



## DIN-Rail Mains Input/Output Unit Installation Guide



### General

The DIN-Rail Mains Input/Output Unit, part no 55000-797, is a loop-powered device which provides a single-pole voltage-free changeover relay output and a monitored input. The unit is designed to be mounted in a suitable enclosure, clipped onto a 35mm DIN-Rail.

To ensure compliance to EN54-18 is maintained, this device shall be installed within an enclosure weighing greater than 4.75 kg.

If voltages greater than 50V are connected to the relay contacts of the unit (pins 10, 11 and 12) it is the responsibility of the installer that the unit and connections comply with the Low Voltage Directive.



The standard applicable for safety aspects is:  
BS EN 60950:2006 'Safety of information technology equipment'.

### Important notes:

1. Installation must be carried out by a suitably qualified person. Instructions for connected equipment must be carefully observed. If this is not done the protection afforded by the equipment may be impaired.
2. The connected control panel must comply with IEC/BS EN 60950 for safety or applicable local codes.
3. The DIN-Rail Mains Input/Output Unit has accessible live terminals and must be housed in a protective enclosure to prevent access to these terminals by an operator. The enclosure must be capable of ensuring an environment with no condensation.
4. Circuits connected to the relay contacts on pins 10, 11 and 12 must be protected by a fuse or circuit breaker to ensure that the relay contact rating is not exceeded in normal or in a fault condition. The protection device must have adequate breaking capacity to interrupt the maximum fault current that can flow.
5. Mains voltage wiring and connectors must be correctly insulated to ensure isolation from low voltage circuits. The mains input/output provides isolation internally between the relay contacts and the other circuits connected to the unit.
6. Mains connectors and wiring must be mechanically anchored that in the case of breakage or unit removal for maintenance there can be no accidental contact with other wiring circuits.

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- Mains voltage circuits should be marked so that correct connection is obvious in the case of unit removal during maintenance. Both the plug-in connector and the socket are marked as "pins 10, 11 & 12".

### Installation

- Run the cables from the loop, the monitored input circuit and the relay connections observing the safety requirements on page 1.
- When screened loop cables are used (for functional screening only - this is not a safety earth) connect the screen in accordance with the instructions of the control panel manufacturers. Always ensure that all segments of the loop cable have continuity of the functional earth and take care that it is insulated from any other earth point such as metalwork, cable trays or junction boxes.
- Set the unit address on segments 1–7 of the DIL switch in accordance with the address table on page 3.

If the LEDs are to be disabled, set segment 8 of the DIL switch to ON.

- Remove the backing strip from the lower portion of the label.
- Fix the lower portion of the label firmly to the unit, ensuring the DIL switch access hole is covered.
- Clip the unit to the standard 35mm DIN-Rail (DIN 46277)  
Please use end stops, part number 27447-528 or equivalent, at each end of the unit to secure it in place

### Wiring Details

All wiring terminals will accept solid or stranded cables up to 2.5mm<sup>2</sup>

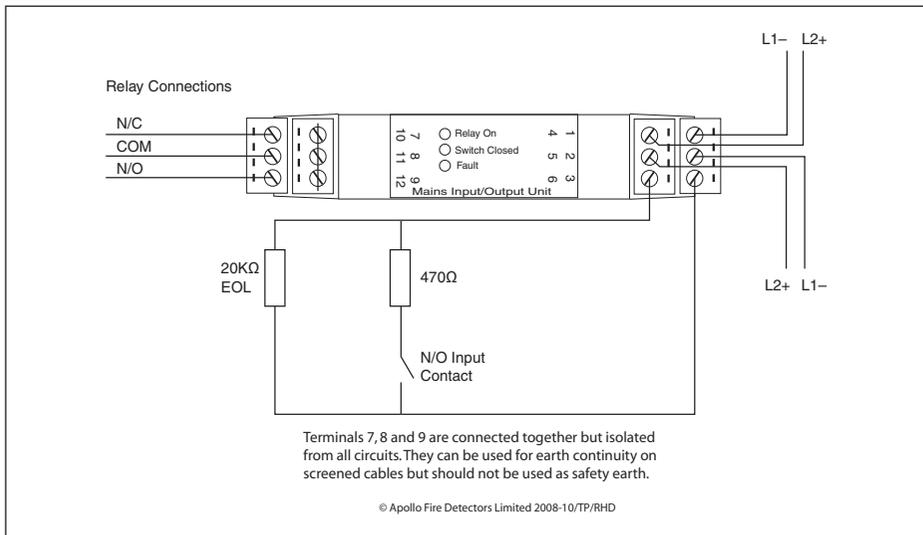


Fig 1 Connecting diagram for Input/Output Unit

### Input conditions and status

| Resistance across Input | Status               | Analogue value | Input Bits<br>2 1 0 |
|-------------------------|----------------------|----------------|---------------------|
| <100Ω                   | Short-circuit fault  | 4              | 0 0 0               |
| 100-200Ω                | Indeterminate        | 4 or 16        | 0 0 0 or 1          |
| 200-11KΩ 470Ω*          | Switch closed        | 16             | 0 0 1               |
| 11-15KΩ                 | Indeterminate        | 16             | 0 0 0 or 1          |
| 15-25KΩ 20KΩ*           | Normal (switch open) | 16             | 0 0 0               |
| 25-30KΩ                 | Indeterminate        | 4 or 16        | 0 0 0               |
| >30KΩ                   | Open-circuit fault   | 4              | 0 0 0               |

\*The values in *italics* are recommended values.

### Troubleshooting

Before investigating individual units for faults, it is very important to check that the system wiring is fault-free. Earth faults on a data loop or any ancillary zone wiring may cause communication errors. Many fault conditions are the result of simple wiring errors. Check all connections to the unit and make sure that the correct value resistors are fitted where necessary.

### Fault Finding

| Problem                  | Possible Cause   |
|--------------------------|--|
| No response or missing   | Incorrect address setting<br>Incorrect loop wiring                           |
| Fault condition reported | Incorrect input wiring<br>Incorrect end-of-line resistor fitted              |
| Relay fails to operate   | Incorrect wiring<br>Control panel has incorrect cause and effect programming |
| Analogue value unstable  | Dual address<br>Loop data fault, data corruption                             |

### Address Setting

The address of the Input/Output Unit is set using the lower seven segments of the DIL switch. Each segment of the switch must be set to "0" or "1", using a small screwdriver or similar tool.

A complete list of address settings is shown below.

| addr | DIL switch setting<br>1234567 |
|------|-------------------------------|------|-------------------------------|------|-------------------------------|------|-------------------------------|------|-------------------------------|
| 1    | 1000000                       | 11   | 1101000                       | 21   | 1010100                       | 31   | 1111100                       | 41   | 1001010                       |
| 2    | 0100000                       | 12   | 0011000                       | 22   | 0110100                       | 32   | 0000010                       | 42   | 0101010                       |
| 3    | 1100000                       | 13   | 1011000                       | 23   | 1110100                       | 33   | 1000010                       | 43   | 1101010                       |
| 4    | 0010000                       | 14   | 0111000                       | 24   | 0001100                       | 34   | 0100010                       | 44   | 0011010                       |
| 5    | 1010000                       | 15   | 1111000                       | 25   | 1001100                       | 35   | 1100010                       | 45   | 1011010                       |
| 6    | 0110000                       | 16   | 0000100                       | 26   | 0101100                       | 36   | 0010010                       | 46   | 0111010                       |
| 7    | 1110000                       | 17   | 1000100                       | 27   | 1101100                       | 37   | 1010010                       | 47   | 1111010                       |
| 8    | 0001000                       | 18   | 0100100                       | 28   | 0011100                       | 38   | 0110010                       | 48   | 0000110                       |
| 9    | 1001000                       | 19   | 1100100                       | 29   | 1011100                       | 39   | 1110010                       | 49   | 1000110                       |
| 10   | 0101000                       | 20   | 0010100                       | 30   | 0111100                       | 40   | 0001010                       | 50   | 0100110                       |
| 51   | 1100110                       | 61   | 1011110                       | 71   | 1110001                       | 81   | 1000101                       | 91   | 1101101                       |
| 52   | 0010110                       | 62   | 0111110                       | 72   | 0001001                       | 82   | 0100101                       | 92   | 0011101                       |
| 53   | 1010110                       | 63   | 1111110                       | 73   | 1001001                       | 83   | 1100101                       | 93   | 1011101                       |
| 54   | 0110110                       | 64   | 0000001                       | 74   | 0101001                       | 84   | 0010101                       | 94   | 0111101                       |
| 55   | 1110110                       | 65   | 1000001                       | 75   | 1101001                       | 85   | 1010101                       | 95   | 1111101                       |
| 56   | 0001110                       | 66   | 0100001                       | 76   | 0011001                       | 86   | 0110101                       | 96   | 0000011                       |
| 57   | 1001110                       | 67   | 1100001                       | 77   | 1011001                       | 87   | 1110101                       | 97   | 1000011                       |
| 58   | 0101110                       | 68   | 0010001                       | 78   | 0111001                       | 88   | 0001101                       | 98   | 0100011                       |
| 59   | 1101110                       | 69   | 1010001                       | 79   | 1111001                       | 89   | 1001101                       | 99   | 1100011                       |
| 60   | 0011110                       | 70   | 0110001                       | 80   | 0000101                       | 90   | 0101101                       | 100  | 0010011                       |
| 101  | 1010011                       | 111  | 1111011                       | 121  | 1001111                       |      |                               |      |                               |
| 102  | 0110011                       | 112  | 0000111                       | 122  | 0101111                       |      |                               |      |                               |
| 103  | 1110011                       | 113  | 1000111                       | 123  | 1101111                       |      |                               |      |                               |
| 104  | 0001011                       | 114  | 0100111                       | 124  | 0011111                       |      |                               |      |                               |
| 105  | 1001011                       | 115  | 1100111                       | 125  | 1011111                       |      |                               |      |                               |
| 106  | 0101011                       | 116  | 0010111                       | 126  | 0111111                       |      |                               |      |                               |
| 107  | 1101011                       | 117  | 1010111                       |      |                               |      |                               |      |                               |
| 108  | 0011011                       | 118  | 0110111                       |      |                               |      |                               |      |                               |
| 109  | 1011011                       | 119  | 1110111                       |      |                               |      |                               |      |                               |
| 110  | 0111011                       | 120  | 0001111                       |      |                               |      |                               |      |                               |

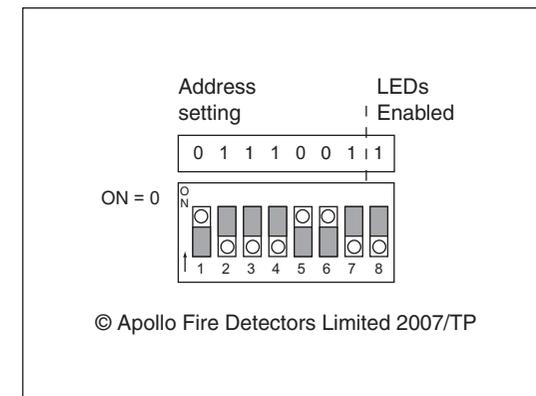


Fig 2 Example of DIL switch setting using address 78

### Commissioning

The relay state is set by protocol messages from the CIE by way of the loop positive and negative lines. It should be noted that when first powered up the relay state will be mechanically latched into the state it was when the unit was last powered.

When powered up there is a 30 second delay during which the state does not change but the CIE can send a message for the required state. At the end of the delay this state is taken up by the relay. If no message is sent, the relay will automatically return to the 'normal' state (open circuit between common and normally open). If required the relay can be reset by applying 24 volts from a power supply for 30 seconds.

It is important that the DIN-Rail Input/Output Unit be fully tested after installation. A Test Set, part no 55000-870, may be used to carry out functional testing of individual units. It can also be used to perform data integrity tests of an entire loop.

### LED Indicators

|   |               |  |
|---|---------------|--|
| ⊙ | Relay On      | Illuminated red when relay is in the SET state*        |
| ⊙ | Switch Closed | Illuminated red when monitored field contact is closed |
| ⊙ | Fault         | Illuminated yellow when input is open or short circuit |

\* The relay state is not monitored. The switch input is intended to be used to monitor a set of dry contacts that confirm operation of the equipment being controlled.

To conserve loop current the LEDs can be disabled by setting the 'LED ENABLE' segment of the DIL switch to '0'.

### Functional Test Data

| output bit | function       | input bit | function           |
|------------|----------------|-----------|--------------------|
| 2          | not used       | 2         | not used           |
| 1          | not used       | 1         | not used           |
| 0          | operates relay | 0         | monitored input    |
|            | 1 = 'SET'      |           | 0 = contact open   |
|            | 0 = 'NORMAL'   |           | 1 = contact closed |

### Technical data

|  |   |
|--|---|
| Loop voltage   | 17–28V DC   |
| Maximum current consumption at 28V (no protocol)   |   |
| LED Enabled  |   |
| switch-on surge 150ms  | 6mA   |
| quiescent, 20kΩ EOL fitted   | 1.5mA   |
| switch input closed, LED on  | 5.5mA   |
| any other condition, max 2 LEDs on   | 5mA   |
| LED Disabled   |   |
| switch-on surge 150ms  | 6mA   |
| quiescent, 20kΩ EOL fitted   | 1.5mA   |
| switch input closed  | 2.5mA   |
| any other condition  | 2.5mA   |
| Rated load at 65°C ambient   | 5A at 250V AC (resistive)<br>2A at 48V DC (resistive) |
| Rated load at 55°C ambient   | 8A at 250V AC (resistive)                             |
| Max switching capacity at 250V 50Hz  | 2kVA  |
| Switch input monitoring voltage (open-circuit condition)                                       | 9–11V DC  |
| Maximum cable resistance   | 50Ω   |
| Environmental Data - See Note A  |   |
| Operating temperature  | –20°C to +65°C  |
| Humidity (no condensation)   | 0–95%RH   |
| Cyclic humidity }<br>Impact }  | to GEI 1–052  |
| Surface temperature under maximum load }<br>Vibration }<br>Rigidity }<br>Dielectric strength } | EN54-18:2005  |
| IP rating  | 20  |
| Radiated emissions   | BS EN 61000-6: 2007                                   |
| Radiated immunity  | BS EN 50130–4: 1996                                   |
| Isolation between relay contacts and other circuits  | tested to 2.2KV                                       |



Complies with EMC Directive 2004/108/EC

*Note A - The operating ambient temperature is that at the outer surface of the Mains I/O case. Consideration should be made of the temperature rise within the protective enclosure which may contain other sources of heat - depending on the installation.*