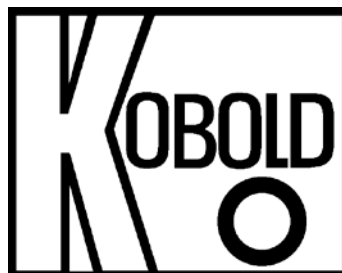


Operating Instructions for Level Control Relay Modules

**Models: MSR-010
MSR-011
MSR-020**



MSR Level Control Relay Module

1. Note

Please read and take note of these operating instructions before unpacking and commissioning. The instruments may only be used, maintained and installed by qualified personnel familiar with the operating instructions and the applicable health and safety requirements.

2. Specific Application

The KOBOLD MSR Level Control Module is been designed for use in level monitoring applications and pump control for liquids.

The switch capacity of reed contacts is often exceeded when switching capacitive, inductive or high current loads, typically resulting in greatly decreased contact life. Using the MSR eliminates these problems and extends the service life of the reed switch.

Models MSR-010 and MSR-020 are monostable, non-latching type control modules with SPDT relay contact output(s). These are used for contact protection and isolation.

The model MSR-011 is a bi-stable latching type control module with SPDT relay contact output. When used as a latching relay, the MSR-011 is well suited for easy high and low level control of a pump or fill/drain valve.

3. Operating Principles

The modules are comprised of a transformer, control logic circuit and output relay.

Control inputs should be dry (potential free) contacts, for example, reed switches from a float-type level detector.

The modules supply a ~24 VDC control voltage to detect input switch closure, while limiting the current to 20 mA or less on the inputs, to protect the level switches. In addition, the modules have a built-in time delay on the inputs, which helps avoid false triggering due to switch bounce or nuisance tripping from process vibration, waves or bubbles.

4. Operating Principles

MSR-011 Latching Relay

The MSR-011 module is designed to provide detection of two levels in a process tank and to control the tank level in a pump-up or pump-down mode of operation. This module can also be wired as a contact isolation relay to isolate low current, pilot duty contacts from high current loads.

Pump-Up Mode

In a pump-up mode, the relay will initiate by switching on the pump when the fluid level in the tank falls below the lower tank level switch. The relay will remain energized (latched) and the pump will continue to operate until fluid fills the tank up to the high-level switch. When the fluid reaches the high-level switch, the control module relay will de-energize and shut off the pump. The control module relay will remain de-energized until the fluid falls below the low tank level switch.

MSR Level Control Relay Module

Pump-Down Mode

In a pump-down mode, the relay will initiate by switching on the pump when the fluid level in the tank reaches the upper tank level switch. The relay will remain energized (latched) and the pump will continue to operate until fluid in the tank empties down to the low-level switch. When the fluid falls below the low-level switch, the control module relay will de-energize and shut off the pump. The control module relay will remain de-energized until the fluid level reaches high tank level switch.

Contact Isolation Mode

In the contact isolation mode, the relay will mimic the function of a contact wired between input pins 12 and 13. If this contact closes, the relay will change state and continuity will exist between relay output pins 42 and 43. If this contact opens, the relay will switch back and continuity will exist between relay output pins 42 and 41.

MSR-010 and MSR-020 Contact Protection Relay – 1 or 2 Contacts

The multifunctional relay is supplied with power via terminals N and L. When the supply voltage has been switched on (and the connected limit switch contact is open), the SPDT contact(s) of the MSR-010 and MSR-020 relay remains in a non-operative state. When the limit switch contact closes, the SPDT contact follows and is energized. When the supply voltage is disconnected, the SPDT contact(s) of the relay return to the non-operative condition.

Important Note:

If desired, multiple relays (e.g. MSR-010 and MSR-020) may also be switched together. This way, one control output (terminal 12 or 22) can drive a maximum of 4 control inputs (terminal 13 or 23). The maximum permissible contact per signal input resistance reduces to 2 k Ω (1 k Ω by supply 24 VAC/DC). Bridging between control outputs is unnecessary. Should a control output drive the control inputs of multiple MSR-relays, one must ensure a uniform reference voltage potential. Terminal 82 of MSR-Relay must be connected together in this case.

5. Instrument Inspection

The instruments are thoroughly inspected by the factory prior to shipment, and have been sent out in perfect condition. Should any damage to the device be visible, we recommend a thorough inspection of the delivery packing. In case of damage, please inform your parcel service/forwarding agent immediately, as they are responsible for damages incurred during transit.

Scope of delivery:

- Level Control Relay Module
- Operation Manual

6. Mechanical Installation

The relay module enclosure is rated IP 20 (approx. equivalent to NEMA 1) which is intended for use in a dry, dust-free environment. If the relay module will be located in harsh, wet or dusty environments, the user should mount the module in an appropriate enclosure to protect the device.

The relay module is mounted onto an electrical panel using standard 35mm DIN mounting rail, according to DIN 50022. The device snaps on to the DIN rail, and can be removed from the rail by releasing the spring-loaded clip, located on the bottom of the device.

MSR Level Control Relay Module

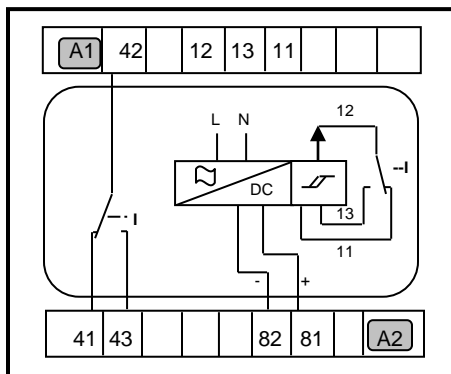
7. Electrical Connections – Type MSR-011

ATTENTION! Ensure that the voltage levels of your power supply system are in agreement with the voltage levels indicated on the type label of the device!

- Make sure that the electric supply lines are inactive during connection to this device.
- Improper wiring can lead to damage of this device as well as injury to the user.
- Make sure that installation, wiring, and circuit protection are **in accordance with all local electrical codes**.
- Make sure the supply circuit **provides adequate fuse or circuit breaker protection** that is in accordance with the circuit's current rating.
- Make sure that a **motor contactor relay or starter is used to energize the pump circuit if the pump's current rating exceeds the MSR Level Control's relay rating**.

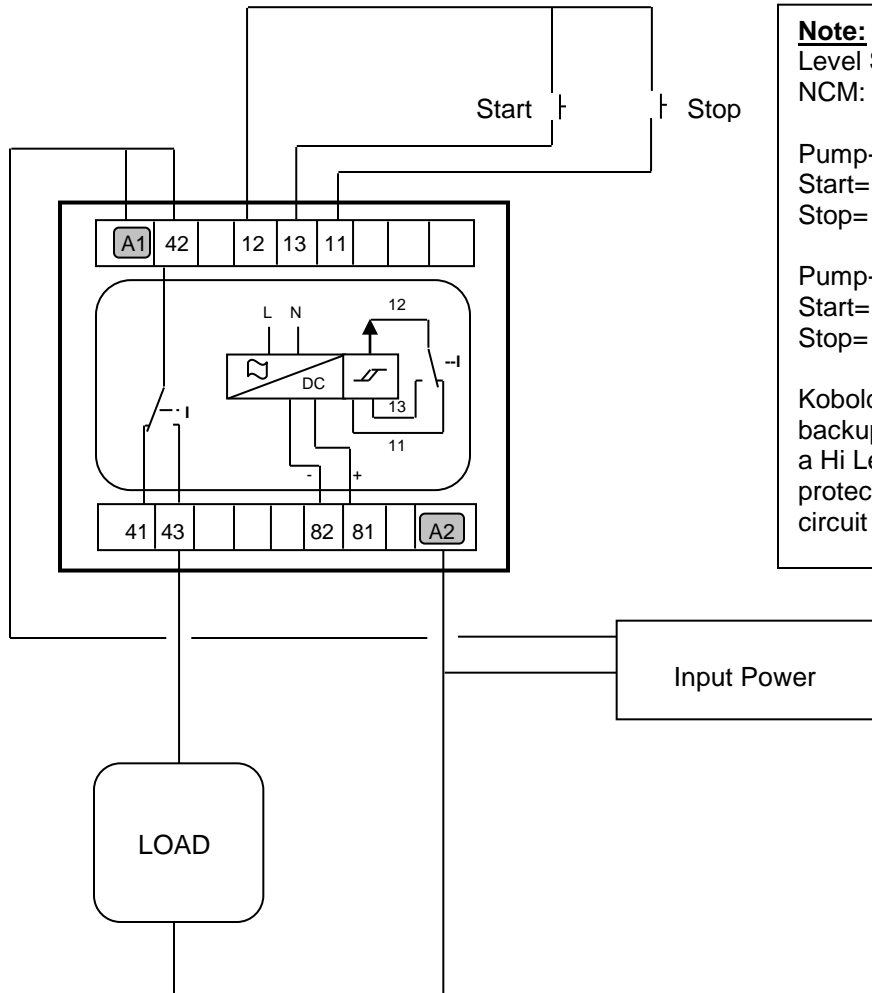
Wiring Table

Terminal #	Description	Function
A1 or L	Line Power Connection	Connect to power supply (+)
A2 or N	Line Neutral Connection	Connect to power supply (- or Neutral)
12	Sensor input common	Connect to one side of switch contacts
13	START Input	Momentary Closure of 12 and 13 Energizes Output Relay (Latch)
11	STOP Input	Momentary Closure of 12 and 11 De-Energizes Output Relay (Reset)
*Note: To operate the relay in contact isolation mode, connect a jumper wire between terminals 11 and 12 and connect control switch contact using pins 12 and 13		
42	Relay Output Common	
41	Relay Output N/C	Normally Closed Contact When relay is energized, 42 and 41 open
43	Relay Output N/O	Normally Open Contact When relay is energized, 42 and 43 close
82 & 81	24 VDC Excitation	Sensor supply (Maximum Load = 20 mA!)



MSR Level Control Relay Module

START & STOP:
Hi and Low Level
Contacts Located on Tank



Note: When using Kobold Multi-Point Level Switches, Models NCG and NCM:

Pump-Up (tank-fill) Application:
Start= Bottom Position N/C (Dry)
Stop= Top Position N/O (Dry)

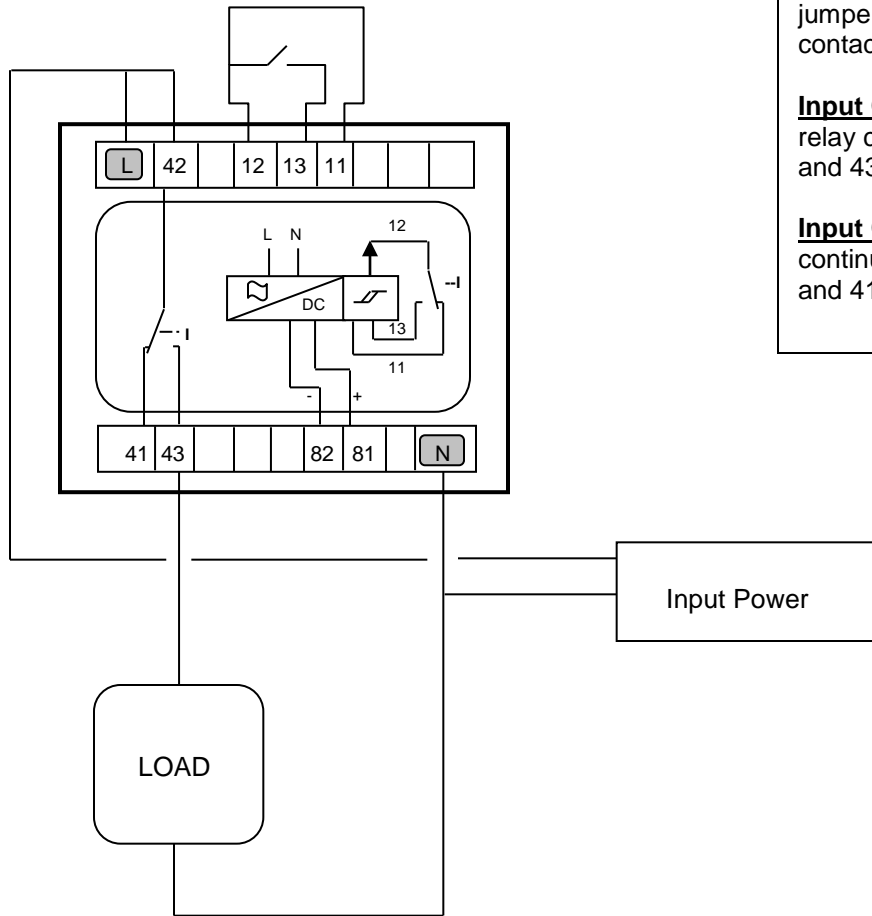
Pump-Down (tank-drain) Application:
Start= Top Position N/O (Dry)
Stop= Bottom Position N/C (Dry)

Kobold recommends including backup safety switches, for example, a Hi Level Alarm for overflow protection, in the event of pump or circuit failure.

MSR-011 Wiring Diagram for Pump Control*

*Suggested typical setup
Subject to customers final verification & approval
All specifications subject to change

MSR Level Control Relay Module



Note: For contact isolation mode, jumper pins 11 and 12. Wire input contact to pins 12 and 13.

Input Contact Closed: Output relay continuity between pins 42 and 43.

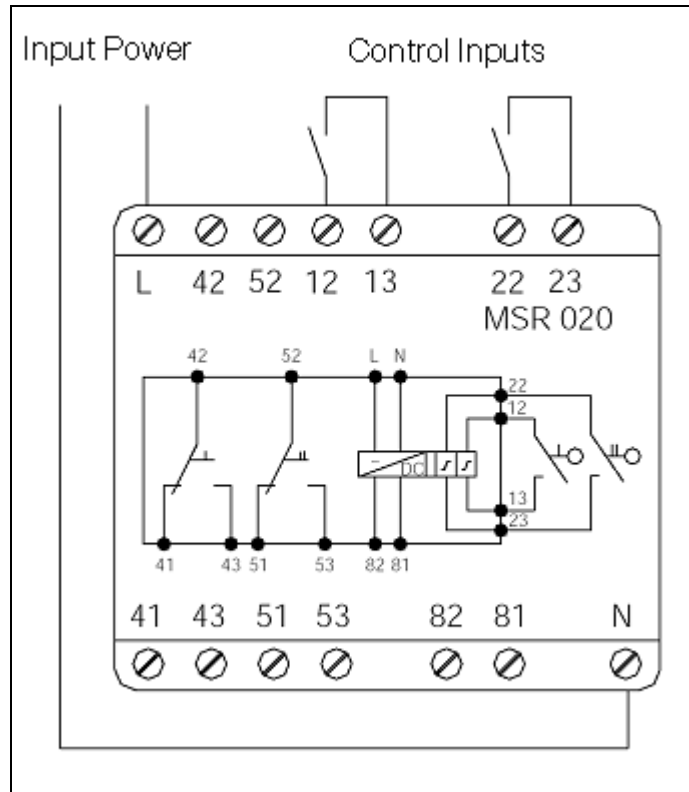
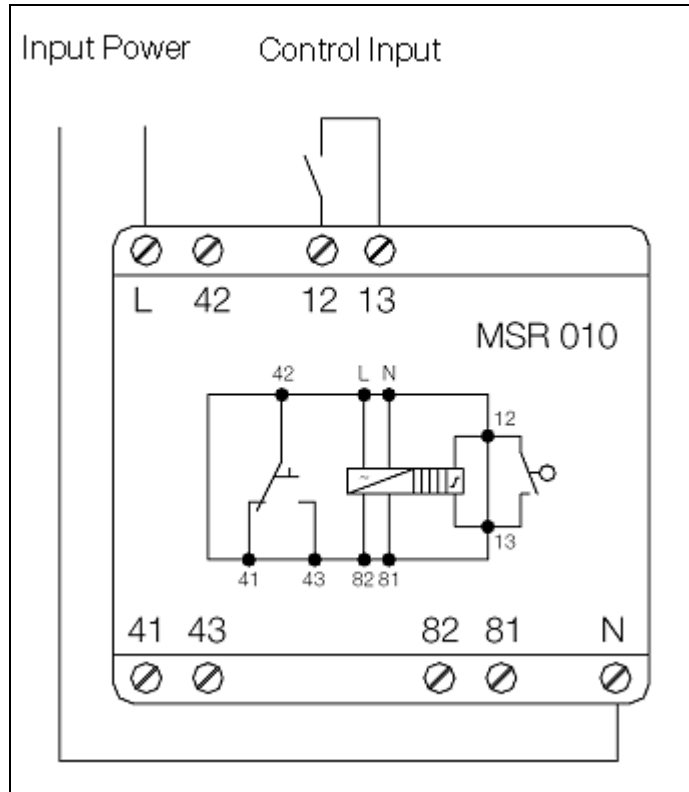
Input Contact Open: Output relay continuity exists between pins 42 and 41.

MSR-011 Wiring Diagram for Contact Isolation*

*Suggested typical setup
Subject to customer's final verification & approval
All specifications subject to change

MSR Level Control Relay Module

Electrical Connections – Types MSR-010 & MSR-020



MSR Level Control Relay Module

8. Start-Up

Ensure that all wiring to the Level Control Relay Module is correctly installed, and the level switches are installed and functioning correctly. The Relay Module is now ready for operation, and the supply power to the level control circuit can be applied. In all cases, the relay should operate in accordance with the description in section 4 - Operating Principles.

9. Troubleshooting

The relay does not operate:

- Check that supply voltage is applied to the L (A1) and N (A2) terminals on the module.
- Check for 24 VDC across terminals 82 and 81. If supply voltage is applied and 24 VDC is not measured across 82 and 81, the module may be faulty.
- Check level switch operation and cabling from the tank location to the module. Temporarily remove the switch inputs from the module and simulate level switch closure by using jumper wires across input terminals.
- When simulating level switch closures the relay does not activate, the relay may be faulty.
- If the relay activates, but does not start the pump, the output wiring or pump circuit may be faulty.

10. Maintenance

The Level Control Relay Module requires absolutely no maintenance. Depending on the type of level sensors used and the process conditions, maintenance to the sensors may be required. Verify and follow maintenance procedures according to the sensor maintenance manual. Verify and follow maintenance procedures according to the pump manufacturer's maintenance manual.

There are no user serviceable parts inside the Type MSR modules. If repair is required, please contact your local Kobold sales office to arrange a return for repair.

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