Алматы (7273)495-231
Ангарск (3955)60-70-56
Архангельск (8182)63-90-72
Астрахань (8512)99-46-04
Барнаул (3852)73-04-60
Белгород (4722)40-23-64
Благовещенск (4162)22-76-07
Брянск (4832)59-03-52
Владивосток (423)249-28-31
Владикавказ (8672)28-90-48
Владимир (4922)49-43-18
Волгоград (844)278-03-48
Вологда (8172)26-41-59
Воронеж (473)204-51-73
Екатеринбург (343)384-55-89
Иваново (4932)77-34-06
Ижевск (3412)26-03-58
Иркутск (395)279-98-46
Казань (843)206-01-48
Калининград (4012)72-03-81
Калуга (4842)92-23-67
Кемерово (3842)65-04-62
Киров (8332)68-02-04
Коломна (4966)23-41-49
Кострома (4942)77-07-48
Краснодар (861)203-40-90
Красноярск (391)204-63-61
Курск (4712)77-13-04
Курган (3522)50-90-47
Липецк (4742)52-20-81
Магнитогорск (3519)55-03-13
Москва (495)268-04-70
Мурманск (8152)59-64-93
Набережные Челны (8552)20-53-41
Нижний Новгород (831)429-08-12
Новокузнецк (3843)20-46-81
Ноябрьск (3496)41-32-12
Новосибирск (383)227-86-73
Омск (3812)21-46-40
Орел (4862)44-53-42
Оренбург (3532)37-68-04
Пенза (8412)22-31-16
Петрозаводск (8142)55-98-37
Псков (8112)59-10-37
Пермь (342)205-81-47
Ростов-на-Дону (863)308-18-15
Рязань (4912)46-61-64
Самара (846)206-03-16
Саранск (8342)22-96-24
Санкт-Петербург (812)309-46-40
Саратов (845)249-38-78
Севастополь (8692)22-31-93
Симферополь (3652)67-13-56
Смоленск (4812)29-41-54
Сочи (862)225-72-31
Ставрополь (8652)20-65-13
Сургут (3462)77-98-35
Сыктывкар (8212)25-95-17
Тамбов (4752)50-40-97
Тверь (4822)63-31-35
Тольятти (8482)63-91-07
Томск (3822)98-41-53
Тула (4872)33-79-87
Тюмень (3452)66-21-18
Ульяновск (8422)24-23-59
Улан-Удэ (3012)59-97-51
Уфа (347)229-48-12
Хабаровск (4212)92-98-04
Чебоксары (8352)28-53-07
Челябинск (351)202-03-61
Череповец (8202)49-02-64
Чита (3022)38-34-83
Якутск (4112)23-90-97
Ярославль (4852)69-52-93

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Технические характеристики на горизонтальные магнитные поплавковые реле контроля уровня SO1DB, S36, вертикальные поплавковые и буйковые реле D компании Delta Mobrey

Виды товаров: горизонтальные с камерой, горизонтальный для взрывоопасной зоны, горизонтальные для морской пехоты, горизонтальные для безопасной зоны.

Technical **Datasheet**

Magnetic Horizontal Level Switches

Weatherproof Aluminium-bronze and Stainless Steel Wetside models

Key **Features**

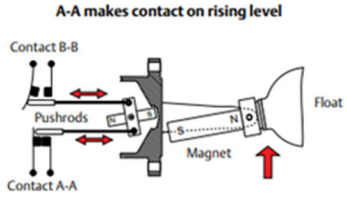
- Operates in almost every liquid, even at high pressure or temperature
- Tough, rugged design for long life in aggressive environments
- Magnetically coupled
- No glands or linkages that could cause leaks

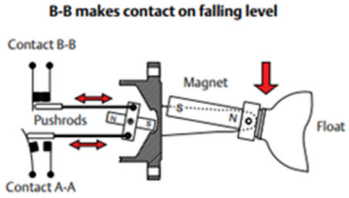
Series **Overview**

The Mobrey magnetic horizontal float switch is ideal for high and low liquid level alarm, and pump control duties. It is designed to open or close a circuit as a changing liquid level within a vessel passes the level of the float.

When the process liquid level is below the switch point, contacts B-B are made and contacts A-A are open, but if the liquid level is above the switch point, contacts A-A are made and contacts B-B are open.

This proven design with over 100 year of experience, allows for fit and forget of the instrument.





Other products

Other products we can offer :

- Vertical level switches
- 003 Gap Sensor
- Horizontal Chamber mounted

Product **applications**

- High and low liquid level alarm
- Direct (side or top) or chamber mounting
- Pump control duty
- Interface duty
- Dirty Liquids

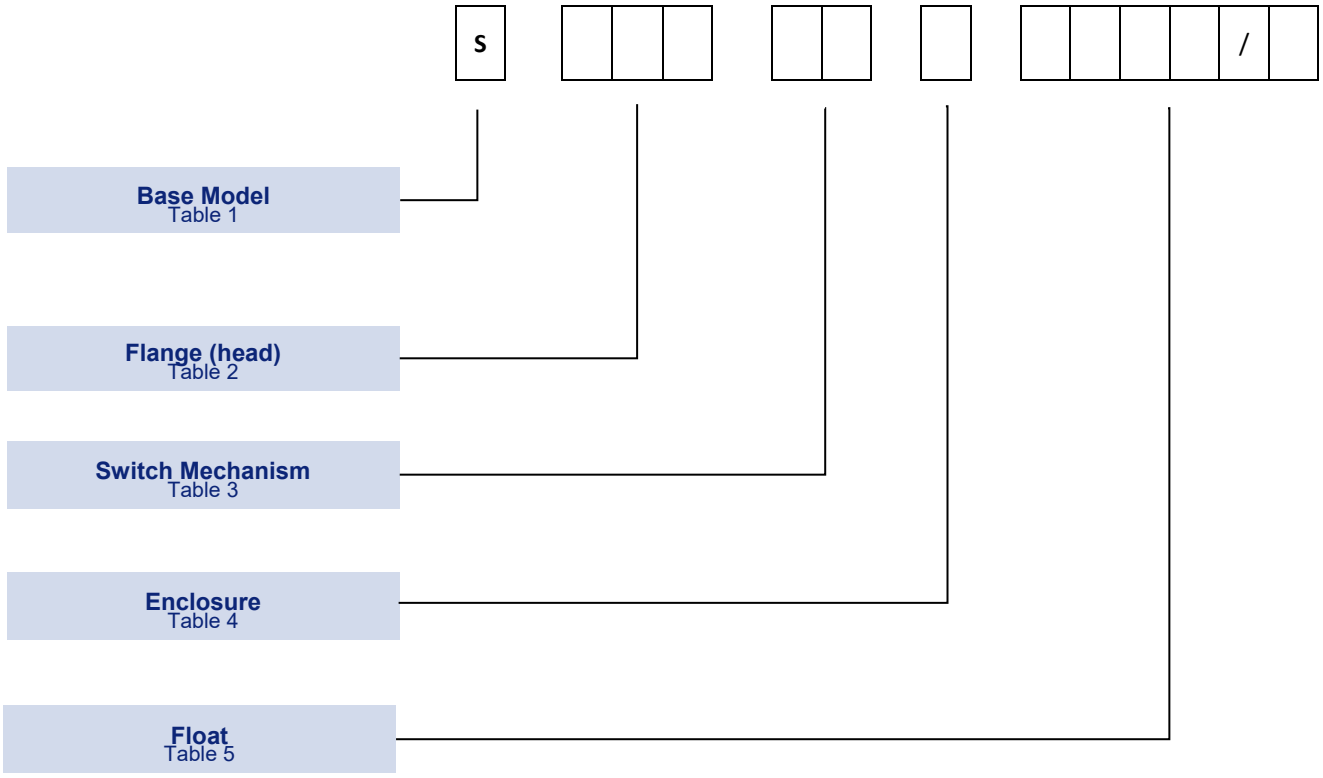
Magnetic Horizontal Level Switches

Model: Aluminium-bronze & Stainless steel

How to order

Instrument can be configured by selecting codes representing the desired features from the tables that follow.

The chart below, describes how the model code is built up. For assistance in configuring a switch that best suits your needs, please contact your local sales office.



Models

TABLE 1	S												/	

Description	Code
Horizontal float switch	**S**

Flange (head) [1]

TABLE 2	S												/	

Description	Max T process [2]	Code
General purpose, aluminium bronze wetside, Mobrey 'A' flange, 261 psi (18 bar)	410 °F (210 °C)	**01**
General purpose, stainless steel wetside, Mobrey 'A' flange, 490 psi (33.8 bar)	752 °F (400 °C)	**36** [3], [4]
General purpose, stainless steel wetside, Mobrey 'A' flange, 490 psi (33.8 bar)	356 °F (180 °C)	**190** [3], [4], [5]
General purpose, stainless steel wetside, 3 in. ASME B16.5 Class 150 RF flange	752 °F (400 °C)	**440**
General purpose, stainless steel wetside, 4 in. ASME B16.5 Class 150 RF flange	752 °F (400 °C)	**441**
General purpose, stainless steel wetside, 3 in. ASME B16.5 Class 300 RF flange	752 °F (400 °C)	**424**
General purpose, stainless steel wetside, 4 in. ASME B16.5 Class 300 RF flange	752 °F (400 °C)	**425**
General purpose, stainless steel wetside, 3 in. ASME B16.5 Class 600 RF flange	752 °F (400 °C)	**489**
General purpose, stainless steel wetside, 3 in. ASME B16.5 Class 900 RF flange	752 °F (400 °C)	**490**
General purpose, stainless steel wetside, EN 1092-1 DN 65 PN 16 (4 bolt hole) flange	752 °F (400 °C)	**428**
General purpose, stainless steel wetside, EN 1092-1 DN 80 PN 16 flange	752 °F (400 °C)	**429**
General purpose, stainless steel wetside, EN 1092-1 DN 100 PN 16 flange	752 °F (400 °C)	**430**
General purpose, stainless steel wetside, EN 1092-1 DN 125 PN 16 flange	752 °F (400 °C)	**431**
General purpose, stainless steel wetside, EN 1092-1 DN 150 PN 16 flange	752 °F (400 °C)	**432**
General purpose, stainless steel wetside, EN 1092-1 DN 65 PN 40 flange	752 °F (400 °C)	**417**
General purpose, stainless steel wetside, EN 1092-1 DN 80 PN 40 flange	752 °F (400 °C)	**418**
General purpose, stainless steel wetside, EN 1092-1 DN 100 PN 40 flange	752 °F (400 °C)	**419**
General purpose, stainless steel wetside, EN 1092-1 DN 125 PN 40 flange	752 °F (400 °C)	**433**
General purpose, stainless steel wetside, EN 1092-1 DN 150 PN 40 flange	752 °F (400 °C)	**434**
General purpose, stainless steel wetside, EN 1092-1 DN 80 PN 63 flange	752 °F (400 °C)	**488**
General purpose, stainless steel wetside, EN 1092-1 DN 100 PN 63 flange	752 °F (400 °C)	**435**
General purpose, stainless steel wetside, EN 1092-1 DN 125 PN 63 flange	752 °F (400 °C)	**436**
General purpose, stainless steel wetside, EN 1092-1 DN 150 PN 63 flange	752 °F (400 °C)	**437**

Switch Mechanism [6]

TABLE 3 | S | | | | | | | | | | | / | |

Description	Max T Process [2]	Code
Electrical: 2 independent Single Pole Single Throw (SPST) contact sets	752 °F (400 °C)	**D**
As type D but with gold plated contacts	752 °F (400 °C)	**P**
Electrical: 2 independent circuits of Double Pole Double Throw (DPDT) contact sets	752 °F (400 °C)	**D6**
As type D6 but with gold plated contacts	752 °F (400 °C)	**P6**
As type D6 but with gold plated contacts and hermetically sealed moving parts	482 °F (250 °C)	**H6**
As type H6 but approved for Zone 2 areas	482 °F (250 °C)	**B6**
Pneumatic: air pilot valve on/off for switching air circuits	752 °F (400 °C)	**AP**
Pneumatic: air pilot valve for continuous modulating of air controlled circuits	752 °F (400 °C)	**AM**[7]

Switch Enclosure

TABLE 4 | S | | | | | | | | | | | / | |

Description	Switch Type	Code
Aluminium alloy	All	**A**
Aluminium bronze (S01 switch head)	Not H6, B6, AP or AM	**B**

Float (All ratings at T room) (8)

TABLE 5	S												/	

Description	Switch	Code
General purpose high/low alarm, 316 SST, min. SG 0.65, 500 psi (34.5 bar)	All	**F84**
Horizontal variable differential for pump control/alarm, 316 SST, min. SG 0.72, 500 psi (34.5 bar)	All except AM	**F68/1**(9)
Horizontal variable differential for pump control/alarm, 316 SST, min. SG 0.85, 500 psi (34.5 bar)	All except AM	**F68/4**(9)
Vertical pump control or alarm, 316 SST, rod length 1524mm, 435 psi (30 bar)	All except AM	**F21/1**(9)
Vertical pump control or alarm, 316 SST, rod length 3048mm, 435 psi (30 bar)	All except AM	**F21/2**(9)
Vertical pump control or alarm, 316 SST, rod length 4570mm, 435 psi (30 bar)	All except AM	**F21/3**(9)
Straight aim, 316 SST, rod length 750mm, 500 psi (34.5 bar)	All	**F104/1**(9)
Cranked arm, horizontal, 316 SST, dimensions to be specified, 500 psi (34.5 bar)	All	**F104/2**(9)
Cranked arm, vertical, 316 SST, dimensions to be specified, 500 psi (34.5 bar)	All	**F104/3**(9)
Shrouded for dirty liquids, 316 SST, min. SG 0.75, atmospheric	All	**F93**(5),(10)
General purpose high/low alarm, Alloy 400, min. SG 0.65, 500 psi (34.5 bar)	All	**F185**
General purpose high/low alarm, 316 SST, min. SG 0.60, 1073 psi (74 bar)	All	**F96**
General purpose high/low alarm, 316 SST, min. SG 0.45, 500 psi (34.5 bar)	All	**F98**
General purpose high/low alarm, 316 SST, min. SG 0.51, 1073 psi (74 bar)	All	**F106**
General purpose high/low alarm, 316 SST, min. SG 0.71, 2900 psi (200 bar)	All	**F107**
Interface duties, 3166 SST, min. SG 0.80, 1073 psi (74 bar)	All	**F88**
Horizontal limited differential, Alloy 400, min. SG 0.85, 464 psi (32 bar)	All except AM	**F264**

1. See table 10 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 9 for Mobrey flange information.
5. The S190 flange (head) can only be used with the F93 float.
6. See "Switch mechanism specifications" on page 8 for information about all switch mechanisms.
7. Switch mechanism type AM is not compatible with float types F68/+, F21/+ or F264.
8. See Table 9 for a comparison of the float options listed here.
9. See pages 13, 14, 15 and 16 for technical float details and length options.
10. A silicone rubber gaiter is supplied with the 316 SST shroud.

Switch Characteristics

Table 6 Float Switch Specification – Aluminium bronze wetside - General Application	
Electric models	
Enclosure & wetside	Aluminium Bronze to BS 1400 – AB1 maximum iron content 2.5%
IP rating	Weatherproof to IEC 60529 (IP66)
End Cap	Short (4 contacts) e.g. S01DB, Aluminium to BS 1490 – grade LM24
	Long (6 contacts) e.g. S01D6B, Brass to BS 1400 – DCB3
Maximum Process Temperature	410°F (210°C) if shrouded float F93 used, maximum 356°F (180°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
Dimensions	See page 9
Air pilot valve models	
Enclosure	Aluminium Alloy to BS 1490 Grade LM24
Valve Block	Aluminium Alloy to BS 1490 Grade LM24
Finish	All external aluminium surfaces are chromate phosphate treated and then externally painted
Maximum Process Temperature	410°F (210°C) if shrouded float F93 used, maximum 356°F (180°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
Dimensions	See page 9

Table 7 Float Switch Specification – Stainless Steel wetside - General Application	
Electric models	
Enclosure / Housing material	Aluminium Alloy to BS 1490 Grade LM24
IP rating	Weatherproof to IEC 60529 (IP66)
Wetside material	316 Stainless Steel (to Mobrey std.)
	316S33 Stainless Steel for S489 and S490 switch types
Back Flange	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 seals. Clamping range from 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 option chosen. **Note**: See gasket materials below for gasket temperature limits
Gasket Material	Float switches with ASME B16.5 class 600, 900 or EN1062-1 PN63 flanges are fitted with spiral non-asbestos filled gaskets rated 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. For higher gas, vapor or Steam temperatures a suitable gasket must be used
Dimensions	See page 10
Air pilot valve models	
Enclosure	Aluminium Alloy to BS 1490 Grade LM24
Valve Block	Aluminium Alloy to BS 1490 Grade LM24
Finish	All external aluminium surfaces are chromate phosphate treated and then externally painted
Maximum Process Temperature	Dependent upon Flange (head), switch mechanism and float option chosen. **Note**: See gasket materials below for gasket temperature limits.
Connections	Brass compression couplings to suit 0.24" (6mm) copper or nylon pipe (coupling ¼" BSP)
Gasket Material	Float switches with ASME B16.5 class 600, 900 or EN1062-1 PN63 flanges are fitted with spiral non-asbestos filled gaskets rated 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. For higher gas, vapor or Steam temperatures a suitable gasket must be used
Dimensions	See page 10

Electric Characteristics

Table 8 Electrical switch mechanism specification

Electrical type D and P	Electrical type D6 and P6	Electrical type H6 and B6	Pneumatic type AP and AM
			

Electrical switch mechanism

Type D

- For alternative make and break circuits
- Function: 2 independent Single Pole Single Throw contacts 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”

Type P and P6

- As type 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 housed in an Inert Gas filled, Hermetically sealed enclosure

Type B6

- For use in Zone 2 Hazardous Area
- As type H6 but coded ATEX II 3G, EExnC IIC T6 -76° F (-60°C) <Ta<140°F (60°C)

Pneumatic switch mechanism

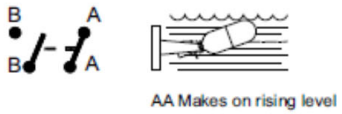
Type AP

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

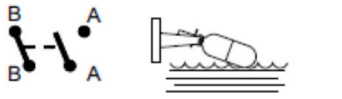
Type AM

- For modulating air controlled circuits
- Function continuous modulation
- Air pressure (air must be clean and dry):
  Maximum air pressure through valve : 20 psi (1.4 bar)
  Modulation linear 0 to 20 psi (0 to 1.4 bar.
  2.9 psi to 20 psi (0.2 to 1.4 Bar) available on request.
- Temperature
  Medium 34 to 752°F (1 to 400 °C)
  Ambient 34 to 140 °F (1 to 60 °C)
  Lower ambient temperature can be tolerated if the air supply is 100% dry

Types D and P

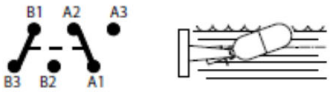


AA Makes on rising level



BB Makes on falling level

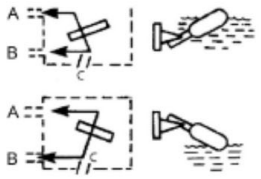
Types D6, P6, H6, and B6



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

Electrical switch mechanism specification

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 Valve	(Live to earth) > 100MOhm		
Terminals	D and P : M4 screws with non-rotating clamp plates		
	D6 and P6 : 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	2000 VA	35 Watts	70 Watts
	Power factor 0.4 maximum	Time constant 40ms maximum	

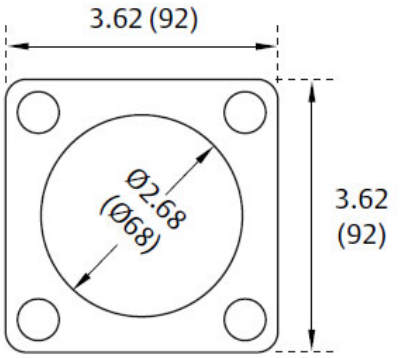
1. Maximum Current for “D” is 8A up to 410°F (210°C)

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

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

Dimensions

Mobrey ‘A’ flange



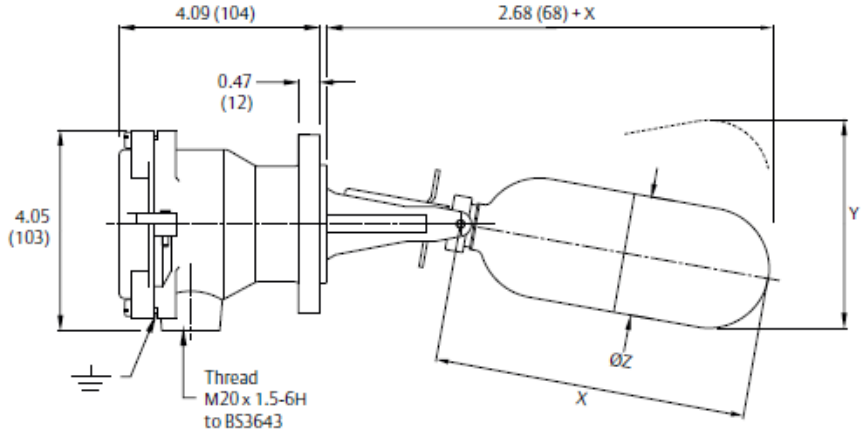
Mobrey ‘A’ flange:
4 off Ø0.55 (Ø14) holes equi-spaced on 3.62 (92) PCD

Note: Dimensions are in inches (mm).

General purpose float switches (aluminium bronze wetside)

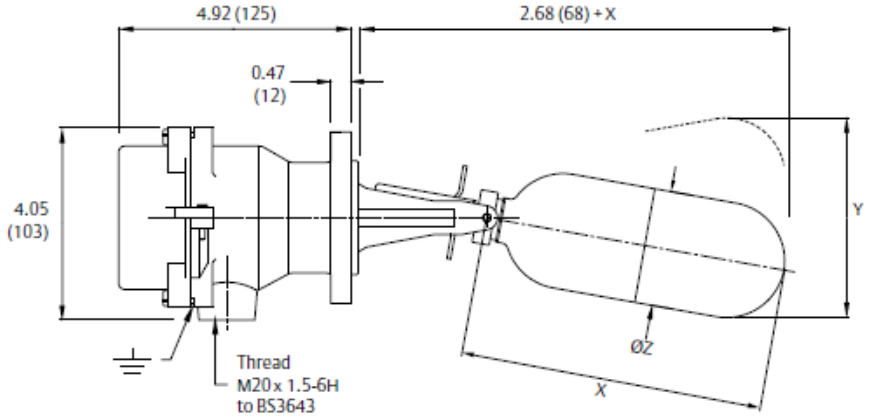
Switch mechanism type DB and PB

Note: See Table 9 for dimensions X, Y and Z.



Switch mechanism type D6B and P6B

Note: See Table 9 for dimensions X, Y and Z.



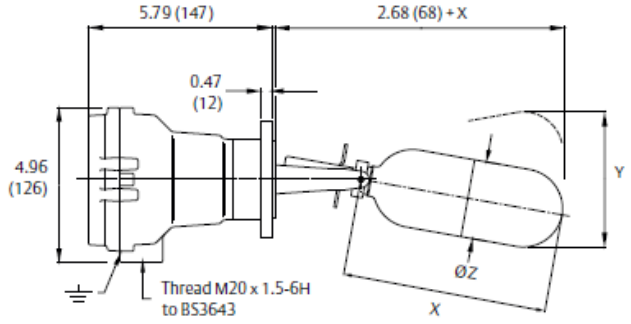
Note: Dimensions are in inches (mm).

General purpose float switches (stainless steel wetside)

Note: Dimensions are in inches (mm).

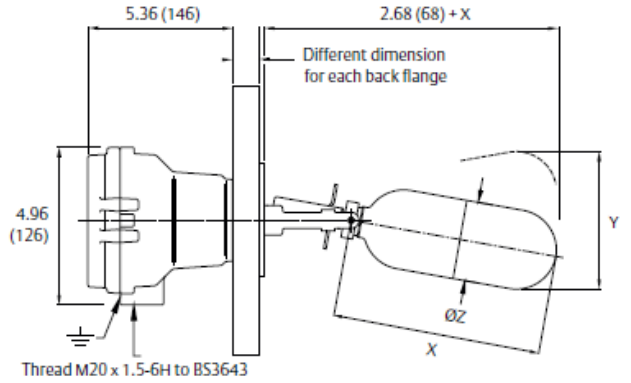
Note: See Table 9 for dimensions X, Y and Z.

Mobrey flange



S36* and S190*

ASME B16.5 / EN1092-1 flange



S4*

Table 9. 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)	2.46 (62.5)	316 SST
F68/+[1]	0.72 to 0.85	500 (34.5)	752 (400)	Variable (See page 13)			2.56 (65)	316 SST
F21/+[1]	0.70	435 (30)	752 (400)	Variable (See page 14)			5.08 (129)	316 SST
F104/+[1]	Various	500 (34.5)	752 (400)	As Ordered (See page 15)			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	2.56 (65)	Alloy 400

1. Refer to pages 12, 13, 14 and 15 for technical float details and length options. See “Nozzle and stud lengths” on page 11 for stud lengths.

Nozzle and stud lengths

Table 10. Maximum Length in mm (Dimensions 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

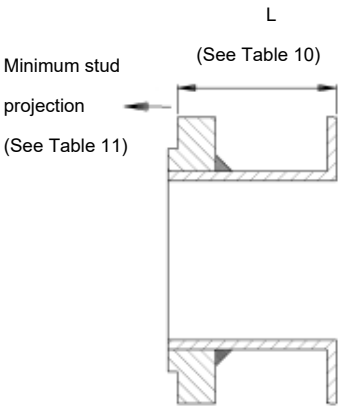
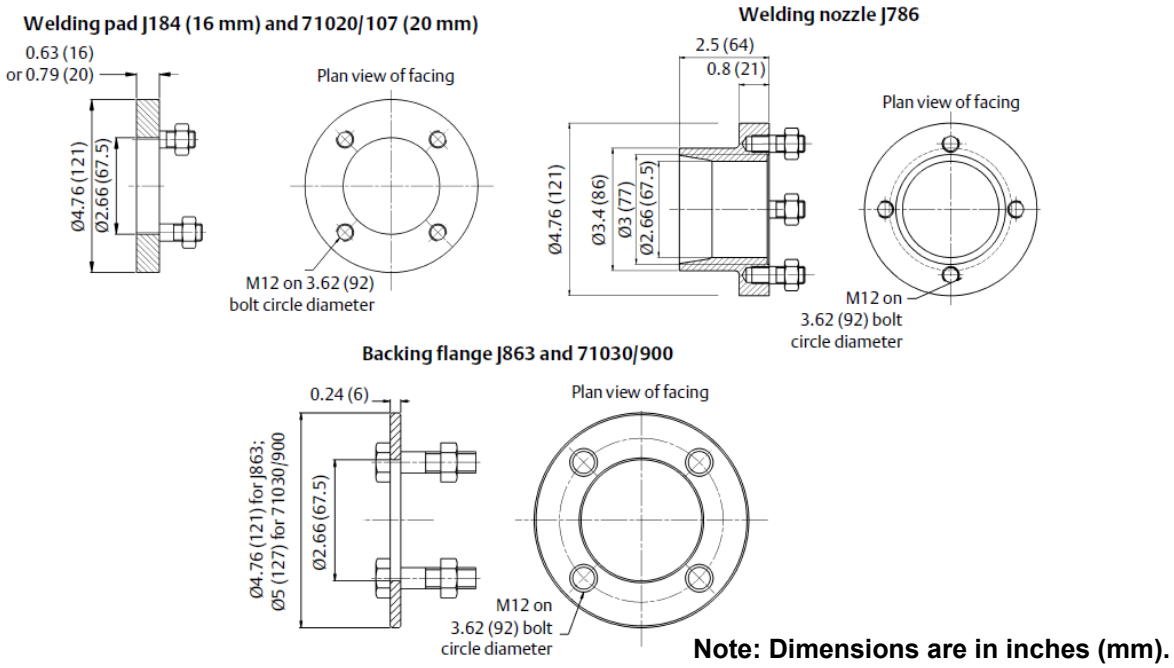


Table 11. Minimum stud projection (in mm)

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	56	54	56	64	73

Companion Flanges

Figure 1. Companion Flanges Mobrey 'A' Flanged Switches

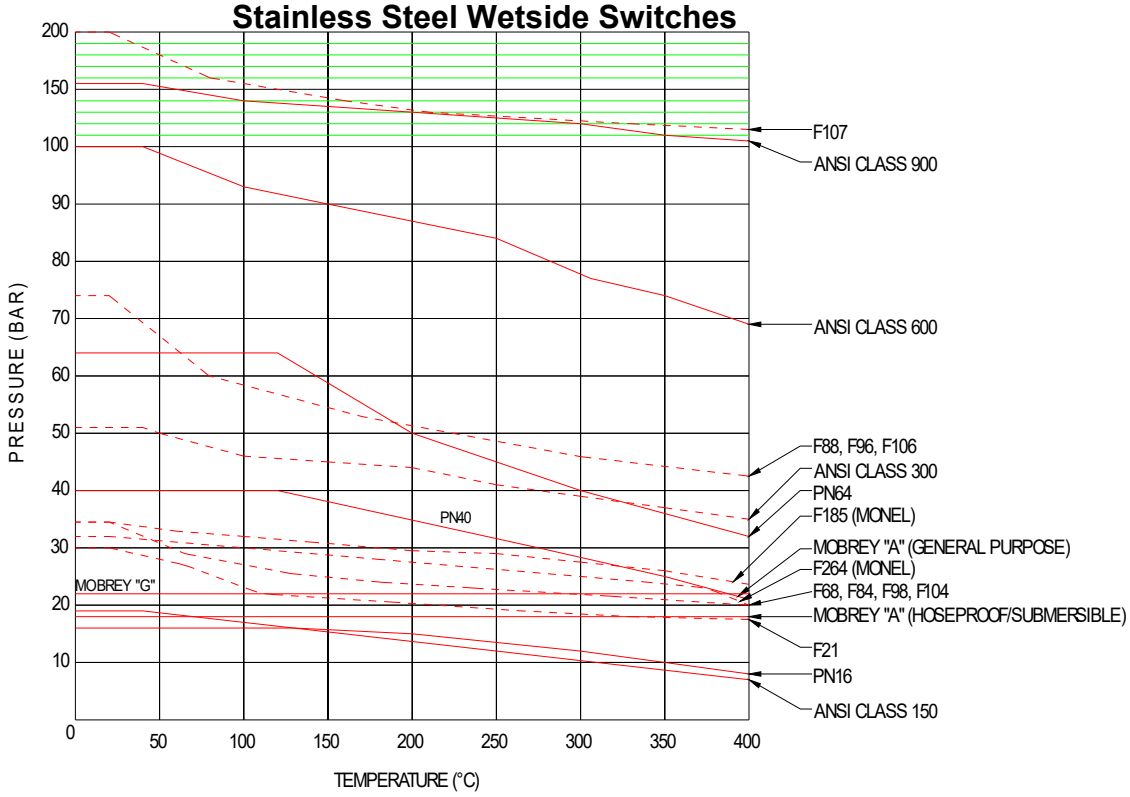


Note: Dimensions are in inches (mm).

Pressure/Temperature Relationships

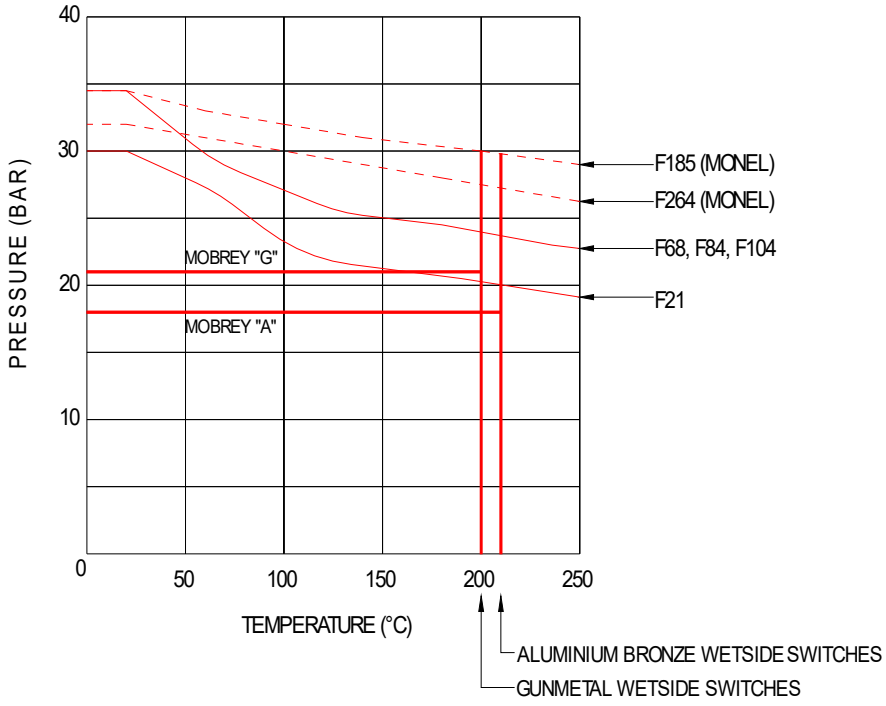
The graphs below show the maximum allowable working pressure of our float assemblies and process connection flanges across their working temperature range.

Stainless Steel Wetside Switches



F93 WORKING PRESSURE: LIMITED TO ATMOSPHERIC UP TO 180°C

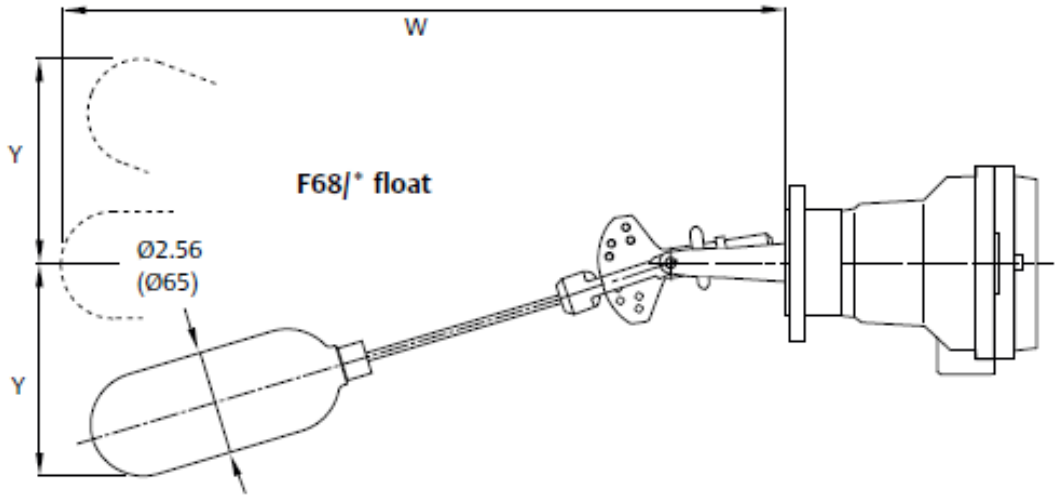
Non-Ferrous Wetside Switches



F93 WORKING PRESSURE: LIMITED TO ATMOSPHERIC UP TO 180°C

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 12.
Full details of the operating levels and differentials are in the product manual (Document Number M310).

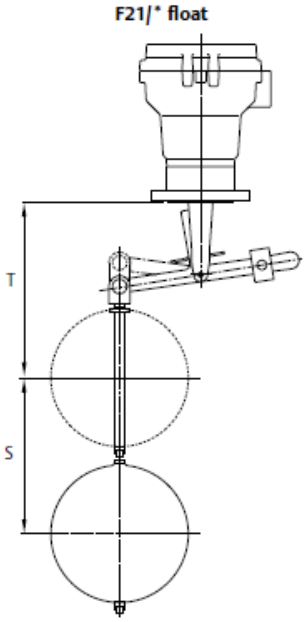
Table 12. Dimensions and specifications for F68/*

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 13 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

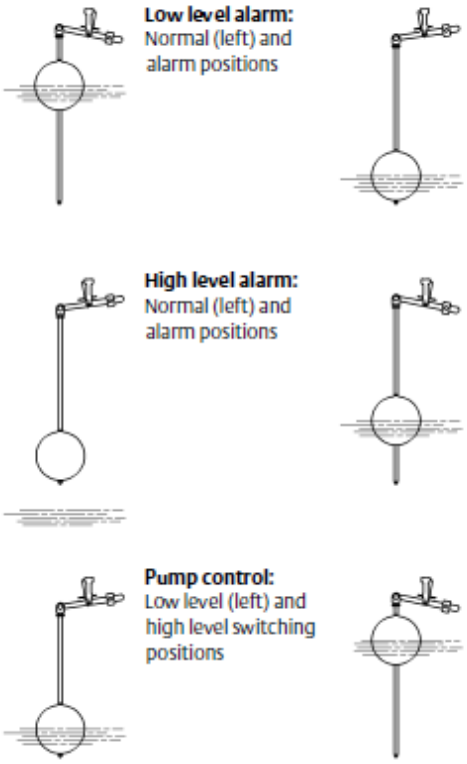
Float rods may be cut to length on site and switches set to operate at required level in either pump control or alarm mode by following the supplied setting instructions.

Table 13. 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]

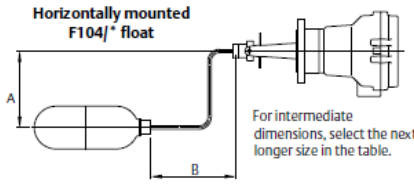
1. When the maximum rod length is specified.

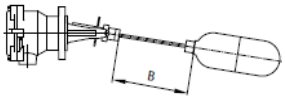
Figure 2. Pump Control and Alarm Applications



Cranked arm floats F104

Note: See Table 14 or Table 15 for dimensions in





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 (above).

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 14. Dimensions A and B with Minimum SG for Horizontally-mounted Switches (Land Applications)

	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
A																									
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 15. Dimensions A and B with Minimum SG for Horizontally-mounted Switches (Marine Applications)

	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
A																									
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	.78	.77	.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	.90	.91	.92					
225			.79	.80	.81	.82	.83	.84	.85	.86	.86	.87	.88	.89	.90	.91	.92	.93	.94						
250				.83	.84	.85	.86	.87	.87	.88	.89	.90	.91	.92	.93	.94	.95	.95							
275					.88	.88	.89	.90	.91	.91	.92	.93	.94	.95	.96	.96	.97								
300					.93	.93	.93	.93	.94	.95	.95	.96	.97	.98	.99	.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 16 or Table 17 for dimensions in mm.

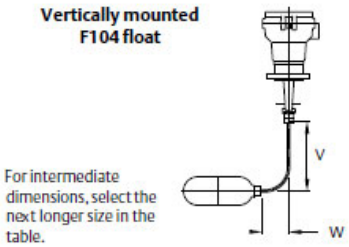


Table 16. Dimensions V and W with Minimum SG for Vertically-mounted Switches (Land Applications)

	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
V																									
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	.67	.67	.68	.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	.69	.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 17. Dimensions V and W with Minimum SG for Vertically-mounted Switches (Marine Applications)

	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
V																									
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	.79				
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	.77	.78	.78						
250				.69	.70	.70.	.71	.71	.72	.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														

Approvals

GLOBAL CERTIFICATION

Functional Safety Certified
Meets the requirements of IEC 61508-2:2010 for use in safety related systems.
Systematic capability: SC 2;
Random Capability: Type A element
SIL1, 2 capable with HFT 0 (1oo1); Route 2_H and 2_S
SIL Capability (Low Demand Mode) = SIL2 ; SIL Capability (High demand mode) = SIL1
Certificate No. CSA FSP 22001

Note: the associated full package of Safety Documentation must be listed on the order acknowledgement.

MARINE

Lloyd's Register
Certificate no. 88/00224 (S01)
Certificate no. 88/00225 (S36, S190, S4**)
LR Test Specification No. 1
ENV1, ENV2

Bureau Veritas
Certificate no. 04795/F1 BV (S01)
BV Rules for the classification of steel ships

American Bureau of Shipping
Certificate no. 19-GD1906187-1
IACS UR E10

DNV
Certificate no. TAA00002GZ (S01)
Certificate no. TAA00002H0 (S36, S190, S4**)
DNV GL rules for classification –Ships, offshore units, and high speed and light craft
Location classes: Temperature – A; Humidity – B; Vibration – B (Switch D, P) – A (switch D6, P6, H6);
Enclosure – C (S36, S190, S4**) – B (S01)

RINA
Certificate no. ELE270819CS001 (S01)
Rules for the classification of ships

NORTH AMERICA

Canadian Standards Association
C22.2 NO 14
CSA Enc 4

EUROPEAN DIRECTIVES

Low voltage Directive (LVD) 2014/35/EU.
Compliant to LVD
Pressure Equipment Directive (PED) 2014/68/EU:
This product is outside the scope of the PED directive

ATEX Directive 2014/34/EU
Hermetically sealed switch insert B6
II 3 G Ex nC IIC T6...T2 Gc (-60°C ≤ T_{amb} ≤ +60°C)

Approvals

UK REGULATION

Electrical Equipment (Safety) Regulations 2016 .
Conform to UK SI 2016 No 1101 as amended
Pressure Equipment (Safety) Regulations 2016 (UK SI 2016 No 1105 as amended) :
This product is outside the scope of the Regulation

Equipment and protective system for use in Potentially Explosive Atmospheres Regulation 2016
Hermetically sealed switch insert B6
II 3 G
Ex nC IIC T6...T1 Gc (-20°C ≤ T_{amb} ≤ +60°C)

Ordering Accessories

Table 18. Ordering Information for Accessories

Accessories	**Note:** See page 9 for dimensions of Mobrey flanges
TD 110/A	316 stainless steel test device for Mobrey 'A' flanged switches, sandwich (see below) *
TD 111/A	Carbon steel test device for Mobrey 'A' flanged switches, weld on (see below) *
71020/107	316 stainless steel welding pad for Mobrey 'A' flanged switches (see page 11)
J184	Carbon steel welding pad for Mobrey 'A' flanged switches (see page 11)
J786	Carbon steel welding nozzle for Mobrey 'A' flanged switches (see page 11)
71030/900	316 stainless steel backing flange for Mobrey 'A' flanged switches (see page 11)
J863	Carbon steel backing flange for Mobrey 'A' flanged switches (see page 11)

Testing Device

Figure 3. Test Devices for Mobrey 'A' Flanged Switches

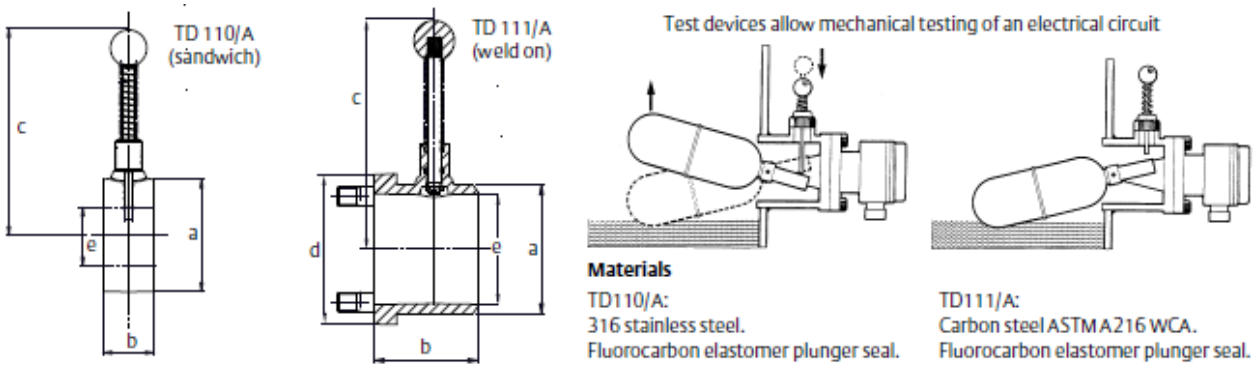


Table 19. Test Device Specifications and Dimensions

Type	Vessel flange	Maximum pressure (1)	Maximum T process	Øa in. (mm)	b in. (mm)	c in. (mm)	d in. (mm)	Øe in. (mm)
TD 110/A	Mobrey 'A'	261psi (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 (92) (2)	2.64 (67)

1. 182 psi (12.6 bar) at maximum temperature of 410 °F (210 °C).
2. See Mobrey 'A' flange dimension 3.62 x 3.62 in, (92 x 92 mm) on page 9.

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 Delta Mobrey for further information.

Technical **Datasheet**

Magnetic Horizontal Level Switches

For Hazardous areas

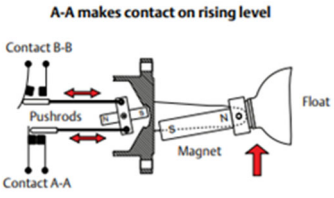
Key **Features**

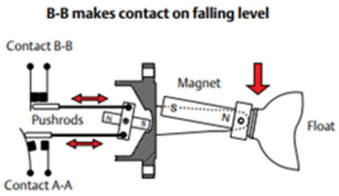
- Operates in almost every liquid at high pressure or temperature
- Tough, rugged design for long life in aggressive environments
- Magnetically coupled
- No glands or linkages that could cause leaks

Series **Overview**

The Mobrey magnetic horizontal float switch is ideal for high and low liquid level alarm, and pump control duties. It is designed to open or close a circuit as a changing liquid level within a vessel passes the level of the float.

When the process liquid level is below the switch point, contacts B-B are made and contacts A-A are open, but if the liquid level is above the switch point, contacts A-A are made and contacts B-B are open.





Product **applications**

- High and low liquid level alarm
- Direct (side or top) or chamber mounting
- Pump control duty
- Interface duty
- Can be fitted to Zone 0 vessels with process temperatures up to 400°C.

Other products

Other products we can offer :

• Vertical level switches

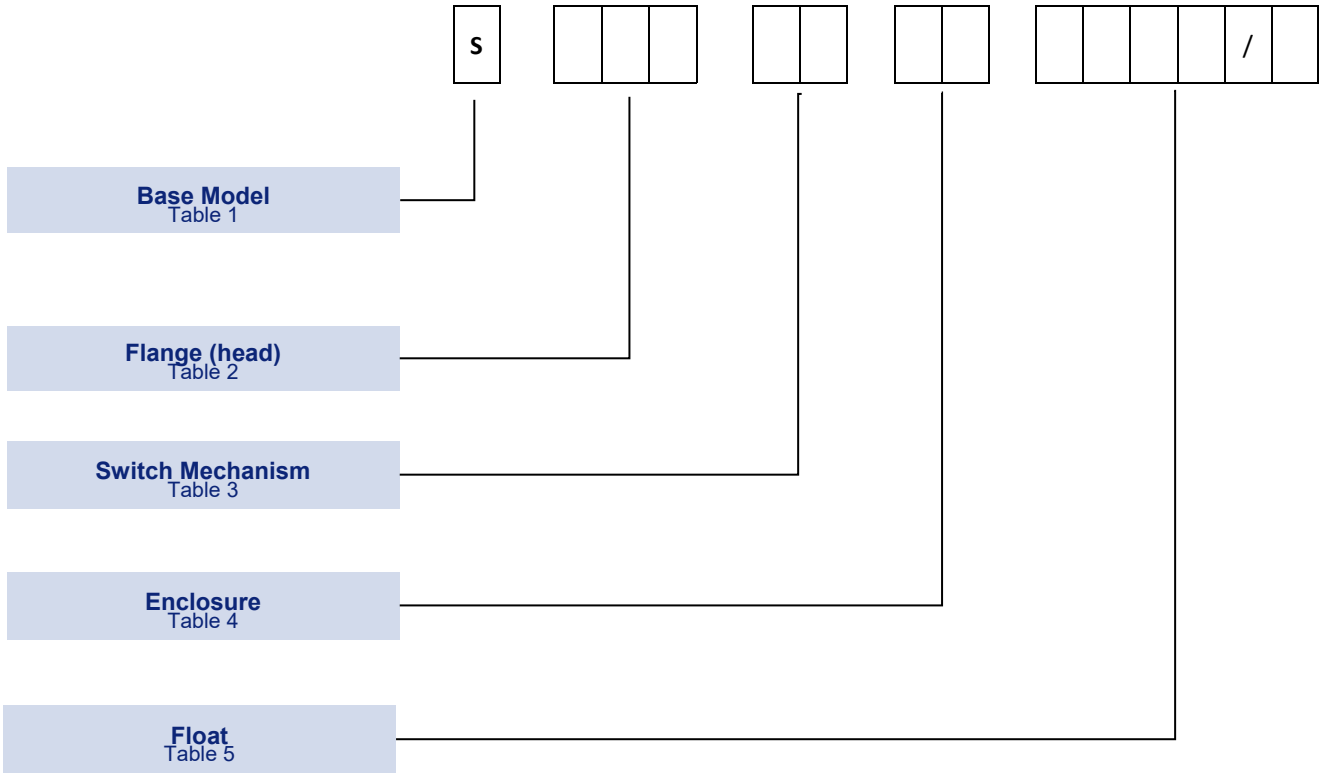
Magnetic Horizontal Level Switches

Model: Hazardous areas

How to order

Instrument can be configured by selecting codes representing the desired features from the tables that follow.

The chart below, describes how the model code is built up. For assistance in configuring a switch that best suits your needs, please contact your local sales office.



Models

TABLE 1	S											/	

Description	Code
Horizontal float switch	S

Flange (head) [1]

TABLE 2	S											/	

Description	Max T process [2]	Code
Flameproof Zone 1, stainless steel wetside, Mobrey ‘G’ flange, 304.5 psi (21 bar)	752 °F (400 °C)	250 [3][4]
Flameproof Zone 1, gunmetal wetside, Mobrey ‘G’ flange, 304.5 psi (21 bar)	392 °F (200 °C)	275 [3][4]
Flameproof Zone 1, stainless steel wetside, 3 in. ASME B16.5 Class 150 RF flange	752 °F (400 °C)	256
Flameproof Zone 1, stainless steel wetside, 4 in. ASME B16.5 Class 150 RF flange	752 °F (400 °C)	257
Flameproof Zone 1, stainless steel wetside, 6 in. ASME B16.5 Class 150 RF flange	752 °F (400 °C)	278
Flameproof Zone 1, stainless steel wetside, 3 in. ASME B16.5 Class 300 RF flange	752 °F (400 °C)	251
Flameproof Zone 1, stainless steel wetside, 4 in. ASME B16.5 Class 300 RF flange	752 °F (400 °C)	254
Flameproof Zone 1, stainless steel wetside, 3 in. ASME B16.5 Class 600 RF flange	752 °F (400 °C)	260
Flameproof Zone 1, stainless steel wetside, 3 in. ASME B16.5 Class 900 RF flange	752 °F (400 °C)	261
Flameproof Zone 1, stainless steel wetside, EN 1092-1 DN 80 PN 40 flange	752 °F (400 °C)	253
Flameproof Zone 1, stainless steel wetside, EN 1092-1 DN 100 PN 40 flange	752 °F (400 °C)	255
Flameproof Zone 1, stainless steel wetside, EN 1092-1 DN 125 PN 40 flange	752 °F (400 °C)	269
Flameproof Zone 1, stainless steel wetside, EN 1092-1 DN 80 PN 63 flange	752 °F (400 °C)	272
Flameproof Zone 1, stainless steel wetside, EN 1092-1 DN 100 PN 63 flange	752 °F (400 °C)	268
Flameproof Zone 1, stainless steel wetside, EN 1092-1 DN 125 PN 63 flange	752 °F (400 °C)	270
Flameproof Zone 1, stainless steel wetside, EN 1092-1 DN 150 PN 63 flange	752 °F (400 °C)	271

Switch Mechanism [5]

TABLE 3	S													/	

Description	Max T Process [2]	Code
Electrical: 2 independent Single Pole Single Throw (SPST) contact sets	752 °F (400 °C)	D
As type D but with gold plated contacts	752 °F (400 °C)	P
Electrical: 2 independent circuits of Double Pole Double Throw (DPDT) contact sets	752 °F (400 °C)	D6
As type D6 but with gold plated contacts	752 °F (400 °C)	P6
As type D6 but with gold plated contacts and hermetically sealed moving parts	482 °F (250 °C)	H6

Switch Enclosure

TABLE 4	S													/	

Description	Max T Process [2]	Code
Aluminium alloy	752 °F (400 °C)	A
Gunmetal	662 °F (350 °C)	G
Aluminium alloy, low ambient temperatures –4 to –76 °F (–20 to –60 °C)	752 °F (400 °C)	AX[6]
Gunmetal, low ambient temperatures –4 to –76 °F (–20 to –60 °C)	662 °F (350 °C)	GX[6]

Float (All ratings at T room) [7]

TABLE 5	S													/	

Description	Switch type	Code
General purpose high/low alarm, 316 SST, min. SG 0.65, 500 psi (34.5 bar)	All	F84
Horizontal variable differential for pump control/alarm, 316 SST, min. SG 0.72, 500 psi (34.5 bar)	All	F68/1 [8]
Horizontal variable differential for pump control/alarm, 316 SST, min. SG 0.85, 500 psi (34.5 bar)	All	F68/4 [8]
Vertical pump control or alarm, 316 SST, rod length 1524mm, 435 psi (30 bar)	All	F21/1 [8]

Vertical pump control or alarm, 316 SST, rod length 3048mm, 435 psi (30 bar)	All	F21/2 [8]
Vertical pump control or alarm, 316 SST, rod length 4570mm, 435 psi (30 bar)	All	F21/3 [8]
Straight aim, 316 SST, rod length 750mm, 500 psi (34.5 bar)	All	F104/1 [8]
Cranked arm, horizontal, 316 SST, dimensions to be specified, 500 psi (34.5 bar)	All	F104/2 [8]
Cranked arm, vertical, 316 SST, dimensions to be specified, 500 psi (34.5 bar)	All	F104/3 [8]
General purpose high/low alarm, Alloy 400, min. SG 0.65, 500 psi (34.5 bar)	All	F185
General purpose high/low alarm, 316 SST, min. SG 0.60, 1073 psi (74 bar)	All	F96
General purpose high/low alarm, 316 SST, min. SG 0.45, 500 psi (34.5 bar)	All	F98
General purpose high/low alarm, 316 SST, min. SG 0.51, 1073 psi (74 bar)	All	F106
General purpose high/low alarm, 316 SST, min. SG 0.71, 2900 psi (200 bar)	All	F107
Interface duties, 316 SST, min. SG 0.80, 1073 psi (74 bar)	All	F88
Horizontal limited differential, Alloy 400, min. SG 0.85, 464 psi (32 bar)	All	F264

1. See page 11 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 9 for Mobrey flange information.
5. See “Switch mechanism specifications” on page 8 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 page 11 for a comparison of the float options listed here.
8. See pages 11,12,13 and 14 for technical float details and length options.

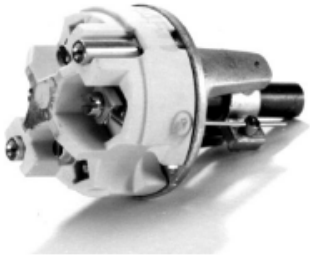
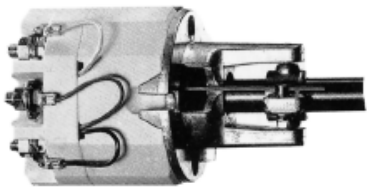
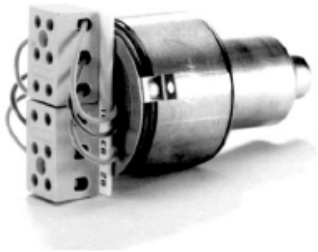
Float switch specifications

Table 6. Float Switch Specification - Hazardous Area Applications

General	
Enclosure/Housing materials	Aluminium alloy to BS 1490: grade LM24, nickel-plated. All external aluminium surfaces are chromate phosphate treated, and then externally stove painted Gunmetal to BS1400: LG2 Nickel-plated 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 tempera-tures	Aluminium 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 9 for dimensional drawings
Approvals [1]	
ATEX	II 1/2 G, Ex db IIC T6…T1 Ga/Gb (Ta = –20 °C to 60 °C) Housing code AX or GX II 1/2 G, Ex db IIC T6…T1 Ga/Gb (Ta = –60 °C to 60 °C)
IECEx	Ex db IIC T6…T1 Ga/Gb (Ta = –20 °C to 60 °C) Housing code AX or GX, Ex db IIC T6…T1 Ga/Gb (Ta = –60 °C to 60 °C)
CSA [2]	Canadian Standards Association, Class 1: Group CD
Marine	Lloyds Register of Shipping (LRS)

1. Other approvals maybe available. Please contact a Delta Mobrey representative for additional information.
2. CSA certified products are available to special order.

Table 7. Electrical switch mechanism specification

Electrical type D and P	Electrical type D6 and P6	Electrical type H6
		

Electrical switch mechanism

Type D

- For alternative make and break circuits
- Function: 2 independent Single Pole Single Throw contacts 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”

Type P and P6

- As type 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 housed in an Inert Gas filled, Hermetically sealed enclosure

Figure 1. Electrical Switching

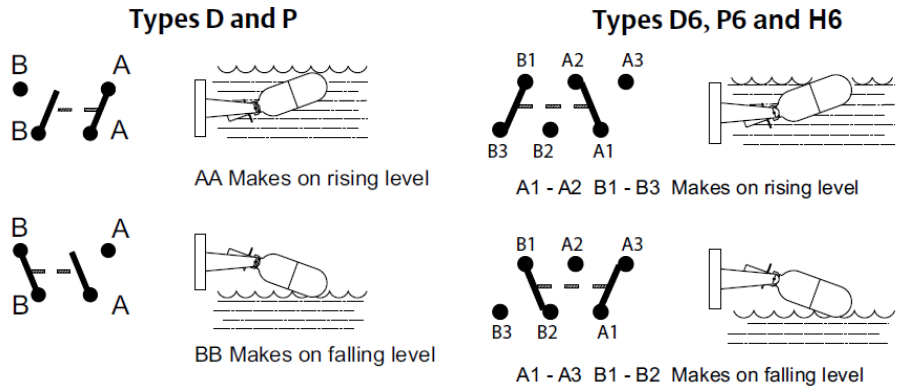


Table 8. Electrical switch mechanism specifications

Electrical switch specification	D and D6	P and P6	H6
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 and P6, : 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).

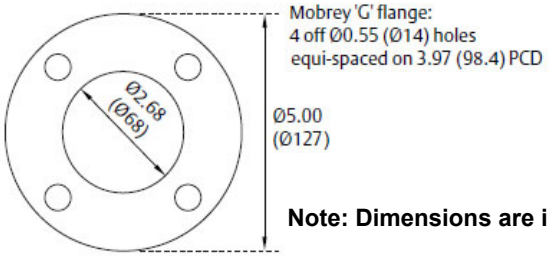
Warning
The plating of gold contacts may be permanently damaged when used to switch circuits above the following limits:

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 ‘G’ flange

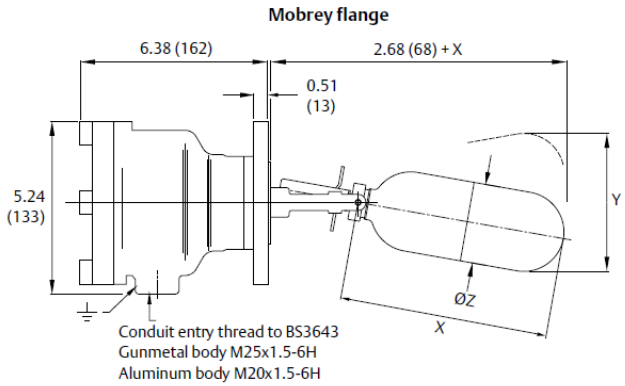


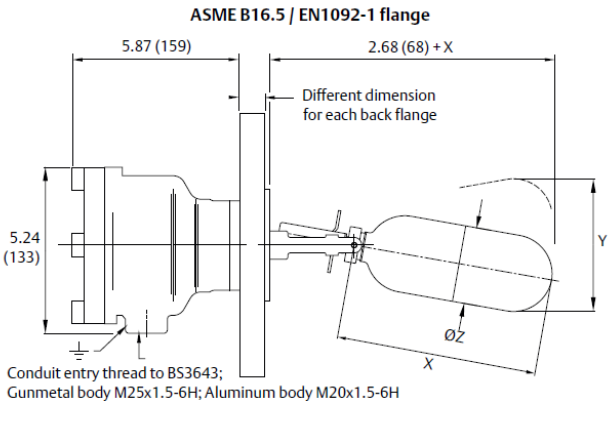
Note: Dimensions are in inches (mm).

Hazardous area float switches

Note: See Table 9 for dimensions X, Y and Z

Note: Dimensions are in inches (mm).

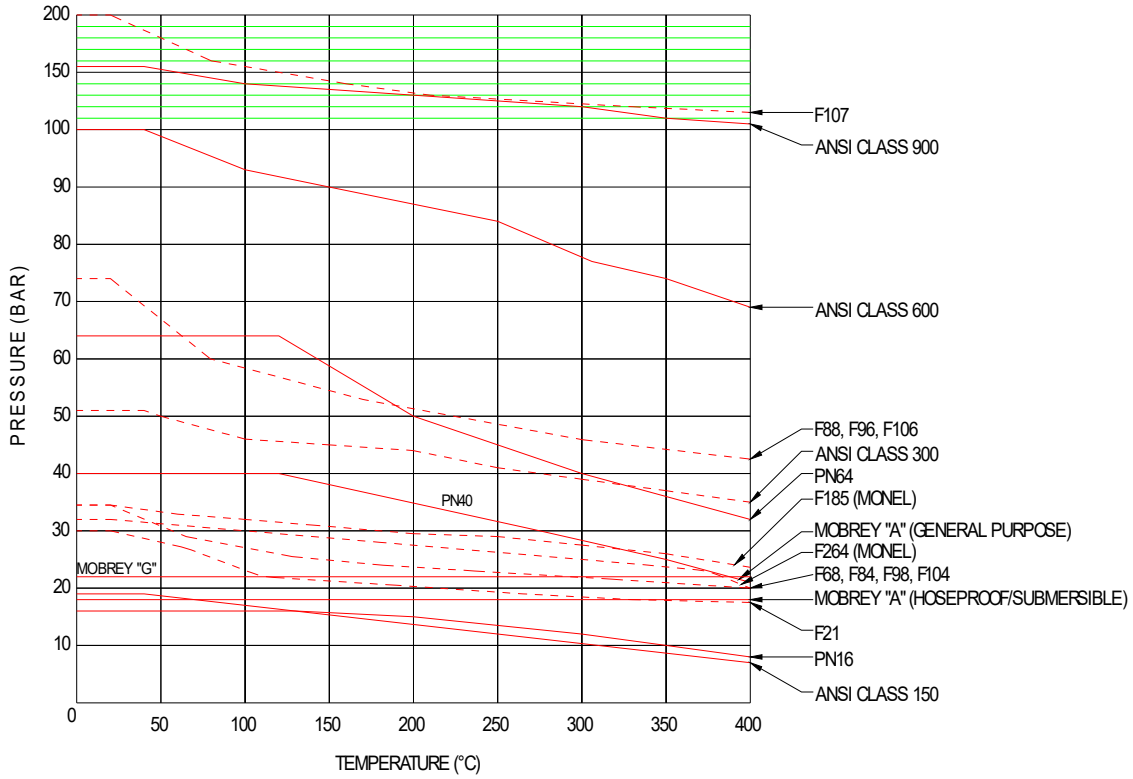




Pressure/Temperature Relationships

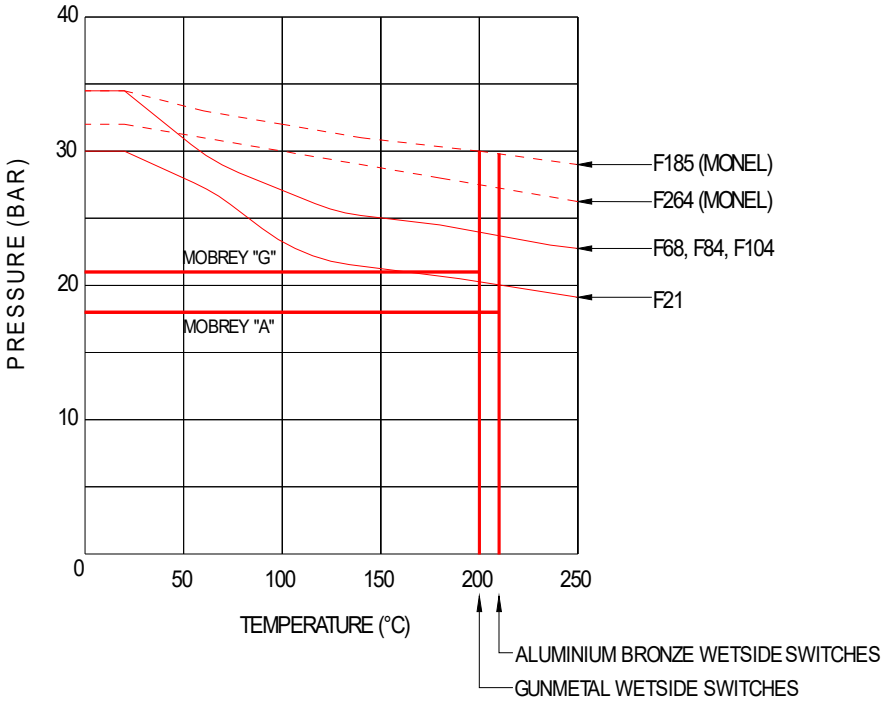
The graphs below show the maximum allowable working pressure of our float assemblies and process connection flanges across their working temperature range.

Stainless Steel Wetside Switches



F93 WORKING PRESSURE: LIMITED TO ATMOSPHERIC UP TO 180°C

Non-Ferrous Wetside Switches



F93 WORKING PRESSURE: LIMITED TO ATMOSPHERIC UP TO 180°C

Table 9. Float dimensions X, Y, and Z hazardous area Float

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)	2.46 (62.5)	316 SST
F68/+(1)	0.72 to 0.85	500 (34.5)	752 (400)	Variable (See page 12)			2.56 (65)	316 SST
F21/+(1)	0.70	435 (30)	752 (400)	Variable (See page 12)			5.08 (129)	316 SST
F104/+(1)	Various	500 (34.5)	752 (400)	As Ordered (See page 13)			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
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	2.56 (65)	Alloy 400

1. Refer to pages 11, 12, 13 and 14 for technical float details and length options. See “Nozzle and stud lengths” below for stud lengths.

Nozzle and stud lengths

Table 10. 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 G	65	75	75	135	-	75	90	-	92	75
6 in. 150	224	180	180	200	-	180	170	-	200	190

Note

See figure 4 on page 15 for companion flanges and accessories.

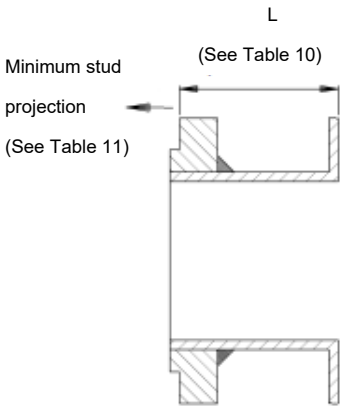
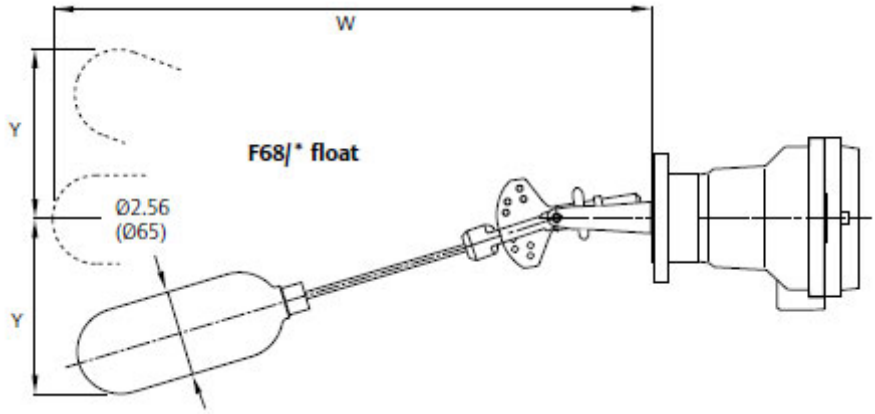


Table 11. Minimum stud projection (in mm)

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	56	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 12 Full details of the operating levels and differentials are in the product manual (Document Number M310).

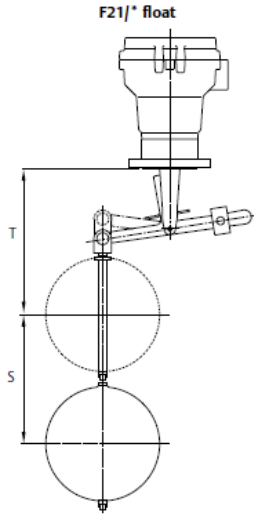
Table 12. Dimensions and specifications for F68/*

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 13 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

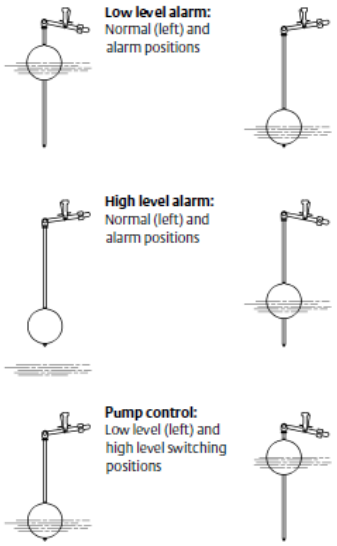
Float rods may be cut to length on site and switches set to operate at required level in either pump control or alarm mode by following the supplied setting instructions.

Table 13. 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]

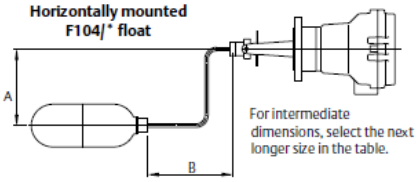
1. When the maximum rod length is specified.

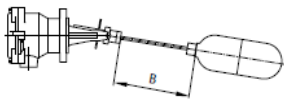
Figure 2. Pump Control and Alarm Applications



Cranked arm floats F104

Note: See Table 14 or Table 15 for dimensions in





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 (above).

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 14. Dimensions A and B with Minimum SG for Horizontal - mounted Switches (Land Applications)

	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
A																									
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 15. Dimensions A and B with Minimum SG for Horizontally - mounted switches (Marine Applications)

	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
A																									
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	.78	.77	.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	.90	.91	.92					
225			.79	.80	.81	.82	.83	.84	.85	.86	.86	.87	.88	.89	.90	.91	.92	.93	.94						
250				.83	.84	.85	.86	.87	.87	.88	.89	.90	.91	.92	.93	.94	.95	.95							
275					.88	.88	.89	.90	.91	.91	.92	.93	.94	.95	.96	.96	.97								
300					.93	.93	.93	.93	.94	.95	.95	.96	.97	.98	.99	.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 16 or Table 17 for dimensions in mm.

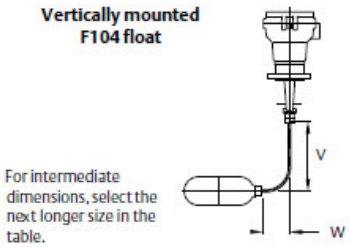


Table 16. Dimensions V and W with Minimum SG for Vertically-mounted Switches (Land Applications)

	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
V																									
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	.67	.67	.68	.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	.69	.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 17. Dimensions V and W with Minimum SG for Vertically-mounted Switches (Marine Applications)

	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
V																									
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	.79				
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	.77	.78	.78						
250				.69	.70	.70.	.71	.71	.72	.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														

Approvals

GLOBAL CERTIFICATION

IECEX
FLAMEPROOF
Certificate no. IECEx SIR 07.0081X
IEC 60079-0, IEC 60079-1, IEC 60079-26
For Zone 0/1
Ex db IIC T6...T1 Ga/Gb (-20°C ≤ T_{amb} ≤ +60°C) or (-60°C ≤ T_{amb} ≤ +60°C)

Functional Safety Certified
Meets the requirements of IEC 61508-2:2010 for use in safety related systems.
Systematic capability: SC 2;
Random Capability: Type A element
SIL1, 2 capable with HFT 0 (1oo1); Route 2_H and 2_S
SIL Capability (Low Demand Mode) = SIL2 ; SIL Capability (High demand mode) = SIL1
Certificate No. CSA FSP 22001

Note: the associated full package of Safety Documentation must be listed on the order acknowledgement.

MARINE

Lloyd's Register
Certificate no. 88/00226
LR Test Specification No. 1
ENV1, ENV2

NORTH AMERICA

Canadian Standards Association
C22.2 NO 30
Class I, Div. 1, Groups C and D; CSA Enc 4

EUROPEAN DIRECTIVES

Low voltage Directive (LVD) 2014/35/EU.
Compliant to LVD
Pressure Equipment Directive (PED) 2014/68/EU:
This product is outside the scope of the PED directive

ATEX Directive 2014/34/EU
II 1/2 G
FLAMEPROOF Certificate no. Sira 03ATEX1140X
Ex db IIC T6...T1 Ga/Gb (-20°C ≤ T_{amb} ≤ +60°C)
Ex db IIC T6...T1 Ga/Gb (-60°C ≤ T_{amb} ≤ +60°C)

UK REGULATION

Electrical Equipment (Safety) Regulations 2016 .
Conform to UK SI 2016 No 1101 as amended
Pressure Equipment (Safety) Regulations 2016 (Inc. Brexit amendments 2021):
This product is outside the scope of the Regulation

Equipment and Protective Systems Intended for use in Potentially Explosive Atmospheres Regulations 2016
II 1/2 G
FLAMEPROOF Certificate no. CSAE 21UKEX1507X
Ex db IIC T6...T1 Ga/Gb (-20°C ≤ T_{amb} ≤ +60°C)
Ex db IIC T6...T1 Ga/Gb (-60°C ≤ T_{amb} ≤ +60°C)

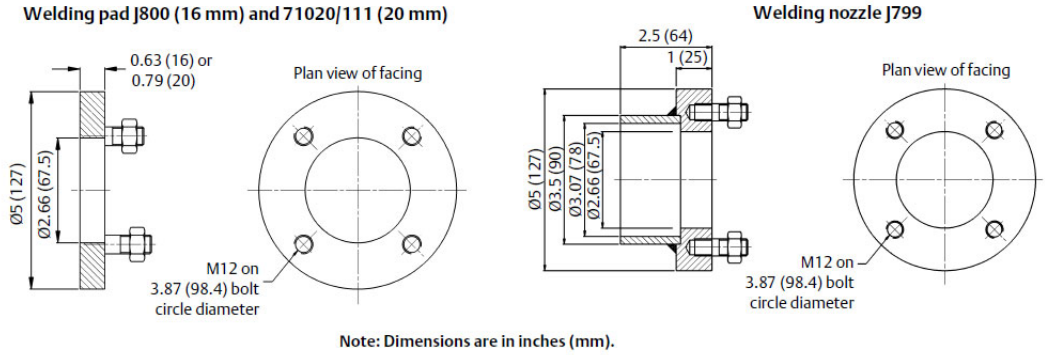
Ordering Accessories

Table 18. Ordering Information for Accessories

Accessories	**Note:** See page 9 for dimensions of Mobrey flanges
J800	Carbon steel welding pad for Mobrey ‘G’ flanged switches (see Figure 4 below)
71020/111	316 stainless steel welding pad for Mobrey ‘G’ flanged switches (see Figure 4 below)
J799	Carbon steel welding nozzle for Mobrey ‘G’ flanged switches (see Figure 4 below)

Companion Flanges

Figure 4. Companion Flanges Mobrey ‘G’ Flanged Switches



Note

- Welding types supplied complete with studs and nuts.
- Other materials available upon request.

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 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 Delta Mobrey for further information.

Technical **Datasheet**

Magnetic Horizontal Level Switches

For Marine applications

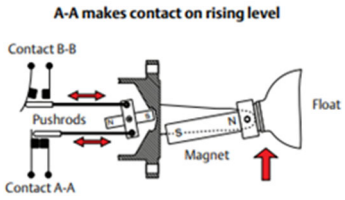
Key **Features**

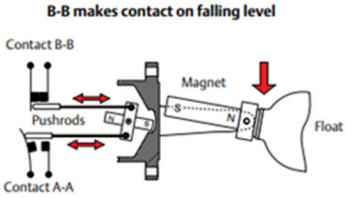
- Operates in almost every liquid
- Tough, rugged design for long life in aggressive environments
- Magnetically coupled
- No glands or linkages that could cause leaks

Series **Overview**

The Mobrey magnetic horizontal float switch is ideal for high and low liquid level alarm, and pump control duties. It is designed to open or close a circuit as a changing liquid level within a vessel passes the level of the float.

When the process liquid level is below the switch point, contacts B-B are made and contacts A-A are open, but if the liquid level is above the switch point, contacts A-A are made and contacts B-B are open.





Other products

Other products we can offer :

- 003 Gap Sensor

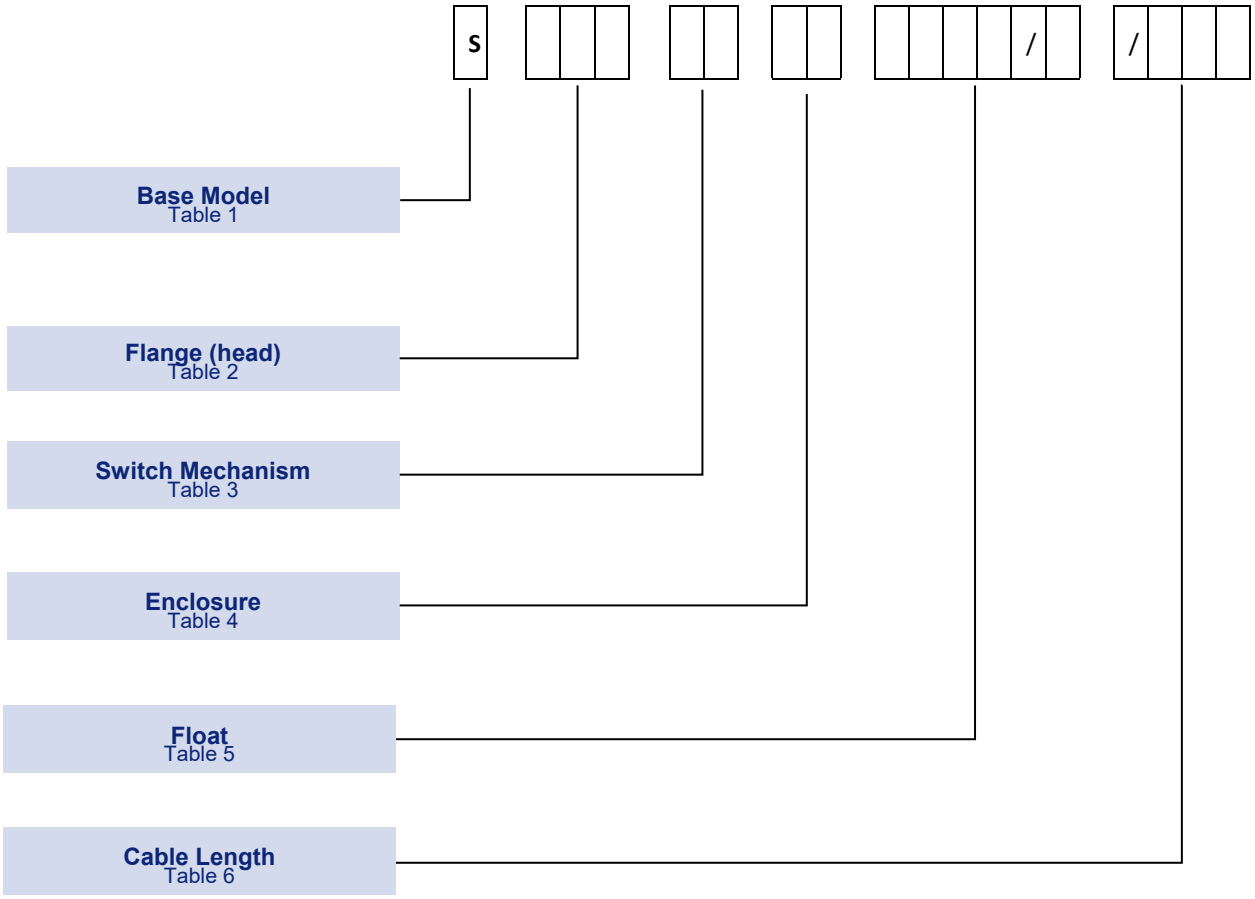
Product **applications**

- High and low liquid level alarm
- Direct side or top mounting
- Pump control duty
- Submersible
- Dirty Liquids
- Hazardous Area approved versions can be fitted to Zone 0 vessels with process temperatures up to 210°C.

How to order

Instrument can be configured by selecting codes representing the desired features from the tables that follow.

The chart below, describes how the model code is built up. For assistance in configuring a switch that best suits your needs, please contact your local sales office.



Models

TABLE 1 **S** | | | | | | | / | /

Description	Code
Horizontal float switch	**S**

Flange (head) (1)

TABLE 2 **S** | | | | | | | / | /

Description	Code
Marine, hoseproof, aluminium bronze wetside, no cable fitted, Mobrey ‘A’ flange, 261 psi (18 bar)	179
Marine, submersible, aluminium bronze wetside, MICC cable fitted, Mobrey ‘A’ flange, 261 psi (18 bar)	03
Marine, submersible, aluminium bronze wetside, CSP cable fitted, Mobrey ‘A’ flange, 261 psi (18 bar)	195
Marine, submersible, stainless steel wetside, MICC cable fitted, Mobrey ‘A’ flange, 261 psi (18 bar)	163 (7)
Marine, hoseproof, stainless steel wetside, no cable fitted, Mobrey ‘A’ flange, 261 psi (18 bar)	181 (7)
Marine, submersible, flameproof, aluminium bronze wetside, CSP cable fitted, Mobrey ‘A’ flange, 261 psi (18 bar)	183
Marine, submersible, flameproof, aluminium bronze wetside, MICC cable fitted, Mobrey ‘A’ flange, 261 psi (18 bar)	187
Marine, hoseproof, flameproof, aluminium bronze wetside, no cable fitted, Mobrey ‘A’ flange, 261 psi (18 bar)	189

Switch Mechanism (1) (2)

TABLE 3 **S** | | | | | | | / | /

Description	Max T process (1)	Code
Electrical: 2 independent Single Pole Single Throw (SPST) contact sets	752 °F (400 °C)	D
As type D but with gold plated contacts	752 °F (400 °C)	P
Electrical: 2 independent circuits of Double Pole Double Throw (DPDT) contact sets	752 °F (400 °C)	D6 (3)
As type D6 but with gold plated contacts	752 °F (400 °C)	P6 (3)

Switch Enclosure [1]

TABLE 4	S											/		/		

Description	Switch Type	Code
Aluminium bronze – (code B is required for S179 and S189 models)	All	B
Stainless steel with 10 ft. (3 m) of fitted cable – (code L is required for S163 model)	All except D6 and P6	L
Aluminium bronze with 10 ft. (3 m) of fitted cable – (code BL is required for S03, S195, S183, and S187 models)	All	BL

Float (All ratings at T room) [4]

TABLE 5	S											/		/		

Description	Switch type	Code
General purpose high/low alarm, 316 SST, min. SG 0.65, 500 psi (34.5 bar)	All	F84
Horizontal variable differential for pump control/alarm, 316 SST, min. SG 0.72, 500 psi (34.5 bar)	All	F68/1 [5]
Horizontal variable differential for pump control/alarm, 316 SST, min. SG 0.85, 500 psi (34.5 bar)	All	F68/4 [5]
Vertical pump control or alarm, 316 SST, rod length 1524mm, 435 psi (30 bar)	All	F21/1 [5]
Vertical pump control or alarm, 316 SST, rod length 3048mm, 435 psi (30 bar)	All	F21/2 [5]
Vertical pump control or alarm, 316 SST, rod length 4570mm, 435 psi (30 bar)	All	F21/3 [5]
General purpose high/low alarm, 316 SST, min. SG 0.45, 500 psi (34.5 bar)	All	F98
Straight aim, 316 SST, rod length 750mm, 500 psi (34.5 bar)	All	F104/1 [5]
Cranked arm, horizontal, 316 SST, dimensions to be specified, 500 psi (34.5 bar)	All	F104/2 [5]
Cranked arm, vertical, 316 SST, dimensions to be specified, 500 psi (34.5 bar)	All	F104/3 [5]
Shrouded for dirty liquids, 316 SST, min. SG 0.75, atmospheric	All	F93 [6] [7]
General purpose high/low alarm, Alloy 400, min. SG 0.65, 500 psi (34.5 bar)	All	F185
Horizontal limited differential, Alloy 400, min. SG 0.85, 464 psi (32 bar)	All	F264

Cable Length (required only if a cable is fitted)	TABLE 6 S [ ][ ][ ] [ ][ ] [ ][ ] [ ][ ][ ][ ]/[ ] [ ]/[ ][ ][ ]

Description	Code
3m of fitted cable	M03
5m of fitted cable	M05
10m of fitted cable	M10
15m of fitted cable	M15
20m of fitted cable	M20
30m of fitted cable	M30

1. The maximum process temperature is dependent on the flange (head), switch mechanism, cable (if fitted), and float options chosen. See Table 7 below for the IP rating and maximum process temperature.
2. See “Switch mechanism specifications” on page 8 for information about all switch mechanisms.
3. Not available for stainless steel enclosure and wetside models S163 and S181.
4. See Table 10 on page 9 for a detailed comparison of the float types listed here.
5. Refer to pages 11, 12, 13 and 14 for technical float details and length options. See “Nozzle and stud lengths” on page 11 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.

Table 7. Switch Types Comparison - Marine Application

Type number	Maximum TProcess[1]		Head IP rating	Cable[2]
	Submersed	Non-submersed		
S03	176 °F (80 °C)	410 °F (210 °C)	6/68 (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 6 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.

Table 8. Float Switch Specifications - Marine Applications

Aluminium bronze wetside models	
Enclosure and wetside	Aluminium bronze to BS1400 – AB1 maximum iron content 2.5%. Enclosure is nickel-plated
IP rating	May be submerged to 100 ft. (30 m) head of water (IP68)
End cap	Brass BS1400 DCB3 (non-hazardous area float switches) Aluminium Bronze BS400 AB, maximum 2.5% iron (hazardous area float switches)
Maximum process temperature	See Table 7
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 9 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	Aluminium bronze to BS1400 – AB1/C
Maximum process temperature	410 °F (210 °C) Note: See “Gasket Material” and “Cable” below for further temperature limits
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 9 for dimensional drawings
Cable[1]	
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 [2]	
ATEX	II 2 G, Ex db IIC T6 Gb (Ta= –20 °C to 60 °C) when submersed in a vented tank application
	II 1/2 G, Ex d IIC T6...T2 Ga/Gb (Ta= –20 °C to 60 °C) when enclosure is outside in a tank mounted application
Approvals [3]	
Marine	Lloyds Register of Shipping (LRS)
	DNV GL
	ABS
	BV[4]
	RMRS

1. See Table 7 for marine application switches supplied with a fitted cable.
2. Types S183, S187 and S189 only.
3. Other approvals may be available. Please contact a Delta Mobrey representative for additional information.
4. The BV approval is not available for stainless steel wetside model types S163 and S181.

Table 9. Electrical switch mechanism specification

Electrical type D and P	Electrical type D6 and P6
	

Electrical switch mechanism

Type D

- For alternative make and break circuits
- Function: 2 independent Single Pole Single Throw contacts sets and “snap-action”
- May be wired S.P.C.O. on site

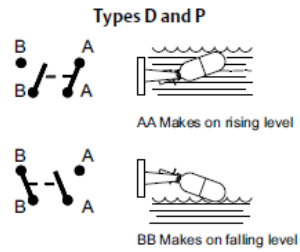
Type D6

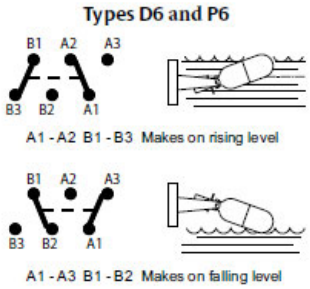
- For switching two independent circuits
- Function Double Pole change over (2 independent circuits) and “snap-action”

Type P and P6

- As type D and D6 but with Gold Plated Contacts for switching low power (e.g. Intrinsically Safe) electrical circuits

Figure 1. Electrical Switching





Electrical switch specifications	D and D6	P and P6
Contact material	Fine silver	Gold plated
Process temperature	–22 to 752 °F (–30 to 400 °C)	–22 to 752 °F (–30 to 400 °C)
Ambient temperature	–22 to 158 °F (–30 to 70 °C)	–22 to 158 °F (–30 to 70 °C)
Insulation value	(live to earth) > 100 MEG OHM	
Terminals	D and P: M4 screws with non-rotational clamp plates.	
	D6 and P6, : 6-way terminal block with pressure plates	

Electrical specifications	AC	DC Inductive	DC restrictive
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 constraints 40ms, maximum	

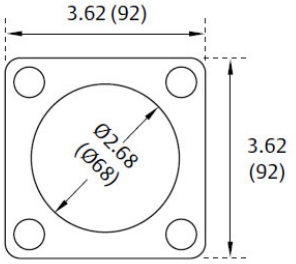
1. Maximum current for Type D is 8 A up to 410°F (210°C).

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

Mobrey ‘A’ flange



Mobrey ‘A’ flange:
4 off Ø0.55 (Ø14) holes equi-spaced on 3.62 (92) PCD

Note: Dimensions are in inches (mm).

Marine float switches

Note: Dimensions are in inches (mm).

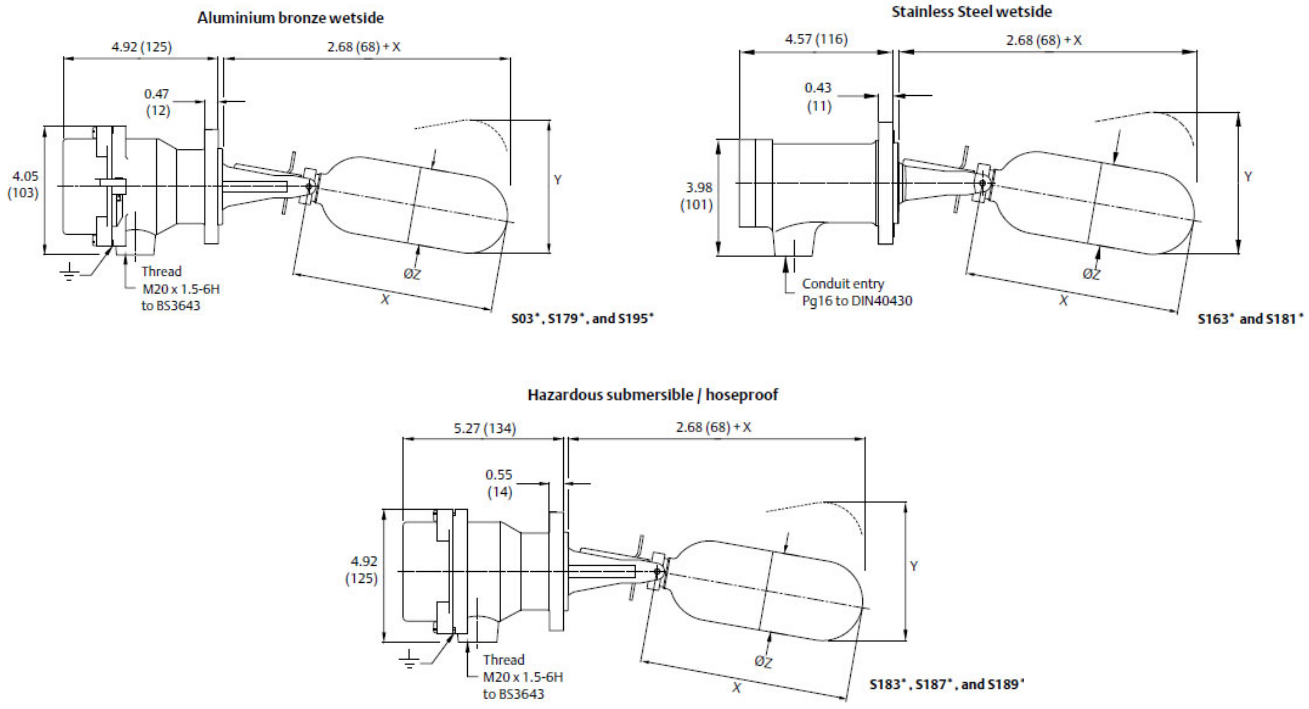


Table 10. Float dimensions X, Y and Z - hazardous and marine float switches

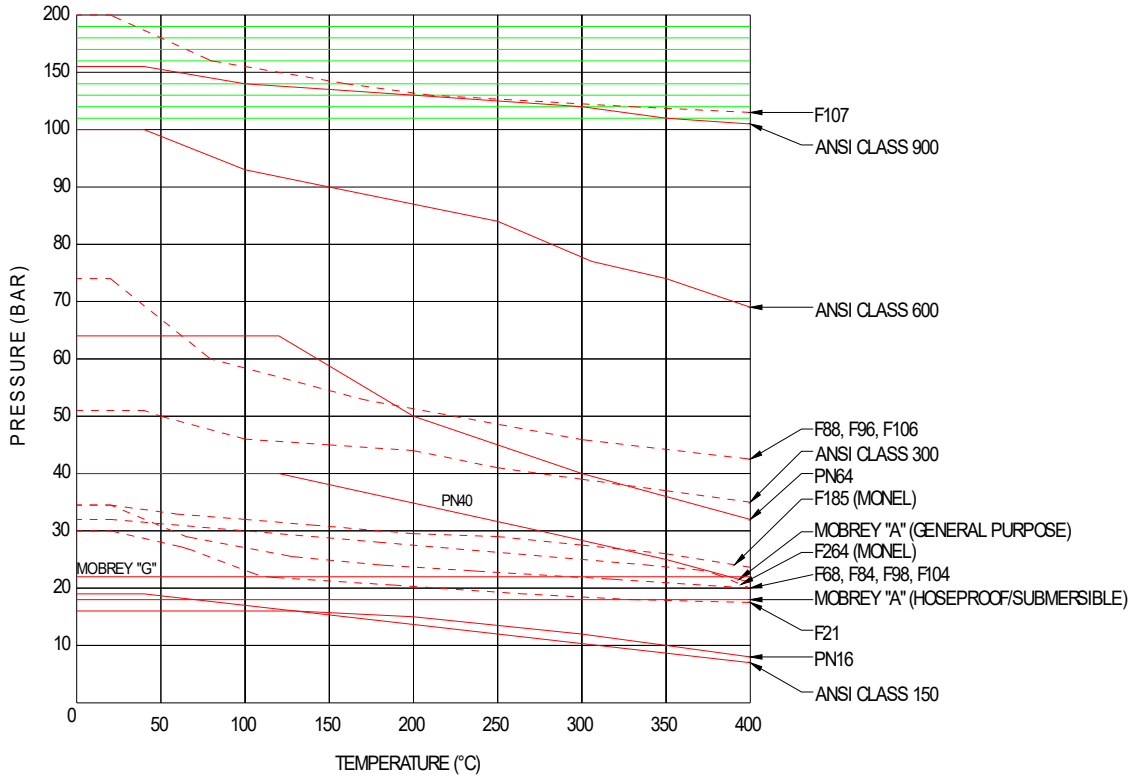
Float Type	Minimum S.G.	Max. P@T Room PSI (Bar)	Max. T Process °F (°C)	Differential in. (mm)	Dimension X in. (mm)	Dimension Y in. (mm)	Dimension ØZ in. (mm)	Float Material
F84	0.65	500 (34.5)	752 (400)	0.51 (13)	6.45 (164)	4.68 (119)	2.56 (65)	316 SST
F68/+(1)	0.72 to 0.85	500 (34.5)	752 (400)	Variable (See page 11)			2.56 (65)	316 SST
F21/+(1)	0.70	435 (30)	752 (400)	Variable (See page 12)			5.08 (129)	316 SST
F104/+(1)	Various	500 (34.5)	752 (400)	As Ordered (See page 13)			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
F98	0.45	500 (34.5)	752 (400)	0.55 (14)	7.24 (184)	5.00 (127)	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	2.56 (65)	Alloy 400

1. Refer to pages 11, 12, 13 and 14 for technical float details and length options. See “Nozzle and stud lengths” on page 11 for stud lengths.

Pressure/Temperature Relationships

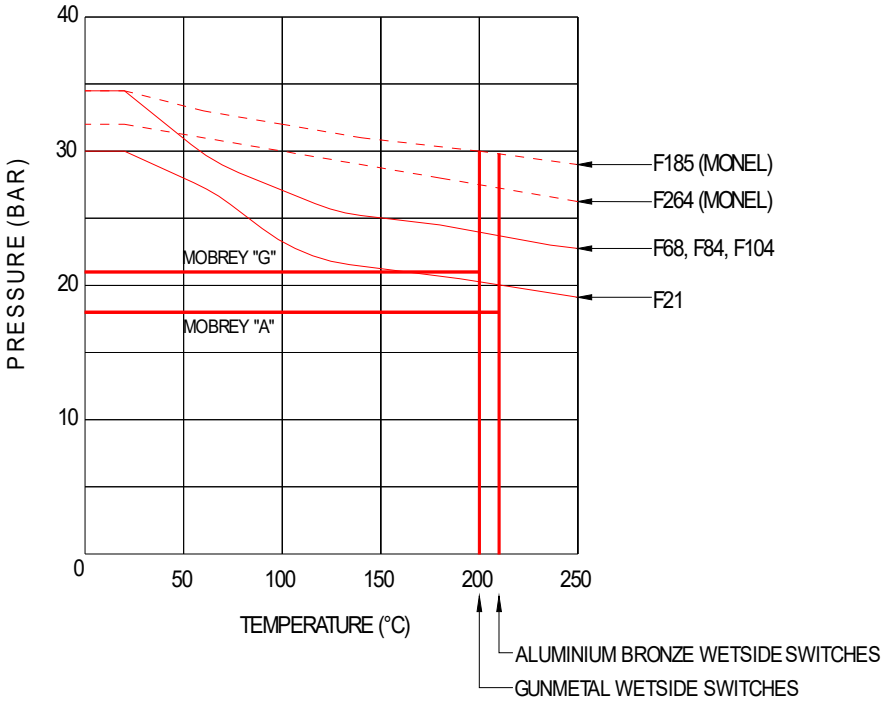
The graphs below show the maximum allowable working pressure of our float assemblies and process connection flanges across their working temperature range.

Stainless Steel Wetside Switches



F93 WORKING PRESSURE: LIMITED TO ATMOSPHERIC UP TO 180°C

Non-Ferrous Wetside Switches



F93 WORKING PRESSURE: LIMITED TO ATMOSPHERIC UP TO 180°C

Nozzle and stud lengths

Table 11. 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

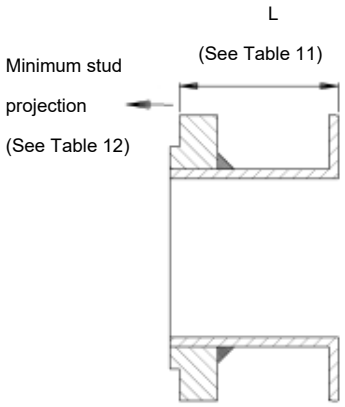
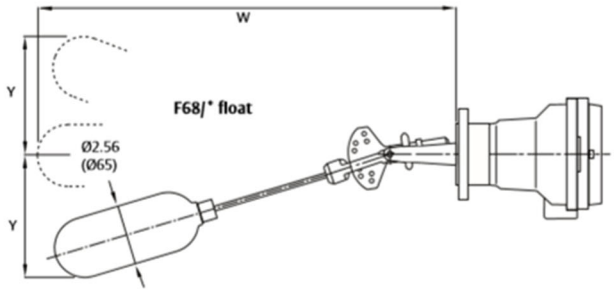


Table 12. Minimum stud projection (in mm)

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	56	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 13. Full details of the operating levels and differentials are in the product manual (Document Number M310).

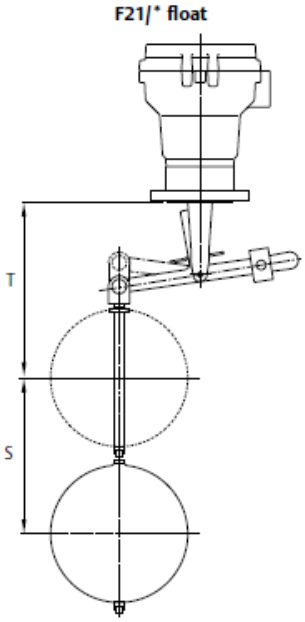
Table 13. Dimensions and specifications for F68/*

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 13 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

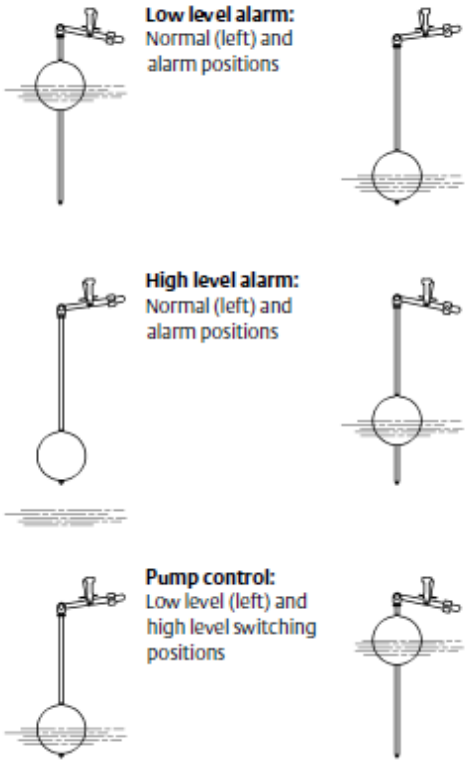
Float rods may be cut to length on site and switches set to operate at required level in either pump control or alarm mode by following the supplied setting instructions.

Table 14. 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]

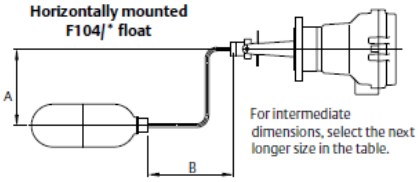
1. When the maximum rod length is specified.

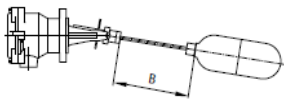
Figure 2. Pump Control and Alarm Applications



Cranked arm floats F104

Note: See Table 15 or Table 16 for dimensions in





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 (above).

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 15. Dimensions A and B with Minimum SG for Horizontally-mounted Switches (Land Applications)

	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
A																									
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 16. Dimensions A and B with Minimum SG for Horizontally-mounted Switches (Marine Applications)

	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
A																									
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	.78	.77	.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	.90	.91	.92					
225			.79	.80	.81	.82	.83	.84	.85	.86	.86	.87	.88	.89	.90	.91	.92	.93	.94						
250				.83	.84	.85	.86	.87	.87	.88	.89	.90	.91	.92	.93	.94	.95	.95							
275					.88	.88	.89	.90	.91	.91	.92	.93	.94	.95	.96	.96	.97								
300					.93	.93	.93	.93	.94	.95	.95	.96	.97	.98	.99	.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 17 or Table 18 for dimensions in mm.

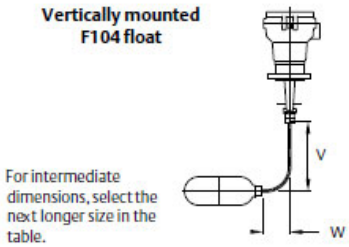


Table 17. Dimensions V and W with Minimum SG for Vertically-mounted Switches (Land Applications)

	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
V																									
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	.67	.67	.68	.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	.69	.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 18. Dimensions V and W with Minimum SG for Vertically-mounted Switches (Marine Applications)

	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
V																									
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	.79				
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	.77	.78	.78						
250				.69	.70	.70.	.71	.71	.72	.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														

Ordering Accessories

Table 19. Ordering Information for Accessories

Accessories	**Note:** See page 8 for dimensions of Mobrey flanges
TD 110/A	316 stainless steel test device for Mobrey ‘A’ flanged switches, sandwich (see below) *
TD 111/A	Carbon steel test device for Mobrey ‘A’ flanged switches, weld on (see below) *
71020/107	316 stainless steel welding pad for Mobrey ‘A’ flanged switches (see below)
J184	Carbon steel welding pad for Mobrey ‘A’ flanged switches (see below)
J786	Carbon steel welding nozzle for Mobrey ‘A’ flanged switches (see below)
71030/900	316 stainless steel backing flange for Mobrey ‘A’ flanged switches (see below)
J863	Carbon steel backing flange for Mobrey ‘A’ flanged switches (see below)

Testing Device

Figure 3. Test Devices for Mobrey ‘A’ Flanged Switches

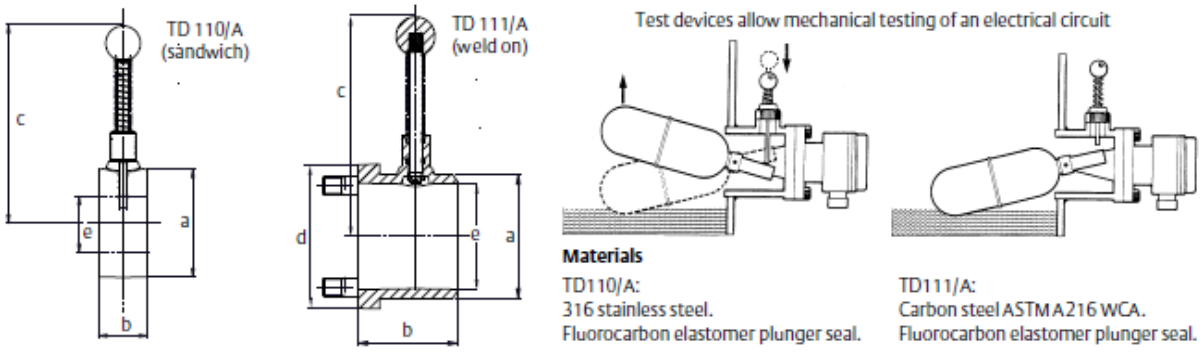


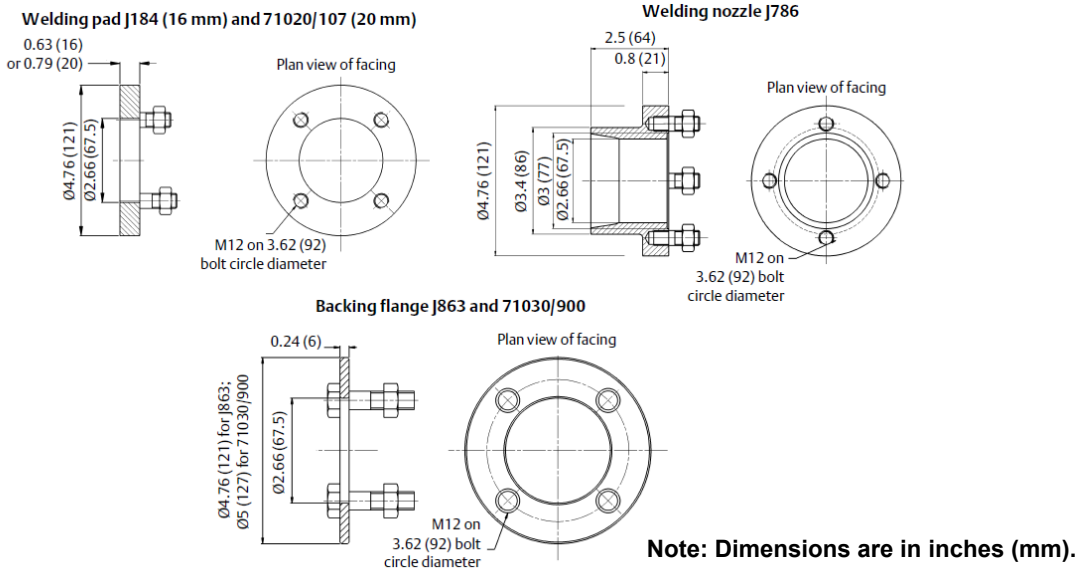
Table 20. Test Device Specifications and Dimensions

Type	Vessel flange	Maximum pressure [1]	Maximum T process	Øa in. (mm)	b in. (mm)	c in. (mm)	d 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 (92)[2]	2.64 (67)

1. 182 psi (12.6 bar) at maximum temperature of 410 °F (210 °C).
2. See Mobrey ‘A’ flange dimension 3.62 x 3.62 in, (92 x 92 mm) on page 9.

Companion Flanges

Figure 4. Companion Flanges Mobrey ‘A’ Flanged Switches



Note: Dimensions are in inches (mm).

Approvals

GLOBAL CERTIFICATION

Functional Safety Certified
Meets the requirements of IEC 61508-2:2010 for use in safety related systems.
Systematic capability: SC 2;
Random Capability: Type A element
SIL1, 2 capable with HFT 0 (1oo1); Route 2_H and 2_S
SIL Capability (Low Demand Mode) = SIL2 ; SIL Capability (High demand mode) = SIL1
Certificate No. CSA FSP 22001

MARINE

Lloyd's Register
Certificate no. 88/00224
LR Test Specification No. 1
ENV1, ENV2

Bureau Veritas
Certificate no. 04795/F1 BV
BV Rules for the classification of steel ships

American Bureau of Shipping
Certificate no. 19-GD1906187-1 IACS UR E10

DNV GL
Certificate no. TAA00002GZ
DNV GL rules for classification –Ships, offshore units, and high speed and light craft
Location classes: Temperature – A; Humidity – B; Vibration – B; Enclosure- D

RINA
Certificate no. ELE270819CS001
Rules for the classification of ships

Canadian Standards Association
C22.2 NO 14
CSA Enc 4

EUROPEAN DIRECTIVES

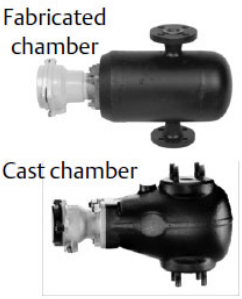
Low voltage Directive (LVD) 2014/35/EU.
Compliant to LVD
Pressure Equipment Directive (PED) 2014/68/EU:
This product is outside the scope of the PED directive

ATEX Directive 2014/34/EU
FLAMEPROOF Models S183, S187, S189
Certificate No. Sira 06ATEX1115X
EN 60079-0, EN 60079-1, EN 60079-26, EN13463-1

II 1/2 G	For Zone 0/1 outside tank mounted applications Ex db IIC T6...T2 Ga/Gb (-20°C ≤ T_{amb} ≤ +60°C)
II 2 G	For Zone 1 submerged in vented tank applications Ex db IIC T6 Gb (-20°C ≤ T_{amb} ≤ +60°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 Delta Mobrey for further information.



Horizontal Level Switch Chambers

For Float Switches

Key **Features**

- Standard finish Black stove paint. 2 pack epoxy available at extra cost.
- Pressure testing All chambers are full pressure tested at the relevant connection flange test pressure.
- Operating pressure
  Note that the pressure/temperature ratings of the switches and chambers are not always compatible so that the lower rating will be the governing factor in selection.
- Low temperature use
  The lowest operating temperature for the fabricated carbon steel chambers is -7°C and the cast iron chambers is 0°C.
  If use at temperatures below these limits is required, LT50 or stainless steel can be specified.

Product **applications**

Paint finish to customers specifications

Chambers may be supplied in accordance with NACE recommendations for sour service

NDT to CSWIP and ASNTis available for radiographic, ultrasonic, mag particle and dye penetrant

Customers and nominated inspection agencies are welcome to witness pressure testing.

Switches and chambers are individually pressure tested at the relevant flange test pressure. They are supplied loosely assembled for transit and flange bolts must be tightened on site before commissioning.

Series Overview

Float chambers are used to facilitate the external mounting of a Mobrey Magnetic level switch on to 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. Process connections may be specified 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. Exotic materials are also available.

Relevant chambers are supplied CE marked and fully compliant with the Pressure Equipment Directive (2014/68/EU)

Variety of connection configurations available.

Welding procedures approved to EN 15614-1 & ASME IX

Welders approved to EN ISO 9606

All materials used for fabricated chambers are to ASME specifications

Material certification, EN 10204 Type 3.1

Chambers can be manufactured in a wide variety of materials, including 321 and 316 stainless steel, Incoloy Monel, CrMo steels and other more exotic materials

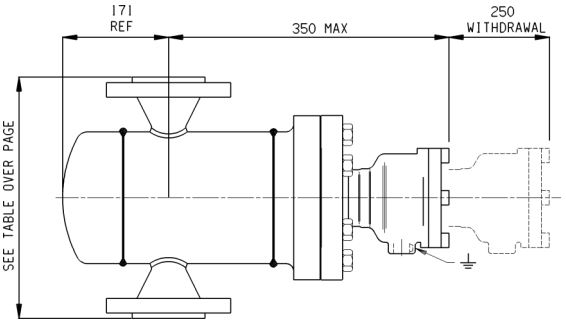
Other products

Other products we can offer:

• horizontal and vertical level switches

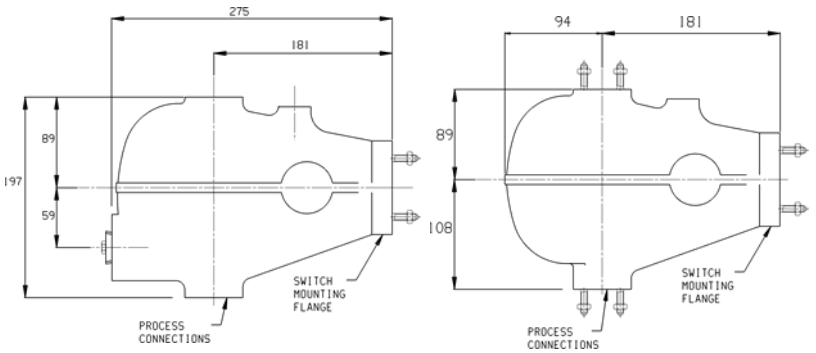
Horizontal Level Switch Chambers
Model: Horizontal Float Switches

Float chambers

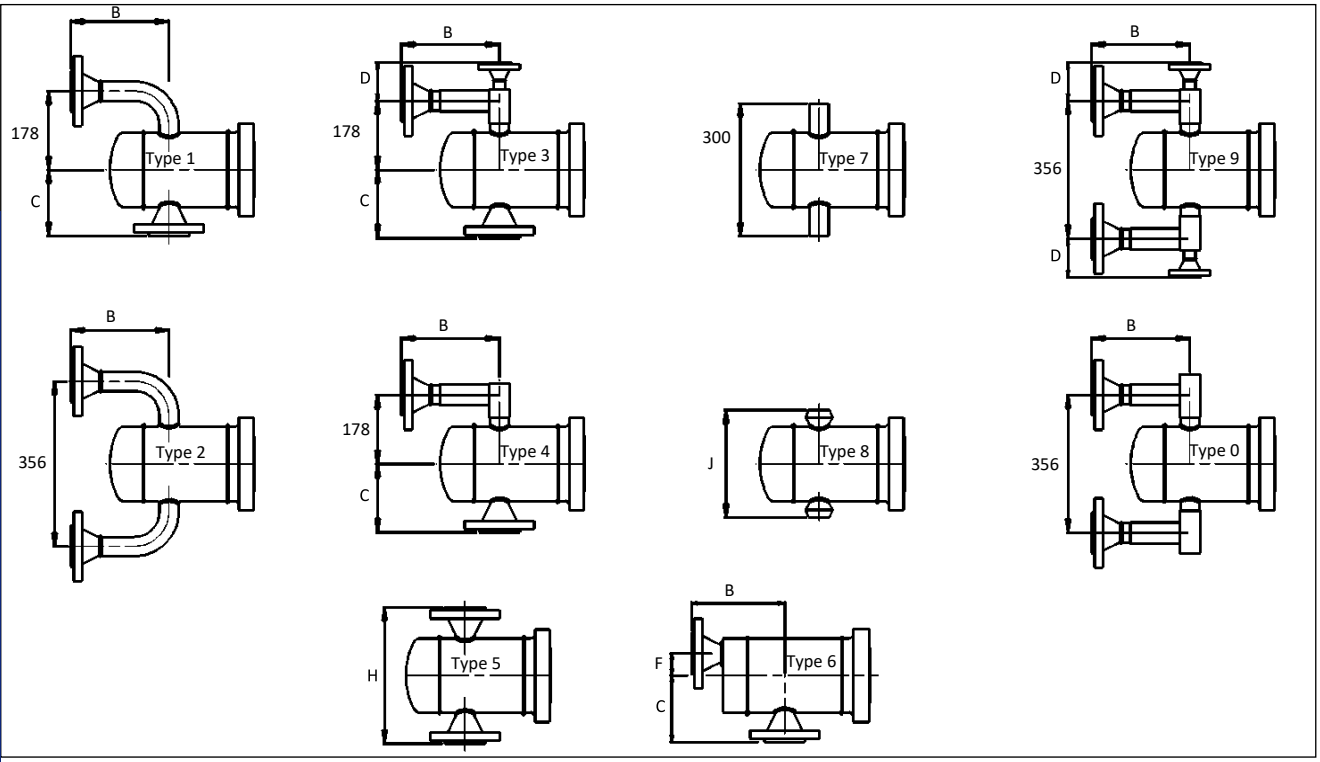


Fabricated chambers

Cast chambers



Fabricated chamber dimensions



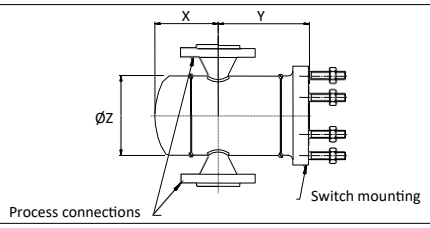
Horizontal Level Switch Chambers

Model: Horizontal Float Switches

Fabricated chambers Standard dimensions: Ref. only - must be certified on order

Model	Sw mounting flg	Pressure	X	Y	Z	Model	Sw mounting flg	Pressure	X	Y	Z
144C	AMSE B16.5 3" #150	19.6 bar	143	185	168	**305C**	BSEN1092-1 DN80 PN63	63 bar	143	183	168
145C	ASME B16.5 3" #300	51 bar	143	185	168	**306C**	BSEN1092-1 DN65 PN40	40 bar	143	162	168
148C	MOBREY 'A'	18 bar	143	169	168	**307C**	AMSE B16.5 3" Class 600	102 bar	170	162	168
151C	MOBREY 'G'	21 bar	143	169	168	**308C**	AMSE B16.5 3" Class 900	153 bar	173	161	168

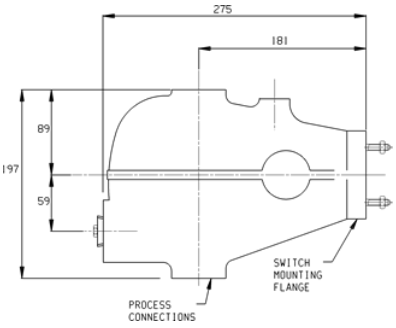
Nominal ref. dimensions



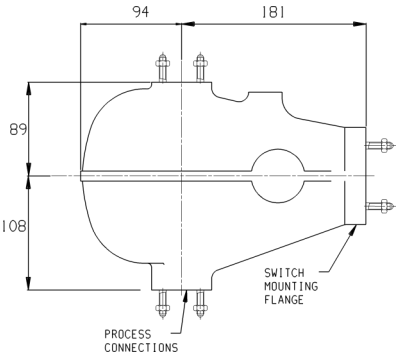
Cast chambers Standard dimensions: Ref. only - must be certified on order

802-S01DB/F84

201 with drainage



802 without drainage



Type no.	Material Cast iron	Process connetions	Maximum working conditions for chamber		Suitable Mobrey level switches		Drainage
			Pressure	Temp.	Switch flange	Typical combination	
201	EN 1561 Grade EN GJL 250	Screwed 1" BSP	13 bar	at 210°C	Mobrey A	201-S01DB/F84	With
802	EN 1561 Grade EN GJL 250	EN 1092-1 DN20 PN16	13 bar	at 210°C	Mobrey A	802-S01DB/F84	Without

Minimum working temperature 0°C

Process connection sizes and dimensions for fabricated chambers																			
	1"			DN25				1.5"		DN40	2"				DN50			Tolerance	
Dim	150	300	600	PN16	PN25	PN40	PN100	150	300	PN16	150	300	600	900	PN16	PN25	PN40	+	-
B	212	218.5	225	196	198	198	216	218.5	225	200	220	226	236	265	203	206	206	0	3
C	139	143.5	152.5	123	125	125	143.5	143.5	150	125.5	144	150.5	161.5	190	127	130	130	0	1.5
D*	108	112	117	-	-	-	-	108	112	-	108	112	117	133	-	-	-	0	2
F	60	60	-	60	60	60	60	54	54	54	48	48	-	-	48	48	48	1	1
H	278	291	305	246	250	250	287	287	300	251	288	301	323	380	254	260	260	0	3
	Screwed							Screwed/SW			Screwed or socket weld								
J	NPT 240			BSP 240				NPT 244			NPT 250							0	3

* ¾" N.B. Vent/drain flange of relevant rating as shown. All dimensions shown are nominal and should be certified on order.

Fabricated chambers : ordering information

Materials & Flanges

TABLE 1

Material switch flange	Max Pressure @ 20°C	Max Temp °C	Code
Carbon Steel / ASME B16.5, 3” ANSI 150RF	19.6 bar	400°C	144C
Carbon Steel / ASME B16.5, 3” ANSI 300RF	51 bar	400°C	145C
Carbon Steel / Mobrey “A” flange	18 bar	400°C	148C
Carbon Steel / Mobrey “G” flange	21 bar	400°C	151C
Carbon Steel / EN1092 -1, DN80 PN63	63 bar	400°C	305C
Carbon Steel / EN1092 -1, DN65 PN40	40 bar	400°C	306C
Carbon Steel / ASME B16.5, 3” ANSI 600RF	102 bar	400°C	307C
Carbon Steel / ASME B16.5, 3” ANSI 900RF	153 bar	400°C	308C

Connection Style

TABLE 2

Description		Code
Side & Top or Side and Bottom	Flanged	1
Side & Side	Flanged	2
Side & Top or Side and Bottom	Flanged with ¾ “ flanged vent/drain	3
Side & Top or Side and Bottom	Flanged with ¾ “ threaded vent/drain	4
Top & Bottom	Flanged	5
Side & Top or Side and Bottom	Flanged (close centers)	6
Top & Bottom stub pipe		7
Top & Bottom threadolet or Socket		8
Side & Side	Flanged with ¾ “ flanged vent/drain	9
Side & Side	Flanged with ¾ “ threaded vent/drain	0

Connection Size/Rating

TABLE 3 

Description	Code
1” NB Sockolet	00
1” NPT threaded (Female)	01
1 ½ “ NPT threaded (Female)	02
2” NPT threaded (Female)	03
1” BSPT threaded (Female)	04
1” NB Sch.80 stub pipe	08
2” NB Sch.80 stub pipe	10
ASME B 16.5 1” Class 150RF weld Neck	11
ASME B 16.5 1” Class 300RF weld Neck	12
ASME B 16.5 1” Class 600RF weld Neck	13
EN 1092-1 DN25 PN16 RF weld neck	15
EN 1092-1 DN25 PN25 RF weld neck	16
EN 1092-1 DN25 PN40 RF weld neck	17
EN 1092-1 DN25 PN63 RF weld neck	18
EN 1092-1 DN25 PN100 RF weld neck	19
ASME B 16.5 1 ½ “ Class 150RF weld Neck	21
ASME B 16.5 1 ½ ” Class 300RF weld Neck	22
EN 1092-1 DN40 PN16 RF weld neck	25
ASME B 16.5 2” Class 150RF weld Neck	31
ASME B 16.5 2” Class 300RF weld Neck	32
ASME B 16.5 2” Class 600RF weld Neck	33
ASME B 16.5 2” Class 900RF weld Neck	34
EN 1092-1 DN50 PN16 RF weld neck	35
EN 1092-1 DN50 PN25 RF weld neck	36
EN 1092-1 DN50 PN40 RF weld neck	37

Chamber options to customer order

- Chambers can be manufactured I a wide range of materials, including 304, 321 & 316 Stainless Steel, Alloy 825, Alloy 400, Duplex & other more exotic materials
- Paint Finish to customer specification
- NDT to CSWIP and ASNT is available for radiographic ultrasonic, mag particle and dye penetrant
- Chambers maybe supplied in accordance with NACE recommendation for Sour Service

Approvals

EUROPEAN DIRECTIVES

Pressure Equipment Directive (PED) 2014/68/EU:
Compliant to the PED directive and CE marked under module H

Technical **Datasheet**

Level Switch Series

Floating Roof Tank Alarm Switch

Series: D

Key **Features**

- Unique 3 magnet latching switch mechanism
- No spring in switching mechanism
- Based on the highly reliable and popular mechanism used for liquid level switches with long trouble-free operation background
- Secondary switch for safety installation in case of failing of the first contact

Series **Overview**

This Delta Mobrey switch is designed specifically for use on floating roof tanks to signal an alarm if the roof rises too high

Operation is based on the popular Mobrey switching mechanism. In the basic construction, a dead weight is suspended on a cable attached to the extension spring of a switch head. Attached to the bottom of the spring is a vertical rod which carries a magnet that sits below a switching mechanism in the switch head.

As the floating roof rises and comes into contact with the dead weight, the extension spring contracts to lift the rod magnet in the support tube. As the rod magnet passes the switching mechanism, it interacts with the mechanism magnets and drives the contacts to change-over.

It is also available for applications where there can be liquid on the floating roof. A displacer element is fitted instead of the dead weight, to detect the liquid and prevent an overspill. As the liquid rises to cover the displacer element, a buoyancy force is created equal to the displaced liquid weight.

This force is seen by the spring as a weight reduction, causing the spring to contract to lift the rod magnet inside the support tube and actuate the switch mechanism. On a falling liquid level, the displacer element is uncovered and the spring extends to move the rod magnet and reset the switch mechanism. The displacer element has a flat end to ensure it still engages with the floating roof, in the same manner as the dead weight, even when there is no liquid present.

Product **applications**

- High level alarms on float roof tanks
- Dry roof or wet roof (liquids above the roof) applications

Other products

Other products we can offer :

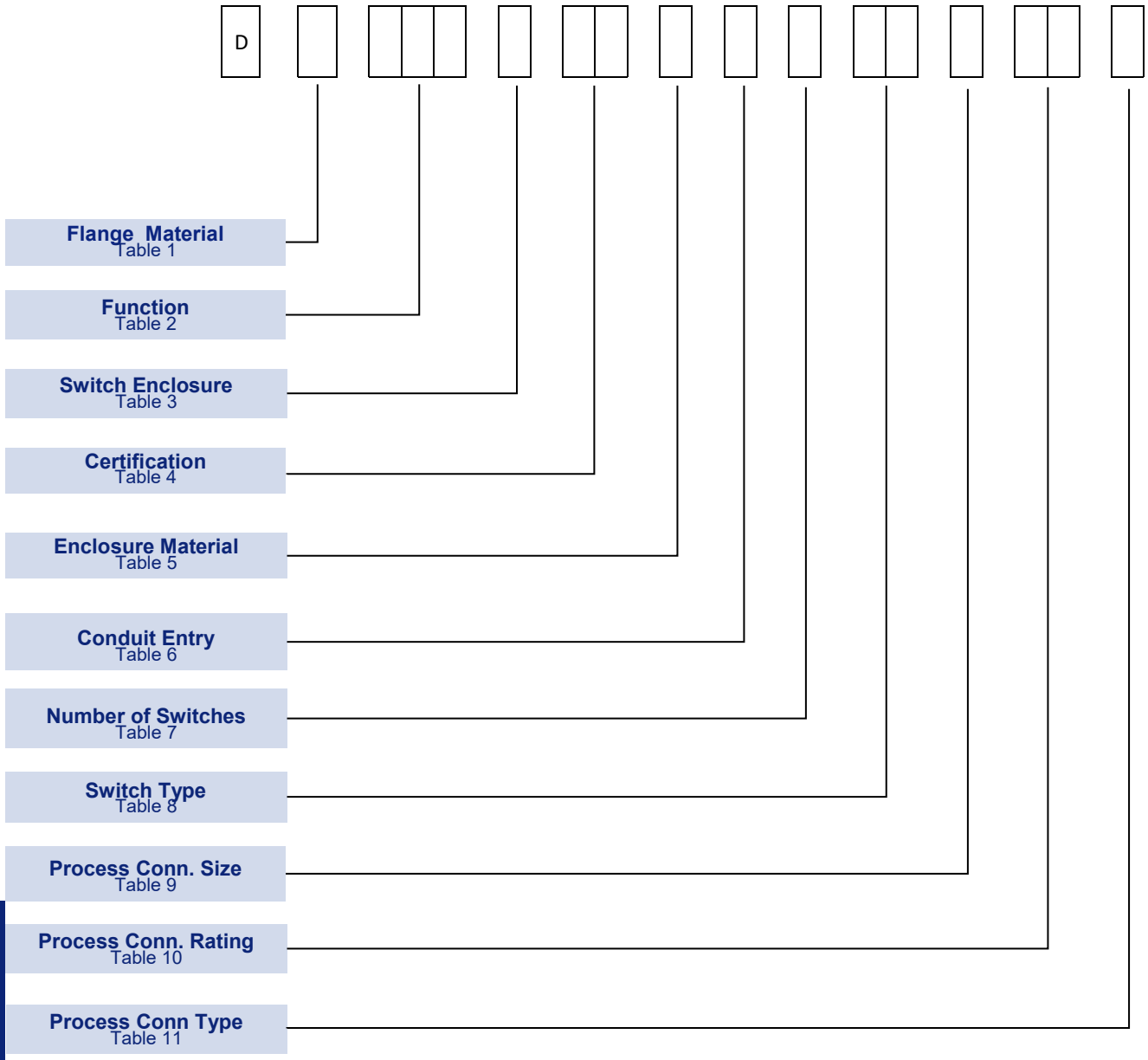
• horizontal and vertical level switches

Floating Roof Tank Alarm Switch
Model: D

How to order

Instruments can be configured by selecting codes representing the desired features from the tables that follow.

The chart below, describes how the model code is built up. For assistance in configuring a switch that best suits your needs, please contact your local sales office.



Flange Material

TABLE 1 D

Description	Code
Carbon Steel	C
316L Stainless Steel	S

Function

TABLE 2 D

Description	Code
Floating roof detection (dry)	20D
Floating roof and overflow detection (wet)	21D

Switch Enclosure

TABLE 3 D

Description	Code
150mm (fits up to 4 switch mechanism)	S

Certification

TABLE 4 D

Description	Code
ATEX/IECEx Flameproof	KN

Enclosure Material

TABLE 5 D

Description	Code
Aluminium Alloy	A
Cast Iron	I

Conduit Entry

TABLE 6 D

Description	Code
1 in. NPTF	A
20mm Thread	B

Number of Switch Mechanisms

TABLE 7 D

Description	Code
One Switch	1
Two Switches	2

Switch Mechanism

TABLE 8 D

Description	Code
4 Contact : 2 x SPST, General purpose switch mechanism	**D4**
4 Contact : 2 x SPST, Gold plated contacts for low power (e.g. Intrinsically Safe) circuits	**P4**
4 Contact : 2 x SPST, High current switch mechanism	**X4**
4 Contact : 2 x SPST, Hermetically sealed in inert gas and gold plated contacts	**H4**
8 Contact : DPDT, General purpose switch mechanism	**D8**
8 Contact : DPDT, Gold plated contacts for low power (e.g. Intrinsically Safe) circuits	**P8**
8 Contact : DPDT, High current switch mechanism	**X8**
8 Contact : DPDT, Hermetically sealed in inert gas and gold plated contacts	**H8**

Process Connection Size

TABLE 9 D

Description	Code
1 in. / 25mm	**1**
3 in. / 80mm	**3**
4 in. / 100mm	**4**

Process Connection Rating

TABLE 10 D

Description	Code
ASME B 16.5 class 150	**AA**
ASME B 16.5 class 300	**AB**
ASME B 16.5 class 600	**AC**
NPT Thread, 316 Stainless Steel	**NN**

Process Connection Type

TABLE 11 D

Description	Code
Raised Face (RF) Flange	**R**
NPT Thread, 316 Stainless Steel	**N**

Special Engineering

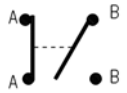
Our company can evaluate customized constructions according to specific requirements and special applications Please contact your sales team for further information.

Technical Specification

Explosion Proof enclosure type "S" suitable for up to 2 switching mechanism

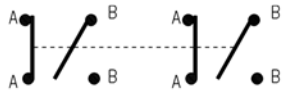
Electric contacts

4 Contact types: D4, X4, P4, H4



2 × independent SPST
AA make on rise: BB Make on fall

8 Contact types: D8, X8, P8, H8



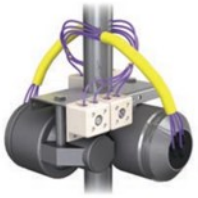
Double pole double throw (4 × independent SPST)
AA make on rise, BB make on fall

4-contact types D4, X4, and P4 (unsealed, single switch):

4-contact type H4 (hermetically-sealed, single switch):

8-contact types D8, X8, and P8 (unsealed, two switches):

8-contact type H8 (hermetically-sealed, two switches):



Type	Max wetside temperature	Low Tempera-ture use	AC maximum values			DC maximum values			
			VA	Volts	Amps	Watts	Volts	Resistive Amps	Inductive Amps
D4 or D8	400 degC	No	2000	440	5	50	250	5	0.5
X4 or X8	250 degC	No	2000	440	10	50	250	10	0.5
P4 or P8	400 degC	No	6	250	0.25	3.6	250	0.25	0.1
H4 or H8	250 degC	-50 degC	2000	440	5	50	250	5	0.5

Electrical entry	1" NPTF or 20mm thread according to table 6
Paint finish	black stove paint
Operating temperature	see table above
Contact type and rating	see table above
Enclosure	NEMA 7 / IP66
Process Connection	see options on table 9, 10 and 11

Approvals

EUROPEAN DIRECTIVES

Low voltage Directive (LVD) 2014/35/EU.
Compliant to LVD

Pressure Equipment Directive (PED) 2014/68/EU:
This product has a process connection size ≤DN25 and is therefore categorised as Sound Engineering Practice (SEP) under Article 4.3

ATEX Directive 2014/34/EU

FLAMEPROOF

Certificate No. Sira 03ATEX1189X

II 1/2G Ex d IIC T6…T1 Ga/Gb (-50 °C ≤ Ta ≤ 60 °C)

GLOBAL CERTIFICATION

IECEx Certified

FLAMEPROOF

Certificate No. IECEx SIR 09.0038X

Ex d IIC T6…T1 Ga/Gb (-50 °C ≤ Ta ≤ 60 °C)

Factory Mutual (FM) approval:

EXPLOSION-PROOF/DUST IGNITION-PROOF

Certificate No. FM19US0147X

Class I, Div 1, Groups B, C, and D

Class II/III, Div 1, Groups E, F, and G

Class I, Zone 0/1, AEx d IIC, (-50 °C ≤ Ta ≤ 60 °C); Type 4, IP66

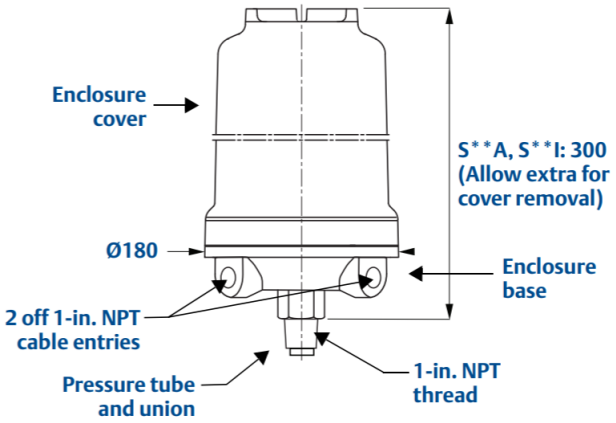
CSA approval:

EXPLOSION-PROOF

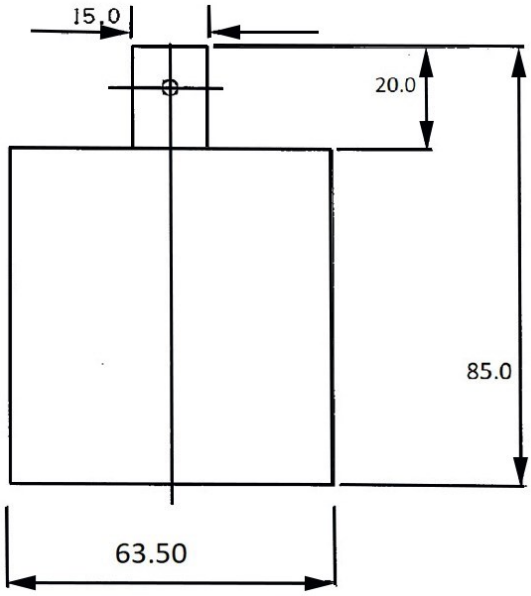
Class 1, Div 1, Groups B, C, and D; Encl 4

Dimensions

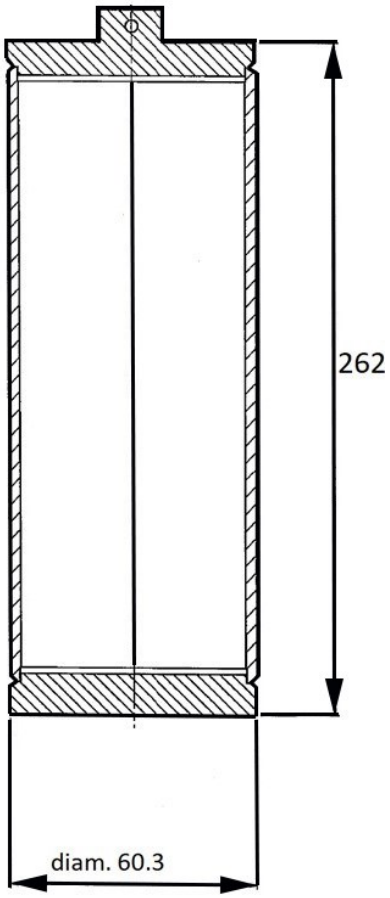
Enclosure type S in Aluminium (code A) or Cast Iron (code I)



Dead weight float for roof detection (function 20D)



Displacer float for overflow detection (function 21D)



Technical **Datasheet**

delta-mobrey

Magnetic Vertical Type Level Switches

Float actuated Chamber mounted type

Key **Features**

- Various chamber type and material
- No springs in switch mechanism – positive snap action switching
- Genuine hermetically-sealed switch option – totally safe and secure
- Weld procedures approved to EN ISO 15614-1 and ASME IX
- Welders approved to EN 287-1
- All welded low cost bottle construction or flanged construction for periodical inspection

Series **Overview**

The chamber mounted float type level switches are offered with a wide range of material and configuration, suitable to meet most the application in chemical and petrochemical industry.

A choice of different type of floats is available making the instrument suitable for a wide range of liquids and pressure and temperature conditions. The length of the rod, is adjustable to fit the application.

These level switches can be optionally supplied mounted vertically in chambers, in a sealed or removable form. A range of carbon steel chambers are available, and for more vigorous applications there are stainless steel chambers.

There are a variety of instrument and process connection options available to make installation simple and economic. This gives you the choice to meet your application in keeping with your budget.

Other products

Other products we can offer :

- Direct mount displacer type, level switches
- Direct mount, float type level switches

Product **applications**

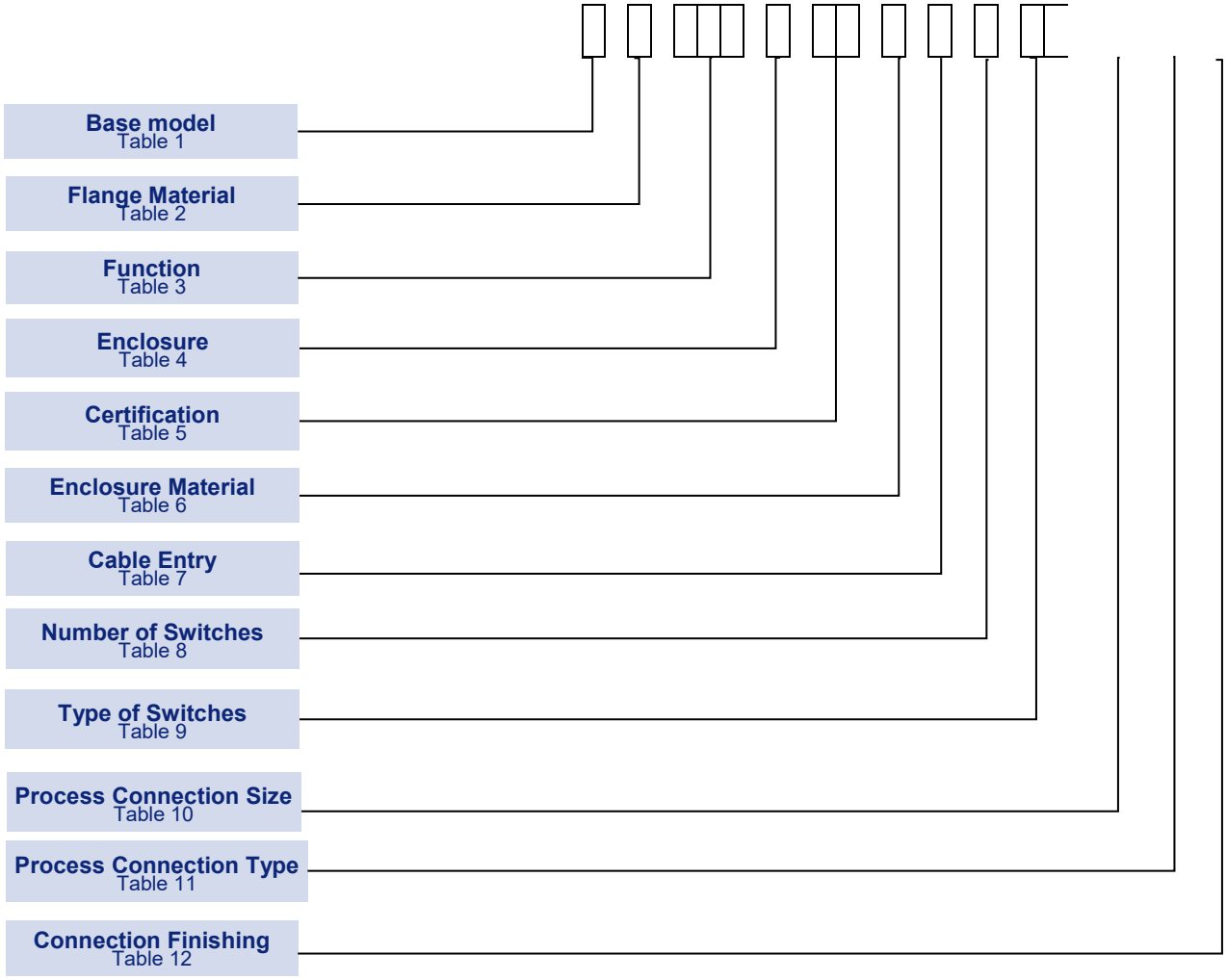
- Unique hermetically-sealed switching mechanism option
- Unique treble-seal pressure tube and union
- Wide range of mounting options
- External chamber options
- Rugged, robust, and trusted all over the world
- Ideal for tough process control duties
- Operates in almost any liquid at high pressures and temperatures
- Multiple switch points
- Unique three-magnet, snap action, and latching switch mechanism

Magnetic Vertical Level Switches

Float actuated , chamber mounted

How to order

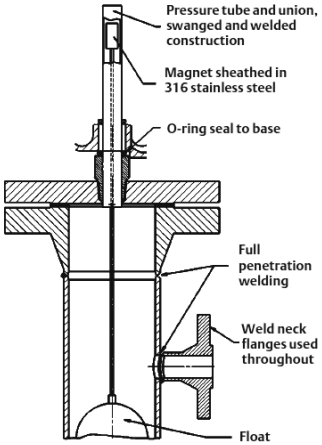
Switches can be configured by selecting codes representing the desired features from the tables that follow. The chart below, describes how the model code is built up. For assistance in configuring a switch that best suits your needs, please contact your local sales office.



Technical Specification

Switching repeatability:	
Storage Temperature:	-50°C to +60°C
Ambient Temperature:	-50°C to +60°C
Maximum Process Temperature:	-10 to 400^{0}C limited by contacts and chamber materials (see **table C**)
Maximum Process pressure:	see **table A and B**, body limited by flange pressure ratings
Enclosure classification:	Weatherproof / Flameproof (Intrinsically Safe, suitable via Declaration of Simple Apparatus).
Ingress Protection:	IP 66 / NEMA 4
Pollution Degree:	Pollution degree 3 according EN60947-5-1 (For extreme conditions where condensation may readily form, then sealed contacts should be used)
Switch Output:	up not six 2xSPST (N.O.+N.C.) or 4xSPST(2xN.O. + 2xN.C.)
Electrical rating:	See **table 9**
Terminal Block:	solid: max 1mm² / 16AWG — stranded : MAX 4 mm² / 10 AWG
Grounding Connection:	One internal and one external suitable for wire section up to to 4 mm2 / 11 AWG
Process Connection:	flanged 3” or 4” ANSI B16.5 150/300/600 or threaded 1”-11.5 NPTF
Approximate Weight:	depending on model
Standard rod & float	316 stainless steel, refer to table dimension A1, A2
Material of enclosure	See description on table below
Material of wetted parts	See **table 2**

Product Description & Operating Principle



These float switches are float operated and are suitable in various version and configuration to fit most of the applications, including high pressure & temperature or low specific gravity applications.
The instrument is made by a float dimensioned for the liquid to measure, integral with a rod and a magnet on top of the rod. The length of the rod is dimensioned according to the application and the distance between process connections. (see below). The float, via the buoyancy principle, is subjected to a lifting force generated by the liquid, that moves up the whole system,
One or more switching units are actuated by the magnet fixed on top of the rod, giving a reliable snap-action "latch-on" switching of the switching unit. The float magnet can continue upwards and activate another switch mechanism at other level points. Switching mechanism already actuated, does not reset until the float magnet returns and falls below the switching mechanism.
Due to the limited length of the rod, these electro-mechanical switches give a reliable switching output in high or low level alarm application.

All pressure retaining assemblies are hydrostatically pressure tested up to 1.43 x maximum working pressure or flange standard requirements.

Table A1 : Body Pressure Ratings of type 11F; 12F, 13F, 14F, 17D in A105 chamber

Float type	Flanged type Chamber Pmax in Bar			Bottle type Chamber Pmax in bar		
	20 °C	250 °C	400 °C	20 °C	250 °C	400 °C
11F	34.5	22.5	20.0	30.1	22.5	20.0
12F	102.1	66.3	59.2	88.8	66.3	59.2
13F	51.1	33.2	29.6	44.6	33.2	29.6
14F	19.6	12.1	6.5	17.1	12.7	6.5
17D	102.1	66.3	59.2	88.8	66.3	59.2

Table A2 : Body Pressure Ratings of type 11F; 12F, 13F, 14F, 17D in AISI316L Chamber

Float type	Flanged type Chamber Pmax in Bar			Bottle type Chamber Pmax in bar		
	20 °C	250 °C	400 °C	20 °C	250 °C	400 °C
11F	34.5	22.5	20.0	30.1	22.5	20.0
12F	82.7	54.9	48.6	88.8	66.3	59.2
13F	41.4	27.5	24.3	44.6	33.2	29.6
14F	15.9	10.5	6.5	17.1	12.7	6.5
17D	82.7	54.9	48.6	88.8	66.3	59.2

Note: For flanged process connection, the P max is limited by the flange rating. See table B

Table B : Flange Pressure rating

Flange rating	A105 Chamber			AISI 316L Chamber		
	20 °C	250 °C	400 °C	20 °C	250 °C	400 °C
ASME B 16.5 Class 150	19.6	12.1	6.5	15.9	10.5	6.5
ASME B 16.5 Class 300	51.1	41.9	34.7	41.4	27.5	24.3
ASME B 16.5 Class 600	102.1	83.9	69.4	82.7	54.9	48.6
EN 1092-1 PN16	16.0	12.1	9.5	16.0	11.9	10.2
EN 1092-1 PN25	25.0	19.0	14.8	25.0	18.6	16.0
EN 1092-1 PN40	40.0	30.4	23.8	40.0	29.9	25.7

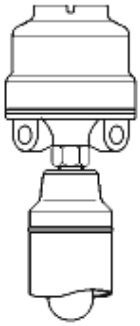
Product Description & Operating Principle

Table C : Wet side temperature limits according to contact type & chamber material		
Contact type	**A105 Chamber**	**AISI 316L Chamber**
D4 / P4 & D8 / P8	400 ^{0}C	400 ^{0}C
X4 / H4 & X8 / H8	250 ^{0}C	250 ^{0}C

Table D : Wet side material		
part	**A105 Chamber**	**316L St.St.Chamber**
Chamber Tube	ASTM A106 Gr.B	ASTM A312 TP316L
Top casting	ASTM A216	-
Top/Bottom caps	ASTM A105	ASTM A182 F316L/A403 WP316L
Flanges/Fittings	ASTM A105	ASTM A182 F316L
Flanges/Fittings	ASTM A105	ASTM A182 F316
Studs	ASTM A193-B7	ASTM A320-L7
Nuts	ASTM 194-2H	ASTM A194 Gr. 7 + S3
Float	AISI316	AISI316
Rod	AISI316	AISI316

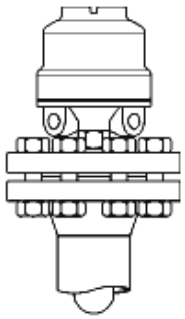
Bottle type: B

Cost effective, all welded construction suitable on fluid and application on clean fluids.



Flanged Type: X

Dismountable version allowing periodical maintenance and cleaning of the internal parts (float, rod)



Base Model

TABLE 1

Note: See table A1, A2, B for pressure ratings respectively for Bottle or Flanged type chamber

	Code
Bottle type chamber all welded, vertical level switch	**B**
Flanged type chamber, suitable for inspection, vertical level switch	**X**

Flange Material

TABLE 2

	Code
Carbon Steel (flanged or threaded process connection)	**C**
316L stainless steel (flanged or threaded process connection)	**S**

Function

TABLE 3

Note: S.G. = Specific Gravity

	Code
3” float suitable for minimum S.G. 0.80 (chamber body min. 3”)	**11F**
4” float suitable for minimum S.G. 0.75 (chamber body min. 4”)	**12F**
4” float suitable for minimum S.G. 0.65 (chamber body min. 4”)	**13F**
4” float suitable for minimum S.G. 0.54 (chamber body min. 4”)	**14F**
4” float , spring assisted, minimum S.G. 0.40 (chamber body min. 4”)	**17D**

Enclosure Type

TABLE 4

	Code
62mm high, suitable for single switch mechanism (no set point adjustment allowance)	**R**
150mm high suitable to fit up to four switch mechanism (set point adjustment allowance 94mm)	**S**

Certification

TABLE 5

	Code
FM Certified Explosion Proof (only for enclosure mat. **A** or **I)**	**E5**
CSA Certified Explosion Proof (only for enclosure mat. **A** or **I**)	**E6**
FM ordinary location, Unclassified Safe Area (only enclosure mat. **N**)	**G5**
CSA ordinary location, Unclassified Safe Area (only enclosure mat. **N**)	**G6**
ATEX/IECEx Certified Flameproof (only enclosure mat. **A** or **I**)	**KN**
No Hazardous location (only enclosure mat. **N**)	**NA**

Enclosure Material

TABLE 6

	Code
Aluminum Alloy base + Drawn steel cover	**N**
Aluminum Alloy	**A**
Cast Iron	**I**

Cable Entry

TABLE 7

	Code
1” -11.5 NPT	**A**
M20X1.5	**B**

Number of Switches

TABLE 8

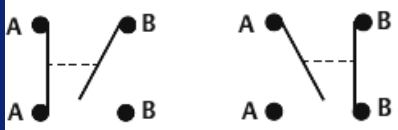
	Code
One switch	**1**
Two switches	**2**
Three switches	**3**
Four switches	**4**

Type of Switches

TABLE 9

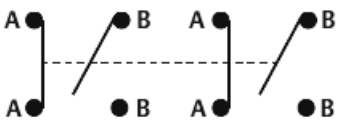
2xSPST (4 contact) configuration

A-A make rising *B-B make falling*

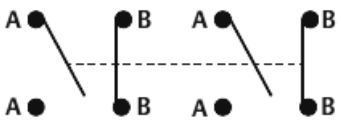


4xSPST (8 contact) configuration

A-A + A-A make rising



B-B + B-B make falling



	Code
4 Contact: 2xSPST general purpose 2kVA 440Vac, 5A / 50W 250Vdc 5A resistive	**D4**
4 Contact: 2xSPST Gold Alloy contact for low power or . I.S. Circuits 6VA 250Vac, 0.25A / 3.6W 250Vdc 0.25A resistive	**P4**
4 Contact: 2xSPST High Current 2kVA 440Vac, 10A / 50W 250Vdc 10A resistive	**X4**
4 Contact: 2xSPST Hermetically Sealed in inert Gas, with Gold plated contacts 2kVA 400Vac , 10A / 50W 250Vdc 10A resistive	**H4**
4 Contact: 2xSPST general purpose 2kVA 440Vac, 5A / 50W 250Vdc 5A resistive	**D8**
4 Contact: 2xSPST Gold Alloy contact for low power or . I.S. Circuits 6VA 250Vac, 0.25A / 3.6W 250Vdc 0.25A resistive	**P8**
4 Contact: 2xSPST High Current 2kVA 440Vac, 10A / 50W 250Vdc 10A resistive	**X8**
4 Contact: 2xSPST Hermetically Sealed in inert Gas, with Gold plated contacts 2kVA 400Vac , 10A / 50W 250Vdc 10A resistive	**H8**

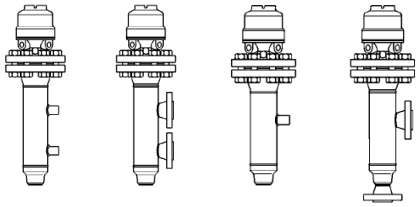
Process Connection

TABLE 10

	Code
Flange RF Finish	R
Thread NPT, for 316 stainless steel bottle type chamber	N

Connection Configuration

TABLE 10



	Code
Side-Side with 1”-11.5 NPT-F drain	B
Side-Bottom	C

Process Connection Size

TABLE 10

	Code
1” / DN25	1
1.5” / DN40	5
2” / DN50	2

Process Connection Type

TABLE 11

	Code
Flanged ASME B16.5 Class 150	AA
Flanged ASME B16.5 Class 300	AB
Flanged ASME B16.5 Class 600	AC
Threaded	NN

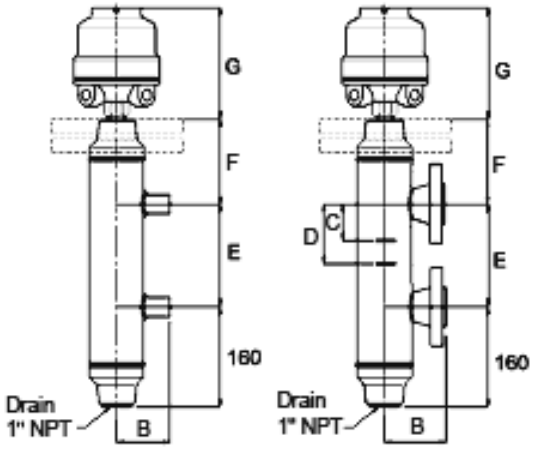
Connection Finishing

TABLE 12

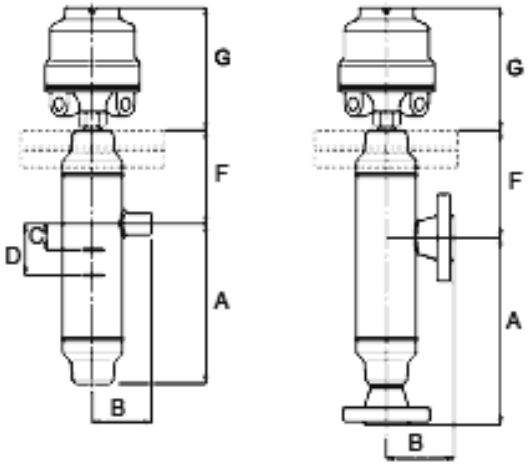
	Code
Raised Face (RF)	R
NPT thread in 316 stainless steel	N

DIMENSIONAL DRAWINGS

Connections configuration type B: SIDE-SIDE



Connections configuration type C: SIDE-BOTTOM



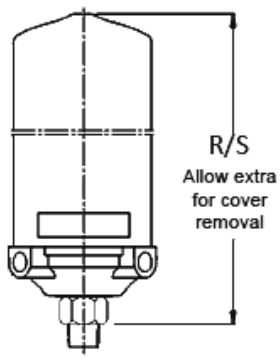
FUNCTION 11F/12F/13F/14F, CHAMBER DIMENSIONS AS BELOW

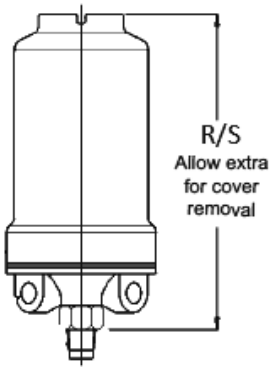
Process Connection	A		B	C	D		E		F	
	Enclosure R	Enclosure S	Bottle type in C.S/ any other		Single Switch Encl. R	Multi Switch Encl. S	Single Switch Encl. R	Multi Switch Encl. S	Bottle type	Flanged Type
1" NPT Side-Bottom	300	385	76/95	50	70	155	/	/	48/160	225
1" NPT Side-Side	/	/	95	50	70	155	271	356	160	225
1"ANSI150	356	441	110	50	70	155	271	356	160	225
1"ANSI300	356	441	117	50	70	155	271	356	160	225
1"ANSI600	356	441	123	50	70	155	271	356	160	225
1-1/2" ANSI150	356	441	115	50	70	155	271	356	160	225
1-1/2" ANSI300	356	441	121	50	70	155	271	356	160	225
1-1/2" ANSI600	356	441	126	50	70	155	271	356	160	225
2"ANSI150	356	441	112	50	70	155	271	356	160	225
2"ANSI300	356	441	118	50	70	155	271	356	160	225
2"ANSI600	356	441	129	50	70	155	271	356	160	225
FUNCTION 17D, ANY CHAMBER										
S.G.	0.4	0.5	0.6	0.7	0.8	0.9	1.0	1.1	1.2	/
Dim. C	65	73	82	91	100	109	118	127	136	/
Dim. D	118	122	127	132	137	141	147	152	156	/

Type of enclosures

Select the enclosures according to the number of Switch mechanism

Weatherproof Nema4/IP66 **Explosionproof and Flameproof**





ENCLOSURE dim. G				
	Diam	Type N	Type A	Type I
R	ϕ163	170	190	190
S	ϕ180	275	300	300

Approvals

GLOBAL CERTIFICATION

IECEx
FLAMEPROOF Certificate No. IECEx SIR 09.0038X
Ex d IIC T6....T1 Ga/Gb (Ta = -50°C to +60°C)

Functional Safety Certified
Meets the requirements of IEC 61508-2:2010 for use in safety related systems.
Systematic capability: SC 2;
Random Capability: Type A element
SIL1, 2 capable with HFT 0 (1oo1); Route 2_H and 2_S
SIL Capability (Low Demand Mode) = SIL2 ; SIL Capability (High demand mode) = SIL1
Certificate No. CSA FSP 22002

Note: the associated full package of Safety Documentation must be listed on the order acknowledgement.

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NORTH AMERICA

Canadian Standards Association
Class I Div. 1 , Group B,C and D
C22.2 NO 14
CSA Enc 4

Factory Mutual
Explosionproof for Class I Div. 1 , Group B,C and D , Ta = -50^{0}C to +60^{0}C
Dust-Ignitionproof for Class II/III Div. 1 , Group E,F and G , Ta = -50^{0}C to +60^{0}C
Flameproof for Class I, Zone 0**/1 AEx d IIC, * Ta = -50^{0}C to +60^{0}C, Type 4, IP66

EUROPEAN DIRECTIVES

Low voltage Directive (LVD) 2014/35/EU.
Compliant to LVD
Pressure Equipment Directive (PED) 2014/68/EU:
The product has been designed and manufactured according to Sound Engineering Practice (SEP)

ATEX Directive 2014/34/EU
II 1/2 G Sira 03ATEX1189X
Ex d IIC T6....T1 Ga/Gb (Ta = -50°C to +60°C)

UK REGULATION

Electrical Equipment (Safety) Regulations 2016 .
Conform to UK SI 2016 No 1101 as amended
Pressure Equipment (Safety) Regulations UK SI 2016 No 1105, as amended
The product has been designed and manufactured according to Sound Engineering Practice (SEP)

Equipment and protective system for use in Potentially Explosive Atmospheres Regulation 2016
II 1/2G Certificate no. CSAE 21UKEX1616X
Ex db IIC T6…T1 Ga/Gb (**Ta =** -50°C to +60°C)

ISO9001
FM00720

Technical **Datasheet**

delta-mobrey

Magnetic Vertical Type Level Switches

Displacer actuated type

Key **Features**

- Suitable for installation on high tanks
- Pump control and alarm function
- Unique switching mechanism – totally reliable
- No springs in switch mechanism – positive snap action switching
- Vibration resistant – eliminates spurious trips
- Multiple switch point options – cost effective control
- Genuine hermetically-sealed switch option – totally safe and secure

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Series **Overview**

Whether you require a switch for critical area applications or just general purpose control, the extensive range of Mobrey switches ensures that we will always have a solution to your particular problem.

A choice of displacer-type operated level switch is available to fit any requirement of pump control or alarm in field.

These level switches are suitable for vertical installation and for high vessels also. The instrument is supplied with 3mt of cable as standard, to be cut at the required switching point to fit in the tank high. Different lengths could be available.

There are also a variety of instrument and process connection options available to make installation simple and economic. This gives you the choice to meet your application in keeping with your budget.

Other products

Other products we can offer :

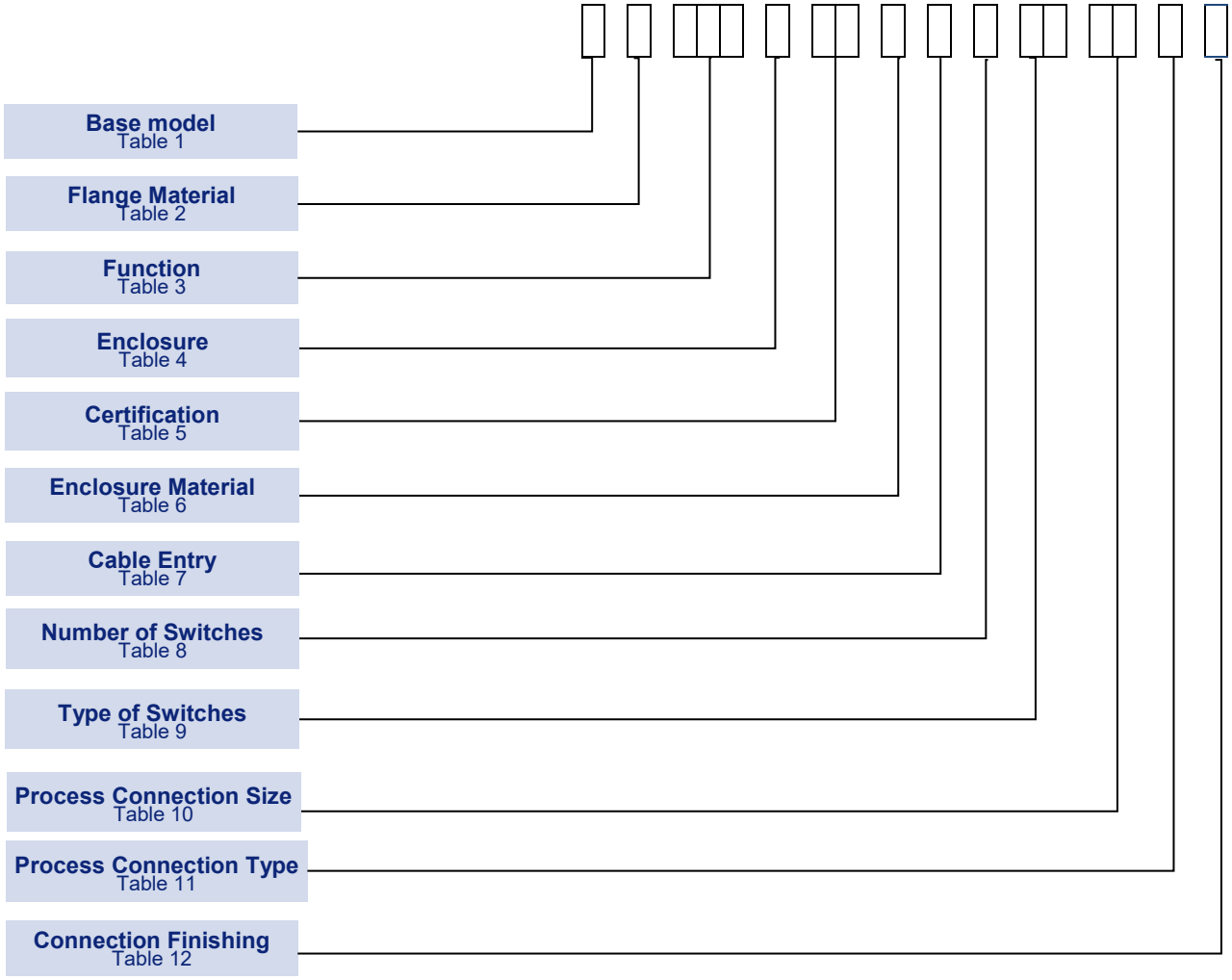
- Float type switches
- Chamber mount float type level switches

Product **applications**

- Unique hermetically-sealed switching mechanism option
- Unique treble-seal pressure tube and union
- Wide range of mounting options
- External chamber options
- Rugged, robust, and trusted all over the world
- Ideal for tough process control duties
- Operates in almost any liquid at high pressures and temperatures
- Multiple switch points
- Unique three-magnet, snap action, and latching switch mechanism

How to order

Switches can be configured by selecting codes representing the desired features from the tables that follow. The chart below, describes how the model code is built up. For assistance in configuring a switch that best suits your needs, please contact your local sales office.



Technical Specification

Switching accuracy:	depends by the accuracy in setting the position of the float
Storage Temperature:	-50°C to +60°C
Ambient Temperature:	-50°C to +60°C
Maximum Process Temperature:	-10 to 300^{0}C for A105 ; -50 to 300^{0}C for 316 stainless steel
Maximum Process Pressure :	102bar at 20^{0}C
Enclosure classification:	Weatherproof / Flameproof (Intrinsically Safe, suitable via Declaration of Simple Apparatus).
Ingress Protection:	IP 66 / NEMA 4
Pollution Degree:	Pollution degree 3 according EN60947-5-1 (For extreme conditions where condensation may readily form, then sealed contacts should be used)
Switch Output:	2xSPST (N.O.+N.C.) or 4xSPST(2xN.O. + 2xN.C.)
Electrical rating:	See **table 9**
Terminal Block:	solid: max 1mm² / 16AWG — stranded : MAX 4 mm² / 10 AWG
Grounding Connection:	One internal and one external suitable for wire section up to to 4 mm2 / 11 AWG
Process Connection:	flanged 3” or 4” ANSI B16.5 150/300/600 or 1”-11.5 NPTF
Approximate Weight:	3.2kg / 7lb - 27.8kg / 61.2lb depending on model
Standard Cable & Displacer	316 stainless steel
Material of enclosure	See description on table below
Material of wetted parts	See description on table below

Product Description & Operating Principle

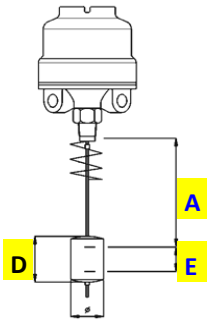
Displacer operated controls, are ideal for sump application and any other top-mounting duties such as low level alarm warning in deep tanks and pump control. The displacer element, made in 316 stainless steel, is suspended on a 3m stainless steel cable from a Nimonic 90 spring. The cable length must be shortened according to the requirements. The element is always heavier than its equivalent volume of the liquid in which it operate, and so will extend the tension spring at all times. In free air, the spring will be extended to a known length, controlled by a mechanical stop to prevent overstressing. Fixed to the spring is the rod and magnet assembly, free to move up and down as the spring extends or contracts. As the liquid rises to cover the displacer element, a buoyancy force is created equal to the weight of the liquid displaced. This force in effect is seen as a reduction of weight causing the spring to contract moving the magnet upwards and actuates the switch mechanism. As the liquid falls to uncover the displacer element, the buoyancy force is reduced and the effect is seen as an increase of weight causing the spring to extend moving the magnet downwards to reset the switch mechanism (dead band). The simple operation principle, allows several constructions to meet different requirements and application.

Standard cable length: 3m

TYPE 11D

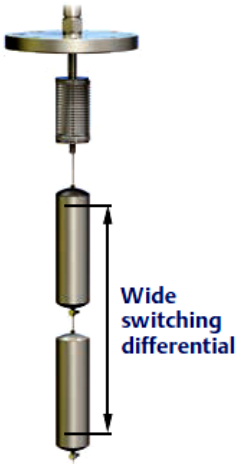
- 3” nominal bore
- **one** 4 or 8 contact switch mechanism
- **Application:** Single alarm
- **Dead-band:** standard narrow

A= adjustable distance to upper switching
E= switching differential
D=200mm



S.G. = Specific Gravity

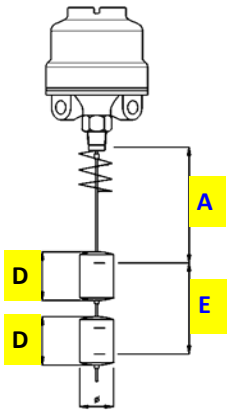
	4 contacts				8 contacts		
S.G.	**0.6**	**0.8**	**1.0**	**1.2**	**0.75**	**1.0**	**1.2**
A min	400mm	425mm	450mm	460mm	350mm	390mm	415mm
E	90mm	70mm	60mm	55mm	135mm	105mm	90mm



TYPE 12D

- 3” nominal bore
- **one** 4 or 8 contact switch mechanism
- **Application:** ON/OFF pump control with wide differential
- **Dead-band:** wide range

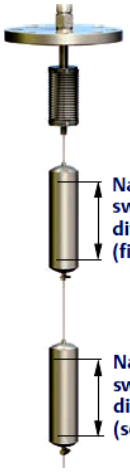
A= adjustable distance to upper switching
E= switching differential
D=200mm



S.G. = Specific Gravity

	4 contacts				8 contacts		
S.G.	**0.6**	**0.8**	**1.0**	**1.2**	**0.75**	**1.0**	**1.2**
A min	415mm	430mm	430mm	425mm	390mm	400mm	400mm
E	165mm	110mm	95mm	80mm	205mm	165mm	140mm

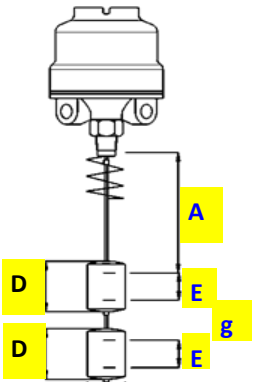
Product Description & Operating Principle



TYPE 18D

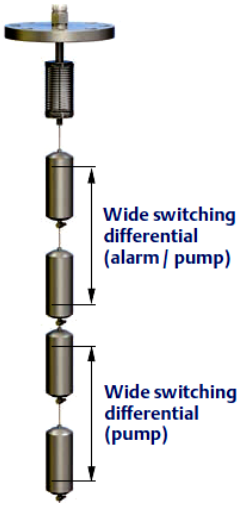
- 3” nominal bore
- **two** 4 or 8 contact switch mechanism
- **Application:** Double alarm
- **Dead-band:** standard narrow

A= adjustable distance to upper switching
g= distance between switch mechanism (set/reset)
E= switching differential
D=200mm



S.G. = Specific Gravity

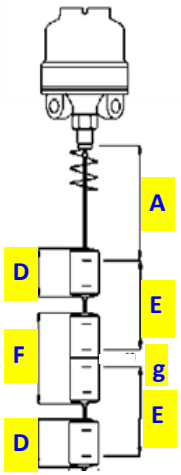
	4 contacts				8 contacts		
S.G.	**0.6**	**0.8**	**1.0**	**1.2**	**0.8**	**1.0**	**1.2**
A min	390mm	385mm	375mm	365mm	355mm	350mm	345mm
E	90mm	70mm	60mm	55mm	135mm	105mm	90mm
g	200mm	230mm	255mm	310mm	165mm	215mm	250mm



TYPE 13D

- 3” nominal bore
- **two** 4 or 8 contact switch mechanism
- **Application:** ON/OFF pump control and alarm with wide dead-band
- **Dead-band:** wide range

A= adjustable distance to upper switching
g= distance between switch mechanism (set/reset)
E= switching differential
D=200mm



S.G. = Specific Gravity

	4 contacts				8 contacts		
S.G.	**0.6**	**0.8**	**1.0**	**1.2**	**0.8**	**1.0**	**1.2**
A min	390mm	385mm	375mm	365mm	355mm	350mm	345mm
E	135mm	110mm	95mm	80mm	200mm	145mm	140mm
g	220mm	255mm	285mm	310mm	165mm	215mm	250mm

Type of enclosures

Weatherproof Nema4/IP66
Type S

Explosionproof and Flameproof
Type S

Base Model

TABLE 1

	Code
Vertical Displacer type level switch , for direct mount	**D**

Flange Material

TABLE 2

	Code
Carbon Steel (only for flanged process connection)	**C**
316L stainless steel (flanged or threaded process connection)	**S**

Function

TABLE 3

	Code
Single alarm, one switch, narrow switching differential	**11D**
Single alarm, one switch, wide switching differential	**12D**
Double alarm, two switches, narrow switching differential;	**18D**
Double alarm, two switches, wide switching differential	**13D**

Enclosure Type

TABLE 4

	Code
150mm high suitable to fit one or two switches, material see certification	**S**

Certification

TABLE 5

	Code
FM Certified Explosion Proof (only for enclosure mat. **A** or **I)**	**E5**
CSA Certified Explosion Proof (only for enclosure mat. **A** or **I**)	**E6**
FM ordinary location, Unclassified Safe Area (only enclosure mat. **N**)	**G5**
CSA ordinary location, Unclassified Safe Area (only enclosure mat. **N**)	**G6**
ATEX/IECEx Certified Flameproof (only enclosure mat. **A** or **I**)	**KN**
No Hazardous location (only enclosure mat. **N**)	**NA**

Enclosure Material

TABLE 6

	Code
Aluminum Alloy base + Drawn steel	**N**
Aluminum Alloy	**A**
Cast Iron	**I**

Cable Entry

TABLE 7

	Code
1” -11.5 NPT	A
M20X1.5	B

Number of Switches

TABLE 8

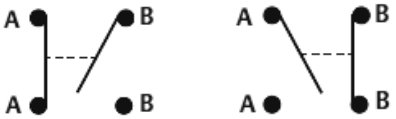
	Code
One switch	1
Two switches	2

Type of Switches

TABLE 9

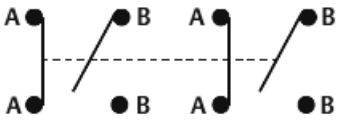
2xSPST (4 contact) configuration

A-A make rising *B-B make falling*

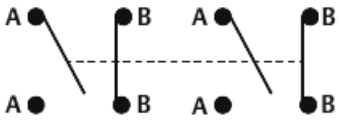


4xSPST (8 contact) configuration

A-A + A-A make rising



B-B + B-B make falling



	Code
4 Contact: 2xSPST general purpose 2kVA 440Vac, 5A / 50W 250Vdc 5A resistive	D4
4 Contact: 2xSPST Gold Alloy contact for low power or . I.S. Circuits 6VA 250Vac, 0.25A / 3.6W 250Vdc 0.25A resistive	P4
4 Contact: 2xSPST High Current 2kVA 440Vac, 10A / 50W 250Vdc 10A resistive	X4
4 Contact: 2xSPST Hermetically Sealed in inert Gas, with Gold plated contacts 2kVA 400Vac , 10A / 50W 250Vdc 10A resistive	H4
4 Contact: 2xSPST general purpose 2kVA 440Vac, 5A / 50W 250Vdc 5A resistive	D8
4 Contact: 2xSPST Gold Alloy contact for low power or . I.S. Circuits 6VA 250Vac, 0.25A / 3.6W 250Vdc 0.25A resistive	P8
4 Contact: 2xSPST High Current 2kVA 440Vac, 10A / 50W 250Vdc 10A resistive	X8
4 Contact: 2xSPST Hermetically Sealed in inert Gas, with Gold plated contacts 2kVA 400Vac , 10A / 50W 250Vdc 10A resistive	H8

Process Connection Size

TABLE 10

	Code
1” / 25mm (only threaded NN)	1
3” / 80mm (only flanged AA/AB/AC)	3
4” / 100mm (only flanged AA/AB/AC)	4

Process Connection Type

TABLE 11

	Code
Flanged ASME B16.5 Class 150	**AA**
Flanged ASME B16.5 Class 300	**AB**
Flanged ASME B16.5 Class 600	**AC**
Threaded	**NN**

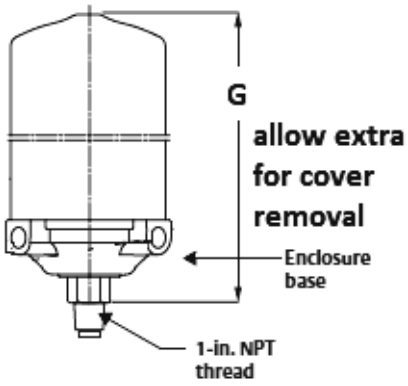
Connection Finishing

TABLE 12

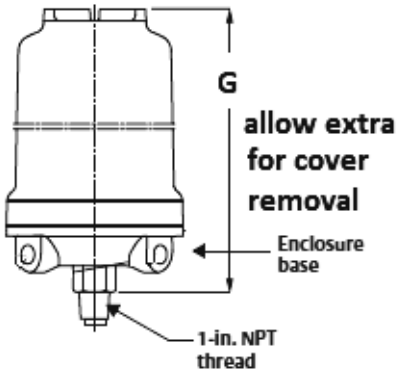
	Code
Raised Face (RF)	**R**
NPT thread in 316 stainless steel	**N**

Dimensions

Enclosure for Safe Area



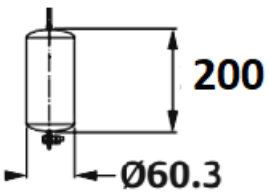
Enclosure for Hazardous Area



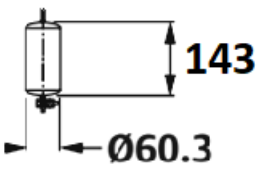
ENCLOSURE dim. G

		material		
type	Diam.	N	A	I
S	ϕ180	275	300	300

Displacer type 11D, 12D, 18D



Displacer type 13D



Approvals

GLOBAL CERTIFICATION

IECEx
FLAMEPROOF Certificate No. IECEx SIR 09.0038X
Ex d IIC T6....T1 Ga/Gb (Ta = -50°C to +60°C)

Functional Safety Certified
Meets the requirements of IEC 61508-2:2010 for use in safety related systems.
Systematic capability: SC 2;
Random Capability: Type A element
SIL1, 2 capable with HFT 0 (1oo1); Route 2_H and 2_S
SIL Capability (Low Demand Mode) = SIL2 ; SIL Capability (High demand mode) = SIL1
Certificate No. CSA FSP 22002

Note: the associated full package of Safety Documentation must be listed on the order acknowledgement.

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NORTH AMERICA

Canadian Standards Association
Class I Div. 1 , Group B,C and D
C22.2 NO 14
CSA Enc 4

Factory Mutual
Explosionproof for Class I Div. 1 , Group B,C and D , Ta = -50^{0}C to +60^{0}C
Dust-Ignitionproof for Class II/III Div. 1 , Group E,F and G , Ta = -50^{0}C to +60^{0}C
Flameproof for Class I, Zone 0**/1 AEx d IIC, * Ta = -50^{0}C to +60^{0}C, Type 4, IP66

EUROPEAN DIRECTIVES

Low voltage Directive (LVD) 2014/35/EU.
Compliant to LVD
Pressure Equipment Directive (PED) 2014/68/EU:
The product has been designed and manufactured according to Sound Engineering Practice (SEP)

ATEX Directive 2014/34/EU
II 1/2 G Sira 03ATEX1189X
Ex d IIC T6....T1 Ga/Gb (Ta = -50°C to +60°C)

UK REGULATION

Electrical Equipment (Safety) Regulations 2016 .
Conform to UK SI 2016 No 1101 as amended
Pressure Equipment (Safety) Regulations UK SI 2016 No 1105, as amended
The product has been designed and manufactured according to Sound Engineering Practice (SEP)

Equipment and protective system for use in Potentially Explosive Atmospheres Regulation 2016
II 1/2G Certificate no. CSAE 21UKEX1616X
Ex db IIC T6…T1 Ga/Gb (**Ta =** -50°C to +60°C)

ISO9001
FM00720

Technical **Datasheet**

delta-mobrey

Magnetic Vertical Type Level Switches

Float actuated type

Key **Features**

- Unique switching mechanism – totally reliable
- No springs in switch mechanism – positive snap action switching
- Vibration resistant – eliminates spurious trips
- Multiple switch point options – cost effective control
- Genuine hermetically-sealed switch option – totally safe and secure
- Suitable for installation in chamber

Series Overview

The float type level switches are offered with a wide range of material to meet most the application in industry.

A choice of different type of floats is available making the instrument suitable for a wide range of liquids and pressure and temperature conditions. The length of the rod, is adjustable to fit the application.

These level switches can be optionally supplied mounted vertically in chambers, in a sealed or removable form. A range of carbon steel chambers are available, and for more vigorous applications there are stainless steel chambers.

There are a variety of instrument and process connection options available to make installation simple and economic. This gives you the choice to meet your application in keeping with your budget.

Other products

Other products we can offer :

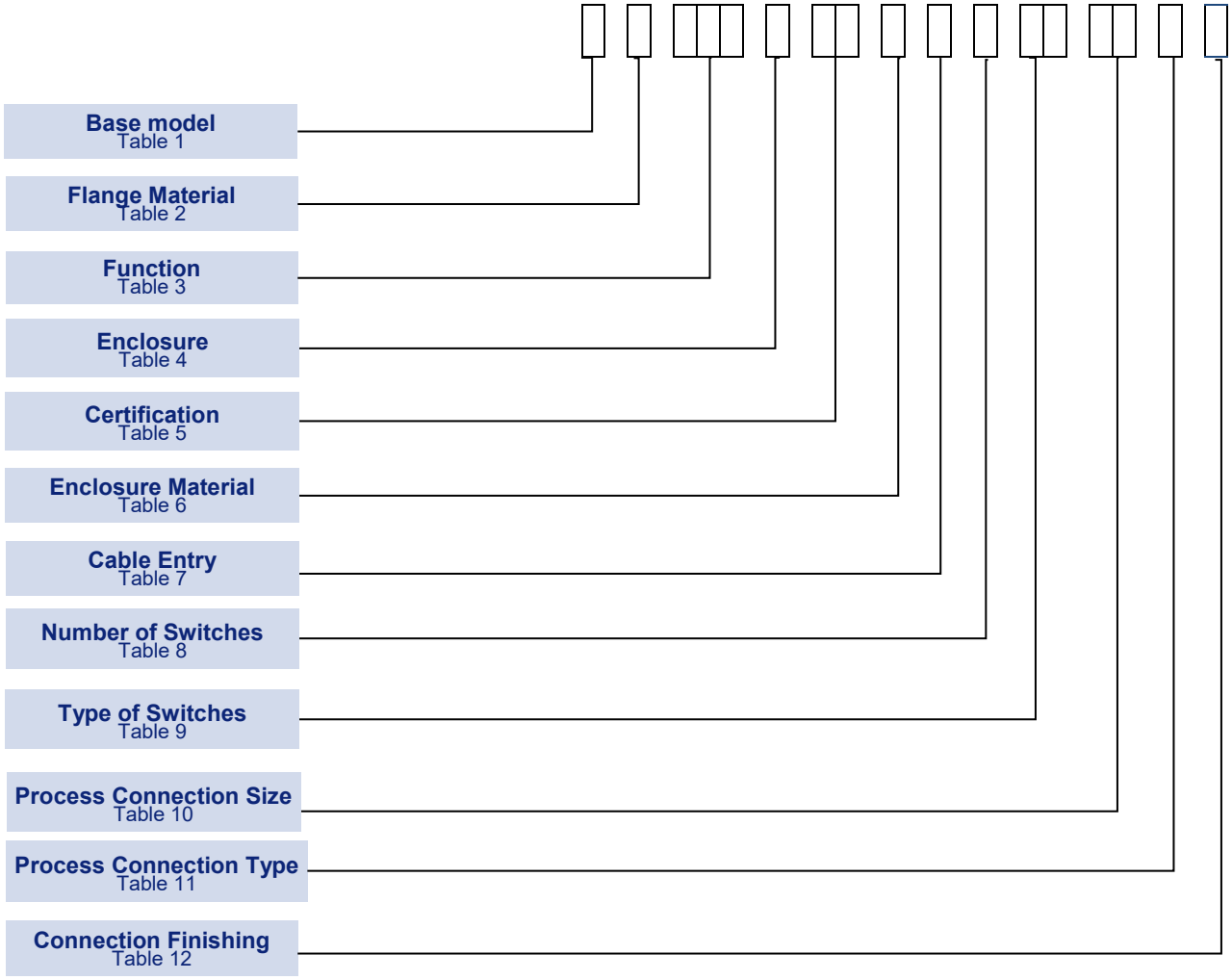
- Displacer type, level switches
- Chamber mount instruments

Product **applications**

- Unique hermetically-sealed switching mechanism option
- Unique treble-seal pressure tube and union
- Wide range of mounting options
- External chamber options
- Rugged, robust, and trusted all over the world
- Ideal for tough process control duties
- Operates in almost any liquid at high pressures and temperatures
- Multiple switch points
- Unique three-magnet, snap action, and latching switch mechanism

How to order

Switches can be configured by selecting codes representing the desired features from the tables that follow. The chart below, describes how the model code is built up. For assistance in configuring a switch that best suits your needs, please contact your local sales office.



Technical Specification

Switching accuracy:	depends by the accuracy in setting the position of the float
Storage Temperature:	-50°C to +60°C
Ambient Temperature:	-50°C to +60°C
Maximum Process Temperature:	-10 to 400^{0}C when fitted with 4/8 contacts type Dn & Pn ; -10 to 250^{0}C when fitted with 4/8 contacts type Xn & Hn
Maximum Process pressure:	see table
Enclosure classification:	Weatherproof / Flameproof (Intrinsically Safe, suitable via Declaration of Simple Apparatus).
Ingress Protection:	IP 66 / NEMA 4
Pollution Degree:	Pollution degree 3 according EN60947-5-1 (For extreme conditions where condensation may readily form, then sealed contacts should be used)
Switch Output:	up not six 2xSPST (N.O.+N.C.) or 4xSPST(2xN.O. + 2xN.C.)
Electrical rating:	See **Table 9**
Terminal Block:	solid: max 1mm² / 16AWG — stranded : MAX 4 mm² / 10 AWG
Grounding Connection:	One internal and one external suitable for wire section up to to 4 mm2 / 11 AWG
Process Connection:	flanged 3” or 4” ANSI B16.5 150/300/600 or 1”NPTM
Approximate Weight:	depending on model
Standard rod & float	316 stainless steel, length see table dimension “A”
Material of enclosure	See description on table below
Material of wetted parts	See description on table below

Product Description & Operating Principle

The float type level switches are usually mounted vertically on top of the vessel, but can also be used on a side of the tank, into appropriate sealed chamber. The operating principle also makes them suitable, in a modified form, to a very wide range of applications, including high pressure & temperature or low specific gravity applications.

The instrument is made by a float dimensioned for the liquid to measure, integral with a rod and a magnet on top of the rod. The length of the rod is adjustable within the limit of the type of Float (see below). The float, via the buoyancy principle, is subjected to a lifting force generated by the liquid, that moves up the whole system,

One or more switching units are actuated by the magnet fixed on top of the rod, giving a reliable snap-action “latch-on” switching of the switching unit. The float magnet can continue upwards and activate another switch mechanism at other level points. Switching mechanism already actuated, does not reset until the float magnet returns and falls below the switching mechanism.

Due to the limited length of the rod, these electro-mechanical switches give a reliable switching output in high or low level alarm application. For high vessels or on/off pump control, the range of displacer type level switches must be considered. See TDS-MVLSD

The simple operation principle, allows several constructions to meet different requirements and application:

Type of enclosures

Select the enclosures according to the number of Switch mechanism

Weatherproof Nema4/IP66

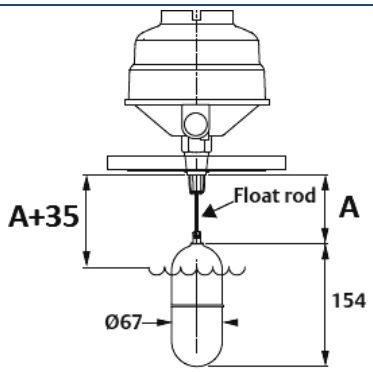
Explosionproof and Flameproof

To fit the application, the float rod length “A” can be adjusted within the limits shown below.

TYPE 11F

- 3” nominal bore
- **two** 4 or 8 contact switch mechanism
- **Application:** Single alarm
- **Dead-band:** standard narrow

A= adjustable distance



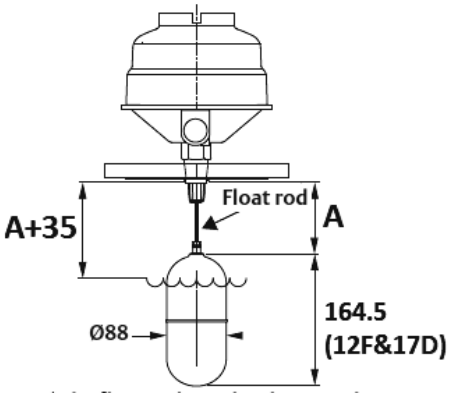
	4 or 8 contacts			Max. distance between switching units
Switch enclosure & Material	**A** Minimum	**A** Maximum	**Switch Adjustment**	
R : all material (N/A/I)	155mm	315mm	None	20mm
S : all material (N/A/I)	155mm	315mm	Up to 94mm	Up to 114mm

Product Description & Operating Principle

TYPE 12F & 17D (single switch only)

- 4" nominal bore
- **two** 4 or 8 contact switch mechanism
- **Application:** multiple alarm
- **Dead-band:** wide range

A= adjustable distance

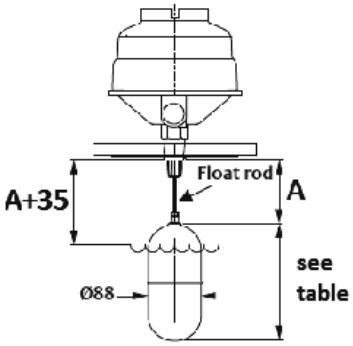


	4 or 8 contacts			Max. distance between switching units
Switch enclosure & Material	**A** Minimum (12F only)	**A** Maxi-mum	**Switch Adjustment**	
R : all material (N/A/I)	155mm	415mm	None	20mm
S : all material (N/A/I)	155mm	415mm	Up to 94mm	Up to 114mm
L : material N only	155mm	415mm	Up to 194mm	Up to 214mm

TYPE 13F & 14F

- 4" nominal bore
- **two** 4 or 8 contact switch mechanism
- **Application:** Single alarm
- **Dead-band:** standard narrow

A= adjustable distance



	4 or 8 contacts			Max. distance between switching units
Switch enclosure & Material	**A** Minimum	**A** Maximum	**Switch Adjustment**	
R : all material (N/A/I)	155mm	415mm	None	20mm
S : all material (N/A/I)	155mm	415mm	Up to 94mm	Up to 114mm
L : all material (N)	155mm	415mm	Up to 199mm	Up to 214mm

			PRESSURE RATING (in bar)		
Type of float & function	**Float diam.**	**Float length**	**20 °C**	**250 °C**	**400 °C**
11F	**67mm**	**154mm**	34.5	22.5	20.2
12F	**88mm**	**168mm**	102.1	66.3	59.2
13F	**88mm**	**160mm**	51.1	33.2	29.6
14F	**88mm**	**160mm**	19.6	12.7	11.3
17D	**88mm**	**168mm**	102.1	66.5	59.2

Base Model

TABLE 1

	Code
Vertical Float type level switch , for direct mount	**D**

Flange Material

TABLE 2

	Code
Carbon Steel (only for flanged process connection)	**C**
316L stainless steel (flanged or threaded process connection)	**S**

Function

TABLE 3

	Code
3” float suitable for minimum S.G. 0.80	**11F**
4” float suitable for minimum S.G. 0.75	**12F**
4” float suitable for minimum S.G. 0.65	**13F**
4” float suitable for minimum S.G. 0.54	**14F**
4” float , spring assisted, minimum S.G. 0.40	**17D**

Enclosure Type

TABLE 4

	Code
62mm high, suitable for **single switch mechanism** (no set point adjustment allowance)	**R**
150mm high suitable to fit **up to four switch mechanism** (set point adjustment allowance 94mm	**S**
250mm high suitable to fit **up to six switch mechanism** (set point adjustment allowance 194mm	**L**

Certification

TABLE 5

	Code
FM Certified Explosion Proof (only for enclosure mat. **A** or **I)**	**E5**
CSA Certified Explosion Proof (only for enclosure mat. **A** or **I**)	**E6**
FM ordinary location, Unclassified Safe Area (only enclosure mat. **N**)	**G5**
CSA ordinary location, Unclassified Safe Area (only enclosure mat. **N**)	**G6**
ATEX/IECEx Certified Flameproof (only enclosure mat. **A** or **I**)	**KN**
No Hazardous location (only enclosure mat. **N**)	**NA**

Enclosure Material

TABLE 6

	Code
Aluminum Alloy base + Drawn steel cover	**N**
Aluminum Alloy	**A**
Cast Iron	**I**

Cable Entry

TABLE 7

	Code
1" -11.5 NPT	**A**
M20X1.5	**B**

Number of Switches

TABLE 8

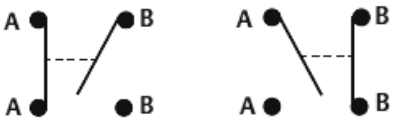
	Code
One switch	**1**
Two switches	**2**
Three switches	**3**
Four switches	**4**
Five switches	**5**
Six switches	**6**

Type of Switches

TABLE 9

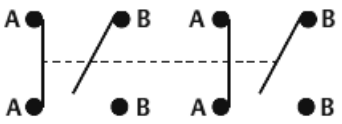
2xSPST (4 contact) configuration

A-A make rising *B-B make falling*

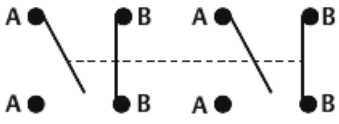


4xSPST (8 contact) configuration

A-A + A-A make rising



B-B + B-B make falling



	Code
4 Contact: 2xSPST general purpose 2kVA 440Vac, 5A / 50W 250Vdc 5A resistive	**D4**
4 Contact: 2xSPST Gold Alloy contact for low power or . I.S. Circuits 6VA 250Vac, 0.25A / 3.6W 250Vdc 0.25A resistive	**P4**
4 Contact: 2xSPST High Current 2kVA 440Vac, 10A / 50W 250Vdc 10A resistive	**X4**
4 Contact: 2xSPST Hermetically Sealed in inert Gas, with Gold plated contacts 2kVA 400Vac , 10A / 50W 250Vdc 10A resistive	**H4**
4 Contact: 2xSPST general purpose 2kVA 440Vac, 5A / 50W 250Vdc 5A resistive	**D8**
4 Contact: 2xSPST Gold Alloy contact for low power or . I.S. Circuits 6VA 250Vac, 0.25A / 3.6W 250Vdc 0.25A resistive	**P8**
4 Contact: 2xSPST High Current 2kVA 440Vac, 10A / 50W 250Vdc 10A resistive	**X8**
4 Contact: 2xSPST Hermetically Sealed in inert Gas, with Gold plated contacts 2kVA 400Vac , 10A / 50W 250Vdc 10A resistive	**H8**

Process Connection Size

TABLE 10 | | | | | | | | | | | | | |

	Code
1” / 25mm (only threaded NN)	1
3” / 80mm (only flanged AA/AB/AC)	3
4” / 100mm (only flanged AA/AB/AC)	4

Process Connection Type

TABLE 11 | | | | | | | | | | | | |

	Code
Flanged ASME B16.5 Class 150	AA
Flanged ASME B16.5 Class 300	AB
Flanged ASME B16.5 Class 600	AC
Threaded	NN

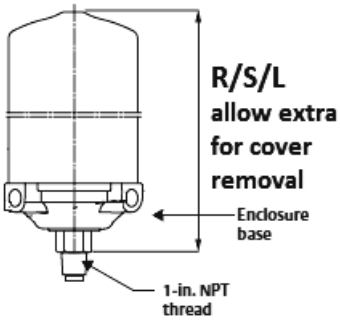
Connection Finishing

TABLE 12 | | | | | | | | | | | | |

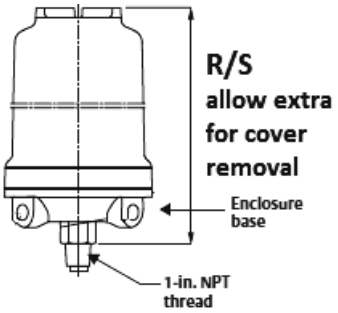
	Code
Raised Face (RF)	R
NPT thread in 316 stainless steel	N

Dimensions

Enclosure for Safe Area



Enclosure for Hazardous Area



ENCLOSURE

		Material		
Type	Diam.	N	A	I
R	ϕ163	170	190	190
S	ϕ180	275	300	300
L	ϕ180	375	/	/

For float dimensions, please see page 3 & 4

Approvals

GLOBAL CERTIFICATION

IECEx
FLAMEPROOF Certificate No. IECEx SIR 09.0038X
Ex d IIC T6....T1 Ga/Gb (Ta = -50°C to +60°C)

Functional Safety Certified
Meets the requirements of IEC 61508-2:2010 for use in safety related systems.
Systematic capability: SC 2;
Random Capability: Type A element
SIL1, 2 capable with HFT 0 (1oo1); Route 2_H and 2_S
SIL Capability (Low Demand Mode) = SIL2 ; SIL Capability (High demand mode) = SIL1
Certificate No. CSA FSP 22002

Note: the associated full package of Safety Documentation must be listed on the order acknowledgement.

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NORTH AMERICA

Canadian Standards Association
Class I Div. 1 , Group B,C and D
C22.2 NO 14
CSA Enc 4

Factory Mutual
Explosionproof for Class I Div. 1 , Group B,C and D , Ta = -50^{0}C to +60^{0}C
Dust-Ignitionproof for Class II/III Div. 1 , Group E,F and G , Ta = -50^{0}C to +60^{0}C
Flameproof for Class I, Zone 0**/1 AEx d IIC, * Ta = -50^{0}C to +60^{0}C, Type 4, IP66

EUROPEAN DIRECTIVES

Low voltage Directive (LVD) 2014/35/EU.
Compliant to LVD
Pressure Equipment Directive (PED) 2014/68/EU:
The product has been designed and manufactured according to Sound Engineering Practice (SEP)

ATEX Directive 2014/34/EU
Sira 03ATEX1189X
II 1/2 G Ex d IIC T6....T1 Ga/Gb (Ta = -50°C to +60°C)

UK REGULATION

Electrical Equipment (Safety) Regulations 2016 .
Conform to UK SI 2016 No 1101 as amended
Pressure Equipment (Safety) Regulations UK SI 2016 No 1105, as amended
The product has been designed and manufactured according to Sound Engineering Practice (SEP)

Equipment and protective system for use in Potentially Explosive Atmospheres Regulation 2016
II 1/2G Certificate no. CSAE 21UKEX1616X
Ex db IIC T6…T1 Ga/Gb (**Ta =** -50°C to +60°C)

ISO9001
FM00720

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