

Electromechanical and Electronic Level Control

Class 9034, 9035, 9036, 9037, 9038,
and Class 9049 Accessories



CATALOG CONTENTS

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SQUARE D
GROUPE SCHNEIDER



Electromechanical and Electronic Level Control Class 9034, 9035, 9036, 9037, and 9038 – Description

Square D provides a wide range of level control products. These include the following:

- Class 9034 - Types LSV, LSD, A, B, and C
- Class 9035 - Types DG, DW, and DR
- Class 9036 - Types D, G, FG, and LG
- Class 9037 - Types D, E, G, and H
- Class 9038 - Types A, B, C, D, and J

Class 9034

Type LSVFW2

The Class 9034 Type LSVFW2 can be used to detect either rising or falling liquid levels in storage vessels, mixing tanks or pipelines. It can be used with any liquid compatible with Type 316 stainless steel in a temperature range of -40°F to +300°F. The unit will operate reliably in viscosities up to 2,000 centistokes (cSt). It is ideally suited for applications which have material buildup, foam, gas bubbles, or suspended solids. It is unaffected by agitation, wave action, or turbulence and can be directly installed without the need for measuring chambers or bypasses.



LSVFW2

Type LSD

The Class 9034 Type LSD is a capacitance type level limit sensor that is ideal for use in applications where the control and measurement of powders, granulars or pelletized solids is required. The extremely sensitive sensing head will detect materials with dielectric constants as low as 1.5. To ensure switch point reliability, the unit has an electronic shield that eliminates the effects of sidewall buildup and guards against false signaling.



Type LSDDAC2

LLV Type A

The Class 9034 LLV Type A miniature vertical liquid level switch is designed to meet limited space requirements in many chemical environments. It is available in either stainless steel or polypropylene.



LLV80

LLV Type B

The Class 9034 LLV Type B full size vertical liquid level switch is designed for use in many chemical environments, including Class I, Groups A, B, C, D; Class II, Groups E, F, G; and Class III hazardous locations.



LLV56



Electromechanical and Electronic Level Control Class 9034, 9035, 9036, 9037, and 9038 – Description

LLH Type C

The Class 9034 LLH Type C horizontal liquid level switch is designed for side mounting through walls of tanks and other vessels. It is available in either stainless steel, PBT, or polypropylene.



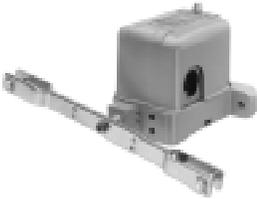
LLH77



LLH501

Class 9035

The Class 9035 Type DG, DW, and DR float switches are designed for the automatic control of AC or DC pump motors directly or through magnetic starters in an open tank or sump application. These switches are wall or floor mounted and are chain or rod operated. They are available in NEMA Type 1, NEMA Type 4, or NEMA Type 7 & 9 enclosures.



Class 9035 Float Switch

Class 9036

Type D and G

The Class 9036 Type D and G float switches are lever operated and designed for open tank or sump applications. These switches are floor mounted. They are available in NEMA Type 1, NEMA Type 4, or NEMA Type 7 & 9 enclosures.



Type DG2



Type GG



Electromechanical and Electronic Level Control Class 9034, 9035, 9036, 9037, and 9038 – Description

Type FG

The Class 9036 Type FG30 pedestal style sump pump switch is designed for liquid level control with electric motor operated pumps either directly or through a magnetic starter. It can also be used to activate alarms in liquid level control systems. The upward or downward movement of the float switch controls the ON and OFF positions corresponding to the water level to turn the pump or alarm on and off.



Type FG



arm of
required

Type LG

The Class 9036 Type LG float switch automatically controls submersible sump, effluent and sewage pumps either directly or through a magnetic starter. It can also be used to activate alarms in water or sewage systems. The Type LG is a universal replacement for most small sump, effluent and sewage pump float switches. **This float switch does NOT contain mercury.** The Type LG is omnidirectional and functions properly regardless of orientation.



Type LG

Class 9037

Type D

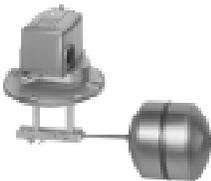
The Class 9037 Type D switches are completely self-contained units composed of switch mechanism, mounting flange, center hole float, and float rod. They are used for top mounted, closed tank applications.



Type D

Type E

The Class 9037 Type E switches are flange mounted and float movement is transmitted through a quad ring seal. Each switch consists of a basic switch, float rod, and float. The switch may be configured in the field to give contacts that open on liquid rise or close on liquid rise. They are used for top mounted, closed tank applications.

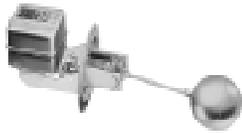


Type E



Electromechanical and Electronic Level Control Class 9034, 9035, 9036, 9037, and 9038 – Description

Type G



Type G

The Class 9037 Type G switches are flange mounted and float movement is transmitted through a bellows seal. Each switch consists of a basic switch, float rod and float. They are used for side mounted, closed tank applications.

Type H

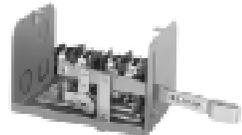


Type H

The Class 9037 Type H switches are attached to the tank by means of a 2¹/₂ inch screw-in connection. An external pointer indicates the float position within the tank when the unit is mounted. Switches come complete with stainless steel float and rod. A nitrile rubber seal such as a Buna N Quad Ring seal is used between the float rod and sealing connector. Normal application is at atmospheric pressure, but where higher pressures are encountered, the switch will withstand tank pressures up to 50 p.s.i. at temperatures up to 220°F. Occasional replacement of the quad ring seal may be necessary.

Class 9038 Mechanical Alternators

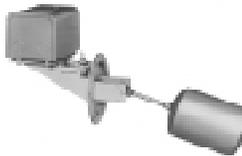
Type A Open Tank



Type AG1

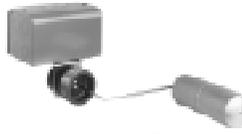
The Class 9038 Type A Open Tank level switch is a mechanical alternator designed to provide motor alternation in the operation of two motors.

Types B and C, Closed Tank Mechanical Alternators



Type BG

The Class 9038 Type B and C Closed Tank level switches are flange mounted with a bellows seal for control of liquid level within a closed tank. Each switch consists of a basic switch, rod, and float.



Type CG

Type C switches are attached to the tank by means of a 2¹/₂ inch screw-in connection. An external pointer indicates the float position within the tank when the unit is mounted. Switches come complete with screw-in connector, stainless steel float and rod.

Occasional replacement of the Quad Ring may be necessary.

Type D Closed Tank



Type DG

Type D Mechanical Alternators are designed for applications where mounting is to be made at the top of a closed tank.



Electromechanical and Electronic Level Control Class 9034, 9035, 9036, 9037, and 9038 – Description



Type JG1

Type J Closed Tank

The Class 9038 Type J Mechanical Alternators are flange mounted vertical action. Switches are complete including float. Float movement is transmitted through a quad ring seal.

Electromechanical and Electronic Level Control

Class 9034 - Type LSV

Level is one of the most widely measured process variables in industry. The purpose of a level sensor, whether electronic or mechanical, is to determine the height of various materials in tanks, storage vessels, or any container capable of holding liquids or granular solids.

The control and measurement of level is vital to many segments of industry. Due to the cost of raw material, accurate level sensors are required. Electronic level sensors are widely used due to their increased accuracy over mechanical sensors and the ease of interfacing them with programmable controllers in industrial processes.

Level sensors can be divided into two general groups:

- Point level sensors
- Continuous level sensors

Point level sensors are on/off devices that are used to measure the presence or absence of the material at a predetermined point. They are ideally suited for use as high or low level alarms. Additionally, they can provide a shutdown signal for applications where material overflow or material shortage could cause damage to equipment or create hazardous conditions.

Continuous level sensors provide complete level monitoring of a system. They measure material level over a range rather than a single point. The continuous level sensor provides an analog output which is directly proportional to the level of the material.

Type LSV



The Class 9034 Type LSV is a universal level limit sensor for applications where float switches were previously used. It is recommended for use in mixing tanks, storage vessels, or any container used for the storage of liquids. The following are features and advantages of the Type LSV:

- No moving parts and maintenance-free, therefore no costs for periodic preventative maintenance.
- Operates reliably in viscosities up to 2,000 centistokes (cSt). This is equivalent to flowing honey.
- Immune to material buildup, foam, gas bubbles, and suspended solids.
- Unaffected by wave action, agitation, or turbulence. It can be installed directly in mixing tanks and pipes without the need for bypasses or measuring chambers.
- Does not require compensation for material density, temperature, viscosity, or conductivity.
- No calibration required.
- Screws into a 1" NPT threaded coupling. Can be installed from outside the tank or pipe.
- Operates with any mounting orientation.
- Indicates material presence or absence directly at the tank via an LED.
- Output mode selection allows use as a high or low level alarm.
- Provides control for process devices.

The Type LSV is designed to operate between 24 Vac and 250 Vac, 50/60 Hz in series with the relay, solenoid valve, or other device it is to control.

The Class 9034 Type LSV point level sensor consists of an oscillating fork and an electronic module. The fork style sensor, driven by a piezoelectric crystal circuit, oscillates at its natural frequency. When the oscillating fork contacts the liquid, the sensor's oscillation frequency shifts and the switch is activated. Simultaneously, the red LED operates to indicate the switching state of the sensor. See Figure 1 on page 9 for the block diagram of the sensor.



Electromechanical and Electronic Level Control Class 9034 - Type LSV

Selection

Description	Type
Sensor AC switching, 2-wire, 24Vac to 250Vac, 50/60 Hz	LSVFW2
Optional Relay 10 Amp, 120Vac, DPDT relay	LSDURW22

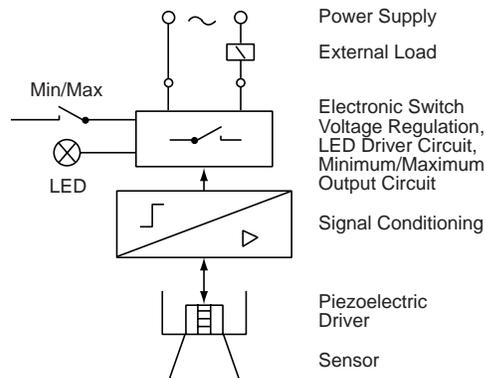


Figure 1: Type LSV Block Diagram

When the LED is on, there is no output. In the maximum output mode, this condition exists when the level of the liquid is above the fork. In the minimum output mode, this condition exists when the level of the liquid is below the fork (see Figure 2 on page 9). In either mode, the electronic switch will turn off in the event of a power failure.

The fork and the 1" NPT threaded gland comprise a single-piece construction of Type 316 stainless steel which alleviates the likelihood of sealing problems with the unit. The electronic module is enclosed in a fiberglass reinforced polycarbonate NEMA 4X housing which is potted for moisture protection. The wiring terminals and output selection switches are accessible by removing the terminal cover. The red LED, which indicates the switching state of the device, is visible through the clear cover. The sensor is designed to operate between 24 VAC and 250 VAC, 50/60 Hz in series with the relay, solenoid valve, etc., it is to control. Power should never be applied to the sensor without an external load connected in series. The Class 9034 Type LSDURW-22 is a dedicated DPDT, 10 amp, 120 VAC, 60 Hz relay package for use as the external load.

NOTE: When the load is switched off, a small current of less than 5 milliamperes still passes through the sensor and load to maintain power to the unit sensing electronics.

Operating Dependent Upon Level and Output Mode

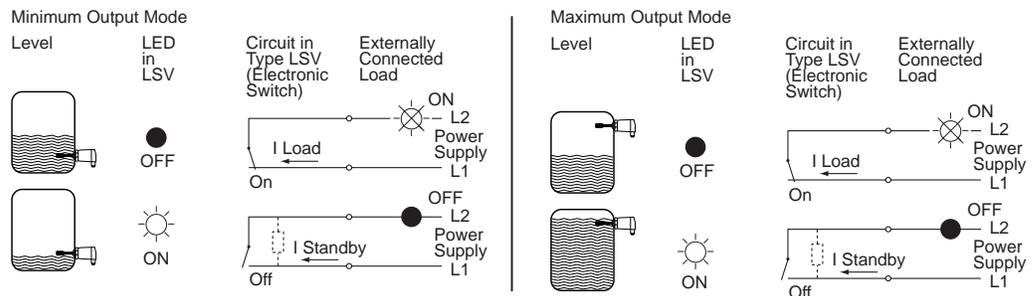


Figure 2: Type LSV Output Modes

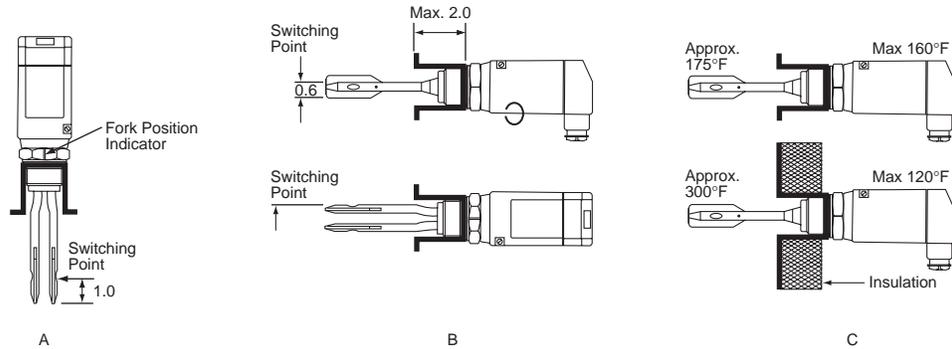
The Type LSVFW-2 can be installed in the container in any orientation. A mounting coupling (user supplied) tapped to accept the 1" NPT threaded unit, may be any length up to a maximum of 2" (see Figure 3 on page 10). For horizontal installations involving liquids that form heavy buildup or are



Electromechanical and Electronic Level Control

Class 9034 - Type LSV

extremely viscous, the fork position indicator on the hex mounting nut be situated upward. The fork is then positioned so that the liquid can easily pass through the fork (see Figure 3A, B, or C).



- Notes:
1. Dimensions are in inches.
 2. Switching points are with reference to water.

Figure 3: Class 9034 Type LSV Installation Orientation

General Specifications

Housing:	
Stainless Steel Body:	Stainless steel
Black Cover:	Polycarbonate
Mounting Gland and Oscillating Fork:	Type 316 stainless steel
Operating Frequency:	87 MHz
Enclosure Rating:	IP65
Operating Temperature:	Sensor, -40 °F to +300 °F Ambient, -40 °F to +160 °F
Operating Pressure:	230 psig maximum
Maximum Viscosity of Liquid:	2,000 centistokes (cSt)
Response Time:	Approximately 0.5 seconds
Switching Hysteresis:	Approximately 0.1 inch
Output Mode:	Field Selectable: minimum - liquid present, output on maximum - liquid absent, output on
Indicator:	LED, lights when output is switched off
Mounting:	1" NPT
Cable Entry:	Liquid tight for cable diameters of 0.21 to 0.27 in. Threaded for 1/2" NPT conduit

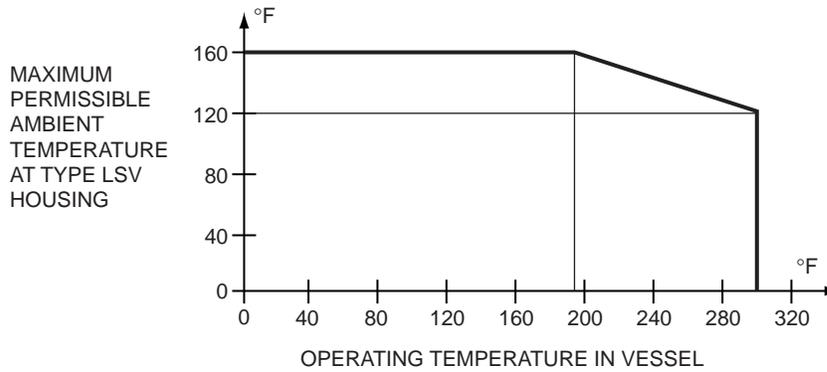
Power Requirements

Input Power:	24 Vac to 250 Vac, 50/60 Hz
Momentary Inrush:	1.5 A max. for 40 ms max.
Continuous Operation:	
Maximum Load:	350 mA maximum
Minimum Load:	20 mA at 24 Vac 12 mA at 115 Vac 10 mA at 240 Vac
Leakage Current:	<5 mA
On-state Voltage Drop:	10 volts maximum
Operating Principle:	SCR

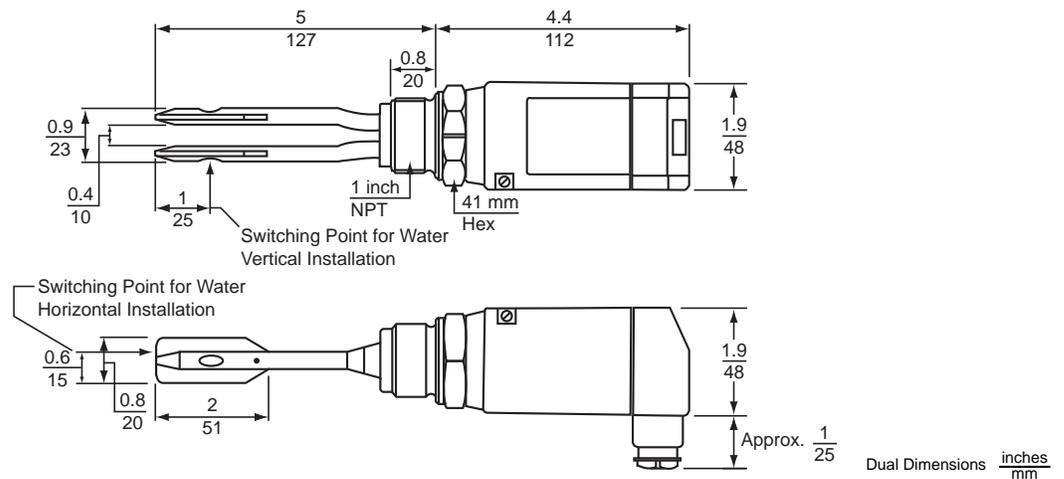
Electromechanical and Electronic Level Control Class 9034 - Type LSV

Temperature Rating

Maximum ambient temperature at housing as a function of operating temperature in vessel.

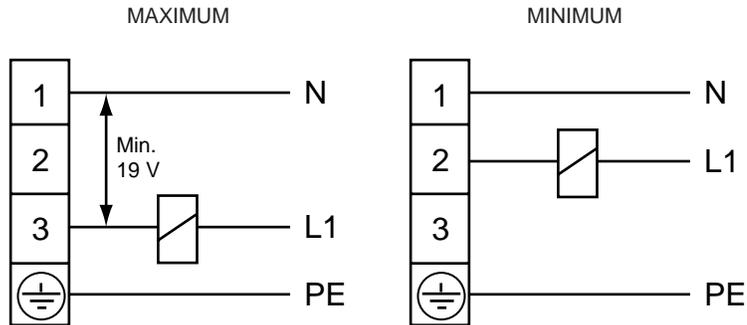


Type LSV Dimensions



Electromechanical and Electronic Level Control Class 9034 - Type LSV

Type LSV Wiring Diagram



A load must be connected in series with the level switch, such that:

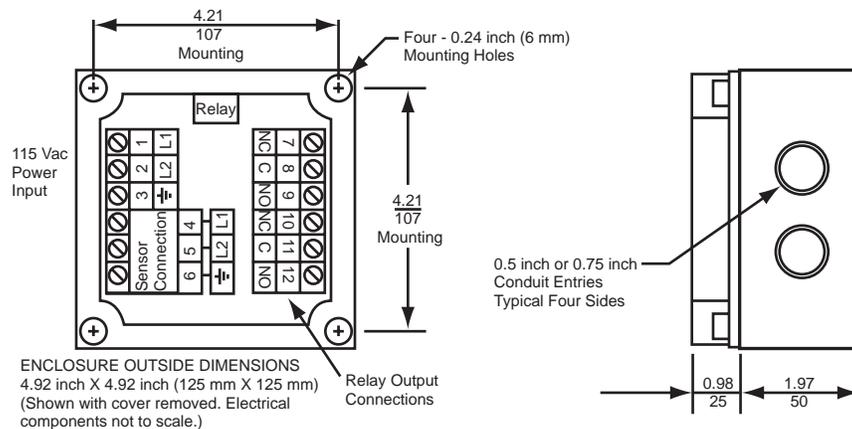
1. The voltage drop across the level switch in closed mode (ON) may be up to 12 V.
2. A minimum terminal voltage of 19 V is required for the unit to switch correctly (check in particular for a low line voltage).

In open mode (OFF), a residual current of 3.8 mA (max) will flow.

Class 9034 Type LSDURW22 Relay

The Class 9034 Type LSDURW22 (120 Vac only) is a dedicated relay package for use as the required load for the Type LSVFW1.

Enclosure:	NEMA 4X polycarbonate wall mounted enclosure
Electrical Ratings:	DPDT, 10 A, 120 Vac
Fuse:	1 A, in line, medium blow
Wiring Terminals:	Two terminal strips, suitable for #18 AWG
Conduit Entry:	Eight knockouts, 0.5 inch or 0.75 inch, two per side



Electromechanical and Electronic Level Control Class 9034 - Type LSD

Type LSD



The Class 9034 Type LSD is a compact level limit sensor constructed of durable impact and abrasion resistant polycarbonate. It is suitable for use in such industries as chemical, food and beverage, pulp and paper, or any other where control and measurement of powders, granulars, or pelletized solids is required. The sensing head is extremely sensitive and will detect materials with dielectric constants as low as 1.5. To ensure switchpoint reliability, the unit has an electronic shield that eliminates the effect of sidewall buildup and guards against false signaling. Designed with no moving parts, the Type LSD offers long life, operational dependability, and no costly periodic maintenance. The field selectable output mode feature allows the user to apply the device as either normally open (material absent) or normally closed (material present). This makes the Type LSD ideal for applications where material overflow or material shortage could result in damage to equipment or create hazardous conditions.

NOTE: Wet materials or condensation can cause false readings. Materials used with this switch must be dry.

Three versions are available and include:

- Type LSDDAC2: AC switching, 2-wire, 24 Vac to 250 Vac, 50/60 Hz
- Type LSDDDN3: DC switching, 3-wire, NPN, 10 Vdc to 55 Vdc
- Type LSDDDP3: DC switching, 3-wire, PNP, 10 Vdc to 55 Vdc

The DC versions provide open collector capability.

The Type LSD is designed to mount in virtually any type of container. The long threaded mounting gland allows direct mounting in the container wall or flange mounting for large openings in the container wall. Optional mounting well and couplings are also available.

Other features of the Type LSD include:

- NEMA Type 4X construction.
- Requires no calibration. It is factory adjusted for standard applications.

The Class 9034 Type LSD contains both plates of a capacitor whose value changes as the dielectric constant of its surroundings changes. When material contacts the sensor head, the capacitance increases and the sensor switches.

An external overload is connected in series with the sensor. This load is normally a control relay or an indicating lamp. When the sensor switches, the load is switched on or off, depending on the fail-safe mode selection. At the same time, a red LED operates to indicate the switching state of the sensor. When the load is switched off, a small current still passes through the sensor (and the load in the AC version) to maintain power to the unit's sensing electronics.

The Type LSD can be installed in any orientation from vertical to horizontal. When mounted horizontally, the cable entry section should be rotated downward to prevent moisture or dust from entering the unit.



Electromechanical and Electronic Level Control

Class 9034 - Type LSD

When mounting through a wall, the sensing tip should extend a minimum of 0.8 inches into the container to ensure full contact with the material (see Figure 4).

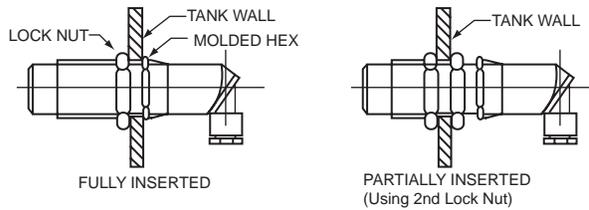


Figure 4: Through Wall Mounting

A user supplied flange may be used where an opening is available at the desired mounting location and is too large to securely mount the sensor (see Figure 5). The unit is mounted to the flange by the same method as through wall mounting. The flange is then mounted to the container wall.

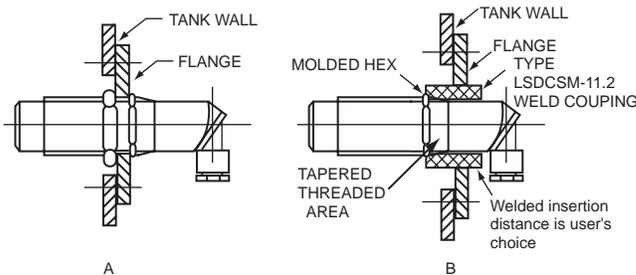


Figure 5: Flange Mounting

In applications where a sight glass is used, the Type LSD sensor may be installed with a user supplied mounting bracket (see Figure 6). The sensor is flush mounted against the glass to ensure positive switching. The sensitivity may be adjusted as required to improve the sensor's ability to detect material through the sight glass. In applications where the container is plastic, a mounting bracket may be used instead of drilling through the container wall. The sensor should be mounted flush against the container wall.

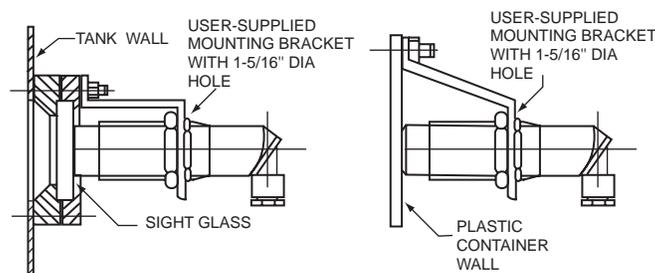


Figure 6: Sight Glass or Flush Mounting

Electromechanical and Electronic Level Control Class 9034 - Type LSD

The Type LSD is shipped with the output mode set at maximum. The output mode can be adjusted in the field to minimum (see Figure 7).

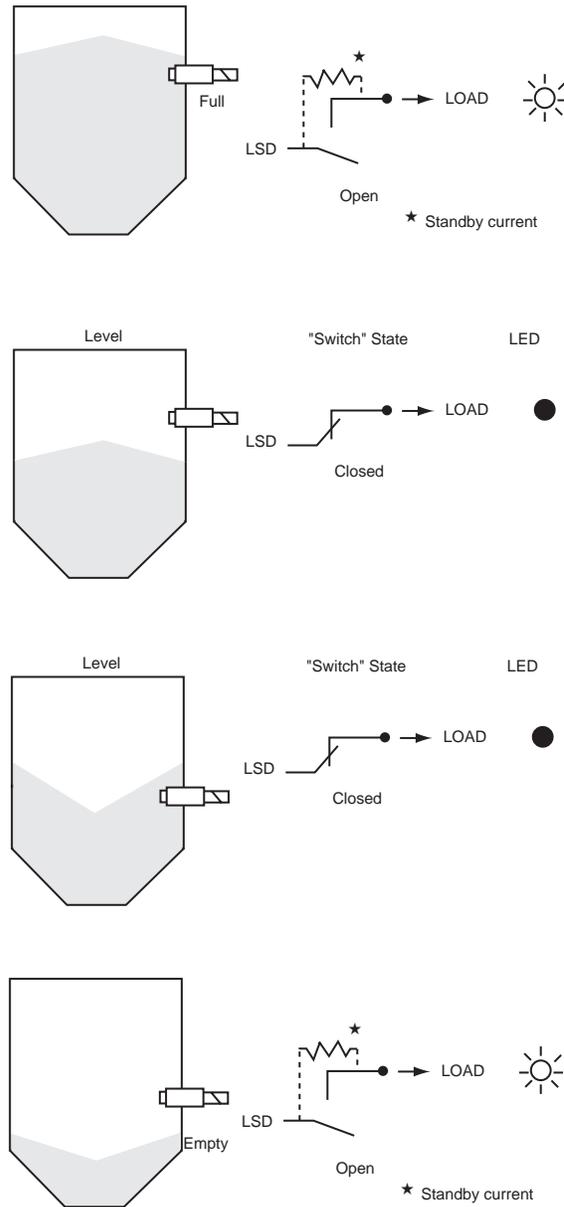


Figure 7: Type LSD Output Modes



Electromechanical and Electronic Level Control

Class 9034 - Type LSD

Selection

Description	Type
Sensor	
AC switching, 2-wire, 24 Vac to 250 Vac, 50/60 Hz	LSDDAC2
DC switching, 3-wire PNP, 10 Vdc to 55 Vdc	LSDDDP3
Optional Relay 10 Amp, 120 Vac, DPDT relay For use with AC sensors only	LSDURW22

Accessories

Type	Description
Mounting well will allow Type LSD to be removed without spilling contents. 1.5 inch BSPP external threads, 1 inch BSPP internal threads to accept Type LSD. Housing material is polyterephthalate (PBTP).	LSDMWM11
304 SS coupling to be welded to tank. 1.5 inch BSPP internal threads to accept mounting well. For use in conjunction with LSDMWM-11 Mounting Well listed above.	LSDMWCSM11.1
304 SS coupling to be welded to tank. 1 inch BSPP internal thread to accept Type LSD.	LSDCSM11.2
304 SS coupling with 1 inch BSPP internal threads on end to accept Type LSD. Other end has 1.25 inch NPT external threads for addition of user supplied extension pipe for low level, top of tank mounting in dry solids.	LSDCSM11.3

General Specifications — LSDD

Housing:	
Blue Body:	Polycarbonate
Clear Cover:	Polycarbonate
Enclosure Rating:	NEMA Type 4X, 12
Operating Temperature:	Sensor, -5 °F to +175 °F Ambient, -5 °F to +140 °F
Operating Pressure:	90 psig maximum
Sensitivity:	Minimum 1.5 dielectric constant, adjustable
Response Time:	0.2 seconds
Output Mode:	Field Selectable: minimum - material present, output on maximum - material absent, output on
Indicator:	Red LED lights when output is switched off
Mounting:	1 inch BSPP mounting thread
Cable Entry:	Liquid tight for cable diameters of 0.21 to 0.27 inch Threaded for PG11 conduit

Power Requirements – LSDD

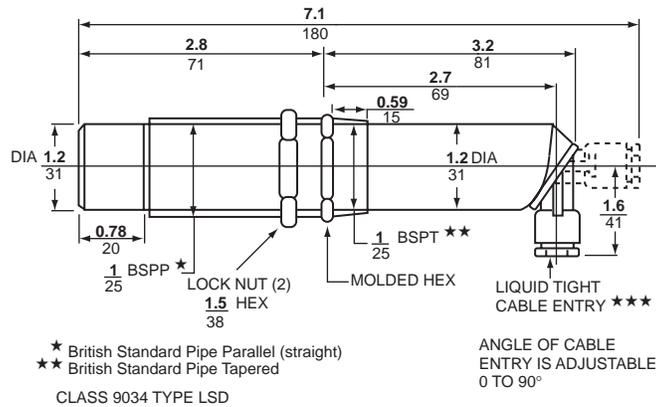
	AC Version, 2-Wire	DC Version, 3-Wire NPN or PNP
Input Power:	24 Vac to 250 Vac, 50/60 Hz	10 Vdc to 55 Vdc
Momentary Inrush:	1.5 A max. for 40 ms max.	1 A max. for 1 second max.
Continuous Operation:		
Maximum Load	350 mA	350 mA
Minimum Load	20 mA at 24 Vac 12 mA at 115 Vac 10 mA at 240 Vac	
Burden Current:	–	Approximately 7 mA
Leakage Current:	<3.5 mA	–
On-state Voltage Drop:	10 volts maximum	3 volts maximum
Operating Principle:	SCR	Open collector, PNP or NPN, 55 Vdc max. input
Polarity Protection:	–	Yes



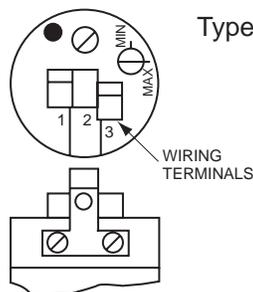
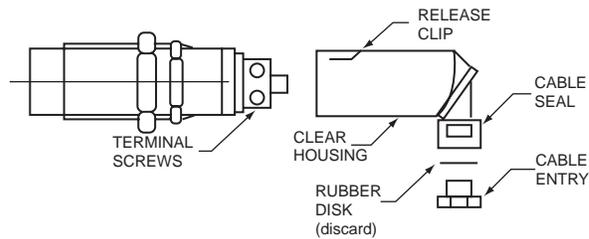
Electromechanical and Electronic Level Control Class 9034 - Type LSD

Dimensions

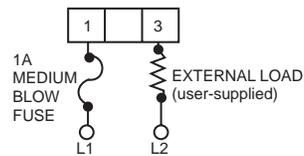
DIMENSIONS AND MOUNTING DETAILS



Wiring Diagrams

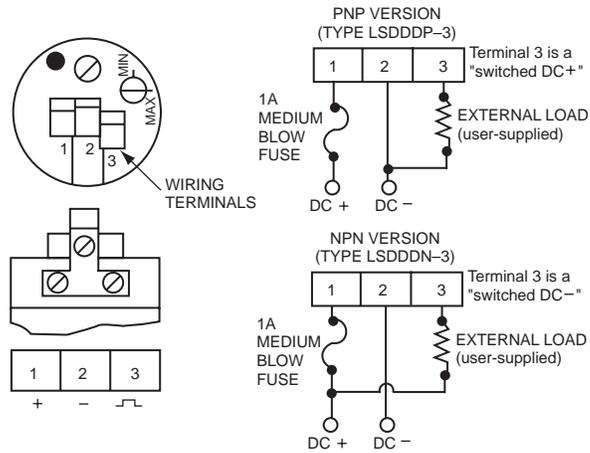


Type LSD – AC Wiring

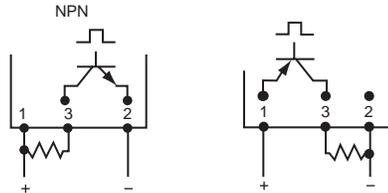


Electromechanical and Electronic Level Control Class 9034 - Type LSD

Wiring Diagrams (continued)



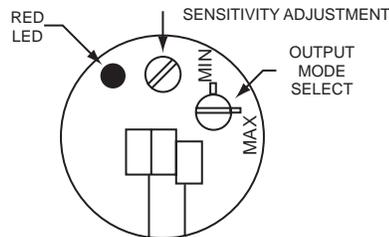
OPEN COLLECTOR DETAIL



Adjustments

The Type LSD is factory adjusted and does not normally require calibration. However, the output mode and the sensitivity of the sensor can be changed without special tools or instruments. The sensitivity adjustment and the output mode selector switch are located next to the wiring terminals.

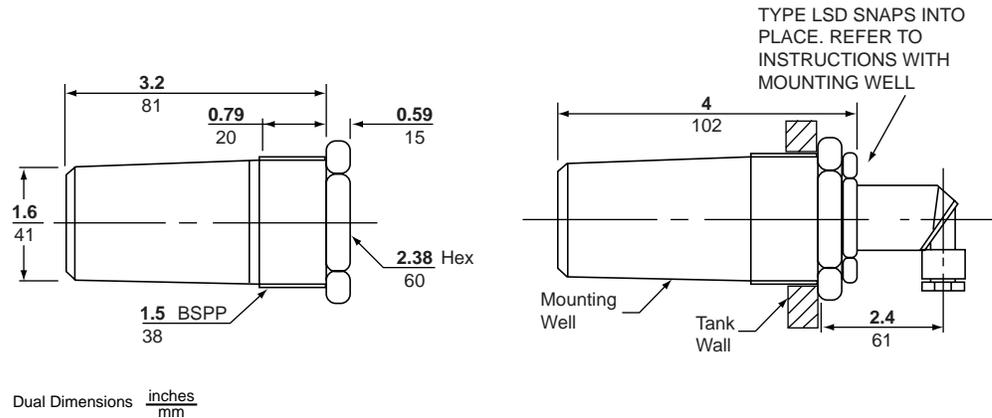
To gain access to the adjustments, remove the clear housing by inserting a screwdriver blade into the release clip and gently pry upward while pulling the housing from the sensor. It may be necessary to loosen the cable entry connector to avoid stretching or pulling connected wires from the terminals.



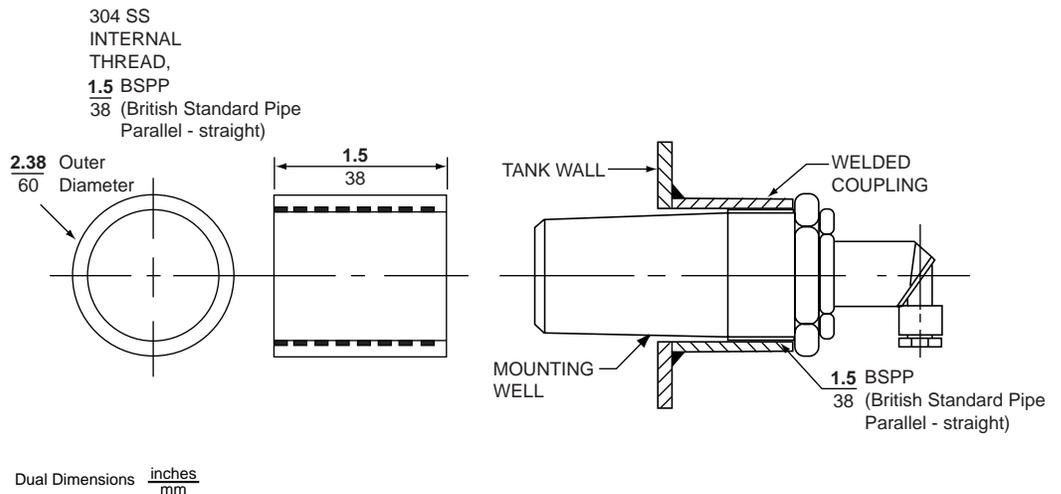
Electromechanical and Electronic Level Control Class 9034 - Type LSD

Type LSD Mounting Accessories

The Type LSDMWM11 mounting well allows the Type LSD to be withdrawn from the container without spilling the contents. The mounting well is constructed of polyterephthalate (PBTB) with 1.5 inch BSPP external threads. The well can be directly mounted into the container wall or used with the Type LSDMWCSM11.1 welded coupling. The well with withstand pressures up to 90 psig.



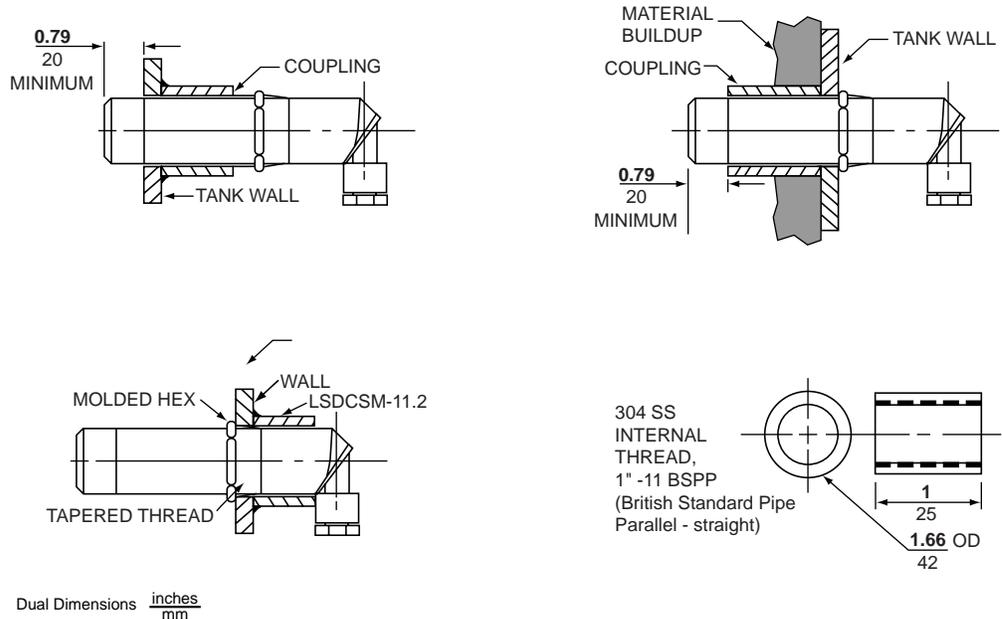
The Type LSDMWCSM11.1 welded coupling is constructed of #304 SS and is welded to the container wall. The inside diameter is tapped with 1.5 inch BSPP threads to allow mounting of the Type LSDMWM11 mounting well.



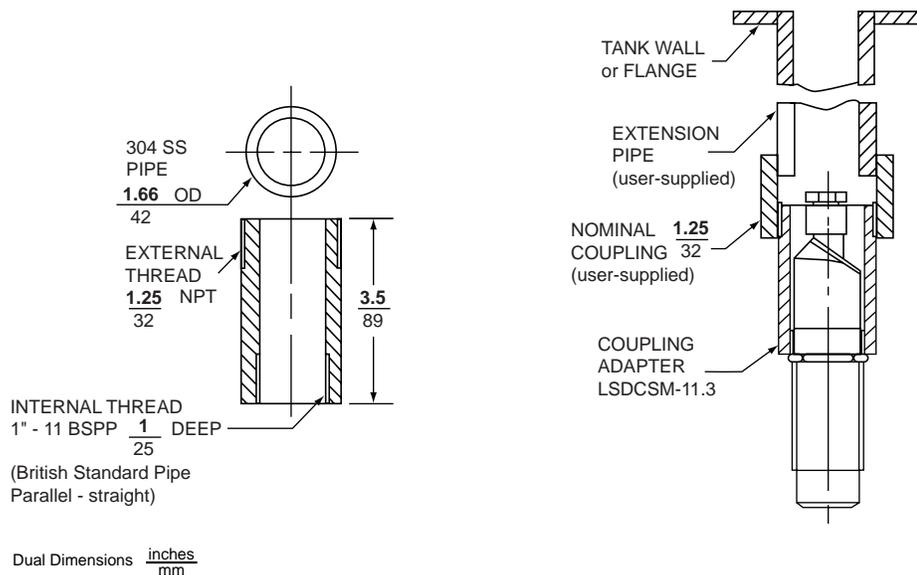
Electromechanical and Electronic Level Control

Class 9034 - Type LSD

The Type LSDCSM11.2 welded coupling is constructed of #304 SS and is welded to the container wall. The inside diameter is tapped with 1 inch BSPP threads to allow mounting of the Type LSD. The coupling is normally mounted with the extension facing away from the container. For heavy sidewall buildup, mount the coupling inserted into the container.



The Type LSDCSM11.3 threaded coupling is constructed of #304 SS. The coupling has 1 inch BSPP internal threads at one end to accept the Type LSD. The other end has 1.25 inch NPT external threads to allow for the addition of an extension pipe for low level, top mounted units in dry solids.



Electromechanical and Electronic Level Control Class 9034 - Types A, B, C

LLV Type A

A miniature size vertical liquid level switch designed to meet limited space requirements found in the chemical industry. The level switch can be provided for general purpose applications or high temperature, high pressure, corrosive environments.



LLV80

- Mounting: 1/8 inch NPT or 3/8 inch bulkhead
- Leads: LLV80 – #22 AWG MTW (24 inch); LLV50 – #22 AWG Teflon (24 inch)

Class 9034 LLV Type A

Model No.	Material	Max. Temp	Max. PSIG	Float SG	Watt Rating	Application
LLV50	316SS	200 °C	300	0.60	30	High temp., high pressure, corrosive conditions
LLV80	Polypro.	105 °C	100	0.60	30	General purpose



UL recognition E12158 for the U.S. and Canada
CCN NKPZ2
NKPZ8



CSA approval LR701891
Class 2252 01

LLV Type B

A full size vertical liquid level switch made of stainless steel for use in high temperature, high pressure, corrosive environments. It is rated for Class I, Groups A, B, C, D; Class II, Groups E, F, G; and Class III hazardous locations.



LLV56

- Mounting: 1/4 inch NPT
- Leads: #22 AWG Teflon (24 inch)

Class 9034 LLV Type B

Model No.	Material	Max. Temp	Max. PSIG	Float SG	Watt Rating	Application
LLV56	316SS	200 °C	200	0.55	60	High temp., high pressure, corrosive conditions



UL recognition E12158 for the U.S.
CCN NKPZ2
UL recognition E12443
CCN NOWT2



CSA approval LR701891
Class 2252 01

LLH Type C

A horizontal liquid level switch designed for through wall mounting in tanks or other vessels. It is available in stainless steel, PBT, or polypropylene.



LLH77

- Mounting: LLH501 – 1/2 inch NPT or 3/8 inch bulkhead; LLH77, LLH87 – 1/2 inch NPT inner, 1/2 inch NPT outer
- Leads: LLH501, LLH77 – #22 AWG Teflon (24 inch); LLH87 – #22 AWG MTW (24 inch)

Class 9034 LLH Type C

Model No.	Material	Max. Temp	Max. PSIG	Float SG	Watt Rating	Application
LLH501	316 SS	200 °C	300 ♦	0.60	30	High temp., high pressure, corrosive conditions
LLH77	PBT	150 °C	100	0.75	30	Fuels and lubricating oils
LLH87	Polypro.	105 °C	100	0.50	30	General purpose; highly acidic conditions

♦ Exclusive of bulkhead fitting.



LLH501



UL recognition E12158 for the U.S. and Canada
CCN NKPZ2
NKPZ8



CSA approval LR701891
Class 2252 01



Electromechanical and Electronic Level Control

Class 9034 - Types A, B, C

Current & Voltage Ratings

For resistive loads only. Maximum voltage ratings: SPST – 220 Vac; SPDT – 120 Vac.

Amperes (Resistive)

Watts	at 220 Vac	at 110 Vac	at 120 Vdc	at 24 Vdc
360	1.50	3.00	0.75	3.00
100	0.4	1.0	0.4	1.0
60	0.4	0.5	0.2	0.5
30	0.14	0.28	0.07	0.28
25	–	0.28	–	0.28
15	0.07	0.15	0.03	0.14

The LLV Type A and Type B vertical liquid level switches are available in miniature (LLV50 and LLV80) and full size (LLV56).

Contact operation can be changed from N.C. to N.O. or from N.O. to N.C. by removing the float and reversing it on the stem (refer to the following table).

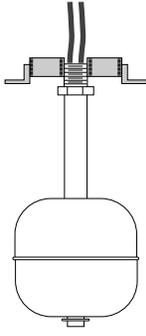
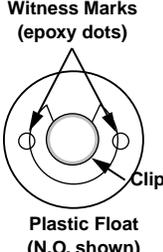
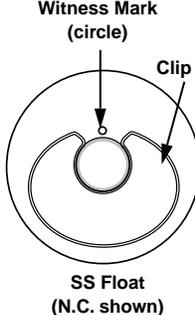
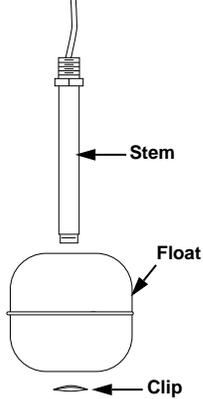
For N.C. dry operation:

- Install stainless steel floats (LLV50 & 56) so that witness mark faces down.
- Install polypropylene float (LLV80) so that witness marks face up.

For N.O. dry operation:

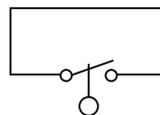
- Install stainless steel floats so that witness mark faces up.
- Install polypropylene float so that witness marks face down.

Installation and Operation

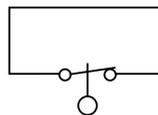
Level Switch Installation		Miniature		Full Size	Removing Float
		LLV50	LLV80	LLV56	
Dry Position		 <p>Witness Marks — Side View</p> <p>Witness Mark (dimple)</p> <p>SS Float (N.C. shown)</p>	 <p>Witness Marks — Bottom View</p> <p>Witness Marks (epoxy dots)</p> <p>Clip</p> <p>Plastic Float (N.O. shown)</p>	 <p>Witness Marks — Bottom View</p> <p>Witness Mark (circle)</p> <p>Clip</p> <p>SS Float (N.C. shown)</p>	 <p>Stem</p> <p>Float</p> <p>Clip</p> <p>To remove float:</p>
Witness Mark	Up	N.O.	N.C.	N.O.	Remove clip. Slide float off stem.
	Down	N.C.	N.O.	N.C.	

Wiring Diagram

Typical N.O. Dry SPST

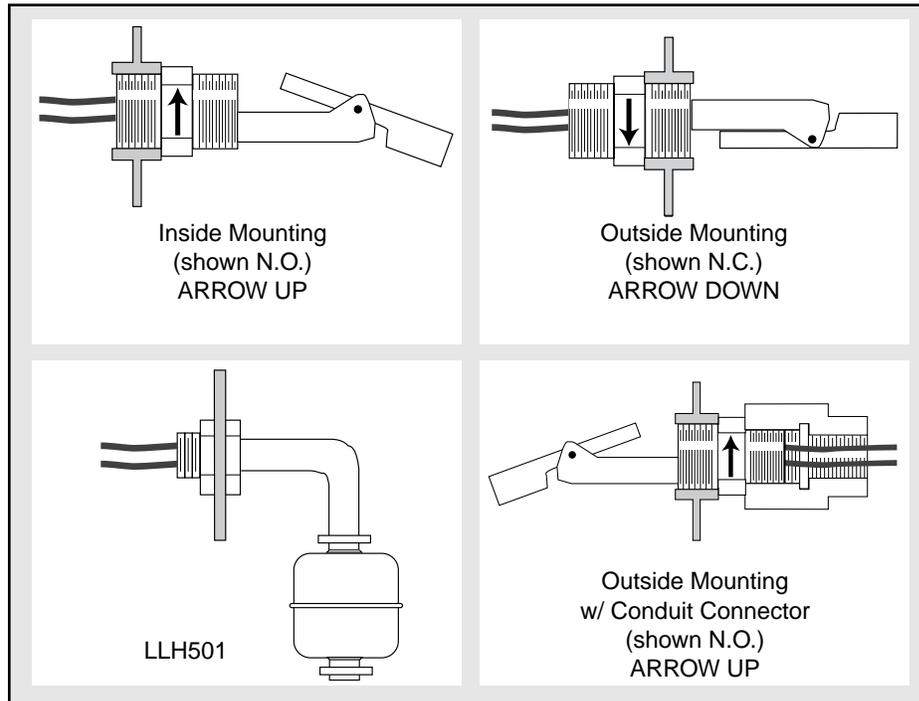


Typical N.C. Dry SPST



Electromechanical and Electronic Level Control Class 9034 - Types A, B, C

The LLH Type C horizontal liquid level switches can be mounted as shown.



Electromechanical and Electronic Level Control Class 9035, 9036, 9037 and 9038

CLASS 9035, 9036, 9037, AND 9038



Class 9035 Type DG30

Class 9035 through 9038 float switches are designed for automatic control of liquid level in open or closed tanks by controlling small motors directly or through AC or DC magnetic starters. Four classes of float switches are available:

- Class 9035 float switches are for open industrial tanks or municipal sewage stations.
- Class 9036 float switches are for open tanks or sumps.
- Class 9037 float switches are for closed tanks, such as condensate tanks used in heating and cooling systems or for diesel fuel day tanks. These float switches are designed to withstand tank pressures up to 50 psi.
- Class 9038 float switches are for mechanical alternators for controlling two pumps in a duplex system in open or closed tanks.



Class 9036 Type DG2

Standard float switches have two contacts that close when the liquid rises above the designated level. This contact configuration is used for tank emptying applications. Float switches are also available with reverse (Form R) and double throw (Form H) contacts. Form R switches, used for tank filling applications, have two contacts that open when the liquid rises above the designated level. Form H switches, which can be used for both applications, have one normally open (N.O.) and one normally closed (N.C.) contact.

The enclosures available for these float switches include the following:

NEMA Type 1 - For general purpose applications intended for indoor use.

NEMA Type 4 - For watertight and dusttight applications for either indoor or outdoor use.

NEMA Type 7 and 9 - For explosion proof applications. Suitable for Class I, Division 1 and 2, Groups C and D and Class II, Division 1 and 2, Groups E, F, and G hazardous locations.



Class 9036 Type GG2

Selecting a Float Switch

To select the proper Square D float switch, determine the following:

- Type and shape of tank (open, closed, sump, etc.)
- Enclosure requirements (NEMA Type 1, 4, 7 & 9)
- Total level change required
- Mounting requirements (flange mounting, screw-in bushing, etc.)
- Horsepower, phase and voltage requirements
- Float and rod material (brass, stainless steel, etc.)

In direct motor control applications, float switch ratings must be greater than or equal to the pump motor ratings.

NOTE: Consult your local Square D field office when using float switches in liquids with a specific gravity different than water.

The following information must be included for each float switch ordered:

1. Basic switch – class and type.
2. Accessory kit(s) – class and type.



Class 9037 Type D



Electromechanical and Electronic Level Control Class 9035, 9036, 9037 and 9038

Selecting Floats and Rods

Class 9036 and Class 9038 Type A float switches are actuated with the Class 9049 Type A line of accessories. Select the float and rod material according to the corrosiveness of the liquid used in the application. Two types of floats are offered:

- Tapped-at-top float (Class 9049 A6, 9049 A6S, and 9049 A6A)
- Center-hole float (Class 9049 A6C, 9049 A6CS, and 9049 A6CA)

The tapped-at-top float is for applications requiring short lengths of tubing and small liquid level changes. The maximum tubing length is 12 feet (3658 mm). Adequate space must be available to allow for ceiling clearance when the level changes. The float must be buoyant enough to lift the tubing, stop collars, and switch lever. The rod has two stops, one above and one below the switch lever. The position of the stops determines the amount of water level change.

The center-hole float is used in applications requiring long lengths of tubing and large liquid level changes. A compensating spring, used for longer lengths of tubing, supports the weight of the tubing and stops. When a compensating spring is used, the float must be buoyant enough to lift up the switch lever and heavy enough to trip the switch lever down. The rod has four stops. The position of the stops on the rod above and below the float determines the amount of water level change.

Class 9035, 9036, 9037, and 9038 Electrical Ratings

Class	Type	Single Phase AC Ratings (Hp)			Polyphase AC Ratings (Hp)			DC (Hp)			Control Circuit Rating
		115 V	230 V	460/575 V	115 V	230 V	460/575 V	32 V	115 V	230 V	
9035	DG, DR, DW30 (2 pole)	2	3	–	3	5	1	0.25	0.5	0.5	A600
9035	DG, DR, DW31 (1 NO, 1 NC)	1	1	–	–	–	–	–	0.25	0.25	A300
9036	D (2 pole)	2	3	–	3	5	1	0.25	0.5	0.5	A600
9036	G (2 pole)	2	3	5	3	5	5	0.5	1	1	A600
9036	G Form H (1 NO, 1 NC)	1	2	2	–	–	–	–	0.5	0.5	A300
9037	D, E, H (2 pole)	2	3	–	3	5	1	0.25	0.5	0.5	A600
9037	G (2 pole)	2	3	5	3	5	5	0.5	1	1	A600
9037	G Form H (1 NO, 1 NC)	1	2	2	–	–	–	–	0.5	0.5	A300
9038	All (2 pole)	2	3	–	3	5	1	0.25	0.5	0.5	A600

The following float switches are UL-listed under file E12158, CCN NKPZ:

- Class 9035 Types DG, DW
- Class 9036 Types DG, DW, GG, GW
- Class 9037 Types DG, DW, EG, EW, GG, GW, HG, HW
- Class 9038 Types AG, AW, BG, BW, CG, CW, DG, DW, JG, JW



The following float switches are UL-listed under file E12443, CCN NOWT:

- Class 9035 Type DR
- Class 9036 Types DR, GR
- Class 9037 Types DR, ER, GR, HR



Electromechanical and Electronic Level Control

Class 9035

CLASS 9035

Class 9035 chain or rod operated float switches are designed for automatic control of AC or DC pump motor magnetic starters and for direct automatic control of light motor loads. These float switches are used in open industrial tanks and municipal sewage station applications and are normally wall mounted. A floor mounting kit for sump applications may be ordered separately.



Class 9035 Type DG30

Class 9035 Float Switches

NEMA Rating	Class 9035 Float Switch Type	
	2 Pole	1 NO, 1 NC
NEMA Type 1	DG30	DG31
NEMA Type 4	DW30	DW31
NEMA Type 7 & 9	DR30	DR31
Type DG: Float on left: contacts open on rise, close on fall Float on right: contacts close on rise, open on fall Lever moves clockwise: contacts open Lever moves counter-clockwise: contacts close	Types DR and DW: Float on left: contacts close on rise, open on fall Float on right: contacts open on rise, close on fall Lever moves clockwise: contacts close Lever moves counter-clockwise: contacts open	

Rod accessory kits are furnished with two-2.5 foot sections of tubing, one 7 inch center-hole float and all necessary linkage and hardware. Standard chain accessory kits are furnished with one 15 foot chain, one 7 inch tapped-at-top float and all necessary linkage and hardware. The following table lists available accessory kits.

Accessory Kits for Class 9035 Float Switches

Accessory Kits	Class 9049 Type
5 foot brass tubing, #304 SS 7 inch diameter float kit	DRA31
5 foot SS tubing, #316 SS 7 inch diameter float kit	DRA32
15 foot bronze chain, #304 SS 7 inch diameter float and pulleys kit	DCA1
15 foot SS chain, #316 SS 7 inch diameter float and pulleys kit	DCA2
15 foot bronze chain, #304 SS 7 inch diameter float and remote pulleys kit	DCA3
15 foot SS chain, #316 SS 7 inch diameter float and remote pulleys kit	DCA4
Floor mounting kit	UMS1
2.5 foot brass tubing, connector and counterweight ▲	T2
2.5 foot #316 SS tubing, connector and counterweight ▲	T2S
5 foot bronze chain and connector ▲	C2
5 foot SS chain and connector ▲	C2S

▲ Additional chain and tubing kits add on to the float accessory kits. Maximum recommended tubing length is 30 feet.

Replacement Parts for Class 9035 Float Switches

Float Only		Class	Type
Applies To	Description		
9049DRA31	7 inch diameter, center-hole, #304 SS	9049	AF1
9049DRA32	7 inch diameter, center-hole, #316 SS	9049	AF2
9049DCA1,3	7 inch diameter, tapped, #304 SS	9049	AF3
9049DCA2,4	7 inch diameter, tapped, #316 SS	9049	AF4
Stops			
Applies To	Description	Part No.	
9049DRA31	Brass Stop and Screw	1091S14G1	
9049DRA32	#316 SS Stop and Screw	1091S15G1	
9049DCA (all)	Stop Assembly	1471L9G1	

Electromechanical and Electronic Level Control

Class 9036 - Types D and G

CLASS 9036 TYPES D AND G



Class 9036 Type DG2

Class 9036 lever operated float switches are used in open industrial tanks and sump applications. There are two types of Class 9036 float switches:

- Type D (general purpose)
- Type G (heavy duty)

Standard action float switch contacts, which normally close on liquid rise, may be ordered in a reverse action (Form R) configuration. Contact action can also be converted in the field by installing the appropriate float rod lever.

A compensating spring supports the weight of long rods that cannot be supported by center-hole floats. A compensating spring is standard on Types GR and GW and may be ordered as a modification (Form C) on other Class 9036 float switches.



Class 9036 Type GG2

Class 9036 Float Switches

NEMA Rating	Class 9036 Float Switch Type			
	Contacts Close 'on Liquid Rise		Contacts Open on Liquid Rise	
NEMA Type 1	DG2	GG2	DG2R	GG2R
NEMA Type 4	DW31	GW1 ▲	DW31R	GW1R ▲
NEMA Type 7 & 9	DR31	GR1 ▲	DR31R	GR1R ▲

▲ Compensating spring standard. Use center-hole float accessories.

The following table lists the trip forces and compensating spring requirements for Class 9036 Type D and G float switches. The trip force may be adjusted on Type G float switches by adjusting the lever length position.

Maximum Trip Forces for Class 9036 Float Switches

Type	Lever Length Position	Force Up to Trip (ounces)	Force Down to Trip (ounces)	Maximum Supported Weight (ounces)	
				Without Compensating Spring	With Compensating Spring
DG2	–	9	8	6	60
DG2R	–	8	8	4	60
DW31	–	8	8	5	66
DW31R	–	8	8	5	66
DR31	–	8	8	5	66
DR31R	–	8	8	5	66
GG2	Short	33	39	25	■
GG2	Long	21	27	13	100
GG2R	Short	30	24	18	■
GG2R	Long	22	16	11	150
GR1, GW1	Short	24	31	19	80
GR1, GW1	Medium	22	29	17	72
GR1, GW1	Long	20	27	16	64

■ Compensating spring not effective in combination with SHORT lever length position.



Electromechanical and Electronic Level Control Class 9036 - Types D and G

The following table lists the float switch modifications. When ordering a factory modification, add the form number to the end of the float switch type number (i.e. Type DG2R). Field installed modifications, when available, are ordered as kits.

Class 9036 Modifications

Modifications	Factory Installed	Field Installed
	Class 9036 Form	Class 9049 Kit
Type D		
Reverse action (Type DG)	R	A58
Compensating spring (Type DG)	C	A19
Compensating spring (Types DR and DW)	C	A20
Compensating spring and reverse action (Types DG, DR, and DW)	CR	Not Available
Type G		
Reverse action (Types GR and GW)	R	Not Available
Compensating spring (Type GG) ●	C	A13
Compensating spring and reverse action (Type GG)	CR	A13
1 NO - 1 NC contact configuration	H	Not Available
Compensating spring and 1 NO - 1 NC contact configuration (Type GG)	CH	Not Available

- Compensating spring standard on Types GR and GW.

Class 9049 accessory kits, listed in the following table, are ordered separately from float switches. Order center-hole floats for Type GW, GR and Form C float switches and tapped-at-top floats for all other Class 9036 float switches. When ordering float accessories, first specify the desired accessory kit, then as a second item give the number of additional tubing kits required. For example, to get a 9049 A6 kit with 15 feet of tubing, specify:

- Item 1: (1) 9049 A6
- Item 2: (4) 9049 T1

Accessory Kits for Class 9036 Float Switches

Accessory Kits	Class 9049 Type	Description	Net Float ■ Buoyancy in Water (ounces)	Weight (ounces)	
				Per Foot of Tubing	of Stops (Total)
Tapped-at-Top Floats	A6	#304 SS float, 5 foot brass tubing and two stops	60	3.7	3
	A6A	#304 SS float, 5 foot aluminum tubing and two stops	60	1.2	3
	A6S	#304 SS float, 5 foot SS tubing and two stops	60	3.4	3
Center-Hole Floats	A6C	#304 SS float, 5 foot brass tubing and four stops	70	3.7	6
	A6CA	#304 SS float, 5 foot aluminum tubing and four stops	70	1.2	6
	A6CS	#304 SS float, 5 foot SS tubing and four stops	70	3.4	6
Additional Tubing ▲	T1	2.5 foot brass tubing with connector	NA	3.7	NA
	T1A	2.5 foot aluminum tubing with connector	NA	1.2	NA
	T1S	2.5 foot SS tubing with connector	NA	3.4	NA
Miscellaneous	UMS1	Floor mounting kit	NA	NA	NA

■ Net buoyancy calculated with float 80% submerged, allowing for a 20% safety factor. Buoyancy data calculated for use in water. Consult local Square D field office for buoyancy in other liquids.

▲ Additional tubing kits add on to float accessory kits.

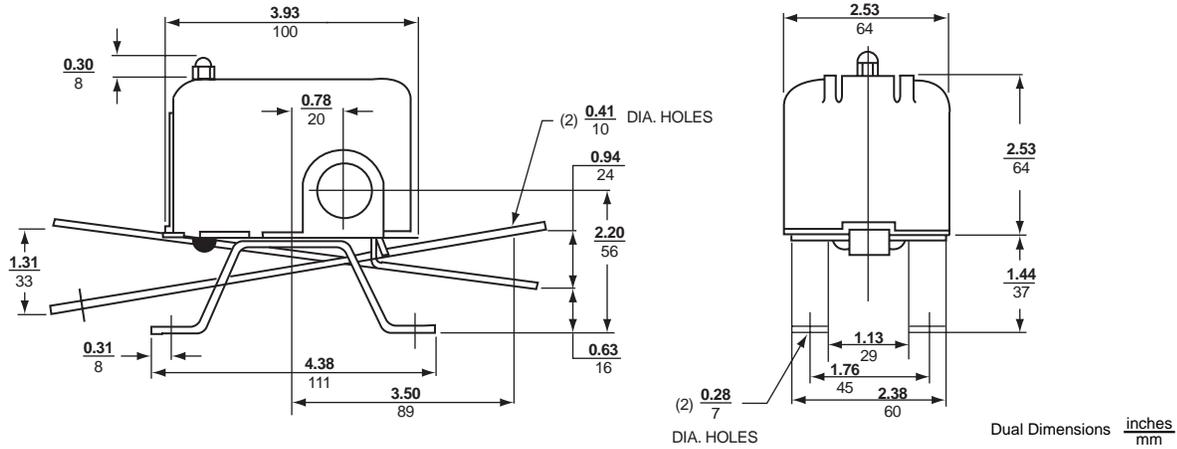
Maximum recommended tubing length for tapped-at-top float: 12.5 feet (3810 mm).

Maximum recommended tubing length for center-hole float: 30 feet (9144 mm).

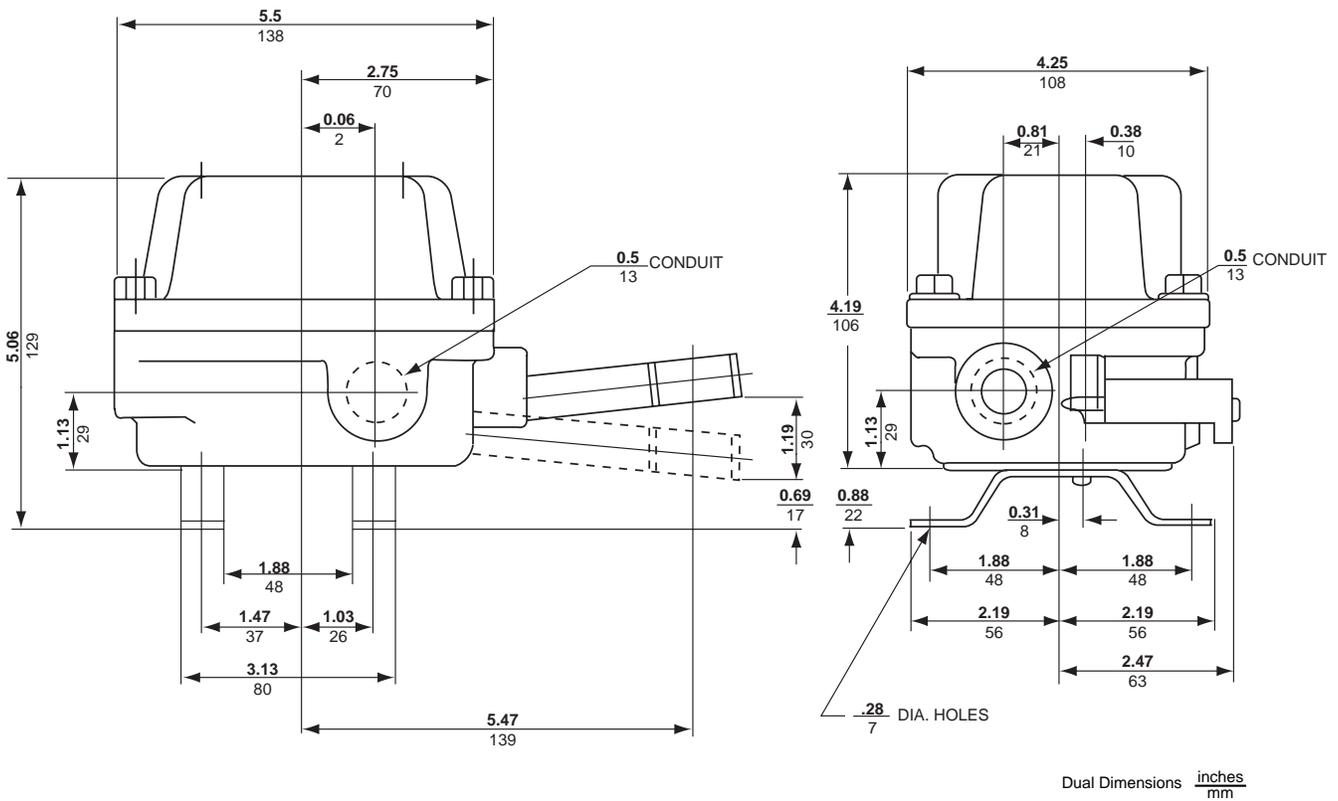


Electromechanical and Electronic Level Control Class 9036 - Types D and G

Type DG Dimensions

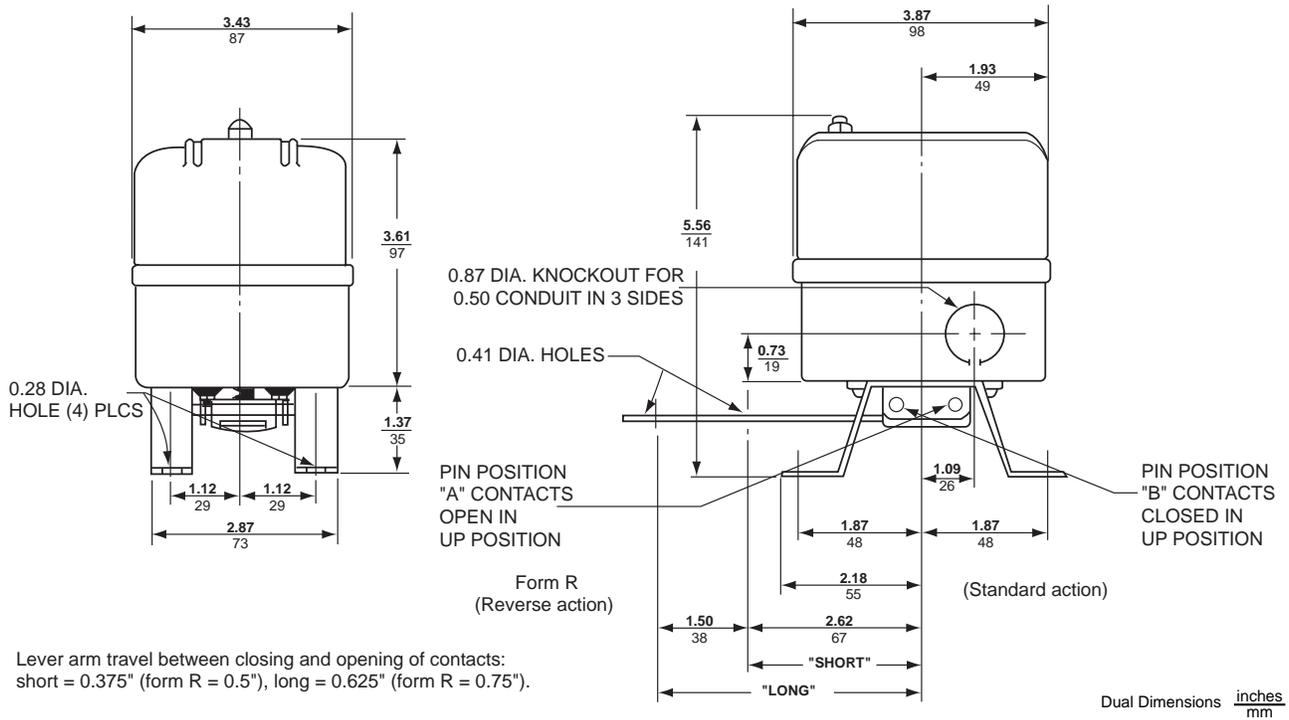


Types DR/DW Dimensions

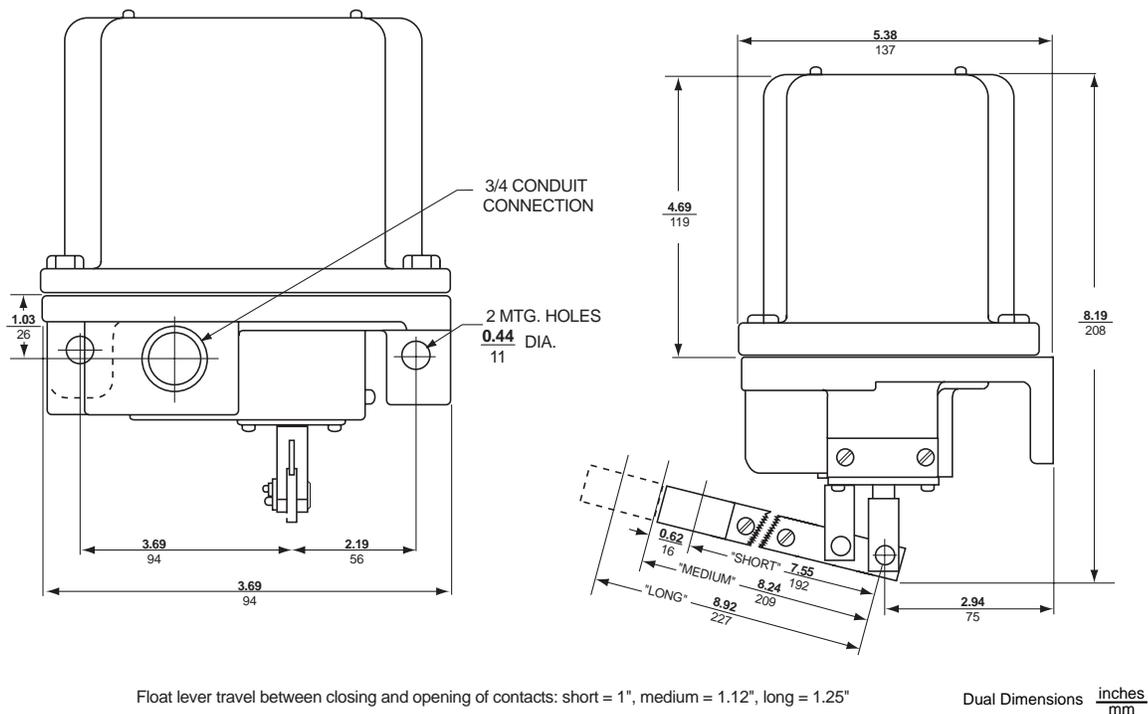


Electromechanical and Electronic Level Control Class 9036 - Types D and G

Type GG Dimensions



Types GR/GW Dimensions



Electromechanical and Electronic Level Control

Class 9036 - Types FG and LG

CLASS 9036 TYPE FG



The Class 9036 Type FG30 pedestal style sump pump switch is designed for liquid level control with electric motor operated pumps either directly or through a magnetic starter. It can also be used to activate alarms in liquid level control systems. The upward or downward movement of the lever arm controls the ON and OFF positions corresponding to the water level changes required to turn the pump or alarm on and off.

Description	Type
2-pole NEMA Type 1 Contacts close on liquid rise	FG-30

Accessories

Description	Number Required	Class	Type
Plastic center hole float	1	9049	A60
33.75 inch aluminum rod, 2 float stop assemblies and attaching hardware	1	9049	A61

Voltage: 120/240 VAC

Rating: Single phase . . . 2 hp @ 120 VAC3 hp @ 240 VAC

Poly phase 3 hp @ 120 VAC5 hp @ 240 VAC

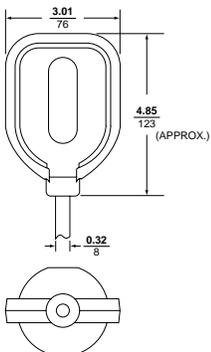
CLASS 9036 TYPE LG



The Class 9036 Type LG float switch automatically controls submersible sump, effluent and sewage pumps either directly or through a magnetic starter. It can also be used to activate alarms in water or sewage systems. The Type LG is a universal replacement for most small sump, effluent and sewage pump float switches. **This float switch does NOT contain mercury.** The Type LG is omnidirectional and functions properly regardless of orientation.

Electrical Ratings

Voltage Single Phase	Underminated Rating	Plug Rating	Recommended Maximum Horsepower
120Vac, 50/60 Hz	15 Amps	12 Amps	1/2 HP max.
230Vac, 50/60Hz	15 Amps	12 Amps	1 HP max.



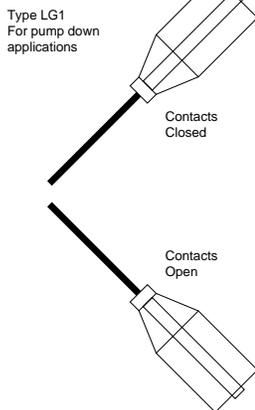
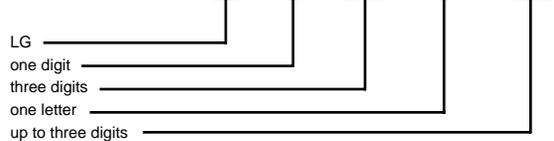
Electrical Contacts:	Snap action, normally open
Differential Angle:	85 degrees +/- 10 degrees
Housing Material:	Polypropylene
Temperature Range:	
Ambient Operating:	+32 °F to +140 °F (0 °C to +60 °C)
Storage:	-40 °F to +185 °F (-40 °C to +85 °C)
Dimensions:	
	3.01 in. (76.4 mm) diameter 5.10 in. (130 mm) length
Cord:	#16 AWG, 2 conductor, SJOW-A, flexible cord, water resistant to 140 °F (60 °C)
Maximum Tether Length:	36 inches

Type Numbering Codes

1. Basic Type
2. Contact Arrangement
3. Cord Length (in inches)
4. Cord Termination
5. Packaging

- | | |
|----------------------------------|---------------------------------------------------------------------------------------------------------------|
| 1. Basic Type | LG |
| 2. Contact Arrangement | 1 – Normally Open (for pump down or high level alarm)
2 – Normally Closed (for pump up or low level alarm) |
| 3. Cord Length | In inches (up to 20 feet), e.g. 12 indicates 12 inches of cord |
| 4. Cord Termination | A = Bare wires
B = 115 Vac piggyback plug
C = 230 Vac piggyback plug |
| 5. Packaging | C20 for bulk of 20 pieces |

Class 9036 Type



Electromechanical and Electronic Level Control Class 9037

CLASS 9037

Class 9037 closed tank float switches, used primarily on condensate pumps, may also be installed on closed industrial and diesel fuel day tanks. There are four types of Class 9037 float switches:

- Type D (flange mounted, vertical action)
- Type E (flange mounted)
- Type G (with bellows seal)
- Type H (with screw-in connector)



Class 9037 Type D

Class 9037 Type D, Flange Mounted, Vertical Action

Class 9037 Type D flange mounted, vertical action float switches are primarily used on closed industrial tanks. Float movement is transmitted through a stuffing box, which may need occasional repacking. The float contacts, which normally close on liquid rise, can be ordered to open on liquid rise (Form R). These float switches are designed to withstand tank pressures up to 50 psi and temperatures up to 250°F.

The following table contains order information for Class 9037 Type D float switches. When ordering a factory modification, add the form number to the end of the float switch type number (i.e. Type DG3R).

Class 9037 Type D Float Switches

Class 9037 Type D Float Switch Type ▲			Ground Link Length (A) (inches/mm)
NEMA 1	NEMA 4	NEMA 7 & 9	
DG1	DW1	DR1	17/432
DG2	DW2	DR2	23/584
DG3	DW3	DR3	29/737
DG4	DW4	DR4	35/889
DG5	DW5	DR5	41/1041
DG6	DW6	DR6	47/1194
DG7	DW7	DR7	53/1346
DG8	DW8	DR8	59/1499

▲ Standard materials: #304 SS float, #316 SS rod, brass cross tie and ground post, brass stop collars.

NOTE: Length cannot be modified in the field.

Modifications are listed below. Consult your local Square D field office when using float switches in liquids with a different specific gravity than water.

Modifications for Type D Float Switches

Modifications	Form
Omit float and rod accessories	L1
Omit rod accessories	L2
Reverse action, contacts open on liquid rise	R ■
#316 SS float and rod accessories	Z25

■ Cannot be modified in the field.



Electromechanical and Electronic Level Control

Class 9037

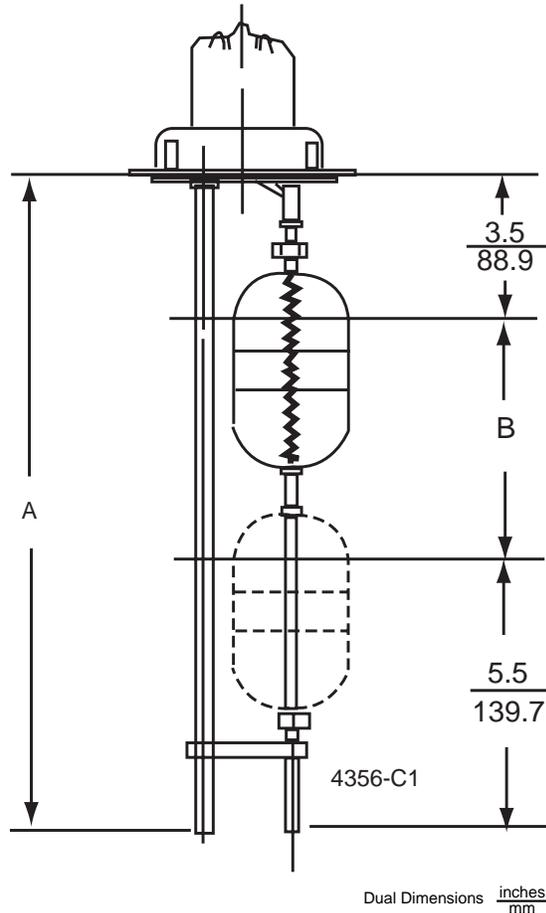
The following table lists the water level adjustments for vertical action float switches. Stop collar positions determine the amount of float travel. For instance, a DG1 set for maximum water level change of 8 inches (203 mm) and installed in a 24 inch (610 mm) tank will cut in when the water level reaches 20.5 inches (521 mm) and cut out when the water level drops to 12.5 inches (318 mm). A DG2 installed in the same tank and also set for maximum water level change of 14 inches (356 mm) will cut in when the water level reaches 20.5 inches (521 mm) and cut out when the water level drops to 6.5 inches (165 mm).

Type D Water Level Adjustments

Type	Link Length (A) (inches/mm)	Water Level Change ▲ (inches/mm)	
		Minimum	Maximum
DG/DW/DR1	17/432	3.5/89	8/203
DG/DW/DR2	23/584	3.5/89	14/356
DG/DW/DR3	29/737	3.5/89	20/508
DG/DW/DR4	35/889	3.5/89	26/660
DG/DW/DR5	41/1041	3.5/89	32/813
DG/DW/DR6	47/1194	3.5/89	38/965
DG/DW/DR7	53/1346	3.5/89	44/1118
DG/DW/DR8	59/1499	3.5/89	50/1270

▲ Cut-in point cannot be adjusted to less than 3.5 inches (89 mm) from top of tank. Cut-out point cannot be adjusted to less than 5.5 inches (140 mm) plus the distance from the end of the ground link to the bottom of the tank.

Type DG Dimensions



Electromechanical and Electronic Level Control

Class 9037

Class 9037 Type E, Flange Mounted

Class 9037 Type E flange mounted float switches are used on closed industrial tanks. Float movement is transmitted through a quad ring seal, which may need occasional replacing. These float switches can withstand tank pressures up to 50 psi and temperatures up to 250 °F. The float and rod mounting position determines the contact operation.



Class 9037 Type E

The following table contains order information for Class 9037 Type E float switches. The post length determines how far the float travels into the tank. Two post lengths are offered, 2.8 inches (71 mm) and 4.69 inches (119 mm). Order rod and float accessory kits separately. Consult your local Square D field office when using Class 9037 float switches in liquids with a different specific gravity than water.

Class 9037 Type E Float Switches and Float Kits

Class 9037 Type E Float Switch Type			Position	Water Level Change	Post Length (L) (inches/mm)
NEMA 1	NEMA 4	NEMA 7 & 9			
EG8	EW8	ER8	1	Minimum	2.63/67
EG10	EW10	ER10	1	Minimum	4.69/119
EG9	EW9	ER9	1, 2, 3	Maximum	2.63/67
EG13	EW13	ER13	1, 2, 3	Maximum	4.69/119
Class 9049 Float Kit Type			Material		
EF1			#304 Stainless Steel		
EF2			#316 Stainless Steel		

To receive all components packaged in a single carton, specify:

- Float switch class, type and form
- “R” and rod number
- “F” and float number

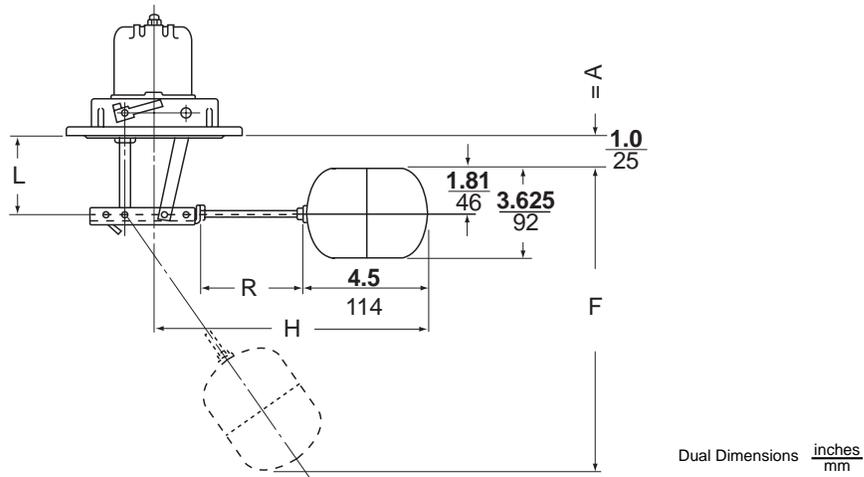
For example, to receive a 9037 EG8, 9049 ER1 and 9049 EF1, specify:

9037EG8R1F1



Electromechanical and Electronic Level Control Class 9037

Float Position 1



When ordering a float switch for operation in position 1, select rod kits from the following table. In position 1, the contacts close when the liquid rises.

Class 9049 Rod Kits – Position 1 Operation

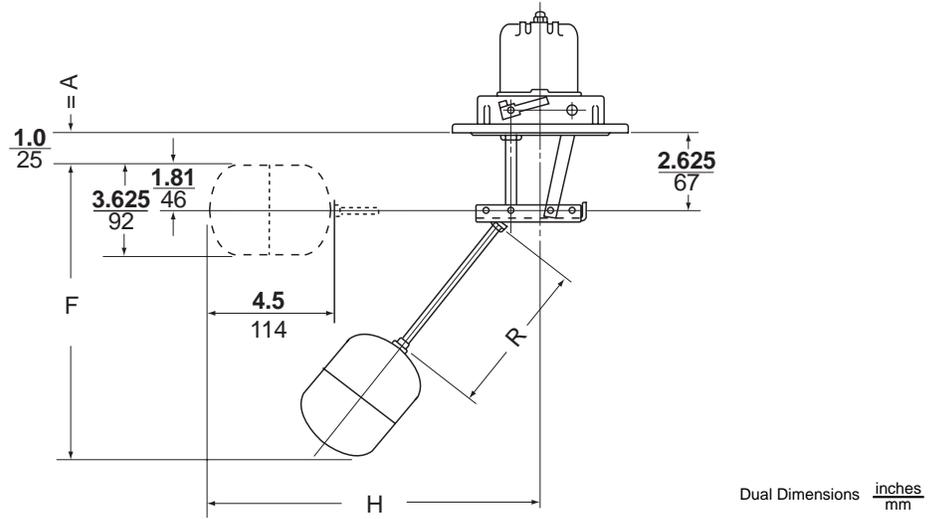
Class 9049 Rod Kit Type	R (Inches/mm)	H (Inches/mm)	EG8, EW8, ER8 A (inches/mm)		EG10, EW10, ER10 A (inches/mm)		F (inches/mm)		Water Level Change (inches/mm)	
			Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
ER1	1.75/44	8.25/210	1/25	2/51	3.06/78	4.06/103	4.75/121	6/152	1.75/44	3/76
ER2	2.5/64	9/229	1/25	2/51	3.06/78	4.06/103	4.75/121	6.25/159	1.75/44	3.25/83
ER3	3.25/83	9.5/241	1/25	2/51	3.06/78	4.06/103	4.75/121	6.5/165	1.75/44	3.5/89
ER5	5.25/133	11.75/298	1/25	2.5/64	3.06/78	4.56/116	4.75/121	6.75/171	1.75/44	3.75/95
ER7	7.25/184	13.75/349	1/25	3/76	3.06/78	5.06/129	5/127	7.25/184	2/51	4.25/108
ER12	12.25/311	18.75/476	1/25	4.25/108	3.06/78	6.31/160	5.75/146	9/229	2.75/70	6/152

Class 9049 Rod Kit Type	R (Inches/mm)	H (Inches/mm)	EG9, EW9, ER9 A (inches/mm)		EG13, EW13, ER13 A (inches/mm)		F (inches/mm)		Water Level Change (inches/mm)	
			Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
ER1	1.75/44	7.5/191	1/25	4/102	3.06/78	6.06/154	6/152	9/229	3/76	6/152
ER2	2.5/64	8.25/210	1/25	4.5/114	3.06/78	6.56/167	6.25/159	9.75/248	3.25/83	6.75/171
ER3	3.25/83	9/229	1/25	5/127	3.06/78	7.06/179	6.25/159	10.25/260	3.25/83	7.25/184
ER5	5.25/133	11/279	1/25	6/152	3.06/78	8.06/205	6.5/165	11.5/292	3.5/89	8.5/216
ER7	7.25/184	12/305	1/25	7.5/191	3.06/78	9.56/243	6.5/165	13/330	3.5/89	10/254
ER12	12.25/311	18/457	1/25	9.5/241	3.06/78	11.56/294	9/229	17.5/445	6/152	14.5/368



Electromechanical and Electronic Level Control Class 9037

Float Position 2



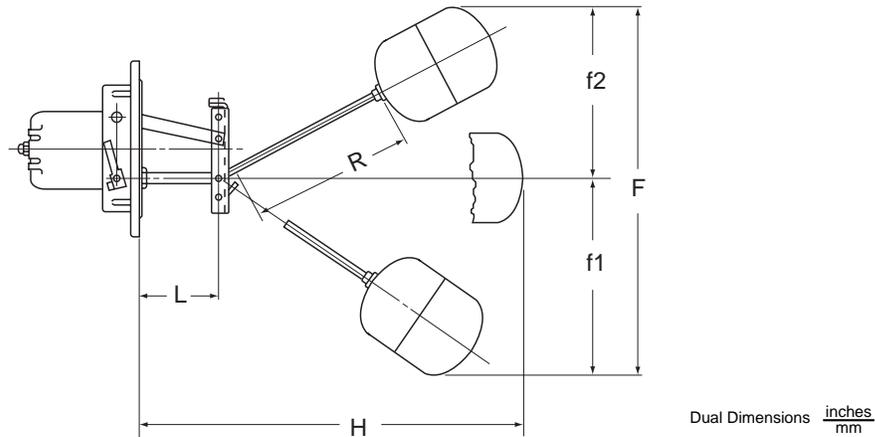
When ordering a float switch for operation in position 2, select rod kits from the following table. In position 2, the contacts open when the liquid rises.

Class 9049 Rod Kits – Position 2 Operation

Class 9049 Rod Kit Type	R (Inches/ mm)	H (Inches/ mm)	EG9, EW9, ER9 A (inches/mm)		EG13, EW13, ER13 A (inches/mm)		F (inches/mm)		Water Level Change (inches/mm)	
			Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
ER1	1.75/44	7.5/191	1/25	3/76	3.06/78	5.06/129	5.25/133	7.25/184	2.75/70	4.25/108
ER2	2.5/64	8.25/210	1/25	3.5/89	3.06/78	5.56/141	5.75/146	8.25/210	2.75/70	5.25/133
ER3	3.25/83	9/229	1/25	4/102	3.06/78	6.06/154	6/152	9/229	3/76	6/152
ER5	5.25/133	11/279	1/25	5/127	3.06/78	7.06/179	6.75/171	10.75/273	3.75/95	7.75/197
ER7	7.25/184	13/330	1/25	6/152	3.06/78	8.06/205	7.75/197	12.75/324	4.75/121	9/229
ER12	12.25/311	18/457	1/25	8.5/216	3.06/78	10.56/268	10.25/260	17.75/451	7.25/184	12.25/311

Electromechanical and Electronic Level Control Class 9037

Float Position 3



When ordering a float switch for operation in position 3, select rod kits from the following table. In position 3, the contacts can be set to open (standard) or close (sump) on liquid rise by turning the control switch 180° around its horizontal center line.

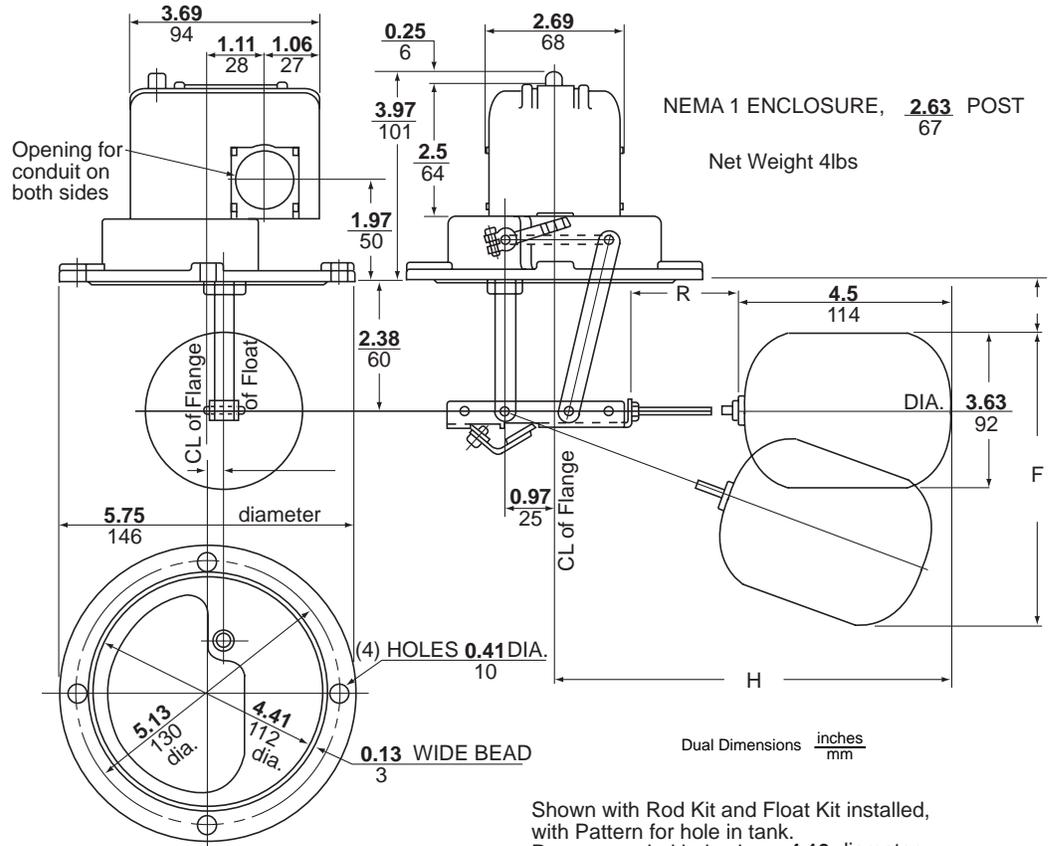
Class 9049 Rod Kits – Position 3 Operation

Class 9049 Rod Kit Type	R (Inches/ mm)	H (inches/mm)		f1 or f2 (inches/mm)		F (inches/mm)		Water Level Change (inches/mm)	
		EG9, EW9, ER9	EG13, EW13, ER13	Min.	Max.	Min.	Max.	Min.	Max.
ER1	1.75/44	9/229	11/279	2.75/70	4.5/114	5.5/140	9/229	2.25/57	5.75/146
ER2	2.5/64	9.75/248	11.75/298	2.75/70	4.5/114	5.5/140	9/229	2.25/57	5.75/146
ER3	3.25/83	10.5/267	12.5/318	3/78	5/127	6/152	10/254	2.75/70	6.75/171
ER5	5.25/133	12.5/318	14.5/368	3.5/89	6/152	7/178	12/305	3.75/95	8.75/222
ER7	7.25/184	14.5/368	16.5/419	3.75/95	7/178	7.5/191	14/356	4.25/108	10.75/273
ER12	12.25/311	19.5/495	21.5/546	4.5/114	9.5/241	8.75/222	19/483	5.5/140	15.75/400



Electromechanical and Electronic Level Control Class 9037

Type EG Dimensions

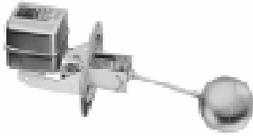


Shown with Rod Kit and Float Kit installed,
with Pattern for hole in tank.
Recommended hole size = $\frac{4.19}{106}$ diameter.

Electromechanical and Electronic Level Control

Class 9037

Class 9037 Type G, Flange Mounted with Bellows Seal



Class 9037 Type G

Class 9037 Type G float switches are flange mounted. Float movement is transmitted through a bellows seal. The float contacts, which normally close on liquid rise, can be configured to open on liquid rise by repositioning the bearing pin. Float movement, determined by the mounting position of the float, is illustrated.

These float switches can withstand tank pressures up to 50 psi and temperatures up to 250 °F. An optional Monel bellows (Form A) allows them to withstand pressures up to 100 psi and temperatures up to 275 °F. Consult your local Square D field office when using Class 9037 float switches in liquids with a different specific gravity than water.

The following table contains order information for Class 9037 Type G float switches. Order rod and float accessory kits separately. When ordering a factory modification, add the form number to the end of the float switch type number (i.e. Type GG22H).

Class 9037 Type G Float Switches

Class 9037 Type G Float Switches			Figure	Float Movement
NEMA 1	NEMA 4	NEMA 7 & 9		
GG21	GW21	GR21	1	Horizontally mounted, above and below centerline
GG22	GW22	GR22	2	Horizontally mounted, below centerline
GG23	GW23	GR23	3	Vertically mounted
Modifications			Form	
1 NC-1 NO contact			H	
Substitute Monel bellows for brass bellows ▲			A	

▲ Increases maximum tank pressure to 100 psi and maximum temperature to 275 °F.

To receive all components packaged in a single carton, specify:

- Float switch class, type and form
- “BR” (brass rod) or “SR” (stainless steel rod) and rod length
- “F” and float number

For example, to receive a 9037 GG21H, 9049 GBR3 and 9049 GF1, specify:

9037GG21HBR3F1

Class 9049 float and rod kits, listed in the following table, are ordered separately from float switches.

Accessory Kits for Type G Float Switches

	Accessory Kits	Class 9049 Type	
Float Kits	#304 stainless steel, 4 inch diameter ball float	GF1	
	#316 stainless steel, 4 inch diameter ball float	GF2	
Rod Kits		Brass	#316 SS
	3 inch rod ▲	GBR3	GSR3
	5 inch rod	GBR5	GSR5
	7 inch rod	GBR7	GSR7
	9 inch rod	GBR9	GSR9
	11 inch rod	GBR11	GSR11
	13 inch rod	GBR13	GSR13
Special lengths ■	GBR99	GSR99	

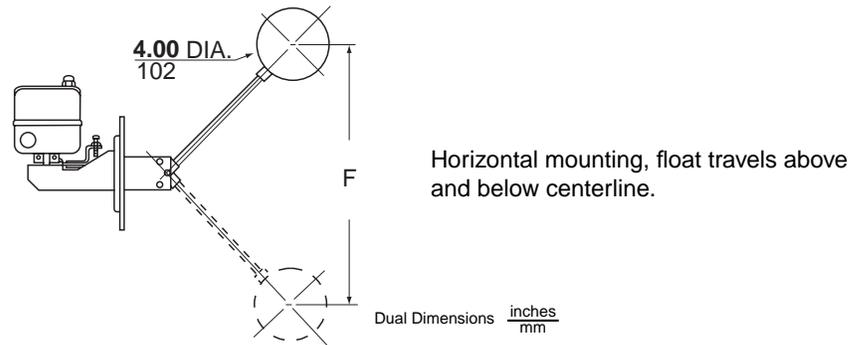
▲ Do not use 3 inch rod on GR or GW when contacts open on rise. Leverage force is insufficient.

■ Maximum recommended rod length is 30 inches.



Electromechanical and Electronic Level Control Class 9037

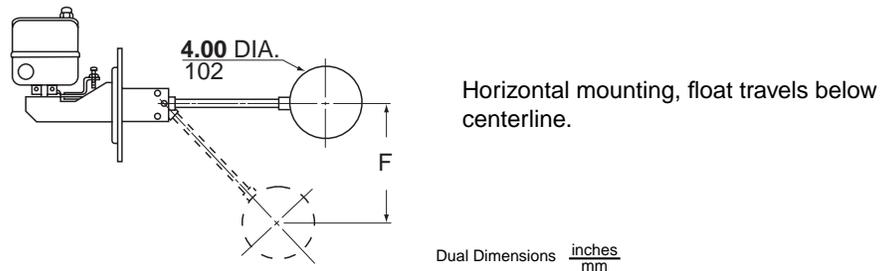
Type GG21, GW21 and GR21 float switches operate above and below the centerline, as shown in the figure below. Float travel distances are listed in the following table.



Type GG21, GW21 and GR21 Float Travel

R (Inches/mm)	H (Inches/mm)	F			
		GG21		GR21, GW21	
		Min.	Max.	Min.	Max.
3/76	10.31/262	3/76	7.5/191	–	–
5/127	12.31/313	3.75/95	10.13/257	4.25/108	10.13/257
7/178	14.31/363	4.63/118	12.75/324	5.13/130	12.75/324
9/229	16.31/414	5.5/140	15.38/391	6/152	15.38/391
11/279	18.31/465	6.38/162	18/457	6.88/175	18/457
13/330	20.31/516	7.25/184	20.63/524	7.75/197	20.63/524

Type GG22, GW22 and GR22 float switches operate below the centerline, as shown in the figure below. Float travel distances are listed in the following table.



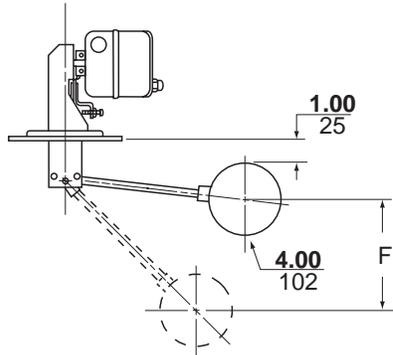
Type GG22, GW22 and GR22 Float Travel

R (Inches/mm)	H (Inches/mm)	F			
		GG22		GR22, GW22	
		Min.	Max.	Min.	Max.
3/76	10.31/262	2.88/73	5/127	–	–
5/127	12.31/313	3.63/92	6.75/171	4.25/108	6.75/171
7/178	14.31/363	4.5/114	8.63/219	5/127	8.63/219
9/229	16.31/414	5.25/133	10.38/264	5.75/146	10.38/264
11/279	18.31/465	6/152	12.13/308	6/152	12.13/308
13/330	20.31/516	6.88/175	14/356	7.38/187	14/356



Electromechanical and Electronic Level Control Class 9037

Type GG23, GW23 and GR23 float switches are vertically mounted, as shown in figure below. Float travel distances are listed in the following table.



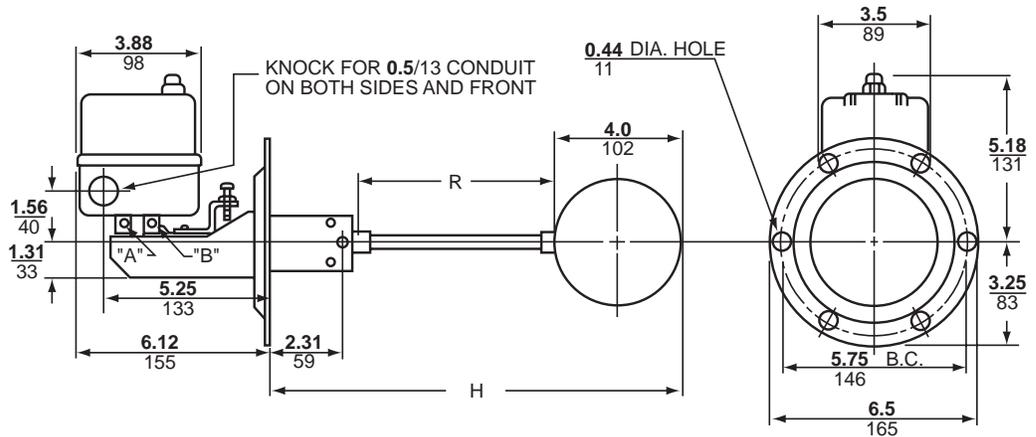
Vertical mounting, contact operation depends on control switch setting.

Dual Dimensions $\frac{\text{inches}}{\text{mm}}$

Type GG23, GW23 and GR23 Float Travel

R (Inches/mm)	H (Inches/mm)	F			
		GG23		GR23, GW23	
		Min.	Max.	Min.	Max.
3/76	10.31/262	2.88/73	4.38/111	—	—
5/127	12.31/313	3.63/92	6/152	4.13/105	6/152
7/178	14.31/363	4.5/114	7.63/194	5/127	7.63/194
9/229	16.31/414	5.25/133	9.25/235	5.75/146	9.25/235
11/279	18.31/465	6/152	10.88/276	6/152	10.88/276
13/330	20.31/516	6.88/175	12.5/318	7.38/187	12.5/318

Type GG Dimensions



NOTES:

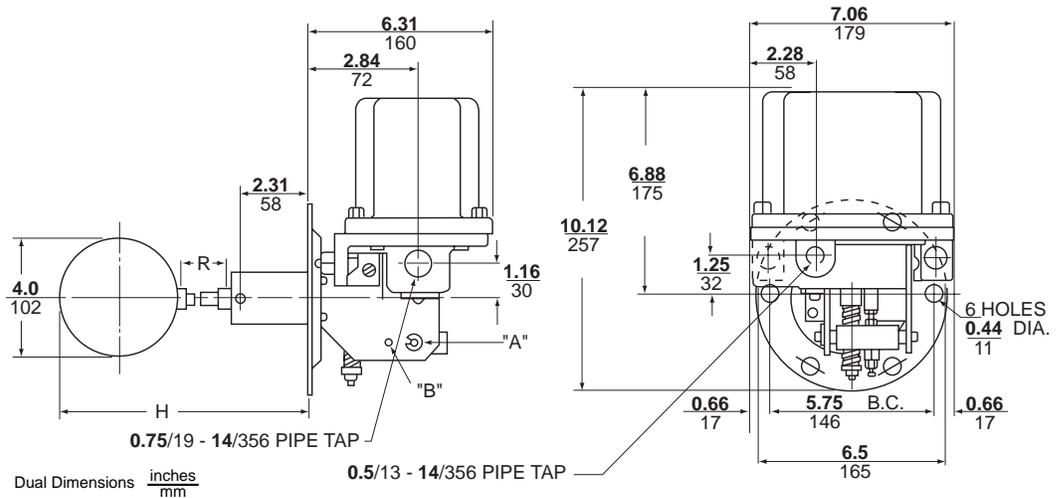
- PIN POSITION "A" CONTACTS OPEN ON LIQUID RISE.
- PIN POSITION "B" CONTACTS CLOSE ON LIQUID RISE.
- EASILY CHANGED IN FIELD.

Dual Dimensions $\frac{\text{inches}}{\text{mm}}$

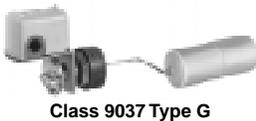


Electromechanical and Electronic Level Control Class 9037

Type GR/GW Dimensions



Class 9037 Type H, with Screw-In Connector



Class 9037 Type H screw-in float switches are primarily used on condensate pumps. A 2.5 inch screw-in connector attaches the float switch to the tank. An external pointer indicates the float position. Float movement is transmitted through a nitrile rubber seal such as a Buna N Quad Ring. Occasional repacking may be necessary. Float travel is determined by the float rod angle. The float contacts, which normally close on liquid rise, can be ordered to open on liquid rise (Form R).

These float switches are designed to withstand tank pressures up to 50 psi at temperatures up to 250°F.

The following table contains order information for Class 9037 Type H float switches. Consult your local Square D field office when using float switches in liquids with a different specific gravity than water.

Class 9037 Type G Float Switches

Class 9037 Type G Float Switches ■			Water Level Change (inches/mm)		Float Rod Angle	Float Position ▲	CL to CL (inches/mm)
NEMA 1	NEMA 4	NEMA 7 & 9	Minimum	Maximum			
HG33	HW33	HR33	2/52	5/127	45°	Right	–
HG35	HW35	HR35	2.5/64	5/127	90° offset	Right	3/76
HG37	HW37	HR37	3.75/95	7/178	90° offset	Right	4.25/108
HG39	HW39	HR39	4.25/108	8.25/210	90° offset	Right	5/127
HG31	HW31	HR31	6/152	11.5/292	90° offset	Right	7/178
HG34	HW34	HR34	2/52	5/127	45°	Left	–
HG36	HW36	HR36	2.5/64	5/127	90° offset	Left	3/76
HG38	HW38	HR38	3.75/64	7/178	90° offset	Left	4.25/108
HG30	HW30	HR30	4.25/108	8.25/210	90° offset	Left	5/127
HG32	HW32	HR32	6/152	11.5/292	90° offset	Left	7/178

■ Standard materials are: #304 SS float, #316 SS rod, 2.5 inch cast iron bushing, brass sealing connector, Buna N Quad Ring packing.

▲ Viewing from front of switch, facing indicator scale.



Electromechanical and Electronic Level Control

Class 9037

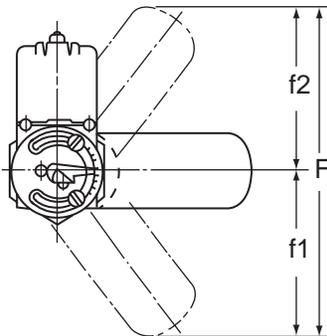
When ordering a factory modification, add the form number to the end of the float switch type number (i.e. Type HG36R). Modifications are listed in the following table.

Modifications for Type H Float Switches

Modifications	Form
Omit 2.5 inch connecting bushing	L1
Omit float	L2
Reverse action, contacts open on liquid rise	R ■
VITON [®] packing, 5 ounce float (diesel fuel, Types HG, HW, HR30, 31, 32, 37, 38, 39 only)	Z19
VITON [®] packing, for temperature 250 °F	Z20
VITON [®] packing, #316 SS float	Z21

■ Cannot be modified in the field.

The following table lists the float travel distances for the screw-in float switches. Distances are referenced to the dimension drawings below.



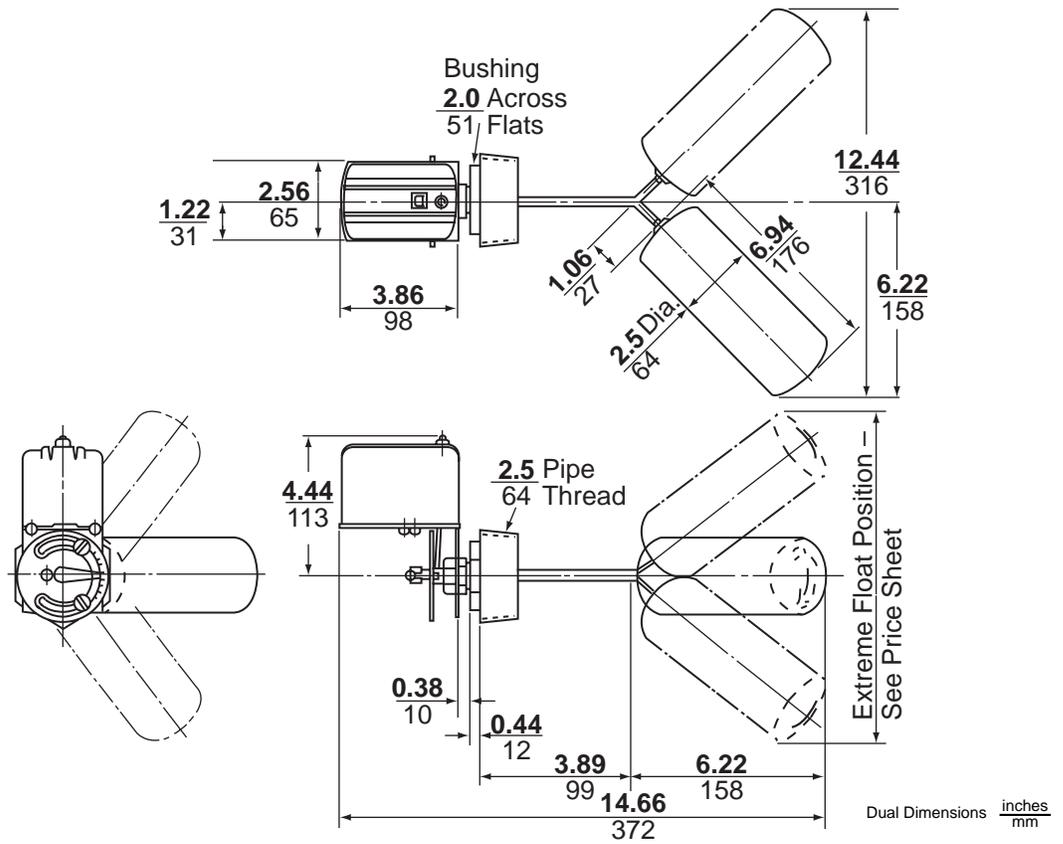
Type H Float Travel

Float Rod Angle	R (inches/ mm)	H ▲ (inches/ mm)	f1 (inches/mm)		f2 (inches/mm)		f3 (inches/mm)	
			Minimum	Maximum	Minimum	Maximum	Minimum	Maximum
45°	–	6.22/158	2.25/57	4.5/114	2/52	4.5/110	4.25/108	9/229
90° offset	3/78	4.25/108	2.75/70	4.25/108	2.25/57	4.25/108	5/127	7.5/191
90° offset	4.25/108	5.5/140	3.5/89	5.5/140	2.75/70	4/102	6.25/159	9.5/241
90° offset	5/127	6.25/159	3.75/95	6.25/159	3/76	4.5/110	6.75/171	10.75/273
90° offset	7/178	8.25/210	4.75/121	8.25/210	3.75/95	5.75/146	8.5/216	14/356

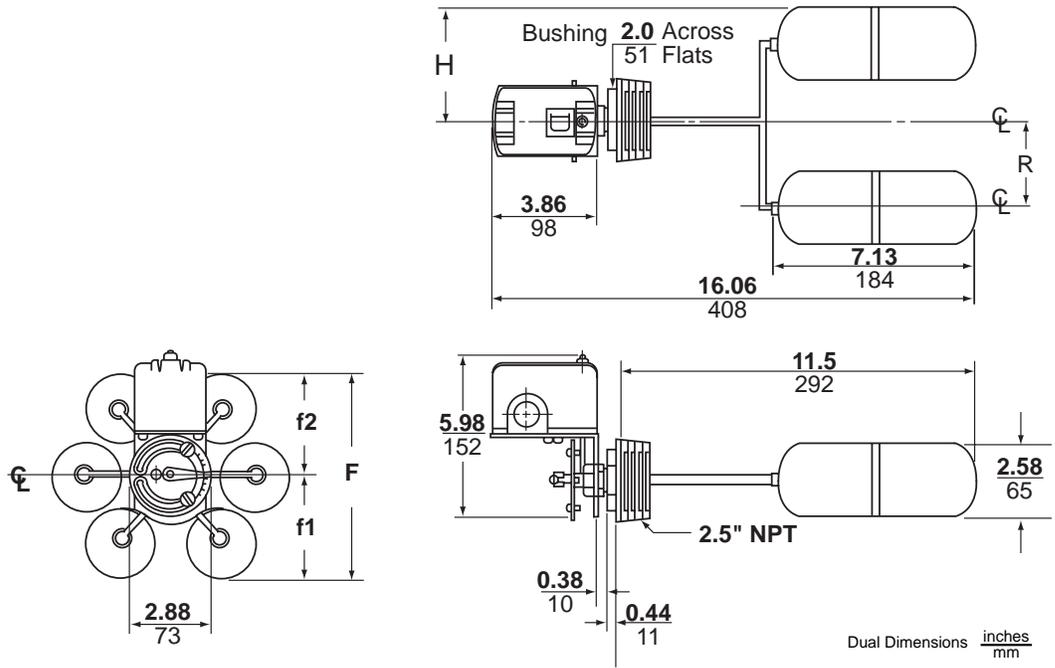
▲ Clearance from centerline of hub to side of tank.

Electromechanical and Electronic Level Control Class 9037

Type HG – 45° Angle Dimensions

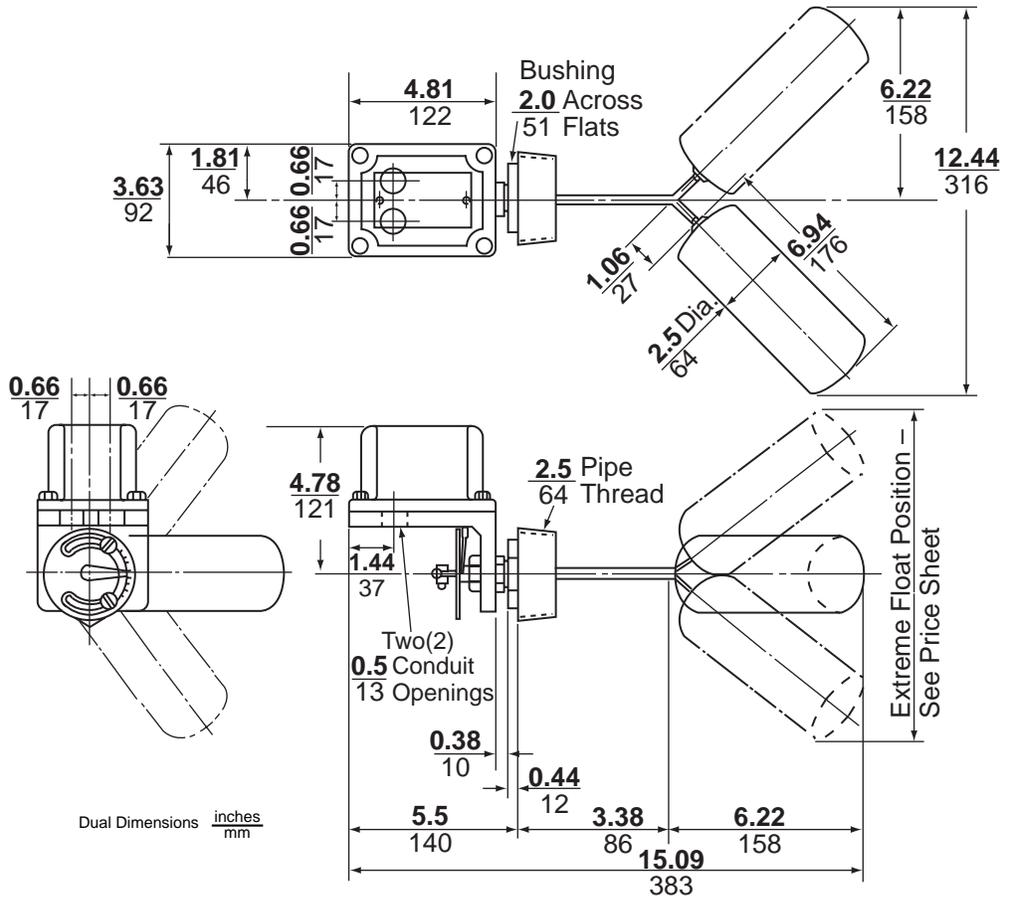


Type HG – 90° Offset Dimensions

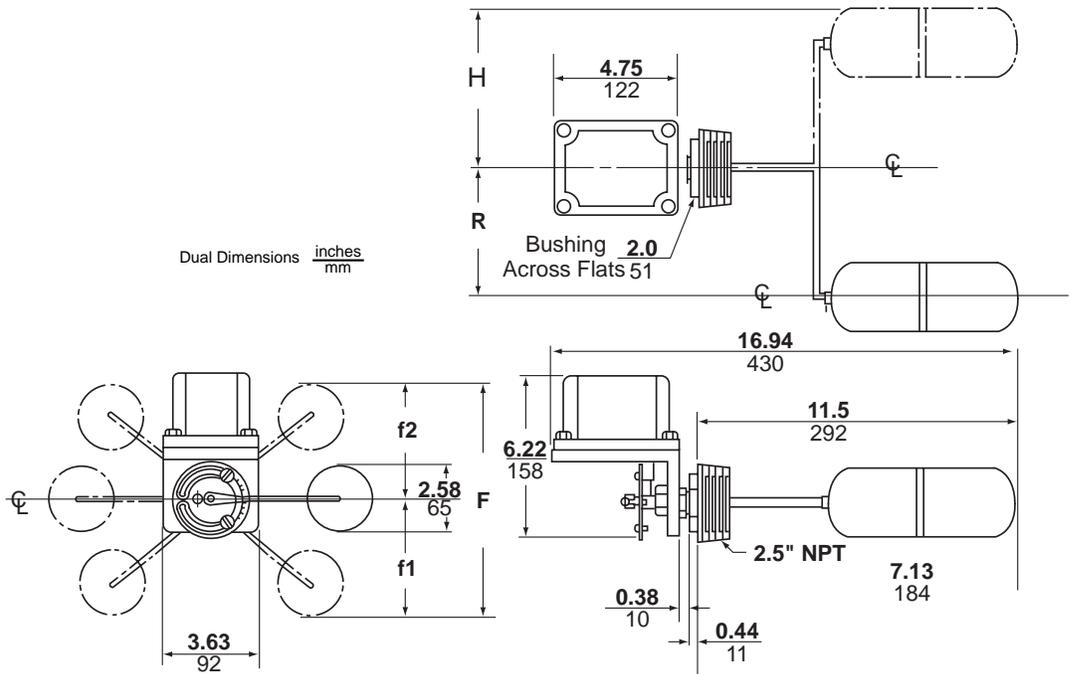


Electromechanical and Electronic Level Control Class 9037

Type HR/HW – 45° Angle Dimensions



Type HR/HW– 90° Offset Dimensions



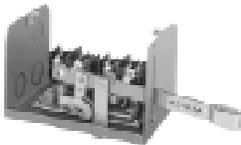
CLASS 9038

Class 9038 mechanical alternators provide a simple, positive means of mechanically alternating two pumps or motors. These alternators are used on devices that are installed in a duplex system with a common tank. There are five types of Class 9038 mechanical alternators:

- Type A (open tank and sump)
- Type B (flange mounted with bellows seal)
- Type C (with screw-in connector)
- Type D (flange mounted, vertical)
- Type J (vertically mounted)

Mechanical alternators can be ordered with a manual transfer selector switch (Form N3), which allows the operator to select which pump cuts-in first. The second pump only operates under peak demand conditions or if the first pump fails. When the switch is disengaged, the alternator reverts to normal operation. Another option (Form N4) allows the alternator to be used as a two level non-alternating unit.

Class 9038 Type A, Open and Sump Tank Mechanical Alternators



Class 9038 Type AG1

Class 9038 Type A mechanical alternators are used on open and sump tanks. When liquid level rises to the first level, one pump turns on, both pumps are automatically turned on when a peak condition occurs and the liquid level continues to rise. The water level change between the cut-in points of the lead pump and the second pump is approximately 1 inch. The same is true between the second pump and the high water alarm (Form N5), when used. The float contacts, which normally close on liquid rise, can be ordered to open on liquid rise (Form R).

These alternators are designed to withstand tank pressures up to 50 psi at temperatures up to 250°F. Consult your local Square D field office when using Class 9038 alternators in liquids with a different specific gravity than water.

The following table contains order information for Class 9038 Type A mechanical alternators. Float accessories must be ordered separately.

Class 9038 Type A Mechanical Alternators

Class 9038 Type A Mechanical Alternator Type		
NEMA 1	NEMA 4	NEMA 7 & 9
AG1	AW1 ▲	AR1 ▲

▲ Compensating spring standard

When ordering a factory modification, add the form number to the end of the mechanical alternator type (i.e. Type AG1R). Modifications are listed in the following table.

Type A Mechanical Alternator Modifications

Modifications	Form
Compensating spring (Type AG)	C
Manual transfer selector switch	N3
Two-level, non-alternating unit	N4
Addition of a third, high water alarm circuit	N5
Reverse action, contacts open on liquid rise	R



Electromechanical and Electronic Level Control

Class 9038

The following table lists the operating forces for Type A mechanical alternators. Use this table when selecting additional tubing or when selecting floats and rods for accessories made by other manufacturers.

Type A Operating Forces

Type	Lever Length Position	Force Up to Trip ▲ (ounces)	Force Down to Trip ▲ (ounces)	Maximum Rod Length Supported by Compensating Spring ■ (feet/meters)			Maximum Weight of Tubing and Stops Supported by Compensating Spring (ounces)
		(without Form C)		Brass	Stainless Steel	Aluminum	
AG1	Minimum	18	20	10/3.05	12/3.66	25/7.62	47
AG1	Maximum	16	17	8/2.44	10/3.05	21/6.4	41
AG1R	Minimum	14	16	7/2.13	8/2.44	17/5.18	33
AG1R	Maximum	11	12	6/1.83	7/2.13	15/4.57	30
AR1/AW1	Standard	–	–	16/4.88	20/6.1	41/12.5	74
AR1R/AW1R	Standard	–	–	19/5.79	23/7.01	47/14.33	85

▲ Add 2 ounces for high water alarm (Form N5).

■ Rod length determined using Class 9049 rod material (0.38 inch/10 mm O.D. tubing). Other types of rod must be weighed and compared to "Weight of Tubing and Stops" column above.

Class 9049 accessory kits, listed in the following table, are ordered separately from alternators. Order tapped-at-top floats for Type AG1 (except form C) and center-hole floats for Types AG1C, AW1 and AR1.

Accessory Kits for Class 9038 Float Switches

Accessory Kits	Class 9049 Type	Description	Net Float ■ Buoyancy in Water (ounces)	Weight (ounces)	
				Per Foot of Tubing	of Stops (Total)
Tapped-at-Top Floats	A6	#304 SS float, 5 foot brass tubing and two stops	60	3.7	3
	A6A	#304 SS float, 5 foot aluminum tubing and two stops	60	1.2	3
	A6S	#304 SS float, 5 foot SS tubing and two SS stops	60	3.4	3
Center-Hole Floats	A6C	#304 SS float, 5 foot brass tubing and four stops	70	3.7	6
	A6CA	#304 SS float, 5 foot aluminum tubing and four stops	70	1.2	6
	A6CS	#304 SS float, 5 foot SS tubing and four SS stops	70	3.4	6
Additional Tubing ▲	T1	2.5 foot brass tubing with connector	NA	3.7	NA
	T1A	2.5 foot aluminum tubing with connector	NA	1.2	NA
	T1S	2.5 foot SS tubing with connector	NA	3.4	NA
Miscellaneous	UMS1	Floor mounting kit	NA	NA	NA

■ Net buoyancy calculated with float 80% submerged, allowing for a 20% safety factor. Buoyancy data calculated for use in water. Consult local Square D field office for buoyancy in other liquids.

▲ Additional tubing kits add on to float accessory kits.

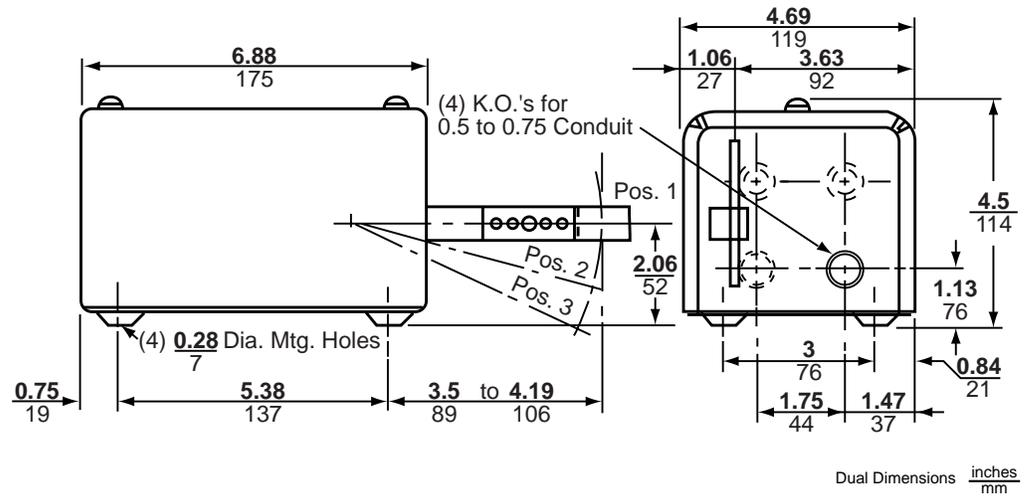
Maximum recommended tubing length for tapped-at-top float: 12.5 feet (3810 mm).

Maximum recommended tubing length for center-hole float: 30 feet (9144 mm).

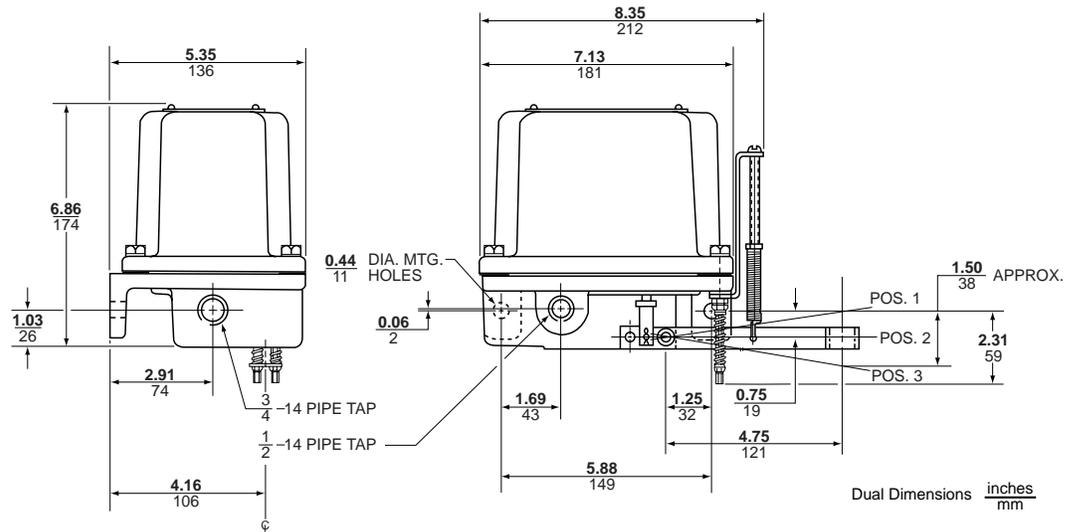


Electromechanical and Electronic Level Control Class 9038

Type AG1 Dimensions



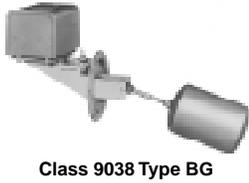
Type AR1/AW1 Dimensions



Electromechanical and Electronic Level Control

Class 9038

Class 9038 Type B, Flange Mounted Mechanical Alternators with Bellows Seal



Class 9038 Type B flange mounted mechanical alternators are used for controlling the liquid level in industrial closed tanks. Float movement is transmitted through a bellows seal. Float travel is determined by the float mounting position. There are three float positions. The float contacts, which normally close on liquid rise, can be ordered to open on liquid rise (Form R).

These alternators are designed to withstand tank pressures up to 50 psi and temperatures up to 250°F. An optional Monel bellows (Form A) allows them to withstand pressures up to 100 psi and temperatures up to 275 °F.

The following table contains order information for Class 9038 Type B alternators. Order float and rod accessory kits separately. Consult your local Square D field office when using Class 9038 alternators in liquids with a different specific gravity than water.

Class 9038 Type B Mechanical Alternators

Class 9038 Type B Mechanical Alternators			Figure	Float Movement
NEMA 1	NEMA 4	NEMA 7 & 9		
BG21	BW21	BR21	1	Horizontally mounted, above and below centerline
BG22	BW22	BR22	2	Horizontally mounted, reduced travel
BG23	BW23	BR23	3	Vertically mounted

Type B Mechanical Alternator Modifications

Modifications	Form
Substitute Monel bellows for brass bellows ▲	A
Manual transfer selector switch	N3
Two-level, non-alternating unit	N4
Reverse action, contacts open on liquid rise	R

▲ Increases maximum tank pressure to 100 psi and maximum temperature to 275 °F.

When ordering a factory modification, add the form number to the end of the alternator type number (i.e. Type BG22R). Modifications are listed in the above table. To receive all components packaged in a single carton, specify:

- Alternator class, type and modification
- “BR” (brass rod) or “SR” (stainless steel rod) and rod length
- “F” and float number

For example, to receive a 9038 BG21N3, 9049 GBR3 and 9049 BF1, specify:

9038 BG21N3 BR3F1

Class 9049 float and rod kits, listed in the following table, are ordered separately from alternators.

Accessory Kits for Type G Float Switches

	Accessory Kits	Class 9049 Type	
Float Kits	#304 stainless steel float	BF1	
	#316 stainless steel float	BF2	
Rod Kits		Brass	#316 SS
	3 inch rod	GBR3	GSR3
	5 inch rod	GBR5	GSR5
	7 inch rod	GBR7	GSR7
	9 inch rod	GBR9	GSR9
	11 inch rod	GBR11	GSR11
	13 inch rod	GBR13	GSR13
	Special lengths ■	GBR99	GSR99

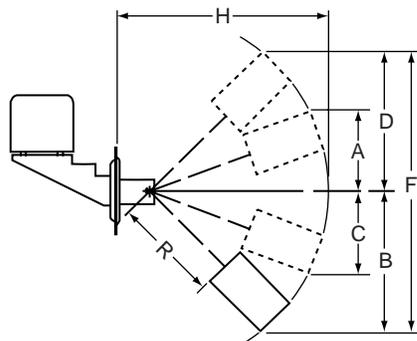
■ Maximum recommended rod length is 30 inches.

Float Travel

Class 9038 Type B alternator switches are normally configured to cut in and out at the high point and low point of distance A plus B. As long as one pump is able to handle the incoming water, the pumps are alternated at this distance. If the water level continues to rise and the float reaches the top of distance D, the second switch cuts in and starts the second pump. Both pumps continue to run until the float returns to the low point of distance D plus C, when one pump cuts out. The other pump continues to run until the float reaches the low point of distance B. (See float travel figures and tables below).

In reverse configuration, both pumps run when the float is at the low point of distance B. When the float rises to the top of distance B plus A, one pump cuts out. The other pump continues to run until the float reaches the high point of distance D. Both pumps are alternated between distance C plus D. (See float travel figures and tables below).

Type BG21, BW21 and BR21 alternator floats travel above and below the centerline as shown in Figure 1. Float travel distances are listed in the following table.



Horizontal mounting, float travels above and below centerline

Type BG21, BW21 and BR21 Float Travel

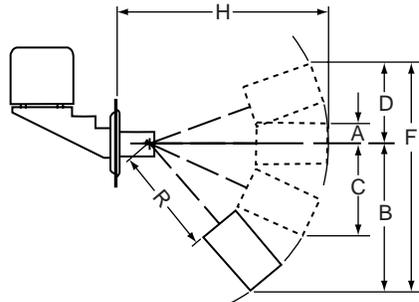
R (Inches/mm)	H (Inches/mm)	A & C (Inches/mm)		B & D (Inches/mm)		F (Inches/mm)	
		Min.	Max.	Min.	Max.	Min.	Max.
3/76	13/330	4.5/114	6/152	6.25/159	8.25/210	12.5/318	16.5/419
5/127	15/381	4.75/121	6.75/171	7/178	9.5/241	14/356	19/483
7/178	17/432	5/127	7.5/191	7.75/197	10.75/273	15.5/394	21.5/546
9/229	19/483	5.5/140	8.25/210	8.5/216	12/305	17/432	24/610
11/279	21/533	6/152	9/229	9.25/235	13/330	18.5/470	26/660
13/330	23/584	6.5/165	9.75/248	10/254	14.25/362	20/508	28.5/724



Electromechanical and Electronic Level Control

Class 9038

Type BG22, BW22 and BR22 alternator floats travel above and below the centerline as shown in Figure 2. Float travel distances are listed in the following table.

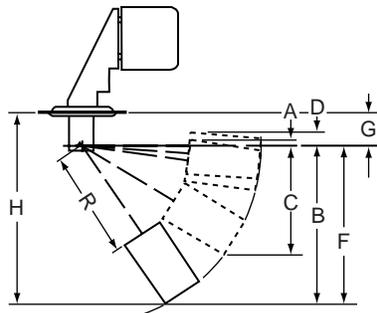


Horizontal mounting, float travels above and below centerline

Type BG22, BW22 and BR22 Float Travel

R (Inches/ mm)	H (Inches/ mm)	A (Inches/ mm)	B (Inches/mm)		C (Inches/mm)		D (Inches/mm)		F (Inches/mm)	
			Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
3/76	13/330	2.25/57	6.75/171	10.5/267	6/152	9.25/235	5.25/133	5/127	12/305	15.5/394
5/127	15/381	2.25/57	7.75/197	12/305	6.75/171	10.75/273	5.75/146	5.5/140	13.5/343	17.5/445
7/178	17/432	2.25/57	8.5/216	13.5/343	7.5/191	12/305	6.25/159	6/152	14.75/375	19.5/495
9/229	19/483	2.25/57	9.25/235	15.25/387	8/203	13.5/343	6.75/171	6.75/171	16/406	22/559
11/279	21/533	2.25/57	10.25/260	16.75/425	8.75/222	14.75/375	7.5/191	7.25/184	17.75/451	24/610
13/330	23/584	2.25/57	11/279	18.25/464	9.5/241	16/406	8/203	7.75/194	19/483	26/660

Type BG23, BW23 and BR23 alternator floats travel below the flange (vertically mounted) as shown in Figure 3. Float travel distances are listed in the following table.



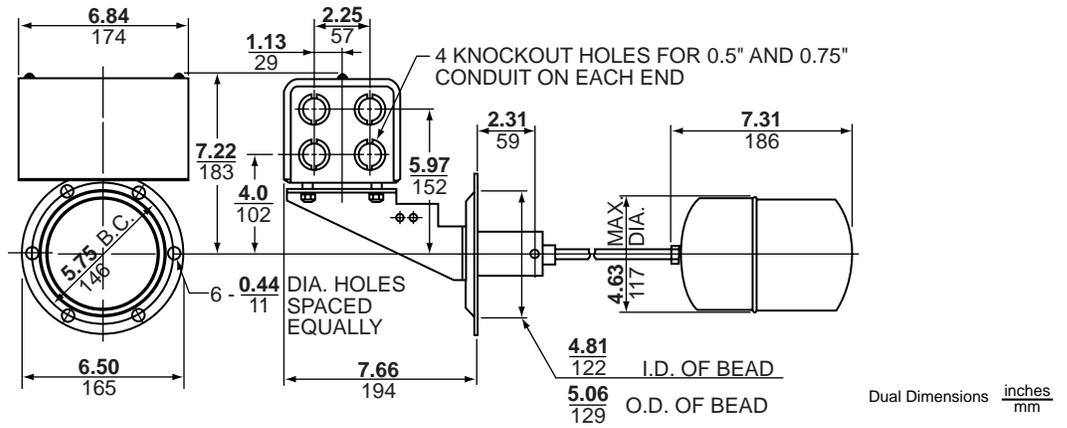
Vertical mounting, contacts close on liquid rise

Type BG23, BW23 and BR23 Float Travel

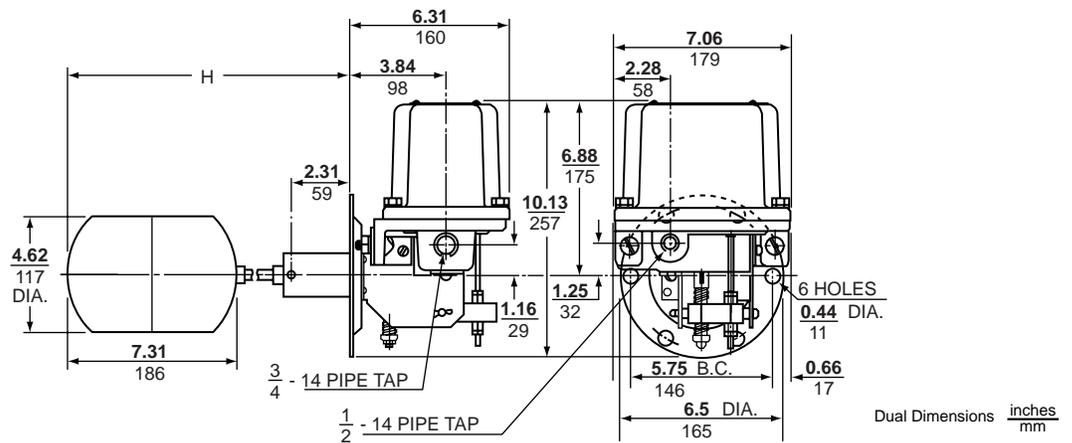
R (Inches/ mm)	H (Inches/ mm)	A (Inches/mm)		B (Inches/mm)		C (Inches/ mm)	D (Inches/mm)		F (Inches/mm)		F (Inches/mm)	
		Min.	Max.	Max.	Min.		Min.	Max.	Min.	Max.	Min.	Max.
3/76	12.75/324	0.5/13	0.5/13	9.75/248	9.75/248	9/229	0.63/16	1.63/41	10.38/264	11.38/289	2.38/60	1.38/35
5/127	14.5/368	2/51	0.13/3	11.75/298	11.75/298	11/279	0.88/22	1.5/38	10.88/276	13.38/340	3.75/95	1.38/35
7/178	16.5/419	3/76	0.5/13	14/356	14/356	13/330	1.5/38	1.5/38	12.5/318	15.5/394	4.5/114	1.38/35
9/229	18.5/470	6/152	1.5/38	17.5/445	17.5/445	16/406	3.25/83	1.5/38	14.25/362	18.75/476	6/152	1.38/35
11/279	20.5/521	7.5/191	2.5/64	20/508	20/508	17/432	4.5/114	1.5/38	15.5/394	21.5/546	7.25/184	1.38/35
13/330	22.5/572	4.75/121	1.5/38	15.75/400	16/406	13.75/349	2.5/64	1.5/38	13.5/343	17.5/445	5.5/140	1.38/35

Electromechanical and Electronic Level Control Class 9038

Type BG Dimensions



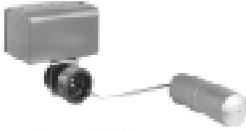
Type BR/BW Dimensions



Electromechanical and Electronic Level Control

Class 9038

Class 9038 Type C, Screw-In Mechanical Alternators



Class 9038 Type CG

Class 9038 Type C screw-in mechanical alternators are primarily used on condensate pumps. A 2.5 inch screw-in connector attaches the float switch to the tank. An external pointer indicates the float position. Float movement is transmitted through a nitrile rubber seal such as a Buna N Quad Ring. Occasional repacking may be necessary. These alternators are designed to withstand tank pressures up to 50 psi at temperatures up to 250 °F.

Float travel is determined by the rod length. The float contacts, which normally close on liquid rise, can be ordered to open on liquid rise (Form R). For more information on float travel and position, see "Float Travel" on page 53.

The following table contains order information for Class 9038 Type C mechanical alternators. Consult your local Square D field office when using Class 9038 alternators in liquids with a different specific gravity than water.

Class 9038 Type C Float Switches

Class 9038 Type C Alternator Type ■			Water Level Change (inches/mm)		Float Position ▲
NEMA 1	NEMA 4	NEMA 7 & 9	Minimum	Maximum	
CG31	CW31	CR31	6.5/165	13/330	Right
CG32	CW32	CR32	6.5/165	13/330	Left
CG33	CW33	CR33	4/102	7.75/197	Right
CG34	CW34	CR34	4/102	7.75/197	Left
CG35	CW35	CW35	4.75/121	9.25/235	Right
CG36	CW36	CW36	4.75/121	9.25/235	Left

■ Standard materials are: #304 SS float, #316 SS rod, 2.5 inch cast iron bushing, brass sealing connector, Buna N Quad Ring packing.

▲ Viewed from front of alternator, facing indicator scale.

When ordering a factory modification, add the form number to the end of the alternator type number (i.e. Type CG36R). Modifications are listed in the following table.

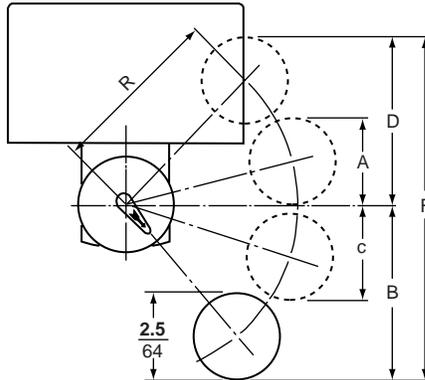
Modifications for Type C Float Switches

Modifications	Form
Omit 2.5 inch connecting bushing	F3
Omit float	L
Manual transfer selector switch	N3
Two-level, non-alternating unit	N4
Addition of a third, high water alarm circuit (Type CG only)	N5
Reverse action, contacts open on liquid rise	R
Fluorcarbon polymer such as VITON® packing, 5 ounce float (diesel fuel, Type CG only)	Z19
Fluorcarbon polymer such as VITON® packing, for temperature 250 °F	Z20
Fluorcarbon polymer such as VITON® packing, #316 SS float	Z21



Electromechanical and Electronic Level Control Class 9038

The following table lists the float travel distances for the screw-in float switches. Distances are referenced to the drawing.

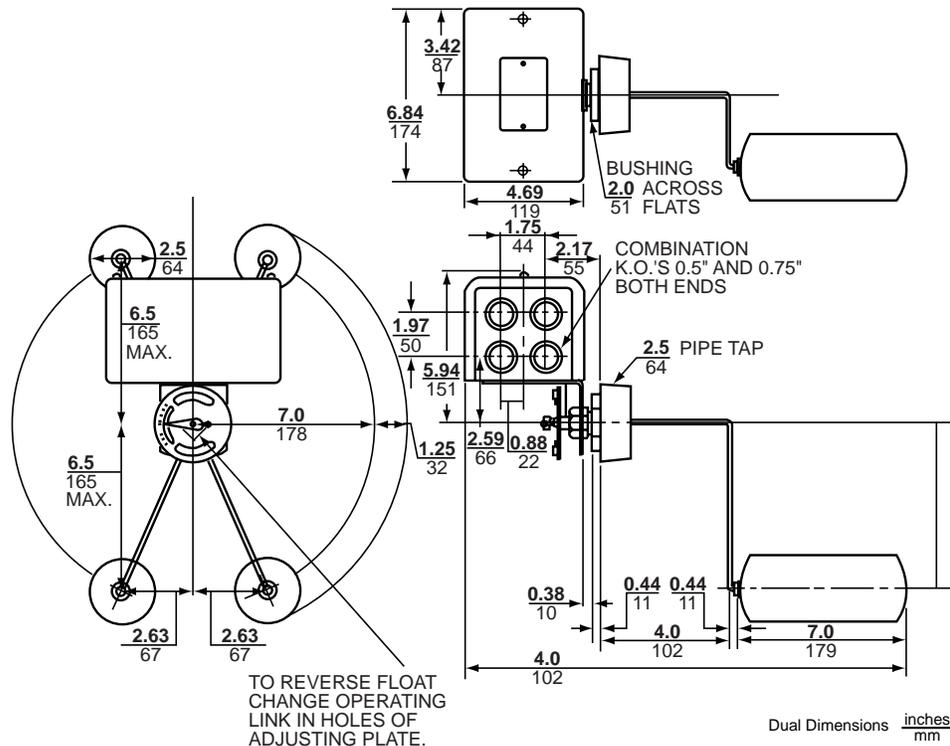


Type C Float Travel Adjustments

R (Inches/ mm)	A (Inches/mm)		B (Inches/mm)		C (Inches/mm)		D (Inches/mm)		F (Inches/mm)	
	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
4.25/108 ▲	2/51	3.5/89	3.5/89	4.75/121	2.5/64	3.75/95	3.5/89	4.75/121	7/178	9.5/241
5/127 ■	2.25/57	3.75/95	4/102	5.25/133	2.75/70	3/76	4/102	5.25/133	8/203	10.5/267
7/178 ●	2.5/64	5/127	5/127	7/178	2/51	4/102	5/152	7/178	10/254	14/495

- ▲ CG33, CG34, CW33, CW34, CR33, CR34
- CG35, CG36, CW35, CW36, CR35, CR36
- CG31, CG32, CW31, CW32, CR31, CR32

Type CG Dimensions

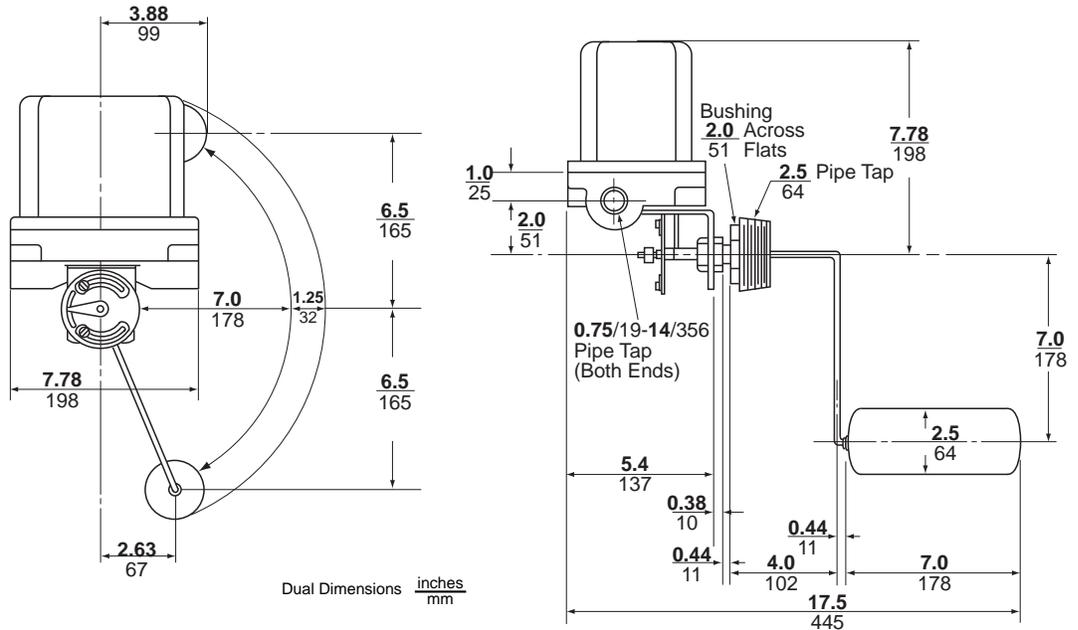


Dual Dimensions $\frac{\text{inches}}{\text{mm}}$



Electromechanical and Electronic Level Control Class 9038

Type CR/CW Dimensions



Class 9038 Type D, Flange Mounted Mechanical Alternators



Class 9038 Type DG

Class 9038 Type D flange mounted mechanical alternators are used for controlling the liquid level in industrial closed tanks. Float movement is transmitted through a stuffing box, which may need occasional repacking. These alternators are designed to be mounted at the top of a closed tank. They can withstand tank pressures up to 50 psi and temperatures up to 250 °F.

The following tables contains order information for Class 9038 Type D alternators. Order rod and float accessory kits separately. Consult your local Square D field office when using Class 9038 alternators in liquids with a different specific gravity than water.

Class 9038 Type D Mechanical Alternators

Class 9038 Type D Mechanical Alternators			Water Level Change	Hinge Post Length (V) (inches/mm)
NEMA 1	NEMA 4	NEMA 7 & 9		
DG7	DW7	DR7	Minimum	2.63/67
DG8	DW8	DR8	Maximum	2.63/67
DG9	DW9	DR9	Minimum	4.69/119
DG10	DW10	DR10	Maximum	4.69/119

Class 9038 Type D Float Kits

Float Kit Type	Material	Diameter (inches/mm)	Length (inches/mm)
EF1	#304 stainless steel	3.62/92	4.5/114
EF2	#316 stainless steel	3.62/92	4.5/114
HF3	#304 stainless steel	2.5/64	7/178
HF4	#316 stainless steel	2.5/64	7/178



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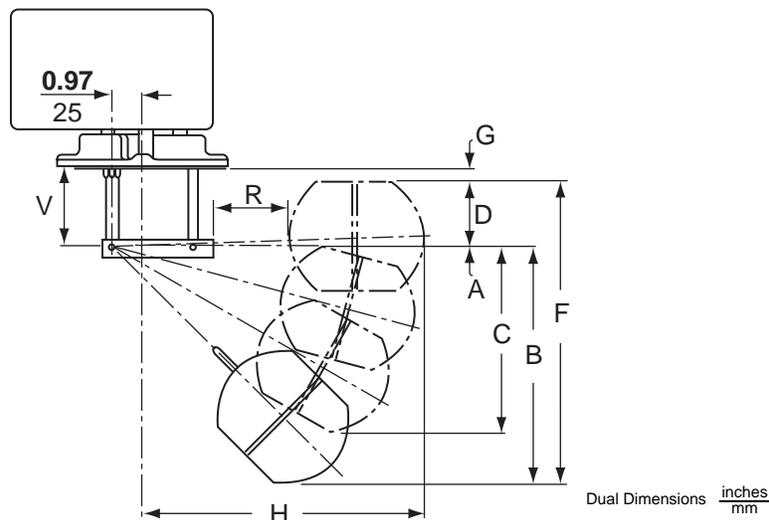
When ordering a factory modification from the following table, add the form number to the end of the alternator type number (i.e. Type DG7R).

Type D Mechanical Alternator Modifications

Modifications	Form
Manual transfer selector switch	N3
Two-level, non-alternating unit	N4
Addition of third, high water alarm circuit (Type DG only)	N5

Float Travel

Float travel is determined by the length of the hinge post and rod and by the float position. The float may be operated in three different positions. In the first position, the contacts close when the liquid rises. In the second position, the contacts open when the liquid rises. In the third position, the contacts can be set to either open or close on liquid rise by turning the control switch 180° around its horizontal center line. Use the following table when ordering Types DG7, DW7 or DR7 alternators.



Class 9049 Rod Kits for Types DG7, DW7, and DR7

Class 9049 Rod Kit Type	Float Travel for Class 9038 Types DG7, DW7, and DR7 Alternators Minimum Water Level Change (V=2.63 inch/67 mm)													
	R	H ▲	A (inches/mm)		B (inches/mm)		C (inches/mm)		D (inches/mm)		F (inches/mm)		G (inches/mm)	
			Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
ER1	1.75 44	8.25 210	0.75 19	0.63 16	5 127	5 127	4 102	4.25 108	1.75 44	1.5 38	6.75 171	6.5 165	1 25	1.5 38
ER2	2.5 64	9 229	0.63 16	0.38 10	5.38 137	5.25 133	4.25 108	4.5 114	1.75 44	1.38 35	7.13 181	6.63 168	1 25	1.5 38
ER3	3.25 83	9.5 241	0.5 13	0.25 6	5.5 140	5.5 140	4.38 111	4.63 118	1.75 44	1.25 32	7.25 184	6.75 171	1 25	1.5 38
ER5	5.25 133	11.75 298	0.13 3	0.0 0	6.38 162	6.25 159	5 127	5.13 130	1.75 44	1 25	8.13 207	7.25 184	1 25	1.75 44
ER7	7.25 184	13.75 349	0.25 6	0.5 13	7 178	7 178	5.5 140	5.75 146	1.75 44	0.88 22	8.75 222	7.88 200	1 25	2 51
ER12	12.25 311	18.75 476	0.38 10	1.5 38	8.63 219	8.75 222	6.75 171	7.75 197	1.75 44	0.63 16	10.38 264	9.38 238	1 25	2.5 64

▲ Add 2.5 inches (64 mm) to H when using HF3 or HF4 floats.



Electromechanical and Electronic Level Control

Class 9038

Use the following table when ordering Types DG8, DW8 or DR8 alternators.

Class 9049 Rod Kits for Types DG8, DW8, and DR8

Class 9049 Rod Kit Type	Float Travel for Class 9038 Types DG8, DW8, and DR8 Alternators Minimum Water Level Change (V=2.63 inch/67 mm)												
	R	H ▲	A (inches/mm)		B (inches/mm)	C (inches/mm)		D ■ (inches/mm)		F (inches/mm)		G (inches/mm)	
			Min.	Max.	Min.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
ER1	1.75 44	7.5 191	0.0 0	1.25 32	8 203	6.5 165	6.5 165	2 51	0.5 13	10 254	8.5 216	1.5 38	2.5 64
ER2	2.5 64	8.25 210	0.5 13	1.5 38	8.75 222	7 178	7 178	1.75 44	0.25 6	10.5 267	9 229	1.5 38	2.75 70
ER3	3.25 83	9 229	1 25	2 51	9.5 241	7.75 197	7.5 191	1.5 38	0.0 0	11 279	9.5 241	1.75 44	3 76
ER5	5.25 133	11 279	2 51	3 76	11.5 292	9.5 241	9 229	1.25 32	0.75 19	12.75 324	10.75 273	2 51	3.75 95
ER7	7.25 184	13 330	3 76	4 102	13.5 343	11 279	10.75 273	0.75 19	1.75 44	14.25 362	11.75 298	2 51	4.5 114
ER12	12.25 311	18 457	5.5 140	6.5 165	18.5 470	14.75 375	15 381	0.5 13	4.25 108	19 483	14.25 362	2.25 57	6.25 159

▲ Add 2.5 inches (64 mm) to H when using HF3 or HF4 floats.

■ D is negative when top of float is below horizontal centerline.

Use the following table when ordering Types DG9, DW9 or DR9 alternators.

Class 9049 Rod Kits for Types DG9, DW9, and DR9

Class 9049 Rod Kit Type	Float Travel for Class 9038 Types DG9, DW9, and DR9 Alternators Minimum Water Level Change (V=4.69 inch/119 mm)													
	R	H ▲	A (inches/mm)		B (inches/mm)		C (inches/mm)		D (inches/mm)		F (inches/mm)		G (inches/mm)	
			Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
ER1	1.75 44	8.25 210	1 25	0.5 13	5.25 133	5.25 133	4.5 114	4.5 114	2 51	1.5 38	7.25 184	6.75 171	3 76	3.75 95
ER2	2.5 64	9 229	1 25	0.13 3	5.75 146	5.63 143	4.75 121	4.75 121	2 51	1.25 32	7.75 197	6.88 175	3 76	4 102
ER3	3.25 83	9.5 241	0.88 22	0.0 0	6 152	5.88 149	5 127	5 127	2 51	1.13 29	8 203	7 178	3 76	4 102
ER5	5.25 133	11.75 298	0.63 16	0.88 22	7.25 184	7.13 181	5.75 146	5.88 149	2 51	0.75 19	9.25 235	7.88 200	3 76	4.38 111
ER7	7.25 184	13.75 349	0.25 6	1.63 41	8.25 210	8.25 210	6.5 165	6.75 171	1.88 48	0.5 13	10.13 257	8.75 222	3.25 83	4.63 117
ER12	12.25 311	18.75 476	0.13 3	2.88 73	10.75 273	11 279	8.38 213	8.5 216	1.63 41	0.5 13	12.38 314	11.5 292	4 102	5.75 146

▲ Add 2.5 inches (64 mm) to H when using HF3 or HF4 floats

Use the following table when ordering Types DG10, DW10 or DR10 alternators.

Class 9049 Rod Kits for Types DG10, DW10, and DR10

Class 9049 Rod Kit Type	Float Travel for Class 9038 Types DG10, DW10, and DR10 Alternators Minimum Water Level Change (V=4.69 inch/119 mm)												
	R	H ▲	A (inches/mm)		B (inches/mm)	C (inches/mm)		D ■ (inches/mm)		F (inches/mm)		G (inches/mm)	
			Min.	Max.	Min.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
ER1	1.75 44	7.5 191	0.5 13	1.5 38	8 203	7 178	7 178	1.75 44	0.5 13	8.75 222	8.5 216	3.25 83	4.75 121
ER2	2.5 64	8.25 210	1 25	2 51	8.75 222	7.75 194	7.5 191	1.75 44	0.25 6	10.5 267	9 229	3.5 89	5 127
ER3	3.25 83	9 229	1.5 38	2.5 64	9.5 241	8.25 210	8.25 210	1.5 38	0.0 0	11 279	9.5 241	3.5 89	5.25 133
ER5	5.25 133	11 279	2.5 64	4 102	11.5 292	10 254	10 254	1.25 32	1 25	12.75 324	10.5 267	3.75 95	6 152



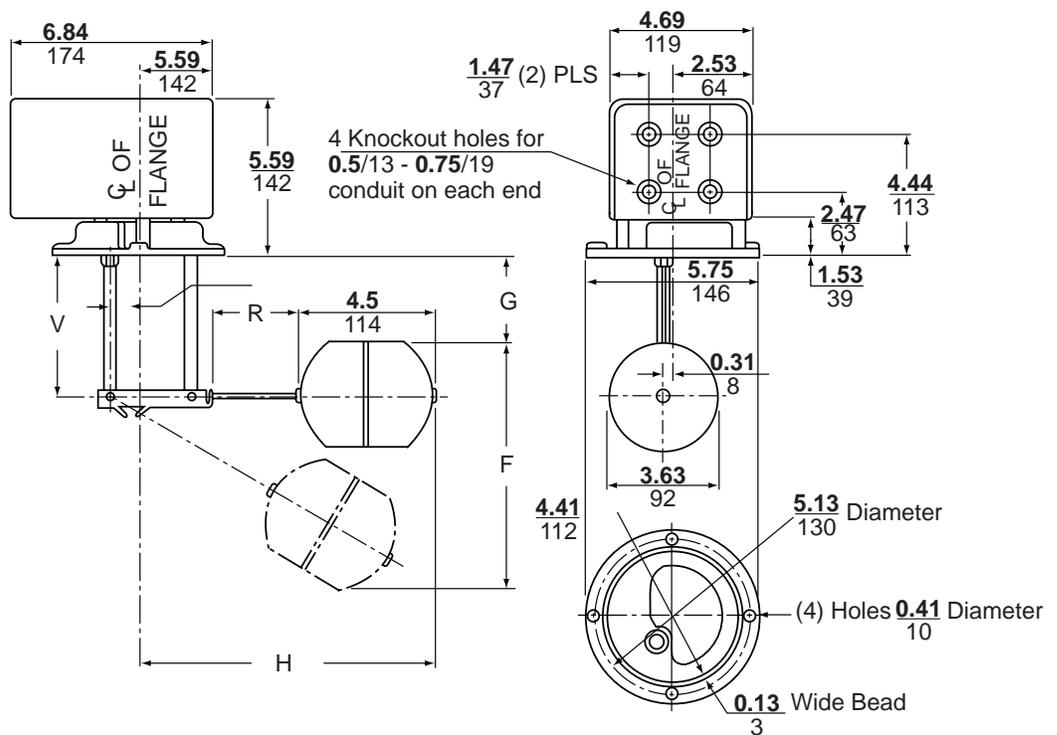
Electromechanical and Electronic Level Control Class 9038

Class 9049 Rod Kits for Types DG10, DW10, and DR10

Class 9049 Rod Kit Type	Float Travel for Class 9038 Types DG10, DW10, and DR10 Alternators Minimum Water Level Change (V=4.69 inch/119 mm)													
	R	H ▲	A (inches/mm)		B (inches/mm)		C (inches/mm)		D ■ (inches/mm)		F (inches/mm)		G (inches/mm)	
			Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
ER7	$\frac{7.25}{184}$	$\frac{13}{330}$	$\frac{3.25}{83}$	$\frac{5.5}{140}$	$\frac{13.5}{343}$	$\frac{11.5}{292}$	$\frac{12}{305}$	$\frac{1}{25}$	$\frac{1.5}{38}$	$\frac{14.5}{368}$	$\frac{12}{305}$	$\frac{4}{102}$	$\frac{6.75}{171}$	
ER12	$\frac{12.25}{311}$	$\frac{18}{457}$	$\frac{6}{152}$	$\frac{9.25}{235}$	$\frac{18.5}{470}$	$\frac{15.5}{394}$	$\frac{17}{432}$	$\frac{0.5}{13}$	$\frac{2.75}{70}$	$\frac{19}{483}$	$\frac{15.75}{400}$	$\frac{4.75}{121}$	$\frac{8.5}{216}$	

- ▲ Add 2.5 inches (64 mm) to H when using HF3 or HF4 floats.
- D is negative when top of float is below horizontal centerline.

Type DG Dimensions



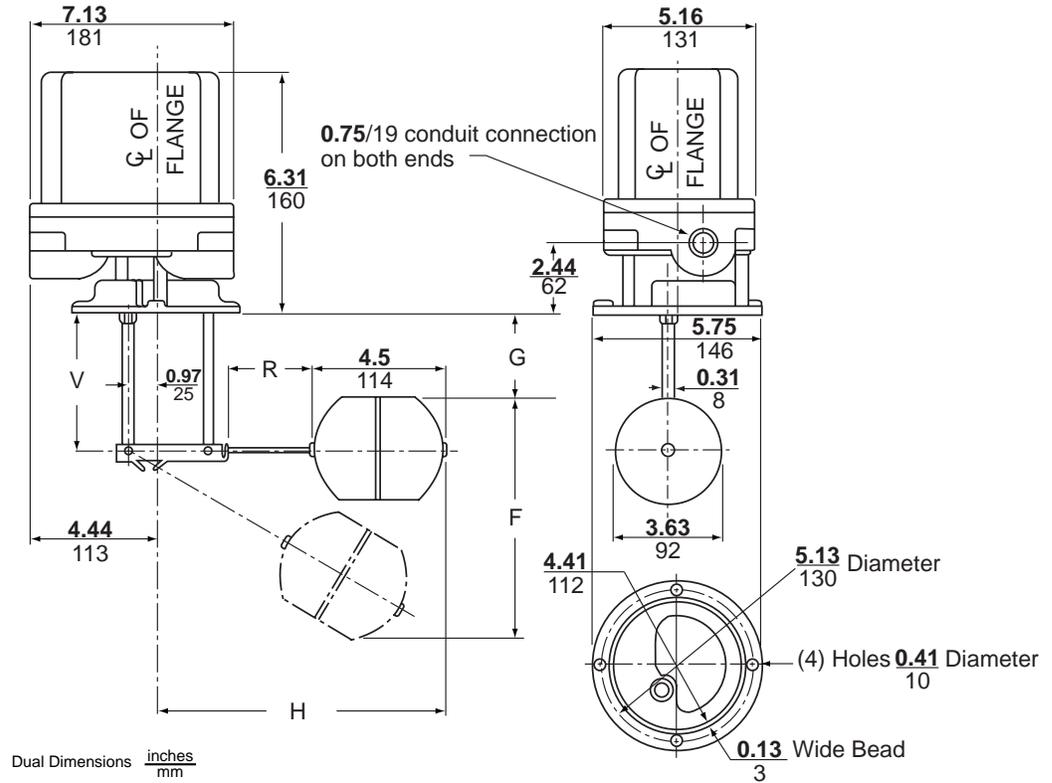
NOTE: The recommended size of hole in the tank for the entry of the float and mounting of the control is 4.19/106. Floats shown are Type EF, 4.5/114 long. Add 2.5/64 to "H" if using Type HF Floats which are 7.0/178.

Dual Dimensions $\frac{\text{inches}}{\text{mm}}$



Electromechanical and Electronic Level Control
Class 9038

Type DR/DW Dimensions



Electromechanical and Electronic Level Control Class 9038

Class 9038 Type J, Flange Mounted, Vertical Action Mechanical Alternators



Class 9038 Type JG

Class 9038 Type J flange mounted, vertical action mechanical alternators are primarily used on closed industrial tanks. Type J alternators are designed for applications when tank space is limited or when large level changes are required. They are comprised of a switch mechanism, mounting flange, linkage, center-hole float and float rod. Float movement is transmitted through a stuffing box, which may need occasional repacking. The float contacts, which normally close on liquid rise, can be ordered to open on liquid rise (Form R).

These float switches are designed to withstand tank pressures up to 50 psi and temperatures up to 250 °F.

The following table contains order information for Class 9038 Type J mechanical alternators. Consult your local Square D field office when using Class 9038 alternators in liquids with a different specific gravity than water.

Class 9038 Type J Mechanical Alternators

Class 9038 Type J Mechanical Alternators			Ground Link Length (inches/mm)
NEMA 1	NEMA 4	NEMA 7 & 9	
JG1	JW1	JR1	17/432
JG2	JW2	JR2	23/584
JG3	JW3	JR3	29/737
JG4	JW4	JR4	35/889
JG5	JW5	JR5	41/1041
JG6	JW6	JR6	47/1194
JG7	JW7	JR7	53/1346
JG8	JW8	JR8	59/1499

When ordering a factory modification, add the form number to the end of the float switch type number (i.e. Type JG3R). Modifications are listed in the following table.

Modifications for Type J Float Switches

Modifications ▲	Form
Omit float and rod accessories	L1
Omit rod accessories	L2
Manual transfer selector switch	N3
Two-level, non-alternating unit	N4
Reverse action, contacts open on liquid rise	R ■
#316 SS float and rod accessories (specify ground link length)	Z5

▲ Standard materials are: #304 SS float, #316 SS rod, brass cross tie, ground post and stop collars.

■ Cannot be modified in the field.



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The following table lists the range of water level adjustments (min. to max.) for the vertical action alternators. "B" is the water level change that will cause the two pumps to alternate.

Type J Water Level Adjustments

Type	Link Length (A) (inches/mm)	Water Level Change (B) ▲ (inches/mm)	
		Minimum	Maximum
JG1	17/432	4.44/113	8/203
JG2	23/584	4.44/113	7.06/179
JG3	29/737	4.44/113	13.06/332
JG4	35/889	4.44/113	25.06/637
JG5	41/1041	4.44/113	31.06/789
JG6	47/1194	4.44/113	37.06/941
JG7	53/1346	4.44/113	43.06/1094
JG8	59/1499	4.44/113	49.06/1246

▲ Cut-in point of leading pump cannot be adjusted to less than 4.44 inches (113 mm) from top of tank. Cut-out point of leading pump cannot be adjusted to less than 6.88 inches (175 mm) plus distance from end of guide rod to bottom of tank.

Cut-in point of lagging pump cannot be adjusted to less than 3.25 inches (83 mm) from top of tank. Cut-out point of lagging pump cannot be adjusted to less than 5.5 inches (140 mm) plus distance from end of guide rod to bottom of tank.

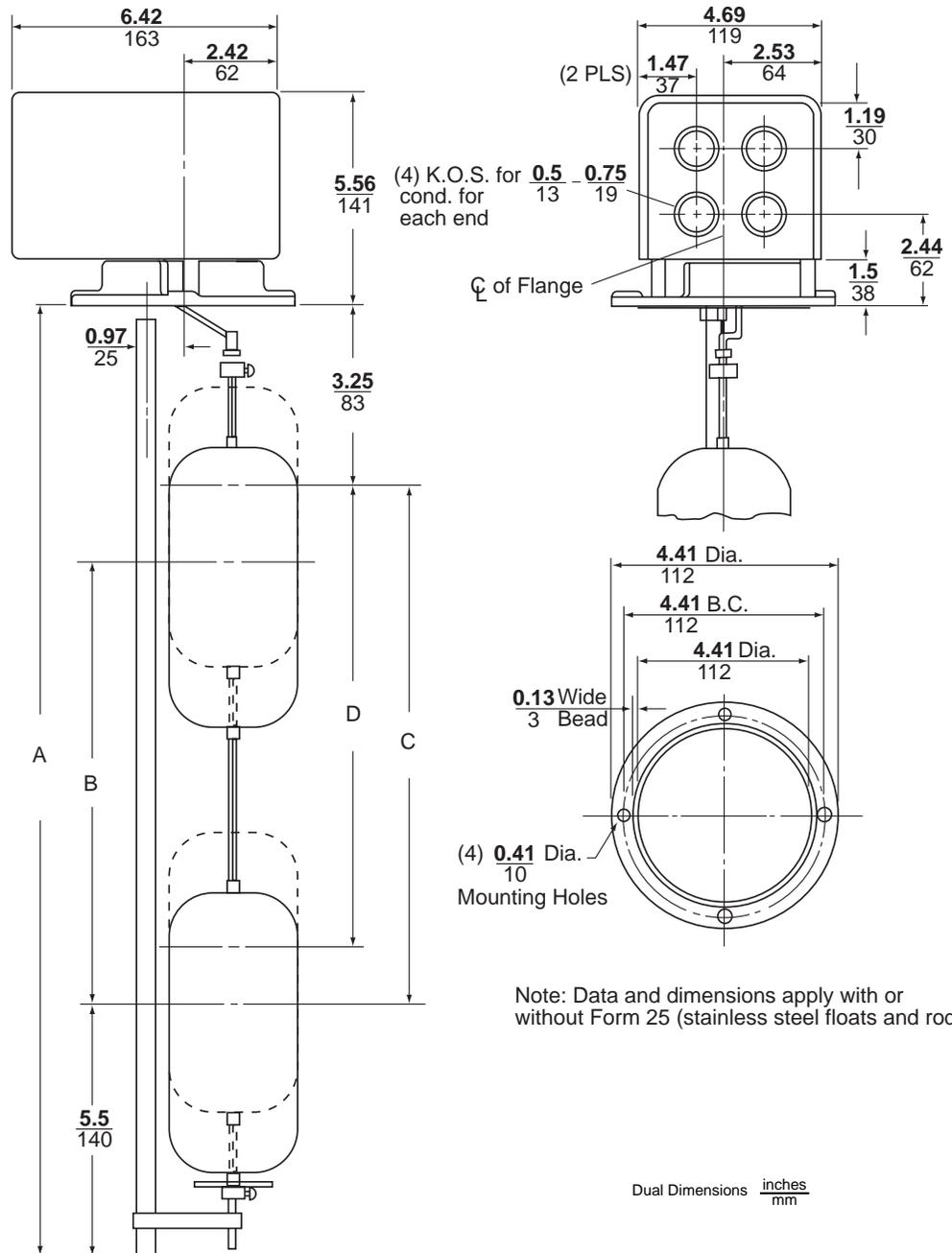
Class 9038 Type J alternator switches are normally configured to cut in and out at the high point and low point of distance B (refer to Type JG Dimensions). As long as one pump is able to handle the incoming water, the pumps are alternated at this distance (solid line floats represent the normal alternating points). If the water level continues to rise and the float reaches the top of distance D (water rises 1.19 inches (30 mm) or more), the second switch cuts in and starts the second pump. Both pumps continue to run until the float returns to the low point of distance D, when the leading pump cuts out. The other pump continues to run until the float reaches the low point of distance B.



Electromechanical and Electronic Level Control Class 9038

Dimensions for Type JG alternators are shown below. Dimensions for Types JW and JR are available on request. The portion of the alternator above the tank is the same as Types DW and DR.

Type JG Dimensions



Electromechanical and Electronic Level Control
Class 9038





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