

Max Flow (1) = Suction Fitting with Anti-Vortex Cover. Maximum Suction Flow with minimum water depth **(W)** over cover.

Max. Flow (2) = Drain Fitting without Anti-Vortex Cover. Maximum suggested absorption flow rate with minimum water depth **(W)** over strainer basket.

T = Pipe Size
A = Diameter of fitting.
OD = Diameter of cover
OV = Height of fitting.
H = Height of fitting w. cover
W = Minimum water over fitting, cover or basket

CUSTOM MADE SQUARE TILE PAN COVER for mosaic tiled pools. Please enquire, stating required frame size and depth to suit tiles. Not available in formed plastic.

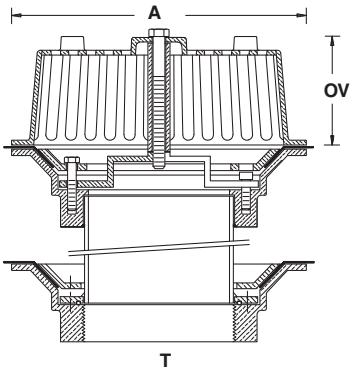
To specify & order:
A. Fitting w/ Strainer: **Base + 05 + - 841**
B. Fitting w/ Strainer & Anti Vortex Cover: **Base + 05 + - 842 - 1 or - 2**
C. Fitting w/ Strainer, Anti Vortex Cover & Valve: Base **+ 05 + - 843 - 1 or - 2**
For application without water proofing membrane, leave out the Clamp(-05)

PEM 6440- 843 SERIES VALVED ANTI-VORTEX SUCTION STRAINER

PEM 6446-843

PEM 6440- 881 SERIES

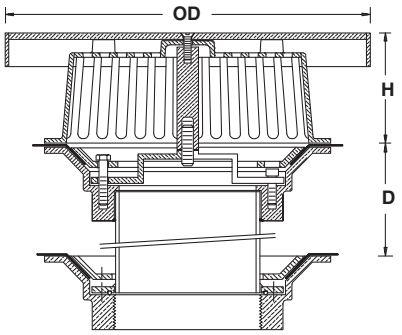
DRAIN FITTING WITH DUAL LINER CLAMPS & EXTENSION SLEEVE.



PEM 6440-88 HEAVY DUTY BASKET DRAIN & ANTI-VORTEX SUCTION FITTINGS WITH CAST BRONZE STRAINER BASKET are designed for dual waterproofing liner pools or reservoirs to provide a liquid tight passage/penetration through the construction strata between a surface and subsurface waterproofed surface. Normally the subsurface membrane is installed on the structural concrete slab,while the surface membrane is used inside the pool or reservoir. The fitting is made of heavy cast bronze and and brass, stainless steel fitted.
The fitting interconnection (Dimension '**D**') is always custom made to order but in observation of the minimum height requirement. Multiple stacking beyond 2 waterproofed surfaces is possible. The fittings without Anti Vortex Cover are for use as strained drains especially useful in terminating balancing pipe systems. With Anti Vortex Cover the fitting become efficient suction fittings for shallow pools. With optional built in valve the flow can be adjusted from above the fitting to suit requirements and/or to balance a multiple suction fitting installation such as in narrow and long pools.

PEM 6440- 882 SERIES

ANTI VORTEX SUCTION FITTING WITH DUAL LINER CLAMPS & EXTENSION SLEEVE

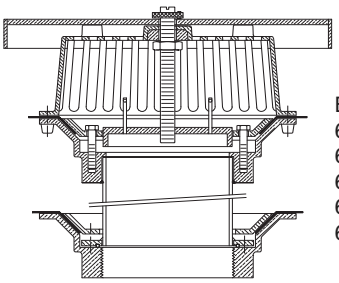


PEM Base	T	A	OD	OV	D	H	W	Free Area	Max. Flow (1)	Max. Flow (2)
6442	2"	216mm 8.500"	203mm 8.000"	88mm 3.470"	64mm 2.520"	92mm 3.75"	102mm 4.0"	145cm² 23 sq"	310L/min 80GPM	95L/min 25GPM
6443	3"	267mm 10.510"	330mm 13.000"	92mm 3.625"	64mm 2.520"	98mm 3.86"	102mm 4.0"	275cm² 42 sq"	680L/min 180GPM	227L/min 60GPM
6444	4"	267mm 10.510"	330mm 13.000"	92mm 3.625"	64mm 2.520"	98mm 3.86"	102mm 4.0"	275cm² 42 sq"	680L/min 180GPM	227L/min 60GPM
6446	6"	318mm 12.520"	406mm 16.000"	117mm 4.610"	89mm 3.500"	123mm 4.84"	254mm 10.0"	600cm² 92 sq"	1290L/min 340GPM	380L/min 100GPM
6448	8"	318mm 12.520"	610mm 24.000"	117mm 4.610"	95mm 3.740	123mm 4.84"	254mm 10.0"	600cm² 92 sq"	2650L/min 700GPM	380L/min 100GPM

PEM 6440- 883

VALVED ANTI VORTEX SUCTION FITTING WITH DUAL LINER CLAMPS & EXTENSION SLEEVE

CUSTOM MADE BRASS SQUARE TILE PAN COVER for mosaic tiled pools is available, please enquire, stating required frame size and depth to suit tiles.



Base
6442
6443
6444
6446
6448

T = Selected Pipe Size Connection
A = Diameter of fitting.
OD = Diameter of cover.
OV = Height of fitting.
D = Minimum height between subsurface and surface. The extension sleeve usually is custom made in height to given specifications
H = Height of fitting with cover.

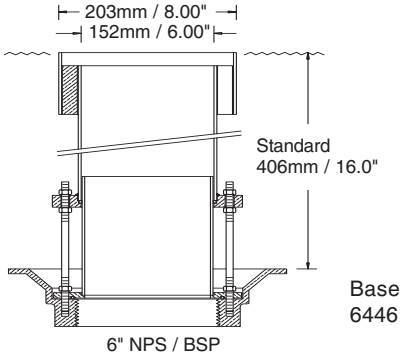
W = Minimum water over fitting or cover or basket
Max Flow (1) = Suction Fitting with Anti Vortex Cover Maximum Flow with minimum water depth (W) over cover
Max. Flow (2) = Drain Fitting without Anti Vortex Cover
Maximum suggested absorption flow rate with minimum water depth.
(W) over strainer basket.

To specify & order:
Fitting with cast bronze AV cover : -1 with formed plastic AV cover : -2
A. Fitting with Strainer: **Lower Base + 05 (1 or 2) + -881**
B. Fitting with Strainer & Anti Vortex Cover: **Lower Base + 05 (1 or 2) + - 882 - 1 or - 2**
C. Fitting with Strainer Anti Vortex Cover & Valve: **Lower Base + 05 (1 or 2) + - 883-1 only**

For application without water proofing liner(s), leave out the Clamp(s)(-05), the upper base is part of the fitting.

PEM 6446- 92

ADJUSTABLE GEYSER DISCHARGE



PEM 6440-92 Geyser Discharge is designed to provide an aerated geyser like display for large volumes of water as used in cascades and or waterfalls. The adjustment (102mm/4.0") permits a suitable immersion of the discharge to suit flow and desired effect. Suggested Flow range is 1.5 m3/min to 3.8m3/min (400 to 1000 USGPM).
PEM 6440-92 is made of cast bronze, brass, copper and neoprene 'O' rings, all stainless fitted. This Geyser discharge requires a low back pressure, tight closing, check valve at the pump, if no backflow is desired. Where no backflow would be permissible, the unit could be custom made to discharge above waterlevel, however the aerated water display would be missing. For a more desirable, non back flowing yet smooth outflowing water discharge,the use of PEM 329 Calyx Jets is recommended with maximum nozzle opening, creating solid mounds of water.

To specify & order:
Fitting: **Base + 05 + -92** Without waterproofing membrane, leave out Clamp(-05)

The drawings on this page show a base, which is not included in fitting option. **BASE, CLAMP & OPTION TO BE ORDERED TOGETHER AS REQUIRED BUT ACCOUNTED FOR SEPARATELY.**

SPRAY MANIFOLD FLANGES FOR SPRAY RINGS

PEM 6501 SERIES

PEM 6501 series SPRAY MANIFOLD FLANGES are designed to connect spray manifolds located close to the water surface without protruding through the same.The sight of heavy pipe flanges protruding out of water among the multitude of small spray nozzles or jets are not a pleasant sight and should be avoided PEM 6501 series Spray Manifold Flanges are made of cast bronze with stainless steel fasteners and are supplied in matching pairs only.

#	PEM	Size	Overall Length
650-0100	6501	1 1/4" x 1 1/4"	33mm / 1.300"
650-0150	6501A	1 1/2" x 1 1/2"	44mm / 1.730"
650-0200	6502	2" x 2"	68mm / 2.680"
650-0300	6503	3" x 3"	78mm / 3.080"
650-0400	6504	4" x 4"	118mm / 4.650"

Top View

Side View

PEM 6501

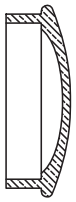
All sizes are for american size I.D. copper tubing.

COPPER TUBE END CAPS FOR SPRAY MANIFOLDS

PEM 6510 SERIES

#	PEM	Size
650-0520	**6512**	2" copper tube
650-0530	**6513**	3" copper tube
650-0540	**6514**	4" copper tube

PEM 6510 series TUBE END CAPS are designed to provide spray manifolds made out of copper tubing with end caps which are more pleasing to the eye than ordinary tube fittings. PEM 6510 series Tube End Caps are made of cast bronze.



'BULL' TEE OFFSET BRASS BUSHINGS FOR SPRAY RINGS

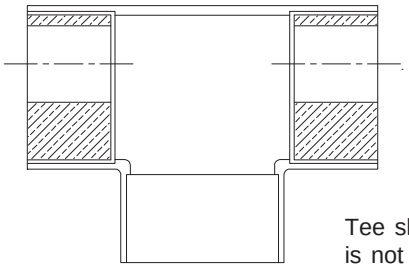
PEM 6515 SERIES

#	PEM	Size
650-1110	6515-1	1 1/2" x 1 1/4"
650-1120	6515-2	2" x 1 1/4"
650-1130	6515-3	2" x 1 1/2"
650-1140	6515-4	3" x 1 1/2"
650-1150	6515-5	3" x 2"
650-1160	6515-6	4" x 1 1/2"
650-1170	6515-7	4" x 2"
650-1180	6515-8	4" x 3"
650-1190	6515-9	6" x 2"
650-1200	6515-10	6" x 3"
650-1210	6515-11	6" x 4"

PEM 6515 series OFFSET BRASS BUSHINGS for Bull Head Spraying Tee Joints, required to permit use of low flow velocity supplies into spray rings, that will not disturb spray effects.
The offset permits minimum elevation differences of spray jets on spraying.

All sizes are for American size copper tube Spray rings.

2" x 1 1/4", 3" x 1 1/2" and 4" x 2" size are standard, others are custom made.



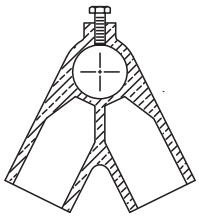
Tee shown in drawing is not included.

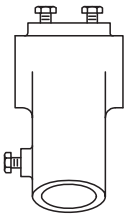
MANIFOLD, 1" X 1" STAND CLAMPS

PEM 6521

PEM 6520 series STAND CLAMPS are designed to support spray manifolds and underwater lights near the water surface in deeper pools.For example; in larger multi effect spray patterns where large and small equipment is mixed.

PEM 6520 series Stand Clamps are made of cast bronze with stainless steel lock bolts. Connections for legs are slip fit with lock bolt for rigid and permanent support.





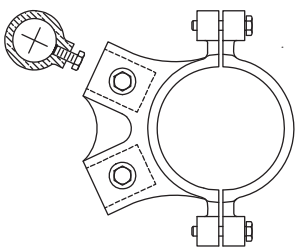
MANIFOLD, 3" x 1" STAND CLAMPS

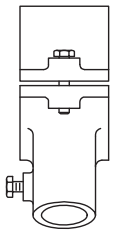
PEM 6523

Sizes available

#	PEM	Size
650-2210	6521	1" pipe x 1" pipe
650-2230	6523	3" tube x 1" pipe

PEM 6520 series Stand Clamps can also be supplied for portable above ground irrigation systems to carry aluminium pipe.For this application the stand clamps are made of aluminium at greatly reduced costs.

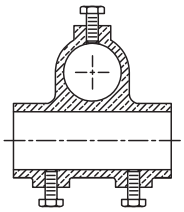


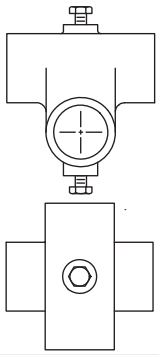


PEM 6530 SERIES

CROSS CLAMPS FOR UNDERWATERS SCAFFOLDS

PEM 6530 series CROSS CLAMPS are designed to create permanent support structures under water or in wet locations.These cross clamps are to be used with either brass/stainless steel/ pipes or copper tubes.





The cross clamps are essential for the support of spray bars with jets mounted on long risers for extended and uniform spray range or to mount multiple submersible light fixtures on mounting yokes in deeper then usual pools.

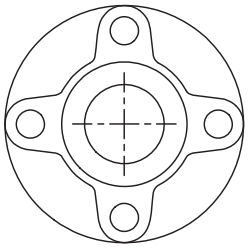
To mount PEM B7 Light fixture Yokes, drill 10mm/0.375" holes through pipe and bolt yoke to pipe. The supports bars are locked together with these clamps.

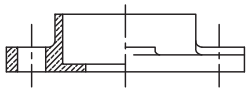
#	PEM	Size
650-2310	**6531**	1" Tube x 1" Tube (1" : 25.4mm O.D.)
650-2320	**6531A**	1" Pipe x 1" Pipe(Schedule size pipe)

PEM 6540 SERIES

COPPER TUBE FLANGES

PEM 6540 series TUBE FLANGES are made of heavy cast bronze and are suitable for max. 150 PSI / 448 kpa internal pressure, to be bolted with stainless steel bolts.
PEM 6540 series TUBE FLANGES are designed for the connection of North American standard size copper tubing to regular pipe size companion flanges. The sizing of these flanges takes into consideration the fact that at times flow size instead of pipe size valves must be used to obtain the degree of control desired. Bolt holes in flanges are standard for all.



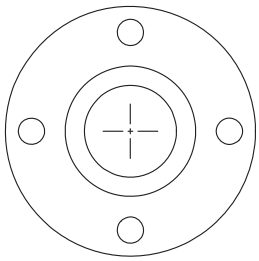


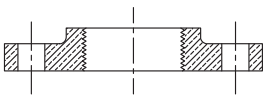
#	PEM	Connection Size
650-3430	**6543**	2" Copper tube to 6" Flange
650-3440	**6544**	2 " Copper tube to 7" Flange
650-3450	**6545**	2.5" Copper tube to 7.5" Flange
650-3460	**6546**	3" Copper tube to 7.5" Flange
650-3470	**6547**	3" Copper tube to 9" Flange
650-3480	**6548**	4" Copper tube to 9" Flange

PEM 6550 SERIES

PIPE FLANGES (ASA/BSP SIZES)

PEM 6550 series PIPE FLANGES are designed to provide heavy duty, cast bronze flanges for application where corrosion resistant pipe and fittings are required.The flanges are suitable for application for max. 150 PSI / 448 kpa internal pressure and must be bolted with stainless steel bolts.





Threads are NPT/BSP.

#	PEM	Pipe	Flange
650-3510	**6551**	2"	6"
650-3520	**6552**	2.5"	7"
650-3530	**6553**	3"	7.5"
650-3540	**6554**	4"	9"
650-3550	**6555**	6"	11"
650-3560	**6556**	8"	13"

CONVERSION DATA:

FLOW:

1 L/min (LPM) :264 USGPM \ .220 IGPM
1 USGPM (G) :3.785 L/min \ 0.833 IGPM
1 IGPM :4.546 L/min \ 1.2 USGPM
1 L/sec. :15.85 USGPM \ 13.2 IGPM
1m3/min :264.2 USGPM \ 220.08 IGPM

PRESSURE:

1m/head (MC) :0.1 bar / 9.82kpa / 3.28'head / 1.422PSI
1'/head (FT) :0.305m / 2.99kpa / 0.0305bar / 0.433PSI

DISTANCE / HEIGHT / DEPTH:

1 Meter :39.37 Inches(") /3.29 Feet(')
1 Inch(") :25.4mm
1 Foot(') :30.4801cm

AREA:

1 m2 :10.76 Square Feet (Sqft)
1 Sqft :0.0929 m2

WEIGHTS OF WATER:

1Kg or 1 Liter : 2.207 Lbs
1m3 : 1000 kg / 2203 Lbs
1 cbft : 62.4 2Lbs / 28.28 Kg
1 US Gallon : 3.785 Kg / 8.36Lbs

VOLUMES OF WATER: (M3 : Cubic meter)

1M3 : 1000 Liter / 35.31 cbft
1 cubic foot : 28.316 Liter / 7.4805 US Gallons
1 Liter : 0.001 M3 / 0.353 cbft

TORQUE : (Tightening of facering bolts of light fixtures)

1 (Newton Meter) NM : 8.85 Inch Lbs
1 (Inch Pound)"lbs : 0.12 NM

LUMINANCE OF ILLUMINATION:

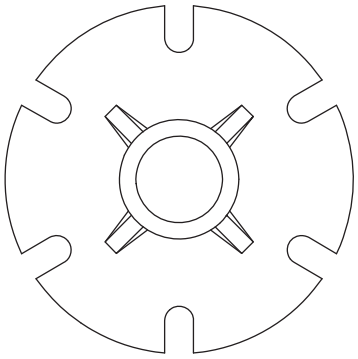
1 CP, Candle Power per sq. foot : 10.764 CP/m2
1 CP, Candle Power per sq. inch : 1550.0 CP/m2
1 LM, Lumen per sq. foot : 10.763 LM/m2

PEM
6580 SERIES
CONVERSION BASES FOR PVC PIPE

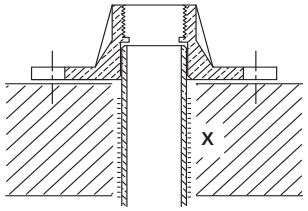
PEM 6580 series CONVERSION BASES are designed for concrete pool installation, where PVC pipe is cast directly into the concrete. The slip over bases will prevent any strain on the PVC pipe as well as prevent its exposure to sunlight radiation. The bases are made of cast bronze with 'O' ring seals for pressure sealing. Lag bolts anchored directly into the concrete, will hold the base in place. Maximum suggested pipe pressure to be 40 Psi, 92 feet head, 2.7 ATM or 2.8 Kg cm^2 provided that the base is properly bolted and pipe is anchored into concrete.

INSTALLATION SUGGESTION:

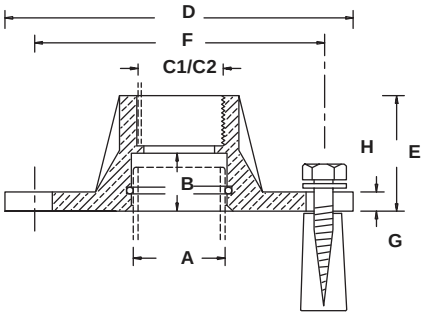
Pipe must be perfectly vertical. Leave it longer for pouring concrete. Tape lowest 100mm/ 4" above concrete. Pour concrete, smooth it around pipe and allow it to cure for at least one week.Cut pipe down to 'B' dimension. Bevel outer edge with file. Remove tape and clean pipe. Remove seal from base and slip base over pipe. Mark bolt holes.Drill holes (do not use a hammer drill as it might break concrete around pipe) and insert anchors (supplied by others). Clean area around the pipe. Put an app. 6mm/.250" bead of silicone caulking around the root of the pipe and let it cure for 24 hours. Solder pipe to base for solder bases. Grease pipe slightly, insert seal into base and slip base over pipe.Bolt down and tighten securely. Stainless Steel Lag Bolts and plastic Anchors are supplied by others.



#	PEM	Connection Size
650-4200	**6585**	2" PVC x 2" Pipe
650-4210	**6585A**	2" PVC x 2" Copper tube
650-4300	**6586**	3" PVC x 3" Pipe
650-4310	**6586A**	3" PVC x 3" Copper tube
650-4400	**6587**	4" PVC x 4" Pipe
650-4410	**6587A**	4" PVC x 4" Copper tube
650-4510	**6588**	6" PVC x 6" Pipe
650-4610	**6588A**	6" PVC x 6" Copper tube



X = PVC pipe in concrete under BASE to be painted with PVC solvent and coated with dry sand-to anchor pipe in concrete.



DIMENSIONS:

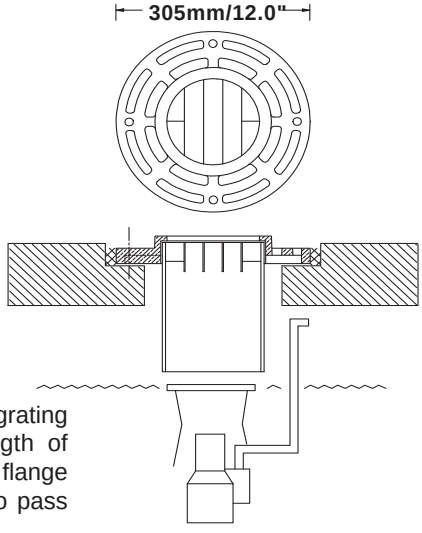
PEM #	Pipe size	*A	B	C1-6580A	C2-6580	D	E	F	G	H / Diam	H / Length	# of H
6585(A)	2" inch	2.375"	1.50"	2.125"	2"	9.0"	3.00"	7.50"	0.5"	0.50"	3.00"	3
	mm	60.3	38.1	54.0		229	76.2	190	12.7	12.7	76	3
6586(A)	3" inch	3.500"	2.0"	3.125"	3"	10.50"	3.50"	9.0"	0.5"	0.50"	3.00"	6
	mm	88.9	50.8	79.4		267	88.9	229	12.7	12.7	76	6
6587(A)	4" inch	4.500"	2.0"	4.125"	4"	11.5"	4.0"	10.0"	0.625"	0.75"	4.00"	6
	mm	114.3	50.8	104.8		292	102	254	15.9	19	102	6
6588(A)	6" inch	6.625"	2.5"	6.125"	6"	14.0"	4.50"	12.0"	0.625"	0.75"	4.00"	6
	mm	168.3	63.5	155.6		356	114.3	305	15.9	19	102	6

* = Actual Pipe Outside Diameter must be confirmed with order as machining is done to very close tolerances.
C1 = Copper tube solder fit for American size copper tubes. For other sizes specify exact O.D.
C2 = Female pipe thread ;custom made to NPT, NPS, BSP.

#660-0860

PEM 6686
SELF DRAINING SPRAY THROUGH FLANGE

PEM 6686 SELF DRAINING SPRAY THROUGH FLANGE is designed to serve as upper terminal for a spray-through-sleeve in a concrete deck for spray effects located in a pool beneath the concrete deck.This so called 'pool-less' fountain concept permits the use of white water geyser type spray effects hereto not possible in pool-less landscapes, stone works and ornamental pavements. It is furthermore useful for fountain construction in vandal prone areas such as playgrounds etc.The flange holds a pipe sleeve through which a spray effect is ejected from the lower pool, while the water from the spray effect returns through the outside of the flange into the pool without effecting the spray. The flange is made of heavy cast bronze and is supplied with either 6" pipe thread or 6" copper tube fit (specify which) to receive the pipe sleeve which is normally not a part of the fixture. The pipe sleeve and the grating in the top of the pipe sleeve are supplied by others. The grating in the pipe sleeve to be made from stainless steel appr. 50mm/2.0"wide with a thickness of app. 1.5mm/0.06" and to be brazed into the pipe. The lower edges of the grating to be ground to a knife edge. The pipe sleeve is to extend to app. 50mm/2.0" from the water surface of the pool. For installation, an opening of between 204mm/8.0" and 230mm/9.0" with a recess around the top of 360mm/14.0" by 32mm/1 1/4" depth is required.The flange is bolted into position and grouted into the surrounding concrete.

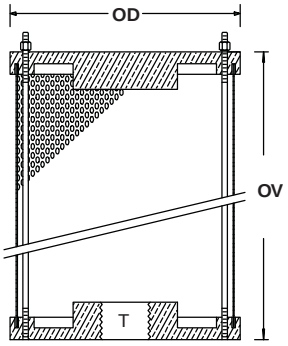


At extra cost **PEM 6686** can be supplied from the factory with the complete sleeve and grating assembly, and also stainless steel fasteners. Please give exact dimensions for length of sleeve.PEM supplied sleeves are in brass pipe or copper tube as specified. The center of the flange extends 12mm/0.5" above the rim of the flange.The maximum size of spray diameter to pass through sleeve is 100mm/4.0" (PEM 54, 64, 749).

PEM 71330 SERIES

SUCTION STRAINERS

PEM 71332



PEM 71330 SUCTION STRAINERS are made of cast bronze with perforated stainless steel strainer and are brass and stainless steel fitted.

#	PEM	T	OD	OV	Orifice Type	Open Area*	Sugg. Max. Flow
670-031	**71331-A**	1 1/2"	280mm	203mm	**A**	745cm²	35 L/min
670-032	**71331-B**	1 1/2"	280mm	203mm	**B**	700cm²	30 L/min
670-033	**71331-C**	1 1/2"	280mm	203mm	**C**	336cm²	15 L/min
670-034	**71332-A**	2"	280mm	318mm	**A**	1490cm²	60 L/min
670-035	**71332-B**	2"	280mm	318mm	**B**	1400cm²	50 L/min
670-036	**71332-C**	2"	280mm	318mm	**C**	672cm²	30 L/min
670-037	**71333-A**	2 1/2"	280mm	318mm	**A**	1490cm²	60 L/min
670-038	**71333-B**	2 1/2"	280mm	318mm	**B**	1400cm²	50 L/min
670-039	**71333-C**	2 1/2"	280mm	318mm	**C**	672cm²	30 L/min

Strainer orifice sizes and percentage of open area:
'A' :4.76mm, appr.51% open area
'B' :2.62mm, appr.48% open area
'C' :0.686mm, appr.23% open area.

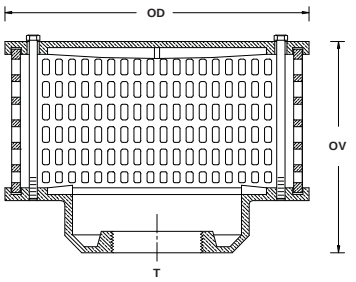
T = NPT/BSP (Pipe connection female) .
OD = Outside diameter.
OV = Overall height from pipe thread.
Sugg. Flow = Max.suggested rate of flow with minimum 300mm/12.0" water depth over fixture

PEM 7160 SERIES

HEAVY DUTY SUCTION STRAINERS

PEM 7160 series SUCTION STRAINERS are designed to serve as dry pump type suction terminal fittings. In order to reduce flow velocity through the suction strainer, the open strainer areas are between 7 and 9 times greater than the pipe size area of the pipe the fittings they are connected to. The reduced flow velocity will greatly reduce plugging up of screens and provide better service life. These suction strainers can be used directly for applications having output orifices larger than 20mm/0.75". For applications with smaller orifices install the suction strainer into suitable suction pits covered with sufficient, suitable suction screening to serve the purpose. (Consult Page 537 of this catalogue).

Use of **PEM 7160 series SUCTION STRAINERS** eliminates the need for costly and insufficient in line strainers to protect the pump impeller etc. In selecting a suction strainer select it for the flow required and never by the pipe connection of the pump. If one strainer is insufficient use multiple.



For shallow water applications see PEM Shallow Pool Suction Fittings

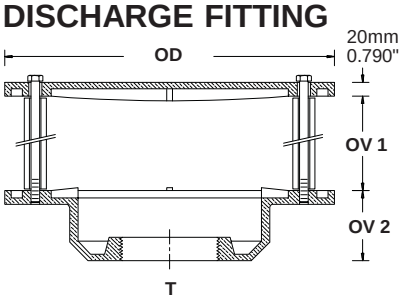
#	PEM	T	OD	OV	W	Free Area	Suggested. Flow
670-1200	**7162**	2"	203mm 8.0"	165mm 6.50"	356mm 14.0"	186cm² 30 sq"	310 L/m 80 GPM
670-1300	**7163**	3"	356mm 14.0"	200mm 7.875"	406mm 16.0"	426cm² 68 sq"	570 L/m 150 GPM
670-1400	**7164**	4"	356mm 14.0"	257mm 10.125"	610mm 24.0"	656cm² 105 sq"	950 L/m 250 GPM
670-1600	**7166**	6"	451mm 17.75"	375mm 14.75"	762mm 30.0"	1452cm² 229 sq"	1700 L/m 450 GPM
670-1800	**7168**	8"	451mm 17.75"	559mm 22.0"	915mm 36.0"	2500cm² 393 sq"	5000 L/m 1300 GPM

T = NPS/BSP
OD = Outside square dimension.
OV = Overall height from pipe thread
W = Minimum water over cover.

Size of screen opening : 8mm x 18mm (0.3" x.75") max. PEM 7160 series Suction Strainer Fittings are made entirely of cast bronze , brass and stainless steel fitted. For applications requiring detachable base mounting into waterproofing membrane protected concrete or into concrete lake suction pads see PEM 6440-48 series SUCTION STRAINERS. PEM Adapters to 'DN' Type PVC pipe sizes DN-100 &150 are available. See page 640.

PEM 7160-1 SERIES

DISCHARGE FITTING



PEM 7160-1 DISCHARGE FITTINGS are made of cast bronze, stainless steel fitted. The fitting can be threaded to plastic pipe and the assembly is set into the concrete pool floor, protecting the plastic pipe and connection. As discharge fitting, the bolted together bottom and top plates provide a solid and pressure resistant deflection device. For same fitting but with suction grating see PEM 7160 or 6440-48.

PEM Adapters to 'DN' Type PVC pipe sizes DN-100 & 150 are available. See page 640.

#	PEM	T	OD	OV2
670-1210	**7162-1**	2"	203mm / 8.00"	70mm / 2.750"
670-1310	**7163-1**	3"	356mm / 14.00"	73mm / 2.875"
670-1410	**7164-1**	4"	356mm / 14.00"	73mm / 2.875"
670-1610	**7166-1**	6"	451mm / 17.75"	83mm / 3.250"
670-1810	**7168-1**	8"	451mm / 17.75"	89mm / 3.500"

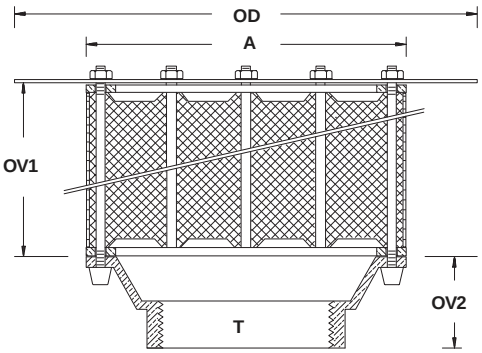
OV1 = Custom made to given specification (Usually 50-75% of pipe size)
OV2 = Height of base.
T = NPS/BSP
OD = Outside square dimension.

BUDGET SUCTION STRAINERS WITH ANTI VORTEX PLATE — PEM 7180 SERIES

PEM 7180 Series SUCTION STRAINERS with Anti Vortex Plate are designed to fill the need for installations that do not require the heavy duty PEM 6440 -48 or 7160 Series Suction Strainers. **PEM 7180 Series SUCTION STRAINERS** are of cast bronze, brass and stainless steel fitted. Strainer openings (expanded brass) are standard 4.5 x 17mm/0.187 x 0.65".

DIMENSIONS:

PEM	**7182**	**7183**	**7184**	**7186**	**7188**
#	670-2200	670-2300	670-2400	670-2600	670-2800
With Surface Puddle Flange					
PEM	**7182-1**	**7183-1**	**7184-1**	**7186-1**	**7188-1**
#	670-2210	670-2310	670-2410	670-2610	670-2810
With Surface Membrane Clamp					
PEM	**7182-2**	**7183-2**	**7184-2**	**7186-2**	**7188-2**
#	670-2220	670-2320	670-2420	670-2620	670-2820
T	2"	3"	4"	6"	8"
A	216mm 8.500"	241mm 9.500"	267mm 10.500"	318mm 12.520"	380mm 14.960"
OD	300mm 12.000"	300mm 12.000"	457mm 18.000"	457mm 18.000"	610mm 24.000"
OV1	51mm 2.000"	76mm 3.000"	100mm 4.000"	152mm 6.000"	203mm 8.000"
OV2	64mm 2.520"	64mm 2.520"	64mm 2.520"	89mm 3.500"	95mm 3.740"



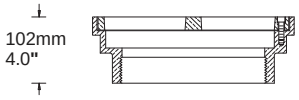
OV1 = Height of strainer. **T** = NPS/BSP.
OV2 = Height of base. **A** = Outside diameter of strainer.
OD = Square dimension of Anti Vortex Plate.
Standard unless specified otherwise.

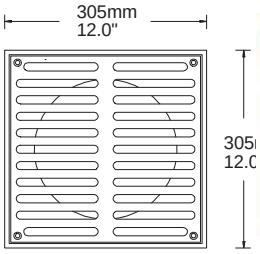
PEM Adapters to 'DN' Type PVC pipe sizes DN-100 &150 are available. See page 640

FLOOR DRAIN FITTINGS — PEM 7210 SERIES

PEM 7210 Series **FLOOR DRAIN FITTINGS** are made of cast bronze and stainless steel fitted. PEM 7210 Series cannot be used in shallow water for suction purpose. Open Area of strainer = 52 sq/ in. or /336 cm2. Width of slots : 12.7mm / 0.5".

#	**PEM**	**T**
670-3140	**7214**	4" NPS/BSP
670-3160	**7216**	6" NPS/BSP
670-3180	**7218**	8" NPS/BSP
670-3190	**7219**	10" NPS/BSP





PEM 7210

Subsurface Puddle Flange is optional and extra.

PEM Adapters to 'DN' Type PVC pipe sizes DN-100 &150 are available. See page 640

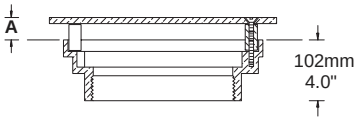
SUCTION OR DISCHARGE FITTINGS — PEM 7230 SERIES

PEM 7230 Series SUCTION or DISCHARGE FITTINGS are made of cast bronze and is stainless steel fitted.

Edge length of A.V cover*	142cm 56"	203cm 80"	244cm 96"	305cm 120"	366cm 144"	488cm 192"	610cm 240"
Waterdepth Multiplication Factor for suction flows.**							
40cm/16.0"	1.0	1.4	1.7	2.1	2.6	3.4	4.3
60cm/24.0"	1.2	1.8	2.2	2.7	3.4	4.4	5.6
90cm/36.0"	1.5	2.1	2.5	3.1	3.9	5.1	6.4
48cm/120.0"	2.0	2.8	3.4	4.2	5.2	6.8	8.6

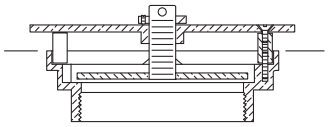
PEM 7236 Bottom, Top and Side Views

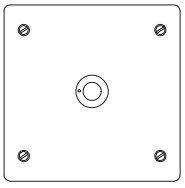
PEM #	**7234** 670-3340	**7236** 670-3360	**7238** 670-3380	**7239** 670-3390
PEM #	**7234V** 670-3540	**7236V** 670-3560	**7238V** 670-3580	**7239V** 670-3590
NPS/BSP 'A'	4" 38mm 1.50"	6" 51mm 2.0"	8" 57mm 2.25"	10" 83mm 3.25"



A.V. cover : Anti Vortex Cover
* = Multiplication Factor for suction flows based upon basic flow of 200 GPM / 750 l/m at 40cm/16.0" Waterdepth, not to exceed flow velocity of pipe of 0.9m/3 feet/sec. Discharge flows can be greater up to 1.5 of values.
** = Edge Length is for non corrosive or plastic plates bolted upon the cover of the basic fitting, to arrive at square size divide by 4.0; circular size by 3.1416.
All flows are suggested maximum flows.
Subsurface Puddle Flange is optional and extra.

VALVED SUCTION OR DISCHARGE FITTINGS — PEM 7230V SERIES

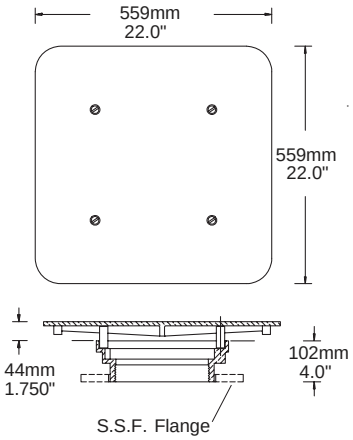




PEM Adapters to 'DN' Type PVC pipe sizes DN-100 &150 are available. See page 640

PEM 7230A SERIES

SUCTION OR DISCHARGE FITTING WITH COVER PLATE



PEM 7230 SUCTION STRAINERS are all made of cast bronze, brass and stainless steel fitted.

PEM	7234A	7236A	7238A	7239A
#	670-3640	670-3660	670-3680	670-3690
T*	4"	6"	8"	10"

* : NPS/BSP

Waterdepth	Multiplication Factor for suction flows.*			
40cm/16.00"	1.6	1.6	1.6	1.6
60cm/24.00"	2.1	2.1	2.1	2.1
90cm/36.00"	2.4	2.4	2.4	2.4
120cm/48.00"	3.2	3.2	3.2	3.2

. * = Multiplication Factor for suction flows based upon basic flow of 200 GPM / 750 l/m at 35cm/14.0" water depth, not to exceed flow velocity of pipe of 0.9m/3 feet sec. Discharge flows x 1.5 of value. Flow rates are suggested maximum for given waterdepth over anti - vortex cover.

SSF :Sub-Surface Puddle Flange optional and extra.

To specify and order add 'SSF' to catalog number and /-1 to # number

PEM Adapters to 'DIN' Type PVC pipe sizes DIN-100 &150 are available. See page 640

PEM 7240 SERIES

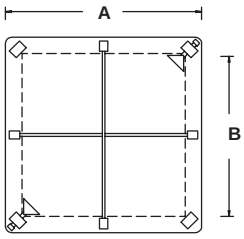
ANTI VORTEX SUCTION PIT COVER

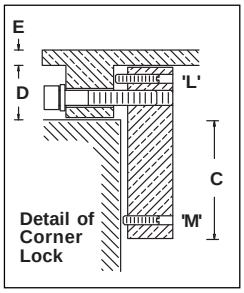
PEM 7240

PEM 7240 ANTI VORTEX SUCTION PIT COVER is made of cast bronze and is stainless steel fitted. The covers are designed to fit over and look into square suction pits cast into concrete pool floors.

DIMENSIONS

#	PEM	A	B	C	D	E
670-4420	**7242**	305mm 12.0"	254mm 10.0"	51mm 2.0"	22mm 0.875"	6mm 0.25"
670-4460	**7246**	559mm 22.0"	432mm 17.0"	51mm 2.0"	22mm 0.875"	6mm 0.25"





INSTALLATION SUGGESTION:

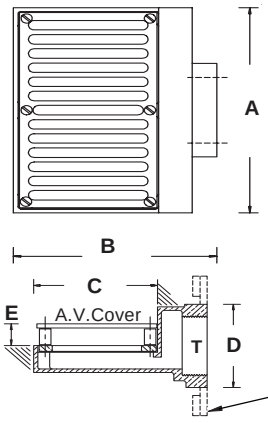
In order to increase the holding power of the locking brackets. First screw in bolts 'L' and also screw in bolts 'M' for better grip.Proper fit is when the brackets scrape slighty when inserted into opening. With Allen Key,lock bracket into position. When properly installed the cover can not be lifted without unlocking 2 of the brackets.

* = Multiplication Factor for suction flows based upon basic flow of 200 GPM / 750 l/m at 35cm/14.0" water depth, not to exceed flow velocity of pipe of 0.9m/3 feet/sec. Discharge flows x 1.5 of value. Flow rates are suggested maximum for given waterdepth over anti-vortex cover.

Waterdepth	Multiplication Factor for suction flows.*
40cm/16.0"	1.6
60cm/24.0"	2.1
90cm/36.0"	2.4
120cm/48.0"	3.2

PEM 7250 SERIES

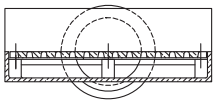
SUCTION / DRAIN FITTING, SIDE CONNECTED



PEM 7250 SUCTION / DRAIN FITTING is designed for installation in horizontal position into pools requiring near floor level outlet piping. Fitting also useable in vertical position in confined size pools.

PEM 7250 SUCTION / DRAIN FITTING is made of cast bronze, stainless steel fitted. Anti Vortex Plate Cover is of brass. Anti Vortex Plate Cover (For horizontal installation only) & Subsurface Membrane Clamp are extra and additional.

. Open Area in grating = 145 cm^2 / 22.5 sq". Width of slots is 12mm/0.50"



#	PEM	T	A	B*	C	D**	E
670-5520	**7252**	2"	264mm	218mm*	156mm	121mm	31mm
670-5530	**7253**	3"	10.39"	8.59"	6.14"	4.75"	1.22"
670-5540	**7254**	4"					

+/-02 Subsurface Membrane Clamp,with change of dimensions

* **'B'** > 300mm/11.820" - ** **'D'** > 203mm/8.0"

A.V. Cover : +/-1 Anti Vortex Cover

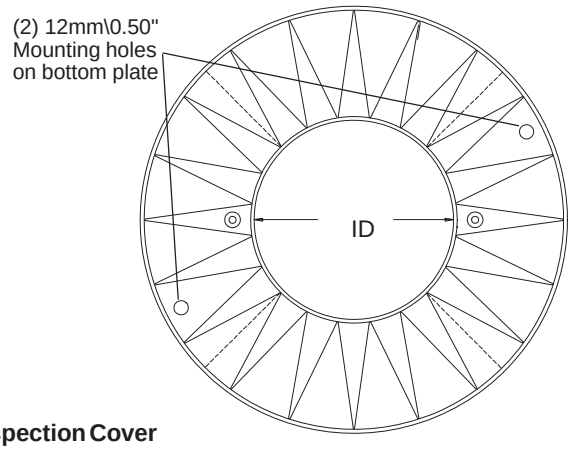
* = Multiplication Factor for suction flows based upon basic flow of 60 GPM /227 l/m at 35cm/14.0" water depth, not to exceed flow velocity of pipe of 0.9m/3 feet sec. Discharge flows x 1.5 of value. Flow rates are suggested maximum for given waterdepth over horizontal drain with anti vortex cover.

Waterdepth	Multiplication Factor for suction flows.*
40cm/16.00"	1.6
60cm/24.00"	2.1
90cm/36.00"	2.4
120cm/48.00"	3.2

PEM Adapters to 'DIN' Type PVC pipe sizes DIN-100 &150 are available. See page 640

STAINLESS STEEL & BRONZE SUCTION STRAINERS FOR PVC & OTHER PIPE

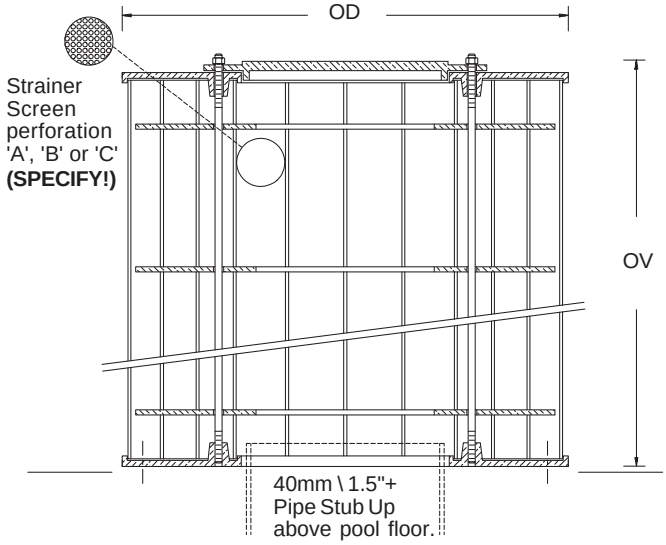
PEM 7280 Series
PEM 7290 Series



PEM 7281A

Inspection Cover

Opening can also be used to stack several strainers when used in horizontal position for use with **'C'** type orifice strainers suitable for PEM 1100 & 1200 Dandelion Fountainheads.



PEM 7298C

To anchor and seal PVC pipe in concrete:
Paint (section of pipe within concrete) with PVC cement, then spread, dry, clean sand on to it. Let dry before pouring concrete.

PEM 7280 & 90 Series SUCTION STRAINERS are made of cast bronze with folded perforated stainless steel strainer screening, brass and stainless steel fitted. Strainers are flush mounted, bolted, to pool floor or wall. Normal installation is into suction pits covered with primary (coarse) suction straining material. Removable cover permits inspection of inside of strainer,this opening can also be used to stack several strainers to increase the flow capacity. Strainers do not have pipe connections, only the center opening to permit termination of pipe within strainer. Multiple internal spacers prevent the collapse of the strainer screening. **Threaded pipe connections are extra and optional,** please enquire as they are normally not desirable to allow removal of strainer for cleaning.

#	PEM	Suggested Pipe size	Suggested Max.Flow Rate	Strainer Orifices	Strainer Area	OV	OD	ID
670-823	**7281**	3",4"	700L/min \ 200 GPM*	**'A'**	0.6m2\6.46 sqft	170mm\6.70"	350mm\13.78"	145mm\5.71"
670-824	**7282**	1.5",2"	200L/min \ 50 GPM	**'B'**	0.6m2\6.46 sqft	170mm\6.70"	350mm\13.78"	145mm\5.71"
670-827	**7285**	4",5"	1500L/min\ 400 GPM*	**'A'**	1.2m2\12.9 sqft	320mm\12.60"	350mm\13.78"	145mm\5.71"
670-828	**7286**	2",3"	600L/min \ 160 GPM	**'B'**	1.2m2\12.9 sqft	320mm\12.60"	350mm\13.78"	145mm\5.71"
670-829	**7287**	2",3"	200L/min \ 50 GPM	**' C'**	1.2m2\12.9 sqft	320mm\12.60"	350mm\13.78"	145mm\5.71"
670-833	**7293**	5",6"	4200L/min\1100 GPM*	**'A'**	1.8m2\19.3 sqft	320mm\12.60"	600mm\23.63"	280mm\11.0"
670-834	**7294**	4",5"	1200L/min\ 300 GPM	**'B'**	1.8m2\19.3 sqft	320mm\12.60"	600mm\23.63"	280mm\11.0"
670-835	**7295**	3",4"	600L/min \ 160 GPM	**'C'**	1.8m2\19.3 sqft	320mm\12.60"	600mm\23.63"	280mm\11.0"
670-837	**7297**	8",10"	6600L/min\1740 GPM*	**'A'**	3.6m2\38.6 sqft	630mm\24.75"	600mm\23.63"	280mm\11.0"
670-838	**7298**	5",6"	2300L/min\ 600 GPM	**'B'**	3.6m2\38.6 sqft	630mm\24.75"	600mm\23.63"	280mm\11.0"
670-839	**7299**	4",5"	1200L/min\ 300 GPM	**'C'**	3.6m2\38.6 sqft	630mm\24.75"	600mm\23.63"	280mm\11.0"

Strainer orifice and percentage of open area, with flow de-rated to suit open area of screen :
'A': 4.76mm\0.187", appr. 51% open area. 'B': 2.62mm\0.10", appr. 48% open area. 'C': 0.686mm\0.027", appr. 23% open area.
When used horizontally, (single or stacked) an Anti Vortex cover has to be provided over the full length

* With equal to 2 x 'OV' water depth over top of strainer.
For smaller strainers: See PEM 71330 SERIES or 6224 & 6225

PEM
WATER SCREEN JETS

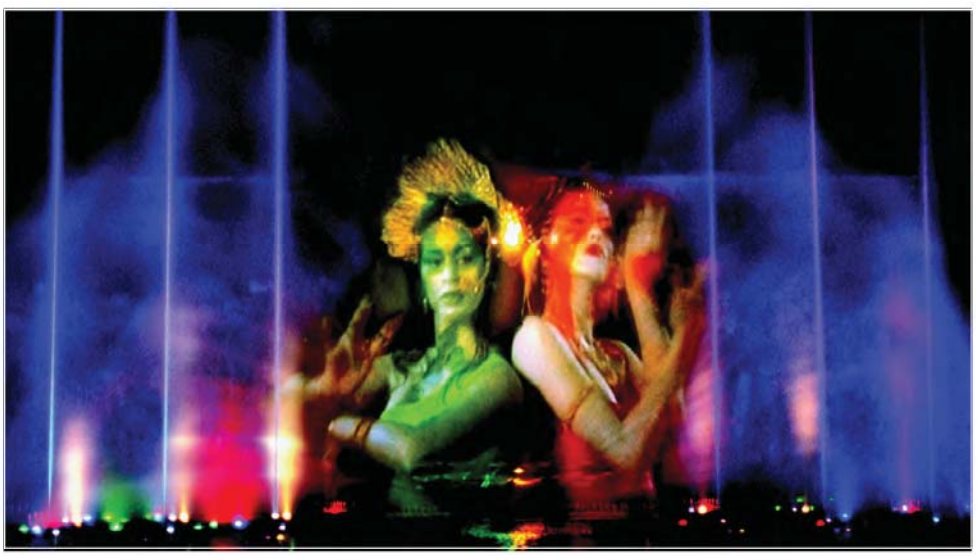
1998 Water & Lasershow Theme Park, Bali, Indonesia

INDEX

PEM 1854 WATER SCREEN

PEM 1854 Screen Jets
Darling Harbour
Sydney
Australia

PEM 1854 Screen Jet
Maritime Museum
Flagstaff Hill
Victoria
Australia



PEM 1854 Screen Jet
Sentosa Island
Singapore

PEM 1854 WATER SCREENS IN DAY TIME

PEM 1854 Screen Jets
Darling Harbour
Sydney
Australia

PEM 1854 Screen Jet
Sentosa Island
Singapore

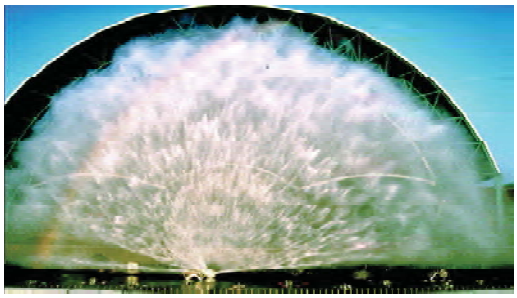
PEM 1854
Screen Jet
Lotte Themepark
Korea

PEM 1854/08
HIGH PRESSURE LOW FLOW WATER SCREEN JET

PEM 1854/08, 6" Water Screen Jet is designed to create a screen surface for the rear or front projection of images by 35mm or larger film, diapositive (slide), template and/or laser projector(s). **PEM 1854** is made of silicon nickelbronze, stainless steel fitted, can be supplied in 6" BSP or NPS, male (outside) pipe thread. **For extreme operating pressures, the jet is supplied with an internal pressure brace, which can be removed for operating with lower pressures.**

 # 510-1110

Projected image onto PEM Waterscreen



PEM Waterscreen at Day Time

Horizontal spray width design consideration = 3 x Sprayheight.
Installation height of jet at above waterlevel or otherwise can be positioned as required to suit the projection equipment.
Place design consideration for wind drifting at moderate wind velocity:
Minimum distance of jet from edge of pool (down wind from main wind direction) = 3 x Sprayheight .
Minimum Pump Size suggestions: 60 Hz Electricty - 150 HP, 50 Hz Electricity - 200KW

The jet is employing laminar adhesion distribution of the ejected spray in an arc of 175º - 182º depending on nozzle pressure. **PEM 1854/08** includes a PEM 08-10, 6" Directional Adjustment Flange that permits appr. 1.5º - 2º of vertical angular adjustment of the screen, pointing away from the projector and thereby creating a smooth, non pulsing surface. Follow attached installation suggestions for best results.
Pipe from pump(s) to be flow sized, to be reduced only at or near jet to 6".

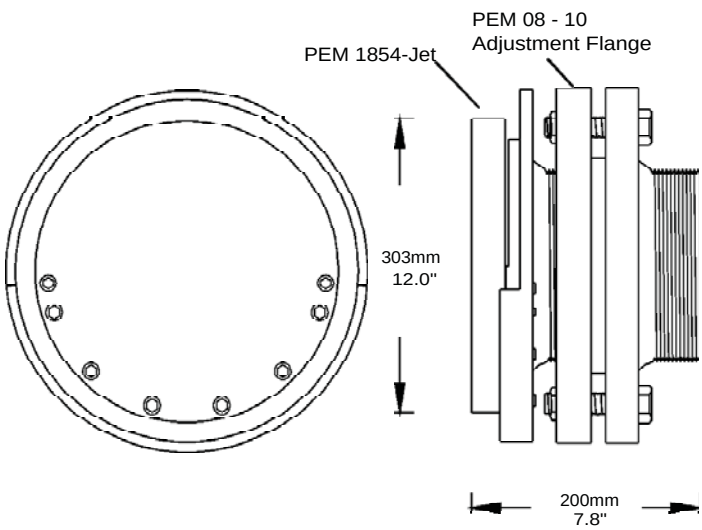
.
PEM 1854-08 is made of nickel bronze stainless steel fitted
It can be supplied in 6" BSP or NPS, male (outside) pipe thread.
For larger sizes please enquire.
Installation :
See attached installation suggestions

PERFORMANCES

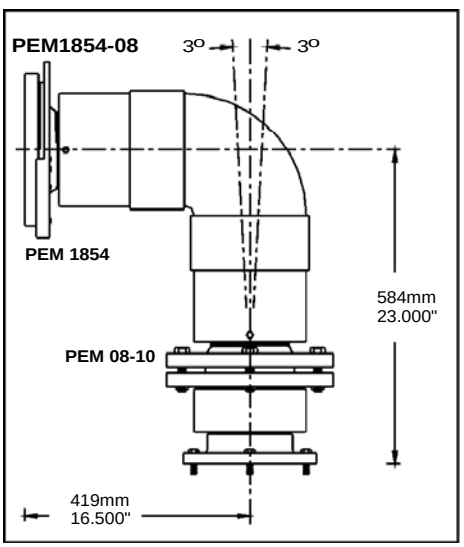
Sprayheight (Radius)		Flow		Nozzle Pressure*	
Meter	Feet	L/min	GPM	bar	PSI
6m	20'	1700	450	5.0	70
9m	30'	2350	620	8.1	115
12m	40'	2750	727	11.0	150
18m	60'	3050	806	12.4	175
24m	80'	3300	872	14.8	210
30m	100'	3500	925	16.2	230

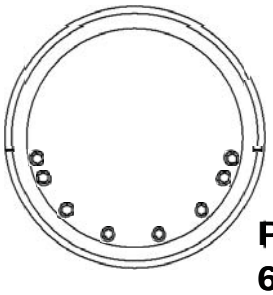
*** Nozzle Pressure to be measured within the orifice slot with a flattened & bent Pitot Tube equipped Pressure Gauge.**
DO NOT USE PUMP PRESSURE AS NOZZLE PRESSURE !

PEM 1854-Jet

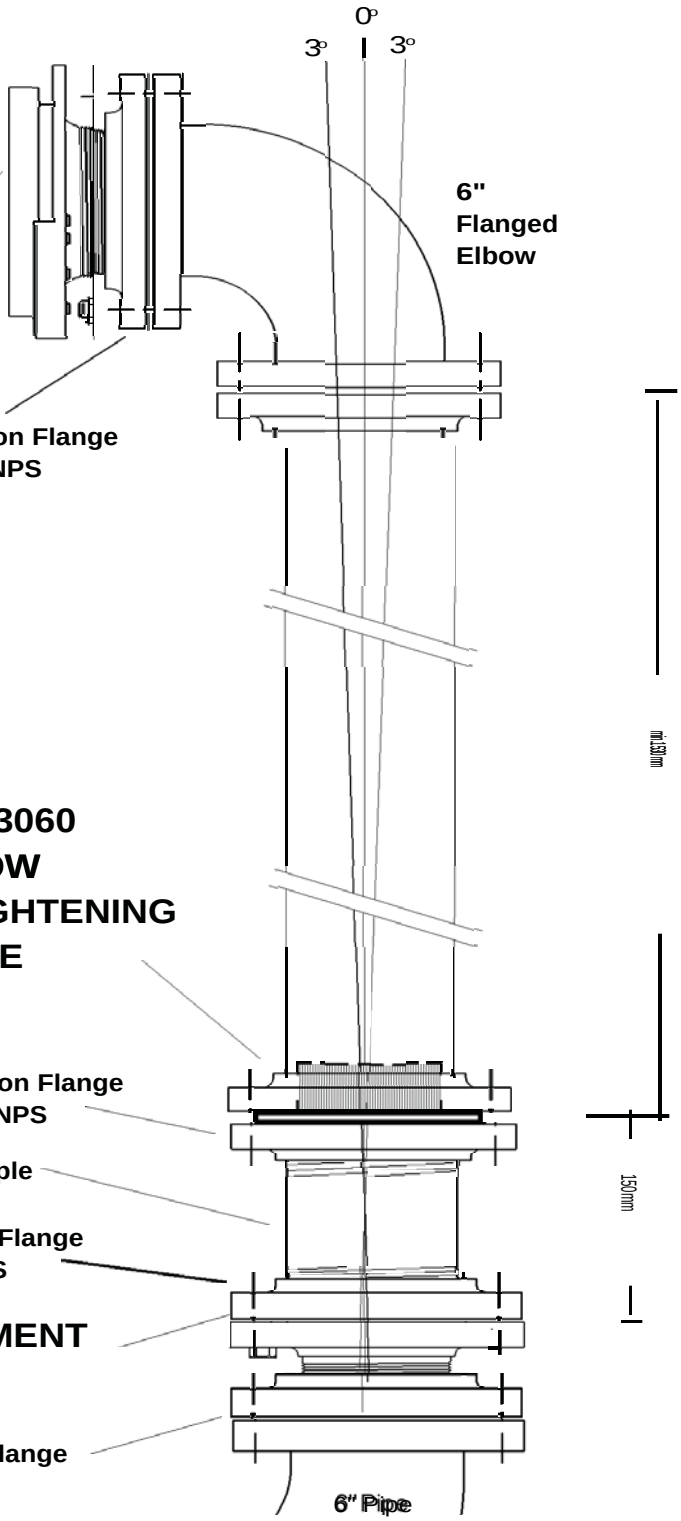


PEM 1854-08 ON PVC INSTALLATION SUGGESTION



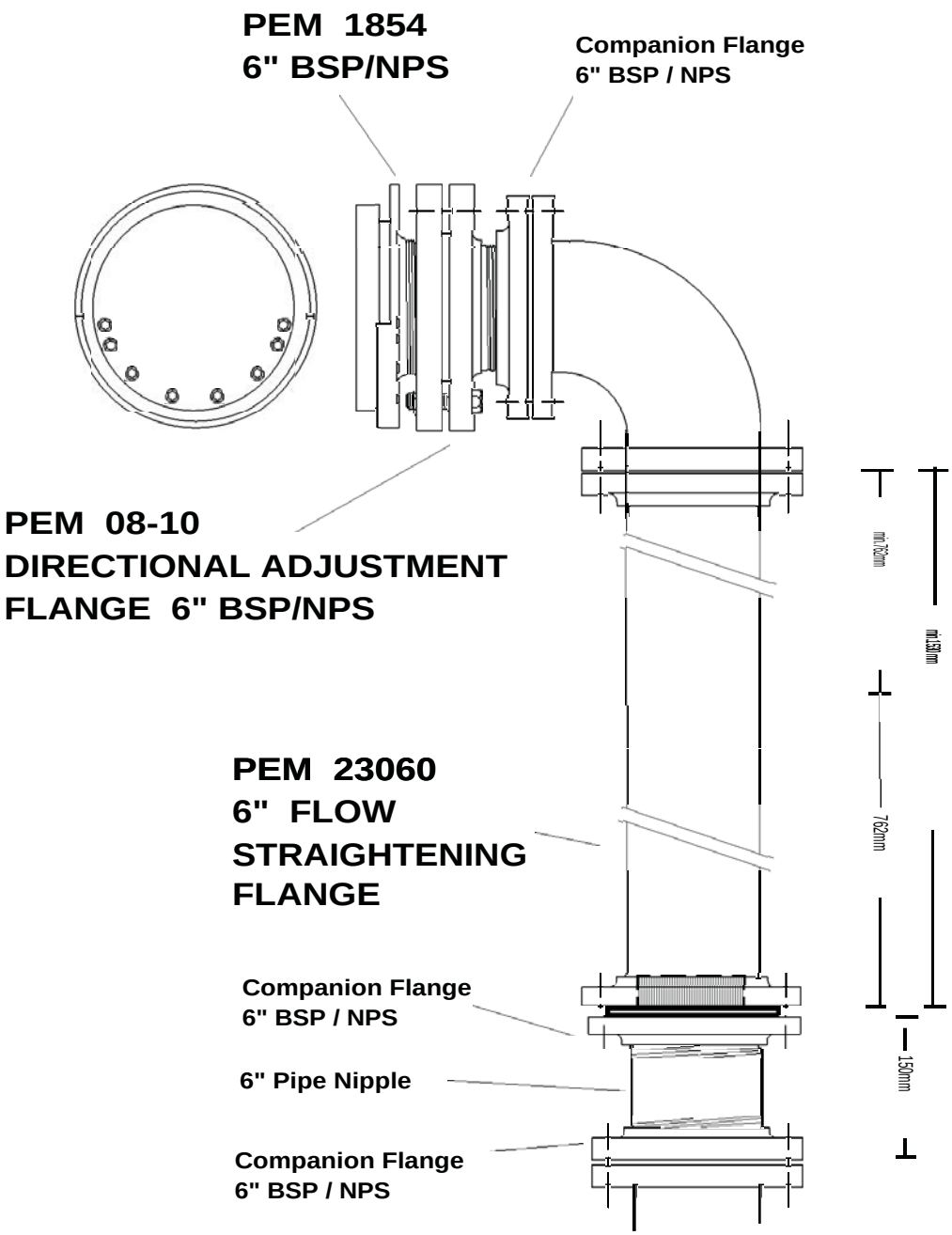


PEM 1854
6" BSP/NPS

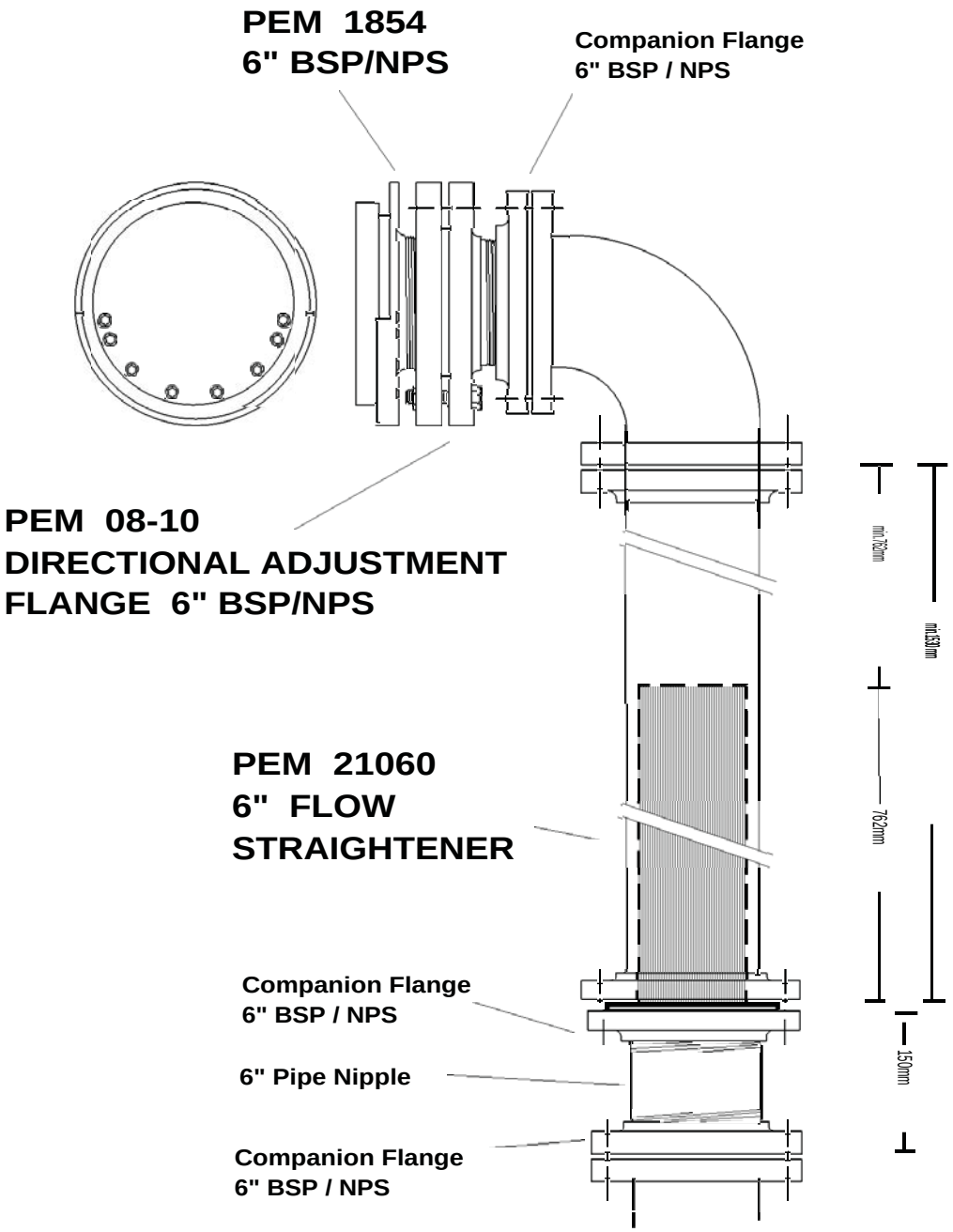


PEM 1854 Suggested Vertical Installation with separate PEM 08-10 Adjustment Flange & 23060 Flow Straightening Flange

PEM 1854 # 2	20060512-7 replaces 950724-7	PEM FOUNTAIN CO.

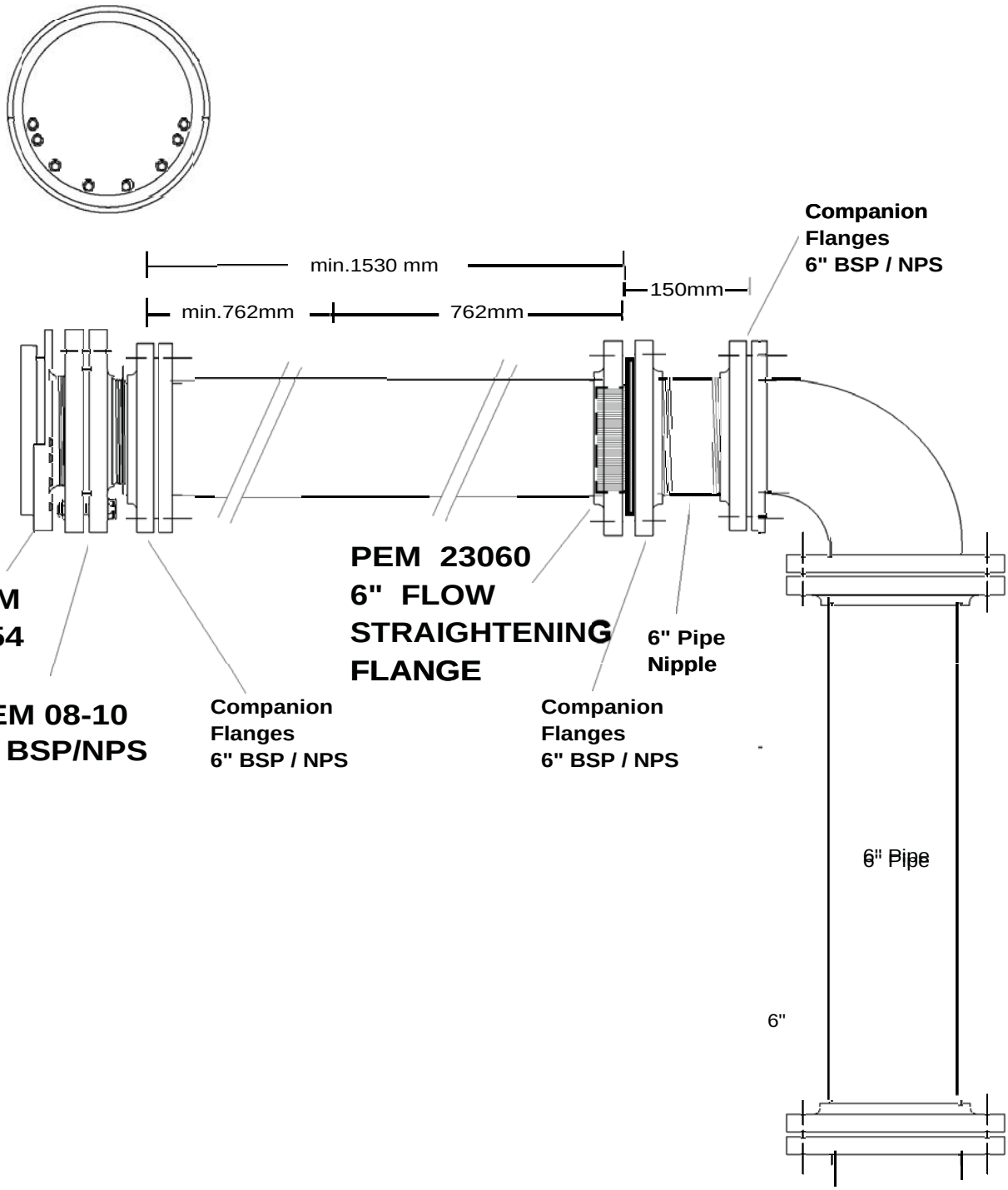


PEM 1854 Suggested Vertical Installation with PEM 08-10 Adjustment Flange & 23060 Flow Straightening Flange

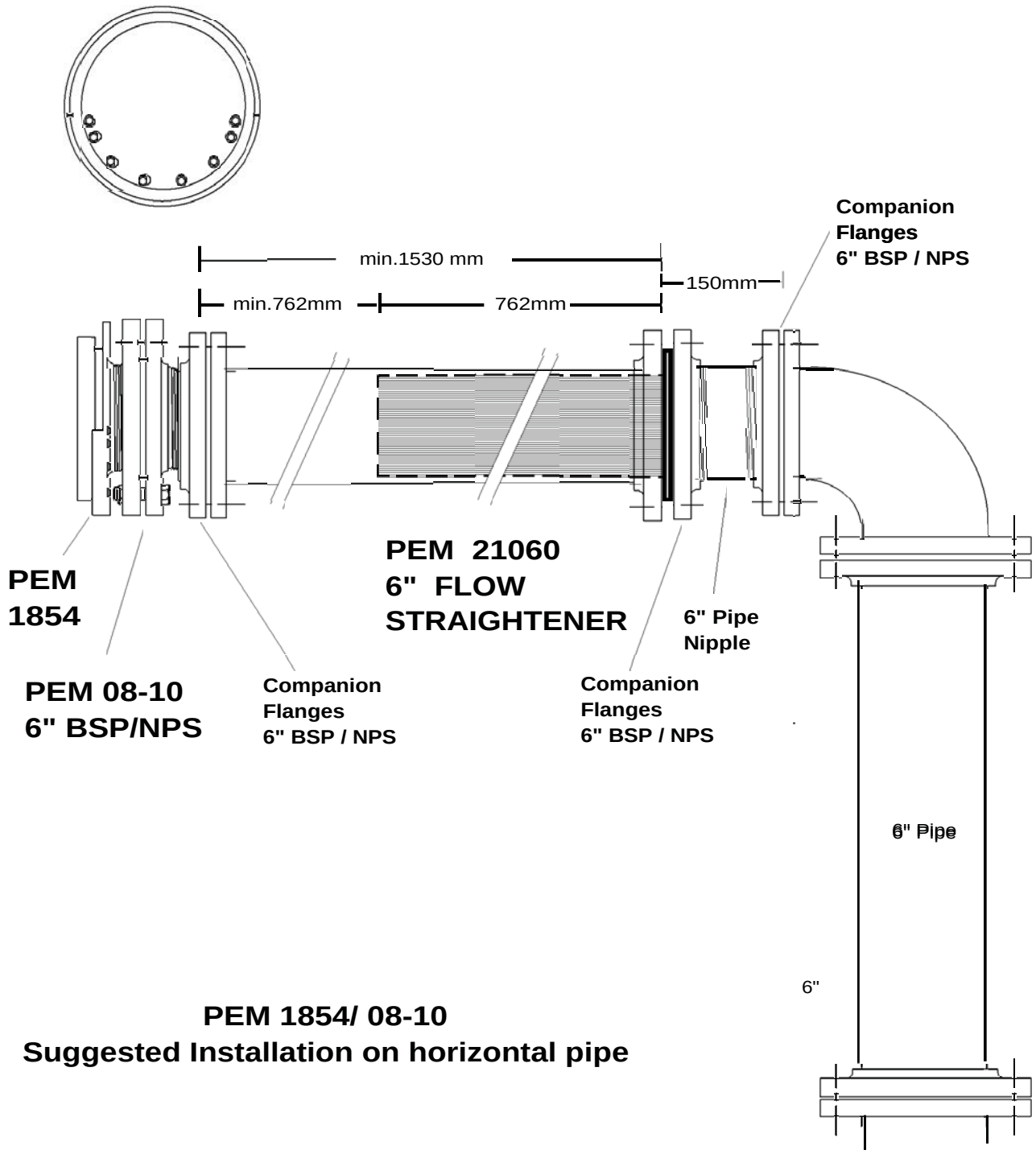


PEM 1854 Suggested Vertical Installation with separated PEM 08-10 Adjustment Flange & 21060 Flow Straightener

PEM 1854 # 4	20060512-9 replaces 950724-9	PEM FOUNTAIN CO.



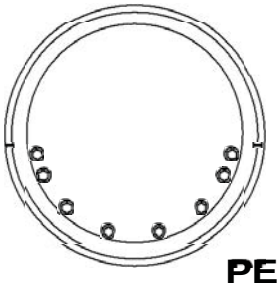
PEM 1854 Suggested Horizontal Installation with PEM 08-10 Adjustment Flange & 23060 Flow Straightener

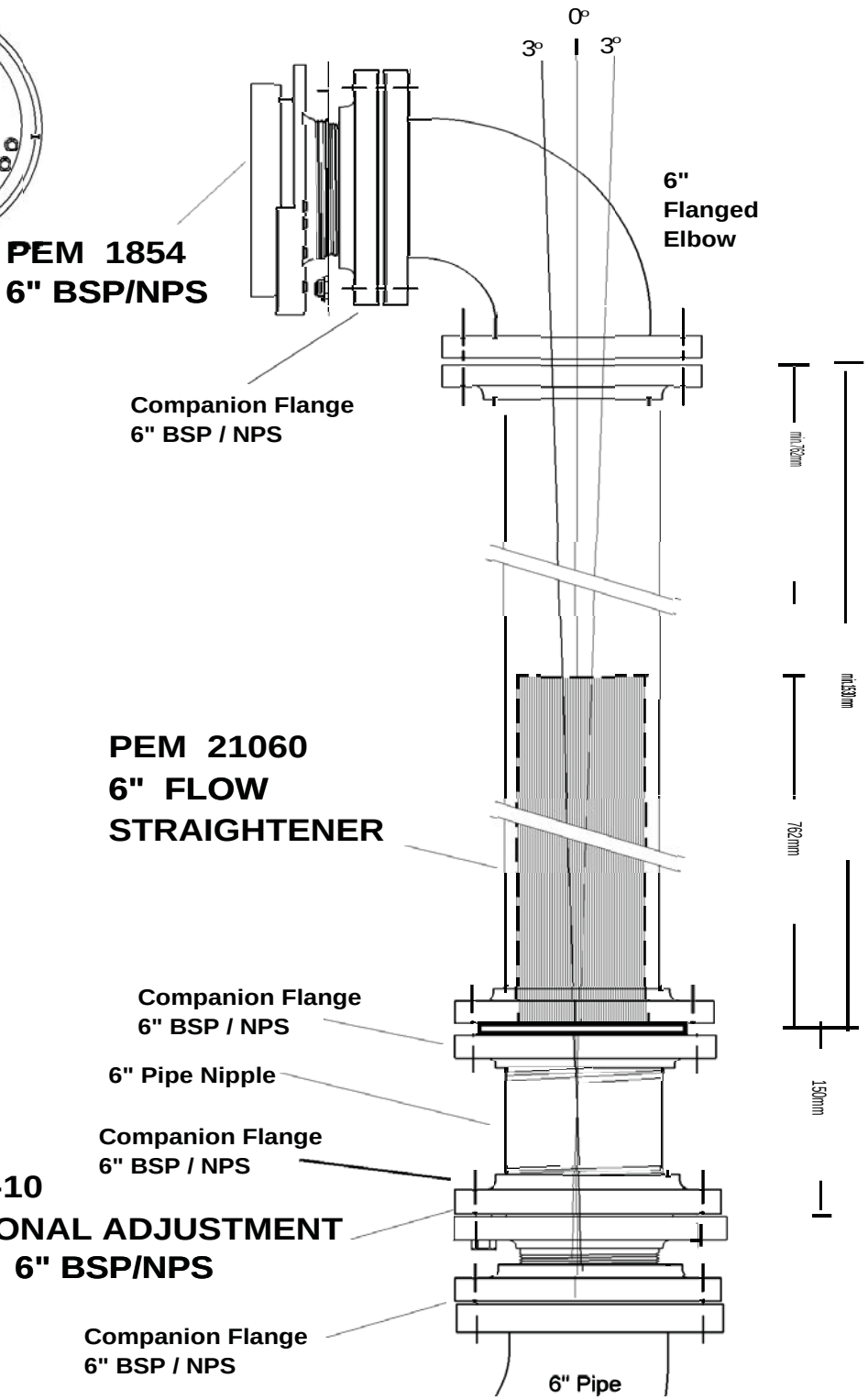


PEM 1854/ 08-10
Suggested Installation on horizontal pipe

PEM 1854 Suggested Horizontal Installation with PEM 08-10 Adjustment Flange & 21060 Flow Straightener

PEM 1854 # 6	20060512-5 replaces 950724-1	PEM FOUNTAIN CO.





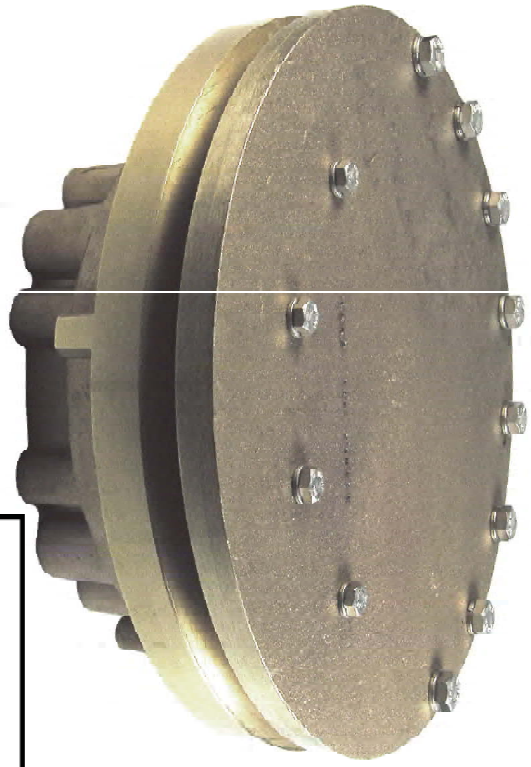
PEM 1854 Suggested Vertical Installation with separated PEM 08-10 Adjustment Flange & 21060 Flow Straightener

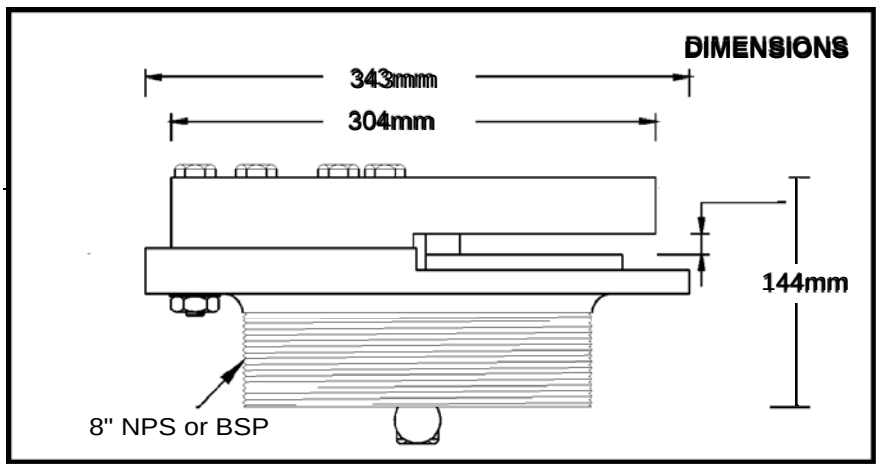
PEM FOUNTAIN CO.

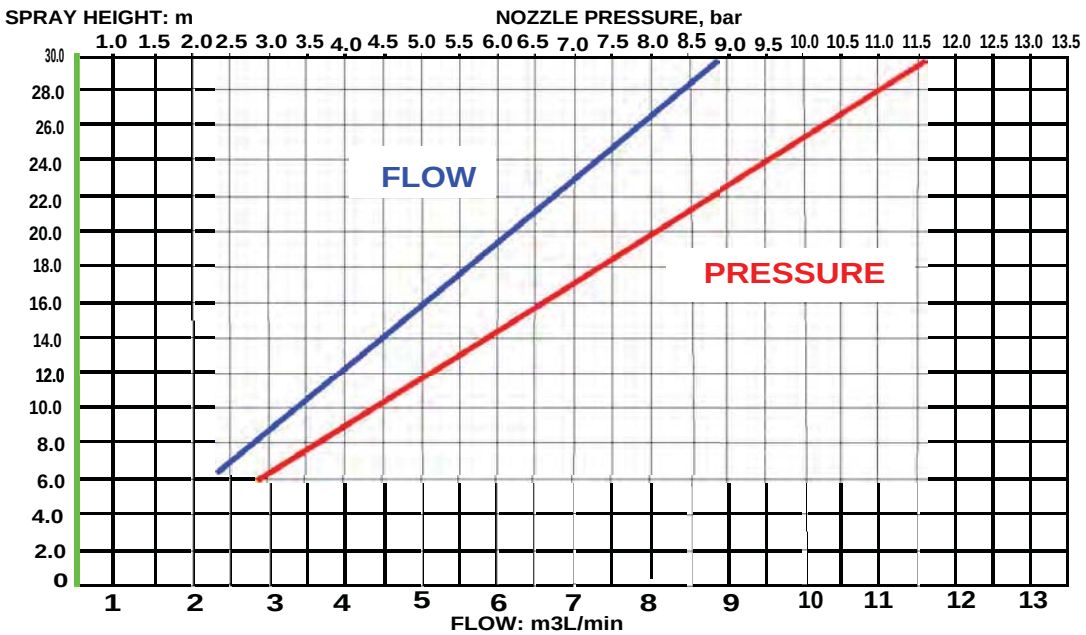
2010.07.10
replaces all previous

PEM 1858

8" WATER SCREEN JET







PERFORMANCES

Spray Height : m
1 m = 3.28 Feet
Spray Width =
2.2 x Sprayheight

PRESSURE in bar
(1 bar = 14.22 PSI
1 bar = 10.0m 0

FLOW in:m3/min
(1000L/min
264.2 US-GPM)

DESCRIPTION

PEM 1858 WATER SCREEN JET

The shown spray effect was created with appr.300 Pump HP at 60Hz electrical power.
This screen jet is made of Aluminum Bronze, Stainless Steel fitted.

This jet requires a **PEM 08-12, 8" BSP/ NPS Adjustment Flange** for fine off vertical adjustments away from projection.
For installation suggestions see PEM 1854, but use pipe size as required for above flows
Appr. Shipping Weight: Plywood crated **PEM 1856**: 40.0 Kg , with **PEM 08-12**: 100.0Kg

SPRAY APRON MODULES

PEM M701

PEM M 701-200
PEM M 701-300

For flush into surface installation of SPRAY APRONS / SPLASH PADS with stainless steel spray nozzle centered in the 18.375mm - 0.750" thick Clear Poly. Carbonate Plastic lens. Not for submersible (under water) use. Modules are surface self draining. Grout frame, fixture body & face ring are made of lead free cast bronze, all stainless steel fitted. Choice of 10 different spray effect, stainless steel nozzles with O ring seal. Vertical Sprayheight Adjustment & Alignment of spray effect up to 2° off vertical, after Installation above while spray is active. Installation & Winterizing Cover included.
Construction of Modules comply with U.S.CPSC requirement, of 2009. 02.10.for lead free materials accessible to children.
PEM M701-200 is available with a selection of 7 spray nozzles to create different spray effects up to 3.0-4.0m / 10' -13' sprayheight, brilliantly illuminated with 4 x high power LED Lamps, either in white, colored or RGB color changing with remote DMX or direct infra red adjustment.
PEM M701-300 for use with Water Switch is available with a selection of 3 spray nozzles to create spray effects activated by computer program(s), creating highly visible water displays up to 3.0-4.0m / 10' -13' sprayheight, brilliantly illuminated by 5W high power LED Lamps either in white, colored or RGB color changing with remote DMX control . Each unit (without affecting any other) can be individually and instantly activated for sequenced or dancing water displays.

USE RECOMMENDATION

For safety reasons, use and do not exceed spray velocities stated on Page 11 to comply with applicable ordinances.
Installations to comply with and be approved for all local building and health department codes .
All PEM M701 installations to allow Illumination only when water/ spray is flowing to cool fixtures, use flow-switch at pump discharge (available from local centrifugal pump suppliers).
Where flush into lens mounted nozzles are required: Order same as 'F-M' Nozzle (Available for Soft Column Sprays)

INDEX:

Edition 2013-9-02; Replaces all previous editions and is subject to change without notice.

PEM M 701-200 MODULE

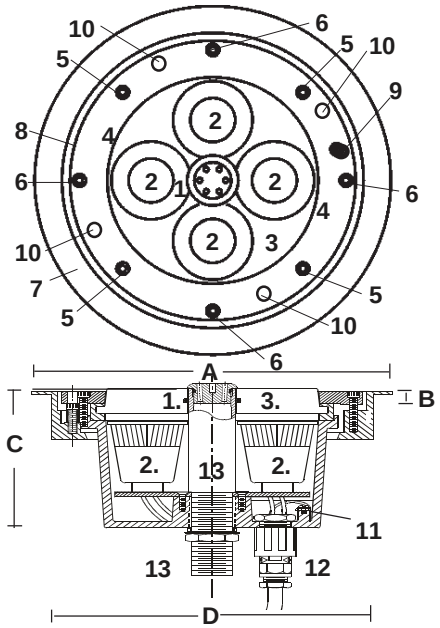
Not for Water Switch !

PARTS

1. Spray Nozzle (Choice of 7)
2. MR 16, 5 W, 12VAC / 24 VDC LED Lamp (4)
3. Clear Poly. Carbonate Plastic Lens 18.375mm / 0.750" x 143mm / 5.625"
4. Face Plate
5. Face Plate Bolts (4)
6. Module Bolts to Grout Frame (4)
7. Grout Frame
8. Surface Drain Opening, 5mm/ 0.19"
9. Valve Key Access Opening (701-3)
10. Access Openings (4) for levelling
11. Epoxy Cable Entry Encapsulation
12. 4 Conductor Plug In Connection for LED's
13. 3/4" NPS/BSP Red Brass Pipe

DIMENSIONS

A - 222mm / 8.740"
B - 5mm / 0.200"
C - 112mm / 4.410"
D - 200mm / 8.000"



PEM M701-200 MODULE with Casing M701-210

With Installation Cover

DIMENSIONS:

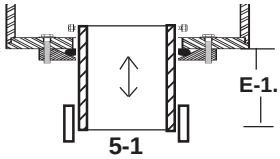
A. 600mm / 23.620 "
B. 5mm / 0.200"
C. 182mm / 7.160"
D. 136mm / 5.350"
E-1 50 / 75mm (2" / 3") +
E-2 10 / 50mm +

PARTS

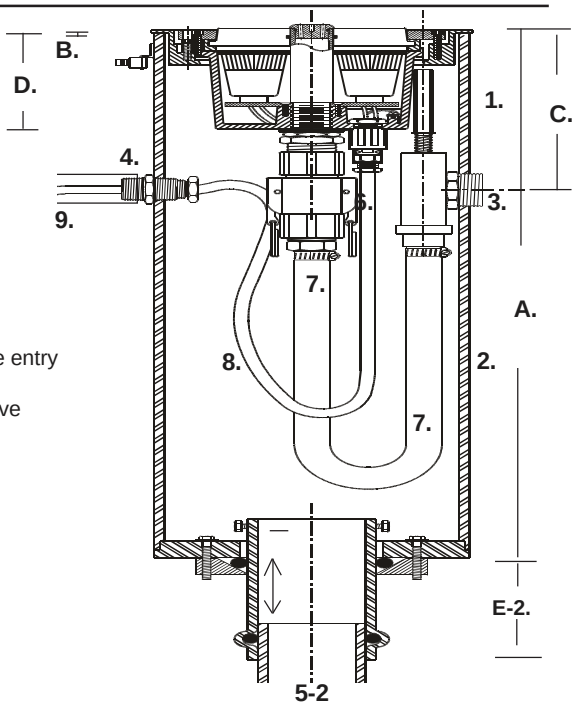
1. PEM 701- 200 Module
2. Casing, 8" PVC Pipe
3. 1" NPT/BSP Supply Connection
4. PEM J13-5 Conduit Cordseal for electrical cable entry

5-1. SAE , 3" PVC 80 Adjustable Casing Drain
5-2. Metric 75mm PVC, P10 Adjustable Drain Sleeve

6. Sprayheight adjustment valve
7. Flex Tube connecting valve to module with Quick Connect Coupling
8. Electrical cable connecting supply with Module.
9. 3/4" / 20 mm Electrical Direct Burial Conduit



SAE Drain Connection



Metric Drain Connection

M 701-200 NOZZLE PERFORMANCES

All Nozzles except M701-233 not for M701-300

METRIC

M701-230			M701-231			M701-233			M701-244			M701-246			M701-255				M701-256			
V	FL	MC	V	FL	MC	V	FL	MC	V	FL	MC	V	FL	MC	V	FL	MC	H	V	FL	MC	H
m	L	m	m	L	m	m	L	m	m	L	m	m	L	m	m	L	m	m	m	L	m	m
1.0m	7.5	1.50	1.0m	24	5.7	1.0m	44	14.7	1.0m	14	3.8	1.0m	27	6	1.0m	15	3	0.4	1.0m	28	8	0.5
1.5m	8.8	2.15	1.5m	27	7.9	1.5m	52	21.4	1.5m	16	5.1	1.5m	32	9	1.5m	16	5	0.6	1.5m	33	11	0.7
2.0m	9.5	2.84	2.0m	30	9.3	2.0m	56	27.1	2.0m	18	6.0	2.0m	36	10	2.0m	18	6	0.8	2.0m	37	14	0.8
3.0m	12.0	5.27	3.0m	34	12.8	3.0m	69	38.4	3.0m	22	11.0	3.0m	55	19	3.0m	23	11	1.1	3.0m	55	19	1.1
4.0m	14.0	8.54	4.0m	38	18.5	4.0m	80	52.7	4.0m	26	15.0	4.0m	60	25	4.0m	27	18	1.2	4.0m	58	28	1.4

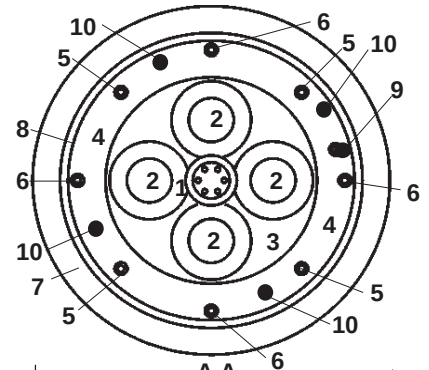
SAE

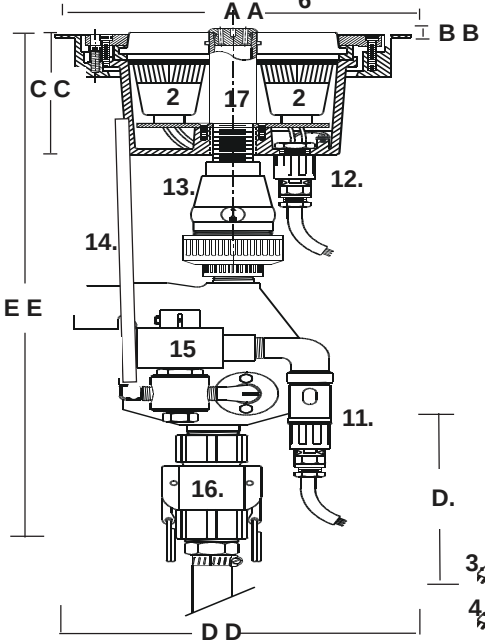
M701-230			M701-231			M701-233			M701-244			M701-246			M701-255				M701-256			
V	FL	MC	V	FL	MC	V	FL	MC	V	FL	MC	V	FL	MC	V	FL	MC	H	V	FL	MC	H
F	G	F	F	G	F	F	G	F	F	G	F	F	G	F	F	G	F	F	F	G	F	F
3'	2.2	5'	3'	6.1	18.1	3'	11.4	43	3'	3.7	12'	3'	7.2	23'	3'	4.0	10'	1.3'	3'	7.7	30'	1.7'
5'	2.4	8'	5'	7.2	26.0	5'	13.8	69	5'	4.3	14'	5'	8.5	30'	5'	4.3	17'	2.0'	5'	8.8	43'	2.3'
8'	3.0	15'	8'	8.5	35.8	8'	16.4	105	8'	4.8	16'	8'	9.6	48'	8'	5.6	29'	2.7'	8'	9.0	60'	2.7'
10'	3.5	19'	10'	9.0	42.0	10'	18.3	112	10'	5.9	18'	10'	14.6	63'	10'	6.1	36'	3.6'	10'	14.6	69'	3.8'
12'	4.0	29'	12'	9.8	54.5	12'	20.1	155	12'	6.9	20'	12'	15.9	78'	12'	6.9	59'	4.0'	12'	15.9	89'	4.6'

Performance Codes: **V** = Sprayheight, **m =** Meter, **F =** Feet, **FL =** Flow, **L =** L/min, **G =** USGPM, **MC =** Pressure, **H =** SprayDiameter

Selection of Spray nozzle(s) to be made with order. For safety reasons, do not exceed sprayheight higher than height of smallest children attending. One (1) Spray Nozzle is included in Assembly. If no selection is made; M 701-333 Nozzle will be included. Extra nozzle (s) can be purchased.

MODULE, PEM M 701-300
for use with PEM W 114-1 Water Switch





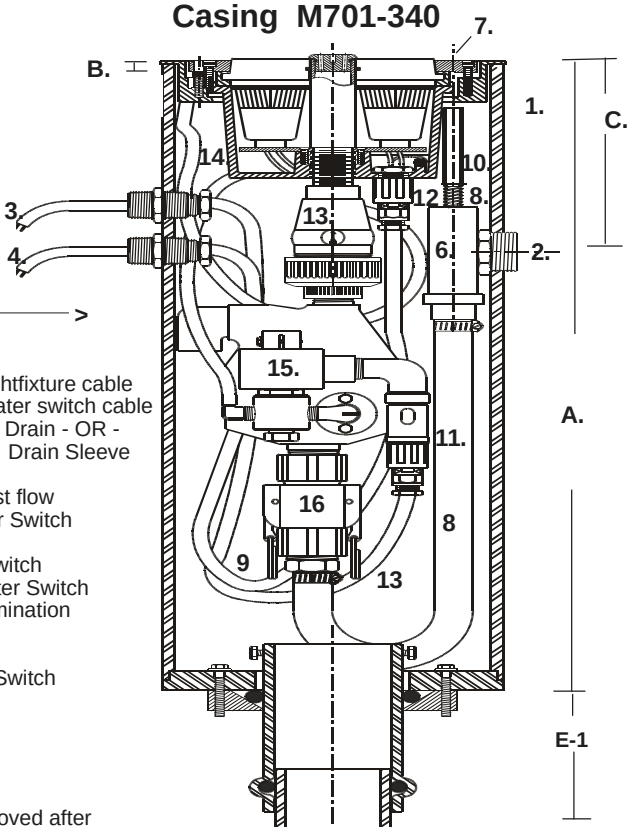
MODULE PARTS

1. Nozzle (Choice of 3)
2. MR 16, 5 W, 12VAC / 24 VDC LED Lamp (4)
3. Clear Poly. Carbonate Plastic Lens
   18.375mm / 0.750" x 143mm / 5.625"
4. Face Plate
5. Face Plate Bolts (4)
6. Module Bolts to Grout Frame (4)
7. Grout Frame
8. Surface Drain Opening, 5mm/ 0.19"
9. Valve Key Access Opening (701-3)
10. Access Openings (4) for leveling
11. Electrical Plug in Connection of Water Switch
12. Electrical Plug in Connection of Illumination
13. Checkvalve
14. Air Tube of Water Switch
15. PEM W114 - M107 Special Water Switch
16. Quick Disconnect Pipe Coupling
17. Red Brass Pipe, 3/4" / 19mm

DIMENSIONS

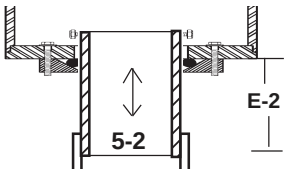
A A 222mm / 8.740"
B B 5mm / 0.200"
C C 112mm / 4.410"
D D 200mm / 8.000"
E E 470mm / 18.500"

PEM M 701-300 Module with Casing M701-340



Metric Drain Connection

With Installation Cover



SAE Drain Connection

Casing with Module Parts: >

1	PEM 701-300 Module
2	1" NPT/BSP Supply Connection
3	PEM J13-5 Conduit Cordseal for lightfixture cable
4	PEM J13-5 Conduit Cordseal for water switch cable
5-1	SAE , 3" PVC 80 Adjustable Casing Drain - OR -
5-2	Metric 75mm PVC, P10 Adjustable Drain Sleeve
6	Sprayheight adjustment valve
7	Access insert valve wrench to adjust flow
8	Flex Tube connecting valve & Water Switch
9	Electrical Cable from (3) to Module
10	Electrical cable from (4) to Water Switch
11	Electrical Plug in Connection of Water Switch
12	Electrical Plug in Connection of Illumination
13	Checkvalve
14	Air Tube of Water Switch
15	PEM W114 - M107 Special Water Switch
16	Quick Disconnect Pipe Coupling

DIMENSIONS

A	600mm / 23.620 "
B	5mm / 0.200"
C	182mm / 7.160"
D	180mm / 7.080" * (to be removed after
E-1	50 / 75mm (2" / 3") + final, secured placement)
E-2	10 / 50mm +

PERFORMANCES M701-300 NOZZLES WITH WATER SWITCH

METRIC	M701-233			M701-377			M701-389			
	V	FL	MC	V	FL	MC	V	FL	MC	H
	m	L	m	m	L	m	m	L	m	m
	1.0m	46	20	1.0m	45	8	1.0m	49	10	0.6
	1.5m	50	26	1.5m	50	15	1.5m	57	17	0.8
	2.0m	51	32	2.0m	57	19	2.0m	63	23	1.1
	3.0m	60	49	3.0m	73	33	3.0m	78	37	1.3
	4.0m	67	63	4.0m	78	40	4.0m	83	50	1.7

SAE	M701-233			M701-377			M701-389			
	V	FL	MC	V	FL	MC	V	FL	MC	H
	F	G	F	F	G	F	F	G	F	F
	3'	12.2	66	3'	12.0	27'	3'	13	33'	2.0
	5'	13.3	79	5'	13.3	50'	5'	16	56'	2.6
	8'	14.8	125	8'	17.0	82'	8'	17	96'	3.8
	10'	15.9	161	10'	19.3	109'	10'	21	121'	4.4
	12'	17.0	181	12'	20.4	132'	12'	23	148'	5.8

Performance Codes: **V** = Sprayheight, **m =** Meter, **F =** Feet, **FL =** Flow, **L =** L/min, **G =** USGPM, **MC =** Pressure, **H =** SprayDiameter

Selection of Spray nozzle(s) to be made with order. For safety reasons, do not exceed sprayheight higher than height of smallest children attending.
One (1) Spray Nozzle is included in Assembly. If no selection is made; M 701-333 Nozzle will be included. Extra nozzle (s) can be purchased.
Use of M701-377 & M701-389 Nozzles in M701-210 Modules & use of M701-200 nozzles except M701-233 in M701-340 not recommended.

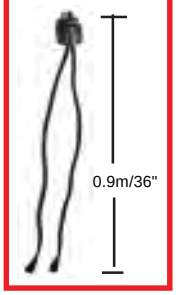
PEM M701 MODULES, CASINGS & PARTS

All PEM M701 installations to allow Illumination only when water/ spray is flowing to cool fixtures, use flow-switch at pump discharge (available from local centrifugal pump suppliers).
For safety reasons, do not exceed spray velocities higher than permissible by local ordinances
Where flush into lens mounted nozzles are required: Order same as 'F-M' Nozzle (Available for Soft Column Sprays)

90701200 **M 701-200** **M701-200 MODULE FOR 8" / 200mm PIPE CASING**
Including: Cast bronze body, lead free cast bronze Facering and Grout Frame, 3/4" NPT / BSP Connection, 1 selected Stainless Steel Spray Nozzle, M701-01 Nozzle Wrench (Free 1 per first 5 Modules of complete order), M701-10,-12,-15 Torque Wrench w. Sockets (Free one set per complete order of 12 modules or more). M701-03 Voltage Test Device (Free 1 per first 5 Modules of complete order) Requires Volt Meter, not included. 3.0m/10' Illumination cable, Aluminum Installation / Winter Cover, Not for Water Switch installation. With limited max 2-o vertical adjustment after installation.
Illumination is not included - must be ordered separately , see page 9 & 10

90701300 **M 701-300** **M701-300 MODULE FOR WATER SWITCH & 8" / 200mm PIPE CASING**
Including: Cast bronze body, lead free cast bronze Facering and Grout Frame, 3/4" NPT / BSP Connection, 1 selected Stainless Steel Spray Nozzle, M701-01 Nozzle Wrench (Free 1 per first 5 Modules of complete order), M701-10,-12,-15 Torque Wrench w. Sockets (Free one set per complete order of 12 modules or more). M701-03 Voltage Test Device (Free 1 per first 5 Modules of complete order) Requires Volt Meter, not included. 3.0m/10' Illumination cable, Aluminum Installation / Winter Cover.
With limited max 1.5-o vertical adjustment after installation.
W 114-m701 Water Switch, 12VAC,24VAC or 24VDC Solenoid Coil, 3.0m/10' Electrical cable. 3/4" Vertical Ball Check Valve, 1" Quick Pipe Coupling for Water Switch
Illumination is not included - must be ordered separately , see page 9 & 10

PEM 00-03
Low Voltage
Test Device



SPRAY NOZZLE SELECTION -
Select Nozzle for module ordered. (Without selection M701- 233 is supplied)
Where flush into lens mounted nozzles are required:
Order as 'F-M' Nozzle (Available for Soft Column Sprays)
For spray velocities of spray nozzles / jets see page 11

90700230 **M 701-230** **For 701 - 200 Modules**, Solid Jet, 6 mm orifice, 5o jet directional adjustable after installation
90701231 **M 701-231** **For 701 - 200 Modules,** Solid Jet, 9 mm orifice
90700233 **M 701-233** **For 701 - 200 Modules,** Solid Jet, 12 mm orifice
90700244 **M 701-244** **For 701 - 200 Modules,** Soft Column, to 25mm / 1.0", with 6 x 3mm orifices
90700246 **M 701-246** **For 701 - 200 Modules,** Soft Column, to 30mm / 1.3", with 12 x 3mm orifices
90700255 **M 701-255** **For 701 - 200 Modules,** Bouquet of sprays with 6 x 3mm x 2.0o orifices
90700256 **M 701-256** **For 701 - 200 Modules,** Bouquet of sprays with 12 x 3mm x 2.0o orifices
90700333 **M 701-333** **For 701 - 300 Modules only,** Solid Jet, 12 mm, 0.5" orifice, for use with 701-300 only
90700377 **M 701-377** **For 701 - 300 Modules only,** Soft Column, to 40mm / 1.5", with 18 x 3mm orifices, for use with 701-300 only
90700389 **M 701-389** **For 701 - 300 Modules only,** Bouquet of sprays with 18 x 3mm x 2.0 o orifices, for use with 701-300 only

LAMPING TOOLS FOR PEM M 701 Modules (1 set with total order)

420-7001 **M701-01** PEM M701 Nozzle Wrench
420-7003 **M701-03** PEM Low Voltage Test Device.
420-7010 **M701-10** Ratched Type, Torque adjustable Wrench for 0 to 10 inch/ lbs / 1 to 10 N.M.
420-7012 **M701-12** For Ratched Torque Wrench: Socket with Hex drive (Allen Key) 5/32" / 4.4mm.
420-7015 **M701-15** For Ratched Torque Wrench: Socket Valve Wrench (1/2" / 12.25mm).

WaterSwitch Voltages:
Maximum operating voltage variance of rated voltage:
+/-10%
Verify at each Water Switch with PEM 003 Voltage Test Device
12 VAC
5.8 AMP. Inrush
3.4 AMP. Holding
24 VAC
2.9 AMP. Inrush
1.7 AMP. Holding
24 DC
0.48 AMP

FACTORY FITTED CASINGS FOR M 701 MODULES

90701210 **M 701-210** **Module M701-200** fitted to 8" / 225mm PVC pipe casing
90701260 **M 701-260*** **Module M701-200** fitted to 8" / 225mm, 304 Stainless Steel casing
90701340 **M 701-340** **Module M701-300** with Water Switch fitted to 8" / 225mm PVC pipe casing
90700370 **M 701-370*** **Module M701-300** with Water Switch fitted to 8" / 225mm, 304 Stainless Steel casing
*** No warranty for stainless steel casings & parts in high salinity soils - Use long lasting CPVC casings!**

INCLUDED FITTINGS OF FACTORY SUPPLIED CASINGS OR REQUIRED FOR SELF SUPPLIED & FITTED PVC CASINGS FOR PEM 701 MODULES

90701221 **M 701-221** Spray adjustment valve, with J13-7 bulkhead seal, 1" NPT / BSP
90701222 **M 701-222** Valve wrench (200mm / 8" x 4mm / 0.187" hex) (1 included per complete order of 5 or more)
90701223 **M 701-223** PEM J13-5, 3/4" > 1/2" NPT / BSP, Bulk Head Seal cable to conduit (1 per M701-200, 2 per M701-300)
90701224 **M 701-224** 25mm / 1.000" O.D. x 1.0m / 39.37" flex tube with clamps.
90701225 **M 701-225** Long Handle Drain Compression Wrench (1 included per complete order of 5 or more)
90701228 **M 701-228** Set of 4 x Holding Clamps for Casing Installation Rods. (4 Rods not included)
90701334 **M 701-334** W 114 Water Switch, 12VAC,24VAC or 24VDC Solenoid Coil, 3.0m/10' Electrical cable,
90701335 **M 701-335** 3/4" Vertical Ball Check Valve for Water Switch
90701339 **M 701-339** 1" NPT/BSP Quick Pipe Coupling for Water Switch
19mm/ 0.750" PVC Bottom Plate Only with Drain Fittings for PVC or St. St. casings.

Exact I.D. of PVC pipe casing must be given with order!

90701416 **M 701-016** 8" / 200mm, PVC Bottom Plate with 3" / 75mm, Adjustable Metric Drain
90701417 **M 701-017** 8" / 250mm, PVC Bottom Plate with 3" / 75mm, Adjustable SAE Drain

For description of nozzles see page 4

M 701 SPRAYS
PERFORMANCE ILLUSTRATIONS
At spray heights of 1.0m (3.28'), 2.0m (6.67') & 3.0m (10.0')


M 701-230


M 701-231


M 701-244


M 701-246


M 701-377

SELECTION OF SPRAY NOZZLES FOR M701-200 (Do not use M701-300 Series Nozzles, except # 233 / 333 !)
Select 200 /210 Series Spray Nozzle with order, without selection; M 701-244 Nozzle will be supplied. Extra nozzle (s) sold separately
Selection of Spray nozzle(s) to be made with order. For safety reasons, do not exceed sprayheight higher than height of smallest children attending.
One (1) Spray Nozzle is included in Assembly. If no selection is made; M 701-333 Nozzle will be included. Extra nozzle (s) can be purchased.


M 701-255


M 701-256


M 701-389

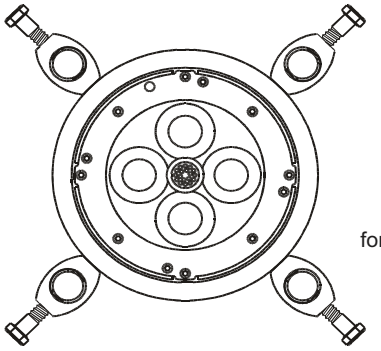

M 701-233/333-A

SELECTION OF SPRAY NOZZLES FOR M701-300 (Do not use M701-200 Nozzles, except # 701-233 / 333 !)
Select 300 Series Spray Nozzle with order, without selection; M 701-333 Nozzle will be supplied. Extra nozzle (s) sold separately
Selection of Spray nozzle(s) to be made with order. For safety reasons, do not exceed sprayheight higher than height of smallest children attending.
One (1) Spray Nozzle is included in Assembly. If no selection is made; M 701-333 Nozzle will be included. Extra nozzle (s) can be purchased.

PEM M 701 CASING INSTALLATION

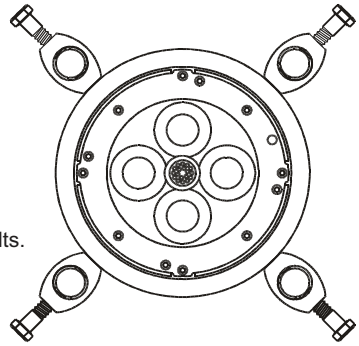
Remove Module from groutframe & lock same onto casing (3 set bolts to lock) before starting. Holding Rods (4) with maximum O.D. of 15mm/ 0.625" (by others) usually steel re-inforcing bars for concrete work. Length of rods depends on actual ground conditions, either be driven deep enough into open ground until they will hold up the casing or cut to length when placed upon concrete sub surface. Use a heavy grease to cover full length rods so that cement cannot hold them (for removing). DO NOT hit horizontal drain pipe. Use PEM 701-225 Long Handle Compression to unlock PVC drain pipe to place drain and only when fitted while casing is levelled while being held by rods, PVC Cement (glue) in connection, then lock in with compression wrench. Use holding rods to hold up casing in position after levelling & drain connection for placing of cement around base of casing - up to holding clamps. After levelling and drain connection of casing, install aluminum installation cover into groutframe to commence cement work. When cement is cured, unlock and pull out rods.(Leave clamps in place to serve as anchors). Then complete cement work (grouting) and surface finish around grout frame.

Module 701-200 on Casing M 701-210

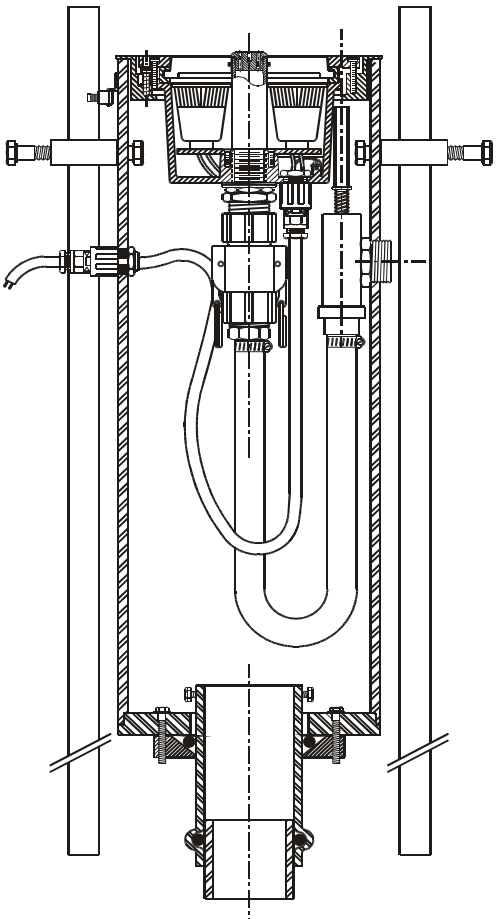


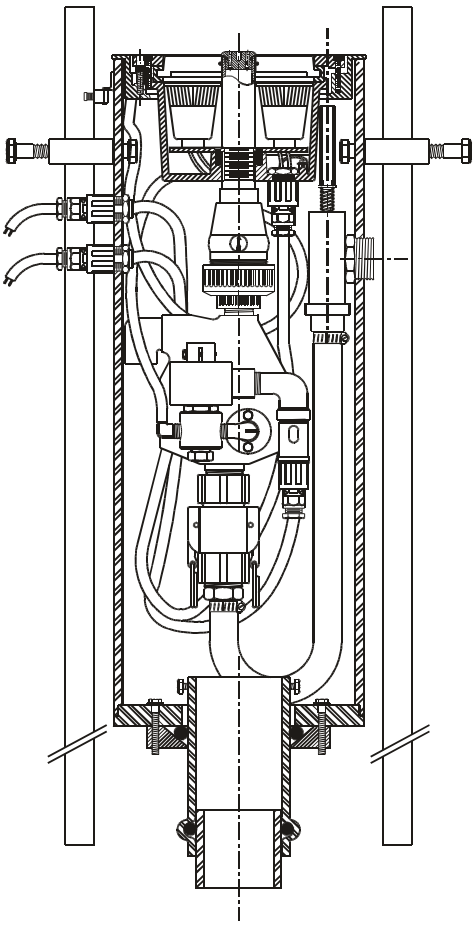
INSTALLATION COVER
for grout frame with O-ring seal & 2 X captive lift up bolts.
Clean & grout frame insert area for O - ring
Save cover for winterizing in cold climates.

Module 701-300 on Casing M 701-340

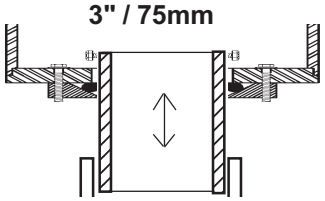


PEM 701 MODULE
on M701 PVC Casing with rod locks





SHOCK ABSORBING DRAIN OPTIONS
3" / 75mm



Metric 75mm, PVC, P10 Half Coupling Height adjustable Drain Connection

SAE, 3" PVC, Schedule 80 Height adjustable Drain Connection

Metric 75mm, PVC, P10 Half Coupling Height adjustable Drain Connection

All PEM M701 installations to allow Illumination only when water/ spray is flowing to cool fixtures, use flow-switch at pump discharge (available from local centrifugal pump suppliers).

PEM M701 MODULE
MAINTENANCE FEATURES

PEM M 701
WITH QUICK DISCONNECT
SUPPLY CONNECTION

PEM M 701
WITH QUICK DISCONNECT
SUPPLY CONNECTION
DISCONNECTED

PEM M 701
WITH WATER SWITCH &
QUICK CONNECT

PEM M 701
WITH WATER SWITCH &
QUICK CONNECT
DISCONNECTED

SPRAY HEIGHT ADJUSTMENT

Find single hole near edge of facering, enter Hex wrench (4.4mm / 5/32") until it locks into valve spindle. Turn slowly with 2 fingers to adjust sprayheight to suit.

VERTICAL ALIGNMENT OF SPRAY

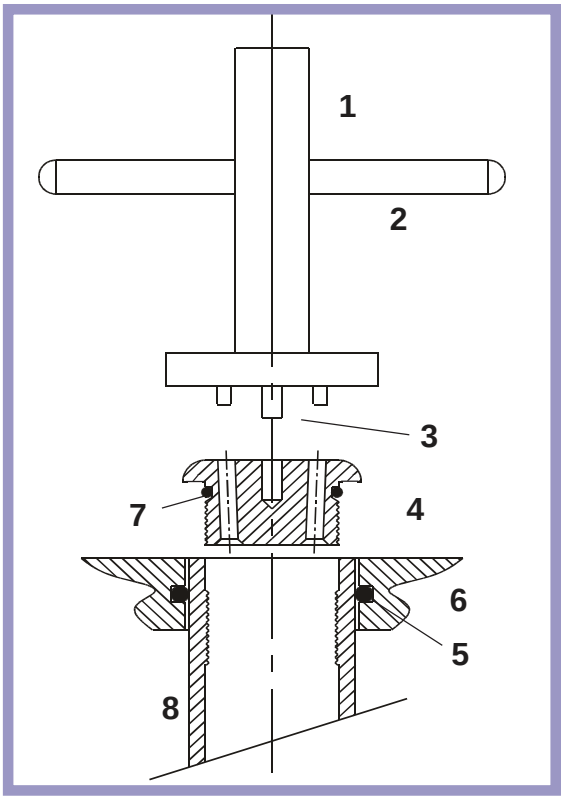
With Hex wrench (4.4mm / 5/32") loosen by 3 full turns the 4 bolts of outer bolt ring, that are holding fixture to groutframe. Then with same wrench, tightening, one turn at a time the 2 bolts opposite to the leaning of the spray, then unscrew one turn at a time the 2 bolts of the side the spray is leaning to. With spray vertical, retighten the 4 bolts holding fixture to groutframe to lock in adjustment!

TO REMOVE FIXTURE FROM GROUT FRAME

Use 2 flat head screw drivers to pry up & out from fixture.

After pryout, lift fixture carefully up and out of groutframe.

PEM M701 MODULE RELAMPING



SEALING /UNSEALING NOZZLE

1. **NOZZLE WRENCH**
   1/2" / 12.25mm Hex Stem for torque wrench with attachment to 50" pounds / 3.40 NM.
   Hold wrench with one hand, torque with the other.
2. **CROSS BAR**
   For hand tightening of nozze
3. **CENTER PIN OF WRENCH**
   to locate wrench to place pins into nozzle orifices.
4. **NOZZLE WITH SPRAY ORIFICES**
   has O ring seal & screws into center tube.
5. **LENS O-RING**
   0.808" / 20.22mm Nominal I.D.
   x 0.125" / 3.53mm Nominal Thickness
6. **LENS, Clear Poly Carbonate Plastic**
   5.625"/143mm Diam. x 0.750"/18.375mm Thickness
7. **CENTER TUBE O-RING**
   1.000" / 25.00mm Nominal .I.D.
   x 0.125"/ 3.53mm Nominal Thickness
8. **CENTER TUBE**
   threaded into fixture bod, sealed with epoxy type thread sealant into fixture body.
9. **NEVER re-use damaged O-rings**, always replace with new O-rings of correct size.

REPLACING LAMPS:

1. With marking pen - make an assembly mark on facering and grout frame. Place nozzle wrench on nozzle and with crossbar in place, unscrew Nozzle.
2. With Hex wrench (4.4mm / 5/32") unscrew and remove 4 x 10/32" x 40mm / 1.500" Bolts of the outer ring of 4 bolts, holding fixture to groutframe. Then unscrew and remove 4 x 10/32" x 40mm / 1.500" Bolts of the inner ring of 4 bolts, fastening the facering for the lens to fixture body.
3. Remove face ring, if required use two flat screw drivers on opposite side and press face ring up and out.
4. Unscrew with nozzle wrench the nozzle and remove to safe keeping.
5. Remove lens and gasket by lifting straight up and out.
6. With lens removed, unplug MR 16 lamps and replace with new ones.

RE-ASSEMBLY:

Test lamps before replacing lens.
With remote control set RGB color changing LED lamps to desired function.
Replace lens with lens gasket attached onto fixture. Replace facering, line up assembly markings. Insert bolts and fasten with hex wrench hand - tight, then torque bolts cross-wise with torque wrench :

(1+4+2+3) to 30" lbs / 3.4 NM

Screw in nozzle by hand, then with nozzle wrench and finally torque nozzle - by fasten torque wrench with attachment to stem of nozzle wrench - to:

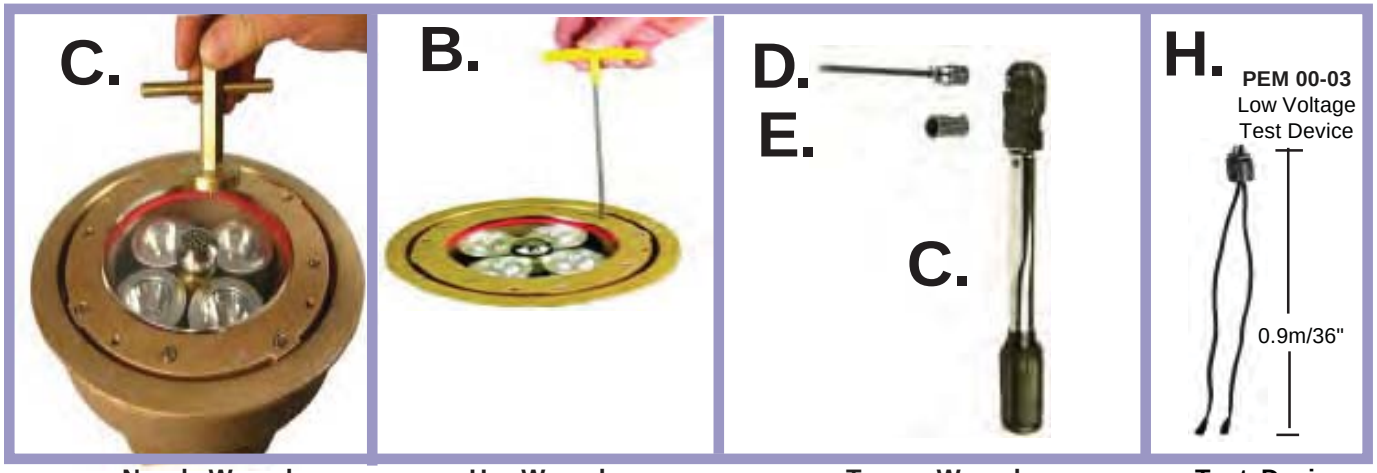
50" lbs / 5.7 NM .

Line up assembled fixture marking to assembly markings on grout frame.Insert bolts into outer bolt ring and fasten hand tight with hex wrench into grout frame.

All PEM M701 installations to allow Illumination only when water/ spray is flowing to cool fixtures, use flow-switch at pump discharge (available from local centrifugal pump suppliers)

TOOLS REQUIRED FOR SERVICING MODULE PEM M701:

See Page 4 for 1 set of lamping tools included with PEM M 701 Modules



Nozzle Wrench **Hex Wrench** **Torque Wrench** **Test Device**

A. 2 x 0.375”/10mm x 8”/ 200mm + Length, **Flat Blade Screwdriver,** *(by others)*

B. 1 x (PEM M701-222) **Hex Wrench** (Allen Key Type) 5/32" x 8" , 4.4mm x 200mm, *(see page 4)*

C. 1 x (PEM M701-220) **Nozzle Wrench** with 1/2" / 12.25mm Hex. Stem, *(see page 4)*

D. **Ratched Type Torque Adjustable Wrench** for 0 to 10 inch/ lbs / 1 to 10 N.M.(NEWTON METER) with 0.375” / 10mm Square Drive *(see page 4).*

E. For (D.) Ratched Torque Wrench: **Socket with Hex drive** (Allen Key) 5/32" / 4.4mm. *(see page 4)*

F. For (D.) Ratched Torque Wrench: **Socket for Nozzle Wrench** (1/2" / 12.25mm). *(see page 4)*

G. Reliable Combination Volt / Ohm Meter. *(by others)*

H. PEM 00-03 Low Voltage Test Device, *(see page 4)*

I. For surface cleaning and polishing of fixture lens: Recommend "FastBrite" Polishing Material
For local supplier see: Internet

j. For minor surface scratches of fixture lens: Recommend "Liquid Resin" Headlight Restauration Kit"'
For local supplier see: Internet

X. Log Book *(by others)* (Kept in safe location offsite, registering every service, reason, time, date & name of service person)

REPLACEMENT MR 16 LED / RGB LAMPS FOR PEM M 701 MODULES

Lamps (4 required) LED, RGB Lamps, MR16, 12VAC/ 24VDC, max. 5W, White , or Colour changing

Can be obtained from other, local sources.

Lamps have to be installed by purchaser at site, requiring above listed tools for installation.

See Page 4 for tools included with PEM M 701 Modules

90400061	**M 701-61**	(4 required) LED Lamp, MR16, 12VAC, 5W, Cool White
90400062	**M 701-62**	(4 required) LED, Lamp, MR16, 12VAC, 5W, Color Red, Green, Blue or Yellow
90400066	**M 701-66**	(4 required) LED Lamp, MR16, 12VAC, 5W, RGB, with remote infra/red adjustment
90400067	**M 701-67**	Remote Infra Red Illumination Control (with Batteries) for infra red adjustable LED lamps.
90400088	**M 701-88**	(4 required) Philips MRg3, (#101-000074-00) MR-16, 24 VDC, 5W, RGB, LED,15° Output Preprogrammed for DMX or Ethernet via Philips - PDS-70MR, 24 VDC Control.Unit
90400091	**M 701-91**	Philips PDS-70MR - DMX or Ethernet, 24 VDC Control Unit (Color Changing remote DMX power & control supply for up to 3 x PEM M701's).
90400092	**M 701-92**	Philips iPlayer 3, Master Control, Program Storage, 2 x DMX Outputs . (Color Changing remote DMX power & control supply for up to 6 x PEM M701's).

PEM M 701 Series

with 30W LED / RGB / Solid Colour Direct or DMX controllable

M 701 SPRAY APRON MODULES WITH RGB OR SOLID COLOUR,DIRECT / DMX 36W, LED PLATE ILLUMINATION

PEM M701 CENTERLINE LIGHT OUTPUT PERFORMANCES AT HEIGHT ABOVE FIXTURE LENS:
With U700 SERIES LED, RGB , 30W, Ring LED Plate In RGB, Solid Red, Green, Blue or White - Direct/DMX Controllable

Height	Lumen	CP-Candle Power
1.0 m / 3.28 Feet	1152 / 482	92 / 38
2.0m / 6.56 Feet	490 / 140	40 / 11
3.0m / 9.84 Feet	302 / 96	24 / 7

(Maximum / Minimum RGB Output Range)

For maximum Ilumination
30W LED's RGB/RGBW
RGB / Direct or DMX
Solid colors:
Cree White
Red
Green
Blue
Amber

PEM U 700 SERIES
SUBMERSIBLE RING LIGHT FIXTURE C-112 LED PLATES WITH
COLOUR CHANGING OR SOLID COLOUR ILLUMINATION WITH LOW VOLTAGE POWER SUPPLY

PEM U 701
FOR 12V-AC WITH INTEGRAL PROGRAMMING, WITH 2 CONDUCTOR 12 VAC CABLE.
TO REPLACE EXISTING HALOGEN - MR16 LAMPS IN PEM M 701 ASSEMBLIES WITH
12VAC RGB - LED PLATES WITH INTEGRAL PROGRAMMING & 2 CONDUCTOR CABLE.
PEM U 702
FOR 12V- AC POWER SUPPLY & 12 VDC - DMX WITH 4 CONDUCTOR CABLE
FOR DMX PARALLEL PROGRAMMING, (2 X 12VAC POWER IN & 2 X 12VDC- DMX IN)
PEM U 703
FOR 12V-AC POWER SUPPLY & 12 VDC - DMX WITH 6 CONDUCTOR CABLE
FOR DMX SERIAL PROGRAMMING,(2 X12VAC POWER IN & 12VDC-DMX , 2 X IN & 2 X OUT)
12VAC & VDC POWER SUPPLIES FOR U701, U702 OR U703
12VAC from Swimming Pool Safety Transformer,
DMX 12VDC from UNIVERSAL POWER SUPPLY "A300' VAC 88V-264V, 47Hz - 63Hz.

PEM U 716
FOR 24VDC WITH INTEGRAL PROGRAMMING WITH 2 CONDUCTOR CABLE (2 X 2 IN)
PEM U 717
FOR 24V VDC POWER SUPPLY & 24 VDC DMX WITH 4 CONDUCTOR CABLE.
FOR DMX PARALLEL PROGRAMMING, (2 X 24 VDC POWER IN & 24VDC-DMX 2 X IN)
PEM U 718
FOR 24V-VDC POWER SUPPLY & 24VDC DMX WITH 6 CONDUCTOR CABLE
FOR DMX SERIAL PROGRAMMING, (2 X 24 VDC POWER IN & 24VDC-DMX 2 x IN & 2 x OUT)
24VDC POWER SUPPLY FOR U716, U717 OR U718
Power & DMX , 24 VDC, 3.0 Amp.
UNIVERSAL POWER SUPPLY "A300'
VAC 88V-264V, 47Hz - 63HZ, 3.0Amp.

CABLE: For factory assembled fixtures for Low Voltage Circuits MAX. 2.7M -9 Feet
PEM 2101 : Type SOW / SOOW, 2/18 AWG / 2 x 1mm H0R7N-F
PEM 2102 : Type SOW / SOOW, 4/18 AWG / 4 x 1mm H0R7N-F
PEM 2103 : Type SOW / SOOW, 6/18 AWG / 6 x 1mm H0R7N-F
Longer supply wiring to junction boxes requires larger shielded & conductors for DMX conductors.
Conductors are color & numerical coded, identification lable is affixed to fixture cable.
No warranty for conductor miss-connections and consequent burned out LED plates!

LED RING PLATE & LED CONTROL ASSEMBLY
for fitting in fixture.with plug in connections to power supply & DMX controls.
Offered and sold separately from fixture at published terms and conditions of sale for 'Lamps'
OR
Supplied by purchaser to Factory for installation at cost (without obligation) of ***:***
LED PLATE ASSEMBLY *with operational testing, and torqued closure of fixture(s) .*

363-40001 **J 36** **Deck Box (Junction Box)** To connect to 1" electrical supply conduit and 3 x M 701 Modules
(To connect up to 3 x M 701 Water Switch Cable & 3 x M701 - Illumination Cable)
(6 x PEM M701's can be connected to 2 x PEM J 36 Deck Boxes.
PEM J36 has internal manual drain valve connecting to 3/4" NPT/BSP drain pipe.
PEM J 36 has 1" NPT/BSPT Conduit connection & internally 6 x 9mm O.D.Cable Seals (PEM J 13-5)
1 x PEM J 36 Deck Box is suitable to service up to **3 x M701's.**
2 x PEM J 36 Deck Boxes are suitable to service up **to 6 x M701's.**
For servicing, drain pond and module casings, open box cover, with hex wrench open drain valve, then slowly open one cable seal to see if water comes up, if so, close seal and wait to try again after 5 minutes, when no water comes up from the cable seal, continue servicing.
All threaded fittings other than cable compresion seals to have thread sealing compound on their threads!!! All Junction Boxes to have single & direct electrical conduit to powersupply. All single Electrical conduits to Junction Boxes to be self draining in visible location outside of pond!

PEM M 701 SPRAY EFFECT VELOCITIES

FLOW VELOCITIES IN FEET PER SECOND OF SPRAYS UP TO 10 FEET SPRAY HEIGHT EJECTED FROM PEM M 900 SPRAYHEADS OR NOZZLES.

THE NOZZLE / SPRAYHEAD IDENTIFICATION REFER TO PAGE # 4 NOZZLE DESCRIPTIONS.

M701-230		M701-233		M701-256	
Spray Height	**FH/S**	**Spray Height**	**FH/S**	**Spray Height**	**FH/S**
2’	2.1	2’	5.0	2’	5.0
3’	3.1	3’	7.5	3’	7.5
4’	4.1	4’	8.6	4’	8.6
5’	5.1	5’	9.7	5’	9.7
6’	6.1	6’	10.8	6’	10.8
8’	8.1	8’	12.6	8’	12.6
10’	10.1	10’	14.5	10’	14.5

FLOW VELOCITIES WERE MEASURED DIRECTLY ABOVE

THE SPRAY HEADS/ NOZZLES HAVING AN INCLINATION

OF 2 - 3 DEGREES OFF VERTICAL - TO MAKE MEASUREMENTS POSSIBLE.

Measuring was done at the PEM test pool with a

GLOBAL FP111 Water Flow Probe, SERIAL # 1233006192

The was set at 3^{o} off vertical Position for insertion of flow probe.

PEM 701's WITH LED / RGB ILLUMINATION

30-1 PEM M701 Module, Day Time

30-3 PEM M701 Module - RGB -DMX - LED - BLUE

30-4 PEM M701 Module- RGB -DMX -LED -

30-5 PEM M701 Module - RGB -DMX -LED - GREEN

30-6 PEM M701 Module - RGB -DMX -LED -

30-7 PEM M701 Module - RGB -DMX -LED - RED

30-8 PEM M701 Module - RGB -DMX -LED -AMBER

Spray Apron with LED - Illumination

POOL SPA & FILTRATION SUPPLIES (Pty) Ltd
90 Oxford St., Ferndale, Randburg, 2194, South Africa
Tel: +27 11 793-1381 - Fax: +27 11 792-3393
Email: info@poolspa.co.za - www.poolspa.co.za

PEM M 900
SPRAY APRON MODULES
2013 - 09

INDEX

PEM M 900, 910 & 920 SPRAY MODULES

PEM M 915-2
Stainless Steel &

Poly Carbonate Cover
with # 2500 LED-RGB Ring Light
Page 11

PEM M 906
Poly Carbonate Cover
with 2 x M 932 Jets & 2 Lights

PEM M 903
Poly Carbonate Cover
with M 933 Jet & 4 Lights

PEM M 903
Bronze Cover
with M 936 Jets & 4 Lights

PEM M 902
Bronze Cover
with M 931 Jets & 2 Lights

PEM M 902
Bronze Cover
with 2 x M 932 Jets & 2 Lights

PEM M 901/904
Solid Bronze Cover
No Lights

PEM M 900 SPRAY APRON MODULES ASSEMBLIES are available with 2 types of covers for illuminated displays.
Type # 1 have cast bronze grated covers for applications other than for children's playgrounds.
Type # 2 have solid, 1/2" (12mm) Poly Carbonate Plastic covers, sand blasted for no slip surface, but with clear windows above light fixtures, which must have special liquid cooling for Halogen lamps above 50W .

PEM M 900 STANDARD ASSEMBLIES are available with cast bronze, solid or grated covers or polycarbonate covers for insertion into10" (250mm) PVC pipe sleeves. Pipe sleeves to be deep enough to store assembly, flextube and cables.
PEM M 910 & 920 HEAVY DUTY ASSEMBLIES are available with cast bronze, solid or grated covers or polycarbonate covers for insertion into 12" (300mm) PVC pipe sleeves. Remote, from top accessible, pipe disconnects and caged assembly for public applications requiring extra maintenance consideration. Pipe sleeves to be deep enough to store assembly, flex. tube and cables.
PEM M 900 SPRAY APRON MODULES are offered several types of spray nozzles to be activated by PEM Water Switches for computer controlled multiple spray & color effects.
PEM M 906 & 920 SPRAY APRON MODULES are supplied with dual PEM 932 Jets, directional adjustable from above after installation. The dual jets are connected to either outlet of the PEM W 114 Water switch and can be oscillated etc.
PEM M 915 SPRAY APRON MODULES with **PEM 954** , 50mm / 2" **Aerated Jet** with 4 Lights and with W 115 Water Switch for an illuminated extreme heavy spray effect, available with bronze or poly carbonate cover for **12" (300mm) pipe sleeve**
PEM M900 SPRAY APRON MODULES require a maximum waterlevel of appr.100mm below grating except 915 Modules that require appr. 400mm 16" of free board under the cover. For suggested connection to supply pipe use 1" (25mm) coiled flexible hose in suitable length to permit lifting up of unit for relamping. Electrical connections are suggested to use a suitable PEM Submersible Junction Box with PEM Cord Seals in bottom of sleeve, connected by a suitable PEM Cordseal to a suitable flexible supply cable, long enough to permit connections being made above ground level.
PEM M 900 SPRAY APRON MODULE ILLUMINATION is by MR 16 or GU9 Lamps, LED or Halogen, 12V - 24V
For extreme color illumination, high intensity dichroic color lenses are available as an option to the light fixtures to produce outstanding color renditions of the spray effects illuminated.
Always advise factory if lamps with higher wattage than 50 Watts are to be used in PEM E 40 under polycarbonate cover.

PEM M 900 SPRAY APRON SPRAY JET PERFORMANCES

PEM M 931 / 932 **Solid, 12.7mm / 0.500" non laminar Stream Jet**

Spray Height	Flow L/min	Inlet Pressure	Spray Height	Flow USGPM	Inlet pressure Feet Head	
1.0m	**28**	**1.2m**	**4'**	**9.3**	**5.6'**	
1.5m	**42**	**2.1m**	**5'**	**11.1**	**8.4'**	
2.0m	54	3.3m	8'	15.3	12.8'	
3.0m	65	4.6m	10'	17.2	15.5'	
4.0m	69	5.2m	12'	18.0	16.4'	**See Page 14 for spray velocities**

PEM M 933 **Multi Stream Jet with 12 Nozzles in 30mm / 1.25" circle. In Playgrounds to 1.5m, 5.0 Ft.**

Spray Height	Flow L/min	Inlet Pressure	Spray Height	Flow USGPM	Inlet Pressure Feet Head	
1.0m	**39**	**4.8m**	**4'**	**10.6**	**15.7'**	
1.5m	**49**	**5.7m**	**5'**	**13.0**	**18.7'**	
2.0m	**57**	**7.8m**	8'	16.9	32.1'	
3.0m	72	12.8m	10'	19.0	42.0'	
4.0m	82	17.0m	12'	21.0	51.0'	**See Page 14 for spray velocities**

PEM M 936 **Soft Stream Aerated Jet , 30mm / 1.25" Diam. In Playgrounds to 2.0m , 6.5 Ft.**

Spray Height	Flow L/min	Inlet Pressure	Spray Height	Flow USGPM	Inlet Pressure Feet Head	
1.0m	**51**	**5.5m**	**4'**	**11.6**	**30.0'**	
1.5m	**72**	**9.2m**	**5'**	**13.8**	**34.5'**	
2.0m	**91**	**12.1m**	8'	17,2	40.7'	
3.0m	130	17.5m	10'	19.1	45.3'	
4.0m	165	24.0m	12'	20.6	49.2'	**See Page 14 for spray velocities**

Suggested Safest Sprayheight in bold letters - The use of automatic pressure regulating valves for down stream pressure reducing and sustaining is recommended to maintain adjusted spray heights regardless of actual pump discharge pressure. **See Page 14 for spray velocities**

PEM M 900 SPRAY APRON SPRAY JET PERFORMANCES
WITH W114-1 WATER SWITCH. For other Jet performances please enquire

PEM M 931 / 932 **Solid, 20mm / 0.500" non laminar Stream Jet.**

Spray Height	Flow L/min	Inlet Pressure into Water Switch	Spray Height Feet	Flow US GPM	Inlet Pressure into Water Switch Feet Head	
1.0m	**45**	**6.5m**				
1.5m	**48**	**14m**	**4**	**12**	**33**	
2.0m	53	20m	**5**	**13**	**46**	
3.0m	60	34m	8	15	86	
4.0m	64	51m	10	16	112	
			12	17	135	**See Page 14 for spray velocities**

PEM M 933 **Multi Stream Jet with 12 Nozzles in 30mm / 1.25" circle. In Playgrounds to 1.5m, 5.0 Ft.**

Spray Height	Flow L/min	Inlet Pressure into Water Switch	Spray Height Feet	Flow US GPM	Inlet Pressure into Water Switch Feet Head	
1.0m	**40**	**14m**				
1.5m	**43**	**17m**	**4**	**11.0**	**43**	
2.0m	**46**	**21m**	**5**	**11.5**	**57**	
3.0m	58	29m	8	13.0	79	
4.0m	65	37m	10	15.3	95	
			12	16.2	111	**See Page 14 for spray velocities**

PEM M 936 **Soft Stream Aerated Jet , 30mm / 1.25" Diam. In Playgrounds to 2.0m, 6.5 Ft.**

Spray Height	Flow L/min	Inlet Pressure into Water Switch	Spray Height Feet	Flow US GPM	Inlet Pressure into Water Switch Feet Head	
1.0m	**46**	**22.5m**				
1.5m	**54**	**27m**	**4**	**11.6**	**56**	
2.0m	**59**	**33m**	**5**	**13.8**	**89**	
3.0m	72	43m	8	17.2	118	
4.0m	80	57m	10	19.0	141	**See Page 14 for spray velocities**

Suggested Safest Sprayheight in bold letters - The use of automatic pressure regulating valves for down stream pressure reducing and sustaining is recommended to maintain adjusted spray heights regardless of actual flow. **See Page 14 for spray velocities**

PEM M 900 ASSEMBLIES

PEM M900 BASIC DIMENSIONS

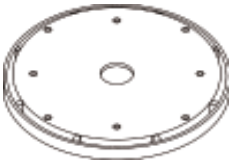
FOR COVER LOAD BEARING TESTS, SEE PAGE 12

FOR APPLICATIONS IN THE USA USE POLYCARBONATE COVERS

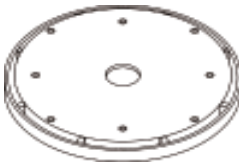
For M915's and others request Dimensional Spec.Page (PDF) or request Auto Cad Drawing of Catalog Number.

PEM M 901

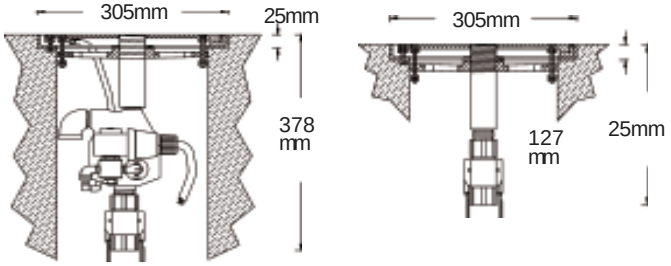
Solid Cast Bronze Cover for 10" (250mm) PVC Pipe Sleeve



PEM M 901-4

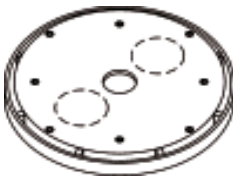


PEM M 901-1

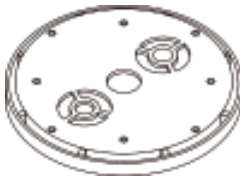


PEM M 902

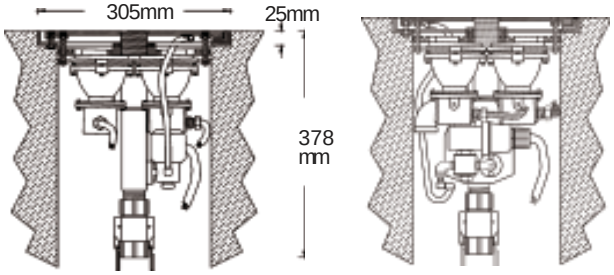
For 10" (250mm) PVC Pipe Sleeve with Water Switch, 1 Jet & 2 Lights



PEM M 902-5
Polycarbonate Cover

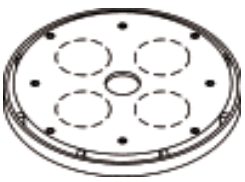


PEM M 902-4
Cast Bronze Cover

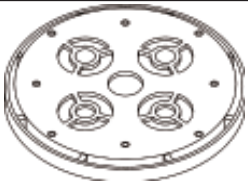


PEM M 903

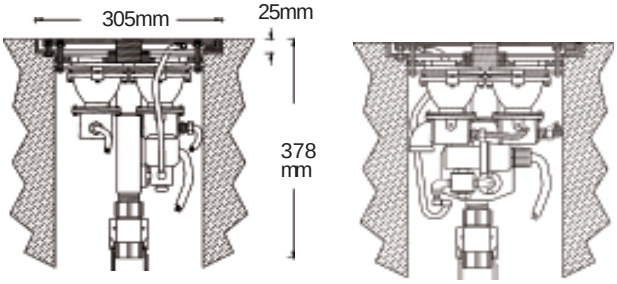
For 10" (250mm) PVC Pipe Sleeve with Water Switch, 1 Jet & 4 Lights



PEM M 903-4
Polycarbonate Cover

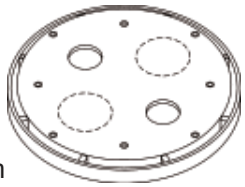


PEM M 903-3
Cast Bronze Cover

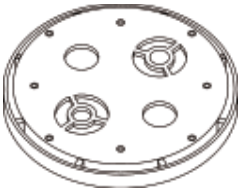


PEM M 906

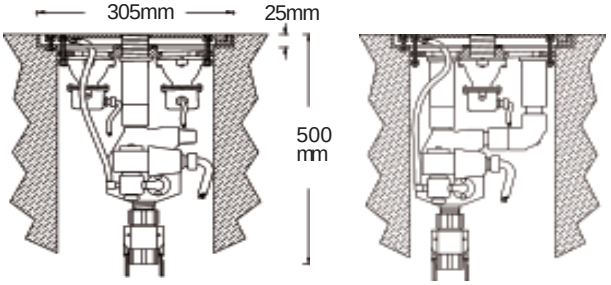
For 10" (250mm) PVC Pipe Sleeve with Water Switch 2 Jets & 2 Lights



PEM M 906-4
Polycarbonate Cover

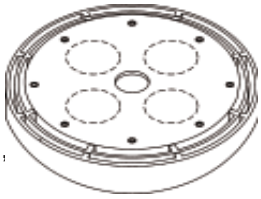


PEM M 906-3
Cast Bronze Cover

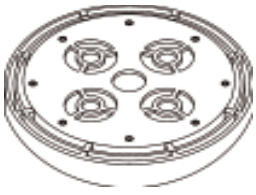


PEM M 910

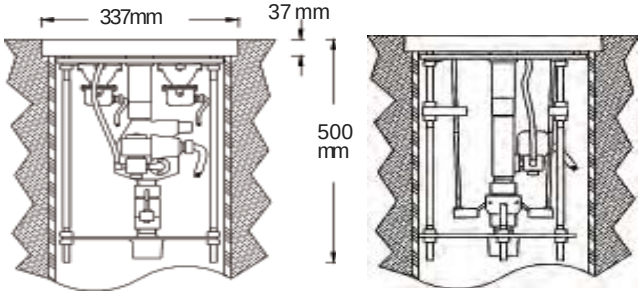
For 12" (300mm) PVC Pipe Sleeve with Water Switch, 1 Jet, 4 Lights, Remote Disconnect 2 Part Assembly



PEM M 910-4
Polycarbonate Cover

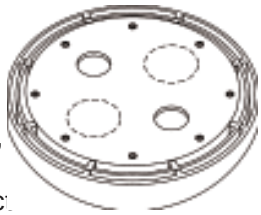


PEM M 910-3
Cast Bronze Cover

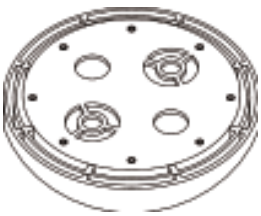


PEM M 920

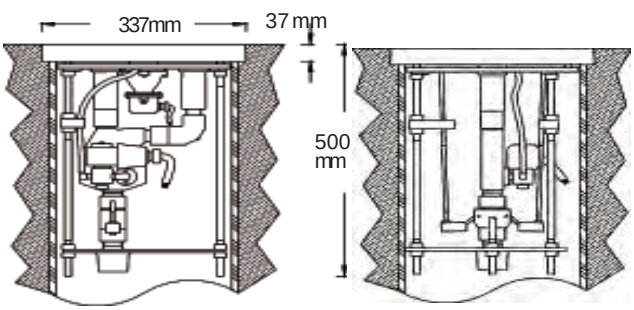
For 12" (300mm) PVC Pipe Sleeve with Water Switch, 2 Jets, 2 Lights, Remote Disconnect 2 Part Assembly



PEM M 920-4
Polycarbonate Cover



PEM M 920-3
Cast Bronze Cover



PEM M 900 SPRAY APRON MODULE ASSEMBLIES

Single jet assemblies are offered with 1 Jet **or** with 1 Jet & Water Switch **or** with Jet, Water Switch and Lights(choice of 2 **or** 4 Lights
Dual jet assemblies are offered with 2 interactive, directional adjustable jets operated by Water Switch and 2 Lights
For daytime use only, where no illumination is required select **PEM M901 & 910**.
For architectural use with lesser illumination select **PEM 902, 910 & 915**
For architectural use with major color changing illumination select units with 4 lights.
For Children Playgrounds select PEM 900 with poly carbonate cover and illumination PEM 906, 910-4, 910-5 & 920-4
Walk over covers are set into self draining Cast Bronze Grout Frame installed flush into pavement.
All assemblies with 1" NPT / BSP Quick Disconnects. See page 14 for spray velocities & check for allowed local spray heights & velocities.

Assemblies for insertion into vertical 10" (250mm) PVC, Schedule 40, Pipe Sleeves or similar.

90101011	**M901-1**	Solid Cast Bronze Cover,Jet*, No Water Switch
90101012	**M901-2**	Solid Cast Bronze Cover,Jet*, Water Switch
90202024	**M902-4**	Cast Bronze Cover with 2 Lights, Jet*
90202026	**M902-6**	Cast Bronze Cover with 2 Lights, Jet* , Water Switch
90203033	**M903-3**	Cast Bronze Cover with 4 Lights, Jet*
90203036	**M903-6**	Cast Bronze Cover with 4 Lights , Jet*, Water Switch
90204032	**M904-2**	Poly. Carbonate (12mm/ 0.5") Cover, Jet*, 2 Lights (LC)
90204043	**M904-3**	Poly. Carbonate (12mm/ 0.5") Cover, Jet*, 4 Lights,(LC)
90204045	**M904-5**	Poly. Carbonate (12mm/ 0.5") Cover, 2 Lights, Jet*, Water Switch (LC)
90204046	**M904-6**	Poly. Carbonate (12mm/ 0.5) Cover, 4 Lights, Jet*, Water Switch (LC)
90205063	**M906-3**	Cast Bronze Cover with 2 x interactive PEM 932 Swivel Jets, 2 Lights, Water Switch(LC) **
90205064	**M906-4**	Poly. Carbonate Cover with 2 x interactive PEM 932 Swivel Jets, 2 Lights, Water Switch (LC) **
9020509	**M909-1**	Winter Cover for M900, Solid Cast Bronze, Overlapping the grout frame and bolted to same (For Freezing Climates)

(LC) = Liquid Cooling of Lightfixture Lenses above 50W

Heavy Duty Assemblies for insertion into vertical 12" (300mm) PVC, Schedule 40, Pipe Sleeves or similar. Walk over covers set into self draining Cast Bronze Grout Frame installed flush into pavement. All assemblies have 1" NPT / BSP Remote Disconnects

90201002	**M 910-2**	Cast Bronze Cover, 1 Jet* with 2 Lights, Water Switch
90201003	**M 910-3**	Cast Bronze Cover, 1 Jet* with 4 Lights, Water Switch
90201004	**M 910-4**	Poly. Carbonate (12mm/ 0.5") Cover, 1 Jet*, 2 Lights, Water Switch (LC)
90201005	**M 910-5**	Poly. Carbonate (12mm/ 0.5") Cover, 1 Jet*, 4 Lights, Water Switch (LC)
90201203	**M 920-3**	Cast Bronze Cover with 2 x interactive PEM 932 Swivel Jets, 2 Lights, Water Switch, (LC)
90201204	**M 920-4**	Poly. Carbonate Cover with 2 x interactive PEM 932 Swivel Jets, 2 Lights, Water Switch, (LC)

Custom made Assemblies for insertion into vertical 12" (300mm) PVC, Schedule 40, Pipe Sleeves or similar. Walk over covers set into self draining Cast Bronze Grout Frame installed flush into pavement .

90205151	**M915-1**	Cast Bronze Cover w.954,15-6,815-1 or 815-5 Jet, 4 Lights, 1 1/2" NPT / BSP.
90205152	**M915-2**	Cast Bronze Cover w.954,15-6,815-1 or 815-5 Jet,, 4 Lights , W115-1 Water Switch, 1 1/2" NPT / BSP.
90205154	**M915-4**	Poly Carbonate Cover w. 954,15-6,815-1 or 815-5 Jet,, 4 Lights, 1 1/2" NPT / BSP,(LC)
90205156	**M915-6**	Poly. Carbonate Cover w. 954,15-6,815-1 or 815-5 Jet,, 4 Lights , W115-1 Water Switch, 1 1/2" NPT / BSP , (LC)
90205609	**M950-1**	Winter Cover for M910,915 & 920, Solid Cast Bronze, overlapping the grout frame and bolted to same (For Freezing Climates)

SPRAY JETS **See Page 14 for spray velocities**

Selection of Jet(s) to be made with order except for M906 and M920, were M 932 Jets are supplied as standard to allow for directional adjustment of sprays.. Spray Jets are set flush into cover, with vertical alignment adjustment of cover, selection of jet to be part of the order for choice of assembly. Assemblies with dual spray jets have a somewhat lesser spray height of the secondary jet.

9020001	**M 931**	**Solid Jet** , 12.7mm / 0.500" non laminar stream , 3/4" NPT/BSP
9020002	**M 932**	**Solid Jet**, directional adjustable after installation, 12.7mm / 0.500" non laminar stream , 3/4" NPT/BSP
9020003	**M 933**	**Multi Stream Jet** with 12 Nozzles in 30mm / 1.25" circle, 3/4" NPT/BSP, Playground Safe to 1.5m, 5'0 Ft.
9020006	**M 936**	**Soft Stream Aerated Jet** , 30mm / 1.25" Diam. 3/4" NPT/BSP, Playground Safe to 2.0m , 6.5 Ft.
9020011	**M 954**	**Soft Foam Spray,** 2" / 50mm, use direct or with W 115 Water Switch. Playground Safe
9020012	**M 15-6**	**Soft Cascade Spray**, 2" / 50mm, use direct or with W 115 Water Switch. Playground Safe
9020022	**M 815-1**	**Solid Spray ,** 16mm use direct or with W 115 Water Switch. Not for Public Playgrounds
9020032	**M 815-5**	**Solid Spray,** 20mm , use direct only r with W 115 Water Switch. Not for Public Playgrounds

WATER SWITCHES USED IN M900 ASSEMBLIES : PEM W114-1, 1" NPT / BSP & W115-1, 1 1/2" NPT / BSP
RECOMMENDED FOR ACTIVATED / INTERACTIVE OR COMPUTER CONTROLLED MULTIPLE SPRAY EFFECTS .
See PEM W 114-1 & W 115-1 Water Switches, 12/24 VAC or 24VDC, 4.5m of 2.5mm2 or 15.0 Ft. of 16/3 AWG size electrical cable.

For Multiple or Musical Water Switch & Illumination Controls see this recommended supplier:
Gilderfluke & Co. (www.gilderfluke.com), Mr. Doug Mobley
(Always state when you intend to use PEM Water Switches to activate the sprays)

All public music uses have to be licenced, the control supplier usually can assist

ILLUMINATION

Must be phase controlled with sprays. (Flow switch at pump or supply permitting lights to work only when sprays are working
Extra liquid cooling connection of Lights with Poly Carbonate Covers & Lights of more than 50 Watts.
For illumination with colored MR 16 NSP Halogen or LED Lamps, specify convex clear lens for lights.see PEM Lightfixture Supplements.(Index # 6)
2 or 4 x PEM E40-LV Cast Bronze Light Fixtures each with 12V-65W Halogen or 5W LED, MR 16 NSP, Clear lens or choice of 4 Colors (Specify).
Each Light Fixture includes either 4.5m of 2.5mm2 or 15.0 Ft. of 16/3 AWG size electrical cable (specify).
OPTIONAL FOR ALL ASSEMBLIES: Stainless Steel Cover & Groutring. Custom made internal parts to suit customer's cover.
PEM Submersible Junction Boxes, Cable Entries, Cordseals and longer or larger electrical cable.

PEM M 900 SPRAY JET / WATER SWITCH REQUIREMENTS

WITH PEM WATER SWITCH (See page 14 for spray velocities of various jets)

Check with all authorities for allowable spray height and velocity at children's playgrounds!

PEM M901/910 with M 931/932, Solid Stream Jet , 12.7mm / 0.5" on PEM W114 Performances

Spray Height Feet	Flow US GPM	Inlet Pressure into Water Switch Feet Head
4	12	33
5	13	46
8	15	86
10	16	112
12	17	135

Spray Height	Flow L/min	Inlet Pressure into Water Switch
1.0m	45	6.5m
1.5m	48	14m
2.0m	53	20m
3.0m	60	34m
4.0m	64	51m

PEM M901/910 with M 933 Multi Stream Jet , 30mm / 1.25" Diam. on PEM W114 Performances

Spray Height Feet	*Flow US GPM*	*Inlet Pressure into Water Switch Feet Head*
4	*11.0*	*43*
5	*11.5*	*57*
8	*13.0*	*79*
10	*15.3*	*95*
12	*16.2*	*111*

Spray Height	Flow L/min	Inlet Pressure into Water Switch
1.0m	40	14m
1.5m	43	17m
2.0m	46	21m
3.0m	58	29m
4.0m	65	37m

PEM M901/910 with M 936 Soft Stream Aerated Jet , 30mm / 1.25" Diam. on PEM W114 Performances

Spray Height Feet	*Flow US GPM*	*Inlet Pressure into Water Switch Feet Head*
4	*11.6*	*56*
5	*13.8*	*89*
8	*17.2*	*118*
10	*19.0*	*141*
12	*21.0*	*187*

Spray Height	Flow L/min	Inlet Pressure into Water Switch
1.0m	46	22.5m
1.5m	54	27m
2.0m	59	33m
3.0m	72	43m
4.0m	80	57m

PEM 915 with 19.0mm / 0.750" Solid Stream Jet on PEM W115 Performances
Nor recommended for children's playgrounds

Spray Height Feet	*Flow US GPM*	*Inlet Pressure Feet*
5	*23*	*30.83'*
8	*27*	*40.00'*
10	*32*	*47.23'*
15	*38*	*64.61'*

Spray Height	Flow L/min	Inlet Pressure into Water Switch
1.0m	75	7.6m
1.5m	87	9.4m
2.0m	100	11.0m
3.0m	120	14.4m
4.0m	127	18.0m

PEM 915 with 40mm / 1 1/2" Aerated Jet on PEM W115 Performances

Spray Height Feet	*Flow US GPM*	*Inlet Pressure Feet*
5	*21*	*50*
6	*25*	*63*
8	*29*	*79*
10	*32*	*86*

Spray Height	Flow L/min	Inlet Pressure into Water Switch
1.0m	69	9.0m
1.5m	80	15.0m
2.0m	100	22.0m
3.0m	120	28.0m

PEM 915 with 50mm / 2" Aerated Jet on PEM W115 Performances

Spray Height Feet	*Flow US GPM*	*Inlet Pressure Feet*
3	*25*	*69*
5	*32*	*105*
6	*37*	*122*
8	*40*	*151*
10	*45*	*177*

Spray Height	Flow L/min	Inlet Pressure into Water Switch
1.0m	100	23.0m
1.5m	120	32.0m
2.0m	143	40.0m
3.0m	165	54.0m

(See page 14 for spray velocities of various jets)

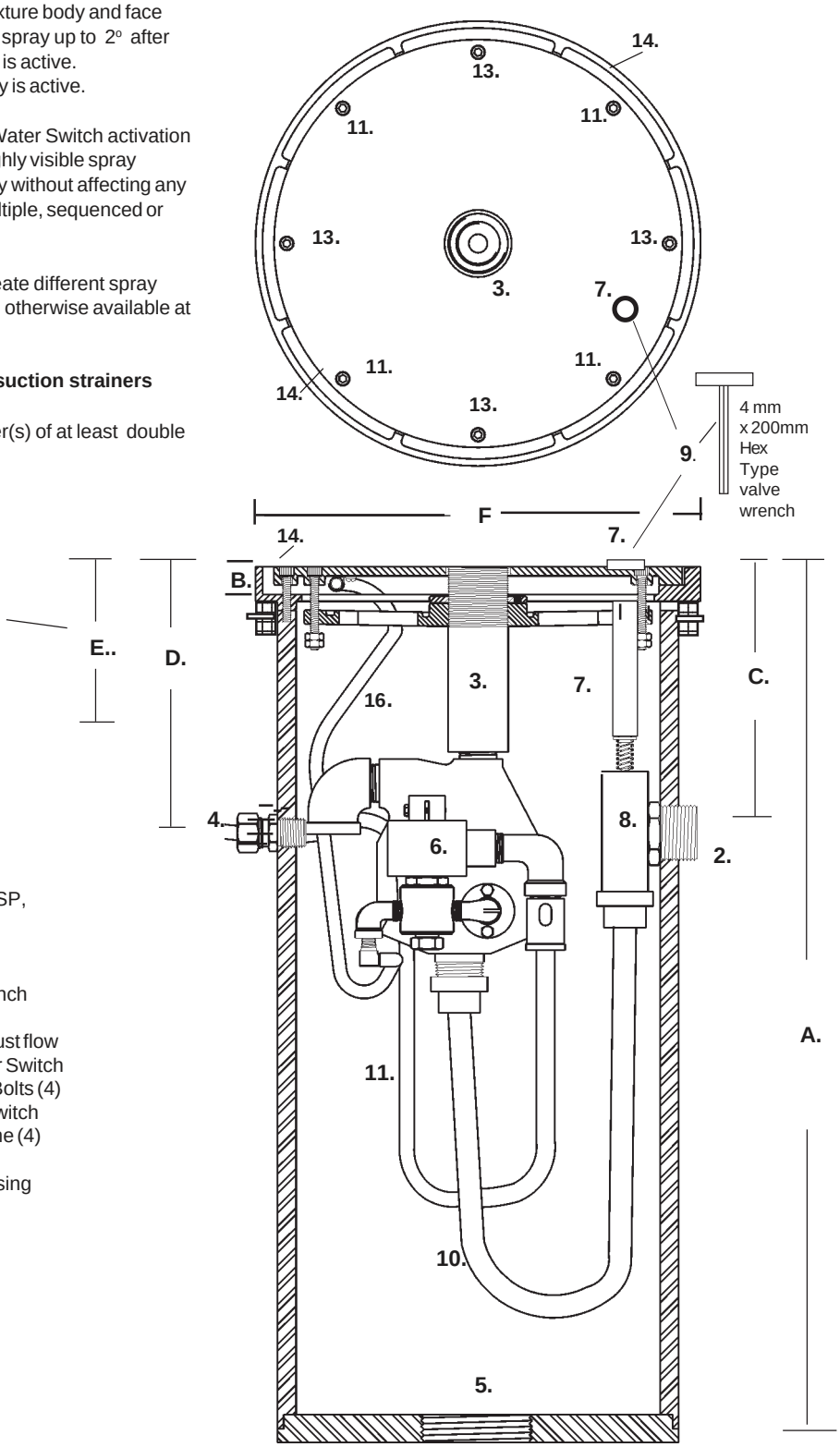
M 901-4-340

PEM M901-4-340 is for flush into surface installation of SPRAY APRONS / SPLASH PAD with centered spray nozzle. Modules are surface self draining, with grout frame, fixture body and face ring made of virgin cast bronze. Vertical Alignment of spray up to 2° after Installation with 4mm Hex key from above while spray is active. Sprayheight adjustment with 4mm Hex Key while spray is active.

PEM M901-4-340 is designed for spray effects with Water Switch activation for computer programmed water displays, creating highly visible spray effects up to 3.0-4.5m / 10' -15' sprayheight Each spray without affecting any other can be individually and instantly activated for multiple, sequenced or dancing to music spray effects of a spray apron.

PEM M901-4-340 has available a variety of jets to create different spray effects, selection of one jet to be ordered with module, otherwise available at extra and additional cost.

Proper Suction Straining is required, suggested suction strainers are PEM 71330 -7280-7290 - C - Series
OR operate system with swimming pool cartridge filter(s) of at least double the required flow size.



E.= Maximum Waterlevel under top of cover plate (Air Space required by jet & water switch)

PARTS

1. PEM M901-2-340 Module
2. 1" NPT / BSP Supply Connection
3. PEM M900 Series nozzle
4. PEM J13-5 Cordseal , 3/4" NPT/ BSP, for Water Switch Cable
5. 3" NPS / BSP Drain Connection
6. PEM W114 Water Switch
7. Lead Tube for valve adjustment wrench
8. Sprayheight adjustment valve
9. 4mm Hex. Type valve wrench to adjust flow
10. Flex Tube connecting valve & Water Switch
11. Elevation & Alignment Adjustment Bolts (4)
12. Electrical cable from (4) to Water Switch
13. Bolts fastening Module to Groutframe (4)
14. Surface drain Slot (5mm)
15. Typical 10" / 250mm PVC Pipe Casing
16. Plastic Tube of Air Snorkel

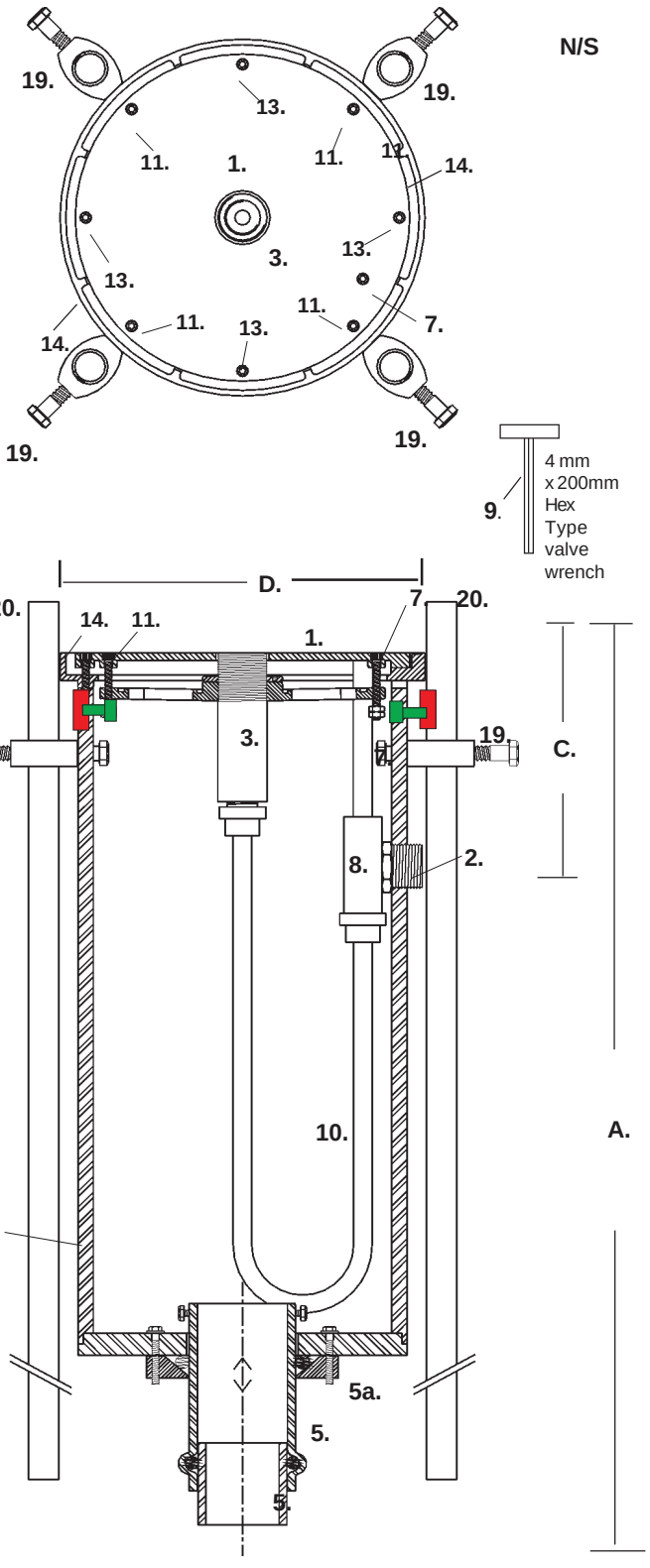
DIMENSIONS

- **A.** 600mm / 23.620 "
- **B.** 25mm / 1.000"
- **C.** 182mm / 7.160"
- **D.** 180mm / 7.080"
- **E.** 150mm / 6.000"
- **F.** 305mm / 12.000"

PEM M901-4-340 SPRAY APRON MODULE
Typical 10" PVC Casing Installation
No flexible drain connection

M 901-1-340

20080503-1



PEM M901-1-340 is for flush into surface installation of SPRAY APRONS / SPLASH PAD with centered spray nozzle. Modules are surface self draining, with grout frame, fixture body and face ring made of virgin cast bronze.

Vertical Alignment of spray up to 2° after Installation with 4mm Hex key from above while spray is active.
Sprayheight adjustment
with 4mm Hex Key while spray is active.

PEM M901-1-340 has available a variety of jets to create different spray effects, selection of one jet to be ordered with module, otherwise available at extra and additional cost.

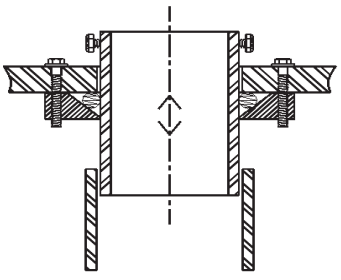
Proper Suction Straining is required, suggested suction strainers are PEM 71330 -7280-7290 - C - Series
OR operate system with swimming pool cartridge filter(s) of at least double the required flow size.

PARTS

1. PEM M901-1-340 Module
2. 1" NPT / BSP Supply Connection
3. PEM M900 Series nozzle
5. SAE or Metric, Drain Connection, height adjustable 3" - 75mm, PVC Pipe, can be adjusted and glued in,**1.1.** when held in final position by support rods.
5a. PVC Compression Flange w. O ring Seal, Inside Bolts tightened with PEM M902-273 Long Handle Wrench
7. Lead Tube for valve adjustment wrench
8. Sprayheight adjustment valve
9. 4mm Hex. Type valve wrench to adjust flow
10. Flex Tube connecting valve & Nozzle
11. Elevation & Alignment Adjustment Bolts (4)
13. Bolts fastening Module to Groutframe (4)
14. Surface drain Slot (5mm)
15. Typical 10" / 250mm PVC Pipe Casing
19. (4) Installation Support Rod Clamps, to permit ease of leveling in multiple installations.
20. **(4) NOT INCLUDED** 10/15mm - 1/2" x Suitable length Concrete Steel Re-Inforcing Bars driven into ground or placed on level surface to support casing for installation.

DIMENSIONS (+ / +/- = or as specified)

A. 600mm / 23.620 "+
B. 25mm / 1.000"
C. 182mm / 7.160"+/-
D. 182mm / 7.160"+/-
E. 150mm / 6.000"+/-
F. 75mm / 3.000" Maximum Water Level
G. 0 / 50mm / 2.000" (Adjustable)
H. 305mm / 12.000"

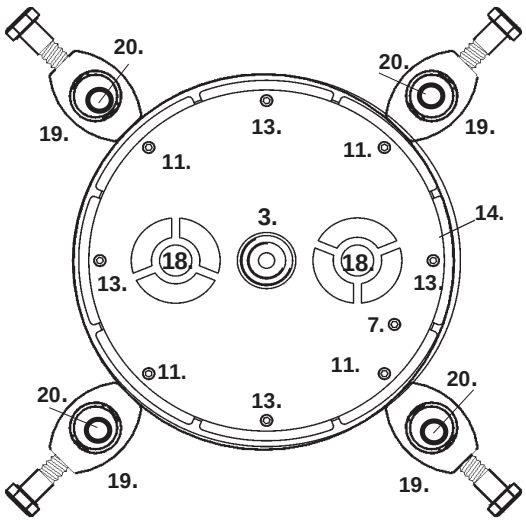


E.= Maximum Waterlevel under top of cover plate (Air Space required by

PEM M901-1-340 SPRAY APRON MODULE

M902-13-340

PEM M902-4-340 Module with cast bronze cover plate is designed for flush into surface installation in SPRAY APRONS / SPLASH PADS .
Modules are surface self draining, with cover plate, lightfixture holder, grout frame, fixture body and face ring made of virgin cast bronze,stainless steel fitted.
Vertical Alignment of spray up to 2º & Spray Height adjustment after Installation with 4mm Hex key from above while spray is active.
PEM M902-4-340 is designed for spray effects with Water Switch activation for computer programmed water displays, creating highly visible spray effects up to 3.0-4.5m / 10' -15' sprayheight, brilliantly illuminated with high power LED's either in white, colored or RGB color changing. or with 50W Halogen lamps in white or colored (to be flow switch controlled, with extra cooling of lamps). Each spray (without affecting any other) can be individually and instantly activated for multiple, sequenced or dancing to music spray effects .
PEM M902-4-340 has available a variety of nozzles to create different spray effects, selection of one jet to be ordered with module, otherwise available at extra and additional cost.
Proper Suction Straining is required. Suggested suction strainers are PEM 71330 -7280-7290 - C - Series - **OR** operate system with in line swimming pool cartridge filter(s) of at least double the required flow size.
Extra cooling of fixtures required for 12V - 65W Halogen Lamps.
Optional Flow Switch by others at pump to operate lights with pumps only.

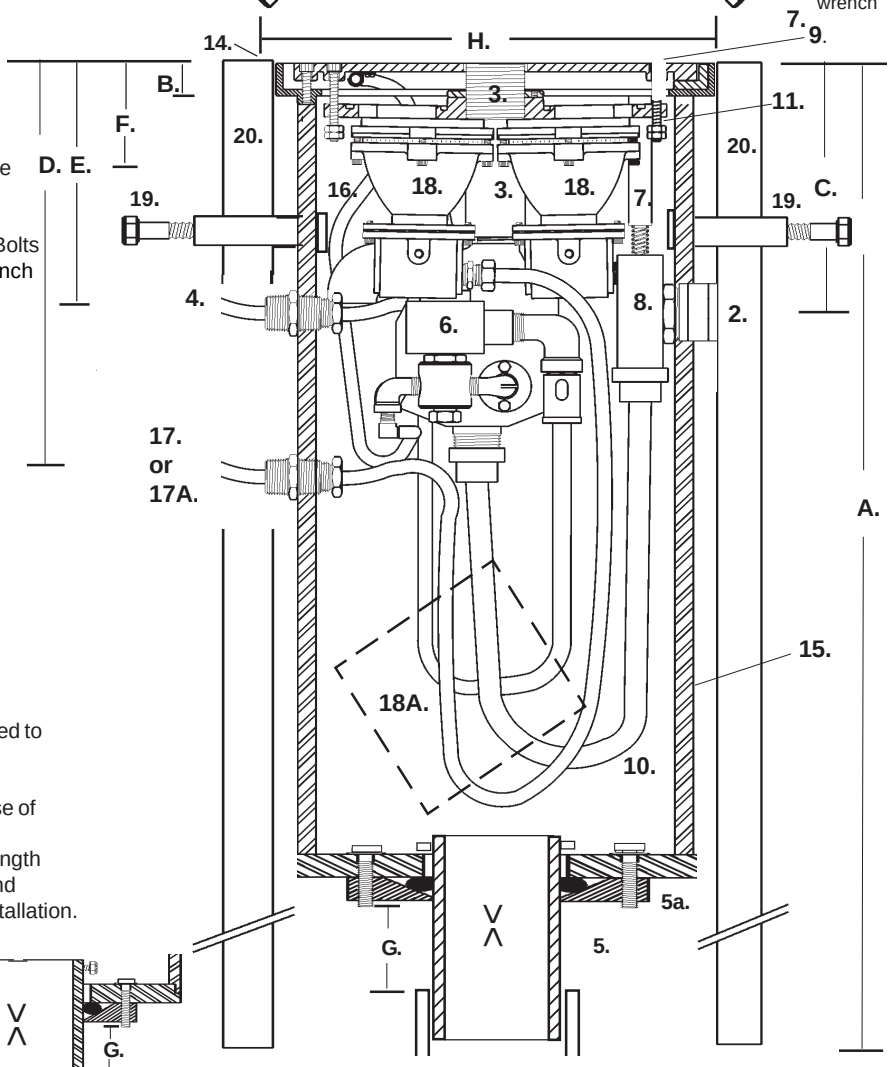


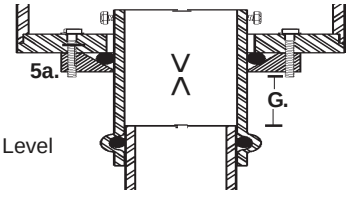
PARTS

1.	PEM M901-2-340 Module
2.	1" NPT / BSP Supply Connection
3.	PEM M900 Series nozzle
4.	PEM J13-5 Conduit-Cordseal , 3/4" NPT/ BSP
5.	SAE or Metric, Drain Connection, height adjustable 3" - 75mm, PVC Pipe, can be adjusted and glued in when held in final position by support rods.
5a.	PVC Compression Flange w. O ring Seal, Inside Bolts tightened with PEM M902-273 Long Handle Wrench
6.	PEM W114 Water Switch
7.	Lead Tube for valve adjustment wrench
8.	Sprayheight adjustment valve
9.	4mm Hex. Type valve wrench to adjust flow
10.	Flex Tube connecting valve & Water Switch
11.	Elevation & Alignment Adjustment Bolts (4)
12.	Electrical cable from (4) to Water Switch
13.	Bolts fastening Module to Groutframe (4)
14.	Surface drain Slot (5mm)
15.	Typical 10" / 250mm PVC Pipe Casing
16.	Plastic Tube of Air Snorkel
17.	PEM J13-5 Conduit Cordseal , 3/4" NPT/ BSP, for 4 x 12V-5W (LED) light fixtures cable
17A.	PEM J13-7 Conduit-Cordseal , 1" NPT/ BSP, & for 12V-65 W (Halogen) light fixtures cable
18. or	PEM E40 Lightfixtures interconnected for 12V - 5W max. LED Lamps (standard).
18A.	(Optional & Extra) PEM E 40Lightfixtures connected to lift out PEM J 2/5 junction box in bottom of casing. & for 12V-65 W (Halogen) light fixture cable
19.	(4) Installation Support Rod Clamps, to permit ease of leveling in multiple installations.
20.	**(4) NOT INCLUDED** 10/15mm - 1/2" x Suitable length Concrete Steel Re-Inforcing Bars driven into ground or placed on level surface to support casing for installation.

DIMENSIONS (+ / +/- = or as specified)

A.	600mm / 23.620 "+
B.	25mm / 1.000"
C.	182mm / 7.160"+/-
D.	182mm / 7.160"+/-
E.	150mm / 6.000"+/-
F.	75mm / 3.000" Maximum Water Level
G.	0 / 50mm / 2.000" (Adjustable)
H.	305mm / 12.000"





Metric PVC P10 75mm Drain Connection

SAE 3" Drain Connection

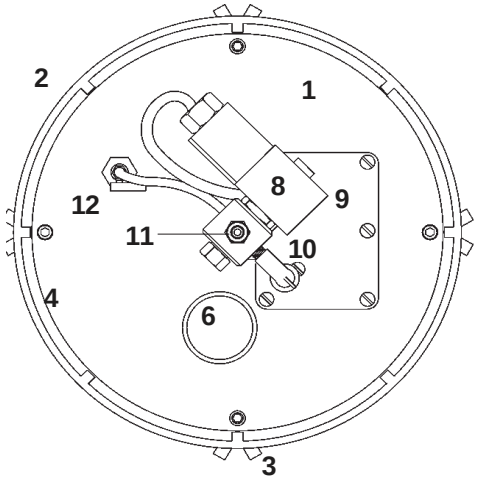
For flush in deck electrical connections use **PEM A470** Deckbox nearby with suitable cordseals & conduits.

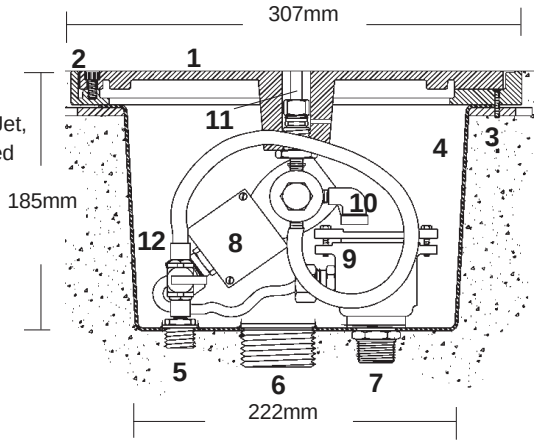
PEM M902-12-340/1 SPRAY APRON MODULE with 250mm / 10" PVC Casing

PEM M 950-1
 # 903-0050

CITY WATER SPRAY ASSEMBLY FOR CONTROLLED ACCESS SPLASH PADS

1 Cast Bronze Cover
2. Cast Bronze, surface draining rim (grout ring)
3. Cast Bronze Clamp Ring attaching niche to rim.
4. Stainless Steel Niche
5. 1/2" male NPT/BSP Water Supply Connection
6. 2" male NPT/BSP Drain Pipe Connection
7. 1/2" NPS/BSP Electrical Conduit Connection
8. Stainless Steel, drip proof Electric Solenoid 3 Way Valve connecting with flex tube to valve permitting lift out with cover.
9. Electric Supply Junction Box with J 14 Cordseal
10. Exhaust Street 90° Elbow
11. PEM 804-1, 5° adjustable Stream Jet, with 3mm / 0.118" Orifice, screwed into cover, connecting pipe and solenoid valve. Permitting lifts ou with cover.
12. Manual ball valve in water supply.





PEM M950-1 PERFORMANCES

Spray Height		USA	Spray Height		METRIC
Feet	GPM	PSI	m	L/min	MC/m
3	1.2	3.8	0.5	4.0	3.5
4	1.4	4.5	1.0	5.0	5.9
5	1.6	5.2	1.5	6.0	7.4
6	1.8	6.7	2.0	7.0	11.0
8	2.0	8.9	2.5	7.5	13.5
10	2.1	11.9	3.0	7.9	17.5

Pressure ratings are for inflow pressure into solenoid valve.

PEM M 950-1 OPERATING VOLTAGES & CURRENT

Operating Voltage must be specified for electrical valves.
12 VAC, 50/60 Hz (4.2 A inrush) **24 VDC,** (0.47A inrush) for sun voltaic supply
For inter-active non electric SPLASH Pad Spray Assemblies see **PEM 902 / 110-5**

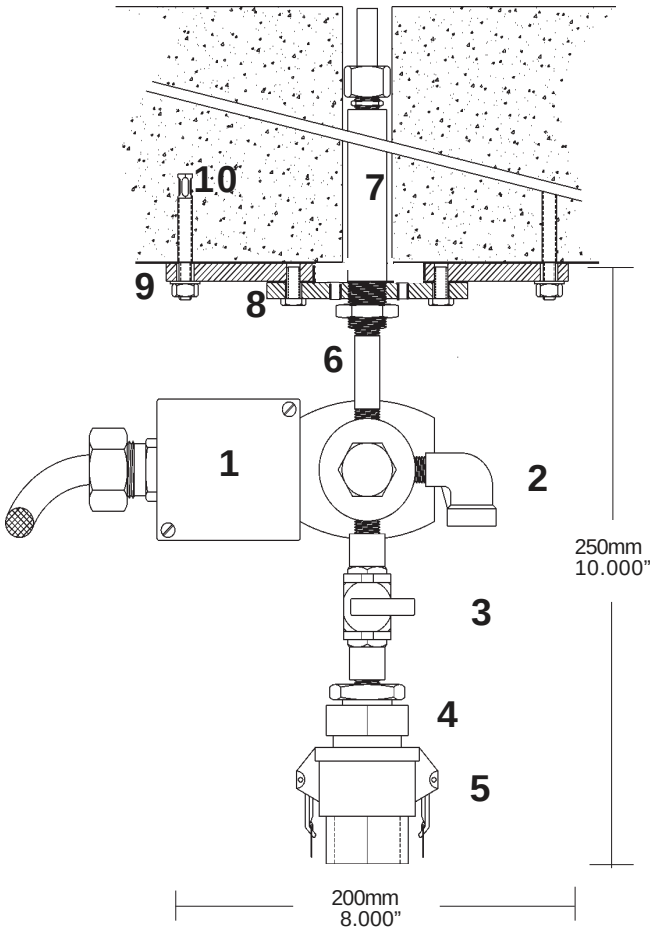
PEM M 950-1 Splash Pad Spray Assemblies are intended for use in animated children's splash pads without standing surface water or water down stream of the solenoid valve when not in operation. Recommended for controlled access & supervised public locations .
For uncontrolled, unsupervised, unenclosed & hygienic endangered public applications see PEM 970-1 Spray Assemblies.
Nearby public rest rooms that also can house the controls for the spray pad would be helpful. The spray pad assemblies are set flush into the surface of the spray pad The animated spray jets are directly operated with potable city water, the used water is draining into an underground (offsite) tank as 'grey' water, which then is pumped with a small submersible pump into an irrigation system, watering surrounding trees and planters. PEM M 950-1 Splash Pad SprayAssemblies are made with heavy duty cast bronze cover within a self draining rim (grout ring) enclosure set flush into the surface of the spray pad. The cover of the assembly is clamped to a stainless steel niche, with welded in bottom connections for water supply (1/2" male NPT) , drain (2" male NPT) and a clamped and gasketed 1/2" NPS electrical conduit connection with the electrical bronze junction box within. The spray jet , with 5° directional adjustment after installation and operating solenoid valve are fastened to the underside of the cover and can be lifted up with same for servicing without disconnection of water or electrical supply. A ball valve in the water supply within the niche permits manual adjustment of spray height at time of installation
The electrical connection of the solenoid valve into the submersible junction box is factory wired through a submersible cordseal The junction box cover opens upwards for ease of wiring connection. The factory installed PEM J1 type junction box has a 1/2" NPS electrical conduit connection to the power supply.
The entire spray assembly is accessible from above, secured by recessed bolts. Nozzle and bolt rececesses when dried out after final testing and adjustments to be filled with molten hard wax or epoxy to discourage vandalism.(Newly installed assemblies could be cleaned with a laquer remover followed by a phosphoric acid solution to make the new equipment look old). For servicing ; the wax / epoxy in the bolt recesses is softened by heat from a blow torch, permitting access to the cover bolts.
PEM M 950-1 Splash Pad Spray Assemblies will discharge an adjusted minimal flow of water if energized or not, the operation of each unit will not affect any other on the same supply system as no back pressure or pressure change in the system is created. Individual spray jet timing can be from less than 100th of a second to continuous.
The control for multiple spray jet applications either by timed, musical or inter-active means could also include supply pressure control to vary spray heights etc. The number of spray jets to be governed by the number of the stations available in a control. Additional control recommendations would include a timed use, a thermostat that will permit operation only above a certain air temperature and a down stream pressure regulating and sustaining auto. valve

CITY WATER SPRAY ASSEMBLY FOR UNCONTROLLED ACCESS SPLASH PADS

PEM M 970-1

 # 903-0050

1 Stainless Steel Electric Solenoid Valve (Specify Voltage) with drip proof junction box, 2.7m / 9 feet of 16/3 AWG / 2 x2.5mm^2 electrical cable.
2 Exhaust Street 90^o Elbow
3 Spray Height Adjustment Valve w. pipe nipple
4 Brass Reducer Fitting with pipe nipple
5 1/2" NPT Quick Disconnect
6 50mm - 2" Pipe Nipple
7 Custom Made 12mm - 0.5" OD Riser Pipe with PEM 804-1, 3mm Stream Jet & Locknut specify length = Thickness of concrete or stone , plus 50mm - 2.0" to thread into holding plate (8.0) Riser Piper requires 14mm - 0..625" I.D. bored hole.
8 Holding plate with 4 x 1/4"-20 UNC bolts, holds Riser Pipe with Jet (7.0)which is threaded and locked into holding plate, which bolts to anchor flange (9.0).Holding plate has drain holes.
9 150mm - 6.0" Anchor Bronze Flange is secured to concrete or stone with 4 concrete anchor bolts.
10 (4) 10mm - 0.375" x 65mm - 2.5" corrosion resistant anchor bolts with expandable shields. Shields must not come into contact with steel re-inforcing bars!



PEM M970-1 PERFORMANCES

Spray Height	USA	
Feet	GPM	PSI
3	1.2	3.8
4	1.4	4.5
5	1.6	5.2
6	1.8	6.7
8	2.0	8.9
10	2.1	11.9

Spray Height	METRIC	
m	L/min	MC/m
0.5	4.0	3.5
1.0	5.0	5.9
1.5	6.0	7.4
2.0	7.0	11.0
2.5	7.5	13.5
3.0	7.9	17.5

Pressure ratings are for inflow pressure into solenoid valve.

PEM M 970-1 OPERATING VOLTAGES & CURRENT

12 VAC, 50/60 Hz (2.7A inrush,1.9A holding)
24 VDC, (0.52A inrush, 0.41A holding)
Operating Voltage must be specified with order.

DESCRIPTION

PEM M 970-1 SPRAY PAD ASSEMBLIES are intended for use in animated children's spray pads without standing water in unsupervised, unenclosed hygienic endangered locations. Nearby public rest rooms that also can house the controls for the spray pad would be helpful. The spray jets are embedded into the concrete slab, covering a concrete underground holding tank . The animated spray jets are operated with potable city water, the used water is overflowing into suitable enclosing gutter drains and collected into the underground tank as 'grey' water, which then is pumped with a l submersible sewage pump into an irrigation system, watering surrounding trees and planters. As a dished splash pad with a center drain can be an invitation to unauthorized use as a neighbourhood car wash pad or worse, the splash pad surface to have a slightly raised center, draining to all sides into surrounding narrow grated gutter drains. The use and installation of the PEM M 970-1 Spray Pad Assemblies with directional adjustable spray jets is intended for and through the concrete slab above a collection tank. Tanks to have sufficient interior headroom to permit ease of installation and servicing of the spray equipment. PEM 970-1 Spray Pad Assemblies are designed to be fitted from below through concrete slabs, with the complete assemblies hanging from the ceiling, supported by anchor flanges bolted into the concrete.

For freezing climates: A second quick disconnect between the solenoid valve and the spray jet pipe is required to dismount & drain the solenoid valve. A thermostatic controlled heat cable to be installed into the bottom of the tank and floordrain.

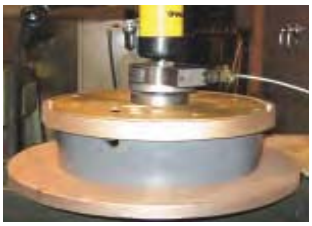
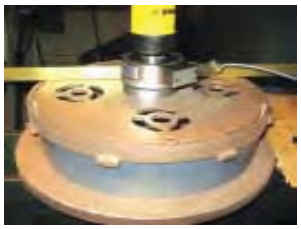
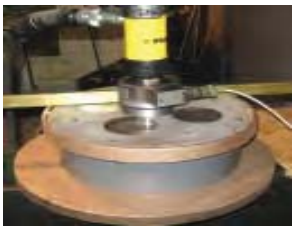
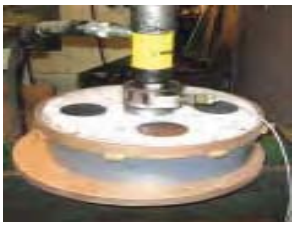
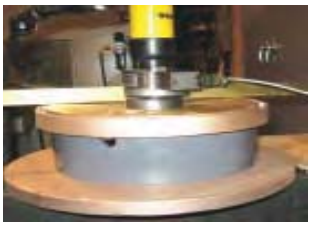
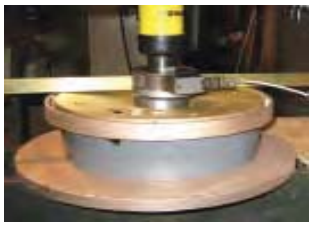
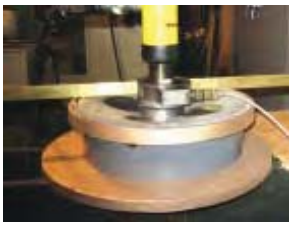
All electrical work in approved drip proof enclosures is to be fastened to the ceiling well above the level of water, which is controlled by suitable over-size overflow(s).The tank content must be drainable by valve from outside through a buried service entrance valve, safe access into the tank is usually from the side of the tank under a manhole cover.

The tank to be vented through the surface drains or separate vents.

PEM M 970-1 Spray Pad Assemblies will discharge an continuous adjusted flow of water if energized or not, the operation of each unit will not affect any other on the same supply system as no back pressure or pressure change in the system is created as long as the system is of sufficient size to support all units. Individual spray jet timing can be from less than 100th of second to continuous.

The control for multiple spray jet applications either by timed, musical or inter-active means that could also include supply pressure control to vary spray heights etc. The number of spray jets to be governed by the number of the stations available in a control. Additional control recommendations would include a timed use, a thermostat that will permit operation only above a certain temperature a a timeswitch limiting the use to daylight hours and a downstream pressure regulating and sustaining auto. valve.

PEM M 910 / 920 COVER LOAD BEARING TESTS

PEM M 901 / 906 254mm / 10.0” x 0,250” / 6.35 mm CAST BRONZE COVER	PEM M 910 / 920 305mm / 12.0” x 0,250” / 6.35 mm CAST BRONZE COVER	PEM M 901 / 906 254mm / 10.0” x 0.500” / 12.7mm POLY CARBONATE COVER	PEM M 910 / 920 305mm / 12.0” x 0.500” / 12.7mm POLY CARBONATE COVER
 0.00 lbs/in² / 0.00 kg/cm²	 0.00 lbs/in² / 0.00 kg/cm²	 0.00 lbs/in² / 0.00 kg/cm²	 0.00 lbs/in² / 0.00 kg/cm²
 1000 lbs/in² / 453.11 kg/cm²	 1000 lbs/in² / 453.11 kg/cm²	 3000 lbs/in² / 1359.3 kg/cm²	 3000 lbs/in² / 1359.3 kg/cm²
 3000 lbs/in² / 1359.3 kg/cm²	 3000 lbs/in² / 1359.3 kg/cm²	 6000 lbs/in² / 2718.7 kg/cm2	 6000 lbs/in² / 2718.7 kg/cm2
Test Results: **1.** 1000 lbs/in² / 453.11 kg/cm² Permanent Depth Deformation in Center: 0.125” / 9.00 mm **2.** 2000 lbs/in² / 906.22 kg/cm² Permanent Depth Deformation in Center: 0.187” / 4.75 mm **3.** 3000 lbs/in² / 1359.3 kg/cm² Permanent Depth Deformation in Center: 0.250” / 6.35 mm **4.** 4000 lbs/in² / 1359.3 kg/cm² Permanent Depth Deformation in Center: 0.375” / 9.00 mm **5.** 5000 lbs/in² / 2265.6 kg/cm2 Permanent Depth Deformation in Center: 0.500” / 12.70 mm **6.** 6000 lbs/in² / 2718.7 kg/cm2 Permanent Depth Deformation in Center: 0.750” / 19.05mm	**Test Results:** **1.** 1000 lbs/in2 / 453.11 Kg /cm2 Permanent Depth Deformation in Center: 0.125” / 9.00 mm **2.** 2000 lbs/in² / 906.22 kg/cm² Permanent Depth Deformation in Center: 0.187” / 4.75 mm **3.** 3000 lbs/in² / 1359.3 kg/cm² Permanent Depth Deformation in Center: 0.250” / 6.35 mm **4.** 4000 lbs/in² / 1359.3 kg/cm² Permanent Depth Deformation in Center: 0.375” / 9.00 mm **5.** 5000 lbs/in² / 2265.6 kg/cm2 Permanent Depth Deformation in Center: 0.500” / 12.70 mm **6.** 6000 lbs/in² / 2718.7 kg/cm2 Permanent Depth Deformation in Center: 1.000” / 25.4 mm	**Test Results:** **1.** 1000 lbs/in² / 453.11 kg/cm² Deflection: 0.250” / 6.35 mm Full spring back to original **2.** 2000 lbs/in² / 906.22 kg/cm² Deflection: 0.500” / 12.70mm Full spring back to original **3.** 3000 lbs/in² / 1359.3 kg/cm² Deflection: 0.550” / 13.97mm Full spring back to original **4.** 4000 lbs/in² / 1359.3 kg/cm² Deflection: 0.650” / 16.51mm Full spring back to original **5.** 5000 lbs/in² / 2265.6 kg/cm2 Deflection: 0.875” / 19.94mm Full spring back, bolts bent **6.** 6000 lbs/in² / 2718.7 kg/cm2 Deflection: 0.900” / 22.86mm Full spring back, bolts bent	**Test Results:** **1.** 1000 lbs/in² / 453.11 kg/cm² Deflection: 0.375” / 9.00 mm Full spring back to original **2.** 2000 lbs/in² / 906.22 kg/cm² Deflection: 0.500” / 12.70mm Full spring back to original **3.** 3000 lbs/in² / 1359.3 kg/cm² Deflection: 0.750” / 19.05mm Full spring back to original **4.** 4000 lbs/in² / 1359.3 kg/cm² Deflection: 0.875” / 19.94mm Full spring back to original **5.** 5000 lbs/in² / 2265.6 kg/cm2 Deflection: 1.000” / 25.4mm Full spring back, bolts bent **6.** 6000 lbs/in² / 2718.7 kg/cm2 Deflection: 1.125” / 28.6mm Full spring back, bolts bent
RECOMMENDED MAXIMUM LOAD BEARING OF COVER: 300 lbs/in² / 136.0 kg/cm2	**RECOMMENDED MAXIMUM LOAD BEARING OF COVER: 300 lbs/in² / 136.0 kg/cm2**	**RECOMMENDED MAXIMUM LOAD BEARING OF COVER: 3000 lbs/in² / 1359.3 kg/cm²**	**RECOMMENDED MAXIMUM LOAD BEARING OF COVER: 3000 lbs/in² / 1359.3 kg/cm²**

Hydraulic testing done with centered circular piston area of 3.00”diam. - 9.426 square inches / 76.2mm diam. - 239.42 cm2
Test PressureS : 0 - 6000 lbs/in² / 0 - 2,718.86 kg/cm²

PEM W114-1,115-1 &116-1 MAINTENANCE SUGGESTIONS

PEM Water Switches or Flow Diverters are intended to switch the flow of a water supply within a fraction of a second from one outlet to another. Within theses devices, water pressure from the supply pipe is converted into flow velocity, then reconverted into a lower outlet pressure. The function can be described as following:
The water inflow from the supply pipe is directed at the junction of 2 branches of a Y-Tee. As the inflowing water entrains ambient atmospheric pressure, replenishing atmospheric pressure from the snorkel is drawn evenly through 2 transverse ports at the base of the Y. By opening or closing one of these two ports, a so called 'COANDA EFFECT' takes place, which bends the stream of the incoming water toward the Y leg at the side that has its port closed. By controlling the atmospheric pressure taken in by these ports from the snorkel with a low voltage solenoid valve, the COANDA EFFECT can be directed from one branch of the Y outlet to the other, in effect switching the flow of water from the one outlet to the other.
The very nature of the device does not permit valving or excessive back pressure of the outlets. The flow usually is controlled before entering the device or by the use of a by-pass valve on the outflow side of the diverter. Direct connection of a spray jet to the vertical outlet is recommended only for nozzles insensitive to turbulent inflow.
Nozzles requiring a non turbulent inflow require a pipe nipple of appr. 6 times pipe size in length and a flowstraightener at the inflow of the nozzle.
If the snorkel terminates below waterlevel, the unit does not work. Normally a larger spray jet or several smaller spray jets can be operated at one time with the vertical outflow port, with the horizontal ourflow port serving as exhaust, however this port (of same full flow pipe size) can also be equipped with a spray jet to provide an alternating spray effect, however it has a lesser output pressure. For remote installation of the water switches, the snorkel air pressure intake (extended with suitable tubing must be at a level above the water-level of the pool/pond in which the jets are used to prevent back drainage when system is not operating.
In the selection of spray jets, waterlevel independent and low backpressure jets or nozzles can be used with suitable pipe fittings, such as water switch performance tested PEM jets. Waterlevel dependent aerated jets and cascade jets should not be used. Never use standard nozzle performances as of normal pipe supply application for use with water switches, consult manufacturers performance data of water switch inflow requirements for a variety of nozzles and jet.
It must be realized, that these water switches or flow diverters require full inflow and pressure at all times, even if the spray effect is not working while the supply is being exhausted.

What to watch for:

Electric controlled water switches have no internal moving parts other than in the attached solenoid 3way valve,which has no flow through other than to control actual air pressure to the two activating ports in the water switch. The heavy duty, water duty, all stainless steel electric solenoid 3 way valve used with the water switch requires a constant operating voltage of not more than plus/minus (+/-) 5% of rated voltage to operate for to maximum life expectancy to appr. several million operating cycles. Too much voltage = the coil will bust, too little voltage = the valve is oscillating(machine gunning) causing internal parts to destruct.
Manual controlled water switches with built in air pressure valve are connected with 2 tubes to the water switch, transfering the air pressure intake from one port to the other within the water switch while depressed.
The water switches require to be operated in clean water, algae free, with suction straining to suit the jet, nozzle or flow straightener on the outflow side. Maximum suggested suction strainer orifices for water switch without jets or nozzles are: PEM W114-1 = 0.125"/3mm, PEM W115-1 = 0.187"/5mm, PEM W116-1 = 0.250"/6mm.
Long string algae and strings can get caught within the water switch junction, to remove: Remove water switch and clean, usually caused by missing or to small suction strainers with too great suction flow velocity!
For multiple installations in protected environments the water switches should be connected to the water supply with bayonet plug-in disconnects and electrical cable plug-in disconnects to permit servicing of individual units without interfering with the system.
Properly installed with proper supplies, under normal working conditions, the water switches do not require maintenance other than critical observation - just in case. If the snorkel(s) ever get immersed for whatever reason, dirt can get into the solenoid valve, requring it to be cleaned. To clean the solenoid valve, shut off electrical power
to the entire pool, remove solenoid valve from water switch (4 small bolts & nuts), open large hex nut at bottom of valve body - be careful it is spring loaded , do not lose the spring, remove plunger, clean valve with compressed air, re-assemble all parts and re-install, should work like new again.
PEM Water Switches have a monolytic molded plastic construction (ABS Acrylonitrile Butadien Styrene) that in extreme freezing climates might become brittle, allowing pipe connections to break off when stressed
For winterizing in cold climates: drain pool & all piping, assure that it cannot fill up with snow melt. Loosen 4 bolts (just loosen them, do not remove) holding the solenoid valve to permit the unit to drain. Enclose unit with plastic garbage bag and tie up on intake pipe.OR - Disconnect the units (with disconnects) and store frost free.

PEM M 900 SPRAY EFFECT VELOCITIES

FLOW VELOCITIES IN FEET PER SECOND OF SPRAYS UP TO 10 FEET SPRAY HEIGHT EJECTED FROM PEM M 701 SPRAYHEADS OR NOZZLES.

THE NOZZLE / SPRAYHEAD IDENTIFICATION REFER TO PAGE # 4 NOZZLE DESCRIPTIONS.

M931		M932		M933		M936		M15-6	
Spray Height	FH/S	Spray Height	FH/S	Spray Height	FH/S	Spray Height	FH/S	Spray Height	FH/S
2’	2.1	2’	4.4	2’	5.0	2’	6.7	2’	8.8
3’	3.1	3’	6.7	3’	7.5	3’	9.8	3’	9.7
4’	4.1	4’	6.6	4’	8.6	4’	10.8	4’	10.4
5’	5.1	5’	8.4	5’	9.7	5’	11.6	5’	11.6
6’	6.1	6’	9.1	6’	10.8	6’	12.4	6’	12.9
8’	8.1	8’	10.9	8’	12.6	8’	14.2	8’	14.8
10’	10.1	10’	12.8	10’	14.5	10’	16.2	10’	16.3

Check with all authorities for allowable spray height and velocity !

952		953		954		M815-1-16mm		M815-5-20mm	
Spray Height	FH/S	Spray Height	FH/S	Spray Height	FH/S	Spray Height	FH/S	Spray Height	FH/S
2’	5.9	2’	5.5	2’	5.5	2’	5.0	2’	6.0
3’	9.0	3’	8.2	3’	8.2	3’	7.4	3’	9.0
4’	10.2	4’	9.8	4’	9.9	4’	8.2	4’	10.1
5’	11.1	5’	10.9	5’	11.1	5’	8.9	5’	11.0
6’	12.0	6’	12.2	6’	12.5	6’	9.6	6’	11.9
8’	13.8	8’	14.1	8’	14.6	8’	11.3	8’	13.7
10’	15.3	10’	16.1	10’	16.4	10’	13.3	10’	15.5

FLOW VELOCITIES WERE MEASURED DIRECTLY ABOVE

THE SPRAY HEADS/ NOZZLES HAVING AN INCLINATION

OF 2 - 3 DEGREES OFF VERTICAL - TO MAKE MEASUREMENTS POSSIBLE.

Measuring was done at the PEM test pool with a

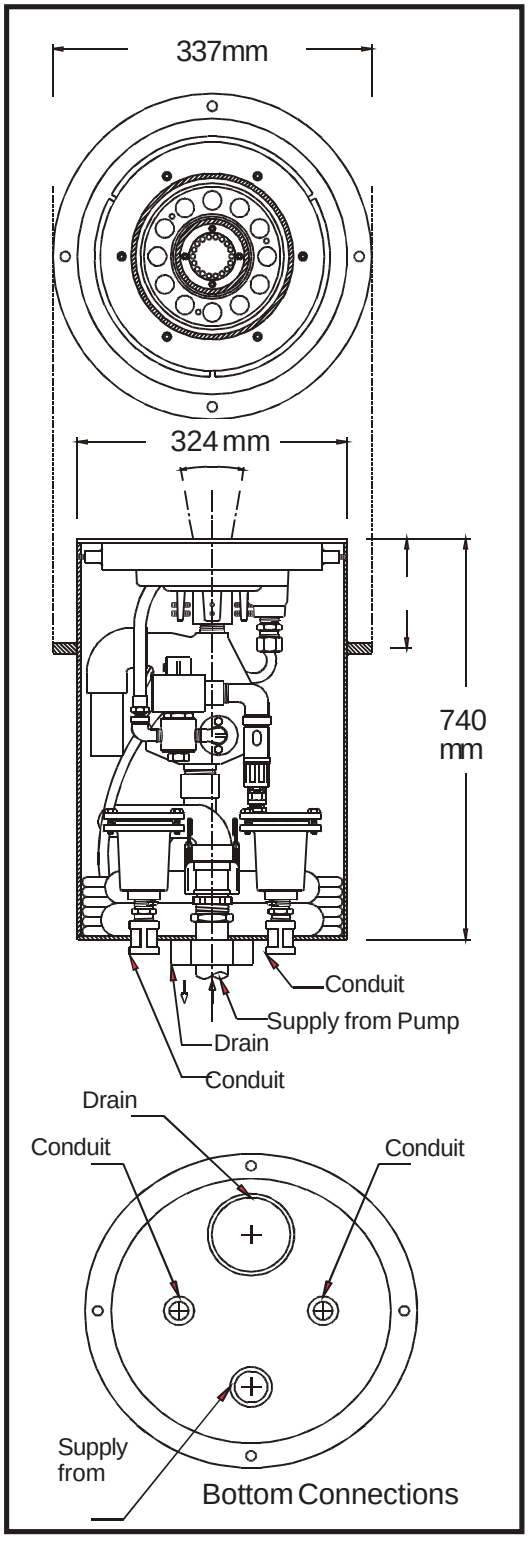
GLOBAL FP111 Water Flow Probe, SERIAL # 1233006192

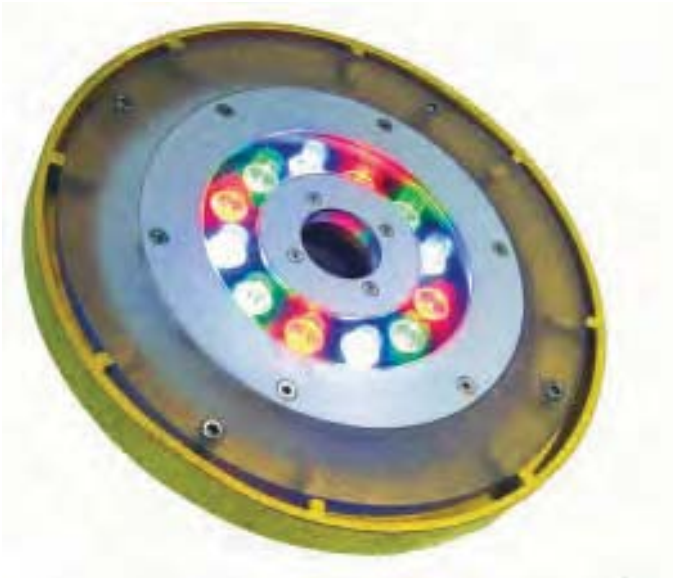
The was set at 3^{o} off vertical Position for insertion of flow probe.

PEM M 915 - 20 Series

PEM M 920 SERIES

Custom made Assemblies for insertion into vertical 12" PVC, Schedule 40, Pipe Sleeves or similar.
With walk over Polycabonate Cover set into surface draining Cast Bronze Grout Frame installed flush into pavement .
Supplied with PEM E2100 SUBMERSIBLE RING LIGHT FIXTURE
E2100 LED PLATE WITH AUTO COLOUR CHANGING OR DMX PARALLEEL or DMX IN SERIES controlled ILLUMINATION
FOR LOW VOLTAGE CLASS 2 CIRCUITS IN 60 Hz AREAS.





90205150

M915-21 Polycarbonate Cover with E2100 LED Ring Light, selection of jets such as 954,15-6,815-1 or 815-5 Jet or others W114 / W115 Water Switch,12 VAC or 24VDC 1 1/2" NPT / BSP & 2" Drain

90205609

M950-1 Winter Cover for M910,915 & 920, Solid Cast Bronze, overlapping the grout frame and bolted to same (For Freezing Climates)

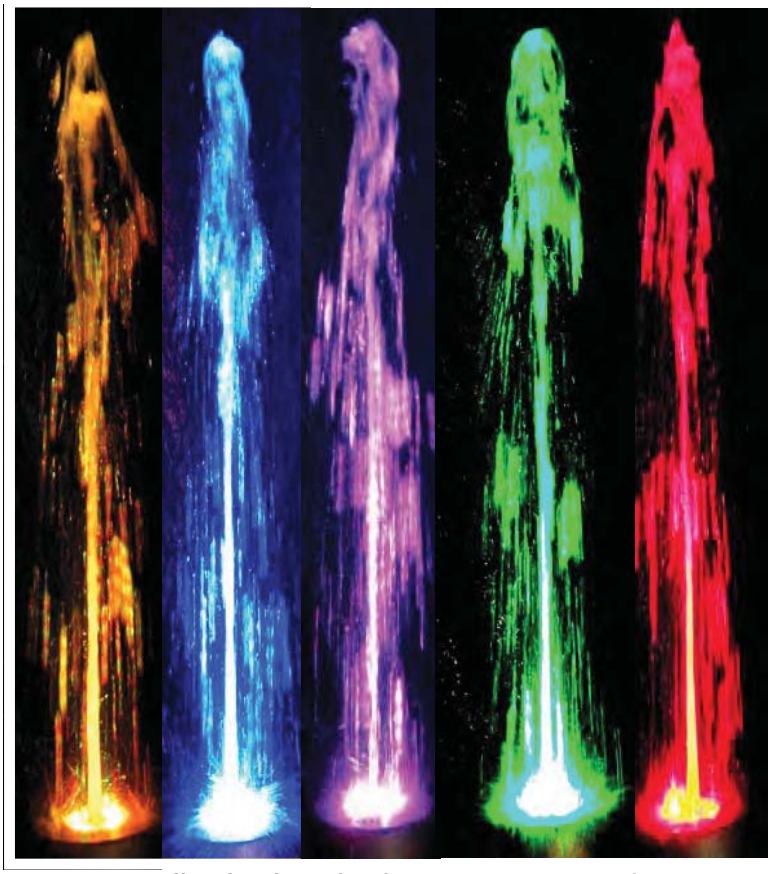
For surface cleaning and polishing of polycarbonate cover:
Recommend "FastBrite" Polishing Material
For local supplier see: Internet Automotive Suppliers
For minor surface scratches of over:
Recommend "Liquid Resin" Headlight Restauration Kit'"
For local supplier see: Internet Automotive Suppliers

PEM M 963-333

SPRAY APRON MODULE

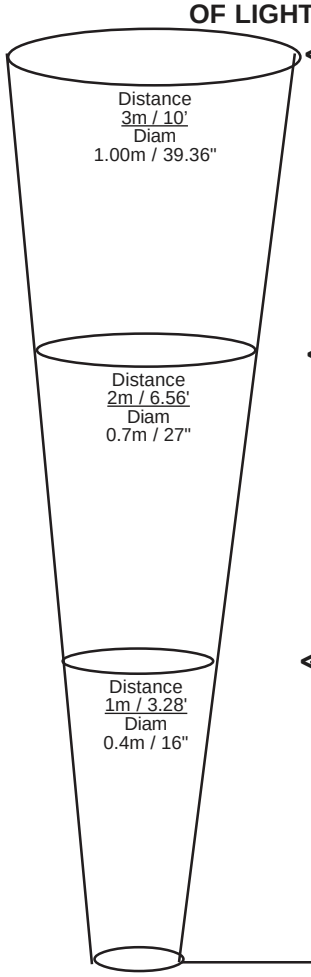
PEM M 963-334 = WITHOUT NICHE & E 2100 -B

COMPONENTS:
PEM M334 RING JET on
PEM W114 WATERSWITCH
PEM E2100-RGB-RING LIGHT
SUBMERSIBLE CABLE CONNECTORS



For Illumination Check PEM E2300 Pages)

AVERAGE, EFFECTIVE PERFORMANCES OF LIGHT OUTPUT



U-020-WHITE - Cree
393 Lum./ sqft - 31 Lux./ m2
U-061-WHITE
314 Lum./ sqft - 25 Lux./ m2
U-062 - RED
553 Lum./ sqft - 44 Lux./ m2
U-063 - BLUE
163 Lum./ sqft - 13 Lux./ m2
U-064 - GREEN
251 Lum./ sqft - 24 Lux./ m2
U-065 - AMBER
138 Lum./ sqft - 11 Lux./ m2
U - 067 - R.G.B.
164- Lum./ sqft - 21- Lux./ m2
- 75 Lum./ sqft - 6 Lux./ m2

U-020-WHITE - Cree
519 Lum./ sqft - 41 Lux./ m2
U-061-WHITE
415 Lum./ sqft - 33 Lux./ m2
U-062 - RED
880 Lum./ sqft - 70 Lux./ m2
U-063 - BLUE
289 Lum./ sqft - 23 Lux./ m2
U-064 - GREEN
591 Lum./ sqft - 47 Lux./ m2
U-065 - AMBER
251 Lum./ sqft - 20 Lux./ m2
U-067 - R.G.B.
376- Lum./ sqft - 30- Lux./ m2
- 113 Lum./ sqft - 9 Lux./ m2

U-020-WHITE - Cree
1152 Lum./ sqft - 69 Lux./ m2
U-061-WHITE
691 Lum./ sqft - 55 Lux./ m2
U-062 - RED
1495 Lum./ sqft - 119 Lux./ m2
U-063 - BLUE
628 Lum./ sqft - 50 Lux./ m2
U-064 - GREEN
1144 Lum./ sqft - 91 Lux./ m2
U-065 - AMBER
591 Lum./ sqft - 47 Lux./ m2
BU- 067 - R.G.B.
942- Lum./ sqft - 75- Lux./ m2
- 376 Lum./ sqft - 30 Lux./ m2

ELECTRICAL REQUIREMENTS:

WATER SWITCH :
Available for
12VAC - 60 Hz
24VAC - 60 Hz
24VDC - 50 Hz

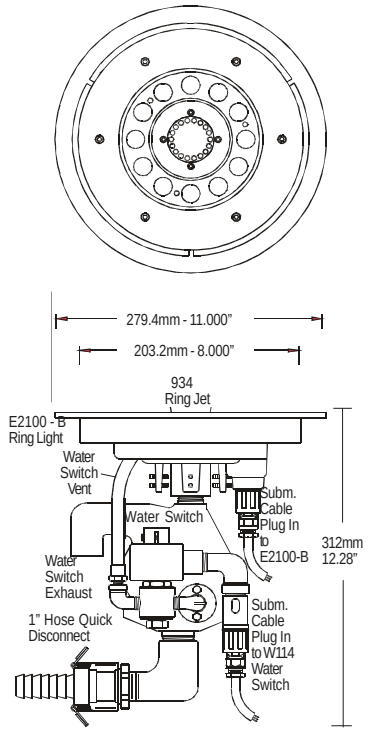
E2100 - RGB :
Available for:
12 VAC - 60Hz
12 VAC - 60Hz & 12 VDC - DMX
24 VDC & 12 VDC -DMX

PERFORMANCES

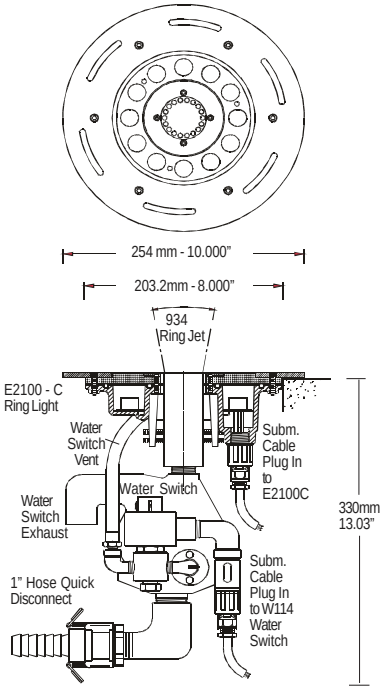
M936-333/ 934 on

Spray Height	Flow GPM	Press. FH	Velocity FH/S	Spray Height	Flow L/min	Press. mc	Velocity mc/s
3 Feet	5.0	27'	6.5				
4 Feet	8.0	33'	7.5	1.0m	22.0	8.8	2.1
5 Feet	10.0	40'	9.0	1.5m	37.0	12.2	3.1
6 Feet	11.0	44'	9.4	2.0m	47.3	16.2	3.2
7 Feet	13.0	52'	10.6	2.5m	57.5	19.2	3.5
10 Feet	18.3	74'	12.5	3.0m	69.3	22.9	3.8
13 Feet	23.9	91'	13.9				

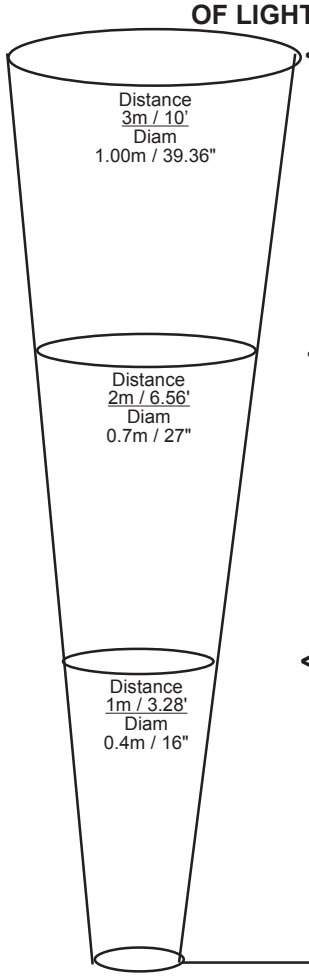
M963-333 - B
PEM E 2300 - B & 934 Jet on PEM 114 Water Switch



M963-333 - C
PEM E 2300 - C & 934 Jet on PEM 114 Water Switch



AVERAGE, EFFECTIVE PERFORMANCES OF LIGHT OUTPUT



U-020-WHITE - Cree
393 Lum./ sqft - 31 Lux./ m2
U-061-WHITE
314 Lum./ sqft - 25 Lux./ m2
U-062 - RED
553 Lum./ sqft - 44 Lux./ m2
U-063 - BLUE
163 Lum./ sqft - 13 Lux./ m2
U-064 - GREEN
251 Lum./ sqft - 24 Lux./ m2
U-065 - AMBER
138 Lum./ sqft - 11 Lux./ m2
U - 067 - R.G.B.
164- Lum./ sqft - 21- Lux./ m2
- 75 Lum./ sqft - 6 Lux./ m2

U-020-WHITE - Cree
519 Lum./ sqft - 41 Lux./ m2
U-061-WHITE
415 Lum./ sqft - 33 Lux./ m2
U-062 - RED
880 Lum./ sqft - 70 Lux./ m2
U-063 - BLUE
289 Lum./ sqft - 23 Lux./ m2
U-064 - GREEN
591 Lum./ sqft - 47 Lux./ m2
U-065 - AMBER
251 Lum./ sqft - 20 Lux./ m2
U-067 - R.G.B.
376- Lum./ sqft - 30- Lux./ m2
- 113 Lum./ sqft - 9 Lux./ m2

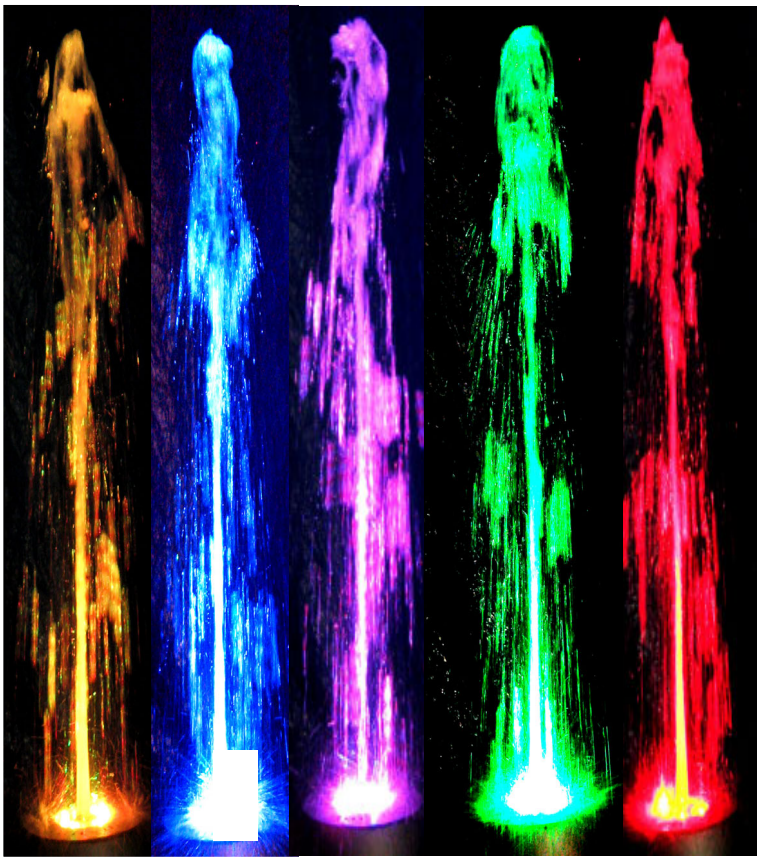
U-020-WHITE - Cree
1152 Lum./ sqft - 69 Lux./ m2
U-061-WHITE
691 Lum./ sqft - 55 Lux./ m2
U-062 - RED
1495 Lum./ sqft - 119 Lux./ m2
U-063 - BLUE
628 Lum./ sqft - 50 Lux./ m2
U-064 - GREEN
1144 Lum./ sqft - 91 Lux./ m2
U-065 - AMBER
591 Lum./ sqft - 47 Lux./ m2
BU- 067 - R.G.B.
942- Lum./ sqft - 75- Lux./ m2
- 376 Lum./ sqft - 30 Lux./ m2

COMPONENTS:
PEM M334 RING JET on
PEM W114 WATERSWITCH
PEM E2100-RGBW-RING LIGHT
PEM 960-1 NICHE (ST.-ST.)

PEM M 963-334

PEM M 963-334 WITH NICHE

SPRAY APRON MODULE



For Illumination Check PEM E2100 Pages)

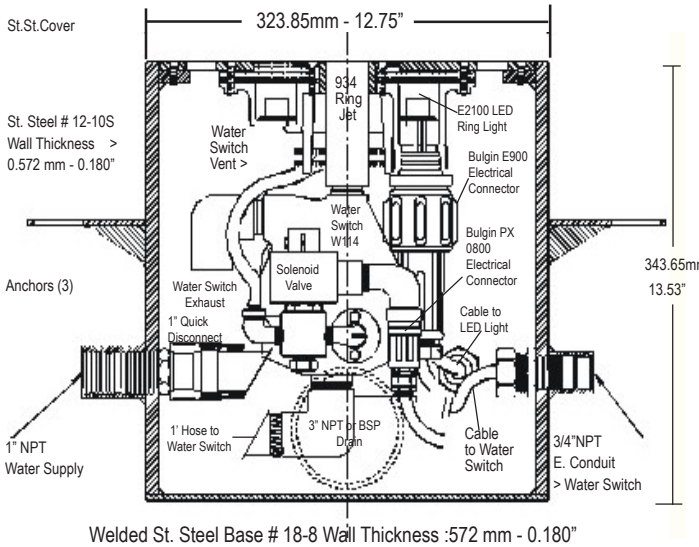
PERFORMANCES

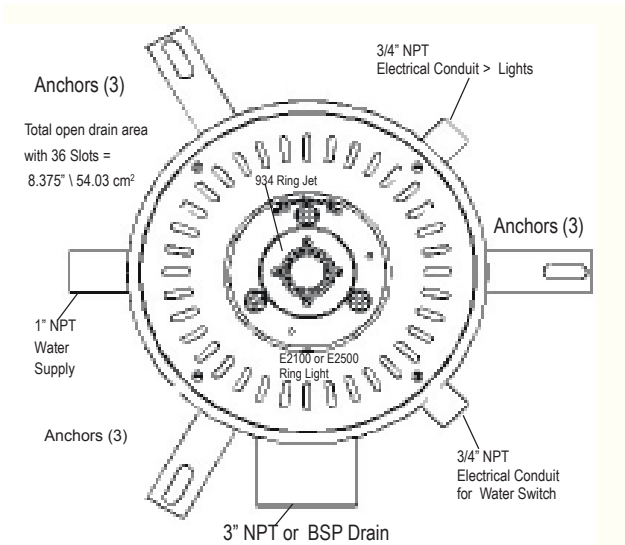
M934 on W 114 Spray Height	Flow GPM	Press. FH	Velocity FH/S	M934 on W 114 Spray Height	Flow L/min	Press. mc	Velocity mc/s
3 Feet	5.0	27'	6.5	1.0m	22.0	8.8	2.1
4 Feet	8.0	33'	7.5	1.5m	37.0	12.2	3.1
5 Feet	10.0	40'	9.0	2.0m	47.3	16.2	3.2
6 Feet	11.0	44'	9.4	2.5m	57.5	19.2	3.5
7 Feet	13.0	52'	10.6	3.0m	69.3	22.9	3.8
10 Feet	18.3	74'	12.5	3.5m	83.3	27.1	4.2
13 Feet	23.9	91'	13.9	4.0m	92.7	29.6	4.5

ELECTRICAL REQUIREMENTS:

WATER SWITCH : Available for 12VAC - 60 Hz, 24VAC - 60 Hz 12VDC / 24VDC

E2100 - RGBW :Available for: 12VAC - 60Hz -DMX 12 VAC - 60Hz & 12 VDC - DMX 24 VDC & 12 VDC -DMX Check PEM E2100





PEM
TECHNICAL INFORMATION & SUGGESTIONS

INDEX
700 SECTION

DESIGN DATA

1. **QUICK PIPE SIZING GUIDE** for **pressure** flows with appr. 3.0m/0.3bar/10'/3.34kpa pressure drop per 30m / 100 feet of pipe.

PIPE SIZE:	1"	1 1/4"	1 1/2"	2"	3"	4"	6"	8"	10"	12"
FLOW\USGPM:	9	19	28	52	200	380	880	1600	2400	3500
FLOW\L/min:	34	72	106	197	757	1438	3330	6056	9084	13247

DO NOT USE PRESSURE FLOW TABLES FOR GRAVITY FLOWS , use Manning sewer flow tables!

2. **QUICK SIZING GUIDE FOR PERFORATED SUCTION STRAINERS** WITH 40 % + OPEN AREAS
Opening size to be appr. 50% of nozzle orifices.

SCREEN OPENINGS:	1mm	1.5mm	2mm	3mm	4mm	6mm	10mm
FLOW \ L/min per m2 :	220	380	530	740	950	1200	3000
SCREEN OPENINGS:		0.063"	0.125"	0.250"	0.375"	0.500"	0.750"
FLOW \ USGPM per square foot:		12	17	25	50	100	270

3. **ANTI VORTEX COVERS** OVER PUMP SUCTION FITTINGS
Required in most installations to prevent entry of air into system by vortexing. Size depends on waterdepth and flow.

4. **NPSHA** : (NET POSITIVE SUCTION HEAD AVAILABLE) :
Term describing the depth of water over the pump suction required to permit pump to perform as advertised , the pump supplier usually furnishes this information, which is essential during design/engineering of a pump system.

5. **SURGE/SPLASH COLLAR**: Structural part of a pool or device that encloses the falling water of a spray effect to prevent content of pool to surge and cause spray effect to jump especially in circular or square pool.

6. **BALANCED OVERFLOW**: An overflow that is sized to remove the greatest possible inflow into a pool before the pool overflows, usually sizing is done to draw off the full flow of a water supply into a pool (2 x #1 on this page). Sizing of overflow is done by establishing linear weir length of overflow device (multiply pipe diameter x 3.14) and possible head of water before pool overflow can occur, then check waterfall data below for flow rates. For very large pool and / or inflows consider an appropriate length overflow weir in front of a suitable size drain in the pool floor. In multi level pools or cascades the overflow to be sized for the entire water surface area and set above non operating water level into base pool.

7. **TO ESTIMATE APPR. 60 Hz PUMP HP / KW FOR A KNOWN PERFORMANCE**:
(Flow in USGPM X MC (total, in feet head)) DIVIDE BY: 2970 or (3960 X 75% of known Efficiency) : KW x 1.34 : HP
TO ESTIMATE APPR. 50 Hz PUMP HP / KW FOR A KNOWN PERFORMANCE:
(Flow in L/min X MC (total , in meter head) DIVIDE BY: 2970 or (3960 X 75% of known Efficiency): KW x 1.34 : HP
(Final engineering calculations might differ from above, as other factors and/or variations are to be considered.)

8. **APPROXIMATE COSTS OF OPERATING A PUMP**: Based upon the hourly operating costs of an electrical motor:
MULTIPLY : KNOWN KWH COSTS X FACTORS SHOWN :

1 PHASE HP :	1/3	1/2	3/4	1	2	3	5	
KW :			1.34	2.68	4.02	6.70		
FACTOR :	.408	.535	.760	1.0	2.0	2.95	4.65	
3 PHASE HP :	1	3	5	10	20	30	50	100
KW :	1.34	4.02	6.7	13.4	26.8	40.2	67.5	135
FACTOR :	.96	2.7	4.5	9.0	16.9	25.0	41.3	81.5

9. **PERFORMANCE DIFFERENCES BETWEEN 50 Hertz & 60 Hertz (Cycles) ELECTRICAL MOTORS:**
Pumps with 50 Hz motors have an appr. 19% lower performance than with 60 Hz motors.
Pumps with 60 Hz motors have an appr. 16% higher performance than with 50 Hz motors.

10. **CONVERSION DATA:**

FLOW:
- 1 L/min (LPM) : .264 USGPM \ .220 IGPM
- 1 USGPM (G) : 3.785 L/min \ 0.833 IGPM
- 1 IGPM : 4.546 L/min \ 1.2 USGPM
- 1 L/sec. : 15.85 USGPM \ 13.2 IGPM
- 1m3/min : 264.2 USGPM \ 220.08 IGPM

PRESSURE :
- 1m/head (MC) : 0.1 bar / 9.82kpa / 3.28'head / 1.422PSI
- 1'/head (FT) : 0.305m / 2.99kpa / 0.0305bar / 0.433PSI

DISTANCE / HEIGHT / DEPTH :
- 1 Meter: 39.37 Inches(") / 3.28083 Feet(')
- 1 Inch(") : 25.4mm
- 1 Foot(') : 30.4801cm

AREA :
- 1 m2 : 10.76 Square Feet (Sqft)
- 1 Sqft : 0.0929 m2

WEIGHTS OF WATER:
- 1Kg or 1 Liter : 2.207 Lbs
- 1m3 : 1000 kg / 2203 Lbs
- 1 cbft : 62.4 2Lbs / 28.28 Kg
- 1 US Gallon : 3.785 Kg / 8.36Lbs

VOLUMES OF WATER:
- M3 : : Cubic meter
- 1M3 : 1000 Liter / 35.31 cbft
- 1 cubic foot : 28.316 Liter / 7.4805 US Gallons
- 1 Liter : 0.001 M3 / 0.353 cbft

TORQUE : (Tightening of facering bolts of lightfixtures)
- 1 (Newton Meter) NM : 8.85 Inch Lbs
- 1 (Inch Pound)"lbs : 0.12 NM

LUMINANCE OF ILLUMINATION:
- 1 CP,Candle Power per square foot : 10.764 CP/m2
- 1 CP,Candle Power per square inch : 1550.0 CP/m2
- 1 LM,Lumen per square foot : 10.763 LM/m2

11. **WATERFALLS** (**'A'** : Height of water overflowing over weir)
Suggested flow volumes per linear meter of waterfall, waterwall or overflow.

'A'	L/min	Suggested maximum free fall height.	
3.5mm	66	0.5m	The longer the overflow weir , the greater 'A' shall be
7mm	150	1.0m	to overcome minute elevation differences in the weir.
10mm	250	1.2m	For noise and splash reduction of waterfalls
15mm	380	1.5m	have water fall into center of a foam bed generated by
20mm	510	1.8m	a movable double row of PEM 64 Foam Jets.
30mm	690	2.4m	For multi level pools , storage cubic area must be provided into the base pool
40mm	1100	3.0m	to store all of the run off of the upper level pools before it overflows.
50mm	1500	3.5m	Run off happens when the circulating pump is shut off !

FLOWS - NON PRESSURE

MAX. FLOW THROUGH REMOTE STORAGE TANK RETURN PIPE or BALANCING PIPE BETWEEN POOLS AT GRADIENT (ELEVATION) PRESSURE

* Maximum Discharge / Flow in m^3/min (1000 L/min - 264.2 USGPM appr.) of a full (PVC) pipe from above waterlevel at given gradient or slope. For flows through a flooded, below water level of storage tank, pipe emptying submersed into same, use the 0.001% gradient regardless of actual gradient, however add cubic content of flooded pipe to that of tank for storage purposes. For gradients between those shown extrapolate values.

Pipe Size	Slope: (Gradient)	Flow m3/min
4"	0.001%	--
100mm	0.01%	0.4
	0.1%	1.2
6"	0.001%	0.3
150mm	0.01%	0.95
	0.1 %	2.3
8"	0.001%	0.6
200mm	0.01%	2.0
	0.1%	6.0
10"	0.001%	2.0
250mm	0.01%	3.8
	0.1%	10.0
12"	0.001%	3.8
300mm	0.01%	6.0
	0.1%	18.0
18"	0.001%	8.3
450mm	0.01%	24.0
	0.1%	52.0
24"	0.001%	13.0
600mm	0.01%	40.0
	0.1%	120.0

DO NOT USE DISCHARGE / FLOW DATA SUCH AS HAZEN-WILLIAMS FORMULA INTENDED FOR PRESSURE OR SUCTION FLOW INSTEAD OF THE ABOVE FOR REMOTE STORAGE TANK RETURN PIPE OR BALANCING PIPE BETWEEN POOLS!

Sewage / Drainage engineers might refine the above when made aware of all pertinent site conditions. The above discharge / flow rates of completely filled pipe, based on the 'Manning Formula' , were adapted for gravity return flows in horizontal or near horizontal return or balancing pipe of fountains and water displays.

Beware of air locks in such pipe, caused by an upward elevation (bend) in a pipe between both lower pipe terminations, entrapping air.

For flows through partially filled pipe, establish percentage of filled area of pipe cross section , use this percentage to find flow on above information

PEM TYPE 'A' ANGULAR SPRAY DESIGN SUGGESTIONS

All spray design calculations are based upon linear, non -turbulent and/or non twisting inflow of water into the spray jet having minimum directional adjustment. Where turbulence and/or twisting flow is present and better performance is desired, the use of flow straightening devices in the pipe riser to the jet can show dramatic sprayheight (distance) improvements.Up to 2" pipe size, plastic flow straighteners, PEM 01050 Series, are installed into the base of a jet or in the riser pipe to the jet.

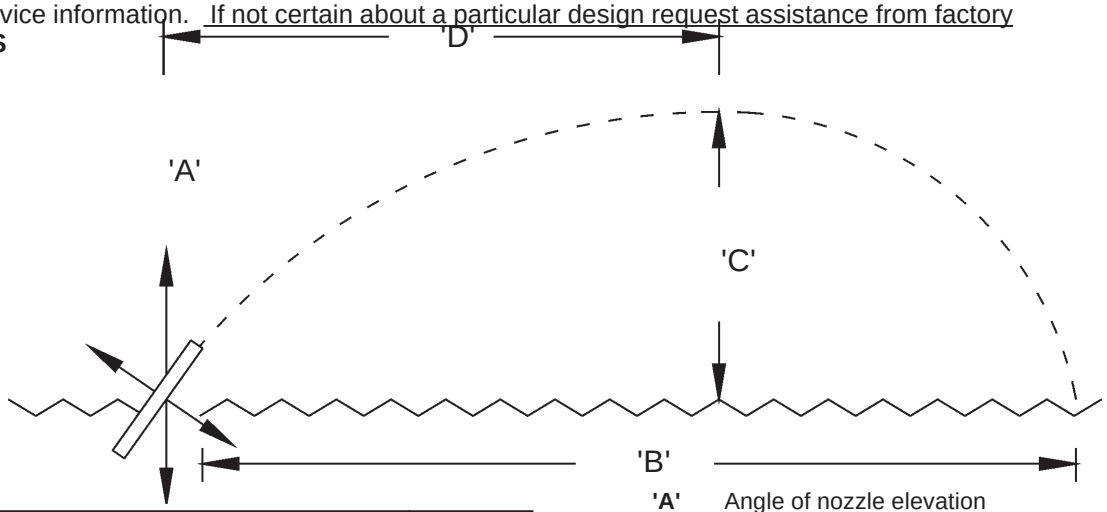
Pipe sizes 2 1/2" and larger require PEM flow straightening devices, such as PEM 21000 Series dual action flow straighteners for critical major spray effects or PEM 23000 Series flow straightening flanges for regular spray effects with a lesser inflow turbulence. Follow the installation suggestions of the PEM flow straightening devices, do not follow other flow straightening device information. If not certain about a particular design request assistance from factory

DESIGN FACTORS

In General:

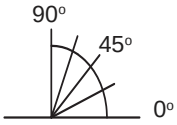
Multiplication Factors are used to find angular spray performances when sprayheight is known.

Dividing Factors are used to find the sprayheight when angular peformances are known



'A'	'E'	'C'	'D'
5°	0.90	6%	36%
15°	1.33	11%	46%
25°	1.83	17%	49%
35°	1.94	22%	51%
45°	2.10	27%	52%
55°	1.80	36%	53%
65°	1.50	50%	56%
75°	0.90	99%	59%
85°	0.40	245%	64%

'A' Angle of nozzle elevation



'B' Horizontal distance of throw from nozzle.

'C' Height of trajectory in percentage of ' B '.

'D' Highest point of trajectory in horizontal distance from nozzle, measured in percentage of ' B '

'E' Multiplying or dividing factor for spray design calculations

'V' Vertical sprayheight (1967-'X')

	TO FIND:	HOW:
1.	Horizontal distance of throw for a desired angle of spray, when only the vertical sprayheight is known.	Establish vertical sprayheight (factor 'V') and multiply the same by factor 'E' to achieve horizontal spray distance. ('X') x ('E') : Horizontal Distance
2.	Performance requirement of a spray pattern with known angle of nozzle discharge or the equivalent vertical sprayheight performance requirements	Establish horizontal distance of throw from nozzle and divide by factor 'E' on same line as shown discharge angle of nozzle . This will give vertical sprayheight which is then used to find performance requirements. (A) - ('B') : ('E') : Vertical Sprayheight
3.	Trajectory of a spray of water	Establish horizontal distance of throw (factor 'B') then calculate factors 'D' and 'C' thereof and combine the results with 'B' to lay out the trajectory.
4.	The jet elevation angle (factor 'A')for the specifi cation of particular trajectories or spray effects.	Establish horizontal distance of throw (factor 'B'),calculate highest point of trajectory (factor 'C') thereof and read on the factors table the angle of elevation (factor'A') on the same line as the result of the calculated height of trajectory (factor 'C')
5.	The manometric nozzle pressure for a sprayheight	Multiply vertical sprayheight (factor 'V') x 1.22 + 10% .

Data given on this page are stricly infomative only, to be used in the layout of normal size water displays, for special applications provide full scale prototype testing as to be installed before providing artistic impressions of the project.

SUGGESTIONS FOR FLOTATION DEVICES FOR FLOATING FOUNTAINS

The basic construction of a platform to support the equipment including submersible pump to be expanded stainless steel with stainless steel angle supports and frame. The platform to be suspended from 2 or 4 floatation pontoons by means of threaded stainless steel rods
These pontoons may consist of stacked closed pore styrofoam panels held in place by a U shape stainless steel cross bar on top of the styrofoam panels. The styrofoam floatation to be covered with fibreglass or stainless steel cover, protecting it from sun and floating chemicals.Styrofoam Floatation cannot be sunk by small caliber gun shots or ramming by boats
Pontoons can also be of sealed plastic or stainless steel tubing or fabricated of stainless steel or fibreglass. Any air filled flotation tank can cause the pontoon to be sunk by gun shots unless filled with Ping Pong Balls or similar floatation devices.
In order to design the carrying capacity the following is suggested:

A. STYROFOAM FLOATION OR COMPRESSED AIR FILLED FLOATATION TANKS
1 cubic decimeter (Liter) of closed cell styrofoam floatation (or air) supports appr. 10 kg of weight less its own weight or 6 to 7 kg
1 cubic decimeter (L) of styrofoam floatation with cover and fittings weighs appr. 3 to 4 kg, PVC or stainless steel tube will weigh somewhat more.
The same as for styrofoam flotation dimensions applies to compressed airfilled tanks, except that the weight of tanks must be added to the total weight.

B. COMPRESSED AIR FILLED FLOTATION TANKS
In most placed that experience freezing winters, the raft has to be removed for the winter. With air filled flotation tanks, the air can be released through pairs of red and white long plastic tubes leading to shore or marker buoys, the red tube terminates inside the air chamber at the bottom, the white on the top. The lower tube can be held below water, allowing water into the chamber with the air to escape through the upper tube and the unit settles to the bottom of the lake. In the spring , compressed air is pumped into the upper tube, the replaced water leaves through the lower tube and the unit rises to the surface.

NOTE:
The total weight of the construction must include the weight of the anchoring and electrical cable suspended from the raft. In open waters subject to wave action, the anchoring must be of the self leveling type with counter weights suspended over rolls.
In addition to weight of construction, the vertical downwards back thrust of the jet(s) must also be accounted for . To do this, multiply nozzle orifice area by ejection pressure in Kgcm.
As the weight of a floatation raft with mounted equipment can be substantial, proper eye mounts for crane cable hooks must be present, usually 4, evenly spaced and supported. Always attach at least 2 stainless steel ropes of sufficient size to the raft and long enough to have 2 marker buoys riding the water surface, this to identify the site and when need be to lift it up.

SUGGESTIONS FOR FOUNTAINS WITH REMOTE STORAGE TANK PIPING

FIGURE 1

Multi Level (Dry) Fountain with remote Storage Tank & Bottom Drains in Pool.
Pump is off, fountain pools are dry

A1 : Water Level w. pump working
A2 : Water Level w. pump shut off
A3 : Cross Connection between 2 or more levels to be avoided, each level to have its own drain into storage tank

Water Level Control Sensors
-1 Operating Level
-2 Water Make Up Level
-3 Safety Shut Off Level

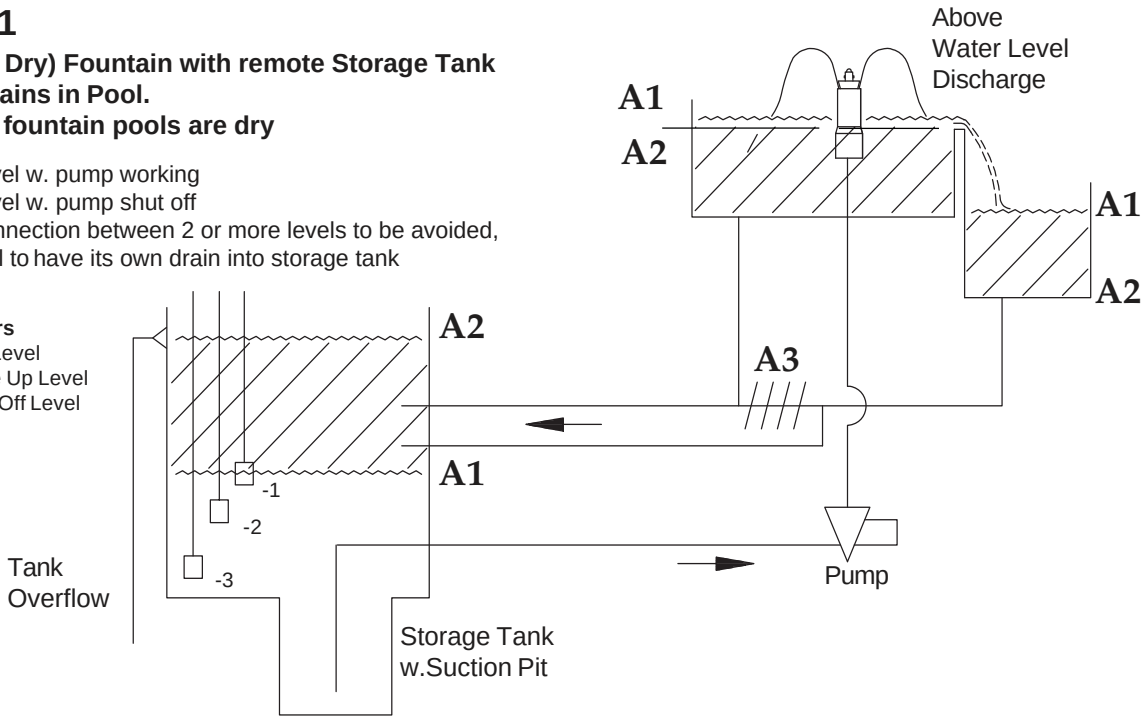
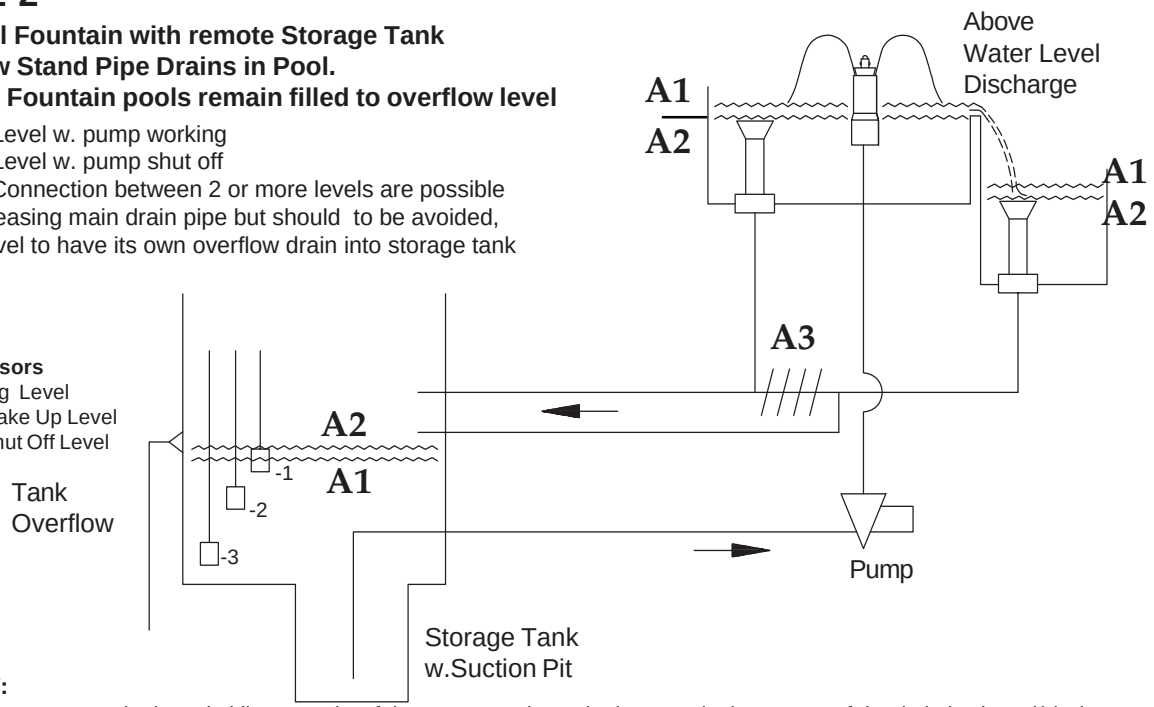


FIGURE 2

Multi Level Fountain with remote Storage Tank & Overflow Stand Pipe Drains in Pool.
Pump off: Fountain pools remain filled to overflow level

A1 : Water Level w. pump working
A2 : Water Level w. pump shut off
A3 : Cross Connection between 2 or more levels are possible by increasing main drain pipe but should to be avoided, each level to have its own overflow drain into storage tank

Water Level Control Sensors
-1 Operating Level
-2 Water Make Up Level
-3 Safety Shut Off Level



COMMENT:

Figure # 1 demonstrates the large holding capacity of the storage tank required to contain the content of the drain back pool(s) also cross connection(s) must be be avoided between levels, each level to be separately drained into storage tank.
In this figures, the water make up is discharged into the storage tank.

Figure # 2 shows the decreased holding capacity of the storage tank due to the retention of content in pool(s) due to overflow stand pipe drains . Cross connection are possible but should be avoided of more than one elevation, each elevation to be separately drained into storage tank. In this figures, the water make up is discharged into the upper pool(s) filling same before filling storage tank.

Great care is to be taken not to have air lock(s) in drain pipe. (Air Locks, caused by air entrapped into pockets of pipe, that does not have a continuous upward slope/gradient . Air Locks can stop the gradient flow of water) - The storage tank to be vented to athmosphere.

SUGGESTIONS FOR PIPING WITH STORAGE TANK UNDER FOUNTAIN

A1 : Water Level w. pump working
A2 : Waterlevel w. pump shut off

FIGURE 1
Fountain with external dry type pump

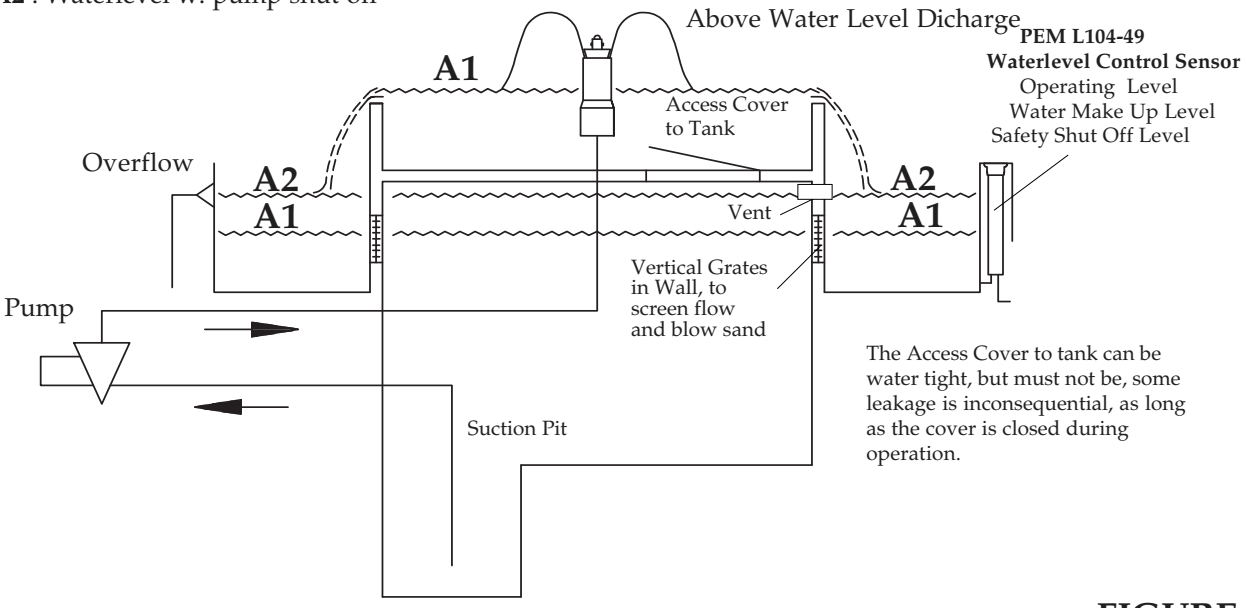
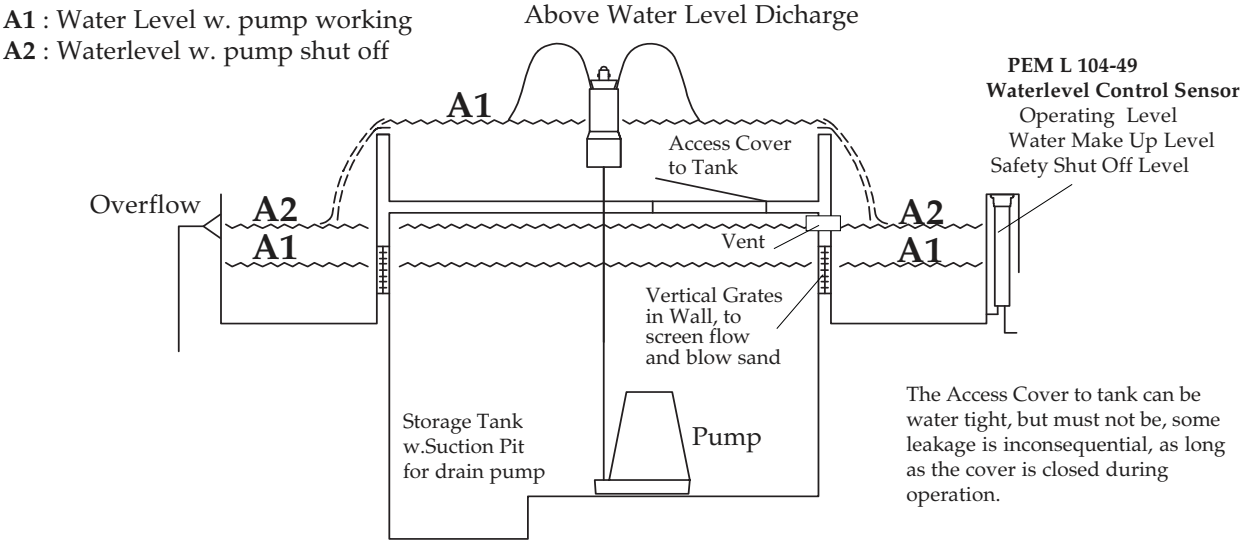


FIGURE 2
Fountain with internal submersible pump



SUGGESTIONS FOR PIPING FOR FOUNTAINS WITH REMOTE STORAGE TANK PIPING

FIGURE 1

Fountain with Water Level Dependent Jets in Multi Level (Dry) Fountain with remote Storage Tank & Bottom Drains in Pool.
Pump is off, fountain pools are dry

A1 : Water Level w. pump working
A2 : Water Level w. pump shut off

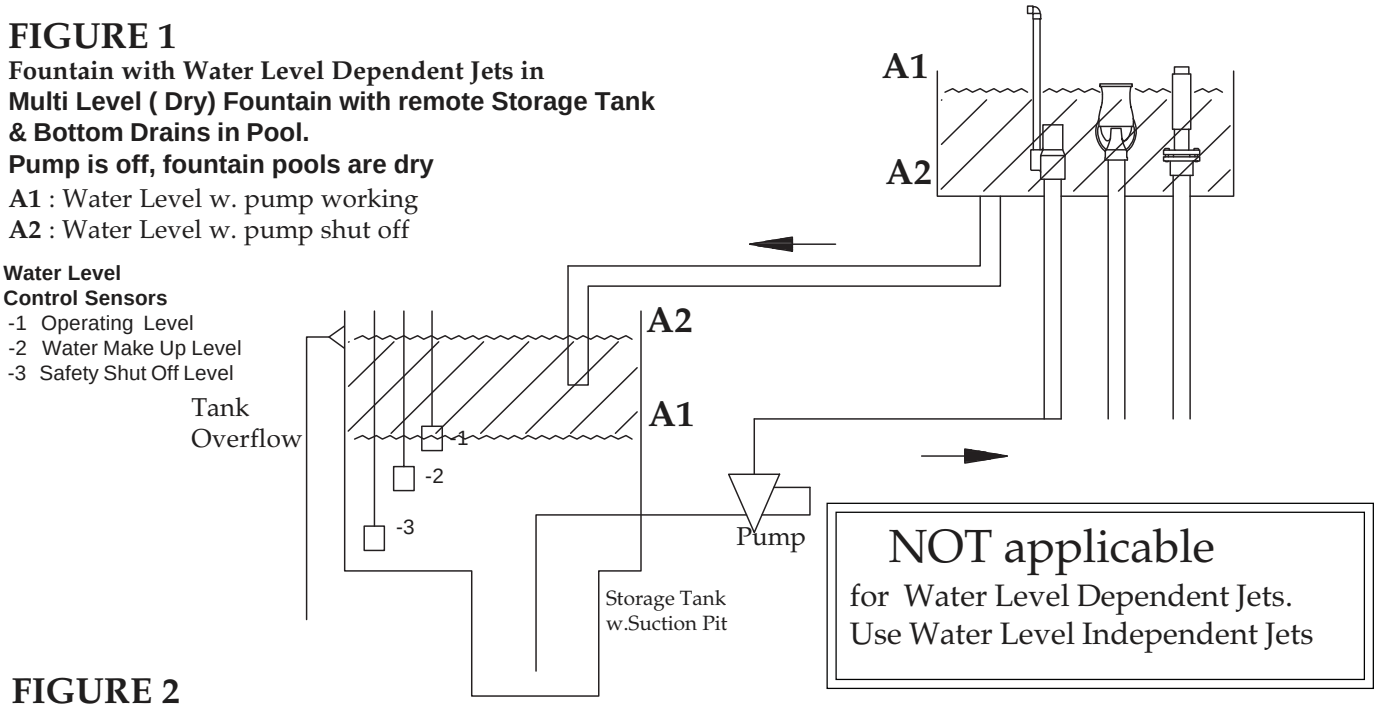
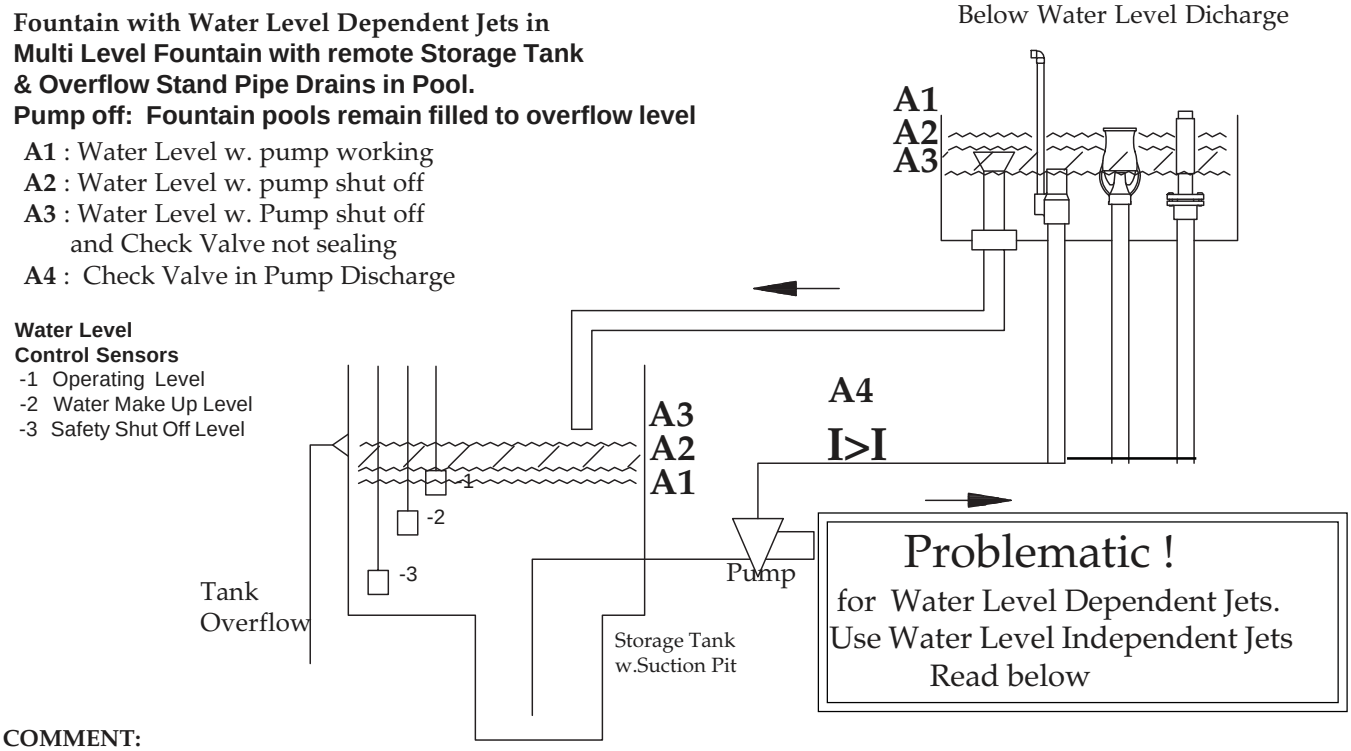


FIGURE 2

Fountain with Water Level Dependent Jets in Multi Level Fountain with remote Storage Tank & Overflow Stand Pipe Drains in Pool.
Pump off: Fountain pools remain filled to overflow level

A1 : Water Level w. pump working
A2 : Water Level w. pump shut off
A3 : Water Level w. Pump shut off and Check Valve not sealing
A4 : Check Valve in Pump Discharge



COMMENT:

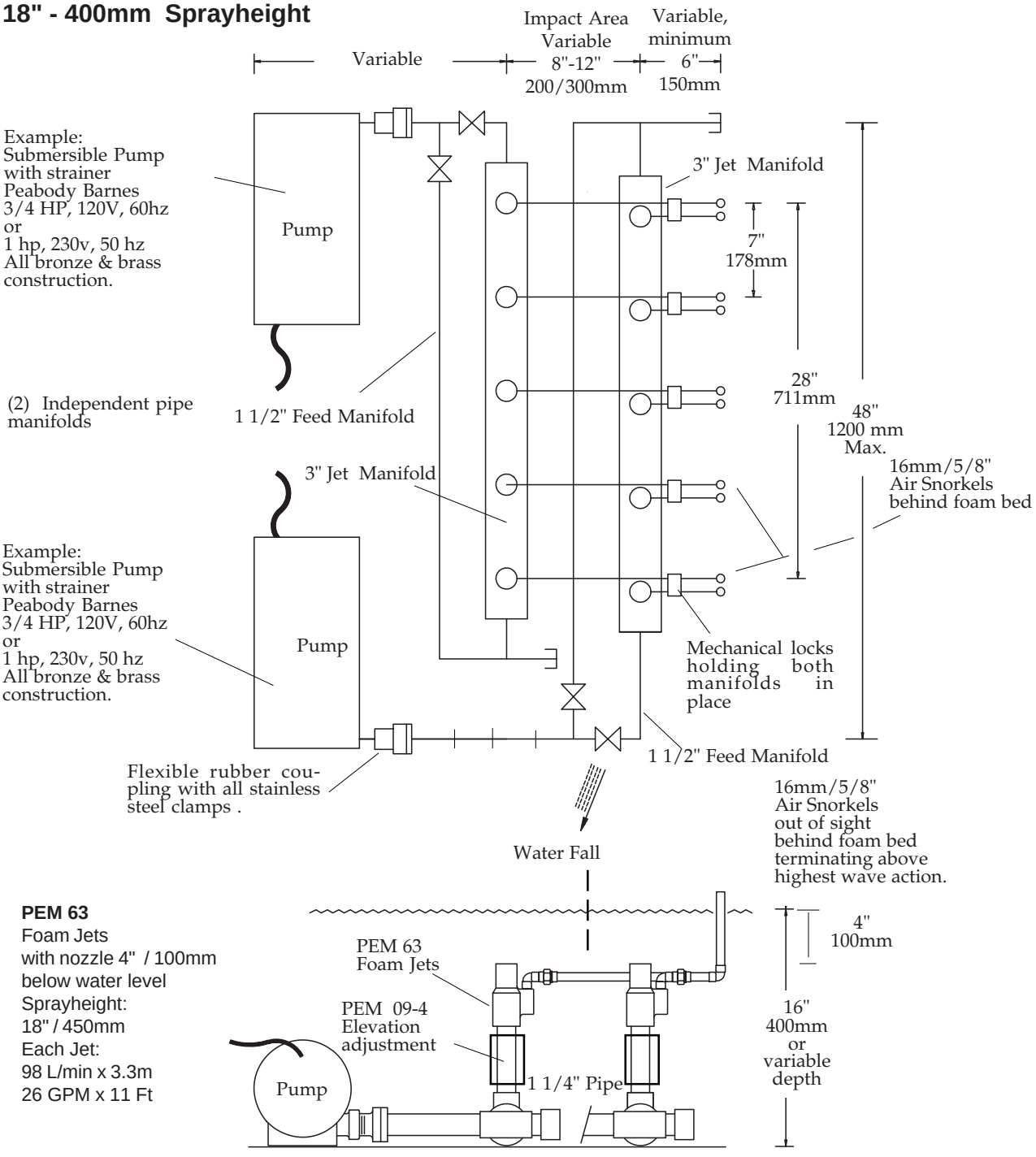
Figure # 1 shows water level dependant jets fully exposed with pump shut off , the jets might not be able to refill the pool as the sprays will be too high and not fall back into the pool, filling same. A common design fault, use water level independent jets!
Figure # 2 shows a design that depends on the perfect sealing of the check (No Return) valve in the pump discharge to maintain the water level for the water level dependent jets after pump is shut off. If the check valve leaks, the water level dependent jet pressure nozzles might be fully exposed and not be able to refill the pool as the sprays will be too high and might not fall back into pool. A common problem, only solved by a secondary pump (water filter) system that is working all the time, refilling the leakage from the pool through the check valve, or by using water level indepent jets.**Most check valves require more back pressure to seal than available with a fountain elevation differential pressure.**

In both figures, the water make up is discharged into the upper pool(s) filling same before storage tank.
- The storage tank must be vented to atmospere, to prevent air lock.

No Splash, reduced noise
FOAM BED for
24" / 0.6M WIDE WATERFALL
15 Feet , 4.5m Height, Indoors.
Double manifold with customized
PEM 63 Foam Jets
18" - 400mm Sprayheight

WATERFALL FOAM BED

A quick cure suggestion to overcome <u>existing</u> problems with indoor waterfalls splash and noise



PEM 63
Foam Jets
with nozzle 4" / 100mm
below water level
Sprayheight:
18" / 450mm
Each Jet:
98 L/min x 3.3m
26 GPM x 11 Ft

The foam bed assembly consist of 2 separate 5 jet manifolds, one in front of falling water, the other behind, final placement must be made under falling water which is to fall exactly into the center between the rows of jets placed as close as possible together.

If the waterfall and pool has other dimensions, adopt the above solution - it just might work.

For aestetic reasons, paint all equipment same color as color of pool, to make it not so noticeable. - If the problems also include failure of air conditioning due to water evaporation, get and install a water chiller to keep the water temperature below that of the ambient air temperature surrounding the water display.

PERFORMANCE PICTURES OF PEM SPRAY EQUIPMENT

800 SECTION

EDITION 2013
Page #

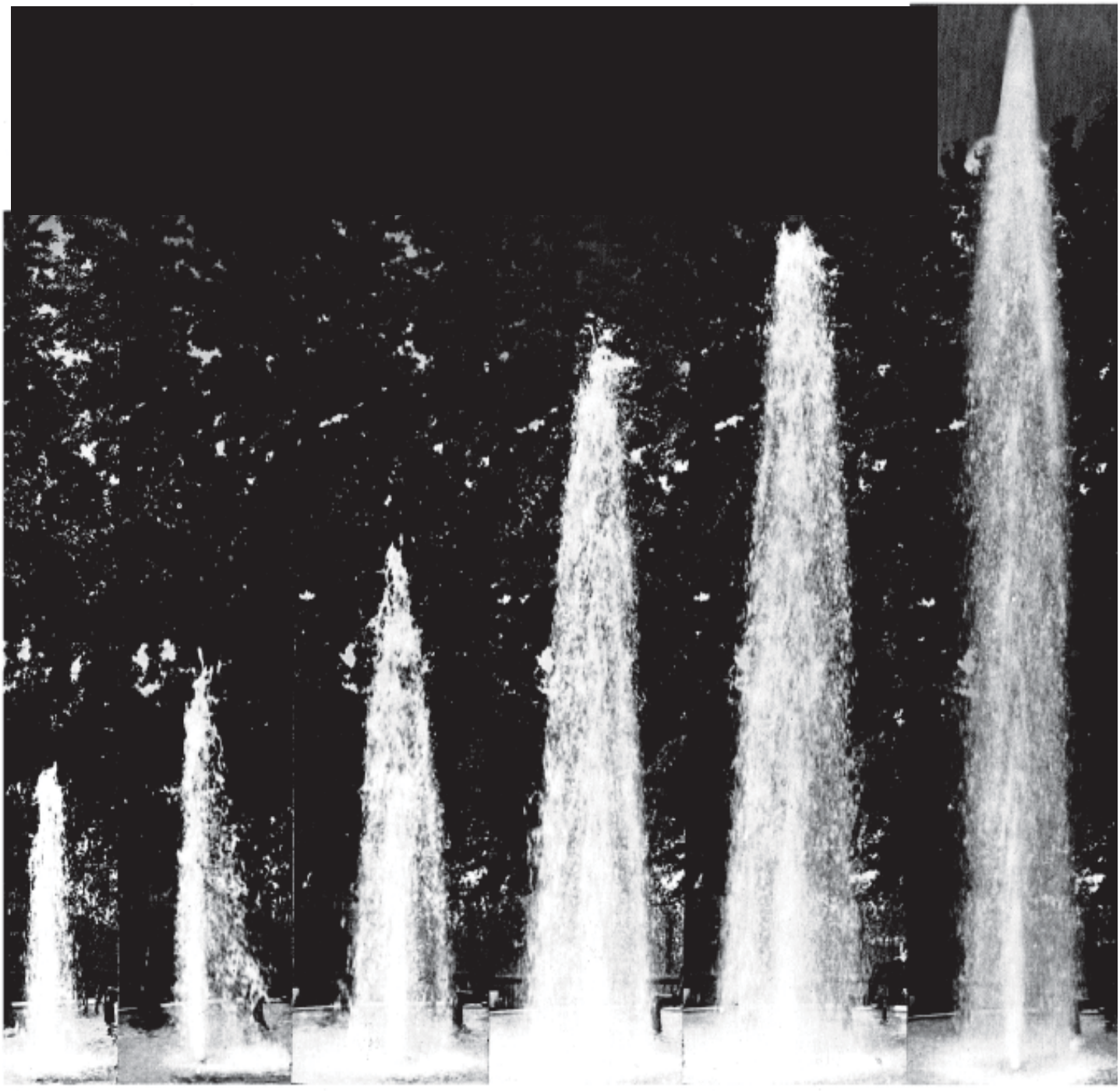
REPRODUCTIONS OFPERFORMANCE PICTURES OF PEM EQUIPMENT FROM THE PEM ARCHIVES

PEM 53
CASCADE JET

5'	8'	10'	15'	20'	24'
1.50m	2.40m	3.00m	4.50m	6.00m	7,20m

SPRAY HEIGHT

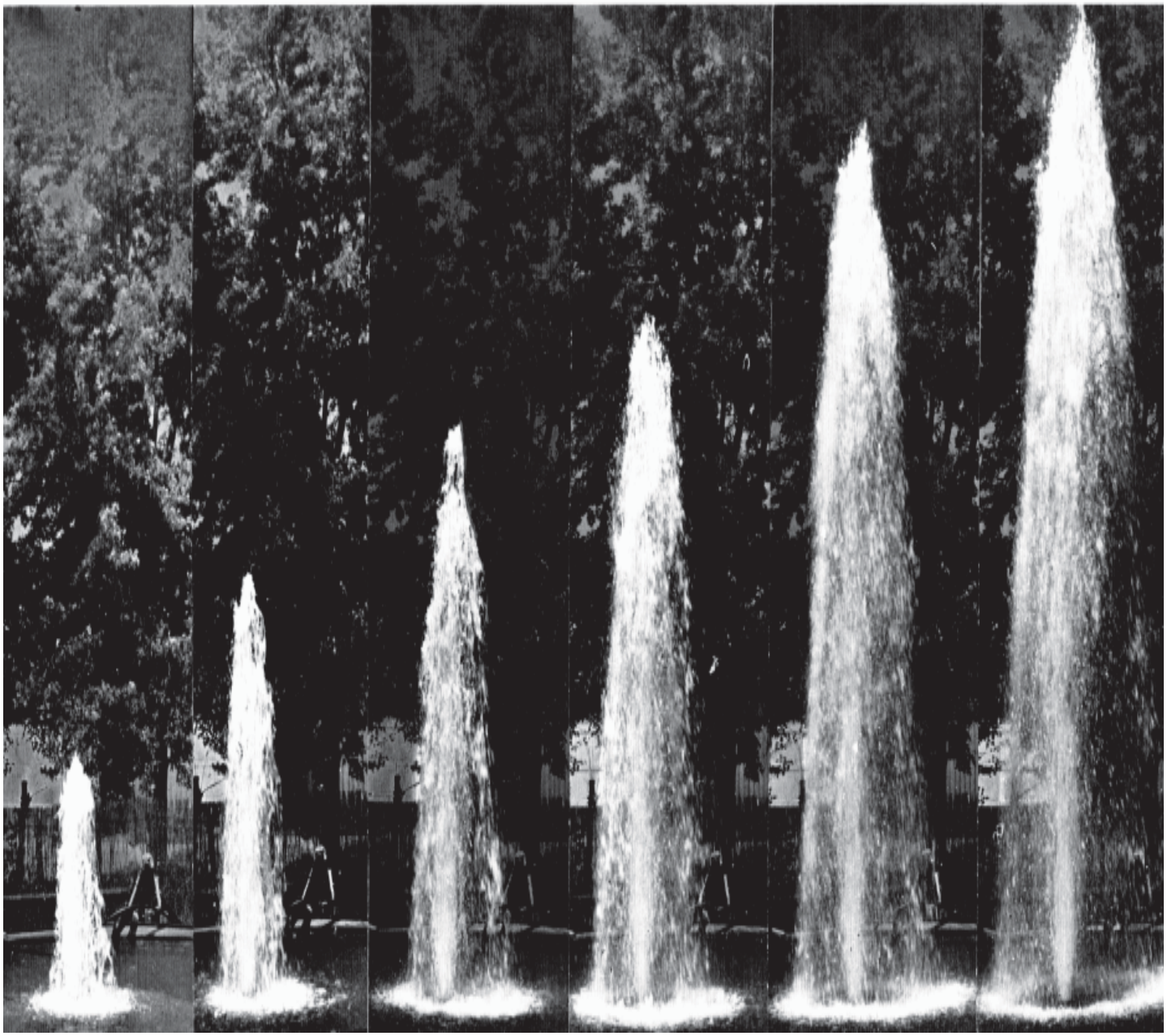
PEM 54
CASCADE JET



8'	11'	14'	20'	23'	30'
2.40m	3.30mm	4.20m	6.00m	6.90m	9.00m

SPRAY HEIGHT

PEM 55
CASCADE JET



7'	12'	16'	19'	24'	28'
2.10m	3.60m	4.80m	5.70m	7. 20m	8.40m

SPRAY HEIGHT

PEM 64
FOAM JET

5'	8'	12'	15'	20'
1.50m	2.40mm	4.20m	4.50m	6.00m

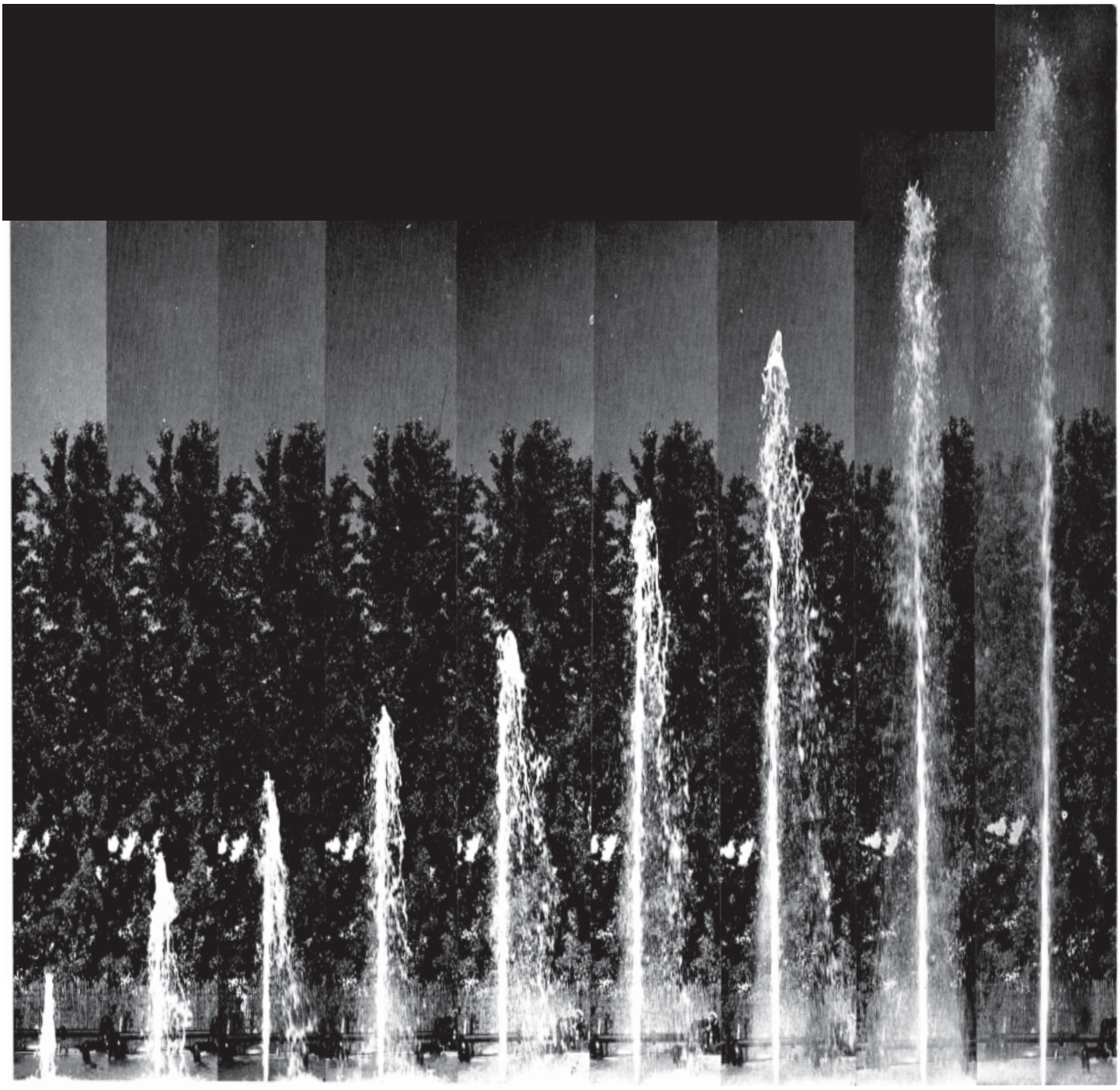
SPRAY HEIGHT

PEM 66
FOAM JET

6'	10'	14'	21'	32'
1.80m	3.00m	4.20m	6.30m	9.60m

SPRAY HEIGHT

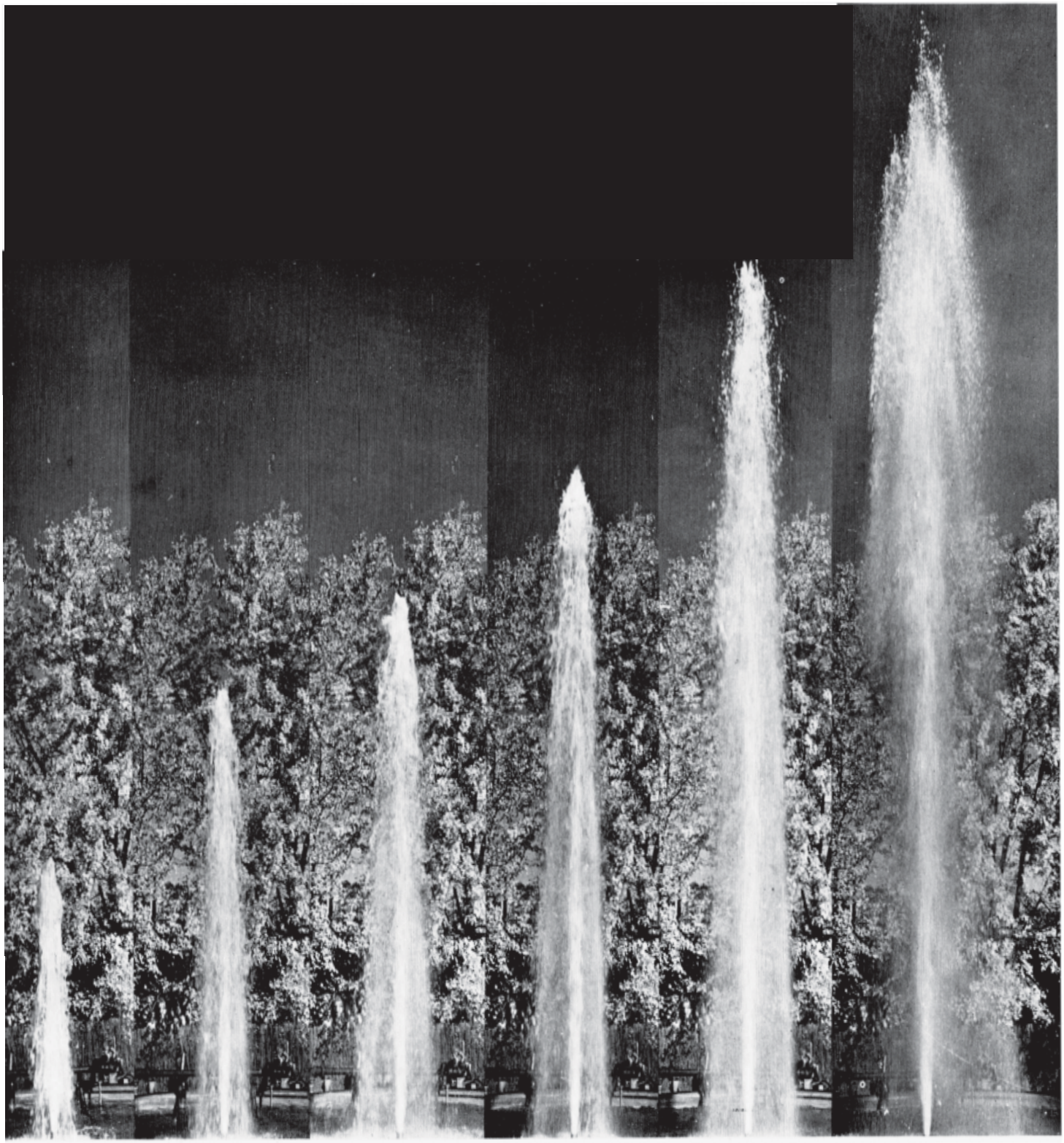
PEM 747
AERATING JET



5'	10'	15'	18'	22'	28'	36'	42'	50'
1.50m	3.00m	4.50m	5.40m	6.60m	8.40m	10.80m	12.60m	15.00m

SPRAY HEIGHT

PEM 750
AERATING JET



14'	23’	28'	35’	45'	58’
4.20m	6.90m	8.40m	10.50m	13.50m	17.40m

SPRAY HEIGHT

PEM 740 - 409
AERATING JET ASSEMBLY

PEM 740-409 (108-9) SPRAY HEIGHT - Spray Height : 80’ / 24.00m
Floating Fountain in Lake Simcoe, City of Barry, Ontario, Canada (1966)

PEM
AERATING JETS

PEM 749, 747 & 746 at Mexican National Memorial, Mexico City, Mexico

PEM 747's, 746's & 744's at National Presbytarian Center, Washington D.C. , USA

PEM AERATING JETS

PEM 749 with 744's at a Church in Houston, Texas, USA

PEM 747 & 745's with 743's, Montreal City Hall, Quebec, Canada

PEM
AERATING JETS

PEM 747's with 744's, Hamilton, Ontario, Canada

PEM 744's, Paris, France

PEM
CASCADE JETS

PEM 53's, Doorn, Netherlands

PEM 55's Brussels, Belgium

PEM 107B, Foam Column Sprayheads, Toronto, Canada

PEM
FOAM & CASCADE JETS

PEM 66 Foam Geyser Jets, Feria de Guayaquil, Ecuador

PEM 66A Foam Geyser Jets & 54 Cascade Jets,
War Memorial, Brisbane, Australia

PEM
FOAM SCULPTURE JETS

PEM 107B, Foam Pinnacle Sprayheads, Toronto, Canada

PEM 107A, Foam Column Sprayheads, Toronto, Canada

PEM
FOAM SCULPTURE JETS

PEM 107A Foam Column & 53 Cascade Jets at Quebec City , Quebec , Canada

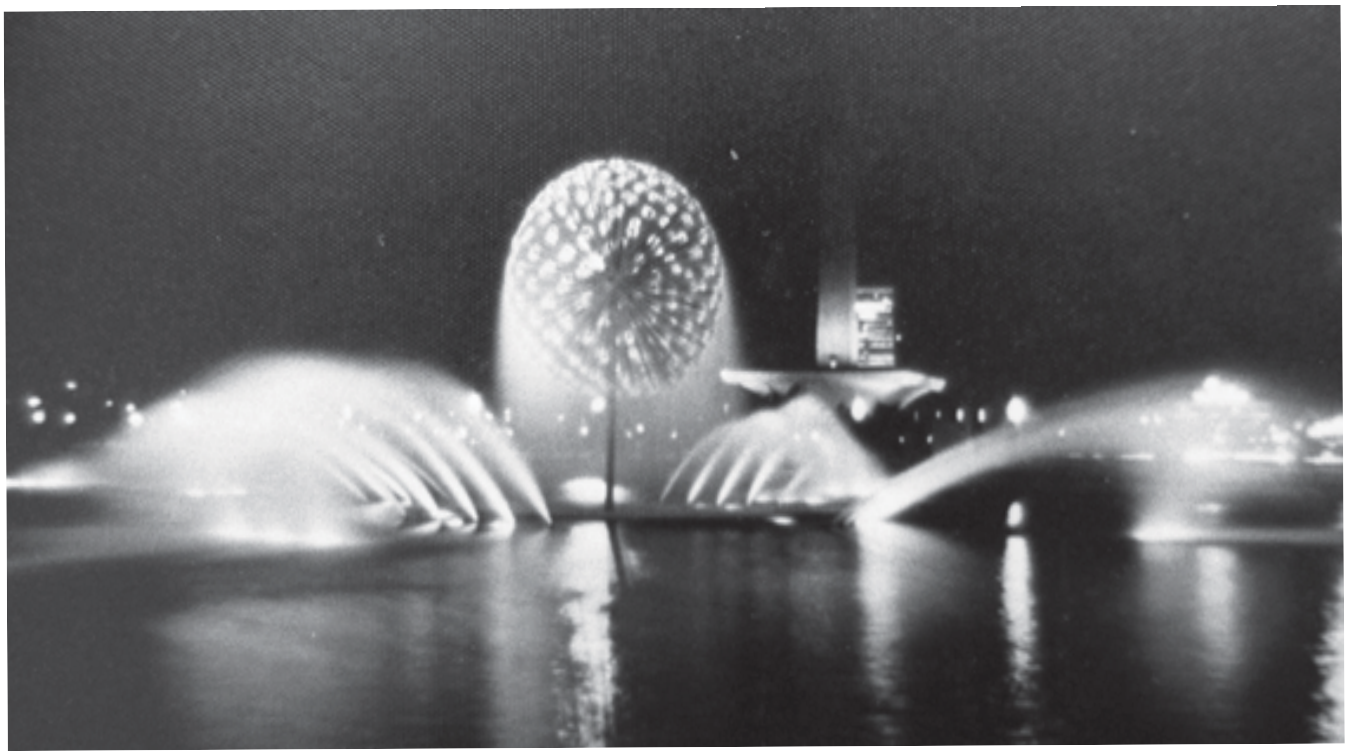
PEM 107A Foam Column at Quebec City , Quebec , Canada

PEM 107B Foam Pinnacle at Dorion , Quebec , Canada

PEM 107B Foam Pinnacle at Oshawa, Ontario, Canada

PEM DANDELION SPHERES

PEM 1141, Dandelion Sphere with PEM 746 Aerating Jets, Monte Carlo



PEM 1141, Dandelion Sphere with PEM 746 Aerating Jets
Jakarta , Indonesia

PEM
DANDELION SPHERES

PEM 1146, 6.0m/20 Feet Diam. Dandelion Sphere, Mulhouse, France (avec Mr. Bernard Quiry)

PEM 1146, 6.0m/20 Feet Diam. Dandelion Sphere, Mulhouse, France (by Bernard Quiry)

PEM
DANDELION SPHERES

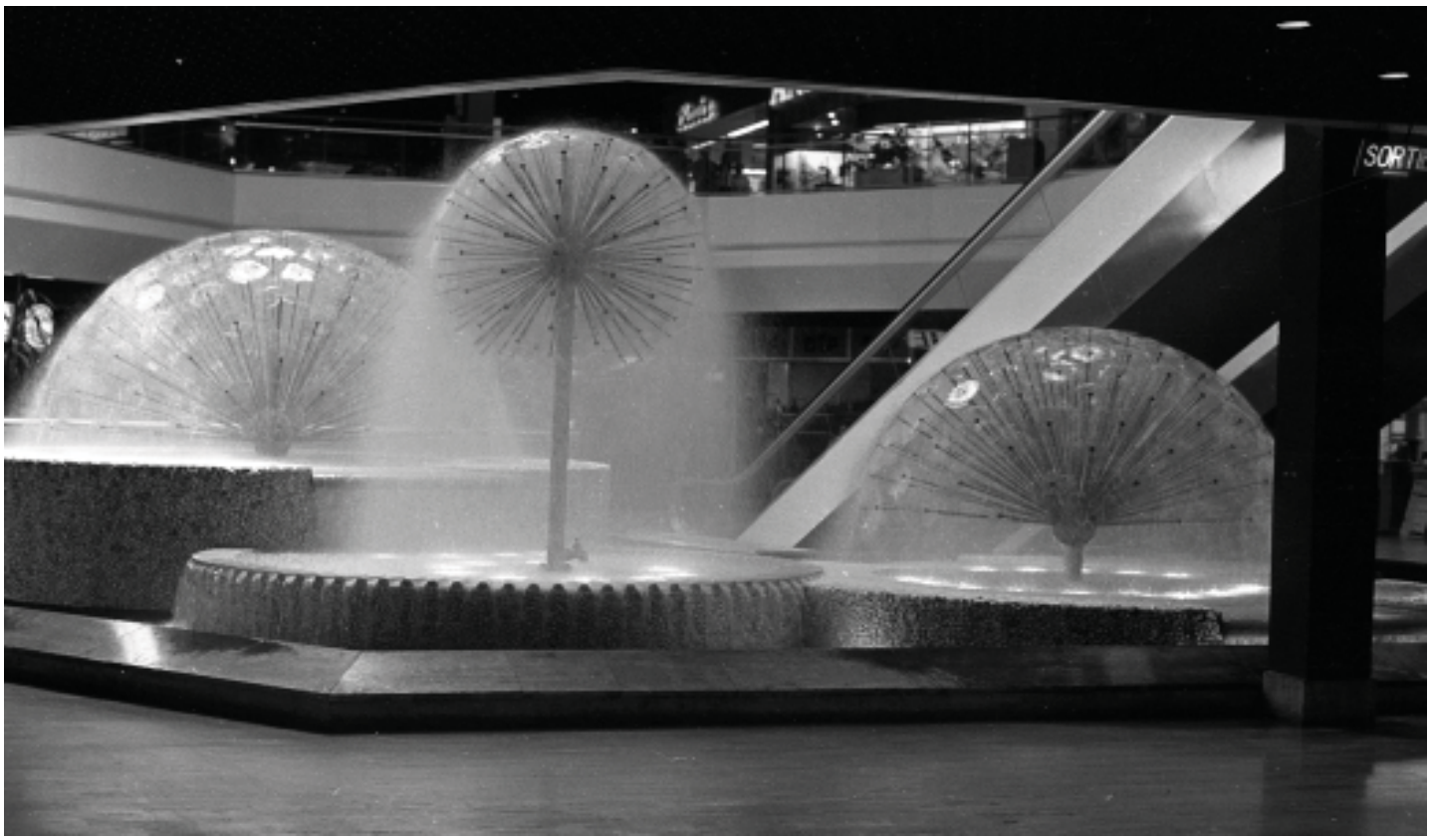
PEM 1139, Dandelion Sphere af Feria de Lima, Peru 1972

PEM 1135, Dandelion Sphere, Kansas City 1971

PEM DANDELION SPHERES

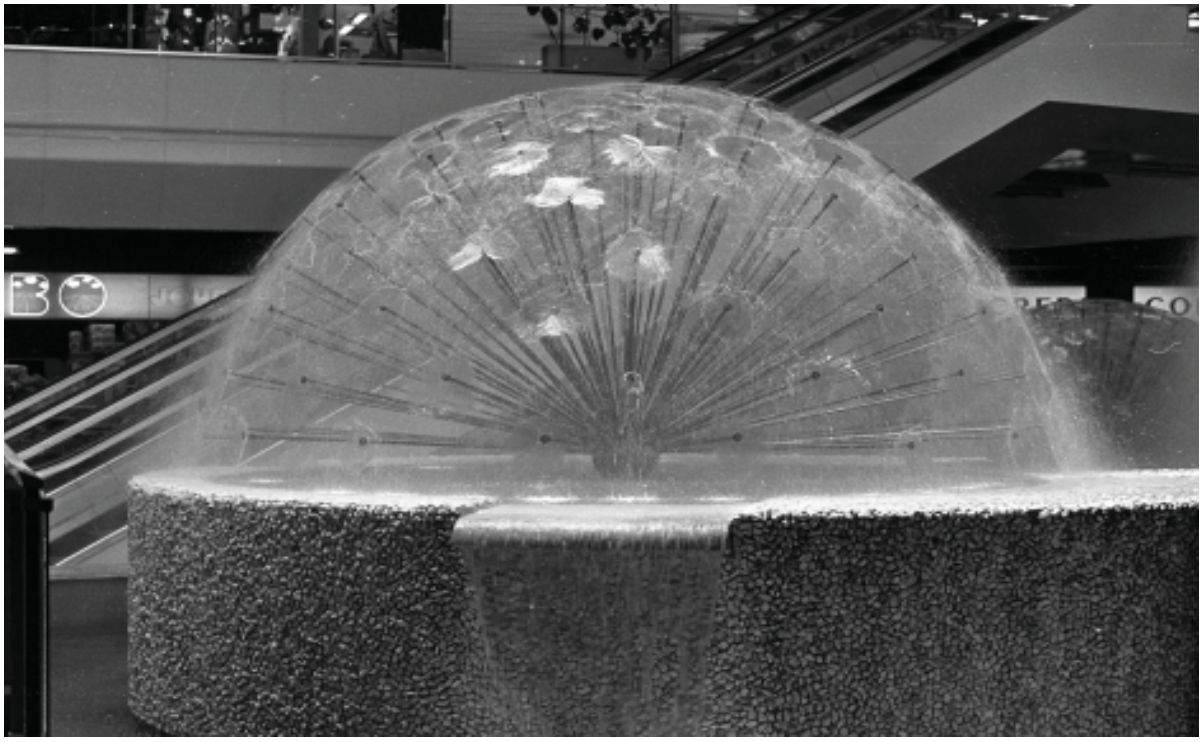
PEM 1141, Dandelion Sphere, Krems, Austria

PEM 1234, Dandelion Hemisphere



PEM 1130, 1244 & 1241 In shopping centre in Paris, France (by Bernard Quiry)

PEM
DANDELION SPHERES



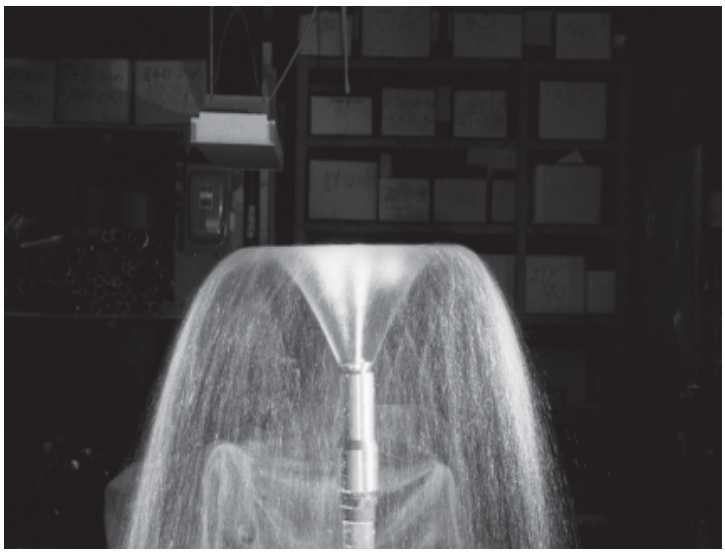
PEM 1244 Hemisphere in shopping centre in Paris, France (by Bernard Quiry)

PEM 1140, 1129 & 1233 in Christchurch, New Zealand

PEM FOAM & CASCADE JETS IN SCULPTURAL COMBINATION

PEM 107 Pinnacle Foam Spray with PEM 53 Cascada Jets, Dearborn, Michigan, USA

PEM 2” CALYX & PICALY JET



PEM 326, 25º Calyx Jet

PEM 366, 20º Picaly Jet