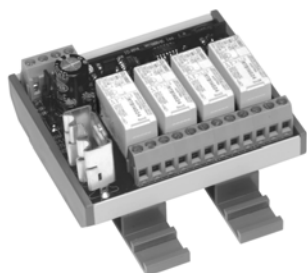# 4-Stage Relay Module

Features

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

Specification

Input signal	0-10Vdc 1mA min. into 22kΩ impedance
Output contacts	8A at 230Vac (resistive load)
Power supply:	
	24Vac ±15% @ 50Hz or
	24Vdc +15% -6%, 115mA max.
Hysteresis	±0.2Vdc about switching points (±0.1Vdc in binary mode)
Operating modes:	
	Raise/Lower(reserved for future use)
	4 Stage
	1 of 4 sequenced
	Binary
LED indication:	
	Supply OK
	Supply voltage low
	Supply voltage high
	Relay Status
	Hi input voltage
	Incorrect input mode jumper selection
	Low input voltage (only in 2-10Vdc mode)
Manual override	On/Off/Sequenced/Staged
Electrical Terminals	Rising cage connectors for 0.5-2.5mm² cable
Ambient range:	
Temperature	-10°C to +40°C
RH	0-80% non-condensing
Dimensions	H72mm x W82mm x D55mm
Country of origin	UK

Product Codes

IO-RM4

Analogue to digital converter. It converts a 0-10Vdc input and opens or closes up to 4 relays.

Danger
240 volts

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.

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Technical Overview

The IO-RM4 is intended for use with BMS controllers to convert an analogue control output to a binary, staged or sequenced relay modes. LEDs indicate correct operation and Hand/Off/Auto jumpers ease commissioning. Low current draw from 0-10Vdc controller output means that the IO-RM4 can work successfully with most BEMS controllers.

Installation

1. The IO-RM4 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 IO-RM4.

3. Maximum cable is 2.5mm², care must be taken not to over tighten terminals.

4. When mounting the IO-RM4 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 IO-RM4 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 not available). In either case one side of the supply is common to the signal ground from the BEMS controller.

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6. The relay outputs are single Pole Change Over (SPCO) so they can be wired as Normally Open (NO) or Normally Closed (NC).

7. The 0-10Vdc signal input requires a minimum of 1mA to operate.

Jumper Settings

Input signal link:

0-10Vdc Input signal

2-10Vdc Input signal

Override links:

On

Off

Auto

Function link:
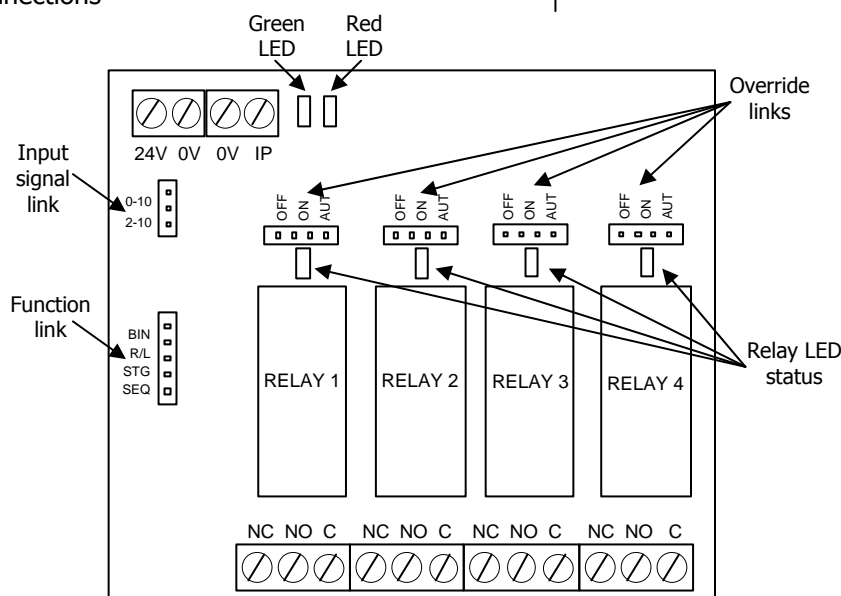
Binary

Staged

Reserved for future use

Sequenced

Connections

Switching Sequences

Binary:

Input Voltage	Nominal	Relay 1	Relay 2	Relay 3	Relay 4
0Vdc - 0.625Vdc	0.0Vdc	OFF	OFF	OFF	OFF
0.625Vdc - 1.25Vdc	0.93Vdc	**ON**	OFF	OFF	OFF
1.25Vdc - 1.875Vdc	1.56Vdc	OFF	**ON**	OFF	OFF
1.875Vdc - 2.5Vdc	2.18Vdc	**ON**	**ON**	OFF	OFF
2.5Vdc - 3.125Vdc	2.81Vdc	OFF	OFF	**ON**	OFF
3.125Vdc - 3.75Vdc	3.43Vdc	**ON**	OFF	**ON**	OFF
3.75Vdc - 4.375Vdc	4.06Vdc	OFF	**ON**	**ON**	OFF
4.375Vdc - 5Vdc	4.68Vdc	**ON**	**ON**	**ON**	OFF
5Vdc - 5.625Vdc	5.31Vdc	OFF	OFF	OFF	**ON**
5.625Vdc - 6.25Vdc	5.93Vdc	**ON**	OFF	OFF	**ON**
6.25Vdc - 6.875Vdc	6.56Vdc	OFF	**ON**	OFF	**ON**
6.875Vdc - 7.5Vdc	7.18Vdc	**ON**	**ON**	OFF	**ON**
7.5Vdc - 8.125Vdc	7.81Vdc	OFF	OFF	**ON**	**ON**
8.125Vdc - 8.75Vdc	8.43Vdc	**ON**	OFF	**ON**	**ON**
8.75Vdc - 9.375Vdc	9.06Vdc	OFF	**ON**	**ON**	**ON**
9.375Vdc - 10Vdc	9.68Vdc	**ON**	**ON**	**ON**	**ON**

Staged:

Input Voltage	Nominal	Relay 1	Relay 2	Relay 3	Relay 4
0Vdc - 2Vdc	0.0Vdc	OFF	OFF	OFF	OFF
2Vdc - 4Vdc	3Vdc	**ON**	OFF	OFF	OFF
4Vdc - 6Vdc	5Vdc	**ON**	**ON**	OFF	OFF
6Vdc - 8Vdc	7Vdc	**ON**	**ON**	**ON**	OFF
8Vdc - 10Vdc	9Vdc	**ON**	**ON**	**ON**	**ON**

Sequenced:

Input Voltage	Nominal	Relay 1	Relay 2	Relay 3	Relay 4
0Vdc - 2Vdc	0.0Vdc	OFF	OFF	OFF	OFF
2Vdc - 4Vdc	3Vdc	**ON**	OFF	OFF	OFF
4Vdc - 6Vdc	5Vdc	OFF	**ON**	OFF	OFF
6Vdc - 8Vdc	7Vdc	OFF	OFF	**ON**	OFF
8Vdc - 10Vdc	9Vdc	OFF	OFF	OFF	**ON**

LED Status

Power supply

Normal:

The green LED indicates the supply power condition. If power supply is normal (between 22V and 40V ±0.2V hysteresis) the green LED is ON continuously, showing that the IO-RM4 is powered correctly.

Low Supply Voltage:

If power supply falls below about 21.8V the green LED double flashes twice a second;

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The low power condition clears at about 22.0V. The relays behave as normal.

High Supply Voltage:

If the power supply is above 40V the green LED flashes 6 times a second;

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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 2 seconds after power-up
- When the supply is greater than 40V
- For 2 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

LED Status (continued)

High Input:

If the input voltage exceeds 11V, ±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 6 times a second:

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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 does triple flashes:

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The relays are switched off.

Low Input:

If the input voltage goes below 1.5Vdc, ±0.2Vdc hysteresis, when 2Vdc to 10Vdc input mode is selected then the red LED does double flashes:

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The relays behave as for 2Vdc.

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.

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