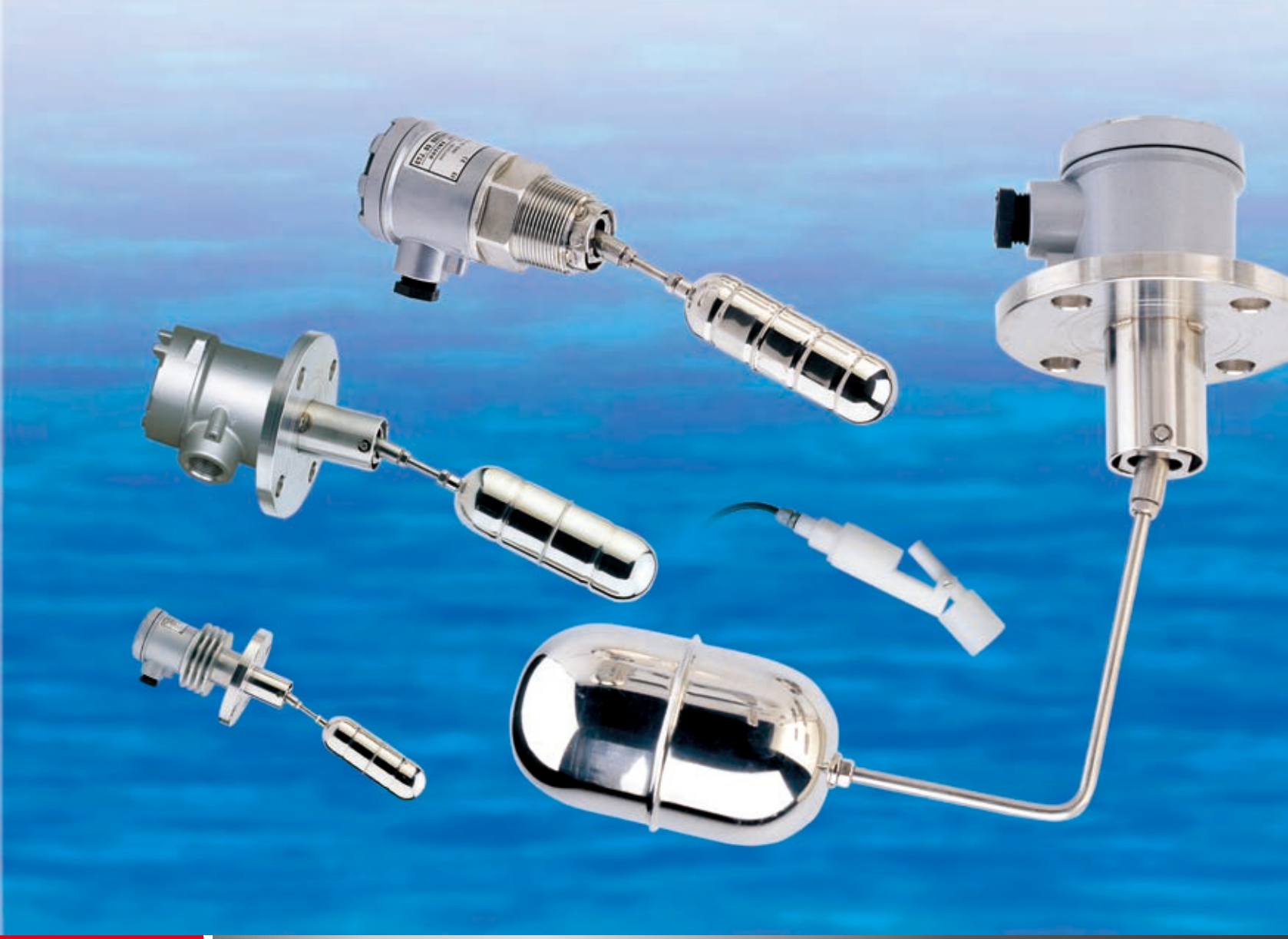


ISO-9001:2000 certified

FF Series Side Mount Float Level Switch

More than just another level measurement company ....

Aplus Finetek Sensor, Inc.

PRODUCT INTRODUCTION

OPERATING PRINCIPLE

The FF Series is a float level switch designed for side mounting in a variety of tanks and other vessels to indicate the presence and absence of a fluid at the point of installation. The FF series float level switches are based on the principle of buoyancy and magnetism. Each float is designed to operate properly with a certain range of fluids based on the fluid specific gravity or density. The buoyancy of the float within the fluid will cause an internal switch within the FF unit to change state.

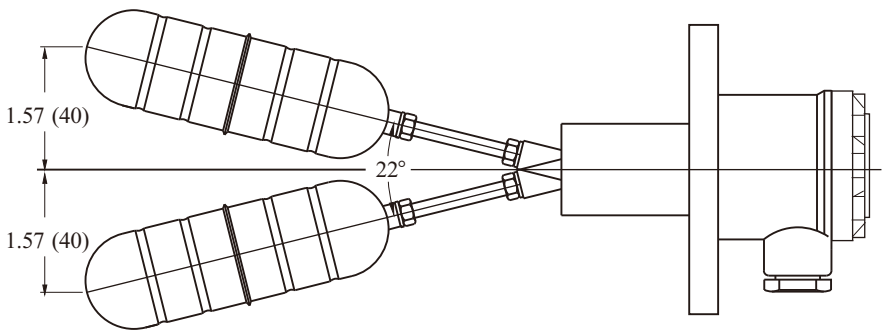
The internal switch is either a microswitch or reed type switch. The microswitch units use internal magnetic coupling to activate the switch.
The reed switch uses the principle of magnetism to either open or close a switch based upon the presence/absence of the magnetic element within the float. The FF series switch is provided in a SPDT form. Switch activation is generally at between 11.5mm~16mm above horizontal. At a point >11.5mm~16mm above horizontal the Normally Open (N.O.) switch will be Closed and the Normally Closed (N.C.) switch will be open. At a point <11.5mm~16mm above horizontal the N.O. switch will be open and the N.C. switch will be closed.

FEATURES

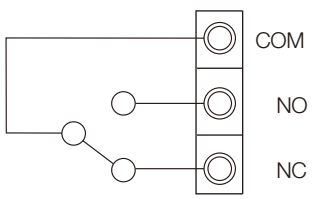
- Specifically designed for side mounting orientation, for high and low level applications.
- Microswitch and Reed Switch versions are available.
- Wide variety of mounting connection sizes and types, threaded and flanged.
- Floats available will work for most all applications.
- Wetted parts include stainless steel or plastic to suit most all industrial requirements.
- Units for hazardous explosionproof areas are available.

TYPICAL FLOAT TRAVEL LIMITS

Inch (mm)



ELECTRICAL CONNECTIONS



REED SWITCH: 1A @ 220VAC/200VDC (FF20, 30, 45, 55 and 8X)
MICROSWITCH: 5A @ 250VAC; 3A @ 250VAC (FF7X)

INDUSTRY USE

- General industrial
- Water/wastewater
- Chemical
- HVAC chillers
- Asphalt plants

INTERNAL STRUCTURE

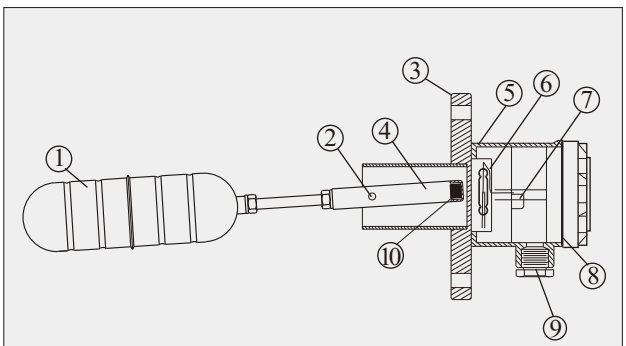


Fig. 1: Reed switch type

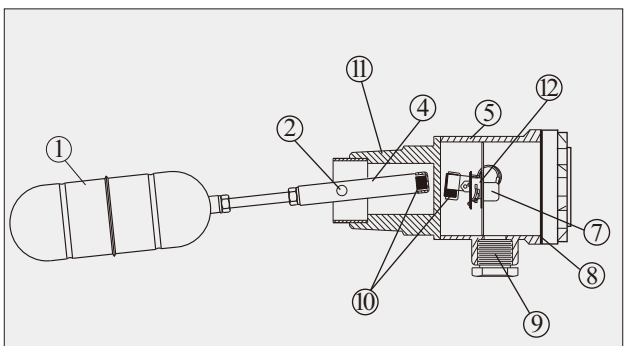


Fig. 2: Microswitch type

1. Float
2. Shaft
3. Flange process connection (if equipped)
4. Pivot
5. Enclosure
6. Reed switch
7. Electrical connection
8. Cover seal
9. Conduit entrance
10. Magnet
11. Threaded process connection (if equipped)
12. Microswitch

TYPES & SPECIFICATIONS

TYPE / SPECIFICATION	Operating Temp.	Electrical Form	Contact Rating	Switch Element	Enclosure	Applicable S.G.
FF10/12BHM	-4°F~212°F (-20°C~100°C)	SPDT/ (2)SPDT	5A@250VAC	Microswitch	Aluminum (Powder Coated) IP65	> 0.25
FF10/12CEM	-4°F~212°F (-20°C~100°C)	SPDT/ (2)SPDT	5A@250VAC	Microswitch	Aluminum (Powder Coated) IP65	> 0.65
FF10/12CEQ	-4°F~212°F (-20°C~100°C)	SPDT/ (2)SPDT	5A@250VAC	Microswitch	Aluminum (Powder Coated) IP65	> 0.65
FF10/12CLO	-4°F~212°F (-20°C~100°C)	SPDT/ (2)SPDT	5A@250VAC	Microswitch	Aluminum (Powder Coated) IP65	> 0.65
FF10/12DFM	-4°F~212°F (-20°C~100°C)	SPDT/ (2)SPDT	5A@250VAC	Microswitch	Aluminum (Powder Coated) IP65	> 0.55
FF10/12DFQ	-4°F~212°F (-20°C~100°C)	SPDT/ (2)SPDT	5A@250VAC	Microswitch	Aluminum (Powder Coated) IP65	> 0.55
FF15HEQ	-4°F~212°F (-20°C~100°C)	SPDT	5A@250VAC	Microswitch	304SS IP65	> 0.8
FF20BHM	-40°F~392°F (-40°C~200°C)	SPDT	1A, 60W @220 VAC/200VDC	Reed Switch	Aluminum (Powder Coated) IP65	> 0.25
FF20CEM	-40°F~392°F (-40°C~200°C)	SPDT	1A, 60W @220 VAC/200VDC	Reed Switch	Aluminum (Powder Coated) IP65	> 0.65
FF20CEQ	-40°F~392°F (-40°C~200°C)	SPDT	1A, 60W @220 VAC/200VDC	Reed Switch	Aluminum (Powder Coated) IP65	> 0.65
FF20DFM	-40°F~392°F (-40°C~200°C)	SPDT	1A, 60W @220 VAC/200VDC	Reed Switch	Aluminum (Powder Coated) IP65	> 0.55
FF20DFQ	-40°F~392°F (-40°C~200°C)	SPDT	1A, 60W @220 VAC/200VDC	Reed Switch	Aluminum (Powder Coated) IP65	> 0.55
FF20DLO	-40°F~392°F (-40°C~200°C)	SPDT	1A, 60W @220 VAC/200VDC	Reed Switch	Aluminum (Powder Coated) IP65	> 0.55

※ Above FF series types are marine certified by DNV, Lloyd's Register, Germanischer Lloyd, Bureau Veritas and ABS

TYPES & SPECIFICATIONS

TYPE / SPECIFICATION	Operating Temp.	Electrical Form	Contact Rating	Switch Element	Enclosure	Applicable S.G.
FF40DFM	-4°F~212°F (-20°C~100°C)	SPDT	5A@250VAC	Microswitch	Aluminum (Powder Coated) IP65	> 0.55
FF42DFM	-4°F~212°F (-20°C~100°C)	(2) SPDT	5A@250VAC	Microswitch	Aluminum (Powder Coated) IP65	> 0.55
FF45DFM	-40°F~392°F (-40°C~200°C)	SPDT	1A, 60W @220 VAC/200VDC	Reed Switch	Aluminum (Powder Coated) IP65	> 0.55
FF50DFM	-4°F~212°F (-20°C~100°C)	SPDT	5A@250VAC	Microswitch	Aluminum (Powder Coated) IP65	> 0.55
FF52DFM	-4°F~212°F (-20°C~100°C)	(2) SPDT	5A@250VAC	Microswitch	Aluminum (Powder Coated) IP65	> 0.55
FF55DFM	-40°F~392°F (-40°C~200°C)	SPDT	1A, 60W@250 VAC/200VDC	Reed Switch	Aluminum (Powder Coated) IP65	> 0.55
FF70/71BHM	-4°F~212°F (-20°C~100°C)	SPDT	3A@250VAC	Microswitch	316SS Ex d IIC T3~T6	> 0.25
FF70/71CFM	-4°F~212°F (-20°C~100°C)	SPDT	3A@250VAC	Microswitch	316SS Ex d IIC T3~T6	> 0.65
FF70/71DFM	-4°F~212°F (-20°C~100°C)	SPDT	3A@250VAC	Microswitch	316SS Ex d IIC T3~T6	> 0.55
FF73GLO	-4°F~212°F (-20°C~100°C)	SPDT	3A@250VAC	Microswitch	316SS Ex d IIC T3~T6	> 0.7
FF75DFM	-4°F~212°F (-20°C~100°C)	SPDT	3A@250VAC	Microswitch	316SS Ex d IIC T3~T6	> 0.55
FF90CLO	-4°F~212°F (-20°C~100°C)	SPDT	5A@250VAC	Microswitch	Aluminum (Powder Coated) IP65	> 0.65

※Above FF series types are marine certified by DNV, Lloyd's Register, Germanischer Lloyd, Bureau Veritas and ABS

TYPE / SPECIFICATION	Operating Temp.	Electrical Form	Contact Rating	Switch Element	Enclosure	Applicable S.G.
FF80EFM	-4°F~176°F (-20°C~80°C)	SPDT	1A, 30W@220 VAC/200VDC	Reed Switch	Aluminum (Powder Coated) IP65	> 0.6
FF81E	-4°F~176°F (-20°C~80°C)	SPDT	1A, 60W @220 VAC/200VDC	Reed Switch	Aluminum (Powder Coated) IP65	> 0.6

DIMENSIONS

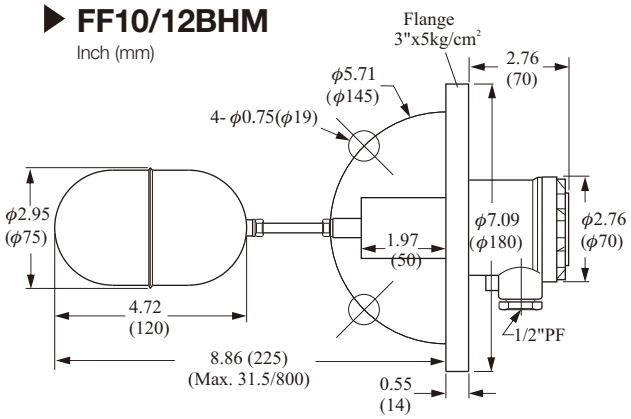
STANDARD TYPES

F F□□ □ □□

- Connecting (Refer to pg. 12)
- Float
- 10: Single Switch
  12: Dual Switch

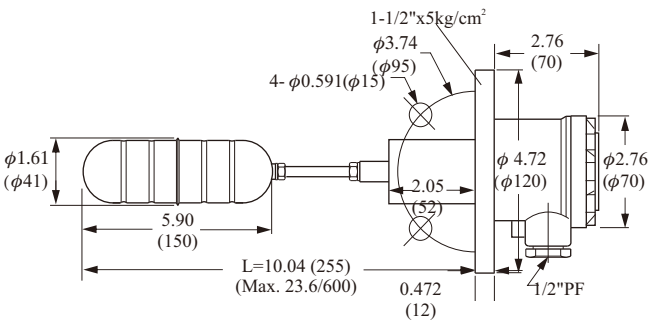
▶ FF10/12BHM

Inch (mm)



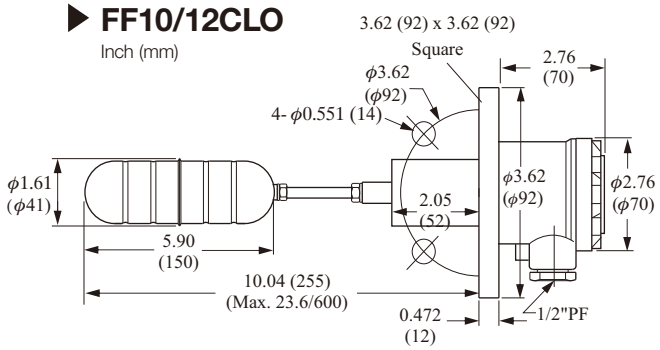
▶ FF10/12CEM

Inch (mm)



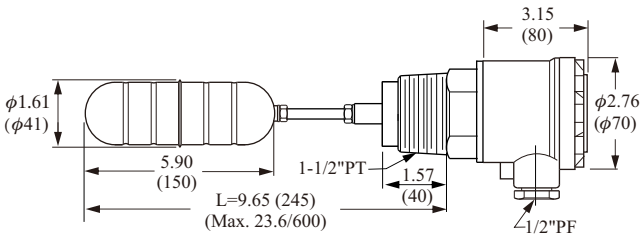
▶ FF10/12CLO

Inch (mm)



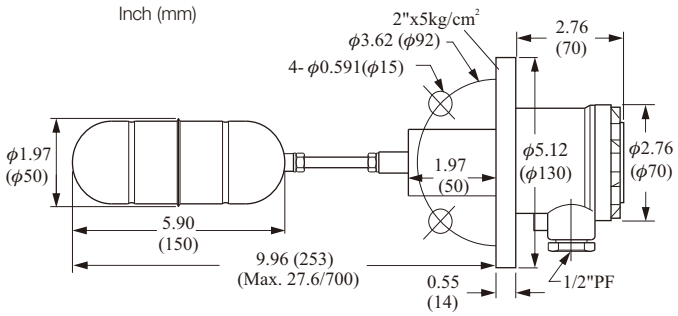
▶ FF10/12CEQ

Inch (mm)



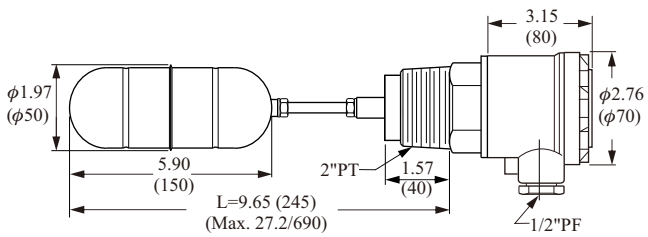
▶ FF10/12DFM

Inch (mm)



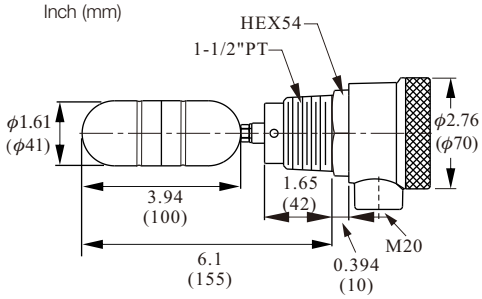
▶ FF10/12DFQ

Inch (mm)



▶ FF15HEQ

Inch (mm)



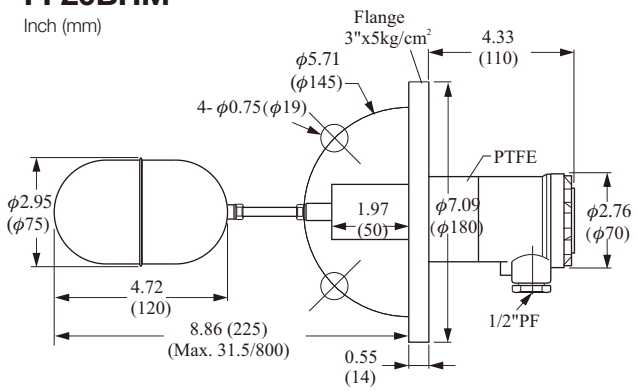
HIGH TEMPERATURE TYPES

FF20 □ □□

- Connection (Refer to pg. 12)
- Float

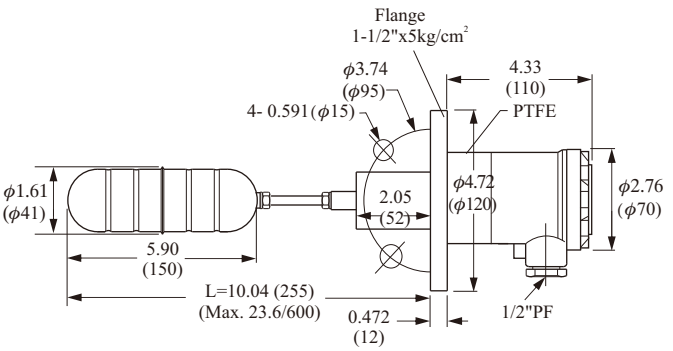
▶ FF20BHM

Inch (mm)



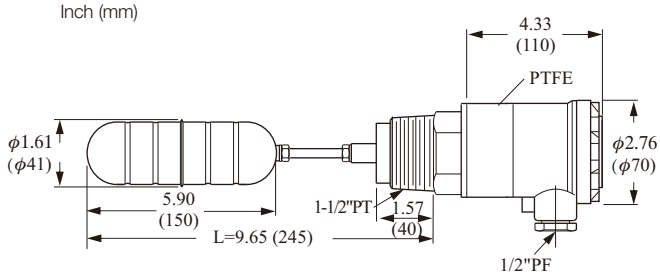
▶ FF20CEM

Inch (mm)



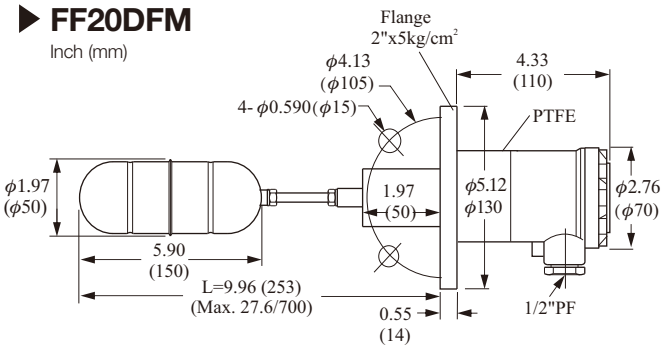
▶ FF20CEQ

Inch (mm)



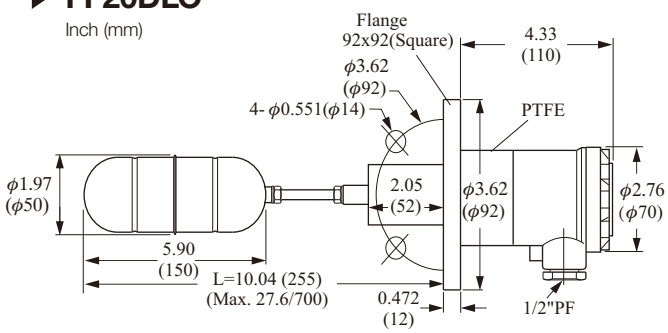
▶ FF20DFM

Inch (mm)



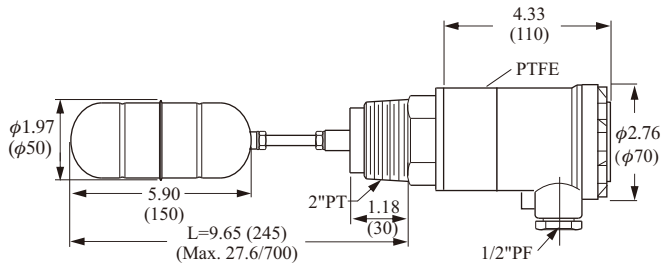
▶ FF20DLO

Inch (mm)



▶ FF20DFQ

Inch (mm)



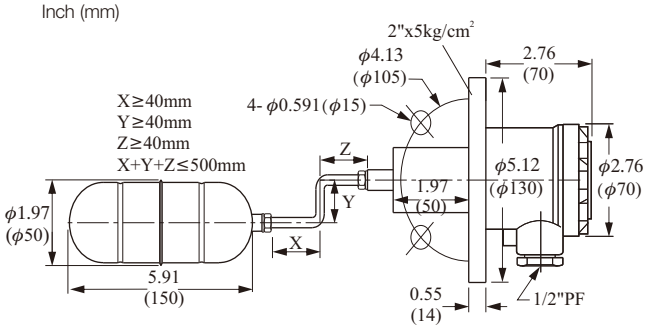
SPECIAL TYPES

F F□□ □ □□

- Connecting (Refer to pg. 12)
- Float
- 30: Mini Type
- 40: Double Angle Standard
- 45: Double Angle High Temperature
- 50: Vertical Standard
- 55: Vertical High Temperature

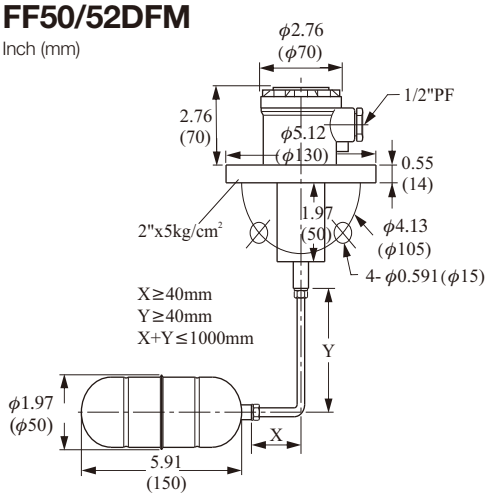
▶ FF40/42DFM

Inch (mm)



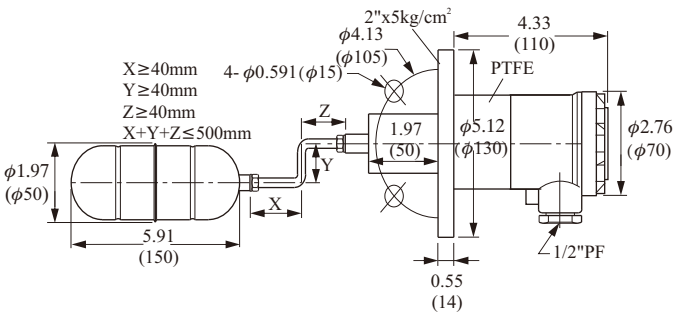
▶ FF50/52DFM

Inch (mm)



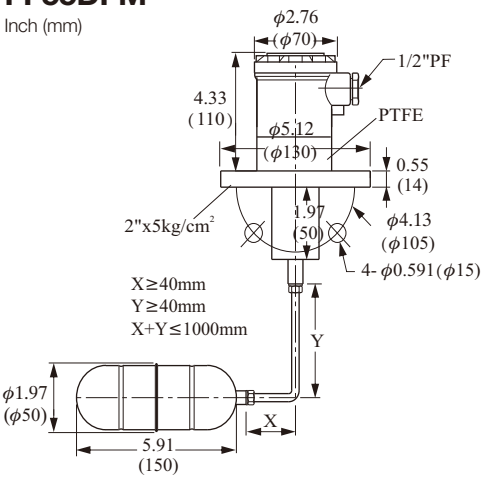
▶ FF45DFM

Inch (mm)



▶ FF55DFM

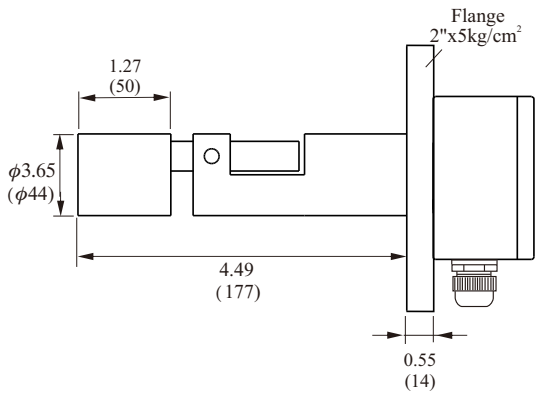
Inch (mm)



ANTI-CORROSIVE TYPES

▶ FF80EFM*

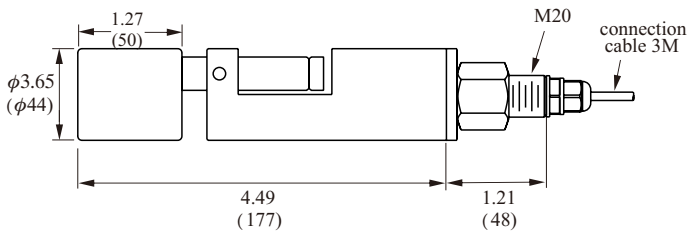
Inch (mm)



※ Shown with "FM" 2" kg/cm² flange, other process connections are available. Polycarbonate enclosure, polypropylene wetted materials.

▶ FF81E†

Inch (mm)



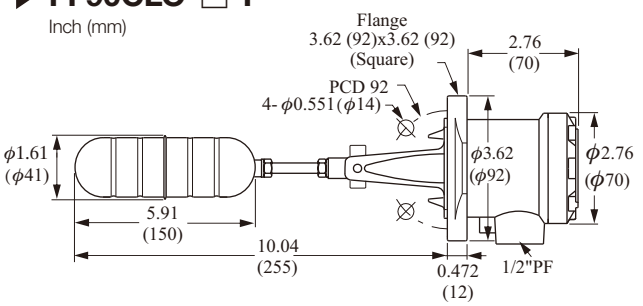
†M20 threaded process connection ONLY, no others available. Polypropylene wetted materials.
Cable is 3m long, PVC jacketed with three (3) 0.75mm² conductors.

TEST ACCESSORY TYPE

FF series side mount float level switch can be provided with a built-in test function.
This test function will allow testing of the mechanical switch parts and float.
When the built-in test accessory or function is required it is necessary to specify the FF90CLO side mount float level switch with the “T” test function option. This test function is ONLY available with the FF90CLO unit.

▶ FF90CLO □ T

Inch (mm)



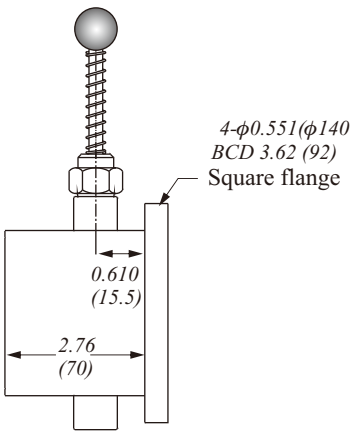
※ FF90CLO shown with optional test function

TEST FUNCTION(Optional)

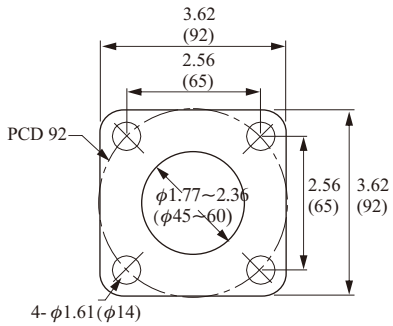
The optional Test Function assembly is constructed of zinc plated steel and includes a test plunger. The Test Function assembly is assembled to the FF90CLO float level switch and in turn welded to the side of the tank. Without changing the level of fluid in the tank the proper function of the level switch can be checked by pressing downward on the plunger that is a part of the Test Function assembly, as shown.

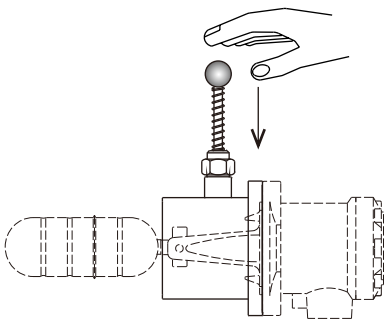
Check list

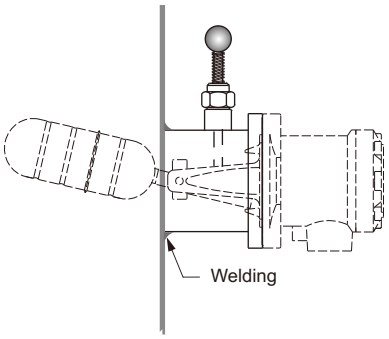
Check if mechanical parts of level switch function well?
Check if float functions well?



Drill Hole







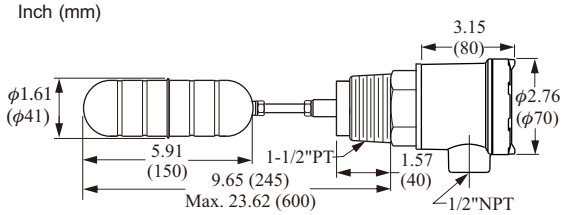
EXPLOSIONPROOF TYPES

F F□□ □ □□

- Connecting Type (Refer to page 13)
- Float Type
- 7□:Explosion Proof (EX d IIC T3~T6)

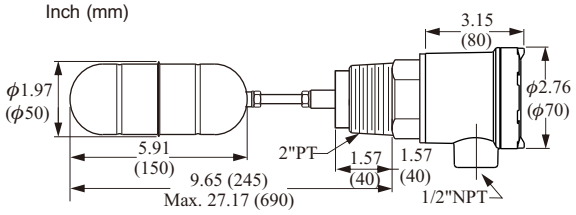
▶ FF 70 CEQ

Inch (mm)



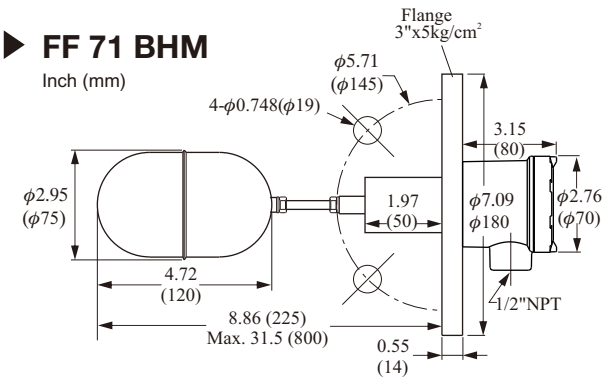
▶ FF 70 DFQ

Inch (mm)



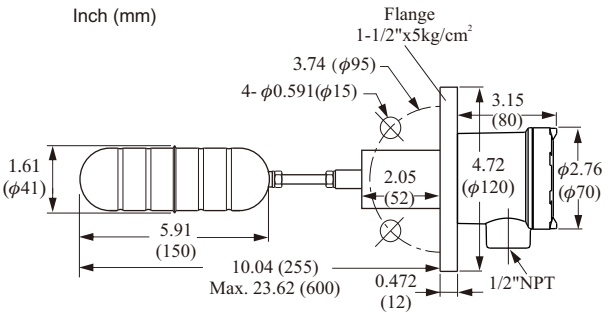
▶ FF 71 BHM

Inch (mm)



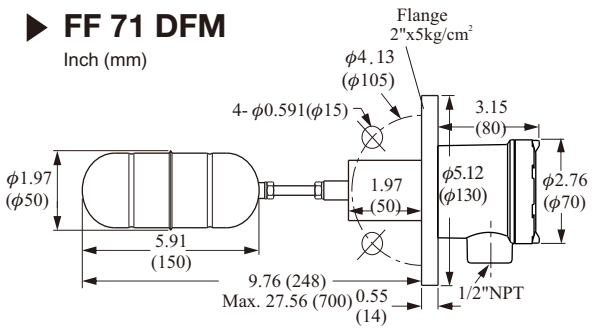
▶ FF 71 CEM

Inch (mm)



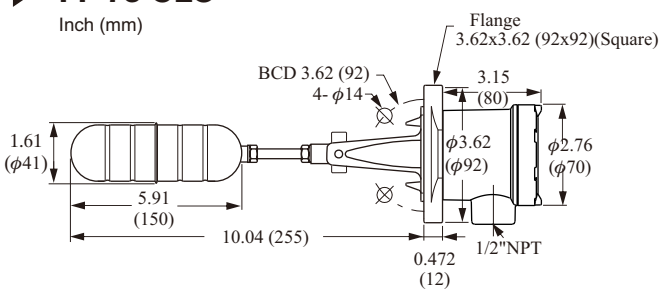
▶ FF 71 DFM

Inch (mm)



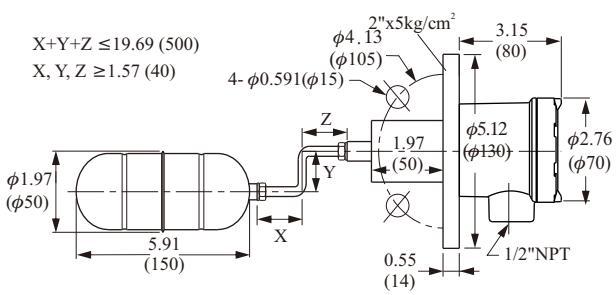
▶ FF 73 CLO

Inch (mm)



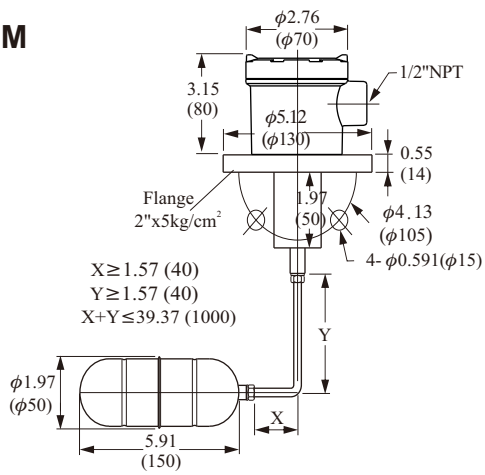
▶ FF 74 DFM

Inch (mm)



▶ FF 75 DFM

Inch (mm)



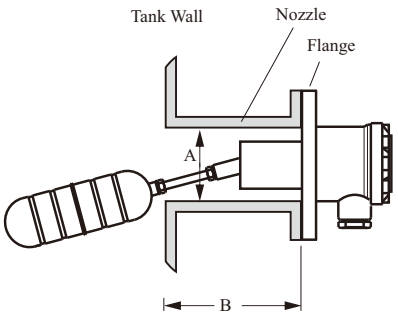
INSTALLATION

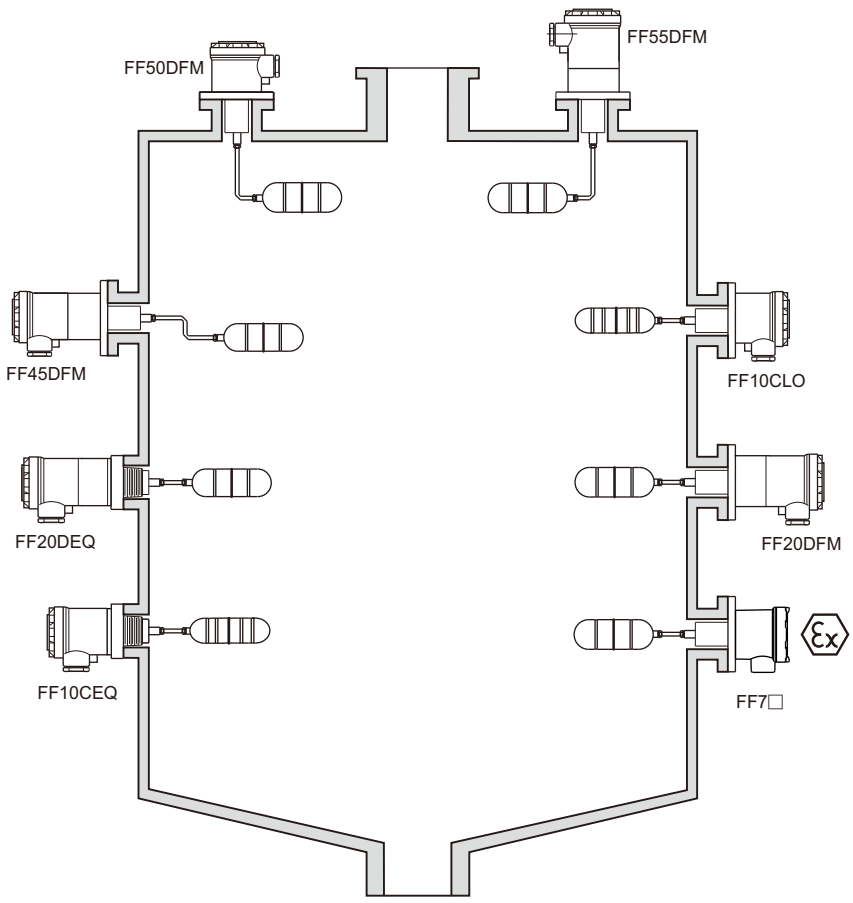
1. When installing the FF side mount float level switch using a mounting nozzle, care should be taken to ensure that the nozzle length and diameter will allow for proper unit operation (see Fig. 1).
2. 304SS/316SS/316LSS materials are typically not used for corrosive applications. Take care to ensure material compatibility and consider use of FF80/81 units for Use with corrosive fluids.
3. Conduit entrance should face downward to avoid moisture Leakage into unit enclosure through conduit/cabling system.
4. The float and interconnecting rod of the FF series side mount float level switch must be inserted completely into the tank.
5. Verify the fluid's S.G. suitability with the FF series float before purchase and installation.
6. The process connection opening must be larger than the outside diameter of the float (refer to float dimensions in previous pages and in order information).
7. Do not mount the FF series level switch near tank inlet flow or near tank discharge.

NOZZLE INSTALLATION

Pipe Dia. (A)	1.77~1.97 (45~50)	1.97~2.17 (50~55)	2.17~2.36 (55~60)	2.36~2.56 (60~65)	2.56~2.76 (65~70)
Length Max. (B)	5.12 (130)	5.51 (140)	5.91 (150)	6.30 (160)	6.69 (170)

TYPICAL MOUNTING





ORDER INFORMATION – NOT EXPLOSIONPROOF TYPES

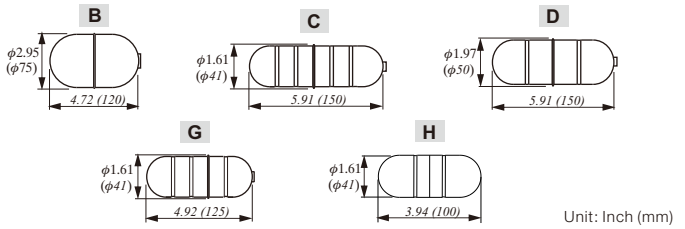
FF [1][0] [C] [E] [M] ([S]) ([T]) - 6

TYPE

10: Standard (single switch)
12: Standard (dual switch)
15: Standard – Compact *
20: High Temperature 392^{0}F (200^{0}C)
40: Double Angle – Standard (single switch)
42: Double Ange – Standard (dual switch)
45: Double Angle - High Temperature 392^{0}F (200^{0}C)
50: Vertical – Standard (single switch)
52: Vertical – Standard (dual switch)
55: Vertical – High Temperature 392^{0}F (200^{0}C)
80: Anti-Corrosive
81: Anti-Corrosive (prewired electrical cable; without enclosure)
90: Standard - Test Function Accessory (square flange process connection only)
※Standard – Compact type available only with C, G or H floats

FLOAT

B: > 0.25 S.G., ϕ2.95" x 4.72" (ϕ75mm x 120mm), 145psi (10bar) Operating Pressure
C: > 0.65 S.G., ϕ1.61" x 5.91" (ϕ41mm x 150mm), 218psi (15bar) Operating Pressure*
D: > 0.55 S.G., ϕ1.97" x 5.91" (ϕ50mm x 150mm), 435psi (30bar) Operating Pressure
E: > 0.60 S.G., ϕ1.73" x 6.97" (ϕ44mm x 150mm), 73psi (5bar) Operating Pressure **
G: > 0.7 S.G., ϕ1.61" x 4.92" (ϕ41mm x 125mm), 218psi (15bar) Operating Pressure*
H: > 0.8 S.G., ϕ1.61" x 3.94" (ϕ41mm x 100mm), 218psi (15bar) Operating Pressure*



Unit: Inch (mm)

* C, G and H floats are the only choices available for use with FF15 type units
** E style float is available ONLY with FF80 or FF81 type units

PROCESS CONNECTION

E: 1½"	L: 3.62" x 3.62" (92mm x 92mm)	T: BSP (R)
F: 2"	M: JIS 5kg/cm^2	U: NPT
G: 2½"	N: JIS 10kg/cm^2	W: DIN PN10
H: 3"	O: ANSI 150	X: DIN PN16
I: 4"	P: ANSI 300	Y: DIN PN25
J: 5"	Q: PT	Z: DIN PN40
K: 6"	R: PF (G)	S: Special

CUSTOM LENGTH (Unit: mm) *

Without: Standard Length
S: Custom Overall Length; Add mm value in parentheses at end
* Overall length made to ± 5mm

TEST FUNCTION

Without: No Test Function
T: Test Function included (requires square flange selection L above)

WETTED MATERIAL

Without: 304SS
- 6: 316SS
- 9: 316LSS (all wetted 316LSS, except washers on interconnecting rod are 316SS)

ORDER INFORMATION –EXPLOSIONPROOF TYPES

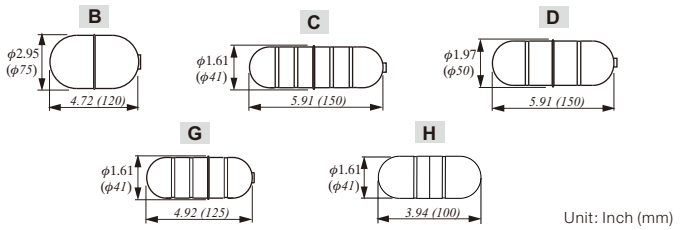
FF [1][0] [C] [E] [M] ([S]) ([T]) - 6

TYPE

70: Explosionproof – threaded process connection
71: Explosionproof – flange process connection
73: Explosionproof – Test Function Accessory
(square flange process connection only)
74: Explosionproof - Double Angle Standard (single switch)
75: Explosionproof - Vertical Standard (single switch)

FLOAT

B: > 0.25 S.G., ϕ2.95" x 4.72" (ϕ75mm x 120mm), 145psi (10bar) Operating Pressure
C: > 0.65 S.G., ϕ1.61" x 5.91" (ϕ41mm x 150mm), 218psi (15bar) Operating Pressure*
D: > 0.55 S.G., ϕ1.97" x 5.91" (ϕ50mm x 150mm), 435psi (30bar) Operating Pressure
G: > 0.7 S.G., ϕ1.61" x 4.92" (ϕ41mm x 125mm), 218psi (15bar) Operating Pressure*
H: > 0.8 S.G., ϕ1.61" x 3.94" (ϕ41mm x 100mm), 218psi (15bar) Operating Pressure*



Unit: Inch (mm)

PROCESS CONNECTION

E: 1½"	L: 3.62" x 3.62" (92mm x 92mm)	T: BSP (R)
F: 2"	M: JIS 5kg/cm^2	U: NPT
G: 2½"	N: JIS 10kg/cm^2	W: DIN PN10
H: 3"	O: ANSI 150	X: DIN PN16
I: 4"	P: ANSI 300	Y: DIN PN25
J: 5"	Q: PT	Z: DIN PN40
K: 6"	R: PF (G)	S: Special

CUSTOM LENGTH (Unit: mm) *

Without: Standard Length
S: Custom Overall Length; Add mm value in parentheses at end
* Overall length made to ± 5mm

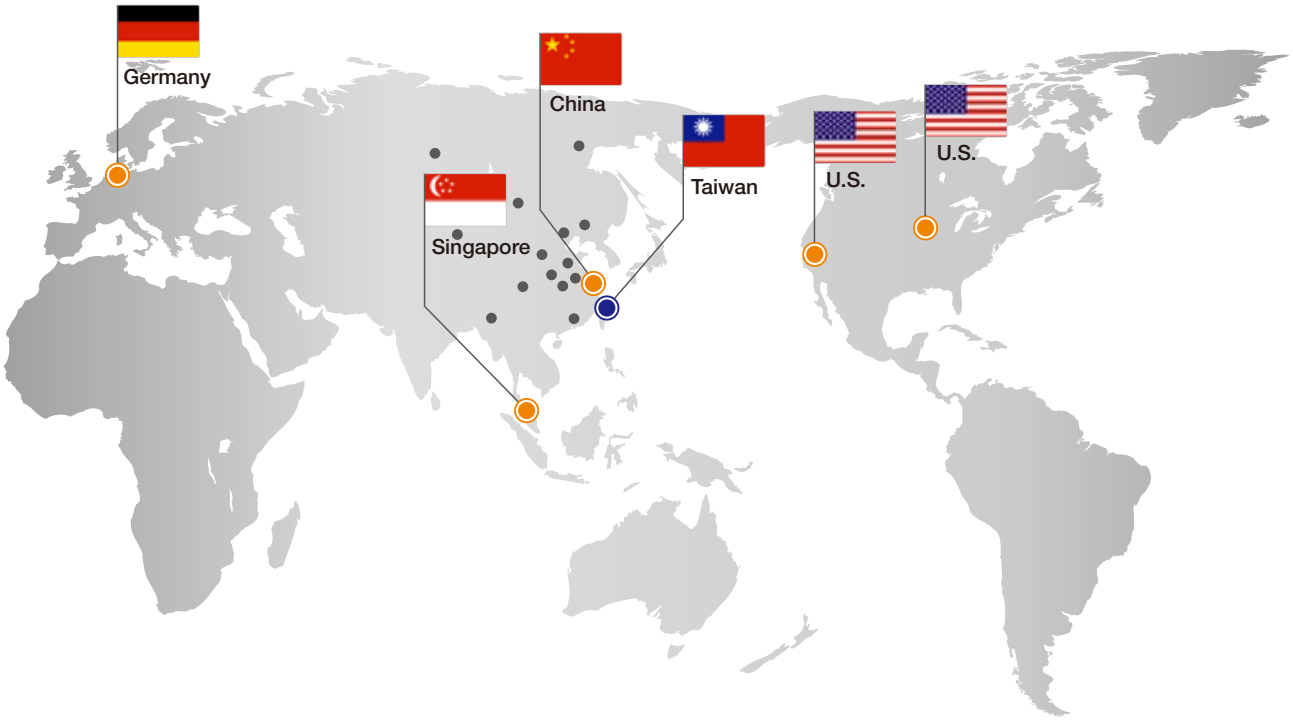
TEST FUNCTION

Without: No Test Function
T: Test Function included (requires square flange selection L above)

WETTED MATERIAL

Without: 304SS
- 6: 316SS
- 9: 316LSS (all wetted 316LSS, except washers on interconnecting rod are 316SS)

Global Network



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08-FF-B0-AP, 08/10/2015