

Mobrey Magnetic Horizontal Float Switches

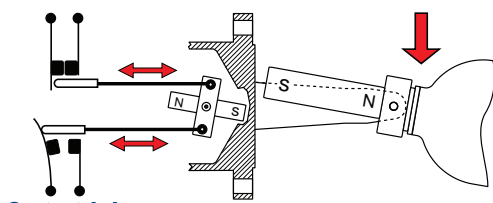
For Liquid Level Alarm and Pump Control



- Ideal for industrial applications such as pump control and high or low alarm duty on tanks and pressure vessels
- Simple, rugged, and reliable. Low cost of ownership
- Direct (side or top) or chamber mounting
- Operates in most liquids
- Variety of switch mechanisms for electrical or pneumatic switching
- Selected models are safety certified to IEC 61508 with proven FMEDA, suitable for Safety Integrity Level 1 (SIL 1)
- ATEX and marine approvals

Magnetic Horizontal Float Switches

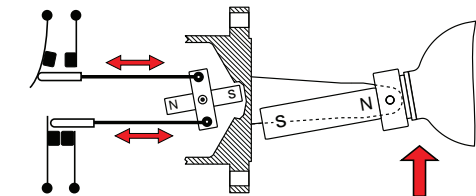
Contact B-B



Contact A-A

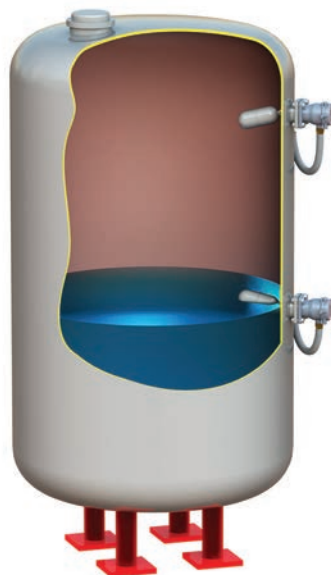
Level switch cross-section
– level below float

Contact B-B



Contact A-A

Level switch cross-section
– level passes float



High and low alarm application

Measurement principle

Mobrey magnetic horizontal float switches (“float switches”) are ideal for high and low liquid level alarm, and pump control duties.

The float switch is designed to open or close a circuit (“switch”) as a changing liquid level within a vessel passes the level of the float (the Switch Point).

When the process liquid level is below the Switch Point, contacts B-B are made (together) and contacts A-A are open.

When the process liquid level is above the Switch Point, contacts A-A are made (together) and contacts B-B are open.

Benefits of Mobrey magnetic float switch technology

- Over 100 years of experience – a proven design
- “Fit and Forget”
– simple, reliable, and cost effective level measurement technology
- Tough, rugged design for long life in aggressive environments
- Operates in almost any liquid at high pressures and temperatures
- Measurement is unaffected by changes in process temperature, dielectric, or the presence of vapors
- Wide range of mounting options and configurations to suit all types of liquid level application and meet site standards

Special features of the Mobrey design

- Magnetically coupled
- No glands or linkages that could cause leaks
- No springs means reduced maintenance
- Snap action switching
- No contact hover or bounce for clean make or break
- Hermetically sealed switch mechanism is available to eliminate freezing and corrosion of contacts and all moving parts

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Selecting a float switch

Float switches for general purpose applications

(aluminum bronze wetside) – see [Table 1 on page 4](#) for model codes

- Ideal for industrial applications such as pump control, and high or low alarm duty
- Selected models are certified to IEC61508 ⁽¹⁾
- Marine approvals: Lloyds Register of Shipping (LRS), Germanischer Lloyd, DNV, ABS, BV, RINA, and RMRS

Float switches for general purpose applications

(stainless steel wetside) – see [Table 2 on page 5](#) for model codes

- Selected models are certified to IEC61508 ⁽¹⁾
- Marine approvals: Lloyds Register of Shipping (LRS), Germanischer Lloyd, DNV, ABS, and RMRS

Float switches for hazardous area applications

– see [Table 3 on page 7](#) for model codes

- ATEX/IECEx Zone 1 Gas Group IIC, CSA Class 1: Group CD, Technical Regulation Customs Union (EAC) Flameproof, and Lloyds Register of Shipping (LRS) approvals
- Selected models are certified to IEC61508 ⁽¹⁾

Float switches for marine applications

– see [Table 4 on page 9](#) for model codes

- Submersible (S03, S163 and S195) or hoseproof (S179 and S181)
- Hazardous Area Submersible/Hoseproof (S183, S187, and S189), designed for submersion in vented tanks and mounting from the outside of a tank
- Aluminum bronze or stainless steel enclosure and wetside
- May be submerged to 100 ft. (30 m) head of water (IP68)
- Hazardous area ATEX approval for Zone 1, Gas Group IIC
- Marine approvals: Lloyds Register of Shipping (LRS), Germanischer Lloyd, DNV, ABS, BV, RINA, and RMRS

Suitable for a Safety Integrity Level 1 (SIL 1) environment

Mobrey magnetic float switches can be used in a Safety Instrumented System (SIS). Float switch orders ⁽¹⁾ that include the code CERT-SIL-L2049 ([page 11](#)) are supplied with a third party certificate of SIL suitability. They have been externally evaluated and certified in accordance with IEC61508 to attain Safety Integrity Level 1 (SIL 1) for a single device.

FLOAT SWITCHES FOR GENERAL PURPOSE APPLICATIONS



Aluminum bronze wetside



Stainless steel wetside

FLOAT SWITCHES FOR HAZARDOUS AREA APPLICATIONS



S250DA/F84

FLOAT SWITCHES FOR MARINE APPLICATIONS



Aluminum bronze



316 stainless steel



Hazardous area

(1) Selected models only – see document M310/FSM on the Mobrey brand pages at www.emersonprocess.com for the latest selected models and option codes.

Ordering Float Switches

Specification and selection of product materials, options, or components must be made by the purchaser of the equipment. See [page 13](#) for more information on Material Selection.

Table 1. Ordering information for general purpose float switches (aluminum bronze wetside)

★The Standard offering represents the most common options. The starred options (★) should be selected for best delivery. The Expanded offering is subject to additional delivery lead time.

Model	Product Description		
S	Horizontal Float Switch		
Flange (Head) ⁽¹⁾		Max. T_{Process} ⁽²⁾	
Standard			Standard
01 ⁽³⁾	General purpose, aluminum bronze wetside, Mobrey 'A' flange, 261 psi (18 bar)	410 °F (210 °C)	★
Switch Mechanism ⁽⁴⁾			
Standard			Standard
D	Electrical: 2 independent Single Pole Single Throw (SPST) contact sets		★
P	As type D but with <i>gold plated contacts</i>		★
Expanded			
D6	Electrical: 2 independent circuits of Double Pole Double Throw (DPDT) contact sets		
P6	As type D6 but with <i>gold plated contacts</i>		
AP ⁽⁵⁾	Pneumatic: air pilot valve on/off for switching air circuits		
AM ^{(5) (6)}	Pneumatic: air pilot valve for continuous modulating of air controlled circuits		
Enclosure		Switch Types	
Standard			Standard
A	Aluminum alloy	AP or AM	★
B	Aluminum bronze	D, P, D6, or P6	★
Float (All Ratings at T_{room}) ⁽⁷⁾		Switch Types	
Standard			Standard
F84	General purpose high/low alarm, 316 SST, min. SG 0.65, 500 psi (34.5 bar)	All	★
F68/1 ⁽⁵⁾⁽⁸⁾	Horizontal variable differential for pump control/alarm, 316 SST, min. SG 0.72, 500 psi (34.5 bar)	All except AM	★
F68/4 ⁽⁵⁾⁽⁸⁾	Horizontal variable differential for pump control/alarm, 316 SST, min. SG 0.85, 500 psi (34.5 bar)	All except AM	★
F21/1 ⁽⁵⁾⁽⁸⁾	Vertical pump control or alarm, 316 SST, rod length 1524 mm, 435 psi (30 bar)	All except AM	★
F21/2 ⁽⁵⁾⁽⁸⁾	Vertical pump control or alarm, 316 SST, rod length 3048 mm, 435 psi (30 bar)	All except AM	★
F21/3 ⁽⁵⁾⁽⁸⁾	Vertical pump control or alarm, 316 SST, rod length 4570 mm, 435 psi (30 bar)	All except AM	★
F104/1 ⁽⁸⁾	Straight arm, horizontal, 316 SST, rod length 750 mm, 500 psi (34.5 bar)	All	★
F104/2 ⁽⁸⁾	Cranked arm, horizontal, 316 SST, dimensions to be specified, 500 psi (34.5 bar)	All	★
F104/3 ⁽⁸⁾	Cranked arm, vertical, 316 SST, dimensions to be specified, 500 psi (34.5 bar)	All	★
F93 ⁽⁹⁾	Shrouded for dirty liquids, 316 SST, min. SG 0.75, atmospheric	All	★
F185	General purpose high/low alarm, Alloy 400, min. SG 0.65, 500 psi (34.5 bar)	All	★
Expanded			
F98	General purpose high/low alarm, 316 SST, min. SG 0.45, 500 psi (34.5 bar)	All	
F264	Horizontal limited differential, Alloy 400, min. SG 0.85, 464 psi (32 bar)	All except AM	
Product Certifications			
Standard			Standard
NA	No hazardous locations certificates		★
GM ⁽¹⁰⁾	Technical Regulation Customs Union (EAC) Ordinary Locations Mark		★
Typical Model Number: S 01 D B F84 NA			

- (1) See [page 23](#) for nozzle and stud lengths.
- (2) The maximum process temperature is dependent on the Flange (Head) and selected Float option.
- (3) See [page 19](#) for Mobrey flange information.
- (4) See “Switch mechanism specifications” on [page 17](#) for information about all switch mechanisms.
- (5) The SIL certificate (code CERT-SIL-L2049 in [Table 6](#) on [page 11](#)) is not available with this option.
- (6) Switch mechanism type AM is not compatible with float types F68/*, F21/*, or F264.
- (7) See [Table 13](#) on [page 20](#) for a comparison of the float options listed here.
- (8) See [pages 23, 24, and 25](#) for technical float details and length options.
- (9) A silicone rubber gaiter is supplied with the 316 SST shroud.
- (10) Contact an Emerson Process Management representative for additional information.

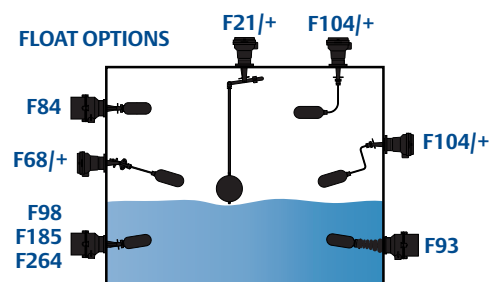


Table 2. Ordering information for general purpose float switches (stainless steel wetside)

★The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Model	Product Description		
S	Horizontal Float Switch		
Flange (Head) ⁽¹⁾		Max. T_{Process} ⁽²⁾	
Standard			Standard
36 ⁽³⁾⁽⁴⁾	General purpose, stainless steel wetside, Mobrey 'A' flange, 490 psi (33.8 bar)	752 °F (400 °C)	★
Expanded			
190 ⁽³⁾⁽⁴⁾⁽⁵⁾	General purpose, stainless steel wetside, Mobrey 'A' flange, 490 psi (33.8 bar)	356 °F (180 °C)	
440	General purpose, stainless steel wetside, 3 in. ASME B16.5 Class 150 RF flange	752 °F (400 °C)	
441	General purpose, stainless steel wetside, 4 in. ASME B16.5 Class 150 RF flange	752 °F (400 °C)	
424	General purpose, stainless steel wetside, 3 in. ASME B16.5 Class 300 RF flange	752 °F (400 °C)	
425	General purpose, stainless steel wetside, 4 in. ASME B16.5 Class 300 RF flange	752 °F (400 °C)	
489	General purpose, stainless steel wetside, 3 in. ASME B16.5 Class 600 RF flange	752 °F (400 °C)	
490	General purpose, stainless steel wetside, 3 in. ASME B16.5 Class 900 RF flange	752 °F (400 °C)	
428	General purpose, stainless steel wetside, EN 1092-1 DN 65 PN 16 flange	752 °F (400 °C)	
429	General purpose, stainless steel wetside, EN 1092-1 DN 80 PN 16 flange	752 °F (400 °C)	
430	General purpose, stainless steel wetside, EN 1092-1 DN 100 PN 16 flange	752 °F (400 °C)	
431	General purpose, stainless steel wetside, EN 1092-1 DN 125 PN 16 flange	752 °F (400 °C)	
432	General purpose, stainless steel wetside, EN 1092-1 DN 150 PN 16 flange	752 °F (400 °C)	
417	General purpose, stainless steel wetside, EN 1092-1 DN 65 PN 40 flange	752 °F (400 °C)	
418	General purpose, stainless steel wetside, EN 1092-1 DN 80 PN 40 flange	752 °F (400 °C)	
419	General purpose, stainless steel wetside, EN 1092-1 DN 100 PN 40 flange	752 °F (400 °C)	
433	General purpose, stainless steel wetside, EN 1092-1 DN 125 PN 40 flange	752 °F (400 °C)	
434	General purpose, stainless steel wetside, EN 1092-1 DN 150 PN 40 flange	752 °F (400 °C)	
488	General purpose, stainless steel wetside, EN 1092-1 DN 80 PN 63 flange	752 °F (400 °C)	
435	General purpose, stainless steel wetside, EN 1092-1 DN 100 PN 63 flange	752 °F (400 °C)	
436	General purpose, stainless steel wetside, EN 1092-1 DN 125 PN 63 flange	752 °F (400 °C)	
437	General purpose, stainless steel wetside, EN 1092-1 DN 150 PN 63 flange	752 °F (400 °C)	
Switch Mechanism ⁽⁶⁾		Max. T_{Process} ⁽²⁾	
Standard			Standard
D	Electrical: 2 independent Single Pole Single Throw (SPST) contact sets	752 °F (400 °C)	★
P	As type D but with <i>gold plated contacts</i>	752 °F (400 °C)	★
Expanded			
D6	Electrical: 2 independent circuits of Double Pole Double Throw (DPDT) contact sets	752 °F (400 °C)	
P6	As type D6 but with <i>gold plated contacts</i>	752 °F (400 °C)	
H6	As type D6 but with <i>gold plated contacts</i> and <i>hermetically sealed moving parts</i>	482 °F (250 °C)	
B6	As type H6 but <i>approved for Zone 2 areas</i>	482 °F (250 °C)	
AP ⁽⁷⁾	Pneumatic: air pilot valve on/off for switching air circuits	752 °F (400 °C)	
AM ⁽⁷⁾⁽⁸⁾	Pneumatic: air pilot valve for continuous modulating of air controlled circuits	752 °F (400 °C)	
Enclosure			
Standard			Standard
A	Aluminum alloy		★
Float (All Ratings at T_{room}) ⁽⁹⁾		Max. T_{Process} ⁽²⁾	
Standard			Standard
F84	General purpose high/low alarm, 316 SST, min. SG 0.65, 500 psi (34.5 bar)	752 °F (400 °C)	★
F68/1 ⁽⁷⁾⁽¹⁰⁾	Horizontal variable differential for pump control/alarm, 316 SST, min. SG 0.72, 500 psi (34.5 bar)	752 °F (400 °C)	★
F68/4 ⁽⁷⁾⁽¹⁰⁾	Horizontal variable differential for pump control/alarm, 316 SST, min. SG 0.85, 500 psi (34.5 bar)	752 °F (400 °C)	★
F21/1 ⁽⁷⁾⁽¹⁰⁾	Vertical pump control or alarm, 316 SST, rod length 1524 mm, 435 psi (30 bar)	752 °F (400 °C)	★
F21/2 ⁽⁷⁾⁽¹⁰⁾	Vertical pump control or alarm, 316 SST, rod length 3048 mm, 435 psi (30 bar)	752 °F (400 °C)	★
F21/3 ⁽⁷⁾⁽¹⁰⁾	Vertical pump control or alarm, 316 SST, rod length 4570 mm, 435 psi (30 bar)	752 °F (400 °C)	★

Table 2. Ordering information for general purpose float switches (stainless steel wetside)

★The Standard offering represents the most common options. The starred options (★) should be selected for best delivery. The Expanded offering is subject to additional delivery lead time.

F104/1 ⁽¹⁰⁾	Straight arm, horizontal, 316 SST, rod length 750 mm, 500 psi (34.5 bar)	752 °F (400 °C)	★
F104/2 ⁽¹⁰⁾	Cranked arm, horizontal, 316 SST, dimensions to be specified, 500 psi (34.5 bar)	752 °F (400 °C)	★
F104/3 ⁽¹⁰⁾	Cranked arm, vertical, 316 SST, dimensions to be specified, 500 psi (34.5 bar)	752 °F (400 °C)	★
F93 ⁽⁵⁾⁽¹¹⁾	Shrouded for dirty liquids, 316 SST, min. SG 0.75, atmospheric	356 °F (180 °C)	★
F185	General purpose high/low alarm, Alloy 400, min. SG 0.65, 500 psi (34.5 bar)	752 °F (400 °C)	★
Expanded			
F96	General purpose high/low alarm, 316 SST, min. SG 0.60, 1073 psi (74 bar)	752 °F (400 °C)	
F98	General purpose high/low alarm, 316 SST, min. SG 0.45, 500 psi (34.5 bar)	752 °F (400 °C)	
F106	General purpose high/low alarm, 316 SST, min. SG 0.51, 1073 psi (74 bar)	752 °F (400 °C)	
F107	General purpose high/low alarm, 316 SST, min. SG 0.71, 2900 psi (200 bar)	752 °F (400 °C)	
F88	Interface duties, 316 SST, min. SG 0.80, 1073 psi (74 bar)	752 °F (400 °C)	
F264	Horizontal limited differential, Alloy 400, min. SG 0.85, 464 psi (32 bar)	752 °F (400 °C)	
Product Certifications			
Standard			Standard
N1	ATEX II 3 G – (code N1 is required for the B6 switching mechanism)		★
NA	No hazardous locations certificates		★
GM ⁽¹²⁾	Technical Regulation Customs Union (EAC) Ordinary Locations Mark		★
Typical Model Number: S 36 D A F84 NA			

- (1) See page 23 for nozzle and stud lengths.
- (2) The maximum allowed process temperature is dependent on Flange (Head), Switch mechanism, and Float options chosen.
- (3) There is no back flange fitted to the S36 and S190 flange (head).
- (4) See page 19 for Mobrey flange information.
- (5) The F93 float and S190 flange (head) can only be used together.
- (6) See “Switch mechanism specifications” on page 17 for information about all switch mechanisms.
- (7) The SIL certificate (code CERT-SIL-L2049 in Table 6 on page 10) is not available with this option.
- (8) Switch mechanism type AM is not compatible with float types F68/+ or F21/+.
- (9) See Table 13 on page 20 for a comparison of the float options listed here.
- (10) See pages 23, 24, and 25 for technical float details and length options.
- (11) A silicone rubber gaiter is supplied with the 316 SST shroud.
- (12) Contact an Emerson Process Management representative for additional information.

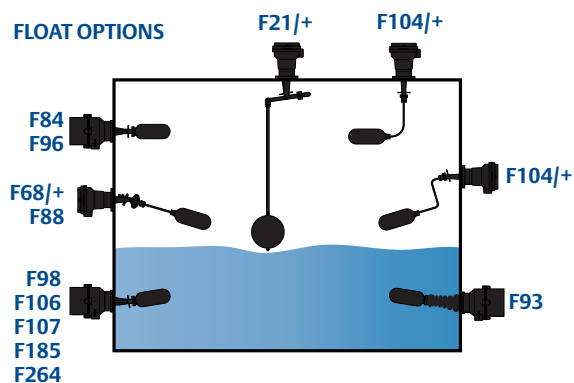


Table 3. Ordering information for float switches in hazardous areas

★The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Model	Product Description		
S	Horizontal Float Switch		
Flange (Head) ⁽¹⁾		Max. T_{Process} ⁽²⁾	
Standard			Standard
250 ⁽³⁾⁽⁴⁾	Flameproof Zone 1, stainless steel wetside, Mobrey 'G' flange, 304.5 psi (21 bar)	752 °F (400 °C)	★
275 ⁽³⁾⁽⁴⁾	Flameproof Zone 1, gunmetal wetside, Mobrey 'G' flange, 304.5 psi (21 bar)	392 °F (200 °C)	★
Expanded			
256	Flameproof Zone 1, stainless steel wetside, 3 in. ASME B16.5 Class 150 RF flange	752 °F (400 °C)	
257	Flameproof Zone 1, stainless steel wetside, 4 in. ASME B16.5 Class 150 RF flange	752 °F (400 °C)	
278	Flameproof Zone 1, stainless steel wetside, 6 in. ASME B16.5 Class 150 RF flange	752 °F (400 °C)	
251	Flameproof Zone 1, stainless steel wetside, 3 in. ASME B16.5 Class 300 RF flange	752 °F (400 °C)	
254	Flameproof Zone 1, stainless steel wetside, 4 in. ASME B16.5 Class 300 RF flange	752 °F (400 °C)	
260	Flameproof Zone 1, stainless steel wetside, 3 in. ASME B16.5 Class 600 RF flange	752 °F (400 °C)	
261	Flameproof Zone 1, stainless steel wetside, 3 in. ASME B16.5 Class 900 RF flange	752 °F (400 °C)	
253	Flameproof Zone 1, stainless steel wetside, EN 1092-1 DN 80 PN 40 flange	752 °F (400 °C)	
255	Flameproof Zone 1, stainless steel wetside, EN 1092-1 DN 100 PN 40 flange	752 °F (400 °C)	
269	Flameproof Zone 1, stainless steel wetside, EN 1092-1 DN 125 PN 40 flange	752 °F (400 °C)	
272	Flameproof Zone 1, stainless steel wetside, EN 1092-1 DN 80 PN 63 flange	752 °F (400 °C)	
268	Flameproof Zone 1, stainless steel wetside, EN 1092-1 DN 100 PN 63 flange	752 °F (400 °C)	
270	Flameproof Zone 1, stainless steel wetside, EN 1092-1 DN 125 PN 63 flange	752 °F (400 °C)	
271	Flameproof Zone 1, stainless steel wetside, EN 1092-1 DN 150 PN 63 flange	752 °F (400 °C)	
Switch Mechanism ⁽⁵⁾		Max. T_{Process} ⁽²⁾	
Standard			Standard
D	Electrical: 2 independent Single Pole Single Throw (SPST) contact sets	752 °F (400 °C)	★
P	As type D but with <i>gold plated contacts</i>	752 °F (400 °C)	★
Expanded			
D6	Electrical: 2 independent circuits of Double Pole Double Throw (DPDT) contact sets	752 °F (400 °C)	
P6	As type D6 but with <i>gold plated contacts</i>	752 °F (400 °C)	
H6	As type D6 but with <i>gold plated contacts and hermetically sealed moving parts</i>	482 °F (250 °C)	
Enclosure		Max. T_{Process} ⁽²⁾	
Standard			Standard
A	Aluminum alloy	752 °F (400 °C)	★
Expanded			
G	Gunmetal	662 °F (350 °C)	
AX ⁽⁶⁾	Aluminum alloy, low ambient temperatures -4 to -76 °F (-20 to -60 °C)	752 °F (400 °C)	
GX ⁽⁶⁾	Gunmetal, low ambient temperatures -4 to -76 °F (-20 to -60 °C)	662 °F (350 °C)	
Float (All Ratings at T_{room}) ⁽⁷⁾		Max. T_{Process} ⁽²⁾	
Standard			Standard
F84	General purpose high/low alarm, 316 SST, min. SG 0.65, 500 psi (34.5 bar)	752 °F (400 °C)	★
F185	General purpose high/low alarm, Alloy 400, min. SG 0.65, 500 psi (34.5 bar)	752 °F (400 °C)	★
F68/1 ⁽⁸⁾⁽⁹⁾	Horizontal variable differential for pump control/alarm, 316 SST, min. SG 0.72, 500 psi (34.5 bar)	752 °F (400 °C)	★
F68/4 ⁽⁸⁾⁽⁹⁾	Horizontal variable differential for pump control/alarm, 316 SST, min. SG 0.85, 500 psi (34.5 bar)	752 °F (400 °C)	★
F21/1 ⁽⁸⁾⁽⁹⁾	Vertical pump control or alarm, 316 SST, rod length 1524 mm, 435 psi (30 bar)	752 °F (400 °C)	★
F21/2 ⁽⁸⁾⁽⁹⁾	Vertical pump control or alarm, 316 SST, rod length 3048 mm, 435 psi (30 bar)	752 °F (400 °C)	★
F21/3 ⁽⁸⁾⁽⁹⁾	Vertical pump control or alarm, 316 SST, rod length 4570 mm, 435 psi (30 bar)	752 °F (400 °C)	★
F104/1 ⁽⁸⁾	Straight arm, horizontal, 316 SST, rod length 750 mm, 500 psi (34.5 bar)	752 °F (400 °C)	★
F104/2 ⁽⁸⁾	Cranked arm, horizontal, 316 SST, dimensions to be specified, 500 psi (34.5 bar)	752 °F (400 °C)	★
F104/3 ⁽⁸⁾	Cranked arm, vertical, 316 SST, dimensions to be specified, 500 psi (34.5 bar)	752 °F (400 °C)	★

Table 3. Ordering information for float switches in hazardous areas

★The Standard offering represents the most common options. The starred options (★) should be selected for best delivery. The Expanded offering is subject to additional delivery lead time.

Expanded		
F96	General purpose high/low alarm, 316 SST, min. SG 0.60, 1073 psi (74 bar)	752 °F (400 °C)
F98	General purpose high/low alarm, 316 SST, min. SG 0.45, 500 psi (34.5 bar)	752 °F (400 °C)
F106	General purpose high/low alarm, 316 SST, min. SG 0.51, 1073 psi (74 bar)	752 °F (400 °C)
F107	General purpose high/low alarm, 316 SST, min. SG 0.71, 2900 psi (200 bar)	752 °F (400 °C)
F88	Interface duties, 316 SST, min. SG 0.80, 1073 psi (74 bar)	752 °F (400 °C)
F96	General purpose high/low alarm, 316 SST, min. SG 0.60, 1073 psi (74 bar)	752 °F (400 °C)
Product Certifications		
Standard		Standard
EM ⁽¹⁰⁾	Technical Regulation Customs Union (EAC) Flameproof	★
KN	ATEX / IECEx Flameproof	★
Typical Model Number: S 250 D A F84 KN		

- (1) See page 23 for nozzle and stud lengths.
- (2) The maximum allowed process temperature is dependent on the Flange (Head), Switch mechanism, Enclosure/Housing, and Float options chosen.
- (3) There is no back flange fitted to the S250 and S275 flange (head).
- (4) See page 19 for Mobrey flange information.
- (5) See “Switch mechanism specifications” on page 17 for information about all switch mechanisms.
- (6) The ATEX certification covering -4 to -76 °F (-20 to -60 °C) requires Mechanism Switch code H6 to be selected.
- (7) See Table 14 on page 21 for a comparison of the float options listed here.
- (8) See pages 23, 24, and 25 for technical float details and length options.
- (9) The SIL certificate (code CERT-SIL-L2049 in Table 6 on page 10) is not available with this option.
- (10) Contact an Emerson Process Management representative for additional information.

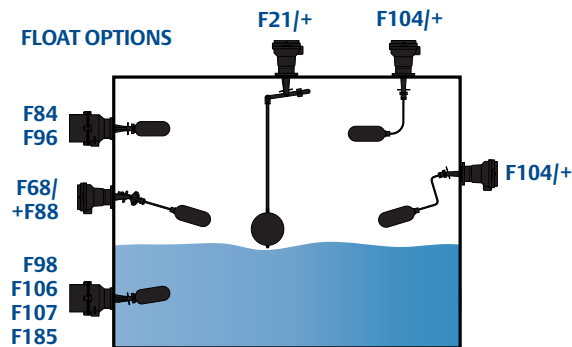


Table 4. Ordering information for float switches in marine applications

★The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Model	Product Description		
S	Horizontal Float Switch		
Flange (Head) ⁽¹⁾			
Standard			Standard
179	Marine, hoseproof, aluminum bronze wetside, no cable fitted, Mobrey 'A' flange, 261 psi (18 bar)		★
Expanded			
03	Marine, submersible, aluminum bronze wetside, MICC cable fitted, Mobrey 'A' flange, 261 psi (18 bar)		
195	Marine, submersible, aluminum bronze wetside, CSP cable fitted, Mobrey 'A' flange, 261 psi (18 bar)		
163	Marine, submersible, stainless steel wetside, MICC cable fitted, Mobrey 'A' flange, 261 psi (18 bar)		
181	Marine, hoseproof, stainless steel wetside, no cable fitted, Mobrey 'A' flange, 261 psi (18 bar)		
183	Marine, submersible, flameproof, aluminum bronze wetside, CSP cable fitted, Mobrey 'A' flange, 261 psi (18 bar)		
187	Marine, submersible, flameproof, aluminum bronze wetside, MICC cable fitted, Mobrey 'A' flange, 261 psi (18 bar)		
189	Marine, hoseproof, flameproof, aluminum bronze wetside, no cable fitted, Mobrey 'A' flange, 261 psi (18 bar)		
Switch Mechanism ⁽¹⁾⁽²⁾			Max. T_{Process} ⁽¹⁾
Standard			Standard
D	Electrical: 2 independent Single Pole Single Throw (SPST) contact sets	752 °F (400 °C)	★
P	As type D but with <i>gold plated contacts</i>	752 °F (400 °C)	★
Expanded			
D6 ⁽³⁾	Electrical: 2 independent circuits of Double Pole Double Throw (DPDT) contact sets	752 °F (400 °C)	
P6 ⁽³⁾	As type D6 but with <i>gold plated contacts</i>	752 °F (400 °C)	
Enclosure ⁽¹⁾			
Standard			Standard
B	Aluminum bronze – (<i>code B is required for S179 and S189 models</i>)		★
BL	Aluminum bronze with 10 ft. (3 m) of fitted cable – (<i>code BL is required for S03, S195, S183, and S187 models</i>)		★
S	Stainless steel – (<i>code S is required for S181 model</i>)		★
SL	Stainless steel with 10 ft. (3 m) of fitted cable – (<i>code SL is required for S163 model</i>)		★
Float (All Ratings at T_{room}) ⁽⁴⁾			Max. T_{Process} ⁽¹⁾
Standard			Standard
F84	General purpose high/low alarm, 316 SST, min. SG 0.65, 500 psi (34.5 bar)	752 °F (400 °C)	★
F185	General purpose high/low alarm, Alloy 400, min. SG 0.65, 500 psi (34.5 bar)	752 °F (400 °C)	★
F68/1 ⁽⁵⁾	Horizontal variable differential for pump control/alarm, 316 SST, min. SG 0.72, 500 psi (34.5 bar)	752 °F (400 °C)	★
F68/4 ⁽⁵⁾	Horizontal variable differential for pump control/alarm, 316 SST, min. SG 0.85, 500 psi (34.5 bar)	752 °F (400 °C)	★
F21/1 ⁽⁵⁾	Vertical pump control or alarm, 316 SST, rod length 1524 mm, 435 psi (30 bar)	752 °F (400 °C)	★
F21/2 ⁽⁵⁾	Vertical pump control or alarm, 316 SST, rod length 3048 mm, 435 psi (30 bar)	752 °F (400 °C)	★
F21/3 ⁽⁵⁾	Vertical pump control or alarm, 316 SST, rod length 4570 mm, 435 psi (30 bar)	752 °F (400 °C)	★
F104/1 ⁽⁵⁾	Straight arm, horizontal, 316 SST, rod length 750 mm, 500 psi (34.5 bar)	752 °F (400 °C)	★
F104/2 ⁽⁵⁾	Cranked arm, horizontal, 316 SST, dimensions to be specified, 500 psi (34.5 bar)	752 °F (400 °C)	★
F104/3 ⁽⁵⁾	Cranked arm, vertical, 316 SST, dimensions to be specified, 500 psi (34.5 bar)	752 °F (400 °C)	★
F93 ⁽⁶⁾⁽⁷⁾	Shrouded for dirty liquids, 316 SST, min. SG 0.75, atmospheric	356 °F (180 °C)	★
Expanded			
F264	Horizontal limited differential, Alloy 400, min. SG 0.85, 464 psi (32 bar)	752 °F (400 °C)	
Product Certifications			
Standard			Standard
EM ⁽⁸⁾	Technical Regulation Customs Union (EAC) Flameproof – (<i>code EM is required for S183, S187, and S189 models</i>)		★
GM ⁽⁸⁾	Technical Regulation Customs Union (EAC) Ordinary Locations Mark – (<i>code GM is required for S183, S187, and S189 models</i>)		★
E1	ATEX Flameproof – (<i>code E1 is required for S183, S187, and S189 models</i>)		★
NA	No hazardous locations certificates – (<i>code NA is required for S179, S03, S195, S163, and S181 models</i>)		★

Table 4. Ordering information for float switches in marine applications

★The Standard offering represents the most common options. The starred options (★) should be selected for best delivery. The Expanded offering is subject to additional delivery lead time.

Cable Length (required only if a cable is fitted)		Standard
Standard		
M03	10 ft. (3 m) of fitted cable	★
Expanded		
M05	15 ft. (5 m) of fitted cable	
M10	30 ft. (10 m) of fitted cable	
M15	45 ft. (15 m) of fitted cable	
M20	60 ft. (20 m) of fitted cable	
M30	90 ft. (30 m) of fitted cable	
Typical Model Number: S 03 D BL F84 NA / M03		

- (1) The maximum process temperature is dependent on the flange (head), switch mechanism, cable (if fitted), and float options chosen. See Table 5 on page 10 for the IP rating and maximum process temperature.
- (2) See “Switch mechanism specifications” on page 17 for information about all switch mechanisms.
- (3) Not available for stainless steel enclosure and wetside models S163 and S181.
- (4) See Table 14 on page 21 for a detailed comparison of the float types listed here.
- (5) Refer to pages 23, 24, and 25 for technical float details and length options. See “Nozzle and stud lengths” on page 23 for stud lengths.
- (6) A silicone rubber gaiter is supplied with the 316 SST shroud
- (7) Shrouded floats for stainless steel switches S163 and S181 are available on request (contact an Emerson Process Management representative for information).
- (8) Contact an Emerson Process Management representative for additional information.

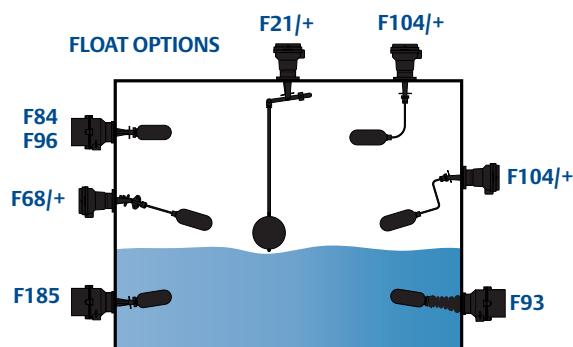


Table 5. Switch types comparison – marine applications

Type Number	Maximum T _{Process} ⁽¹⁾		Head IP Rating	Cable ⁽²⁾
	Submersed	Non-submersed		
S03	176 °F (80 °C)	410 °F (210 °C)	66/68 (100 ft. / 30 m)	MICC
S179	212 °F (100 °C)	410 °F (210 °C)	66 ⁽³⁾	None fitted
S195	122 °F (50 °C)	410 °F (210 °C)	66/68 (100 ft. / 30 m)	CSP
S163	176 °F (80 °C)	410 °F (210 °C)	66/68 (100 ft. / 30 m)	MICC
S183	122 °F (50 °C)	410 °F (210 °C)	66/68 (100 ft. / 30 m)	CSP
S181	212 °F (100 °C)	410 °F (210 °C)	66 ⁽³⁾	None fitted
S187	122 °F (50 °C) ⁽⁴⁾	410 °F (210 °C)	66/68 (100 ft. / 30 m)	MICC
S189	140 °F (60 °C)	410 °F (210 °C)	66 ⁽⁵⁾	None fitted

- (1) The maximum process temperature is dependent on the Flange (Head), Switch mechanism, and Float options chosen.
- (2) See page 16 for cable specification.
- (3) S179 and S181 may be submersed to 100 ft. (30 m) head of water with temperatures between 34 and 212 °F (1 and 100 °C). Fitting and testing of customer supplied cable and cable gland is the customer’s responsibility. The cable and cable gland may limit the temperature further.
- (4) The maximum process temperature for submersed S187 is 176 °F/80 °C (for non-approved) or 122 °F/50 °C (for ATEX approved).
- (5) S189 may be submersed to 100 ft. (30 m) head of water with temperatures between 34 and 140 °F (1 and 60 °C). Fitting and testing of customer supplied cable and cable gland is the customer’s responsibility. The cable and cable gland may limit the temperature further.

Ordering SIL Certificate and Accessories

Table 6. Ordering information for SIL certificate and accessories

SIL certificate and accessories		Note: See page 19 for dimensions of Mobrey flanges	Standard
Standard			
CERT-SIL-L2049 ⁽¹⁾	SIL Certificate		★
TD 110/A	316 stainless steel test device for Mobrey 'A' flanged switches, sandwich (see Figure 1 on page 11)		★
TD 111/A	Carbon steel test device for Mobrey 'A' flanged switches, weld on (see Figure 1 on page 11)		★
Expanded			
71020/107	316 stainless steel welding pad for Mobrey 'A' flanged switches (see Figure 2 on page 12)		
J184	Carbon steel welding pad for Mobrey 'A' flanged switches (see Figure 2 on page 12)		
J786	Carbon steel welding nozzle for Mobrey 'A' flanged switches (see Figure 2 on page 12)		
71030/900	316 stainless steel backing flange for Mobrey 'A' flanged switches (see Figure 2 on page 12)		
J863	Carbon steel backing flange for Mobrey 'A' flanged switches (see Figure 2 on page 12)		
J800	Carbon steel welding pad for Mobrey 'G' flanged switches (see Figure 3 on page 12)		
71020/111	316 stainless steel welding pad for Mobrey 'G' flanged switches (see Figure 3 on page 12)		
J799	Carbon steel welding nozzle for Mobrey 'G' flanged switches (see Figure 3 on page 12)		

(1) Not available with float switches for marine applications, models with pneumatic switch mechanism and some float options. See M310/FSM for full details.

Test devices

Figure 1. Test devices for Mobrey 'A' flanged switches

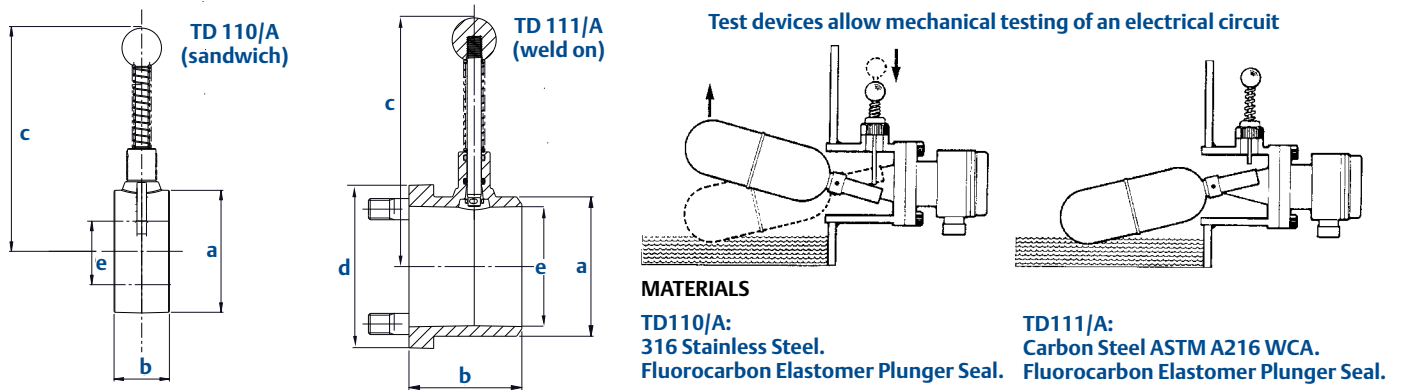


Table 7. Test device specifications and dimensions

Type	Vessel Flange	Maximum Pressure ⁽¹⁾	Maximum T _{Process}	Øa in. (mm)	Øb in. (mm)	Øc in. (mm)	d ² in. (mm)	Øe in. (mm)
TD 110/A	Mobrey 'A'	261 psi (18 bar)	410 °F (210 °C)	3.02 (77)	1.38 (35)	5.59 (142)	N/A	2.64 (67)
TD 111/A	Weld on	261 psi (18 bar)	410 °F (210 °C)	3.11 (79)	2.52 (64)	5.59 (142)	3.62 ² (92 ²)	2.64 (67)

(1) 182 psi (12.6 bar) at maximum temperature of 410 °F (210 °C).

Float chambers

Float chambers are used to facilitate the external mounting of the float switch onto a tank or pressure vessel, particularly where space inside the vessel is restricted or where the control must be isolated for routine maintenance whilst the plant is in operation.

A wide range of **cast** or **fabricated** chambers is available. Exotic materials are also available.

Process connections may be specified as top-and-bottom or side-and-side, and can be flanged, screwed or butt welded in a choice of sizes to suit most plant installations.

Please contact Rosemount Measurement for further information.



Companion flanges

Figure 2. Companion flanges for Mobrey 'A' flanged switches

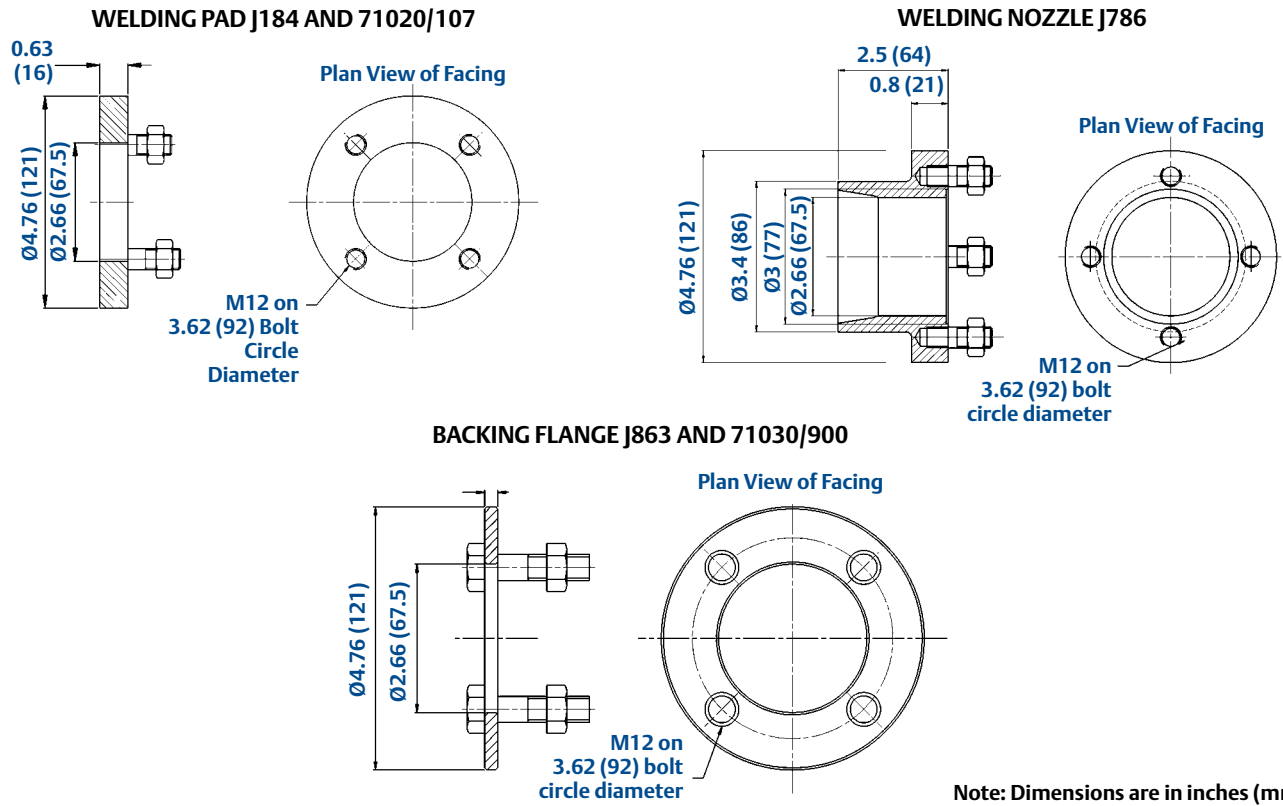
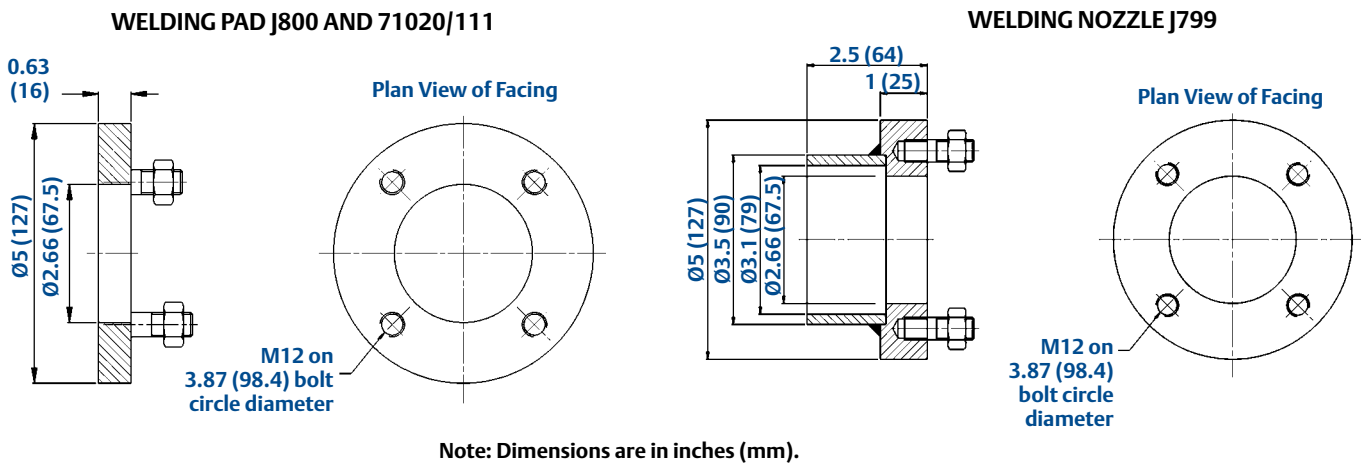


Figure 3. Companion flanges for Mobrey 'G' flanged float switches



Note

- Backing flange J863 is zinc plated and passivated
- Welding types supplied complete with studs and nuts
- Backing type supplied complete with bolts, sealing washers, and full face gasket
- Other materials available upon request

Specifications

Material selection

Emerson provides a variety of products with various product options and configurations including materials of construction that can be expected to perform well in a wide range of applications. The product information presented is intended as a guide for the purchaser to make an appropriate selection for the application. It is the purchaser's sole responsibility to make a careful analysis of all process parameters (such as all chemical components, temperature, pressure, flow rate, abrasives, contaminants, etc.), when specifying product, materials, options and components for the particular application. Emerson Process Management is not in a position to evaluate or guarantee the compatibility of the process fluid or other process parameters with the product, options, configuration or materials of construction selected.

Float switch specifications

Table 8. Float switch specification – general applications (aluminum bronze wetside)

Electrical Models	
Enclosure and Wetside	Aluminum bronze to BS1400 – AB1 maximum iron content 2.5%
IP Rating	Weatherproof to IEC60529 (IP66)
End Cap	Short (4 contacts) e.g. S01DB, Aluminum to BS1490 – grade LM24
	Long (6 contacts) e.g. S01D6B, Brass to BS1400 – DCB3
Cable Gland	Nickel-plated brass gland with a fully insulated polychloroprene-nitrile rubber CR/NBR gasket seal. Clamping range for 8 to 13 mm OD cable
	Maximum ambient temperature is 176 °F (80 °C)
Maximum Process Temperature	410 °F (210 °C). <i>If shrouded float F93 used, maximum is 356 °F (180 °C)</i>
Gasket Material	Non-asbestos sheet material gaskets to BS 7531 Grade X, which has upper temperature limits of 482 °F (250 °C) for gas, vapor, and steam, and 824 °F (440 °C) for liquids
Dimensions	See page 19 for dimensional drawings
Air Pilot Valve Models	
Enclosure	Aluminum Alloy to BS 1490: Grade LM24
Valve Block	Aluminum Alloy to BS 1490: Grade LM25
Finish	All external aluminum surfaces are chromate phosphate treated, and then externally painted
Maximum Process Temperature	410 °F (210 °C). <i>If shrouded float F93 used, maximum is 356 °F (180 °C)</i>
Gasket Material	Non-asbestos sheet material gaskets to BS 7531 Grade X, which has upper temperature limits of 482 °F (250 °C) for gas, vapor, and steam, and 824 °F (440 °C) for liquids
Dimensions	See page 19 for dimensional drawings
Approvals⁽¹⁾	
UK	Lloyds Register of Shipping (LRS)
Germany	Germanischer Lloyd
Canada	CSA (Special order, contact factory)
USA	ABS
France	BV
Italy	RINA
Russia	RMRS
	Technical Regulation Customs Union (EAC) Ordinary Location Mark
Norway	DNV

(1) Other approvals may be available. Please contact an Emerson Process Management representative for additional information.

Table 9. Float switch specification – general purpose applications (stainless steel wetside)

Electrical Models	
Enclosure Housing Material	Aluminum alloy to BS 1490: Grade LM24
IP Rating	Weatherproof to IEC60529 (IP66)
Wetside material	316 Stainless steel (to Mobrey Standard) 316S33 Stainless steel for S489 and S490 switch types
Back Flange (Excludes S36 and S190)	Carbon steel to BS 1501: 224 Grade 430B LT50 This material has guaranteed properties at high 752 °F (400 °C) and low -58 °F (-50 °C) temperatures
Cable Gland	Nickel-plated brass gland with a fully insulated polychloroprene-nitrile rubber CR/NBR gasket seal. Clamping range for 8 to 13 mm OD cable Maximum ambient temperature is 176 °F (80 °C)
Maximum Process Temperature	Dependent upon Flange (Head), Switch mechanism, and Float options chosen ⁽¹⁾ . Note: See “Gasket Material” below for gasket temperature limits
Gasket Material	Float switches with AMSE B16.5 Class 600, Class 900, or EN 1092-1 PN 63 flanges are fitted with spiral wound non-asbestos filled gaskets rated to 752 °F (400 °C) Otherwise non-asbestos sheet material gaskets to BS 7531 Grade X, which has upper temperature limits of 482 °F (250 °C) for gas, vapor, and steam, and 824 °F (440 °C) for liquids. If the switch experiences gas vapor or steam temperatures above 482 °F (250 °C), then a suitable alternative gasket must be fitted
Dimensions	See page 20 for dimensional drawings
Air Pilot Valve Models	
Enclosure	Aluminum Alloy to BS 1490: Grade LM24
Valve Block	Aluminum Alloy to BS 1490: Grade LM25
Finish	All external aluminum surfaces are chromate phosphate treated, and then externally painted
Maximum Process Temperature	Dependent upon Flange (Head), Switch mechanism, and Float options chosen ⁽¹⁾ . Note: See “Gasket Material” below for gasket temperature limits
Connection	Brass compression couplings to suit 0.24 in. (6 mm) copper or nylon pipe (coupling thread 1/4-in BSP)
Gasket Material	Float switches with AMSE B16.5 Class 600, Class 900, or EN 1092-1 PN 63 flanges are fitted with spiral wound non-asbestos filled gaskets rated to 752 °F (400 °C) Otherwise non-asbestos sheet material gaskets to BS 7531 Grade X, which has upper temperature limits of 482 °F (250 °C) for gas, vapor, and steam, and 824 °F (440 °C) for liquids. If the switch experiences gas vapor or steam temperatures above 482 °F (250 °C), then a suitable alternative gasket must be fitted
Dimensions	See page 20 for dimensional drawings
Approvals⁽²⁾	
UK	Lloyds Register of Shipping (LRS)
Germany	Germanischer Lloyd
Canada	CSA (Special order, contact factory)
USA	ABS
Russia	RMRS Technical Regulation Customs Union (EAC) Ordinary Location Mark
Norway	DNV

(1) See [Table 2 on page 5](#) for maximum process temperature ratings of these options.

(2) Other approvals may be available. Please contact an Emerson Process Management representative for additional information.

Table 10. Float switch specification – hazardous area applications

General	
Enclosure/Housing Materials	Aluminum Alloy to BS 1490: Grade LM24 All external aluminum surfaces are chromate phosphate treated, and then externally stove painted
	Gunmetal to BS1400: LG2 Natural finish
IP Rating	Weatherproof to IEC60529 (IP66)
Wetside Material	316 Stainless steel to Mobrey Standard (316S33 Stainless steel for S260 and S261 switches)
	Gunmetal to BS1400: LG2
Back Flange (Excludes S250 and S275)	Carbon steel to BS 1501: 224 Grade 430B LT50
	This material has guaranteed properties at high (752 °F/400 °C) and low (-58 °F/-50 °C) temperatures
Maximum Process Temperatures	Aluminum enclosure: 752 °F (400 °C); Gunmetal enclosure: 662 °F (350 °C) Note: See "Gasket Material" below for gasket temperature limits
	S275: 392 °F (200 °C)
Gasket Material	Float switches with AMSE B16.5 Class 600, Class 900, or EN 1092-1 PN 63 flanges are fitted with spiral wound non-asbestos filled gaskets rated to 752 °F (400 °C)
	Otherwise non-asbestos sheet material gaskets to BS 7531 Grade X, which has upper temperature limits of 482 °F (250 °C) for gas, vapor, and steam, and 440 °C for liquids. If the switch experiences gas vapor or steam temperatures above 482 °F (250 °C), then a suitable alternative gasket must be fitted
Ambient Temperatures Below 0 °C	(i) Down to -4 °F (-20 °C) Standard enclosure/housing codes A or G are suitable
	(ii) Down to -76 °F (-60 °C) Specify Enclosure/Housing order codes "AX" or "GX" which are as standard but with ATEX certification to use down to -76 °F (-60 °C). Note: This is downrated to -58 °F (-50 °C) unless a Mobrey 'G' flange is fitted or low temperature back flange is specified
Dimensions	See page 21 for dimensional drawings
Approvals ⁽¹⁾	
ATEX	II 1/2 G, Exd IIC T6 (Ta = -20 °C to 60 °C) Housing code AX or GX II 1/2 G, Ex d IIC T6 (Ta = -60 °C to 60 °C)
IECEX	Ex d IIC T6 (Ta = -20 °C to 60 °C) Housing code AX or GX, Ex d IIC T6 (Ta = -60 °C to 60 °C)
CSA ⁽²⁾	Canadian Standards Association, Class 1: Group CD
EAC	Technical Regulation Customs Union (EAC) Flameproof Certificate: RU C-GB.ГБ06.B.00078 Flameproof: 1Exd IIC T6X Ta (see table in the certificate)
LRS	Lloyds Register of Shipping

(1) Other approvals may be available. Please contact an Emerson Process Management representative for additional information.

(2) CSA certified products are available to special order.

Table 11. Float switch specification – marine applications

Aluminum Bronze Wetside Models	
Enclosure and Wetside	Aluminum bronze to BS1400 – AB1 maximum iron content 2.5%
IP Rating	May be submerged to 100 ft. (30 m) head of water (IP68)
End Cap	Brass BS1400 DCB3 (non-hazardous area float switches) Aluminum Bronze BS400 AB, maximum 2.5% iron (hazardous area float switches)
Maximum Process Temperature	See Table 5 on page 10
Gasket Material	Non-asbestos sheet material gaskets to BS 7531 Grade X, which has upper temperature limits of 482 °F (250 °C) for gas, vapor, and steam, and 824 °F (440 °C) for liquids. If the switch experiences gas vapor or steam temperatures above 482 °F (250 °C), then a suitable alternative gasket must be fitted
Dimensions	See page 22 for dimensional drawings
Stainless Steel Wetside Models	
Enclosure and Wetside	Type 316 Stainless steel
IP Rating	May be submerged to 100 ft. (30 m) head of water (IP68)
End Cap	Aluminum bronze to BS1400 – AB1/C
Maximum Process Temperature	410 °F (210 °C) Note: See “Gasket Material” and “Cable” below for further temperature limits
Cable Gland ⁽¹⁾	Nickel-plated brass gland with a fully insulated polychloroprene-nitrile rubber CR/NBR gasket seal. Clamping range for 8 to 13 mm OD cable Maximum ambient temperature is 176 °F (80 °C)
Gasket Material	Non-asbestos sheet material gaskets to BS 7531 Grade X, which has upper temperature limits of 482 °F (250 °C) for gas, vapor, and steam, and 824 °F (440 °C) for liquids. If the switch experiences gas vapor or steam temperatures above 482 °F (250 °C), then a suitable alternative gasket must be fitted
Dimensions	See page 22 for dimensional drawings
Cable⁽²⁾	
MICC	Maximum Process Temperature limit: 176 °F (80 °C). 600V light duty grade mineral insulated copper clad cable
CSP	Maximum Process Temperature limit: 122 °F (50 °C). 600V/1000V grade ethylene-propylene rubber insulated flexible cable
Hazardous Area Approvals⁽³⁾	
ATEX	II 2 G, Ex d IIC Gb T6 (Ta= –20 °C to 60 °C) when submersed, in a vented tank application II 1/2 G, Ex d IIC Ga/Gb T6 (Ta= –20 °C to 60 °C) when enclosure is outside in a tank mounted application
Approvals⁽⁴⁾	
UK	Lloyds Register of Shipping
Germany	Germanischer Lloyd
USA	ABS
France	BV
Italy	RINA
Russia	RMRS
	Technical Regulation Customs Union (EAC) Flameproof and Ordinary Location Mark
Norway	DNV

(1) For S179 only, cable gland is supplied loose in the box. Fitting of the gland is the customer's responsibility. Types S03, S195, S163, S183, and S187 are supplied with a pre-fitted cable gland.

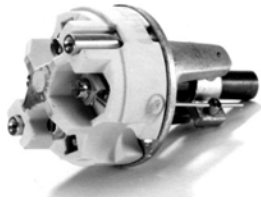
(2) See [Table 5 on page 10](#) for marine application switches supplied with a fitted cable.

(3) Types S183, S187, and S189 only.

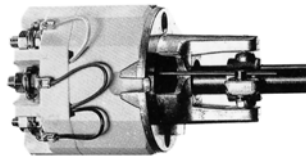
(4) Other approvals may be available. Please contact an Emerson Process Management representative for additional information.

Switch mechanism specifications

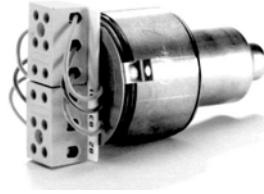
Electrical Types D and P



Electrical Types D6 and P6



Electrical Types H6 and B6



Pneumatic Types AP and AM



Electrical switch mechanisms

Type D

- For alternative make and break circuits
- Function: 2 independent single pole single throw contact sets and “Snap-Action”
- May be wired S.P.C.O. on site

Type D6

- For switching two independent circuits.
- Function: Double pole change over (2 independent circuits) and “Snap-Action”

Types P and P6

- As types D and D6, but with gold-plated contacts for switching low power (e.g. intrinsically safe) electrical circuits

Type H6

- For use in corrosive area and/or low temperature applications
- As type D6, but with gold-plated contacts and all moving parts are housed in an inert gas-filled hermetically sealed enclosure

Type B6

- For use in Zone 2 Hazardous Areas
- As type H6, but coded ATEX II 3 G, EExnC IIC T6 $-76^{\circ}\text{F} (-60^{\circ}\text{C}) < T_a < 140^{\circ}\text{F} (60^{\circ}\text{C})$
- For Technical Regulation Customs Union (EAC) approvals, contact an Emerson Process Management representative for the latest information

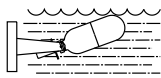
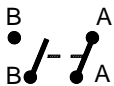
Pneumatic switch mechanisms

Type AP

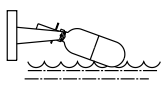
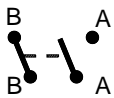
- For switching air circuits
- Function: Change over
- Air pressure:
 - Max. air pressure through valve: 100 psi (7 bar).
 - Max. air flow through valve: 66 litres/minute at 100 psi (7 bar). Air must be clean and dry
- Nominal leakage rate of 0.2%
- Connections: Brass compression couplings to suit 0.24-in. (6 mm) copper or nylon pipe, coupling thread ¼-in. BSP.

Type AM

Types D and P

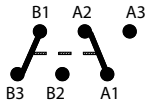


AA Makes on rising level

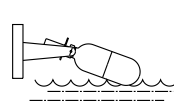
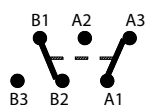


BB Makes on falling level

Types D6, P6, H6, and B6

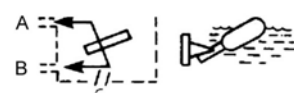


A1 - A2 B1 - B3 Makes on rising level



A1 - A3 B1 - B2 Makes on falling level

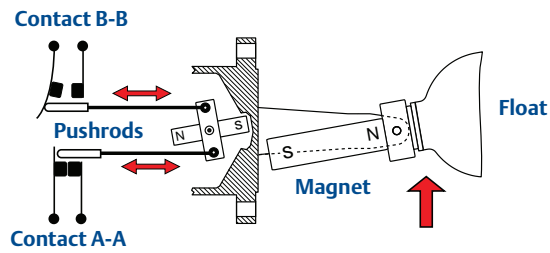
Type AP and AM



Supply - Port A or B Outlet - Port C

Glandless magnetic snap-action switching

A-A makes contact on rising level



B-B makes contact on falling level

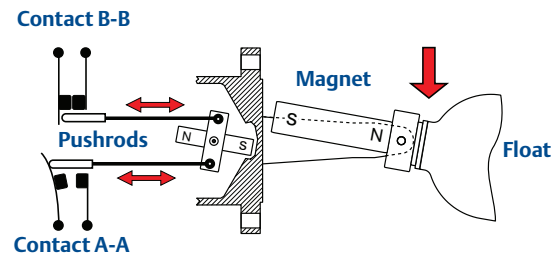


Table 12. Electrical switch mechanisms

Electrical Switch Specification	D and D6	P and P6	H6 and B6
Contact Material	Fine Silver	Gold Plated	Gold Plated
Process Temperature	-22 to 752 °F (-30 to 400 °C)	-22 to 752 °F (-30 to 400 °C)	-148 to 482 °F (-100 to 250 °C)
Ambient Temperature	-22 to 158 °F (-30 to 70 °C)	-22 to 158 °F (-30 to 70 °C)	-76 to 158 °F (-60 to 70 °C)
Insulation Value	(live to earth) > 100 MEG OHM		
Terminals	D and P: M4 screws with non-rotational clamp plates. D6, P6, H6, and B6: 6-way terminal block with pressure plates		
Electrical Specification	AC	DC Inductive	DC Resistive
Maximum Voltage V	440	240	240
Maximum Current A	5.0 ⁽¹⁾	1.0	2.0
Maximum Power	2000VA	35 Watts	70 Watts
	Power Factor 0.4 Minimum	Time Constant 40 ms Maximum	

(1) Maximum current for Type D is 8 A up to 410 °F (210 °C).

Warning

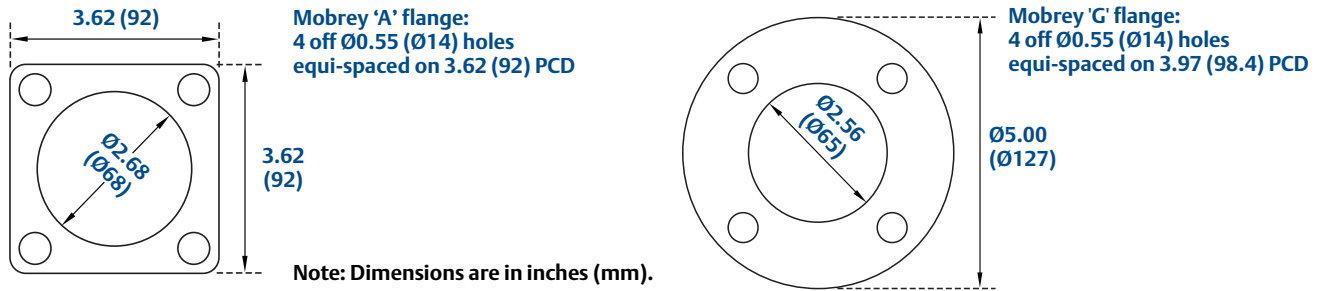
- The plating of gold contacts may be permanently damaged when used to switch circuits above the following limits:
 300 V: 12 mA Resistive
 24 V: 2 mH/200 mA Inductive
 24 V: 250 mA Resistive
 24 V: 750 mH/10 mA Inductive

Note

- LVD (Low Voltage Directive) standards applied: EN60947 Parts 1 and 5.1

Dimensional Drawings

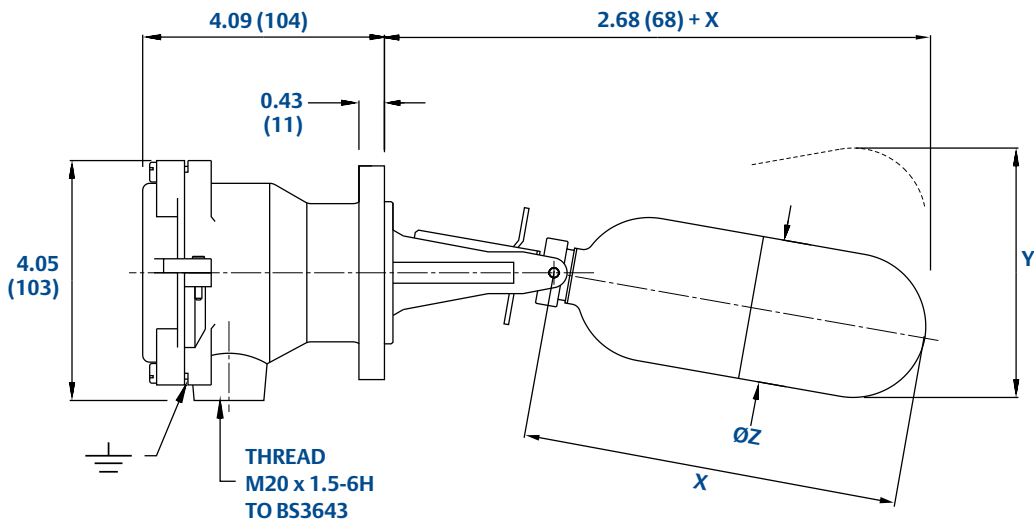
Mobrey 'A' and 'G' flanges



General purpose float switches (aluminum bronze wetside)

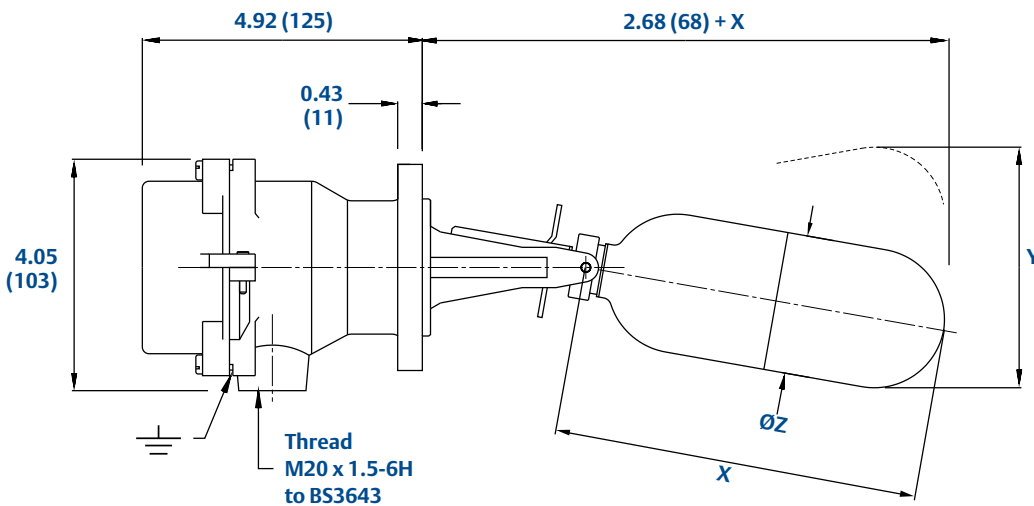
Switch Mechanism Types DB and PB

Note: See Table 13 for dimensions X, Y, and Z.



Switch Mechanism Types D6B and P6B

Note: See Table 13 for dimensions X, Y, and Z.



Note: Dimensions are in inches (mm).

General purpose float switches (stainless steel wetside)

Note: Dimensions are in inches (mm).

Note: See Table 13 for dimensions X, Y, and Z.

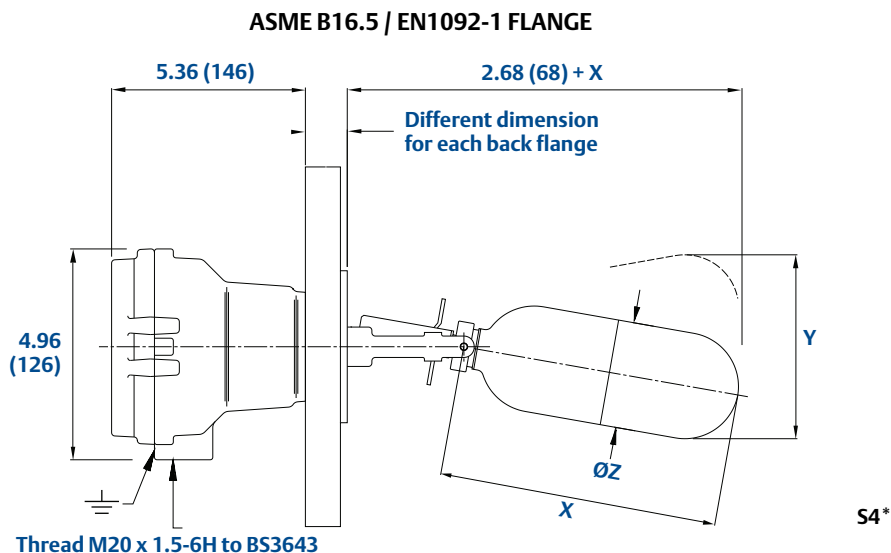
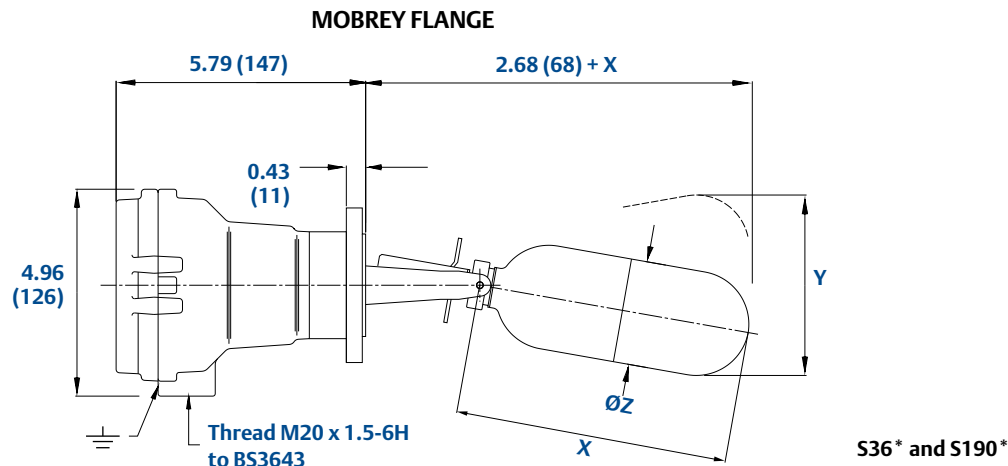


Table 13. Float dimensions X, Y, and Z – general purpose float switches

Float Type	Minimum S.G.	Max. P@T _{Room} PSI (Bar)	Max. T _{Process} °F (°C)	Differential in. (mm)	Dimension X in. (mm)	Dimension Y in. (mm)	Dimension ØZ in. (mm)	Float Material
F84	0.65	500 (34.5)	752 (400)	0.51 (13)	6.45 (164)	4.68 (119)	2.56 (65)	316 SST
F96	0.60	1073 (74)	752 (400)	0.51 (13)	6.45 (164)	4.68 (119)	2.56 (65)	316 SST
F98	0.45	500 (34.5)	752 (400)	0.55 (14)	7.24 (184)	5.00 (127)	2.56 (65)	316 SST
F106	0.51	1073 (74)	752 (400)	0.51 (13)	7.28 (185)	4.25 (108)	2.56 (65)	316 SST
F107	0.71	2900 (200)	752 (400)	0.51 (13)	6.77 (172)	4.72 (120)	2.56 (65)	316 SST
F68/ ⁽¹⁾	0.72 to 0.85	500 (34.5)	752 (400)	Variable (See page 23)			2.56 (65)	316 SST
F21/ ⁽¹⁾	0.70	435 (30)	752 (400)	Variable (See page 24)			5.08 (129)	316 SST
F104/ ⁽¹⁾	Various	500 (34.5)	752 (400)	As Ordered (See page 25)			2.56 (65)	316 SST
F88	0.8/1.0	1073 (74)	752 (400)	1.02 (26)	14.13 (359)	7.79 (198)	2.56 (65)	316 SST
F93	0.75	Atmospheric	356 (180)	0.51 (13)	7.20 (183)	4.88 (124)	2.56 (65)	316 SST
F185	0.67	500 (34.5)	752 (400)	0.51 (13)	6.45 (164)	4.68 (119)	2.56 (65)	Alloy 400

(1) Refer to pages 23, 24, and 25 for technical float details and length options. See “Nozzle and stud lengths” on page 23 for stud lengths.

Hazardous area float switches

Note: Dimensions are in inches (mm).

Note: See Table 14 for dimensions X, Y, and Z.

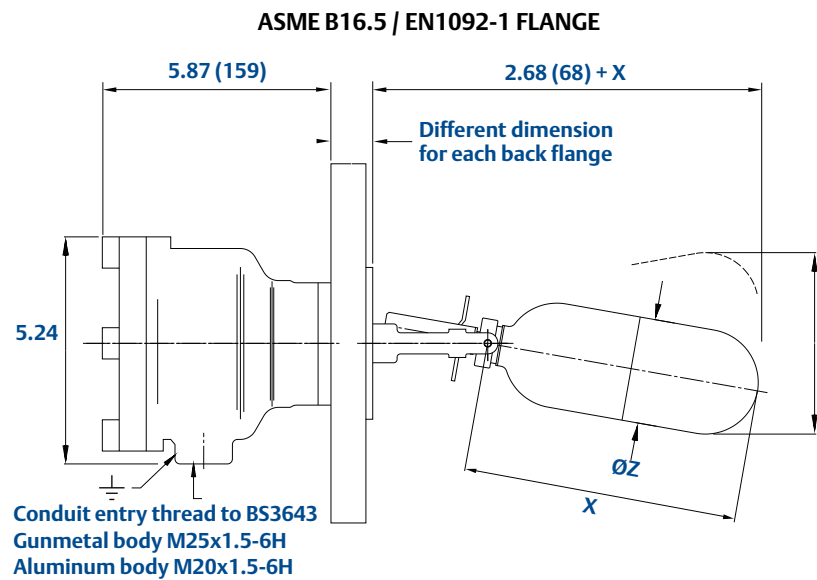
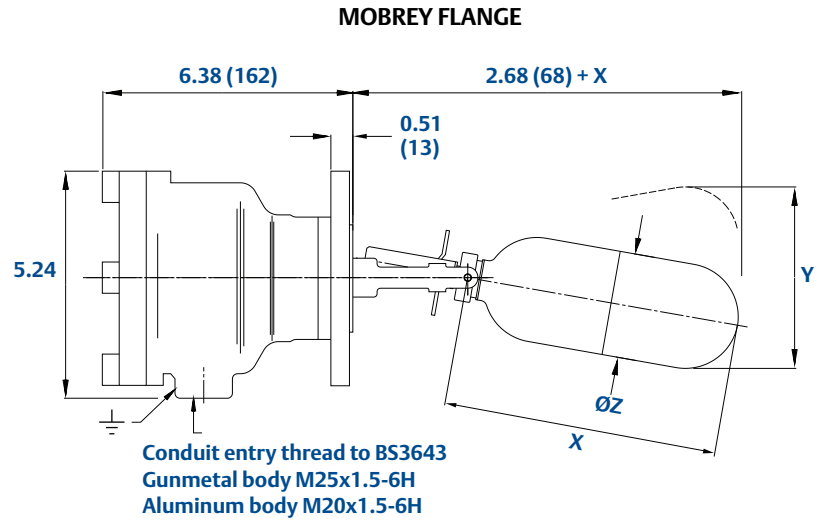


Table 14. Float dimensions X, Y, and Z – hazardous area and marine float switches

Float Type	Minimum S.G.	Max. P@T _{Room} PSI (Bar)	Max. T _{Process} °F (°C)	Differential in. (mm)	Dimension X in. (mm)	Dimension Y in. (mm)	Dimension ØZ in.(mm)	Float Material
F84	0.65	500 (34.5)	752 (400)	0.51 (13)	6.45 (164)	4.68 (119)	2.56 (65)	316 SST
F98	0.45	500 (34.5)	752 (400)	0.55 (14)	7.24 (184)	5.00 (127)	2.56 (65)	316 SST
F106	0.51	1073 (74)	752 (400)	0.51 (13)	7.28 (185)	4.25 (108)	2.56 (65)	316 SST
F107	0.71	2900 (200)	752 (400)	0.51 (13)	6.77 (172)	4.72 (120)	2.56 (65)	316 SST
F68/+ ⁽¹⁾	0.72 to 0.85	500 (34.5)	752 (400)	Variable (See page 23)			2.56 (65)	316 SST
F21/+ ⁽¹⁾	0.70	435 (30)	752 (400)	Variable (See page 24)			5.08 (129)	316 SST
F104/+ ⁽¹⁾	Various	500 (34.5)	752 (400)	As Ordered (See page 25)			2.56 (65)	316 SST
F88	0.8/1.0	1073 (74)	752 (400)	1.02 (26)	14.13 (359)	7.79 (198)	2.56 (65)	316 SST
F93	0.75	Atmospheric	356 (180)	0.51 (13)	7.20 (183)	4.88 (124)	2.56 (65)	316 SST
F185	0.67	500 (34.5)	752 (400)	0.51 (13)	6.45 (164)	4.68 (119)	2.56 (65)	Alloy 400
F264	0.85	464 (32.0)	752 (400)	0.9 (23)/1.14 (29)/1.3 (33)	7.05 (179)	Variable	2.5 (63.5)	Alloy 400

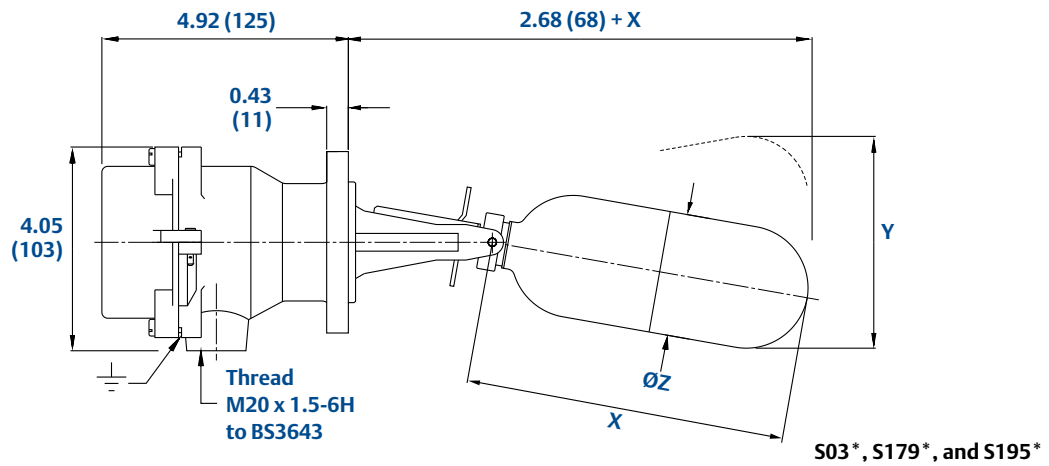
(1) Refer to pages 23, 24, and 25 for technical float details and length options. See “Nozzle and stud lengths” on page 23 for stud lengths.

Marine float switches

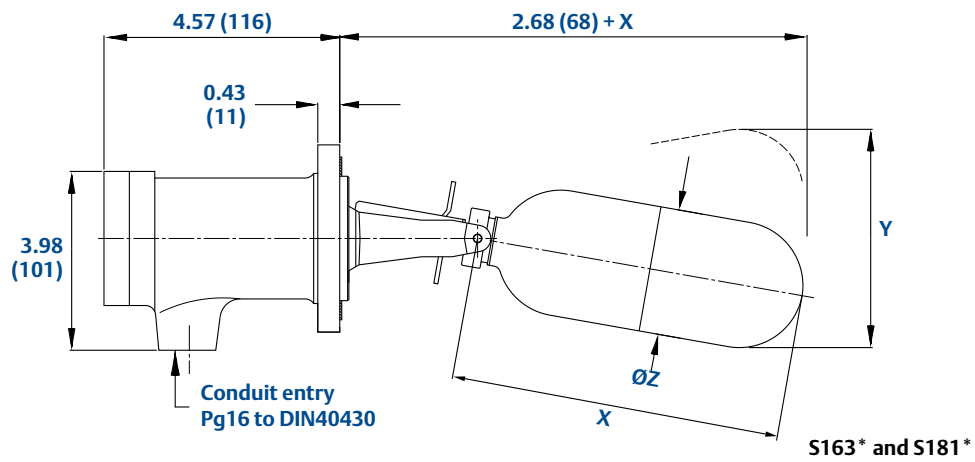
Note: See Table 14 on page 21 for dimensions X, Y, and Z.

Note: Dimensions are in inches (mm).

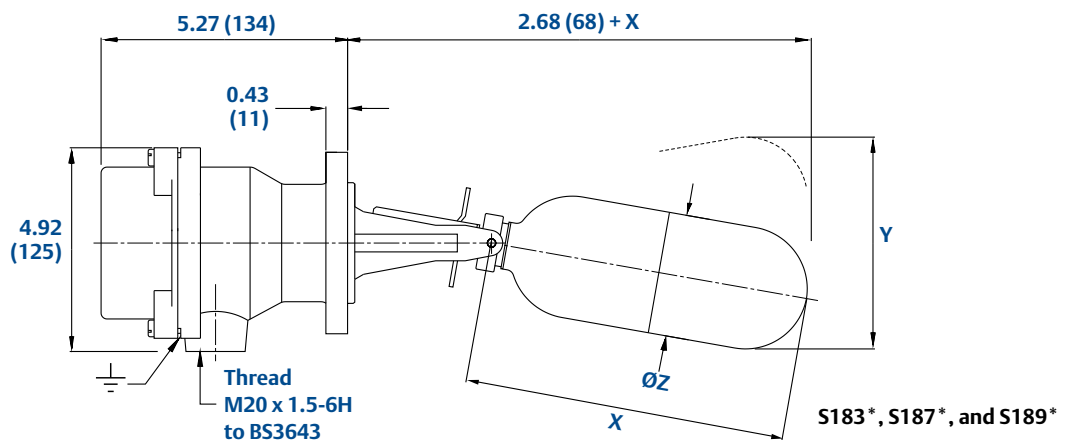
ALUMINUM BRONZE WETSIDE



STAINLESS STEEL WETSIDE



HAZARDOUS SUBMERSIBLE / HOSEPROOF



Nozzle and stud lengths

Table 15. Maximum length in mm (dimension L)

	F68/*	F84	F185	F88	F93	F96	F98	F107	F106	F264
Mobrey A	65	75	75	135	75	75	90	-	92	75
DN65	65	75	75	135	-	75	90	-	92	75
DN80	70	80	80	170	-	75	90	-	98	90
DN100	95	105	105	200	-	105	105	-	110	100
DN125	105	140	140	200	-	140	140	-	140	140
DN150	224	180	180	200	-	180	170	-	200	190
3 in. 300/150	70	80	80	170	-	80	90	-	98	90
4 in. 300/150	95	105	105	200	-	105	105	-	110	100
3 in. 600	62	70	70	130	-	70	85	80	89	70
3 in. 900	-	-	-	-	-	70	-	80	-	-
Mobrey A	65	75	75	135	-	75	90	-	92	75
6 in. 150	224	180	180	200	-	180	170	-	200	190

Note

See Table 6 on page 11 for companion flanges and accessories.

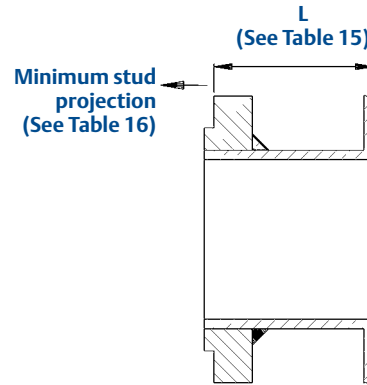
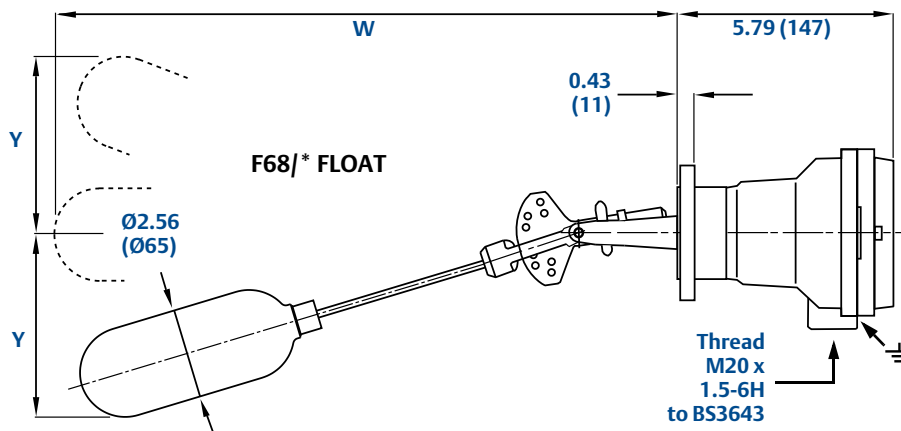


Table 16. Minimum stud projection (in mm)

Rating	G	A	PN 16					PN 40					PN 63			150		300		600	900	
Size	-	-	65	80	100	125	150	65	80	100	125	150	80	100	125	150	3 in.	4 in.	3 in.	4 in.	3 in.	3 in.
Stud	35	30	40	40	40	40	44	42	42	46	52	54	52	55	62	67	46	46	54	56	64	73

Horizontal F68 pump control and alarm float

Note: Dimensions are in inches (mm).



Note

- Switches fitted with the F68/+ type float may be adjusted on site to meet pump control differentials. The float is available as F68/1 or F68/4. The F68/4 has pre-drilled holes along the rod to allow the user to achieve the /2 and /3 differentials in Table 17.
- Full details of the operating levels and differentials are in the product manual (Document Number M310).

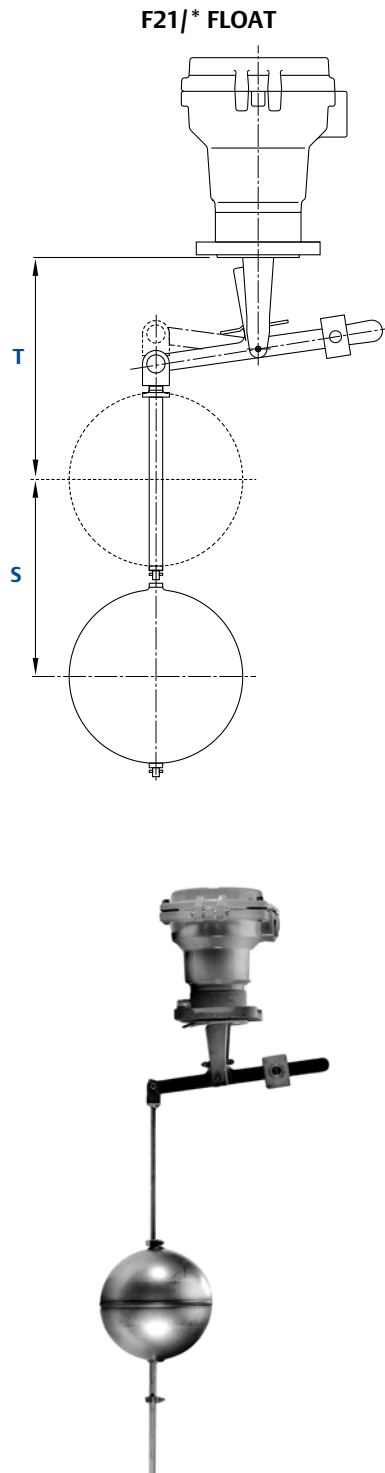
Table 17. Dimensions and specifications for F68/*

Maximum Intrusions ⁽¹⁾	F68/1	F68/2	F68/3	F68/4
Wetside in. (mm) 'W'	14.2 (360)	18.5 (470)	23.2 (590)	25.3 (643)
Minimum tank dimension above/below centre line (mm) 'Y'	8.5 (216)	11.5 (292)	14.5 (368)	16.0 (406)
Minimum Specific Gravity (S.G.)	0.72	0.8	0.82	0.85
Maximum differential (mm)	9.72 (247)	14.2 (360)	19.0 (483)	21.9 (555)

(1) These dimensions in inches (mm) are approximate for cold water and will vary for liquids with a different specific gravity (SG.)

Vertical F21 pump control and alarm float

Note: See Table 18 for dimensions S and T.



Note

- Float assembly must be fitted from inside if for use in a vessel, or complete switch and float assembly may be mounted on a suitable bracket or manhole cover.

Float rod lengths available:

- F21/1 5 ft. (1524 mm)
- F21/2 10 ft. (3048 mm)
- F21/3 15 ft. (4570 mm) maximum

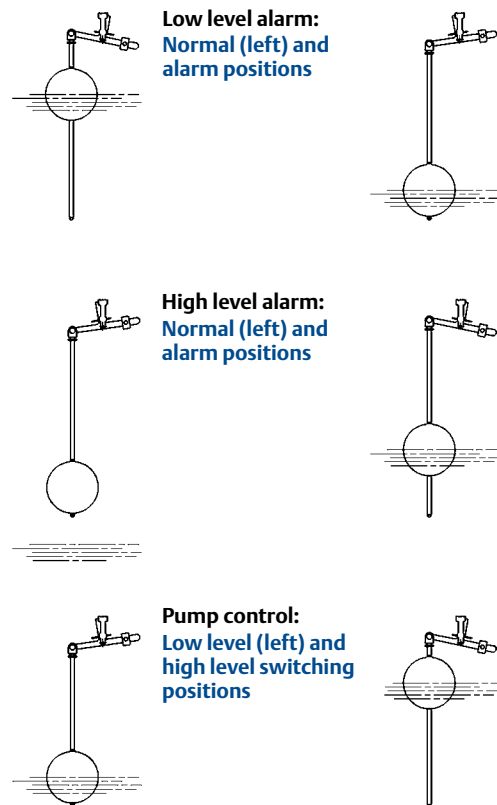
Float rods may be cut to length on site and switches set to operate at required level in either pump control or alarm mode by following the supplied setting instructions.

Table 18. Dimensions S and T for F21/+

Pump Differential 'S' in. (mm)	Alarm Level in. (mm)	
	Minimum 'T'	Maximum 'S'
0.5 to 174.0 (13 to 4420) ⁽¹⁾	6.77 (172)	173.2 (4400) ⁽¹⁾

(1) When the maximum rod length is specified.

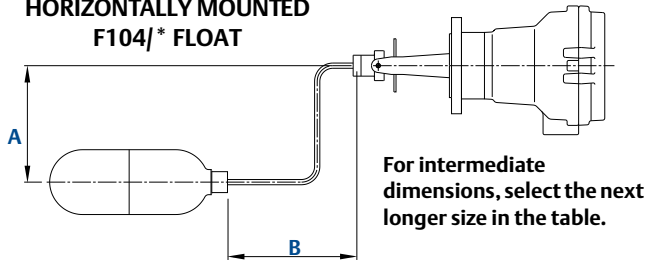
Figure 4. Pump control and alarm applications



Cranked arm floats F104

Note: See Table 19 or Table 20 for dimensions in mm.

**HORIZONTALLY MOUNTED
F104/* FLOAT**



A plus B must not exceed 750 mm. A and B should each be equal to or greater than 75 mm, unless it is a straight arm where A is 0 mm (right).

To order, specify the F104 float with these details:

1. A and B (this page) or V and W (next page) dimensions. (For a straight arm float, state only the 'B' dimension).
2. Liquid in contact.
3. Specific Gravity (SG) of liquid.
4. Magnetic switch head type number (e.g. S01DB/F)
5. State land or marine application.

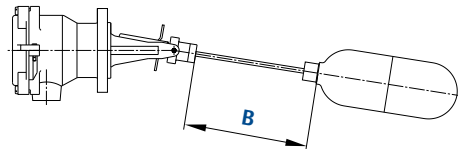


Table 19. Dimensions A and B with min. SG for horizontally-mounted switches (land applications)

A	B																									
	75	100	125	150	175	200	225	250	275	300	325	350	375	400	425	450	475	500	525	550	575	600	625	650	675	
0 & 75	.64	.64	.65	.66	.67	.67	.68	.69	.70	.71	.72	.73	.73	.74	.75	.76	.77	.78	.79	.80	.81	.81	.82	.83	.84	
100	.64	.65	.66	.67	.68	.69	.70	.70	.71	.72	.73	.74	.75	.76	.77	.78	.79	.79	.80	.81	.82	.83	.84	.85		
125	.65	.66	.67	.68	.69	.70	.71	.72	.73	.74	.75	.75	.76	.77	.78	.79	.80	.81	.82	.83	.84	.85	.86			
150	.65	.67	.68	.69	.70	.71	.72	.73	.74	.75	.76	.77	.78	.79	.80	.81	.82	.83	.84	.85	.85	.86				
175	.66	.67	.69	.70	.71	.72	.73	.74	.75	.76	.77	.78	.79	.80	.81	.82	.83	.84	.85	.86	.87					
200	.66	.68	.70	.71	.72	.73	.75	.76	.77	.78	.79	.80	.81	.82	.83	.84	.85	.86	.87	.88						
225	.67	.69	.70	.72	.73	.75	.76	.77	.78	.79	.80	.81	.82	.84	.85	.86	.87	.88	.89							
250	.67	.69	.71	.73	.74	.76	.77	.78	.80	.81	.82	.83	.84	.85	.86	.87	.88	.89								
275	.68	.70	.72	.74	.76	.77	.78	.80	.81	.82	.83	.85	.86	.87	.88	.89	.90									
300	.68	.71	.73	.75	.77	.78	.80	.81	.82	.84	.85	.86	.87	.88	.89	.90										
325	.69	.71	.74	.76	.78	.80	.81	.83	.84	.85	.86	.88	.89	.90	.91											
350	.69	.72	.75	.77	.79	.81	.82	.84	.85	.87	.88	.89	.90	.92												
375	.70	.72	.76	.78	.80	.82	.84	.85	.87	.88	.90	.91	.92													
400	.71	.73	.76	.79	.81	.83	.85	.87	.88	.90	.91	.92														
425	.71	.74	.77	.80	.83	.85	.87	.88	.90	.91	.93															
450	.72	.74	.78	.81	.84	.86	.88	.90	.91	.93																
475	.72	.75	.79	.82	.85	.87	.89	.91	.93																	
500	.73	.76	.80	.83	.86	.89	.91	.93																		
525	.74	.77	.81	.85	.88	.90	.92																			
550	.74	.77	.81	.86	.89	.92																				
575	.75	.78	.82	.87	.90																					
600	.76	.79	.83	.88																						
625	.76	.80	.84																							
650	.77	.80																								
675	.78																									

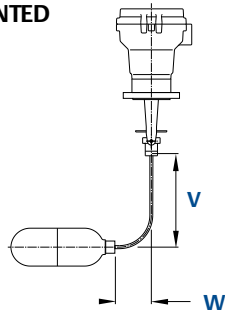
Table 20. Dimensions A and B with Min. SG for horizontally-mounted switches (marine applications)

A	B																									
	75	100	125	150	175	200	225	250	275	300	325	350	375	400	425	450	475	500	525	550	575	600	625	650	675	
0 & 75	.67	.67	.68	.68	.69	.69	.70	.71	.72	.73	.73	.74	.75	.76	.77	.78	.79	.79	.80	.81	.82	.83	.84	.85	.86	
100	.68	.68	.69	.70	.70	.71	.72	.73	.74	.74	.75	.76	.77	.78	.79	.80	.81	.81	.82	.83	.84	.85	.86	.87		
125	.69	.70	.71	.71	.72	.73	.74	.75	.76	.76	.77	.78	.79	.80	.81	.82	.83	.84	.84	.85	.86	.87	.88			
150	.71	.71	.72	.73	.74	.75	.76	.77	.78	.78	.79	.80	.81	.82	.83	.84	.85	.86	.87	.88	.89	.89				
175	.73	.74	.75	.76	.77	.78	.79	.80	.81	.82	.83	.83	.84	.85	.86	.87	.88	.89	.90	.91						
200	.76	.77	.78	.79	.80	.81	.82	.83	.84	.85	.86	.87	.88	.89	.90	.91	.92	.93	.94							
225	.79	.80	.81	.82	.83	.84	.85	.86	.86	.87	.88	.89	.90	.91	.92	.93	.94	.95								
250	.83	.84	.85	.86	.87	.87	.88	.89	.90	.91	.92	.93	.94	.95	.96	.97	.98	.99								
275	.88	.88	.89	.90	.91	.91	.92	.93	.94	.95	.96	.97														
300	.93	.93	.93	.94	.95	.95	.96	.97	.98	.99																
325	.98	.98	.98	.98	.98	.99	1.0	1.0	1.01	1.02																
350	1.04	1.03	1.02	1.03	1.03	1.03	1.04	1.04																		
375	1.09	1.08	1.07	1.07	1.07	1.08																				
400	1.15	1.13	1.12	1.12																						
425	1.20	1.18																								

Note: See Table 21 or Table 22 for dimensions in mm.

**VERTICALLY MOUNTED
F104 FLOAT**

For intermediate dimensions, select the next longer size in the table.



V plus W must not exceed 750 mm. V and W should each be equal to or greater than 75 mm.

Table 21. Dimensions V and W with minimum SG for vertically-mounted switches (land applications)

V	W																								
	75	100	125	150	175	200	225	250	275	300	325	350	375	400	425	450	475	500	525	550	575	600	625	650	675
75	.67	.67	.66	.66	.66	.66	.67	.67	.68	.68	.68	.70	.70	.71	.72	.73	.73	.74	.75	.76	.77	.77	.78	.79	.80
100	.67	.66	.66	.66	.66	.66	.67	.67	.68	.68	.69	.70	.70	.71	.72	.73	.73	.74	.75	.76	.77	.77	.78	.79	
125	.67	.66	.66	.66	.66	.66	.67	.67	.68	.68	.69	.70	.70	.71	.72	.73	.74	.74	.75	.76	.77	.78	.78		
150	.67	.66	.66	.66	.66	.66	.67	.67	.68	.68	.69	.70	.71	.71	.72	.73	.74	.74	.75	.76	.77	.78			
175	.67	.66	.66	.66	.66	.66	.67	.67	.68	.69	.69	.70	.71	.71	.72	.73	.74	.75	.75	.76	.77				
200	.67	.66	.66	.66	.66	.66	.67	.67	.68	.69	.69	.70	.71	.72	.72	.73	.74	.75	.75	.76					
225	.66	.66	.66	.66	.66	.67	.67	.68	.68	.69	.70	.70	.71	.72	.72	.73	.74	.75	.76						
250	.66	.66	.66	.66	.67	.67	.67	.68	.68	.69	.70	.70	.71	.72	.73	.73	.74	.75							
275	.67	.66	.66	.67	.67	.67	.68	.68	.69	.69	.70	.71	.71	.72	.73	.73	.74								
300	.67	.67	.66	.67	.67	.67	.68	.68	.69	.69	.70	.71	.71	.72	.73	.74									
325	.67	.67	.67	.67	.67	.67	.68	.68	.69	.70	.70	.71	.72	.72	.73										
350	.67	.67	.67	.67	.67	.68	.68	.69	.69	.70	.70	.71	.72	.72											
375	.68	.67	.67	.67	.67	.68	.68	.69	.69	.70	.71	.71	.72												
400	.68	.67	.67	.67	.68	.68	.68	.69	.70	.70	.71	.71													
425	.68	.68	.68	.68	.68	.68	.69	.69	.70	.70	.71														
450	.68	.68	.68	.68	.68	.68	.69	.69	.70	.71															
475	.69	.68	.68	.68	.68	.69	.69	.70	.70																
500	.69	.69	.68	.68	.69	.69	.69	.70																	
525	.69	.69	.69	.69	.69	.69	.70																		
550	.70	.69	.69	.69	.69	.70																			
575	.70	.70	.69	.69	.70																				
600	.70	.70	.70	.70																					
625	.71	.70	.70																						
650	.71	.71																							
675	.72																								

Table 22. Dimensions V and W with Min. SG for vertically-mounted switches (marine applications)

V	W																								
	75	100	125	150	175	200	225	250	275	300	325	350	375	400	425	450	475	500	525	550	575	600	625	650	675
75	.75	.72	.70	.69	.68	.68	.68	.68	.68	.69	.70	.71	.71	.72	.73	.74	.74	.75	.76	.77	.78	.79	.79	.80	.81
100	.76	.72	.70	.68	.67	.68	.68	.68	.69	.70	.70	.71	.72	.73	.73	.74	.75	.76	.77	.77	.78	.79	.80	.81	
125	.77	.72	.69	.67	.67	.68	.68	.69	.69	.70	.71	.72	.72	.73	.74	.75	.75	.76	.77	.78	.79	.80	.80		
150	.79	.72	.68	.67	.67	.68	.69	.69	.70	.71	.71	.72	.73	.74	.74	.75	.76	.77	.78	.78	.79	.80			
175		.71	.67	.67	.68	.68	.69	.70	.70	.71	.72	.73	.73	.74	.75	.76	.76	.77	.78	.79	.80				
200			.67	.68	.68	.69	.70	.70	.71	.72	.72	.73	.74	.75	.75	.76	.77	.78	.79	.79					
225				.68	.69	.70	.70	.71	.72	.72	.73	.74	.74	.75	.76	.77	.78	.78							
250				.69	.70	.71	.71	.72	.73	.73	.74	.74	.75	.76	.77	.77	.78	.78							
275				.70	.71	.71	.72	.73	.73	.74	.75	.76	.76	.77	.78	.79									
300					.71	.73	.73	.73	.74	.75	.76	.76	.77	.78	.79										
325						.73	.73	.74	.75	.75	.76	.77	.78	.78											
350							.74	.75	.75	.76	.77	.78	.78												
375								.75	.76	.77	.77	.78													
400									.77	.77	.78														
425										.78															

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