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Delta Controls CORPORATION

Internationally recognized
40+ years of service
Unsurpassed durability

With 45+ years in production, the Delta Controls Series 700 mechanical switches are the industry standard for quality engineered mechanical level switches. With service up to 20,000 psig and 1100 °F, the Delta mechanical switches are available in a wide range of materials, process connections, and configurations to provide reliable service in even the most challenging applications. For process conditions beyond the limits of standard instrumentation, Delta has an engineered mechanical solution.

Mechanical Switches

Theory of Operation

Displacers
Operation is based on the liquid displacement principle. A displacer, which is more dense than the process liquid, is supported by a spring. The length of the spring is proportional to the amount of weight that it supports: the less weight, the longer the spring will be. When liquid covers a displacer an amount of weight, equal to displaced process liquid, is removed from the spring and is supported by the process liquid. The spring length is proportionally increased and the attractor is raised into the switch station magnet's field. The magnet is pulled in against the outside of the sealing tube and the output switch is activated.

Similarly, when the process fluid uncovers the displacer, the liquid weight equal to the volume of the displacer is transferred back to the spring. The length of the spring decreases to its original length and the attractor is lowered from the magnet field. The magnet is pulled back to its original position and output switch.

Floats
Operation is based on buoyancy. A sensing float is attached to a vertical shaft, which moves up and down. The output switch station activates when the float rises. The switch station is on the outside of a solid, non-magnetic pipe wall. A permanent magnet is attached to the switch's actuating lever. As the liquid level rises, the float is carried upwards and the attractor is carried into the magnet's field. The magnet is attracted and pulled against the wall of the sealing tube. This movement actuates the output switch.

When the liquid level falls the float drops, the attractor is pulled out of the field of the magnet, and the output switch returns to its original position.

Floats/Displacers/Configurations, Housings & Options

Options

Housing Heater
The 'HH' option offers a 120 ACV heater that is mounted in the housing. The housing heater is recommended for low ambient temperatures and prevents formation of condensation and icing.

Ground Level Checker
The 'GLC' option is available on certain models. It provides a lever actuated checking mechanism that offers verification of switch functionality.

Temperature Extensions
Optional temperature extensions are used to extend the housing and switch station(s) away from high temperature processes to lower the ambient temperature.

Configurations

Insertion
Insertion is measured from the base of process connection to the bottom of the float or displacer. Cable suspended displacer switches are supplied with at a minimum of 10 feet of cable (can be shortened in field) and a maximum of 50 feet. The level typically rises 60 percent of the total height of each float or displacer before upward travel (consult Delta Controls for specific calculations).

Process Connection Configurations
Vertical caged models typically offer process connections available as side/side, side/bottom, or side/side with drain. Custom process connection spacing is typically available in each configuration allowing flexible solutions for existing installation sites. Spacing is measured by centerline to centerline on side/side and side/side/drain configurations and centerline to bottom connection face on side/bottom configurations.

Switch Stations
A variety of microswitches are available in SPDT and DPDT configurations. For models offering differential control, a single switch station is used in either a SPDT or DPDT configuration.

Housings

C Housing

T Housing

Model 709 • Float Switch, Top Inserted, Single Point

Features

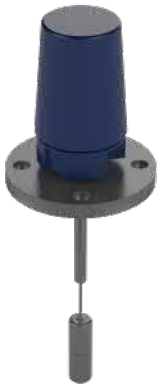
- Simple mechanical device
- High reliability
- Sensing float
- High level alarms
- Float guide always located 3 inches above float
- Non-magnetic, heavy-duty sealing tube

Description

The Delta Controls **Model 709** Float Switch is a simple mechanical device which is **highly reliable** over long periods of time. An alarm switch-type action is provided as the liquid level surface passes through the elevation where the **sensing float** has been positioned. The sensing float is attached to a vertical shaft, which can move up and down. Lifting the float causes the output switch station to activate. The switch station is on the outside of a solid, non-magnetic pipe wall. This isolation **eliminates** the possibility of leaking seals and flex tube failures, which are problems in many other designs.

The 709 is commonly used for high level alarms and shutdown on tanks. An optional support bracket allows the 709 to also be used in sumps and pits.
The float may be extended down into the tank as far as **12 feet** (beyond 12 feet, the float can no longer lift the weight of the long and heavy float rod). This allows it to provide switch action as far as 12 feet down into the tank and allows the 709 to be used as a **low-level alarm**.

Unlike most competitive switches, the **709 float rod guide** is always located just three inches above the float and thus avoids the need for any type of 'stilling well.' Moderate swirling or fluid motion **will not damage** the 709. A **permanent magnet** is attached to the actuating lever of the switch. As the liquid level rises, the float is carried upwards and the attractor is carried into the field of the magnet. The magnet is attracted and pulled against the wall of the sealing tube. This movement **actuates the output switch**. When the liquid level falls, the float drops, the attractor is pulled out of the field of the magnet and the output switch returns to its original position. The non-magnetic heavy-duty sealing tube provides a **leakproof static barrier** to the process fluid. The magnetic lines of force are the only coupling; failure prone couplings such as shafts with o-rings, diaphragms, bellows, etc have been eliminated to improve operation and reliability.



Model 709

Specifications

Available Wetted Materials:	316 Stainless Steel, carbon steel
Insertion (Below Process Connection):	≤ 12 ft (3.5 m)
Switch Action:	Single point
Sensing Element:	316 Stainless Steel
Specific Gravity:	0.4 to 2.40
Temperature:	-150 °F to +750 °F (-101 °C to +399 °C)
Pressure:	-15 psig to +1200 psig (-1 bar to +80 bar)
Threaded Connection:	1 in to 4 in MPT
Flanged Connection:	2 in to 8 in
Flange Rating:	≤ 300 lb ANSI flanges or Grayloc® hub DIN or JIS equivalents
Certifications:	
C SP® US	Third Party Listed by CSA NRTL/C (USA and Canada) Class I, Division 1, Groups B, C and D; Class II, Division 1, Groups E, F and G; Class III, Division 1 Class I, Zone 1, Ex d IIB+H2 Class I, Zone 1, AEx d IIB+H2

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Model Numbering System

MODEL EXAMPLE	MODEL	-	SENSING FLOAT	-	INSERTION DISTANCE	-	PROCESS CONNECTION	-	SWITCHING & HOUSING	-	OPTIONS[2]
	709	-	TY	-	11.0	-	2"MPTS	-	L1C	-	AA

MODEL	DESCRIPTION
709	Float Switch, Top Inserted, Single Point

SENSING FLOAT

Elements (inches)				WKG psig @ °F			Min Connection Size		Min SPG @ Insertion Distances (inches)									
M/N	MATERIAL	OD	LENGTH	100	450	750	FPT	FLANGED	13	18	24	36	48	60	72	96	120	150
TY	316 Stainless Steel	2.6	7.0	275	185	160	2.5 in	3 in S160	0.76	0.78	0.79	0.81	0.85	0.88	0.92	NA	NA	NA
14Y	316 Stainless Steel	3.5	7.0	265	175	145	NA	4 in S120	0.56	0.57	0.58	0.59	0.62	0.65	0.67	0.73	0.78	0.85
15Y	316 Stainless Steel	5.5	Ball	425	300	250	NA	6 in S80	0.40	0.41	0.41	0.42	0.43	0.45	0.46	0.49	0.51	0.55
PY	316 Stainless Steel	7.0	Ball	425	275	235	NA	8 in S120	0.56	0.56	0.56	0.57	0.57	0.58	0.59	0.60	0.61	0.63
Interface Service																		
IY	316 Stainless Steel	7.0	Ball	730	475	400	NA	8 in S120	0.45 min spg, 0.10 min spg Differential									

INSERTION DISTANCE	DESCRIPTION
**.*	**.* in of insertion (11 in to 150 in)

PROCESS CONNECTION	DESCRIPTION
	Refer to 'Mechanical Technical Resources'
	MPT sizes 1 in to 4 in
	Flange sizes 1 in to 8 in, Classes 150, 300

SWITCHING & HOUSING	DESCRIPTION
	Refer to 'Mechanical Technical Resources'

OPTIONS[2]	DESCRIPTION
AA	None
T6	6 in temperature extension (see 'Mechanical Technical Resources')
T12	12 in temperature extension (see 'Mechanical Technical Resources')
HH	120 ACV housing heater

Notes:

[2] A hyphen will separate multiple options selected

- SPG: Specific Gravity Unit
- Inferface service min difference between the SPG of the 2 liquids: 0.10
- Inferface min SPG of the heavier liquid: 0.45
- Centerline of switch band: 4 in above insertion depth

REQUIRED ORDERING INFORMATION:

- Detailed model number
- Tag or nameplate detail (if required)
- Documentation & testing packages (if required, refer "Additional Resources")

APPLICATION DETAILS:

- Process fluid or material name*
- Process fluid or material specific gravity
- Maximum process temperature
- Maximum process pressure

*Upper and lower materials required for interface service

Model 710 • Float Switch, Top Inserted, Two Point

Features

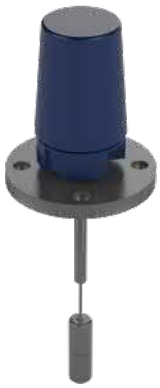
- Variable liquid output switching
- Both high and low level alarms
- Attractor located inside barrier tube
- Switching stations located outside tube
- Vertical mounted on top of vessel
- Two fixed switching points

Description

The Delta Controls **Model 710** Float Switch offers two configurations, A and D, for variable liquid output switching. **Model 710A** provides **output switching** at two points based on a varying liquid level. The 710 is commonly used with a preliminary warning which announces that 'shutdown' may soon occur and remedial action should be taken at once.

The unit is located on top of the vessel with the primary element extending down into the vessel. The float rides on the surface of the liquid and is carried up and down as the liquid level varies. The **attractor** is coupled to the float by the float rod and also moves up and down as the level varies. The attractor is located inside of the barrier tube and is in contact with the **process fluid.**

The switching stations are located on the outside of the tube and are isolated from the process fluid. Each station contains a magnet which is magnetically attracted to magnetic materials such as the attractor. The attractor is lifted into the magnetic field of the bottom switch station. The magnet is pulled in against the barrier tube, an output switch is connected to the magnet and is actuated. **Additional increases** in the liquid level lift the attractor into the magnetic field of the top switch station and its output switch also actuates. Falling liquid level sequentially pulls the attractor out of the field of the switch station magnetic fields and each output switch de-actuates. Separation between the **two output switch actuation points** is two inches to three inches, depending on the actual specific gravity (SPG) of the liquid.



Model 710

The 710 should be mounted vertically on top of the vessel. The **guide tube/float rod** must be long enough so that the float centerline extends down approximately two inches below the point where switch action is desired. A baffle or stilling well is required if the **fluid is agitated** or has surface turbulence; otherwise the switching action may be erratic. The switching points are fixed by the length of the float rod/guide tube. The process connection should be large enough to admit the float into the vessel. If not, then the float must be unscrewed from the float rod and installed from inside the vessel after the body/attractor assembly has been mounted on top of the vessel.

The **Model 710D** Differential Option has a single switch station and is equipped with a differential device. The station activates at a high level and remains activated unit the liquid level falls to a lower elevation. The additional amount that it must fall, before the station deactivates, is called the **Differential**. This amount is adjustable from about one inch to two and one half inches depending upon the specific gravity (spg) of the liquid. The 710D is commonly used where a considerable amount of surface agitation or splashing is expected to occur. This design results in a **more stable** and **reliable alarm action**, particularly as the level approaches the switching point. It can also serve as a pump control in large tanks.

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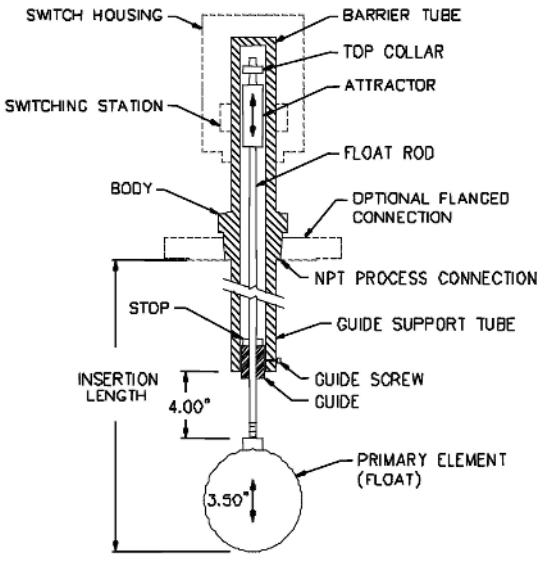
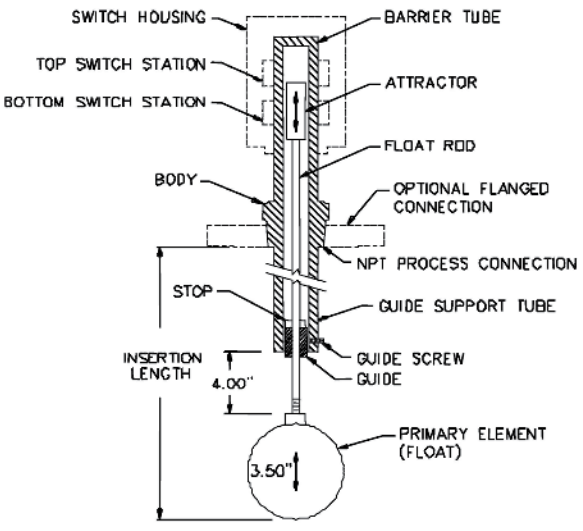
Specifications

Available Wetted Materials:	316 Stainless Steel, carbon steel
Insertion (Below Process Connection):	≤ 10 ft
Switch Action:	1 to 4 points of alarm and/or differential
Sensing Element:	316 Stainless Steel
Specific Gravity:	0.43 to 2.40
Temperature Range:	-150 °F to +750 °F (-101 °C to +399 °C)
Pressure:	-15 psig to +1200 psig (-1.0 bar to +82.7 bar)
Threaded Connection:	1.0 in to 3.0 in MPT
Flanged Connection:	2.0 in to 8.0 in
Flange Rating:	≤ 300 lb ANSI flanges or Grayloc® hub DIN or JIS equivalents
Certifications:	
C SP® US	Third Party Listed by CSA NRTL/C (USA and Canada) Class I, Division 1, Groups B, C and D; Class II, Division 1, Groups E, F and G; Class III, Division 1 Class I, Zone 1, Ex d IIB+H2 Class I, Zone 1, AEx d IIB+H2



MODEL 710D



MODEL 710A

Model 710 • Float Switch, Top Inserted, Two Point

Model Numbering System

MODEL EXAMPLE	MODEL	-	SENSING FLOAT	-	INSERTION DISTANCE	-	PROCESS CONNECTION	-	SWITCHING & HOUSING	-	OPTIONS[2]
	710A	-	TY	-	13.0	-	3"150RS	-	L1C	-	AA

MODEL	DESCRIPTION
710A	Float Switch, Top Inserted, Two Point
710D	Float Switch, Top Inserted, Two Point, Differential

SENSING FLOAT

Elements (inches)				WKG psig @ °F			Min Process Connection		Type Action	Min SPG @ Insertion Distances (inches)									
M/N	MATERIAL	OD	LENGTH	100	450	750	FPT	FLANGED		13	18	24	36	48	60	72	96	120	150
TY	316 Stainless Steel	2.6	7.0	275	185	160	2.5 in	3 in S160	AD	0.79	0.80	0.82	0.84	0.88	0.91	NA	NA	NA	NA
									2 STA	0.89	0.91	0.93	NA	NA	NA	NA	NA	NA	NA
14Y	316 Stainless Steel	3.5	7.0	265	175	145	NA	4 in S120	AD	0.62	0.63	0.65	0.66	0.69	0.71	0.74	0.79	0.85	0.92
									2 STA	0.70	0.71	0.72	0.74	0.76	0.79	0.82	0.87	0.92	NA
15Y	316 Stainless Steel	5.5	Ball	425	300	250	NA	6 in S80	AD	0.43	0.44	0.45	0.45	0.47	0.48	0.50	0.52	0.55	0.58
									2 STA	0.49	0.50	0.51	0.51	0.53	0.55	0.55	0.58	0.61	0.64
PY	316 Stainless Steel	7.0	Ball	425	275	235	NA	8 in S120	AD	0.57	0.58	0.58	0.58	0.59	0.60	0.60	0.62	0.63	0.65
										0.61	0.61	0.61	0.62	0.62	0.63	0.64	0.65	0.66	0.68
Interface Service																			
IY	316 Stainless Steel	7.0	Ball	730	475	400	NA	8 in S120	0.50 for adjustable differential, 0.125 units 0.52 for 2 station alarm, Differential										

INSERTION DISTANCE	DESCRIPTION
**.*	**.* in of insertion (13 in to 150 in)

PROCESS CONNECTION	DESCRIPTION
	Refer to 'Mechanical Technical Resources' for M/N
	MPT sizes 1 in to 4 in
	Flange sizes 1 in to 8 in, Classes 150, 300

SWITCHING & HOUSING	DESCRIPTION
	Refer to 'Mechanical Technical Resources' for options

MODEL EXAMPLE	MODEL	-	SENSING FLOAT	-	INSERTION DISTANCE	-	PROCESS CONNECTION	-	SWITCHING & HOUSING	-	OPTIONS[2]
	710A	-	TY	-	13	-	3"150RS	-	L1C	-	AA

OPTIONS[2]	DESCRIPTION
AA	None
T6	6 in temperature extension (see 'Mechanical Technical Resources')
T12	12 in temperature extension (see 'Mechanical Technical Resources')
HH	120 ACV housing heater

Notes:

[2] A hyphen will separate multiple options selected

- SPG: Specific Gravity Unit
- Inferface service min difference between the spg of 2 liquids: 0.1
- Inferface min SPG of the heavier liquid: 0.5
- Centerline of switch band: 4 in above insertion depth

REQUIRED ORDERING INFORMATION:

- Detailed model number
- Tag or nameplate detail (if required)
- Documentation & testing packages (if required, refer "Additional Resources")

APPLICATION DETAILS:

- Process fluid or material name*
- Process fluid or material specific gravity
- Maximum process temperature
- Maximum process pressure

*Upper and lower materials required for interface service

Model 711 • Float Switch, Top Inserted, Two Point, Wide Separation

Features

- Two alarm points
- Horizontal position maintained by stroke rod
- High and low alarm
- Liquid supported float
- Does the job of two conventional float switches

Description

The **Model 711** Float Switch provides two point alarms with from 6 to 65 inches of elevation spacing between the two switching points. A float rides on the surface of the liquid. Its horizontal position is maintained by the stroke rod as the liquid level varies. The 711 produces two **widely spaced switch actions**. The normal application would be for **high/low alarm**. Note that the liquid must not leave significant coatings or deposits on the rod.

The **attractor** and **inner works** is supported at the midpoint of its travel by a spring. The float is supported by the liquid and is free to slide up and down on the rod. Rising level carries the float up until it contacts the upper stop. The rod is then lifted which carries the attractor into the field of the station magnet. The magnet pulls in against the outside of the sealing tube and the switch activates. Falling level drops the float away from the upper stop. The attractor moves down and the switch deactivates.

Similarly, **falling level** carries the float down until it contacts the lower stop. The weight of the float pushes the rod down, lowers the attractor so that it is in front of the magnet, and the lower switch actuates. It de-actuates when the float rises above the stop and the spring pulls the attractor out of the field of the lower switch station magnet.

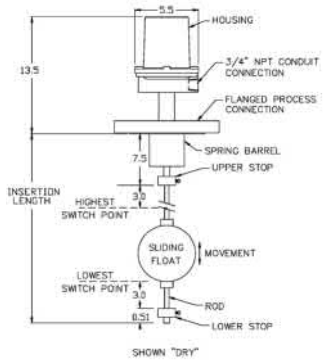
The 711 will do many jobs that would otherwise require the use of two separate conventional float switches. This **results in cost savings** for both the equipment and the decreased amount of installation required. The switching points may be easily changed in the field by repositioning the stops.

Model 711D, Differential Option has a single switching station and is normally used to control a pumping action in a process vessel or storage tank. The **station activates** when the sensing float rises to the upper stop and lifts the guide rod attractor into the field of the station magnet. The station stays activated until the float moves down against the lower stop. The **guide rod-attractor** is then pulled down out of the magnetic field and the switch station deactivates. It remains in that condition until the float again rises up against the upper stop and activates the switch.

Model 711

Specifications

Available Wetted Materials:	316 Stainless Steel, carbon steel
Insertion (Below Process Connection):	≤ 10 ft
Switch Action:	1 to 4 points of alarm and/or differential
Specific Gravity:	0.35 to 2.40
Temperature Range:	-150 °F to +750 °F (-101 °C to +399 °C)
Pressure:	-15 psig to +1200 psig (-1.0 bar to +82.7 bar)
Threaded Connection:	1.0 in to 3.0 in NPT
Flanged Connection:	2.0 in to 8.0 in
Flange Rating:	≤ 300 lb ANSI flanges or Grayloc® hub DIN or JIS equivalents
Certifications:	
	Third Party Listed by CSA NRTL/C (USA and Canada) Class I, Division 1, Groups B, C and D; Class II, Division 1, Groups E, F and G; Class III, Division 1 Class I, Zone 1, Ex d IIB+H2 Class I, Zone 1, AEx d IIB+H2



Model Numbering System

MODEL EXAMPLE	MODEL	-	SENSING ELEMENT	-	INSERTION DISTANCE	-	PROCESS CONNECTION	-	SWITCHING & HOUSING	-	OPTIONS
	711A	-	11Y	-	13.0	-	4"150RS	-	L1C	-	AA

MODEL	DESCRIPTION
711A	Float Switch, Top Inserted, Two Point, Wide Separation
711D	Float Switch, Top Inserted, Two Point, Wide Separation, Differential

SENSING ELEMENT

Elements (inches)					WKG psig @ °F			Minimum Flanged
M/N	MATERIAL	SPG	OD	LENGTH	100	250	450	PROCESS CONNECTION NOZZLE
11Y	316 Stainless Steel	0.60	3.6	7.6	185	145	120	4 in SCH 80
12Y	316 Stainless Steel	0.65	5.1	Ball	450	350	290	6 in SCH 160
13Y	316 Stainless Steel	0.35	7.2	Ball	375	295	295	8 in SCH 80

INSERTION LENGTH	DESCRIPTION
**.*	**.* in of insertion (13 in to 150 in)

PROCESS CONNECTION	DESCRIPTION
	Refer to 'Mechanical Technical Resources' for M/N
	MPT sizes 4 in
	Flange sizes 4 in to 8 in, Classes 150, 300

SWITCHING & HOUSING	DESCRIPTION
	Refer to 'Mechanical Technical Resources' for options

OPTIONS	DESCRIPTION
AA	None
HH	120 ACV housing heater

Notes:
- SPG: Specific Gravity Unit
- Note: Limited to 250 °F with 316 Stainless Steel range spring
- Up to 450 °F with Inconel® range spring

REQUIRED ORDERING INFORMATION:
- Detailed model number
- Tag or nameplate detail (if required)
- Documentation & testing packages (if required, refer "Additional Resources")

APPLICATION DETAILS:
- Process fluid or material name
- Process fluid or material specific gravity
- Maximum process temperature
- Maximum process pressure

Model 715 • Displacer Switch, Top Inserted, Single Point

Features

- Single switch station activation
- Provides high or low alarm for liquid level or interface position
- Suitable for floating roof type tanks
- Optional brass displacer
- Optional ground level checker

Description

The **Model 715** Top Displacer Switch provides activation of a **single switch station** as the liquid level surface rises past the elevation at which the displacer has been positioned. Similarly the switch station is deactivated as the liquid level falls below the displacer.

Operation is based on **liquid displacement**. A displacer, which is more dense than the process liquid is supported by a spring. The length of the spring is proportional to the amount of weight that it supports—the less the weight, the longer the spring will be. When liquid covers a displacer, an amount of weight, equal to the weight of the process liquid displaced, is removed from the spring and is **supported by the process liquid**. The spring length is proportionally increased and the attractor is moved up into the field of a switch station magnet. The magnet is pulled in against the outside of the sealing tube and the **output switch is activated**.

Similarly, when the process fluid uncovers the displacer, the liquid weight equal to the volume of the displacer is transferred back to the spring. The length of the spring **decreases** to its original length and the attractor is pulled out of the field of the magnet. The magnet is pulled back to its original position and the output switch de-actuates. For floating roof type tanks, the 715 may be used to **detect** the position of the roof.

The 715 may be equipped with a **lead weight** instead of a displacer. It is positioned above the top of a floating roof tank, the roof lifts the weight as it rises, triggering an alarm switch, warning that the roof has traveled to the **limit**.

Model 715

Specifications

Available Wetted Materials:	316 Stainless Steel, lead, brass, carbon steel
Insertion (Below Process Connection):	≤ 50 ft (16 m) max
Switch Action:	1 to 4 points of alarm and/or differential
Specific Gravity:	0.50 to 2.0
Temperature Range:	-20 °F to +500 °F (-29 °C to +260 °C)
Pressure Range:	-15 psig to +2200 psig (-1 bar to +151.7 bar)
Threaded Connection:	2.0 in to 3.0 in NPT
Flanged Connection:	4.0 in to 8.0 in
Flange Rating:	≤ 300 lb ANSI flanges or Grayloc® hub DIN or JIS equivalents
Certifications:	
C SP® US	Third Party Listed by CSA NRTL/C (USA and Canada) Class I, Division 1, Groups B, C and D; Class II, Division 1, Groups E, F and G; Class III, Division 1 Class I, Zone 1, Ex d IIB+H2 Class I, Zone 1, AEx d IIB+H2

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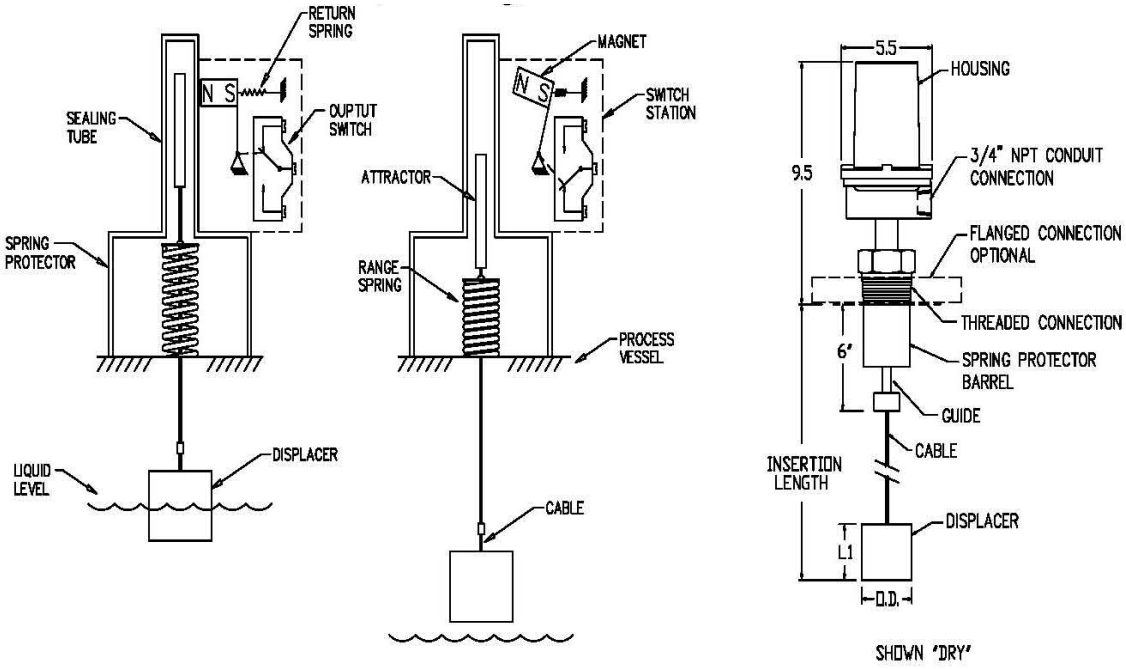
RETURN SPRING
SEALING TUBE
OUPTUT SWITCH
SPRING PROTECTOR
LIQUID LEVEL
DISPLACER
MAGNET
SWITCH STATION
ATTRACTOR
RANGE SPRING
PROCESS VESSEL
CABLE
5.5
HOUSING
9.5
3/4" NPT CONDUIT CONNECTION
FLANGED CONNECTION OPTIONAL
THREADED CONNECTION
6"
SPRING PROTECTOR BARREL
GUIDE
CABLE
INSERTION LENGTH
DISPLACER
L1
O.D.
SHOWN "DRY"

Model 715 • Displacer Switch, Top Inserted, Single Point

Model Numbering System

MODEL EXAMPLE	MODEL	-	SENSING ELEMENT	-	INSERTION DISTANCE	-	PROCESS CONNECTION	-	SWITCHING & HOUSING	-	OPTIONS[2]
	715	-	44Y	-	10.0	-	2"MPTS	-	L1C	-	AA

MODEL	DESCRIPTION
715	Displacer Switch, Top Inserted, Single Point

SENSING ELEMENT

		Displacer (inches)				WKG psig @ °F		Min ANSI Flanged		
M/N	MATERIAL*	MIN SPG	MAX SPG	OD	Length	100	250	450	NPT	NOZZLE
38Y	316 Stainless Steel	0.40	1.05	2.9	10.0	510	400	320	3 in	3 in SCH 80
39Y	316 Stainless Steel	0.50	1.85	1.9	14.0	1500	1300	1150	2 in	2 in SCH 80
40Y	316 Stainless Steel	0.60	1.80	1.9	12.0	1500	1300	1150	2 in	2 in SCH 80
44Y	316 Stainless Steel	0.85	2.00	1.9	8.0	1500	1300	1150	2 in	2 in SCH 80
		Interface Service								
		MIN DIFFERENCE BETWEEN LIQUIDS		MIN SPG OF HEAVIER LIQUID: 0.50 UNITS						
45Y	316 Stainless Steel	0.22 SPG Units		2.9	12.0	510	400	335	3 in	3 in SCH 80
46Y	316 Stainless Steel	0.15 SPG Units		3.5	12.5	300	300	255	NA	4 in SCH 120
47Y	316 Stainless Steel	0.10 SPG Units		2.5	18.0	300	300	255	NA	4 IN SCH 120
		High Position of Floating Tank Roof								
48Z	Lead	Position		1.0	4.0	NA	NA	NA	NA	NA
44L	Brass	Position, Rainwater		1.9	8.0	NA	NA	NA	NA	NA

INSERTION DISTANCE	DESCRIPTION
**.*	**.* feet of 316 Stainless Steel cable (10 ft to 50 ft)

PROCESS CONNECTION	DESCRIPTION
	Refer to 'Mechanical Technical Resources' for M/N
	MPT sizes 2 in to 4 in
	Flange sizes 2 in to 8 in, Classes 150, 300

SWITCHING & HOUSING	DESCRIPTION
	Refer to 'Mechanical Technical Resources' for options

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MODEL EXAMPLE	MODEL	-	SENSING ELEMENT	-	INSERTION DISTANCE	-	PROCESS CONNECTION	-	SWITCHING & HOUSING	-	OPTIONS[2]
	715	-	44Y	-	10.0	-	2"MPTS	-	L1C	-	AA

OPTIONS[2]	DESCRIPTION
AA	None
HH	120 ACV housing heater
GLC	Ground Level Checker

Notes:
[2] A hyphen will separate multiple options selected
- Min insertion distance 10 ft
- Max insertion distance 50 ft
- SPG: Specific Gravity Unit

REQUIRED ORDERING INFORMATION:

- Detailed model number
- Tag or nameplate detail (if required)
- Documentation & testing packages (if required, refer "Additional Resources")

APPLICATION DETAILS:

- Process fluid or material name
- Process fluid or material specific gravity
- Maximum process temperature
- Maximum process pressure

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Model 716 • Displacer Switch, Top Inserted, Two Point

Features

- Top inserted
- Spring supported displace level switch
- Two point switch stations
- High and/or low alarm
- Single and multiple pump control
- Optional ground level checker

Description

The Delta Controls **Model 716** Displacer Switch provides output switching at two field adjustable points based on a varying liquid level. The unit is located on top of the vessel with the primary element extending down into the vessel. The spring supported **displacer type level switches** are used in sumps, tanks, and vessels where long insertions and switching over wide variations in liquid level are required.

Displacer actuated units are less sensitive to surface wave action than other models which are actuated by floats. Spring opposed displacer type units are suited to **difficult services** where the fluid contains entrained solids or otherwise would tend to cause hang-ups in float actuated units.

Operation is based on **liquid displacement**. A displacer, which is more dense than the process liquid is suspended from a spring. The length of the spring is proportional to the amount of weight that it supports; the less the weight, the longer the spring will be. When liquid covers a displacer, an amount of weight equal to the weight of the process liquid displaced, is removed from the spring and supported by the process liquid. The spring length is proportionally increased and the attractor is moved up into the field of the switch station magnet. The **magnet** is pulled in against the outside of the sealing tube and the output switch is actuated.

Similarly, when the process fluid **uncovers** the displacer, the displacer liquid weight is transferred back to the spring. The length of the spring is decreased to its original length and the attractor is pulled out of the field of the magnet. The magnet returns to its original position and the output switch **deactivates**. The two separate displacers are supported by a single spring. As the liquid covers the first displacer, the spring lifts the entire displacer assembly (along with the attractor) upward a precise amount. The second switch station will be operated as the liquid level continues to rise covering the **upper displacer**. The displacers may be placed on the cable at widely separated points and the switch action will then be produced when the liquid level surface covers a displacer at the separated points.

Model 716

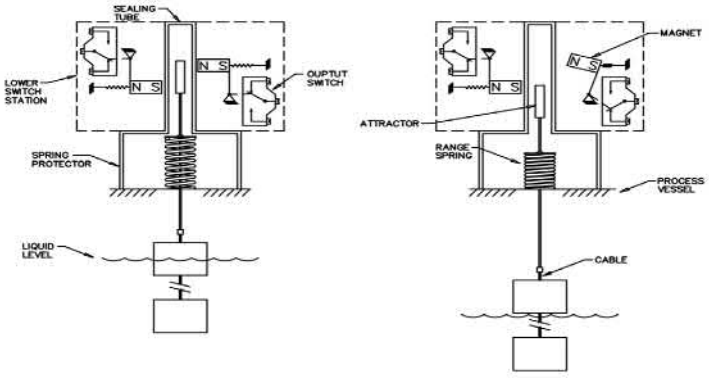
Units equipped with the optional **GLC Ground Level Checker** include a mechanical arm that allows the switch to be manually operated. Operating this lever allows the user to manually verify the function of the switch without changing the level in the tank. Pulling the lever caused the lever arm to raise the **switch actuator** through the switchpoints. Releasing the lever returns the switch to its previous position. The checker lever can be operated via a cable attached to it and routed to ground level.

Model 716D Differential Option is equipped with only a single switch station and is setup for adjustable differential control action. The **most common application** is turning a pump on and off to control the filling or emptying of tanks and sumps.

Specifications

Available Wetted Materials:	316 Stainless Steel, lead, brass, carbon steel
Insertion (Below Process Connection):	≤ 50 ft (16 m) max
Switch Action:	1 to 4 points of alarm and/or differential
Specific Gravity:	0.45 to 2.10
Temperature Range:	-20 °F to +500 °F (-29 °C to +260 °C)
Pressure Range:	-15 psig to +2200 psig (-1 bar to +151.6 bar)

Threaded Connection:	3.0 in to 4.0 in NPT
Flanged Connection:	3.0 in to 8.0 in
Flange Rating:	≤ 300 lb ANSI flanges or Grayloc® hub DIN or JIS equivalents
Certifications:	
	Third Party Listed by CSA NRTL/C (USA and Canada) Class I, Division 1, Groups B, C and D; Class II, Division 1, Groups E, F and G; Class III, Division 1 Class I, Zone 1, Ex d IIB+H2 Class I, Zone 1, AEx d IIB+H2



Model Numbering System

MODEL EXAMPLE	MODEL	-	SENSING ELEMENT	-	INSERTION DISTANCE	-	PROCESS CONNECTION	-	SWITCHING & HOUSING	-	OPTIONS
	716A	-	54Y	-	10.0	-	3"MPTS	-	L1C	-	AA

MODEL	DESCRIPTION
716A	Displacer Switch, Top Inserted, Two Point
716D	Displacer Switch, Top Inserted, Two Point, Differential

SENSING ELEMENT

Displacer (inches)						WKG psig @ °F			Min ANSI Flanged	
M/N	MATERIAL*	MIN SPG	MAX SPG	OD	Length	100	250	450	NPT	NOZZLE
49Y	316 Stainless Steel	0.45	0.90	3.5	5.9, 12.5	385	300	250	NA	4 in SCH 80
50Y	316 Stainless Steel	0.60	1.20	3.5	4.8, 10.0	385	300	250	NA	4 in SCH 80
51Y	316 Stainless Steel	0.60	1.07	2.9	7.1, 14.9	500	400	325	3 in	3 in SCH 80
52Y	316 Stainless Steel	0.70	1.10	2.9	5.9, 12.0	500	400	325	3 in	3 in SCH 80
54Y	316 Stainless Steel	0.85	1.20	2.9	4.8, 10.0	400	400	325	3 in	3 in SCH 80
55Y	316 Stainless Steel	1.01	2.10	2.9	4.8, 10.0	500	400	325	3 in	3 in SCH 80
High Position of Floating Tank Roof										
52L	Brass	0.70	1.10	2.5	10.0, 12.0	375	300	260	3 in	3 in SCH 80
52Z	Lead	Position		1.0	4.0, 4.0	NA	NA	NA	2.0	C/F

INSERTION DISTANCE	DESCRIPTION
**	** feet of 316 Stainless Steel cable (10 ft to 50 ft)

SWITCHING & HOUSING	DESCRIPTION
	Refer to 'Mechanical Technical Resources' for options

PROCESS CONNECTION	DESCRIPTION
	Refer to 'Mechanical Technical Resources' for M/N
	MPT sizes 3 in to 4 in
	Flange sizes 3 in to 8 in, Classes 150, 300

OPTIONS	DESCRIPTION
AA	None
HH	120 ACV housing heater

Notes:
- Min insertion distance 10 ft
- Max insertion distance 50 ft
- SPG: Specific Gravity Unit

REQUIRED ORDERING INFORMATION:
- Detailed model number
- Tag or nameplate detail (if required)
- Documentation & testing packages (if required, refer "Additional Resources")

APPLICATION DETAILS:
- Process fluid or material name
- Process fluid or material specific gravity
- Maximum process temperature
- Maximum process pressure

Model 717 • Displacer Switch, Top Inserted, Three Point

Features

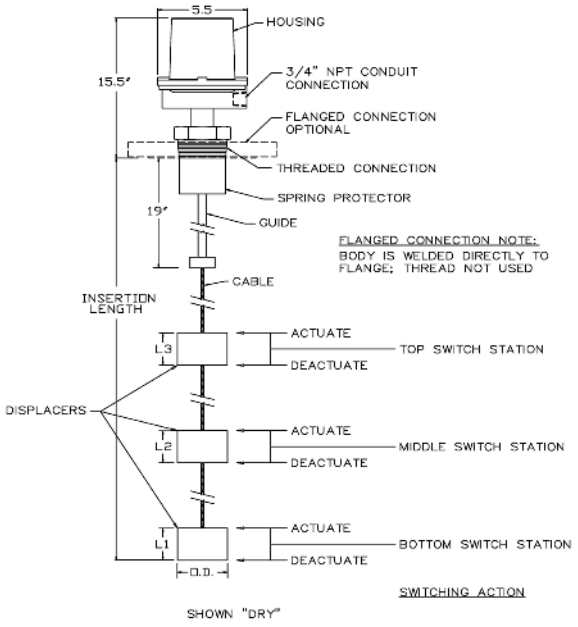
- Top inserted
- Two alarm points
- Three switching station displacers
- Displacer weight is supported by a spring
- High and/or low alarm
- Single and multiple pump control

Description

The Delta Controls **Model 717** Displacer Switch has two alarm points, three switching stations and three displacers. A precise **on/off action** occurs in the appropriate switch station when the liquid level surface passes the elevation of the related displacer element.

The Delta Controls Model 717 is commonly used to **control two pumps** acting to empty a sump. Each of the two top displacers starts a pump; the lower displacer operates a DPDT switch, which **acts to stop both pumps** at the same place. Latch/unlatch pump starters are normally used in this arrangement.

Options: The Model 717 Option D utilizes an adjustable differential device has been added, and only two switch stations are utilized. The lower switch station is activated when the liquid surface covers the middle displacer and stays activated until the liquid level falls below the bottom displacer. A typical application is to **control a single pump** with a high or low level alarm.



Model 717

Specifications

Available Wetted Materials:	316 Stainless Steel, carbon steel
Insertion (Below Process Connection):	≤ 50 ft max
Switch Action:	1 to 4 points of alarm and/or differential
Specific Gravity:	0.55 to 1.45
Temperature Range:	-20 °F to +500 °F (-29 °C to +260 °C)
Pressure Range:	-15 psig to +2200 psig (1 bar to +151.6 bar)
Threaded Connection:	3.0 in to 8.0 in NPT
Flanged Connection:	3.0 in to 12 in
Flange Rating:	≤ 300 lb ANSI flanges or Grayloc® hub DIN or JIS equivalents
Certifications:	
	Third Party Listed by CSA NRTL/C (USA and Canada) Class I, Division 1, Groups B, C and D; Class II, Division 1, Groups E, F and G; Class III, Division 1 Class I, Zone 1, Ex d IIB+H2 Class I, Zone 1, AEx d IIB+H2

Model Numbering System

MODEL EXAMPLE	MODEL	-	SENSING ELEMENT	-	INSERTION DISTANCE	-	PROCESS CONNECTION	-	SWITCHING & HOUSING	-	OPTIONS
	717A	-	64Y	-	15	-	3"150RS	-	L1C	-	AA

MODEL	DESCRIPTION
717A	Displacer Switch, Top Inserted, Three Point
717D	Displacer Switch, Top Inserted, Three Point, Differential

SENSING ELEMENT

717A Displacer (inches)						WKG psig @ °F			Min ANSI Flanged	
M/N	MATERIAL*	MIN SPG	MAX SPG	OD	Length	100	250	450	NPT	NOZZLE
60Y	316 Stainless Steel	0.55	0.68	3.5	5.9, 10, 10	385	300	250	NA	4 in SCH 80
61Y	316 Stainless Steel	0.60	0.75	3.5	5.9, 10, 10	385	300	250	NA	4 in SCH 80
62Y	316 Stainless Steel	0.70	0.90	2.9	7.1, 12, 12	500	400	325	3 in	3 in SCH 80
63Y	316 Stainless Steel	0.80	0.99	2.9	7.1, 12, 12	500	400	325	3 in	3 in SCH 80
64Y	316 Stainless Steel	0.90	1.10	2.9	5.9, 10, 10	500	400	325	3 in	3 in SCH 80
68Y	316 Stainless Steel	1.15	1.45	2.9	4.8, 8.2, 8.2	500	400	325	3 in	3 in SCH 80

717D Displacer (inches)						WKG psig @ °F			Min ANSI Flanged	
M/N	MATERIAL*	MIN SPG	MAX SPG	OD	Length	100	250	450	NPT	NOZZLE
73Y	316 Stainless Steel	0.60	0.73	3.5	8.1, 10, 12.5	385	300	250	NA	4 in SCH 80
74Y	316 Stainless Steel	0.70	0.85	2.9	10, 12, 14.9	500	400	325	3 in	3 in SCH 80
75Y	316 Stainless Steel	0.80	0.99	2.9	10, 12, 14.9	500	400	325	3 in	3 in SCH 80
77Y	316 Stainless Steel	0.90	1.08	2.9	8.2, 10, 12	500	400	325	3 in	3 in SCH 80
79Y	316 Stainless Steel	1.01	1.20	2.9	8.2, 10, 12	500	400	325	3 in	3 in SCH 80
81Y	316 Stainless Steel	1.10	1.30	2.9	4.8, 5.9, 7.1	500	400	325	3 in	3 in SCH 80

INSERTION DISTANCE	DESCRIPTION
**	** feet of 316 Stainless Steel cable (10 ft to 50 ft)

PROCESS CONNECTION	DESCRIPTION
	Refer to 'Mechanical Technical Resources' for M/N
	MPT sizes 3 in to 4 in
	Flange sizes 3 in to 8 in, Classes 150, 300

SWITCHING & HOUSING	DESCRIPTION
	Refer to 'Mechanical Technical Resources' for options

OPTIONS	DESCRIPTION
AA	None
HH	120 ACV housing heater

Notes:
- SPG: Specific Gravity Unit

REQUIRED ORDERING INFORMATION:

- Detailed model number
- Tag or nameplate detail (if required)
- Documentation & testing packages (if required, refer "Additional Resources")

APPLICATION DETAILS:

- Process fluid or material name
- Process fluid or material specific gravity
- Maximum process temperature
- Maximum process pressure

Model 718 • Displacer Switch, Top Inserted, Four Point

Features

- Top inserted
- Four alarm points
- High and/or low alarm
- Single and multiple pump control
- Field-adjustable cable

Description

The Delta Controls **Model 718** Displacer Switch has two alarm points, four switching stations, and two displacers. A precise **On/Off action** occurs in the appropriate switch station when the liquid level surface passes the elevation of the related displacer element. The 718 is **commonly used** to provide a 'High' warning alarm, a 'High-High' shutdown action, a 'Low' warning alarm, and a 'Low-Low' shutdown action. The type service is found in processes where a **heater must not be uncovered** and the tank must not overflow. Another application is emptying a sump using three pumps. Each of the three top displacers starts a pump, the bottom displacer simultaneously stops all three pumps.

Options: The Model 718 Option D utilizes a four-point alarm, three switch stations, and an adjustable differential device. The **lower switch station activates** when the liquid level covers the L2 displacer and stays activated until the liquid level drops below the L1 displacer. The middle switch station activates when the liquid level covers the L3 displacer and stays activated until the liquid level drops below the L2 displacer. The upper switch station activates when the liquid level covers the L4 displacer and **stays activated** until the liquid level drops below the L3 displace.

Model 718

Specifications

Available Wetted Materials:	316 Stainless Steel, carbon steel
Insertion (Below Process Connection):	≤ 50 ft max
Switch Action:	1 to 4 points of alarm and/or differential
Specific Gravity:	0.75 to 1.20
Temperature Range:	-20 °F to +500 °F (-29 °C to +260 °C)
Pressure Range:	+15 psig to +2200 psig (+1 bar to +151.6 bar)
Threaded Connection:	3.0 in to 4.0 in NPT
Flanged Connection:	3.0 in to 8.0 in
Flange Rating:	≤ 300 lb ANSI flanges or Grayloc® hub DIN or JIS equivalents
Certifications:	
	Third Party Listed by CSA NRTL/C (USA and Canada) Class I, Division 1, Groups B, C and D; Class II, Division 1, Groups E, F and G; Class III, Division 1 Class I, Zone 1, Ex d IIB+H2 Class I, Zone 1, AEx d IIB+H2

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Model Numbering System

MODEL EXAMPLE	MODEL	-	SENSING ELEMENT	-	INSERTION DISTANCE	-	PROCESS CONNECTION	-	SWITCHING & HOUSING	-	OPTIONS
	718A	-	21Y	-	15	-	3"150RS	-	S1C	-	AA

MODEL	DESCRIPTION
718A	Displacer Switch, Top Inserted, Four Point
718D	Displacer Switch, Top Inserted, Four Point, Differential

SENSING ELEMENT

		Displacer (inches)				WKG psig @ °F			Min ANSI Flanged	
M/N	MATERIAL*	MIN SPG	MAX SPG	OD	Length	100	250	450	NPT	NOZZLE
21Y	316 Stainless Steel	0.75	0.85	2.9	7.1, 10, 10, 12	500	400	325	3 in	3 in SCH 80
22Y	316 Stainless Steel	0.80	0.94	2.9	7.1, 10, 10, 12	500	400	325	3 in	3 in SCH 80
23Y	316 Stainless Steel	0.90	1.06	2.9	7.1, 10, 10, 12	500	400	325	3 in	3 in SCH 80
25Y	316 Stainless Steel	1.01	1.20	2.9	5.9, 8.2, 8.1, 10	500	400	325	3 in	3 in SCH 80
64Y	316 Stainless Steel	0.90	1.10	2.9	5.9, 10, 10	500	400	325	3 in	3 in SCH 80
68Y	316 Stainless Steel	1.15	1.45	2.9	4.8, 8.2, 8.2	500	400	325	3 in	3 in SCH 80

INSERTION DISTANCE	DESCRIPTION
**	** feet of 316 Stainless Steel cable (10 ft to 50 ft)

PROCESS CONNECTION	DESCRIPTION
	Refer to 'Mechanical Technical Resources' for M/N
	MPT sizes 3 in to 4 in
	Flange sizes 3 in to 8 in, Classes 150, 300

SWITCHING & HOUSING	DESCRIPTION
	Refer to 'Mechanical Technical Resources'. Only available in options S1C, S2C, S1T, S2T

OPTIONS	DESCRIPTION
AA	None
HH	120 ACV housing heater

Notes:
- None
- 120 ACV housing heater

REQUIRED ORDERING INFORMATION:

- Detailed model number
- Tag or nameplate detail (if required)
- Documentation & testing packages (if required, refer "Additional Resources")

APPLICATION DETAILS:

- Process fluid or material name
- Process fluid or material specific gravity
- Maximum process temperature
- Maximum process pressure

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Model 735 • Float Switch, Side Inserted, Single Point

Features

- Single alarm point
- Horizontal side inserted float type level switch
- Highly reliable design
- Dual opposed magnets

Description

The Delta Controls **Model 735** Float Switch's small design **easily handles** high pressures and temperatures, and is immune to most heavy vibrations. .

The 735 provides switch action as the liquid moves past a fixed point on the side of the vessel or tank. The float is inserted into the vessel through a **flanged** or **threaded connection**. The vessel connection must be located at the elevation where switch action is to occur.

This type level switch uses a counterbalance principal which allows the use of **smaller, heavy wall floats**. The use of these heavy-duty floats significantly improves the safety and reliability of the switch. The purpose of the counterweight is to offset the extra weight of the heavy-duty float. This results in the element only having to provide enough flotation to operate the **switch magnet**. In addition, the element is smaller, which allows the use of smaller process connections.

A **counterbalanced float** is held in a horizontal position by a pivot mechanism. As the liquid level rises, the float moved upwards. This movement results in a rotary motion of the drive magnet, which carries it into the field of the **switch station magnet**. The switch station magnet is driven against the outside of the sealing tube and the output switch is actuated.

Similarly, as the liquid level falls, the **sensing element** moves downward. The drive magnet is rotated back through the field of the switch station magnet. The switch station magnet is operated, returns to its original position, and the output is de-actuated. This **dual opposed magnet design** provides snap action, immunity from vibration, and greatly improves reliability.

Model 735

Specifications

Available Wetted Materials:	304 Stainless Steel, 316 Stainless Steel, Hastelloy® C-276, carbon steel
Switch Action:	Single point alarm
Insertion (From Process Connection):	12 in to 24 in
Specific Gravity:	0.50 to 2.40
Temperature Range:	-85 °F to +1000 °F (-65 °C to +538 °C)
Pressure Range:	-15 psig to +2250 psig (-1 bar to +155.1 bar)
Threaded Connection:	1.0 in to 3.0 in
Flanged Connection:	2.0 in to 8.0 in
Flange Rating:	≤ 900 lb ANSI flanges or Grayloc® hub DIN or JIS equivalents
Certifications:	
	Third Party Listed by CSA NRTL/C (USA and Canada) Class I, Division 1, Groups B, C and D; Class II, Division 1, Groups E, F and G; Class III, Division 1 Class I, Zone 1, Ex d IIB+H2 Class I, Zone 1, AEx d IIB+H2

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Model Numbering System

MODEL EXAMPLE	MODEL	-	SENSING ELEMENT	-	INSERTION DISTANCE	-	PROCESS CONNECTION	-	SWITCHING & HOUSING	-	OPTIONS
	735	-	VY	-	12	-	2"150RS	-	L1C	-	AA

MODEL	DESCRIPTION
735	Float Switch, Side Inserted, Single Point

SENSING ELEMENT

Sensing Float/Displacer				Min SPG & Insertion Distance		WKG psig @ °F			Min ANSI Flanged	
M/N	MATERIAL (**)	OD	LENGTH	SPG	Inches	100	450	750	MPT	NOZZLE
30Y	316 Stainless Steel	1.0	12.0	0.60	15	275	175	155	1 in	N/A
31P	Polypropylene	1.0	12.0	0.60	15	2200	^	^	1 in	N/A
32P	Polypropylene	1.6	7.0	0.60	14	2200	^	^	2 in	2 in SCH 160
VY	316 Stainless Steel	2.0	3.5	0.50	12	375	245	210	2 in	2 in SCH 40
VG	Hastelloy C-276	1.9	3.5	0.75	12	100	65	60	2 in	2 in SCH 80
16Y	316 Stainless Steel	2.5	Ball	0.50	12	860	550	500	2.5 in	3 in SCH 160
Interface Service										
IHY	316 Stainless Steel	5.0	Ball	*	13.5	950	625	550	N/A	6 in SCH 160

INSERTION DISTANCE

Insertion (Inches)	Min SPG @ Inches						
M/N	30Y	31P	32P	VY	VG	16Y	IHY
12	N/A	N/A	N/A	0.50	0.75	0.50	N/A
13.5	N/A	N/A	N/A	N/A	N/A	N/A	*
14	N/A	N/A	0.60	N/A	N/A	N/A	N/A
15	0.60	0.60	N/A	N/A	N/A	N/A	N/A
18	N/A	N/A	N/A	0.50	N/A	0.75	N/A
24	N/A	N/A	N/A	0.60	N/A	0.85	N/A

PROCESS CONNECTION	DESCRIPTION
	Refer to 'Mechanical Technical Resources' for M/N
	30Y, 31P only available in 1"MPT
	32P, VY only available in 2"MPT, Flanges 2 in to 8 in, Class 150, 300
	VG requires Hastelloy C-276 process connection

SWITCHING & HOUSING	DESCRIPTION
	Refer to 'Mechanical Technical Resources' for options

OPTIONS	DESCRIPTION
AA	None
HH	120 ACV housing heater

Notes:
- SPG: Specific Gravity Unit
- * Min difference between the SPG of the 2 liquids is 0.10
- Min SPG of the heavier liquid is 0.47
- ^ Max operating temperature is 220 °F
- ** 735-VG has all wetted parts of Hastelloy C-276

REQUIRED ORDERING INFORMATION:

- Detailed model number
- Tag or nameplate detail (if required)
- Documentation & testing packages (if required, refer "Additional Resources")

APPLICATION DETAILS:

- Process fluid or material name*
- Process fluid or material specific gravity
- Maximum process temperature
- Maximum process pressure

*Upper and lower materials required for interface service

Model 740 • Float Switch, Side Inserted, Two Point

Features

- Two alarm points
- Side inserted float switch
- Optional differential
- Barrel tube encased attractor
- Two switch actions occur as the elevation varies

Description

The Delta Controls **Model 740** Float Switch has a longer stroke than Model 735 and can provide two separate alarm points with up to eight inch spacing between them. The spacing between the **switch points** is controlled by the length of the float insertion and the differential adjustment setting.

The 740 is located on the side of the **vessel** with the float extending into the vessel. The float rides on the surface of the liquid and is carried up and down as the liquid level varies. The attractor is coupled to the float by the linkage and also moves up and down as the level varies. The attractor is located inside of the barrier tube and contacts the process fluid. The **switching stations** are located on the outside of the barrier tube and are isolated from the process fluid. Each switch station contains a magnet whose magnetic lines of force penetrate the **nonmagnetic barrier** and are magnetically attracted to magnetic materials such as the attractor. The magnet is pulled in against the tube as the attractor moves up into its magnetic field. The magnet is connected to an output switch which actuates as the magnet is pulled in against the barrier tube.

Options: The Model 740 Option D uses an adjustable differential device and a single switch station. The float moves down as the **liquid level drops**. This causes the attractor to be moved into the field of the switch station magnet; the magnet is pulled against the sealing tube and the switch is actuated. The switch stays activated until the liquid level rises significantly (an adjustable mount). The attractor is then pulled out of the field of the switch magnet and the switch deactivates. The amount of differential is controlled by the length of the float insertion and the setting of the differential device; up to 16 inch differential is possible. Typical applications include **'Low' alarm** and **'Low-Low' shutdown** for pump protection; control of a pump in a catch tank; and similar services.

Model 740

Specifications

Available Wetted Materials:	304 Stainless Steel, 316 Stainless Steel, carbon steel From 1 to 4 points of alarm and/or differential
Insertion (From Process Connection):	12 in to 48 in
Specific Gravity:	0.50 to 2.40
Temperature Range:	-50 °F to +750 °F (-45 °C to +399 °C)
Pressure Range:	-15 psig to +2200 psig (-1 bar to +151.6 bar)
Threaded Connection:	3.0 in to 4.0 in NPT
Flanged Connection:	3.0 in to 8.0 in
Flange Rating:	≤ 300 lb ANSI flanges or Grayloc® hub DIN or JIS equivalents
Certifications:	
C SP® US	Third Party Listed by CSA NRTL/C (USA and Canada) Class I, Division 1, Groups B, C and D; Class II, Division 1, Groups E, F and G; Class III, Division 1 Class I, Zone 1, Ex d IIB+H2 Class I, Zone 1, AEx d IIB+H2

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Model Numbering System

MODEL EXAMPLE	MODEL	-	SENSING ELEMENT	-	INSERTION DISTANCE	-	PROCESS CONNECTION	-	SWITCHING & HOUSING	-	OPTIONS[2]
	740A	-	TY	-	12	-	3"150RS	-	L1C	-	AA

MODEL	DESCRIPTION
740A	Float Switch, Side Inserted, Two Point
740D	Float Switch, Side Inserted, Two Point, Differential

SENSING ELEMENT

Sensing Float				Min ANSI Process Connection		WKG psig @ °F		
M/N	MATERIAL	OD	LENGTH	NPT	Flanged Nozzle	100	450	750
TY	316 Stainless Steel	2.6	7.0	3.0 in*	3 in SCH 160	275	185	155
16Y	316 Stainless Steel	2.5	Ball	3.0 in*	3 in SCH 160	860	560	470
DY	316 Stainless Steel	3.5	Ball	N/A	4 in SCH 120	500	330	275
YY	316 Stainless Steel	3.5	Ball	N/A	4 in SCH 120	1760	1150	970

INSERTION DISTANCE

Insertion (Inches)	Min SPG @ Inches				Diff Adj.	
M/N	TY	16Y	DY	YY	Min	Max
12	0.50	0.70	0.60	0.40	2.0	5.0
24	0.50	0.77	0.55	0.73	3.5	8.0
36	0.55	N/A	0.50	N/A	5.0	12.0
48	0.60	N/A	0.55	N/A	7.5	16.0

PROCESS CONNECTION	DESCRIPTION
	Refer to 'Mechanical Technical Resources' for M/N
	MPT sizes 3 in to 4 in
	Flange sizes 3 in to 8 in, Classes 150, 300

SWITCHING & HOUSING	DESCRIPTION
	Refer to 'Mechanical Technical Resources' for options

OPTIONS[2]	DESCRIPTION
AA	None
T6	6 in temperature extension
T12	12 in temperature extension
HH	120 ACV housing heater

Notes:
[2] A hyphen will separate multiple options selected
- 16Y, YY Float not available with 36 and 48 insertion

REQUIRED ORDERING INFORMATION:

- Detailed model number
- Tag or nameplate detail (if required)
- Documentation & testing packages (if required, refer "Additional Resources")

APPLICATION DETAILS:

- Process fluid or material name
- Process fluid or material specific gravity
- Maximum process temperature
- Maximum process pressure

Model 750 • Float Switch, External Cage, Horizontal

Features

- One alarm point
- Small, vertical mounting
- External cage mounted outside process vessel
- Float type leveling switch
- Balanced horizontal element design

Description

The Delta Controls **Model 750** Float Switch utilizes a balanced horizontal element design. Model 750 is suitable for **high temperature** and **pressure**. The sensing elements can be made solid for high pressures, better reliability, and corrosion resistance. A float is held in a horizontal position by a counterweight pivot mechanism. As the liquid level rises, the sensing element is moved vertically up. This movement results in short stroke rotary motion which carries the **drive magnet** into the field of the switch station magnet.

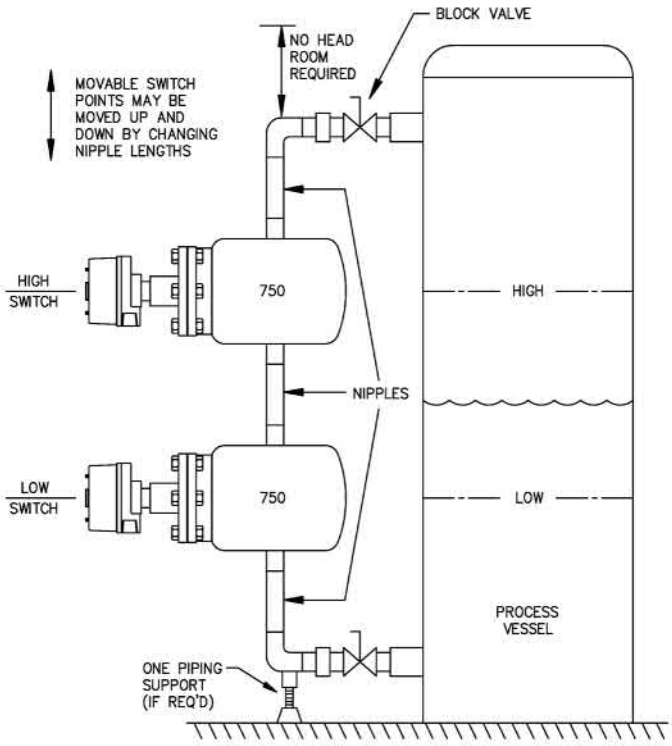
The vertical dimension requirement is small–less than inches in some cases. Its **dual magnet positive switching action** is reliable as well as insensitive to vibration and shock. There is no 'in between' condition of the switching mechanism. This modern design has significant advantages over vertically rising float design. The straight through piping is **efficient**, lowers installation costs, and switch point can be set to a new elevation without cutting on the process vessel.

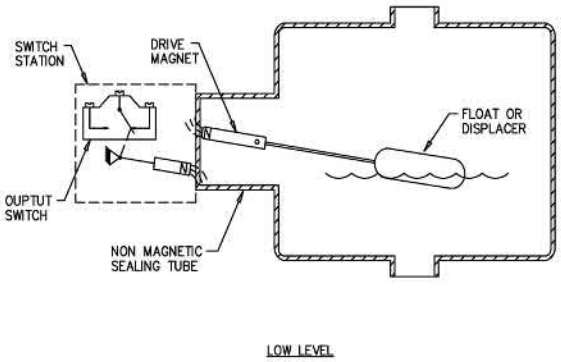
The switch magnet is pushed against the side of the sealing tube and the output switch is actuated. When the liquid level falls, the **sensing element** moves down with it. The drive magnet is rotated back through the magnet fields; the switch magnet is repulsed, the switch returns to its original position, and the output switch de-actuates. The dual opposed magnet design provides **snap action** of the switch mechanism; immunity from vibration, and greatly improved reliability.

Model 750

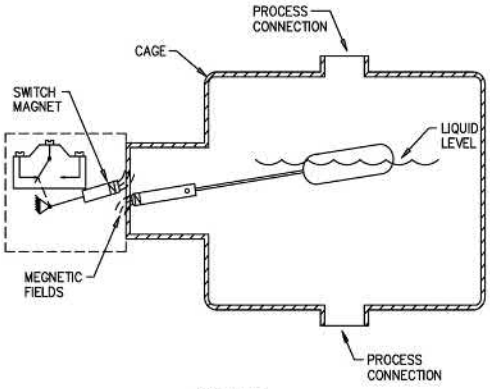
Specifications

Available Wetted Materials:	316 Stainless Steel, carbon steel
Specific Gravity:	0.50 to 2.40
Temperature Range:	-200 °F to +1100 °F (-129 °C to +593 °C)
Pressure Range:	-15 psig to +6000 psig (-1 bar to +413.6 bar)
Orientation:	Top/Bottom
Butt or Socket Weld:	1.0 in
Threaded Connection:	1.0 in FPT 1.0 in to 4.0 in MPT
Flanged Connection:	1.0 in to 8.0 in
Flange Rating:	≤ 1500 lb ANSI flanges or Grayloc® hub DIN or JIS equivalents
Certifications:	Third Party Listed by CSA NRTL/C (USA and Canada) Class I, Division 1, Groups B, C and D; Class II, Division 1, Groups E, F and G; Class III, Division 1 Class I, Zone 1, Ex d IIB+H2 Class I, Zone 1, AEx d IIB+H2





LOW LEVEL



HIGH LEVEL

Model 750 • Float Switch, External Cage, Horizontal

Model Numbering System

MODEL EXAMPLE	MODEL	-	SENSING ELEMENT	-	BODY CAGE CONNECTION	-	PROCESS CONNECTION	-	SWITCHING & HOUSING	-	OPTIONS
	750	-	VY	-	W	-	1"150RY	-	L1C	-	AA

MODEL	DESCRIPTION
750	Float Switch, External Cage, Horizontal

SENSING ELEMENT

* Element Assembly				Assembly Working psig @ F			
Material							
M/N	FLOAT	CAGE	MIN SPG	100	450	750	1000
VS	316 Stainless Steel	Steel	0.80	375	235	200	85
VY	316 Stainless Steel	316 Stainless Steel	0.80	375	235	200	185
XS	316 Stainless Steel	Steel	0.50	965	630	935	80
XY	316 Stainless Steel	316 Stainless Steel	0.50	720	580	510	475
YS	316 Stainless Steel	Steel	0.40	1750	1100	1060	275
YY	316 Stainless Steel	316 Stainless Steel	0.40	1585	1100	1060	875
Interface Service							
KIS	316 Stainless Steel	Steel	*0.15	400	260	245	200
KIY	316 Stainless Steel	316 Stainless Steel	*0.15	400	260	245	200

BODY CAGE CONNECTION	DESCRIPTION
W	Welded, No flanged cage connection
F	Flanged cage connection

PROCESS CONNECTION	DESCRIPTION
	Refer to 'Mechanical Technical Resources' for M/N
	FPT size 1 in
	Flange sizes 1 in to 8 in, Class 150 to 1500
	Process connection material must match cage material

SWITCHING & HOUSING	DESCRIPTION
	Refer to 'Mechanical Technical Resources' for options

OPTIONS	DESCRIPTION
AA	None
HH	120 ACV housing heater

Notes:
- SPG: Specific Gravity Unit
- Steel cage is A-106B material, Limited to 800 °F max continous service
- * 'KI' min difference between the SPG of the 2 liquids is 0.15
- Min SPG of the heavier liquid: 0.40

REQUIRED ORDERING INFORMATION:

- Detailed model number
- Tag or nameplate detail (if required)
- Documentation & testing packages (if required, refer "Additional Resources")

APPLICATION DETAILS:

- Process fluid or material name*
- Process fluid or material specific gravity
- Maximum process temperature
- Maximum process pressure

*Upper and lower materials required for interface service

Model 760 • Float Switch, External Cage, Vertical

Features

- Recognized worldwide
- One alarm point
- External cage mount float
- Available in threaded, socket weld or flanged
- Simple, yet robust design

Description

The Delta Controls **Model 760** Float Switch has been an industry standard for decades. Thousands of units are providing continuous service with **highly reliable** monitoring of liquid levels and interfaces.

The 760 external cage mounted float actuated switches are used to provide **alarm functions**. These actions are produced in response to a float position as it rides up and down the surface of the process liquid level or interface dividing line. All units are equipped with a guide bushing at the lower end of the stroke rod. This feature keeps the **float** and **attractor mechanism centered** in the cage and prevents the float from dragging on the cage wall. Failures due to dragging, sideways binding, and bent rods have historically been problems with older vertically rising float designs.

The 760 is available with a flange sealed cage, which allows access to the float and internal parts for inspection and maintenance. The flange is an ANSI design and usually carries the same pressure rating as the element assembly with higher pressure ratings available. It is available with **standard or special connection configurations**. These include side/bottom, side/side, and side/side/bottom drain. All connections are available either threaded, socket weld, or flanged.

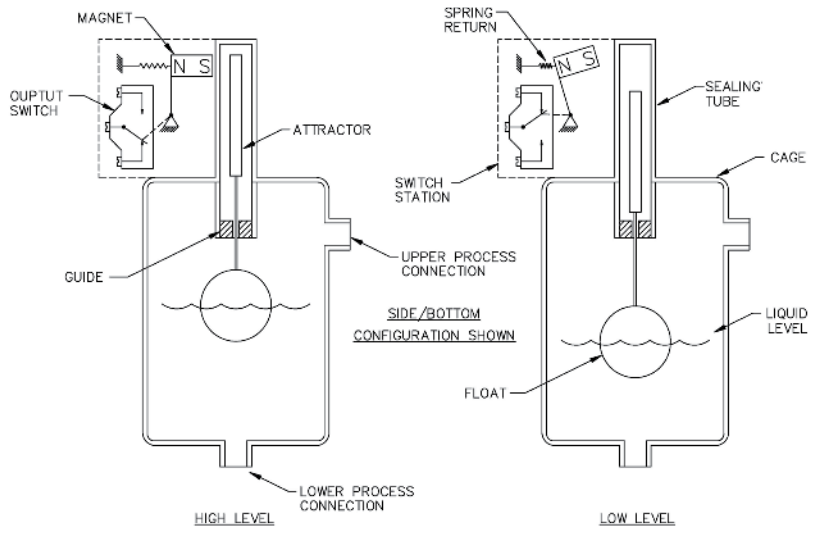
The float inside the cage rests on the surface of the liquid and rides up and down with as the level changes. An attractor is attached to the float and also moves with the liquid level. When the level rises, the attractor is move up into the field of the switch station magnet. The **magnet is free to move** and is pulled in against the side of the nonmagnetic sealing tube. The output switch is actuated by the movement of the magnet. Similarly, when the liquid level falls, the attractor is pulled out of the magnet. The return spring pulls the magnet back to its **original position** and the output switch is de-actuated.

Model 760

Specifications

Available Wetted Materials:	304 Stainless Steel, 316 Stainless Steel, carbon steel
Switch Action:	Single point alarm
Specific Gravity:	0.50 to 2.40
Temperature Range:	-100 °F to +800 °F (-73 °C to +427 °C)
Pressure Range:	-15 psig to +20 000 psig (-1 bar to +1378.9 bar)
Optional Drain:	0.75 in NPT
Orientation:	Side/Bottom, Side/Side, Side/Side with Drain
Socket Weld Connection:	1.0 in
Threaded Connection:	1.0 in FPT
Flanged Connection:	1.0 to 2.0 in
Flange Rating:	≤ 600 lb ANSI flanges or Grayloc® hub DIN or JIS equivalents
Certifications:	
C SP US	Third Party Listed by CSA NRTL/C (USA and Canada) Class I, Division 1, Groups B, C and D; Class II, Division 1, Groups E, F and G; Class III, Division 1 Class I, Zone 1, Ex d IIB+H2 Class I, Zone 1, AEx d IIB+H2

Model 760 • Float Switch, External Cage, Vertical



Model Numbering System

MODEL EXAMPLE	MODEL	-	SENSING ELEMENT	-	BODY CAGE CONNECTION	-	CONNECTION SPACING	-	ORIENTATION	-	PROCESS CONNECTION	-	SWITCHING & HOUSING	-	OPTIONS[2]
	760	-	CZ	-	W	-	B	-	SS	-	1"FPTS	-	L1C	-	AA

MODEL	DESCRIPTION
760	Float Switch, External Cage, Vertical

SENSING ELEMENT

* Element Assembly				Assembly Working psig @ F		
Material						
M/N	FLOAT	CAGE	MIN SPG	100	450	750
FS	316 Stainless Steel	Steel	0.80	1320	865	735
FB	316 Stainless Steel	304 Stainless Steel	0.80	875	605	500
FY	316 Stainless Steel	316 Stainless Steel	0.80	875	605	500
CZ	316 Stainless Steel	Steel	0.80	600	500	400
CS	316 Stainless Steel	Steel	0.75	1050	680	595
CB	316 Stainless Steel	304 Stainless Steel	0.75	970	680	535
CY	316 Stainless Steel	316 Stainless Steel	0.75	970	680	535
GS	316 Stainless Steel	Steel	0.70	850	565	485
GB	316 Stainless Steel	304 Stainless Steel	0.70	850	565	500
GY	316 Stainless Steel	316 Stainless Steel	0.70	850	565	500
HS	316 Stainless Steel	Steel	0.60	1170	755	665
HB	316 Stainless Steel	304 Stainless Steel	0.60	730	505	420
HY	316 Stainless Steel	316 Stainless Steel	0.60	730	505	420
LS	316 Stainless Steel	Steel	0.50	470	305	260
LB	316 Stainless Steel	304 Stainless Steel	0.50	470	305	260
LY	316 Stainless Steel	316 Stainless Steel	0.50	470	305	260
Interface Service						
IS	316 Stainless Steel	Steel	^	730	475	400
IB	316 Stainless Steel	304 Stainless Steel	^	730	475	400
IY	316 Stainless Steel	316 Stainless Steel	^	730	475	400

Model Numbering System Cont.

MODEL EXAMPLE	MODEL	-	SENSING ELEMENT	-	BODY CAGE CONNECTION	-	CONNECTION SPACING	-	ORIENTATION	-	PROCESS CONNECTION	-	SWITCHING & HOUSING	-	OPTIONS[2]
	760	-	CZ	-	W	-	B	-	SS	-	1"FPTS	-	L1C	-	AA

BODY CAGE CONNECTION	DESCRIPTION
W	Welded, No flanged cage connection
F	Flanged cage connection

CONNECTION SPACING	DESCRIPTION
B	Basic spacing
C**.*	Custom, **.* in spacing

ORIENTATION	DESCRIPTION
SB	Side/Bottom
SS	Side/Side
SSD	Side/Side plus 3/4 in bottom drain

PROCESS CONNECTION	DESCRIPTION
	Refer to 'Mechanical Technical Resources' for M/N
	FPT size 1 in
	Flange sizes 1 in to 2 in, Classes 150, 300, 600
	Socket weld size 1 in
	Process connection material must match cage material

SWITCHING & HOUSING	DESCRIPTION
	Refer to 'Mechanical Technical Resources' for options

OPTIONS[2]	DESCRIPTION
AA	None
T6	6 in temperature extension ('Mechanical Technical Resources' for ratings)
T12	12 in temperature extension ('Mechanical Technical Resources' for ratings)
HH	120 ACV housing heater

Notes:
[2] A hyphen will separate multiple options selected
- SPG: Specific Gravity Unit
- * Steel cage is A-106B carbon steel material: Limit -20 °F
- ^ Min difference between the SPG of the 2 liquied: 0.10

REQUIRED ORDERING INFORMATION:

- Detailed model number
- Tag or nameplate detail (if required)
- Documentation & testing packages (if required, refer "Additional Resources")

APPLICATION DETAILS:

- Process fluid or material name*
- Process fluid or material specific gravity
- Maximum process temperature
- Maximum process pressure

*Upper and lower materials required for interface service

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Model 762 • Displacer Switch, External Cage, Vertical, High Pressure

Features

- Mechanical simplicity produces maximum reliability
- Designed in accordance with ANSI B31
- Low specific gravity operation, optional pressure to 20 000 psig
- Interface detection at high pressures
- Insensitive to high frequency vibration
- No seals to leak, magnetically coupled

Description

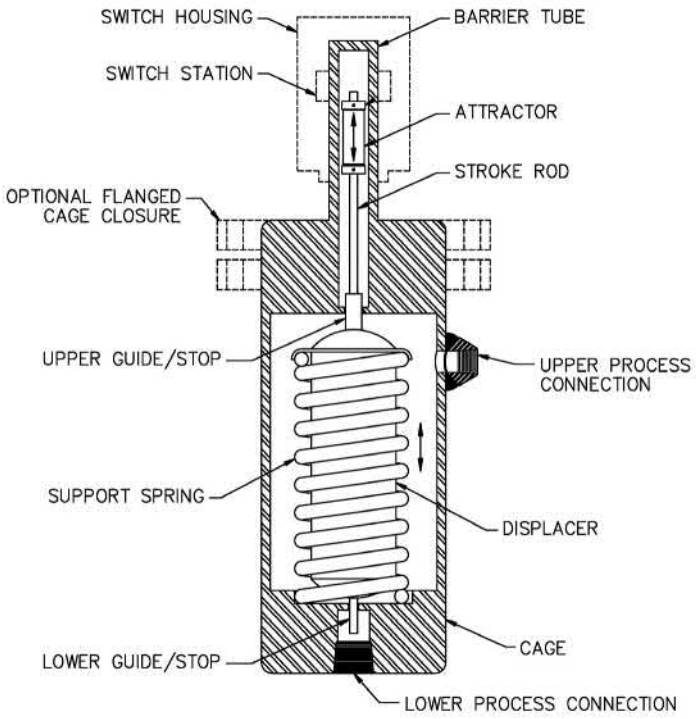
The Delta Controls **Model 762** Displacer Switch provides output switching at one elevation of a varying liquid level. The unit has its primary element mounted outside the process vessel. The **external cage design** is utilized to minimize process turbulence effects and so that the level alarm may be valved off from the process vessel. It can then be depressurized for testing and maintenance without disturbing the operation of the process. The output of the unit consists of a switching action at a **preset liquid level elevation**. The liquid level rises and the displacer lifts the attractor in front of the switch station magnet. This external magnet pulls in and the output switch is actuated. Decreasing liquid level moves the displacer assembly downwards. The output switch de-actuates when the attractor is pulled out of the switch station's magnetic field.

The switch station is mounted external to the **barrier tube** and is isolated from the process liquid. It is equipped with a magnet whose lines of force pass through the non-magnetic barrier tube. The magnet is pulled in against the outside of the tube and actuates the microswitch(s) when the attractor is lifted into the **magnetic field** inside the tube. This unit utilizes thick wall displacers for sensing elements. The support spring offsets most of the displacer weight so that liquid buoyancy requirements are **minimized**. It is designed for very high pressure services, even those with low specific gravities.

Model 762

Specifications

Available Wetted Materials:	304 Stainless Steel, 316 Stainless Steel, carbon steel
Switch Action:	1 point alarm
Specific Gravity:	0.40 to 2.40
Temperature:	-100 °F to +800 °F (-73 °C to +427 °C)
Pressure:	-15 psig to 20 000 psig (-1 bar to 1400 bar)
Optional Drain:	0.75 in NPT
Orientation:	Side/Bottom, Side/Side, Side/Side/Drain
Socket Weld Connection:	1.0 in
Threaded Connection:	1.0 in FPT
Flanged Connection:	1.0 in to 2.0 in
Flange Rating:	≤ 2500 lb ANSI flanges or Greyloc® hub DIN or JIS equivalents
Certifications:	
C SP® US	Third Party Listed by CSA NRTL/C (USA and Canada) Class I, Division 1, Groups B, C and D; Class II, Division 1, Groups E, F and G; Class III, Division 1 Class I, Zone 1, Ex d IIB+H2 Class I, Zone 1, AEx d IIB+H2


SWITCH HOUSING
BARRIER TUBE
SWITCH STATION
ATTRACTOR
STROKE ROD
OPTIONAL FLANGED CAGE CLOSURE
UPPER GUIDE/STOP
UPPER PROCESS CONNECTION
SUPPORT SPRING
DISPLACER
CAGE
LOWER GUIDE/STOP
LOWER PROCESS CONNECTION

Model 762 • Displacer Switch, External Cage, Vertical, High Pressure

Model Numbering System

MODEL EXAMPLE	MODEL	-	SENSING ELEMENT	-	BODY CAGE CONNECTION	-	CONNECTION SPACING	-	ORIENTATION	-	PROCESS CONNECTION	-	SWITCHING & HOUSING	-	OPTIONS
	762	-	17S	-	W	-	B	-	SSD	-	1"FPTS	-	L1C	-	AA

MODEL	DESCRIPTION
762	Displacer Switch, External Cage, Vertical, High Pressure

SENSING ELEMENT

Displacer Sensing Element						
	Material		Min SPG °F		Assembly Working psig at °F	
M/N	ELEMENT	CAGE	215	450	215	450
17S	316 Stainless Steel	Steel	0.60	0.65	1325	1015
17B	316 Stainless Steel	304 Stainless Steel	0.60	0.65	1260	1015
17Y	316 Stainless Steel	316 Stainless Steel	0.60	0.65	1260	1015
19S	316 Stainless Steel	Steel	0.40	0.45	1010	810
19B	316 Stainless Steel	304 Stainless Steel	0.40	0.45	1010	810
19Y	316 Stainless Steel	316 Stainless Steel	0.40	0.45	1010	810
33S	316 Stainless Steel	Steel	0.40	0.50	3000	3000
34S	316 Stainless Steel	Steel	0.40	0.50	4500	4500
35S	316 Stainless Steel	Steel	0.40	0.50	6000	6000
36S	316 Stainless Steel	Steel	0.40	0.50	7500	7500
37S	316 Stainless Steel	Steel	0.40	0.50	10 000	10 000
38S	316 Stainless Steel	Steel	0.40	0.50	20 000	20 000

BODY CAGE CONNECTION	DESCRIPTION
W	Welded, No flanged cage connection
F	Flanged cage connection

CONNECTION SPACING	DESCRIPTION
B	Basic spacing
C**.*	Custom, **.* in spacing

ORIENTATION	DESCRIPTION
SB	Side/Bottom
SS	Side/Side
SSD	Side/Side plus 3/4 in bottom drain

PROCESS CONNECTION	DESCRIPTION
	Refer to 'Mechanical Technical Resources' for M/N
	FPT size 1 in
	Flange sizes 1 in to 2 in, Classes 150 to 2500
	Socket weld size 1 in
	Process connection material must match cage material

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MODEL EXAMPLE	MODEL	-	SENSING ELEMENT	-	BODY CAGE CONNECTION	-	CONNECTION SPACING	-	ORIENTATION	-	PROCESS CONNECTION	-	SWITCHING & HOUSING	-	OPTIONS
	762	-	17S	-	W	-	B	-	SSD	-	1"FPTS	-	L1C	-	AA

SWITCHING & HOUSING	DESCRIPTION
	Refer to 'Mechanical Technical Resources' for options

OPTIONS	DESCRIPTION
AA	None
HH	120 ACV housing heater

Notes:
- SPG: Specific Gravity Unit
- Note: Units for highter pressure and temperature are optional Contact the factory

REQUIRED ORDERING INFORMATION:

- Detailed model number
- Tag or nameplate detail (if required)
- Documentation & testing packages (if required, refer to "Additional Resources")

APPLICATION DETAILS:

- Process fluid or material name
- Process fluid or material specific gravity
- Maximum process temperature
- Maximum process pressure

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Model 763 • Float Switch, External Cage, Horizontal, High Temperature and Pressure, Steam Serv

Features

- Single alarm point
- High pressure service
- Reliable operation in steam condensate applications
- Simple, robust design

Description

The Delta Controls **Model 763** Float Switch is specially intended for the tough applications found in boiler houses and heating facilities. The 763's are typically used in steam drum level and drip leg services and similar environments.

Various element styles are utilized to produce the most reliable operation under the **specific service conditions**. Dual magnets are standard in all models providing reliable and positive switching. They also make the units immune to the vibration-induced false alarms and shutdowns.

The **763 condensate level switch** produces a switching action when a liquid level passes a selected elevation. The sensing element is mounted in an external cage. An **external cage** is utilized to minimize the effects of turbulence, boiling, and splashing on the measurement. This cage design can also be valved off from the process, cooled and depressurized; allowing inspection, testing, maintenance, etc.

The output signal from the 763 consists of one or more heavy **SPDT dry contacts**. The unit has a strong heavy-wall displacer sensing element. The weight of this element is partially offset by a pivoted counterweight. The displacer net weight is strictly a function of the earth's gravity. Switch action is **unaffected by process temperature** and other variables. This design allows it to work reliably at temperatures in excess of 1500 °F (815 °C).

The 763 is truly a **highly reliabilit**y liquid level switch which operates at high temperatures and pressures. Only a single weight which is kept in position by a pivot shaft, moves. Reliable magnet lines of force penetrate the cage wall and connect up to the output switch.

Model 763

Specifications

Available Wetted Materials:	316 Stainless Steel, carbon steel
Switch Action:	Single point alarm
Specific Gravity:	0.30 to 2.40
Interface Differential:	0.1 min
Temperature:	-350 °F to +1100 °F (-212 °C to +593 °C)
Pressure:	-15 psig to 6000 psig (-1 bar to +414 °C)
Process Connection:	
Orientation:	Top/Bottom
Butt or Socket Weld:	1.0 in
Certifications:	
c SP® us	Third Party Listed by CSA NRTL/C (USA and Canada) Class I, Division 1, Groups B, C and D; Class II, Division 1, Groups E, F and G; Class III, Division 1 Class I, Zone 1, Ex d IIB+H2 Class I, Zone 1, AEx d IIB+H2

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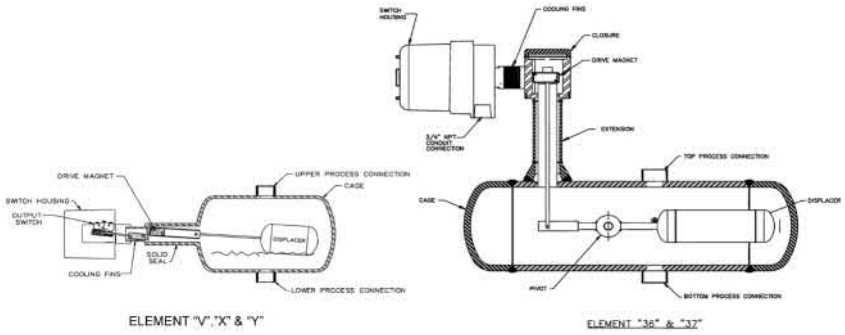


Model Numbering System

MODEL EXAMPLE	MODEL	-	SENSING ELEMENT	-	BODY CAGE CONNECTION	-	PROCESS CONNECTION	-	SWITCHING & HOUSING	-	OPTIONS
	763	-	36S	-	W	-	1"SWS	-	L1C	-	AA

MODEL	DESCRIPTION
763	Float Switch, External Cage, Horizontal, High Temperature and Pressure, Steam Service

SENSING ELEMENT

				Min Specific Gravity Limitations for Steam		Working psig @ °F Vapor Temperature			
Material			Process Connection Spacing (Inches) **	Service psig* Saturation Steam		A106 Carbon Steel		316 Stainless Steel	
M/N	SENSOR	CAGE		PSI	°F	-20 to +650	+750	+1000	+1150
36S	316 Stainless Steel	Carbon Steel	8.0	2000	636	1800	1550	–	–
36Y	316 Stainless Steel	316 Stainless Steel	8.0	2000	636	–	–	3000	2500
37S	316 Stainless Steel	Carbon Steel	11.9	3000	695	3000	2670	–	–
37Y	316 Stainless Steel	316 Stainless Steel	11.9	3000	695	–	–	3000	2500

BODY CAGE CONNECTION	DESCRIPTION
W	Welded, No flanged cage connection

PROCESS CONNECTION	DESCRIPTION
	Refer to 'Mechanical Technical Resources' for M/N
	Socket weld size 1 in
	Butt weld size 1 in

SWITCHING & HOUSING	DESCRIPTION
	Refer to 'Mechanical Technical Resources'for options

OPTIONS	DESCRIPTION
AA	None
HH	120 ACV housing heater

Notes:
- SPG: Specific Gravity Unit
- Min SPG requirement occurs when presurized steam is at its saturation temperature
- The element is suitable for superheated steam and for higher pressures
- ** Other connection spacing available. Contact factory

REQUIRED ORDERING INFORMATION:
- Detailed model number
- Tag or nameplate detail (if required)
- Documentation & testing packages (if required, refer "Additional Resources")

APPLICATION DETAILS:
- Process fluid or material name
- Process fluid or material specific gravity
- Maximum process temperature
- Maximum process pressure

Model 765 • Float Switch, External Cage, Vertical, Two Point

Features

- Exterior barrier tube switch station
- Designed in accordance with ANSI standards
- Low specific gravity operation
- Insensitive to high frequency vibration

Description

The Delta Controls **Model 765** Float Switch has a float differential range of up to 72 inches and utilizes two switch stations. This design **allows both monitoring and shutdown operation** of critical liquid levels with a single control. It can provide a 'High' alarm, plus a 'High-High' shutdown action with one control unit.

The 765 float inside the cage rests on the surface of the liquid and rides up and down as the level changes. An **attractor** is attached to the float and also moves with the station magnet. When the level rises, the attractor is moved up into the field of the **switch station magnet**. The magnet is free to move and is pulled in against the side of the nonmagnetic sealing tube. The output switch is actuated by the movement of the magnet. If the level continues to rise, the attractor is pushed into the field of the upper switch station magnet and that output switch is actuated.

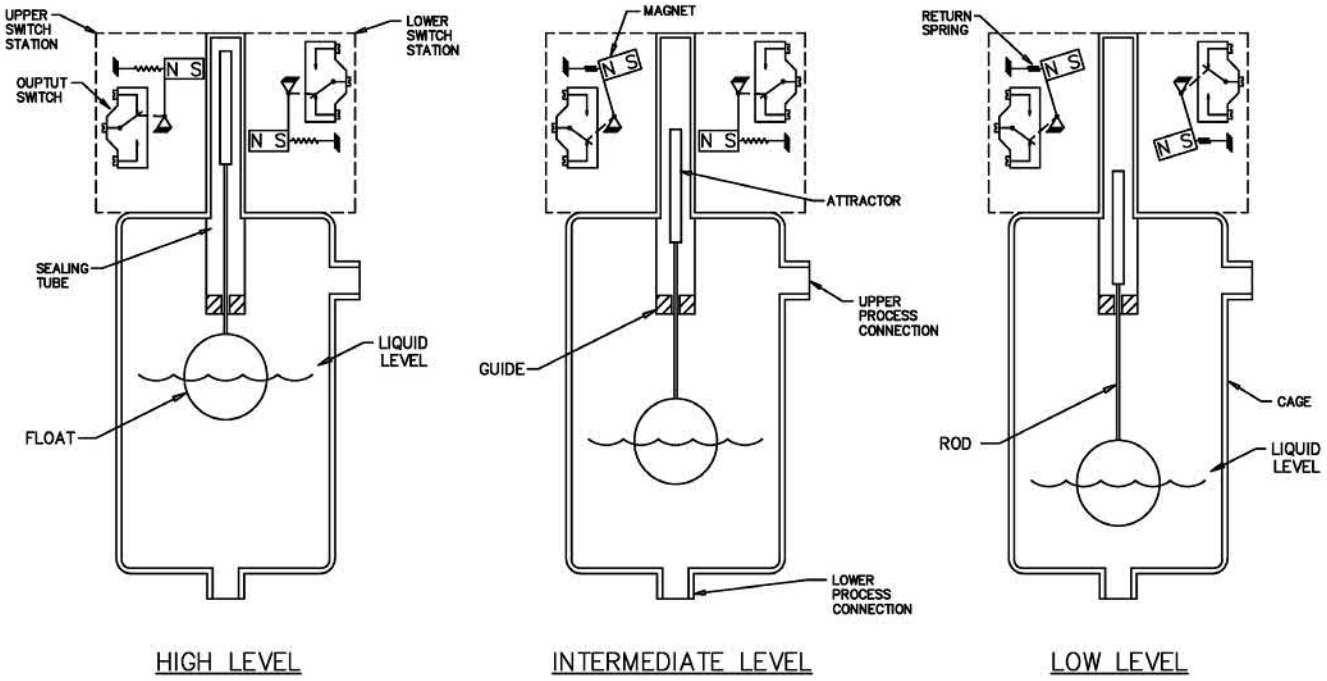
Similarly, when the liquid level falls the attractor is sequentially pulled out of the field of each magnet. The magnet moves back to its **original position** and the output switch is de-actuated. Note that extra force (greater specific gravity [SPG]) is required for operating the second switch station.

Option: The Model 765 Option D body, mechanism, and float utilizes a single switching station. The station activates when the sensing float rises to the upper stop and lifts the guide rod attractor into the field of the station magnet. The **station stays activated** until the float moves down against the lower stop. The guide rod-attractor is then pulled down out of the magnetic field and the switch station deactivates. It remains in that condition until the float again rises up against the upper stop and activates the switch.

Model 765

Specifications

Available Wetted Materials:	304 Stainless Steel, 316 Stainless Steel, carbon steel
Switch Action:	From 1 to 4 points of alarm and/or differential
Differential:	≤ 72 in (1.83 m)
Specific Gravity:	0.4 to 2.40
Temperature:	-20 °F to +750 °F (-29 °C to +399 °C)
Pressure:	-15 psig to +2200 psig (-1 bar to 151.6 bar)
Optional Drain:	0.75 in NPT
Orientation:	Side/Bottom, Side/Side, Side/Side/Drain
Socket Weld Connection:	1.0 in
Threaded Connection:	1.0 in FPT
Flanged Connection:	1.0 to 2.0 in
Flange Rating:	≤ 600 lb ANSI 2 in Greyloc® clamp hubs DIN or JIS equivalents
Certifications:	
C SP® US	Third Party Listed by CSA NRTL/C (USA and Canada) Class I, Division 1, Groups B, C and D; Class II, Division 1, Groups E, F and G; Class III, Division 1 Class I, Zone 1, Ex d IIB+H2 Class I, Zone 1, AEx d IIB+H2


UPPER SWITCH STATION
LOWER SWITCH STATION
OUPTUT SWITCH
N S
N S
SEALING TUBE
LIQUID LEVEL
FLOAT
HIGH LEVEL
MAGNET
N S
N S
ATTRACTOR
UPPER PROCESS CONNECTION
GUIDE
LOWER PROCESS CONNECTION
INTERMEDIATE LEVEL
RETURN SPRING
N S
N S
CAGE
ROD
LIQUID LEVEL
LOW LEVEL

Model 765 • Float Switch, External Cage, Vertical, Two Point

Model Numbering System

MODEL EXAMPLE	MODEL	-	SENSING ELEMENT	-	BODY CAGE CONNECTION	-	CONNECTION SPACING	-	ORIENTATION	-	PROCESS CONNECTION	-	SWITCHING & HOUSING	-	OPTIONS[2]
	765A	-	DS	-	W	-	B	-	SSD	-	1"FPTS	-	L1C	-	A

MODEL	DESCRIPTION
765A	Float Switch, External Cage, Vertical, Two Point
765D	Float Switch, External Cage, Vertical, Two Point, Differential

SENSING ELEMENT

ES Element Assembly						
Material				Assembly Working psig @ F		
M/N	FLOAT	CAGE	MIN SPG	100	450	750
DS	316 Stainless Steel	Steel	0.85	525	350	300
DB	316 Stainless Steel	304 Stainless Steel	0.85	525	350	300
DY	316 Stainless Steel	316 Stainless Steel	0.85	525	350	300
GS	316 Stainless Steel	Steel	0.70	850	565	485
GB	316 Stainless Steel	304 Stainless Steel	0.70	850	565	500
GY	316 Stainless Steel	316 Stainless Steel	0.70	850	565	500
HS	316 Stainless Steel	Steel	0.60	1170	755	665
HB	316 Stainless Steel	304 Stainless Steel	0.60	730	505	420
HY	316 Stainless Steel	316 Stainless Steel	0.60	730	505	420
LS	316 Stainless Steel	Steel	0.50	470	305	260
LB	316 Stainless Steel	304 Stainless Steel	0.50	470	305	260
LY	316 Stainless Steel	316 Stainless Steel	0.50	470	305	260
Interface Service						
IS	316 Stainless Steel	Steel	^	730	475	400
IB	316 Stainless Steel	304 Stainless Steel	^	730	475	400
IY	316 Stainless Steel	316 Stainless Steel	^	730	475	400

BODY CAGE CONNECTION	DESCRIPTION
W	Welded, No flanged cage connection
F	Flanged cage connection

CONNECTION SPACING	DESCRIPTION
B	Basic spacing
C**.*	Custom, **.* in spacing

ORIENTATION	DESCRIPTION
SB	Side/Bottom
SS	Side/Side
SSD	Side/Side plus 3/4 in bottom drain

MODEL EXAMPLE	MODEL	-	SENSING ELEMENT	-	BODY CAGE CONNECTION	-	CONNECTION SPACING	-	ORIENTATION	-	PROCESS CONNECTION	-	SWITCHING & HOUSING	-	OPTIONS[2]
	765A	-	DS	-	W	-	B	-	SSD	-	1"FPTS	-	L1C	-	A

PROCESS CONNECTION	DESCRIPTION
	Refer to 'Mechanical Technical Resources'for M/N
	FPT size 1 in
	Flange sizes 1 in to 2 in, Classes 150, 300, 600
	Socket weld size 1 in
	Process connection material must match cage material

SWITCHING & HOUSING	DESCRIPTION
	Refer to 'Mechanical Technical Resources' for options

OPTIONS[2]	DESCRIPTION
AA	None
T6	6 in temperature extension ('Mechanical Technical Resources' for ratings)
T12	12 in temperature extension ('Mechanical Technical Resources' for ratings)
HH	120 ACV housing heater

Notes:
[2] A hyphen will separate multiple options selected
- SPG: Specific Gravity Unit
- Steel cage: A-106B carbon steel
- ^ Min difference between the SPG of the upper and lower liquids: 0.10

REQUIRED ORDERING INFORMATION:

- Detailed model number
- Tag or nameplate detail (if required)
- Documentation & testing packages (if required, refer "Additional Resources")

APPLICATION DETAILS:

- Process fluid or material name*
- Process fluid or material specific gravity
- Maximum process temperature
- Maximum process pressure

*Upper and lower materials required for interface service

Model 767 • Float Switch, External Cage, Vertical, Two Point, Wide Separation

Features

- 1 to 4 alarm and/or differential
- Two switch point stations
- Vertical mounted between process connections
- Customizable spacing

Description

The **Model 767** Float Switch provides two point alarms with from 6 to 72 inches of elevation spacing between the two switching points. The float features an extra wide spacing between the liquid level positions at which switch action occurs. The **wide spacing** is accomplished by allowing the float to slide on the float rod. No switch action occurs as long as the liquid level is varying between stops. The float is carried against a stop when it rises or falls far enough. The float pushes against the stop and **causes switch action to occur**. A counter spring offsets the weight of the attractor, rod, and inner works. The attractor is held in the middle of its travel as long as the liquid supporting the float between stops. The weight of the float pulls the attractor down on low level and its buoyancy lifts it up on high level. Each of these movements produces a switch action. The 767 **provides two switch points** at widely spaced alarm point locations.

Options: The Model 767 Option D utilizes a differential device and one switch station. It provides pumping control between the high and low switching points. The switch magnet is **attracted** and the switch station actuates when the upper stop is lifted by a float. The station stays actuated until the level drops enough for the float to push the lower stop down. The attractor is pulled away from the switch magnet; the switch **deactivates**, and stays that way until the upper stop is lifted again.

Model 767

Specifications

Available Wetted Materials:	304 Stainless Steel, 316 Stainless Steel, carbon steel
Switch Action:	From 1 to 4 points of alarm and/or differential
Differential:	≤ 72 in (1.83 m)
Specific Gravity:	0.40 to 2.40
Temperature:	-20 °F to +750 °F (-29 °C to +399 °C)
Pressure:	-15 psig to 2200 psig (-1 bar to +151.7 bar)
Optional Drain:	0.75 in NPT
Orientation:	Side/Bottom, Side/Side, Side/Side/Drain
Socket Weld Connection:	1.0 in
Threaded Connection:	1.0 in FPT
Flanged Connection:	1.0 to 2.0 in
Flange Rating:	≤ 600 lb ANSI flanges or Grayloc® hub DIN or JIS equivalents
Certifications:	
	Third Party Listed by CSA NRTL/C (USA and Canada) Class I, Division 1, Groups B, C and D; Class II, Division 1, Groups E, F and G; Class III, Division 1 Class I, Zone 1, Ex d IIB+H2 Class I, Zone 1, AEx d IIB+H2

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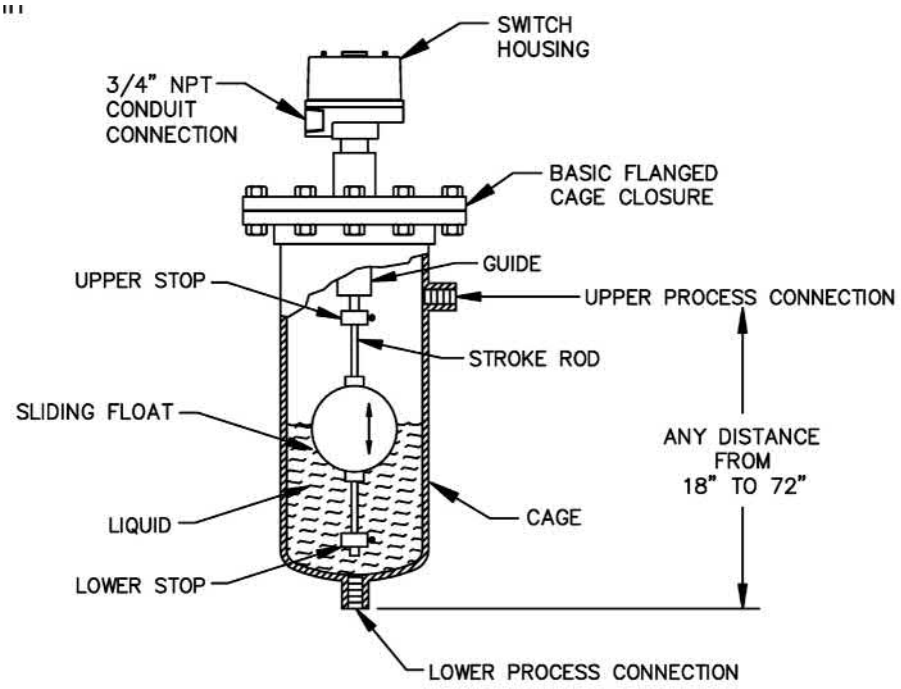
SWITCH HOUSING
3/4" NPT CONDUIT CONNECTION
BASIC FLANGED CAGE CLOSURE
GUIDE
UPPER STOP
UPPER PROCESS CONNECTION
STROKE ROD
SLIDING FLOAT
ANY DISTANCE FROM 18" TO 72"
CAGE
LIQUID
LOWER STOP
LOWER PROCESS CONNECTION

Model 767 • Float Switch, External Cage, Vertical, Two Point, Wide Separation

Model Numbering System

MODEL EXAMPLE	MODEL	-	SENSING ELEMENT	-	BODY CAGE CONNECTION	-	CONNECTION SPACING	-	ORIENTATION	-	PROCESS CONNECTION	-	SWITCHING & HOUSING	-	OPTIONS
	767A	-	11S	-	F	-	B	-	SSD	-	1"FPTS	-	L1C	-	AA

MODEL	DESCRIPTION
767A	Float Switch, External Cage, Vertical, Two Point, Wide Separation
767D	Float Switch, External Cage, Vertical, Two Point, Wide Separation, Differential

SENSING ELEMENT

* Element Assembly						
Material			Min SPG	Assembly Working psig @ F		
M/N	FLOAT	CAGE	A	100	250	450
11S	316 Stainless Steel	Steel	0.60	185	145	120
11B	316 Stainless Steel	304 Stainless Steel	0.60	185	145	120
11Y	316 Stainless Steel	316 Stainless Steel	0.60	185	145	120
12S	316 Stainless Steel	Steel	0.65	450	350	290
12B	316 Stainless Steel	304 Stainless Steel	0.65	450	350	290
12Y	316 Stainless Steel	316 Stainless Steel	0.65	450	350	290
13S	316 Stainless Steel	Steel	0.35	375	295	245
13B	316 Stainless Steel	304 Stainless Steel	0.35	375	295	245
13Y	316 Stainless Steel	316 Stainless Steel	0.35	375	295	245

BODY CAGE CONNECTION	DESCRIPTION
F	Flanged cage connection

CONNECTION SPACING	DESCRIPTION
B	Basic spacing
C**.*	Custom, **.* in spacing

ORIENTATION	DESCRIPTION
SB	Side/Bottom
SS	Side/Side
SSD	Side/Side plus 3/4 in bottom drain

PROCESS CONNECTION	DESCRIPTION
	Refer to 'Mechanical Technical Resources' for M/N
	FPT size 1 in
	Flange sizes 1 in to 2 in, Classes 150, 300, 600
	Socket weld size 1 in
	Process connection material must match cage material

MODEL EXAMPLE	MODEL	-	SENSING ELEMENT	-	BODY CAGE CONNECTION	-	CONNECTION SPACING	-	ORIENTATION	-	PROCESS CONNECTION	-	SWITCHING & HOUSING	-	OPTIONS
	767A	-	11S	-	F	-	B	-	SSD	-	1"FPTS	-	L1C	-	AA

SWITCHING & HOUSING	DESCRIPTION
	Refer to 'Mechanical Technical Resources' for options

OPTIONS	DESCRIPTION
AA	None
HH	120 ACV housing heater

Notes:
- SPG: Specific Gravity Unit
- Steel cage: A-106B carbon steel
- Flanged cleanout rating: Same as cage
- Min SPG: Increased by 6% above 300 °F

REQUIRED ORDERING INFORMATION:

- Detailed model number
- Tag or nameplate detail (if required)
- Documentation & testing packages (if required, refer "Additional Resources")

APPLICATION DETAILS:

- Process fluid or material name
- Process fluid or material specific gravity
- Maximum process temperature
- Maximum process pressure

Model 770 • Float Switch, External Cage, Vertical, Multipoint

Features

- 1 to 4 alarm and/or differential
- Two switch point stations
- External cage design with raised ANSI flanged closure, optional
- Wide-ranging differential points available

Description

The Delta Controls **Model 770** Float Switch provides switching alarm contacts at up to four elevations of a varying liquid level. The unit has its float mounted outside the process vessel in a cage. The external cage design is utilized to minimize process turbulence effects and in order that the level control may be valved off from the process vessel and depressurized for maintenance **without disturbing** the operation of the process.

The output of the control consists of **switching action** as the liquid level varies with up to four switch stations operating. Action occurs as the attractor arrives at each switching station. The switch stations are on the outside of the **barrier tube** which isolates them from the process liquid. Each is equipped with a magnet whose lines of force pass through the nonmagnetic barrier tube. The magnet is pulled in against the outside of the tube when the attractor is lifted into the magnetic field inside the tube. The liquid level rises and the float lifts the attractor in front of each switch station magnet. The magnet pulls in and its output switch is actuated. Each magnet pulls in sequentially as the liquid level continues to rise, and stays in as long as the liquid level is above that point. Decreasing liquid level moves the float/rod/collars/attractor downward.

Each output switch remains actuated until the **attractor** is pulled out of its magnetic field—it then de-actuates. The 770 is to be mounted vertically near the process vessel containing the liquid level to be monitored. It should be positioned so that the desired switching points are located between the upper and lower process connections on the element body. Long lines connecting the process vessel to the element chamber should be avoided; but when necessary, they should be sloped one inch per foot towards the process vessel to limit sedimentation buildup. The 770 provides switching alarm contacts at **four elevations** of a varying liquid level. The switching alarm points are separated from each other by approximately one and one half inches.

Model 770

Specifications

Available Wetted Materials:	304 Stainless Steel, 316 Stainless Steel, carbon steel
Switch Action:	From 1 to 4 points of alarm and/or differential
Differential:	≤ 72 in (1.83 m)
Specific Gravity:	0.40 to 2.40
Temperature:	-20 °F to +750 °F (-29 °C to +399 °C)
Pressure:	-15 psig to 2200 psig (-1 bar to +151.7 bar)
Optional Drain:	0.75 in NPT
Orientation:	Side/Bottom, Side/Side, Side/Side/Drain
Socket Weld Connection:	1.0 in
Threaded Connection:	1.0 in FPT
Flanged Connection:	1.0 to 2.0 in
Flange Rating:	≤ 600 lb ANSI flanges or Grayloc® hub DIN or JIS equivalents
Certifications:	
C SP US	Third Party Listed by CSA NRTL/C (USA and Canada) Class I, Division 1, Groups B, C and D; Class II, Division 1, Groups E, F and G; Class III, Division 1 Class I, Zone 1, Ex d IIB+H2 Class I, Zone 1, AEx d IIB+H2

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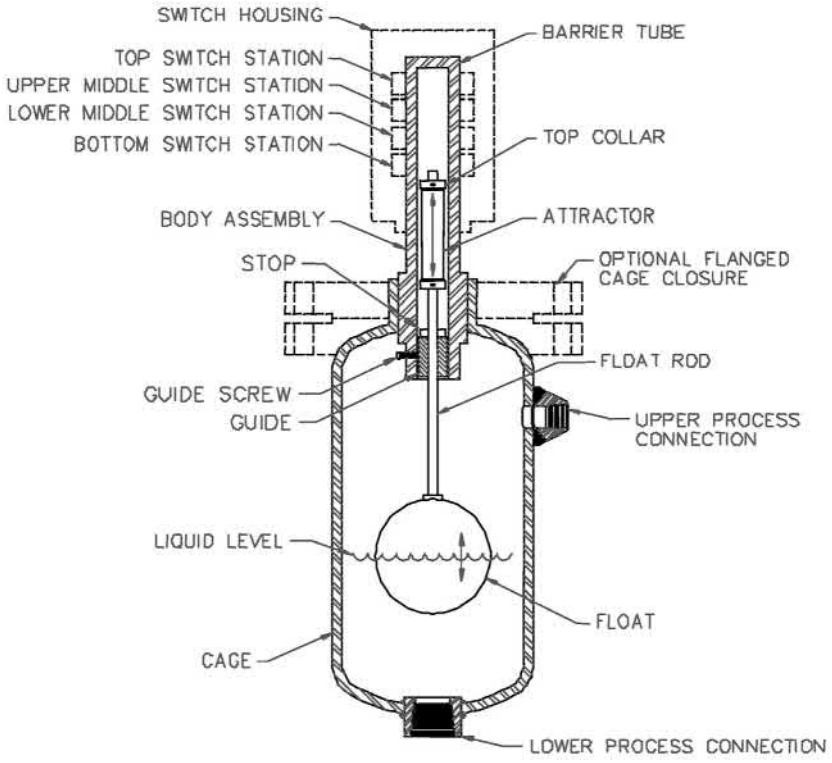
SWITCH HOUSING
TOP SWITCH STATION
UPPER MIDDLE SWITCH STATION
LOWER MIDDLE SWITCH STATION
BOTTOM SWITCH STATION
BODY ASSEMBLY
STOP
GUIDE SCREW
GUIDE
LIQUID LEVEL
CAGE
BARRIER TUBE
TOP COLLAR
ATTRACTOR
OPTIONAL FLANGED CAGE CLOSURE
FLOAT ROD
UPPER PROCESS CONNECTION
FLOAT
LOWER PROCESS CONNECTION

Model 770 • Float Switch, External Cage, Vertical, Multipoint

Model Numbering System

MODEL EXAMPLE	MODEL	-	SENSING ELEMENT	-	BODY CAGE CONNECTION	-	CONNECTION SPACING	-	ORIENTATION	-	PROCESS CONNECTION	-	SWITCHING & HOUSING	-	OPTIONS[2]
	770A	-	HS	-	W	-	B	-	SSD	-	1"FPTS	-	L1C	-	AA

MODEL	DESCRIPTION
770A	Float Switch, External Cage, Vertical, Two Point, Wide Separation, Four Alarm Points
770B	Float Switch, External Cage, Vertical, Two Point, Wide Separation, Three Switch Stations
770C	Float Switch, External Cage, Vertical, Two Point, Wide Separation, Two Switch Stations
770D	Float Switch, External Cage, Vertical, Two Point, Wide Separation, One Heavy Duty Switch Station
770E	Float Switch, External Cage, Vertical, Two Point, Wide Separation, Two Heavy Duty Switch Stations

SENSING ELEMENT

* Element Assembly								
Material			Min SPG/Suffix			Assembly Working psig @ °F		
M/N	FLOAT	CAGE	A & B	C	D	100	450	450
HS	316 Stainless Steel	Steel	0.80	0.72	0.61	470	305	260
HB	316 Stainless Steel	304 Stainless Steel	0.80	0.72	0.61	470	305	260
HY	316 Stainless Steel	316 Stainless Steel	0.80	0.72	0.61	470	305	260
MS	316 Stainless Steel	Steel	0.65	0.58	0.45	475	315	270
MB	316 Stainless Steel	304 Stainless Steel	0.65	0.58	0.45	475	315	270
MY	316 Stainless Steel	316 Stainless Steel	0.65	0.58	0.45	475	315	270
Interface Service								
IS	316 Stainless Steel	Steel	0.55 to 1.5 avg SPG			730	475	400
IB	316 Stainless Steel	304 Stainless Steel	0.18 min differential			730	475	400

BODY CAGE CONNECTION	DESCRIPTION
W	Welded, No flanged cage connection
F	Flanged cage connection

CONNECTION SPACING	DESCRIPTION
B	Basic spacing
C**.*	Custom, **.* in spacing

ORIENTATION	DESCRIPTION
SB	Side/Bottom
SS	Side/Side
SSD	Side/Side plus .75 in bottom drain

PROCESS CONNECTION	DESCRIPTION
	Refer to 'Mechanical Technical Resources' for M/N
	FPT size 1 in
	Flange sizes 1 in to 2 in, Classes 150, 300, 600
	Socket weld size 1 in
	Process connection material must match cage material

MODEL EXAMPLE	MODEL	-	SENSING ELEMENT	-	BODY CAGE CONNECTION	-	CONNECTION SPACING	-	ORIENTATION	-	PROCESS CONNECTION	-	SWITCHING & HOUSING	-	OPTIONS[2]
	770A	-	HS	-	W	-	B	-	SSD	-	1"FPTS	-	L1C	-	AA

SWITCHING & HOUSING	DESCRIPTION
	Refer to 'Mechanical Technical Resources' for options
	Only S* switch station available with 770A
	S* switch station not available with 770D, 770E

OPTIONS[2]	DESCRIPTION
AA	None
T6	6 in temperature extension ('Mechanical Technical Resources' for ratings)
T12	12 in temperature extension ('Mechanical Technical Resources' for ratings)
HH	120 ACV housing heater

Notes:

[2] A hyphen will separate multiple options selected

- SPG: Specific Gravity Unit
- Steel cage: A-106B material
- For 316 Stainless Steel cage instead of 304 Stainless Steel: Change 'B' to 'Y'
- Higher temperatures and pressures available: C/F
- Other materials are available: C/F

REQUIRED ORDERING INFORMATION:

- Detailed model number
- Tag or nameplate detail (if required)
- Documentation & testing packages (if required, refer "Additional Resources")

APPLICATION DETAILS:

- Process fluid or material name*
- Process fluid or material specific gravity
- Maximum process temperature
- Maximum process pressure

*Upper and lower materials required for interface service

Technical Resources

700 Switch/Housing

SWITCHING & HOUSING	DESCRIPTION	SPDT / DPDT	MICROSWITCH RATING	MICROSWITCH TEMPERATURE RATING	HOUSING RATING	HOUSING MATERIAL
T1C	High temperature	SPDT	5 A @ 125/250/480 ACV	-65 °F to 400 °F (-54 *C to 204 °C)	Explosion-proof*	Aluminum
T2C	High temperature	DPDT	5 A @ 125/250/480 ACV	-65 °F to 400 °F (-54 °C to 204 °C)	Explosion-proof*	Aluminum
H1C	Environmentally sealed	SPDT	15 A @ 125/250/480 ACV	-67 °F to 185 °F (-55 °C to 85 °C)	Explosion-proof*	Aluminum
H2C	Environmentally sealed	DPDT	15 A @ 125/250/480 ACV	-67 °F to 185 °F (-55 °C to 85 °C)	Explosion-proof*	Aluminum
L1C	AC motor loads	SPDT	15 A @ 125/250/480 ACV	-67 °F to 185 °F (-55 °C to 85 °C)	Explosion-proof*	Aluminum
L2C	AC motor loads	DPDT	15 A @ 125/250/480 ACV	-67 °F to 185 °F (-55 °C to 85 °C)	Explosion-proof*	Aluminum
D1C	High DC loads	SPDT	10 A @ 125 ACV/DCV	-67 °F to 180 °F (-55 °C to 82 °C)	Explosion-proof*	Aluminum
D2C	High DC loads	DPDT	10 A @ 125 ACV/DCV	-67 °F to 180 °F (-55 °C to 82 °C)	Explosion-proof*	Aluminum
T1T	High temperature	SPDT	5 A @ 125/250/480 ACV	-65 °F to 400 °F (-54 °C to 204 °C)	Explosion-proof*	300 Stainless Steel
T2T	High temperature	DPDT	5 A @ 125/250/480 ACV	-65 °F to 400 °F (-54 °C to 204 °C)	Explosion-proof*	300 Stainless Steel
H1T	Environmentally sealed	SPDT	15 A @ 125/250/480 ACV	-67 °F to 185 °F (-55 °C to 85 °C)	Explosion-proof*	300 Stainless Steel
H2T	Environmentally sealed	DPDT	15 A @ 125/250/480 ACV	-67 °F to 185 °F (-55 °C to 85 °C)	Explosion-proof*	300 Stainless Steel
L1T	AC motor loads	SPDT	15 A @ 125/250/480 ACV	-67 °F to 185 °F (-55 °C to 85 °C)	Explosion-proof*	300 Stainless Steel
L2T	AC motor loads	DPDT	15 A @ 125/250/480 ACV	-67 °F to 185 °F (-55 °C to 85 °C)	Explosion-proof*	300 Stainless Steel
D1T	High DC loads	SPDT	10 A @ 125 ACV/DCV	-67 °F to 180 °F (-55 °C to 82 °C)	Explosion-proof*	300 Stainless Steel
D2T	High DC loads	DPDT	10 A @ 125 ACV/DCV	-67 °F to 180 °F (-55 °C to 82 °C)	Explosion-proof*	300 Stainless Steel
S1C	General use	SPDT	5 A @ 125/250/480 ACV	-65 °F to 250 °F (-54 °C to 121 °C)	Explosion-proof*	Aluminum
S2C	General use	DPDT	5 A @ 125/250/480 ACV	-65 °F to 250 °F (-54 °C to 121 °C)	Explosion-proof*	Aluminum
S1T	General use	SPDT	5 A @ 125/250/480 ACV	-65 °F to 250 °F (-54 °C to 121 °C)	Explosion-proof*	300 Stainless Steel
S2T	General use	DPDT	5 A @ 125/250/480 ACV	-65 °F to 250 °F (-54 °C to 121 °C)	Explosion-proof*	300 Stainless Steel

Notes:
- * CSA Rating
- Housing types 'C' and 'T'
- Cl I Div 1, Gr B,C,D; Cl II, Div 1 Gr E,F,G; CL III Div 1
- Class I Zone 1, Ex/AEx d IIB+H2
- General use

Optional Temperature Extension

		Max process temperature (°F)					
		Condensing service			Noncondensing service		
M/N	DESCRIPTION	D	S,L,H	T	D	S,L,H	T
AA	None	400	500	750	500	600	850
T6	6 in	500	575	950	600	700	1100
T12	12 in	600	650	1250	800	925	1500

700 Process Connections

M/N	SIZE	TYPE	MATERIAL
1”FPTS	1 in	FPT	Carbon Steel
1"MPTS	1 in	MPT	Carbon Steel
2"MPTS	2 in	MPT	Carbon Steel
2.5"MPTS	2.5 in	MPT	Carbon Steel
3”MPTS	3 in	MPT	Carbon Steel
4"MPTS	4 in	MPT	Carbon Steel
1"150RS	1 in	Class 150 raised face flange	Carbon Steel
1"300RS	1 in	Class 300 raised face flange	Carbon Steel
1"600RS	1 in	Class 600 raised face flange	Carbon Steel
1"900RS	1 in	Class 900 raised face flange	Carbon Steel
1"1500RS	1 in	Class 1500 raised face flange	Carbon Steel
1"2500RS	1 in	Class 2500 raised face flange	Carbon Steel
2"150RS	2 in	Class 150 raised face flange	Carbon Steel
2"300RS	2 in	Class 300 raised face flange	Carbon Steel
2"600RS	2in	Class 600 raised face flange	Carbon Steel
2"900RS	2in	Class 900 raised face flange	Carbon Steel
2"1500RS	2in	Class 1500 raised face flange	Carbon Steel
2"2500RS	2in	Class 2500 raised face flange	Carbon Steel
3”150RS	3 in	Class 150 raised face flange	Carbon Steel
3"300RS	3 in	Class 300 raised face flange	Carbon Steel
4”150RS	4 in	Class 150 raised face flange	Carbon Steel
4”300RS	4 in	Class 300 raised face flange	Carbon Steel
6”150RS	6 in	Class 150 raised face flange	Carbon Steel
6”300RS	6 in	Class 300 raised face flange	Carbon Steel
8”150RS	8 in	Class 150 raised face flange	Carbon Steel
8”300RS	8 in	Class 300 raised face flange	Carbon Steel
1"SWS	1 in	Socket weld	Carbon Steel
1"BWS	1 in	Butt weld	Carbon Steel

M/N	SIZE	TYPE	MATERIAL
1”FPTY	1 in	FPT	316 Stainless Steel
1"MPTY	1 in	MPT	316 Stainless Steel
2"MPTY	2 in	MPT	316 Stainless Steel
2.5"MPTY	2.5 in	MPT	316 Stainless Steel
3”MPTY	3 in	MPT	316 Stainless Steel
4"MPTY	4 in	MPT	316 Stainless Steel
1"150RY	1 in	Class 150 raised face flange	316 Stainless Steel
1"300RY	1 in	Class 300 raised face flange	316 Stainless Steel
1"600RY	1 in	Class 600 raised face flange	316 Stainless Steel
1"900RY	1 in	Class 900 raised face flange	316 Stainless Steel
1"1500RY	1 in	Class 1500 raised face flange	316 Stainless Steel
1"2500RY	1 in	Class 2500 raised face flange	316 Stainless Steel
2"150RY	2 in	Class 150 raised face flange	316 Stainless Steel
2"300RY	2 in	Class 300 raised face flange	316 Stainless Steel
2"600RY	2in	Class 600 raised face flange	316 Stainless Steel
2"900RY	2in	Class 900 raised face flange	316 Stainless Steel
2"1500RY	2in	Class 1500 raised face flange	316 Stainless Steel
2"2500RY	2in	Class 2500 raised face flange	316 Stainless Steel
3”150RY	3 in	Class 150 raised face flange	316 Stainless Steel
3"300RY	3 in	Class 300 raised face flange	316 Stainless Steel
4”150RY	4 in	Class 150 raised face flange	316 Stainless Steel
4”300RY	4 in	Class 300 raised face flange	316 Stainless Steel
6”150RY	6 in	Class 150 raised face flange	316 Stainless Steel
6”300RY	6 in	Class 300 raised face flange	316 Stainless Steel
8”150RY	8 in	Class 150 raised face flange	316 Stainless Steel
8”300RY	8 in	Class 300 raised face flange	316 Stainless Steel
1"SWY	1 in	Socket weld	316 Stainless Steel
1"BWY	1 in	Butt weld	316 Stainless Steel

M/N	SIZE	TYPE	MATERIAL
1”FPTB	1 in	FPT	304 Stainless Steel
1"MPTB	1 in	MPT	304 Stainless Steel
2"MPTB	2 in	MPT	304 Stainless Steel
2.5"MPTB	2.5 in	MPT	304 Stainless Steel
3”MPTB	3 in	MPT	304 Stainless Steel
4"MPTB	4 in	MPT	304 Stainless Steel
1"150RB	1 in	Class 150 raised face flange	304 Stainless Steel
1"300RB	1 in	Class 300 raised face flange	304 Stainless Steel
1"600RB	1 in	Class 600 raised face flange	304 Stainless Steel
2"150RB	2 in	Class 150 raised face flange	304 Stainless Steel
2"300RB	2 in	Class 300 raised face flange	304 Stainless Steel
2"600RB	2 in	Class 600 raised face flange	304 Stainless Steel

M/N	SIZE	TYPE	MATERIAL
3”150RB	3 in	Class 150 raised face flange	304 Stainless Steel
3"300RB	3 in	Class 300 raised face flange	304 Stainless Steel
4”150RB	4 in	Class 150 raised face flange	304 Stainless Steel
4”300RB	4 in	Class 300 raised face flange	304 Stainless Steel
6”150RB	6 in	Class 150 raised face flange	304 Stainless Steel
6”300RB	6 in	Class 300 raised face flange	304 Stainless Steel
8”150RB	8 in	Class 150 raised face flange	304 Stainless Steel
8”300RB	8 in	Class 300 raised face flange	304 Stainless Steel

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