Multi-Function Moisture Sensing Liquid Level Control

INGRAM PRODUCTS, INC.

Part No. : MSR1P24A, MSR1P120A

The Ingram **Multi-function Moisture Sensing Relay (MSR)** saves you time and money. No more time spent trying to figure out the part number and features of the model that you need. All you have to select is the operating voltage when ordering an Ingram MSR. Drain or fill, sensitivity and time delay are all user selectable on the unit. It takes only one Ingram MSR to do the job of several of the competitor's MSRs.

The MSR was designed for use in two different applications:
(1) Seal monitor relay for use with submersible pumps.
(2) Single probe, single point liquid level indication and control.

Features

- Drain/Fill selector switch
- Adjustable time delay
- Adjustable sensitivity up to 250KΩ
- Stock item - same day shipping available
- LED Indicator reduces adjustment time
- SPDT isolated contacts
- Isolated AC voltage on the probe
- 5 year warranty
- UL Recognized: File E308954

Technical Specifications

MSR1P24A MSR1P120A	62mA @ 24 VAC 23mA @ 120 VAC
Power Consumption	0.55 Watts
Probe Voltage	12VAC
Max Current at Probe	0.5mA
Probe Isolation	>1500 VAC
Adjustable Sensitivity	500Ω - 250KΩ
Adjustable Response Time	0.5 - 10 seconds
Reset Time	10 msec
Reset Type	Automatic
Output	SPDT Isolated Relay Contacts
Relay Contact Ratings	Load: 5A Resistive @ 240VAC 1/10 HP @ 240VAC
Operating Temperatures	-20˚C to +40˚C
Life Expectancy	Mechanical 100,000 Electrical 50,000
Humidity Tolerance	0 to 99% no condensing
Enclosure	ABS Plastic
Mounting	Octal Base Plug In
Weight	8.46oz

Applications

- Pump seal monitor
- Moisture Sensing Relay
- Single-point Liquid Level Controls
- High or low level alarm (field selectable)
- Solenoid control
- Detect the absence or presence of conductive liquid or moisture
- Boiler low water cut-off protection
- Boiler feed water level control
- HVAC
- Pump control
- Sump pump
- Hydropneumatic tank liquid level control
- Food and cooking equipment
- Dairy equipment
- Steam cookers
- Drink dispensers
- Tap water
- Sea water

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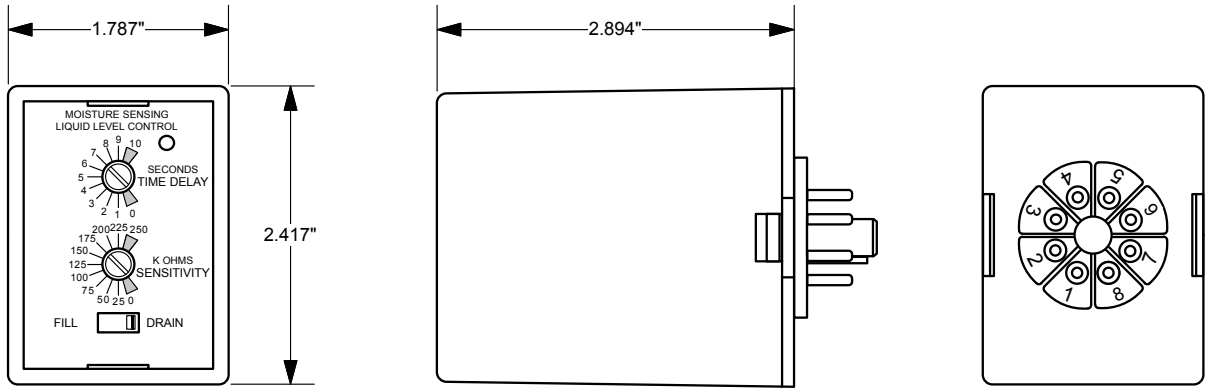


APPLICATION NOTES

Seal Monitor Relay

Most submersible pumps have seal chambers filled with oil that has a high electrical resistance. When the seal for the shaft of the submersible begins to fail, water enters the seal chamber and mixes with the oil causing the resistance to drop. The MSR senses this drop in resistance and energizes the electromechanical relay. The relay is normally used to turn on a red warning indicator light that indicates a seal leak in the pump it is monitoring.

This early warning indicates that the pump seal needs to be repaired before the pump motor becomes damaged by liquid intrusion.

Failure probes are installed in the seal chamber using two different methods. The most common method is to install one probe in the chamber. The resistance between the probe and ground or pump housing is monitored by the seal monitor relay (see diagram 1). The other method uses two probes installed in the seal chamber. The resistance between the two probes in the seal chamber is monitored by the seal monitor relay (see diagram 2).

DIAGRAM 1

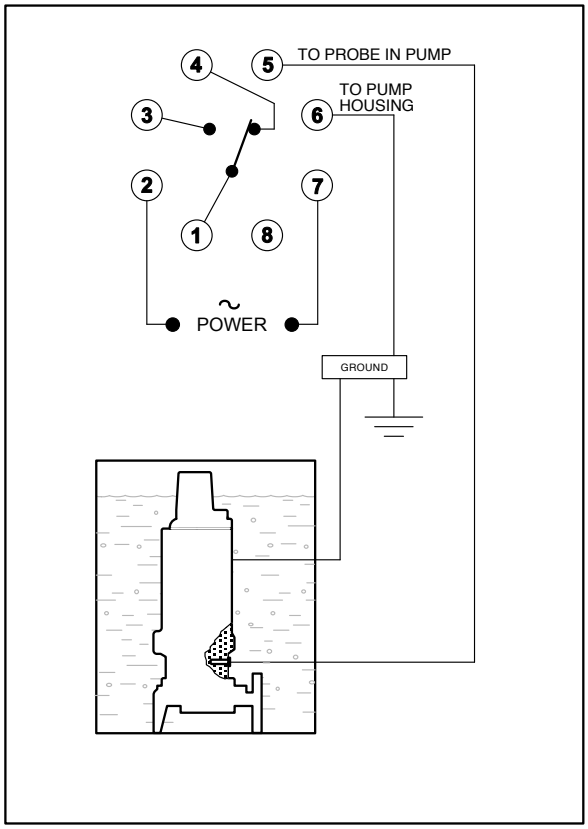
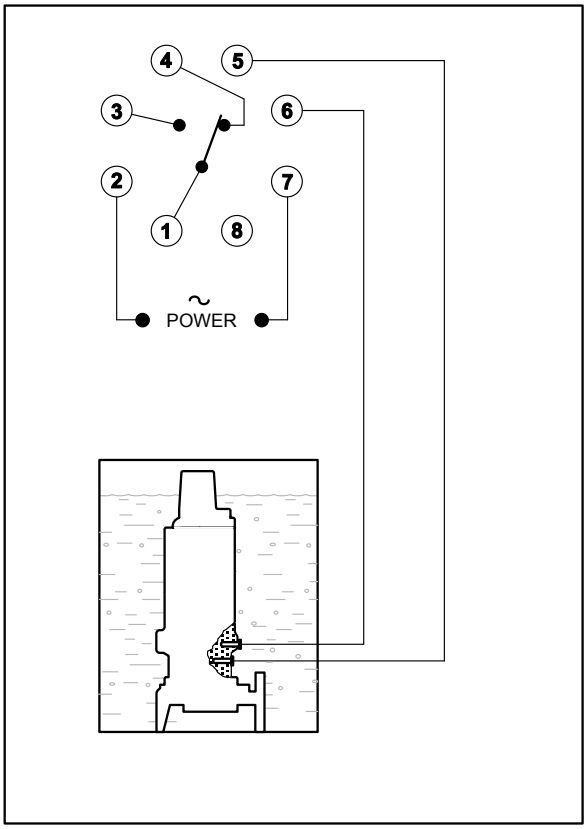


DIAGRAM 2



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APPLICATION NOTES (continued)

Adjusting Seal Monitor Relay

Most manufacturers of submersible pumps requiring seal monitoring have a recommended sensitivity setting for their pumps. The moisture sensing relay should be set at the pump manufacturer's recommended sensitivity setting. Ingram's MSR sensitivity can be adjusted from 500Ω to 250K ohms. It also has an adjustable time delay from 0.5 to 10 seconds to prevent nuisance tripping.

If the pump manufacturer does not have a recommended sensitivity setting use one of the following methods:

Note: Drain-Fill selector switch must be in the Drain position for this application.

1. A sensitivity setting of 30K ohms with a two second delay is considered adequate for most submersible pumps in most applications.

2. To obtain the earliest possible warning of contaminates entering the seal chamber, set the sensitivity as follows:

   A. Set the sensitivity potentiometer to the maximum 250K ohms. If the LED comes on and the MSR relay energizes, slowly turn the sensitivity potentiometer down until the MSR LED goes out.

   B. Note the sensitivity value indicated by the pot when the LED turns off. Set the sensitivity for approximately 20% less than this value. For example, if the LED goes out at the 100KΩ position while you are turning the pot down, set the sensitivity to 80K ohms (20% less than 100K ohms).

If the LED does not come on when MSR is adjusted to maximum sensitivity of 250K ohms, leave the setting at the 250K ohm. Be aware that this high sensitivity setting may result in false seal failure alarms.

Single Point Liquid Level Indication and Control
The MSR relay can be used for single point liquid level indication and/or control of conductive liquids.

Adjusting MSR for liquid level indication and/or control.
There are three adjustments that need to be set for liquid level indication and control:

DRAIN-FILL selector switch located on the top of the MSR.

Drain Position: Timing starts when the liquid level touches the probe connected to pin 5 of the MSR. At the end of the set time delay the relay will energize and contacts will transfer.

Fill Position: If the liquid level falls below the bottom of the probe that is connected to pin 5 of the MSR, timing will start and the contacts will transfer after the time delay has elapsed.

Screwdriver adjustable time delay located on top of the MSR.

The purpose of this time delay is to prevent false or momentary activation of the MSR due to wave action or agitation. It can be adjusted from 0.5 to 10 seconds.

Screw Sensitivity adjustment located on top of the MSR.

The sensitivity should be set as low as practical so long as the MSR responds reliably when the liquid touches or stops touching the probe. Our table of liquid sensitivity will give you a good idea of the maximum sensitivity required for various liquids.

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Application Examples

High level alarm. (Diagram 3.) In this application the MSR responds to a liquid level that needs to be kept below the bottom of “HIGH PROBE”. The DRAIN-FILL switch needs to be put in the DRAIN position for proper operation. When liquid rises and touches the bottom of the “HIGH PROBE”, the MSR begins timing. When the delay time has elapsed, and the liquid is still in contact with the probe, the MSR will energize and the relay contacts will transfer. The relay contacts can be used to activate an alarm or solenoid valve or to start a pump.

Low level alarm. (Diagram 4.) In this application the MSR responds to a liquid level that needs to be kept above the bottom of “LOW PROBE”. The DRAIN-FILL switch needs to be put in the FILL position for proper operation. When liquid falls below the bottom of the “LOW PROBE” the MSR begins timing. When the delay time has elapsed, and the liquid is still not in contact with the probe, the MSR will energize and the relay contacts will transfer. Again, the relay contacts can be used to activate an alarm or solenoid valve, or to start a pump.

DIAGRAM 3

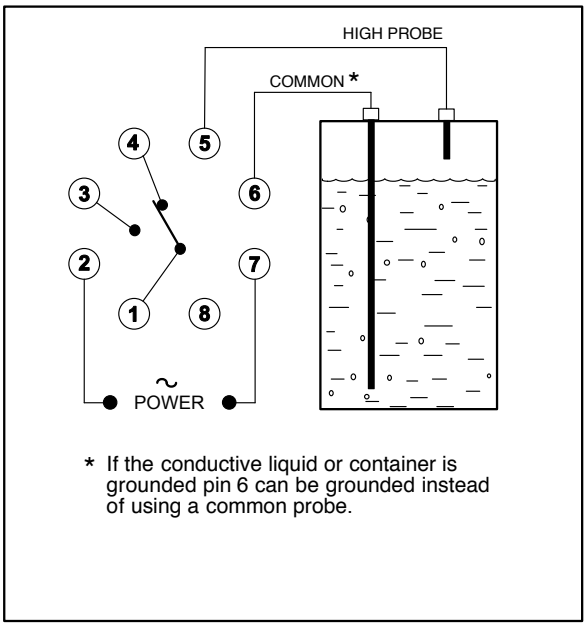
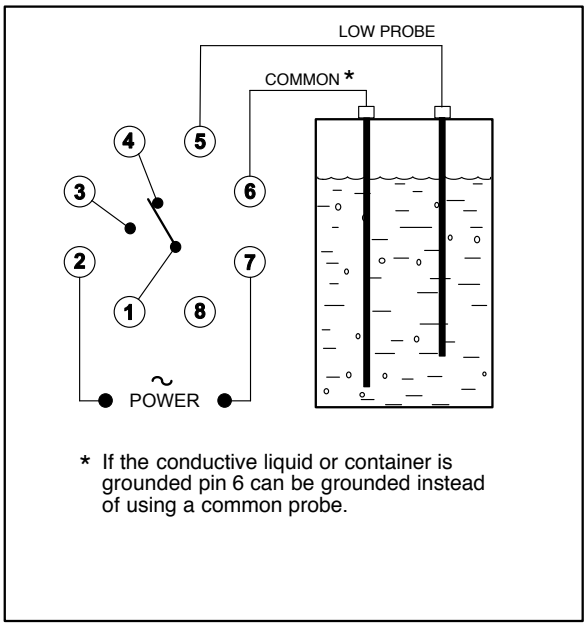


DIAGRAM 4



Sensitivity Selection Based on Material

Liquid Or Material	Sensitivity-Conductivity Ohms/cm	Micro-Mhos/cm
Acids	Consult Factory	
Aluminum Hydroxide	2.2K	450
Aluminum Sulfate	2.2K	250
Ammonia	5K	200
Ammonium Chloride	1K	1K
Ammonium Hydroxide	10K	100
Ammonium Nitrate	18K	50
Ammonium Sulfate	10K	100
Baby Foods	1K	1K
Barium Chloride	1K	1K
Barium Nitrate	1K	1K
Beer	2.2K	450
Black Liquor	1K	1K
Borax–Aqueous	10K	100
Boubon	200K	5
Brine	1K	1K
Buttermilk	1K	1K
Cadmium Chloride	1K	1K
Cadmium Nitrate	1K	1K
Cake Batter	5K	200
Calcium Chloride	1K	1K
Calcium Hydroxide	10K	100
Catsup	2.2K	450
Caustic Soda	1K	1K
Cement Slurry	5K	200
Coffee	2.2K	450
Corn Syrup	45K	21
Corn–Cream Style	2.2K	450
Ferric Chloride	10K	100
Ferrous Sulfate	10K	100
Ink (Water Base)	2.2K	450
Jams/Jellies	45K	21
Juices–Fruit/Vegetable	1K	1K
Lithium Chloride	1K	1K
Magnesium Chloride	1K	1K
Magnesium Hydroxide	2.2K	450
Mayonnaise	5K	200
Mercuric Chloride	90K	11
Milk	1K	1K
Molasses	10K	100
Mustard	1K	1K
Oil–Soluble	10K	100
Paper Stock	5K	200
Photographic Solutions	1K	1K
Plating Solutions	2.2K	450
Potassium Chloride	1K	1K
Salts–Chemical	2.2K	450
Sewage	5K	200
Silver Nitrate	1K	1K
Soap Foam	18K	50
Sodium Carbonate	2.2K	450
Sodium Hydroxide	1K	1K
Soups	1K	1K
Starch Solutions	5K	200
Vinegar–Aqueous	2.2K	450
Water–Carbonated	3K	330
Water–Condensate	18K	50
Water–Chlorinated	5K	200
Water–Distilled	450K	2
Water–Deionized	2.0M	.5
Water–Hard/Natural	5K	200
Water–Salt	2.2K	450
Wine	2.2K	450
Zinc Chloride	1K	1K
Zinc Sulfate	2.2K	450