

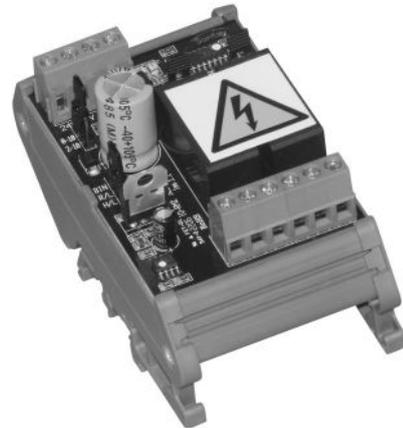
# 2-Stage Relay Module

## IOR-2

### Description:

The IOR-2 is intended for use with BMS controllers to convert an analogue control output to a raise/lower, high/low or binary relay output pair.

Applications include the control of raise/lower valve and damper actuators, and pump changeover, LEDs indicate correct operation and Hand/Off/Auto jumpers ease commissioning. Low current draw from 0-10Vdc controller output means that the IOR-2 can work successfully with most BEMS controllers.



### Technical Specification:

|                                |                                                                                                                                                                                 |
|--------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Input Signal:</b>           | 0-10Vdc 1mA min. into 22k $\Omega$ impedance                                                                                                                                    |
| <b>Output Contacts:</b>        | 8A at 230Vac (resistive load)                                                                                                                                                   |
| <b>Power Supply:</b>           | 24Vac $\pm$ 15% @ 50Hz or 24Vdc +15% -6%, 65mA max.                                                                                                                             |
| <b>Hysteresis:</b>             | $\pm$ 0.2Vdc about switching points                                                                                                                                             |
| <b>Operating Modes:</b>        | Hi/Lo<br>1 raise/lower pair<br>Binary                                                                                                                                           |
| <b>LED Indication:</b>         | Supply OK<br>Supply voltage low<br>Supply voltage high<br>Relay Status<br>Hi input voltage<br>Incorrect input mode jumper selection<br>Low input voltage (only in 2-10Vdc mode) |
| <b>Manual Override:</b>        | On/Off/Auto jumper selectable                                                                                                                                                   |
| <b>Electrical Terminals:</b>   | Rising cage connectors for 0.5-2.5mm <sup>2</sup> cables                                                                                                                        |
| <b>Ambient Range...</b>        |                                                                                                                                                                                 |
| <b>Temperature:</b>            | -10 to +40°C                                                                                                                                                                    |
| <b>RH:</b>                     | 0-80% non-condensing                                                                                                                                                            |
| <b>Dimensions (H x W x H):</b> | 72 x 49.5 x 55                                                                                                                                                                  |

### Features:

- Link selectable modes raise/lower, hi/low or binary
- On/Off/Auto links for ease of commissioning
- DIN Rail mounting
- Fault finding LED indication
- Relay status LED indication

### Order Code:

IOR-2                      2 Stage Relay Module

### Installation:

Antistatic precautions must be observed when handling these sensors. The PCB contains circuitry that can be damaged by static discharge.

1. The IOR-2 should only be installed by a competent, suitably trained technician, experienced in installation with hazardous voltages (>50Vac & <1000Vac or >75Vdc & 1500Vdc).
2. Ensure that all power is disconnected before carrying out any work on the IOR-2.
3. Maximum cable is 2.5mm<sup>2</sup>, care must be taken not to over tighten terminals.
4. When mounting the IOR-2 care should be taken not to stress the PCB when fitting to the DIN rail. If it is necessary remove the module from the DIN rail, be sure to use a flat bladed screwdriver to release the DIN clips.
5. The IOR-2 is designed to operate from a 24Vac/dc supply (so that power can be drawn from a 24Vac transformer used for other purposes if a 24Vdc supply is unavailable). In either case one side of the supply is common to the signal ground from the BEMS controller.
6. The relay outputs are single Pole Change Over (SPCO) so they can be wired as Normally Open (N/O) or Normally Closed (N/C).
7. The 0-10Vdc signal input requires a minimum of 1mA to operate.

**Warning:** When installed, the output relay contacts may carry 240Vac. Special care must be taken to isolate the switched voltages prior to any work being undertaken.

# 2-Stage Relay Module IOR-2

## LED Status:

### Power Supply:

**Normal:** The green LED indicates the supply power condition. If power supply is normal (between 22V and 40V  $\pm 0.2V$  hysteresis) the green LED is ON continuously, showing that the IOR-2 is powered correctly.

**Low:** If power supply falls below about 21.8V the green LED double flashes twice per second. The low power condition clears at about 22.0V. The relays behave as normal.

**High:** If power supply is above 40V the green LED flashes six times per second. All the relays are switched off (except when forced ON by jumper settings) as excessive voltage might overload the voltage regulator. The relays are switched off:

- For two seconds after power-up
- When the supply is greater than 40V
- For two seconds after any over 40V condition clears

This prevents the relays from switching on and off during power-up or power failure with an over voltage power supply.

### Control Input Voltage:

The red LED indicates input voltage condition, normally the red LED is off.

**High Input:** If the input voltage exceeds 11V,  $\pm 0.2V$  hysteresis, the red LED goes on continuously. The relays behave as if 10Vdc were applied. The input voltage should settle on one 'voltage band'. Voltage is deemed to have settled after it has been within one band for 250ms. If it has not settled for 500ms it is deemed to be unstable. If it is unstable the red LED flashes six times per second. The relay outputs remain at their last settled value.

### Mode Select Error:

If the mode select jumper is missing or there is an inconsistent setting (such as connecting 2 jumpers) then this is an error. The red LED triple flashes. The relays are switched off.

### Low Input:

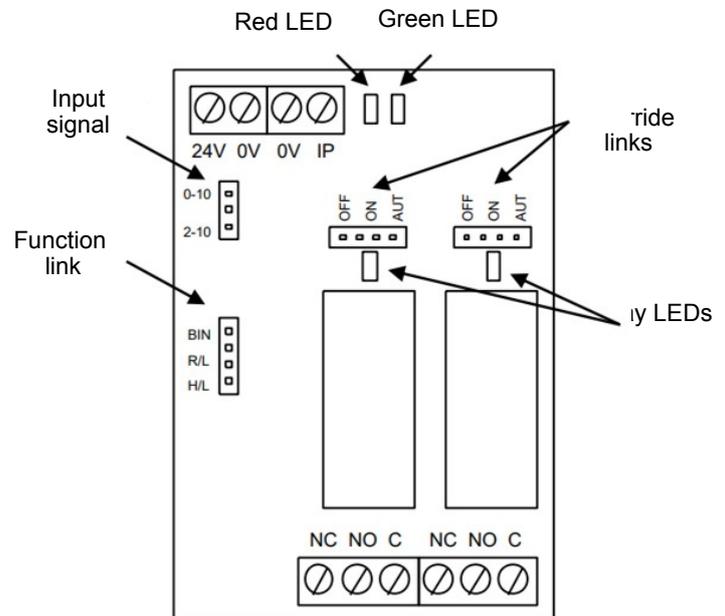
If the input voltage goes below 1.5Vdc,  $\pm 0.2Vdc$  hysteresis, when 2Vdc to 10Vdc input mode is selected then the red LED double flashes.

### Input Mode:

2Vdc to 10Vdc input mode:

This works the same as the normal 0-10Vdc input mode except that the input voltages are taken from 20% to 100% of the full range, and are consequently more closely spaced. The bottom 20% is regarded as an error (see LED indications), and will cause all relays to be off (unless jumpers force them on). Hysteresis around changeover voltages are 80% of the normal 0.2Vdc = 0.16Vdc.

## Connections & Jumper Settings:



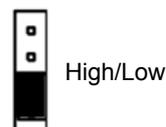
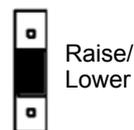
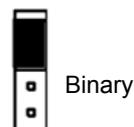
### Inputs:

|     |               |
|-----|---------------|
| 24V | 24Vac/dc      |
| 0V  | 0V            |
| 0V  | 0V            |
| IP  | 0(2) to 10Vdc |

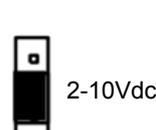
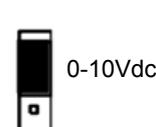
### Outputs:

|       |                 |
|-------|-----------------|
| Relay |                 |
| NC    | Normally Closed |
| NO    | Normally Open   |
| C     | Common          |

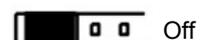
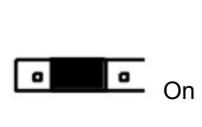
### Function:



### Input signal:



### Override:



It's important not to mix SELV (safety extra low voltage) and non-SELV loads on the same IO-RM-2 module.

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## 2-Stage Relay Module IOR-2

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### Switching Sequences:

#### Binary:

| Input Voltage | Nominal | Relay 1   | Relay 2   |
|---------------|---------|-----------|-----------|
| 0Vdc - 3Vdc   | 0Vdc    | OFF       | OFF       |
| 3Vdc - 5.5Vdc | 4Vdc    | <b>ON</b> | OFF       |
| 5.5Vdc - 8Vdc | 7Vdc    | OFF       | <b>ON</b> |
| 8Vdc - 10Vdc  | 10Vdc   | <b>ON</b> | <b>ON</b> |

#### Raise/Lower:

| Input Voltage | Nominal | Relay 1   | Relay 2   |
|---------------|---------|-----------|-----------|
| 0Vdc - 3Vdc   | 0Vdc    | OFF       | OFF       |
| 3Vdc - 5.5Vdc | 4Vdc    | <b>ON</b> | OFF       |
| 5.5Vdc - 8Vdc | 7Vdc    | OFF       | OFF       |
| 8Vdc - 10Vdc  | 10Vdc   | OFF       | <b>ON</b> |

#### High/Low:

| Input Voltage  | Nominal | Relay 1   | Relay 2   |
|----------------|---------|-----------|-----------|
| 0Vdc - 3Vdc    | 0Vdc    | OFF       | OFF       |
| 3Vdc - 7.5Vdc  | 5Vdc    | <b>ON</b> | OFF       |
| 7.5Vdc - 10Vdc | 10Vdc   | <b>ON</b> | <b>ON</b> |