LIQUID LEVEL SWITCH

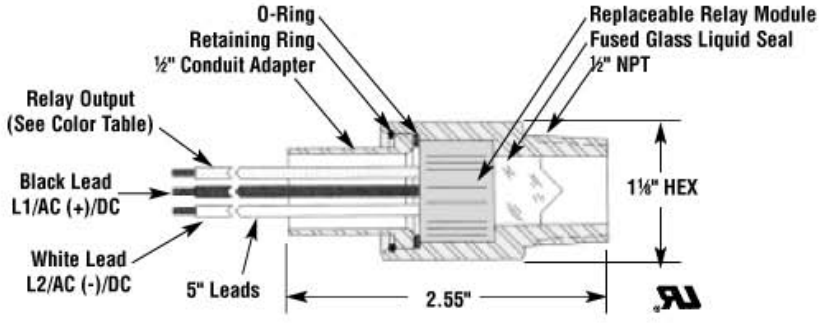
HENRY TECHNOLOGIES

- ✓ **Switches Solid-State** for liquid sensing
- ✓ **No contact** level sensing
- ✓ **Serviceable without** loss of refrigerant
- ✓ **Works with oil, refrigerants,** or any non-hazardous non-corrosive fluid
- ✓ **Glass prism in contact** with fluid medium
- ✓ **Industry approved for Nema 4** and 4X for Water tight
- ✓ **Meets UL Standard #873 & #207** File Numbers E141577 & sa6720*

*U.S. Patent #5,278,426 & other U.S. and Foreign Patents pending

Mounting:	Horizontal Only
Switch Inductive Ratings:	36 va Pilot Duty Rated
Contacts, Power Off:	Normally Open (N.O.)
Contact Life:	Over 1 Million Cycles at Rated Electrical Load
Pressure Rating:	1200 PSI Working, 6000 Burst
Power for Operation:	3.5 ma AC, 5.5 ma DC
Minimum Load:	2 ma (without bleed resistor)

S-9400 Series
with ½" NPT Connection



Compressor Protective Devices

AC&R Components

5637-10

LIQUID LEVEL SWITCH

HENRY TECHNOLOGIES

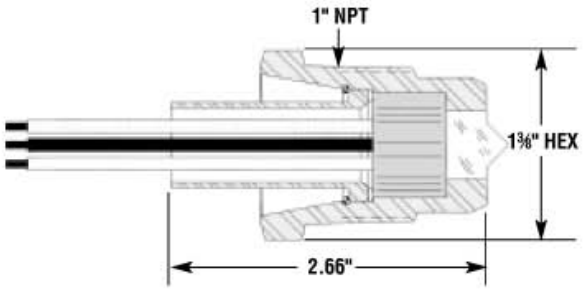
Construction: The switch consists of a sturdy nickel plated steel body with a built-in fused glass prism. This allows liquid to be optically detected by a solid state opto-electronic module. The solid state module is encapsulated in silicon. It can be easily replaced without disturbing the system. The fused glass prism provides chemical resistance to all refrigerants and high pressure ability to withstand typical burst pressure needs. The switch can be installed on any location in the refrigeration system where the temperatures do not exceed the rating in the table above. This includes Oil Separators, Oil Reservoirs, Refrigerant Receivers and compressor crankcase applications. The electrical connection end is suitable for ½" conduit.

Operation: The S-9400 Series Level Switch uses light reflecting from a conical glass prism as a means of detecting the absence of a fluid at the level of the glass cone. When no fluid covers the lower half of the cone infra-red light from the module reflects from the mirror-like inner surface of the cone back to a light detector signaling the electronic module to switch. When fluid covers the lower half of the glass cone, the light from the module passes into the fluid. This absence of light is detected by the module which switches into the opposite direction. The module provides a .06/.10 differential distance from the cone point down.

Optional 1" NPT Connection: A 1" connection is available for the S-9400 series by ordering with a "-1" suffix (i.e. S-9424A-1). The 1" pipe thread connection allows the module to be mounted closer to the inner wall of the tank. This prevents the fitting from creating a pool of liquid next to the glass prism which, in certain applications, can be detrimental to the operation. The 1" connection is also recommended for Ammonia applications where residue can build up on the sight glass.

Replacement Sight Glass Part #: 3-020-070

S-9400-1 Series
with 1" NPT Connection

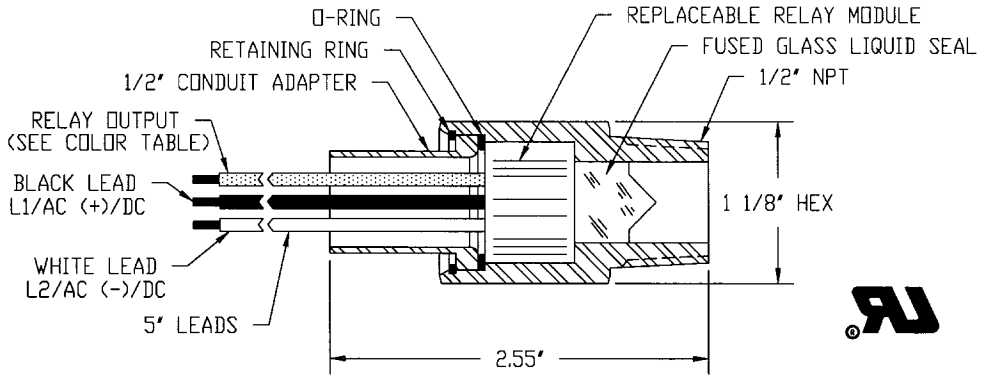


Catalog Numbers	Size NPT	Voltage	Resistive Rating	Contacts With Liquid Present	Wire Color Code	Replacement Module No.	Min/Max Fluid Temp.*
S-9400	1/2	120V 50/60hz	.5 amp	Closed	Yellow & White	2-044-012	-40°F+210°F
S-9400-1	1"						
S-9400A	1/2	120V 50/60hz	.5 amp	Open	Yellow & White/Stripe	2-044-017	-40°F+210°F
S-9400A-1	1"						
S-9420	1/2	208/240V 50/60hz	.25 amp	Closed	Red & White	2-044-015	-40°F+200°F
S-9420-1	1"						
S-9420A	1/2	208/240V 50/60hz	.25 amp	Open	Red & White/Stripe	2-044-018	-40°F+200°F
S-9420A-1	1"						
S-9424	1/2	24V AC/DC	.5 amp	Closed	Orange & White	2-044-013	-40°F+210°F
S-9424-1	1"						
S-9424A	1/2	24V AC/DC	.5 amp	Open	Orange & White/Stripe	2-044-020	-40°F+210°F
S-9424A-1	1"						

*Actual fluid temperature, not tank temperature
NOTE: Load is to be wired between black lead and colored lead.
Replacement sight glass Part #: 3-020-063

S-9400 LEVEL SWITCH SERIES

HENRY TECHNOLOGIES



* Switches Solid-State for liquid sensing
* No contact level sensing
* Serviceable without loss of refrigerant
* Works with oil, refrigerants, or any non-hazardous, non-corrosive fluid
* Glass prism in contact with fluid medium
* Industry approved for Nema 4 and 4X for Watertight
* Meets UL Standard #873 & #207 File Numbers E141577 & SA6720.

LEVEL SWITCH TABLE

CATALOG NUMBER	VOLTAGE	RESISTIVE RATING	CONTACTS LIQ. PRESENT	WIRE COLOR CODE	REPLACEMENT MODULE NO.	MIN./MAX. FLUID TEMP.
S-9400	120 V 50/60 hz	.5 Amp	N.C.	YELLOW & WHITE	2-044-012	-40°F/210°F
S-9400A	120 V 50/60 hz	.5 Amp	N.O.	YELLOW & WHITE/STRIPE	2-044-017	-40°F/210°F
S-9420	208/240V 50/60hz	.25 Amp	N.C.	RED & WHITE	2-044-015	-40°F/200°F
S-9420A	208/240V 50/60hz	.25 Amp	N.O.	RED & WHITE/STRIPE	2-044-018	-40°F/200°F
S-9424	24 V AC/DC	.5 Amp	N.C.	ORANGE & WHITE	2-044-013	-40°F/210°F
S-9424A	24 V AC/DC	.5 Amp	N.O.	ORANGE & WHITE/STRIPE	2-044-020	-40°F/210°F

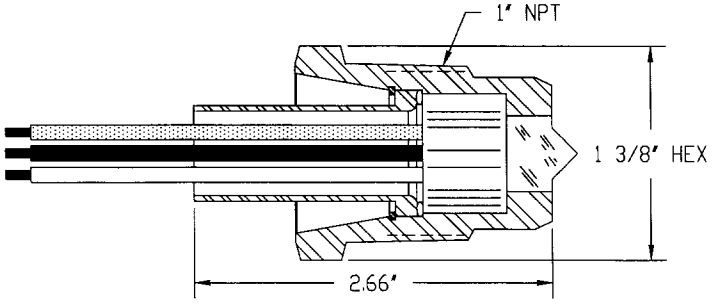
SPECIFICATIONS:

Mounting:	1/2" NPT Connection; Horizontal Only
Switch Inductive Rating:	36 va Pilot Duty Rated
Contacts, Power Off:	Normally Open (N.O.)
Contact Life:	Over 1 Million Cycles at Rated Electrical Load
Pressure Rating:	1200 PSI Working, 6000 Burst
Power for Operation:	3.5 ma AC, 5.5 ma DC
Minimum Load:	2 ma (without bleed resistor)

REPLACEMENT SIGHT GLASS PART NUMBER: 3-020-063

CONSTRUCTION: The switch consists of a sturdy nickel plated steel body with a built-in fused glass prism. This allows liquid to be optically detected by a solid state opto-electronic module. The soild state module is encapsulated in moisture proof epoxy. It can be easily replaced without disturbing the system. The fused glass prism provides chemical resistance to all refrigerants and high pressure ability to withstand typical burst pressure needs. The switch can be installed on any location in the refrigeration system where the temperatures do not exceed the rating in the table above. This includes Oil Separators, Oil Reservoirs, Refrigerant Receivers, and compressor crankcase applications. The electrical connection end is suitable for 1/2" conduit.

OPERATION: The S-9400 Series Level Switches uses light reflecting from a conical glass prism as a means of detecting the absence of a fluid at the level of the glass cone. When no fluid covers the lower half of the cone, infra-red light from the module reflects from the mirror-like inner surface of the cone back to a light detector signaling the electronic module to switch. When fluid covers the lower half of the glass cone, the light from the module passes into the fluid. This absence of light is detected by the module which switches into the opposite direction. The module provides a .06/.10 differential distance from the cone point down.



OPTIONAL 1" NPT CONNECTION:

A 1" NPT connection is available for the S-9400 series by ordering with a "-1" suffix (i.e.S-9424A-1). The 1" pipe thread connection allows the module to be mounted closer to the inner wall of the tank. This prevents the fitting from creating a pool of liquid next to the glass prism which, in certain applications, can be detrimental to the operation. The 1" connection is also recommended for Ammonia applications where residue can build up on the sight glass.

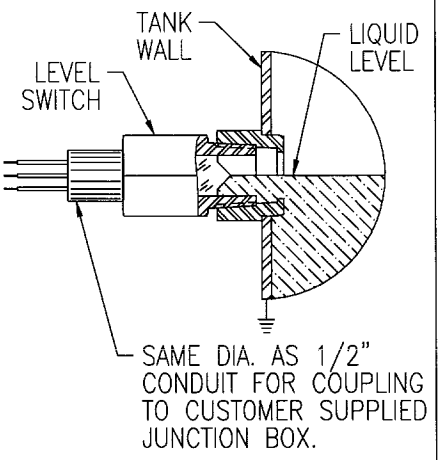
HENRY TECHNOLOGIES — S-9400 LEVEL SWITCH SERIES

INSTALLATION

The S-9400 Series Level Switch is intended to be mounted horizontally in the side of a tank in a 1/2" NPT fitting. Since the Level Switch uses the passage of light into the fluid to detect high level, the user must prevent locating a reflective surface close to the inside end of the Level Switch or the possible reflecting surface must be roughened.

The Level Switch can be installed without disassembly. A pipe sealant satisfactory for the intended fluid must be applied to the 1/2" NPT threads. A 1 1/8" deep socket wrench must be used during the installation. Tighten the pipe threads 1 to 1 1/4 turns past free thread engagement. Test the pipe joint for external leakage to meet applicable standards.

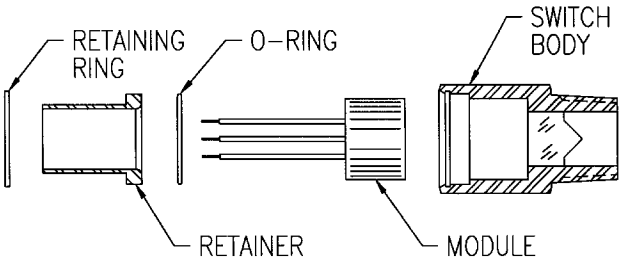
For electrical safety, Level Switch types which use an AC power supply must be used on grounded equipment.



MODULE REPLACEMENT

(1) Disconnect power at the fuse box.
(2) Remove wiring box from the retainer.
(3) Remove the IRR 4000-93 Ring with an IRR P-101 or equivalent retaining ring pliers.
(4) Remove the Retainer.
(5) Pull out the Module by the leads.
(6) Install new Module.
(7) Verify the voltage rating.
(8) Re-assemble the Retainer, Ring, and wiring.

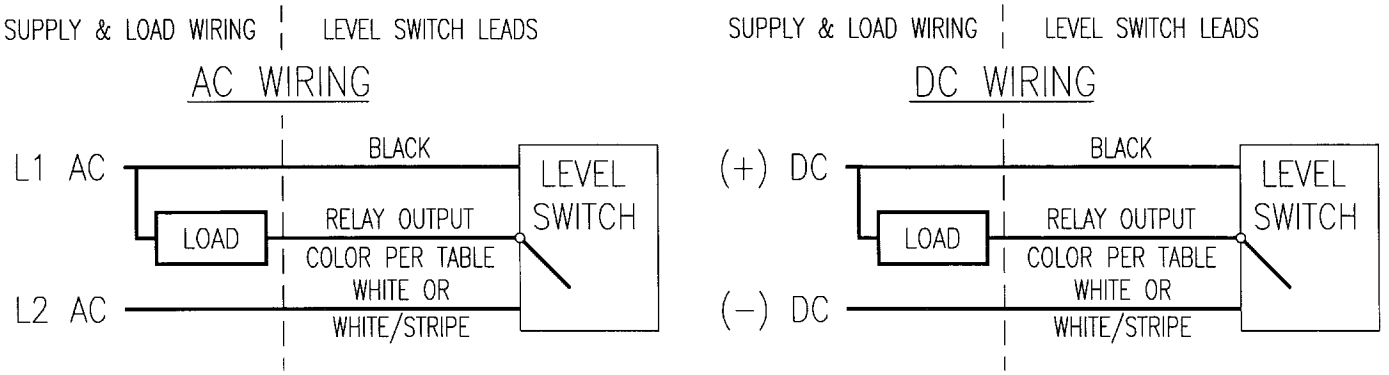
DISASSEMBLED VIEW



APPLICATION WIRING

Wiring diagrams for both AC and DC applications are shown below. The 3 wire switching circuits shown can be used in a number of applications.
Some of the possible wiring applications include:

- Solenoid valve operation for oil control in a refrigerant recovery/reclaim/recycle unit.
- Indicate high or low level by means of relay contact operation to a system controller.
- Operate a relay to switch a high amperage load based on a level condition.
- Switch a load through a time delay based on a level condition.

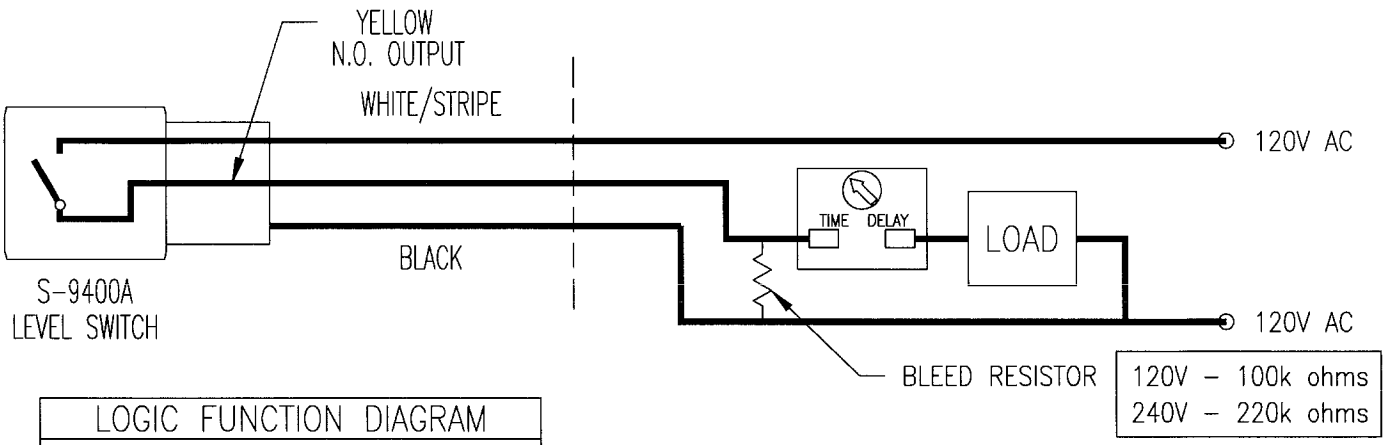


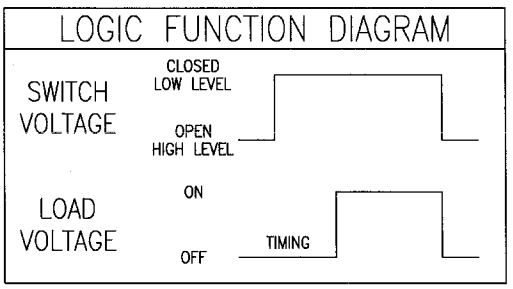
L1 & L2 MAY BE INTERCHANGED BETWEEN THE BLACK & WHITE LEADS FOR AC WIRING APPLICATIONS ONLY

S-9400 LEVEL SWITCH SERIES

HENRY TECHNOLOGIES

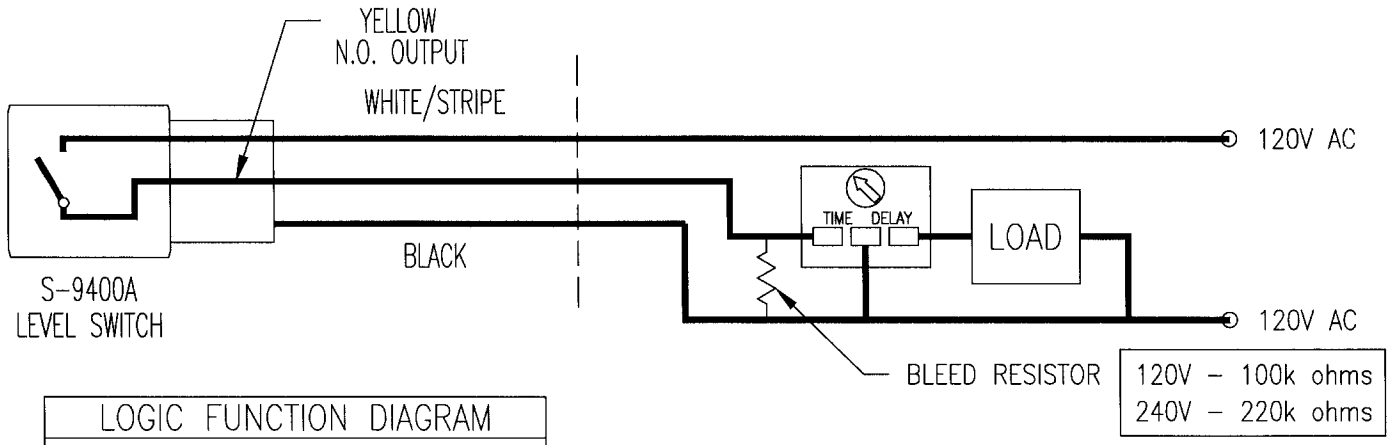
ANTI-SHORT CYCLE TIMER, DELAY ON MAKE

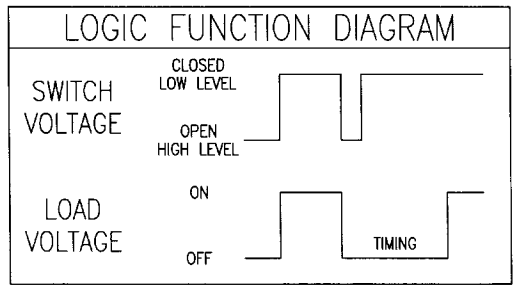




OPERATION:
RUNS TIME DELAY ON EQUIPMENT STARTUP.
LEVEL SWITCH OPENS WHEN LEVEL IS HIGH.
TIMER RESETS TO ZERO WHEN WHEN LEVEL SWITCH OPENS.

ANTI-SHORT CYCLE TIMER, DELAY ON BREAK





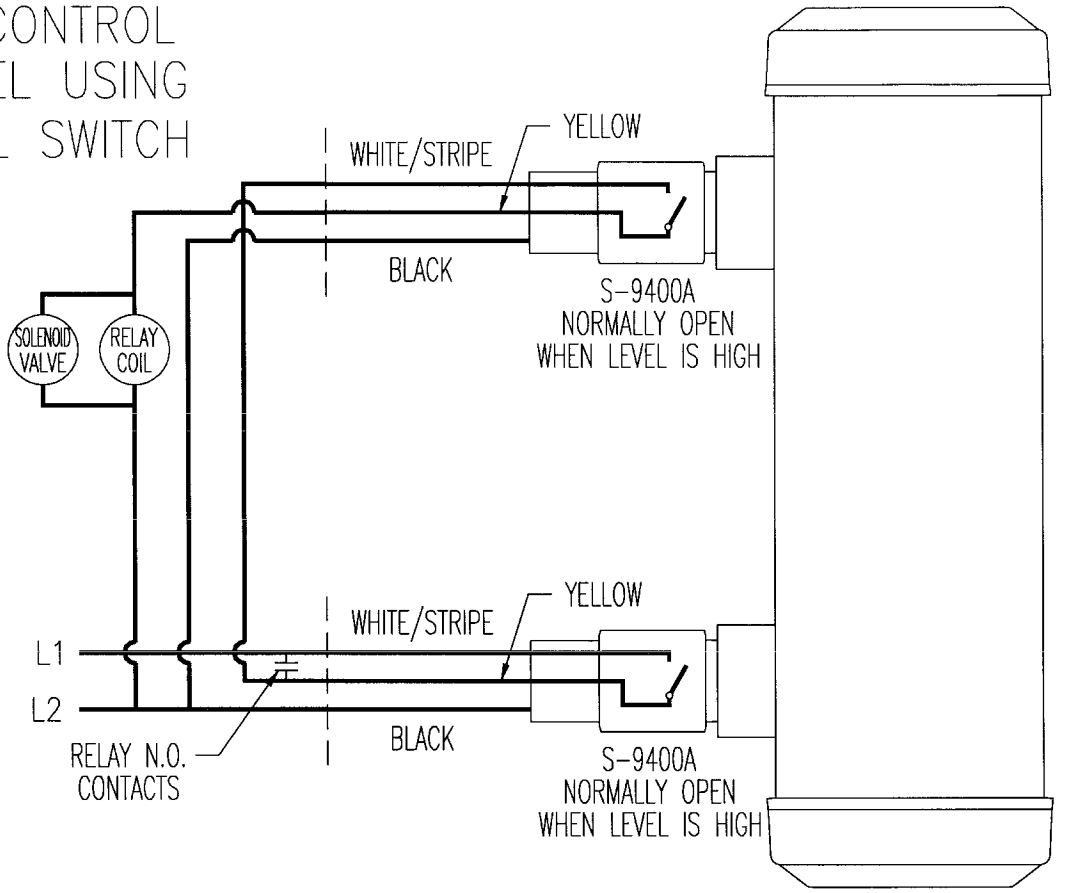
OPERATION:
NO TIME DELAY WHEN EQUIPMENT IS STARTED.
LEVEL SWITCH OPENS WHEN LEVEL IS HIGH.
TIMER RESETS TO ZERO WHEN WHEN LEVEL SWITCH OPENS.

NOTE: THESE CIRCUITS ARE DRAWN AS A GENERAL GUIDE. THE USER MUST MAKE THE FINAL DESIGN OF WIRING AND TIME DELAY REQUIREMENTS WHICH FIT THE PARTICULAR APPLICATION.

HENRY TECHNOLOGIES — S-9400 LEVEL SWITCH SERIES

DIFFERENTIAL CONTROL OF LIQUID LEVEL USING S-9400A LEVEL SWITCH

OPERATION:
- TURN ON SOLENOID VALVE WHEN LEVEL GOES BELOW LOWER S-9400A.
- TURN OFF SOLENOID VALVE WHEN LEVEL GOES ABOVE UPPER S-9400A.



TROUBLESHOOTING S-9400 LEVEL SWITCHES

COMPLICATION	POSSIBLE CAUSE
1) Switch acts like there is no fluid at all times.	A) The inner diameter of the tank or pipe should not be less than 1 1/8". When the diameter is less than 1 1/8", the light beam is reflected off of the back wall and back to the switch, even when liquid is present. B) Additional sources of light, such as a sight glass directly across from the switch, will be picked up by the light detector in the module.
2) Switch acts like there is fluid present at all times.	A) Fluid temperatures should remain in the ranges stated in the Level Switch Table. Colder, thicker fluids will take longer to drain away from the switch housing, delaying the switching action. B) Low temperature applications (below 32°F) in humid environments can in some instances produce a frost layer on the glass between the housing and the module. The frost layer will absorb the light and the switch will act like there is fluid present. C) The angle of the housing installation should be horizontal or sloping back into the tank (up to a 10° angle), to allow the fluid to drain away from the switch. To check for entrapped liquid, remove the module from the housing and view the glass. An empty glass should have two rings with approximately an 1/8" diameter dot in the center of the smaller ring.
3) Switch "chatters" rapidly.	A) Fluid splashing on the glass can give false readings as the glass is rapidly covered and drained of fluid.
4) Module switches, but load does not switch.	A) The size of the load that the switch is trying to pull should not exceed those stated in the Level Switch Specifications (Switch Resistive Ratings).