



## FP2002 QE20 Relay Output Module Installation Instructions

### 1. General Description

This sheet describes installation of the FP2002 QE20 Relay Output Module (ROM). The Relay Output Module can be used to provide switched outputs in a QE20 system or as a replacement for an existing module. It provides:

- Eight outputs (Relays 1-8) that can be configured for either dual polarity switched 24V operation (e.g., for Visual Alarm Devices - VADs) or clean contact on/off (normally open) relay outputs.
- Eight relay outputs (Relays 9-16) that can be individually configured for normally-open (NO) or normally-closed (NC) operation.

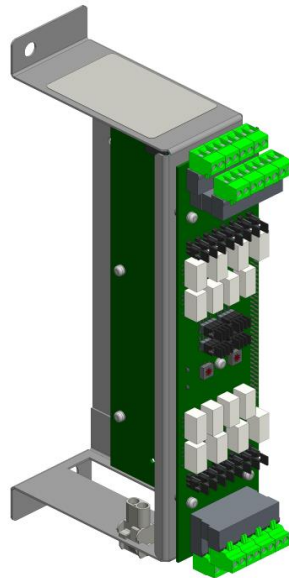


Figure 1 – FP2002 QE20 Relay Output Module

### 2. Kit Contents

This kit contains:

- 1 x FP2002 QE20 Relay Output Module fitted with 2way terminal blocks and 2k7 EOL resistors
- 1 x LM0665 QE20 QBus power/coms, 4 way, 1200mm long
- 2 x LM0655 2-way Power Looms 500mm long
- 2 x M6 x 10mm Pan Head Pozi mounting screws.
- 1 x LT0697, these installation instructions.

### 3. Mounting the ROM

The Relay Output Module occupies one of the 60mm positions on a QE20 mounting frame, as shown in Figure 2. Generally, it can be mounted in any position, but refer to the existing QE20 panel layout for an empty position when adding to a system.

It is secured to the frame using two M6 x 10 screws. Loosely fit one screw to the bottom hole of the desired position, then slide the open slot at the bottom of the Relay Output Module under the screw head and then fit the top screw to secure the module. Tighten both screws to lock the module into position.

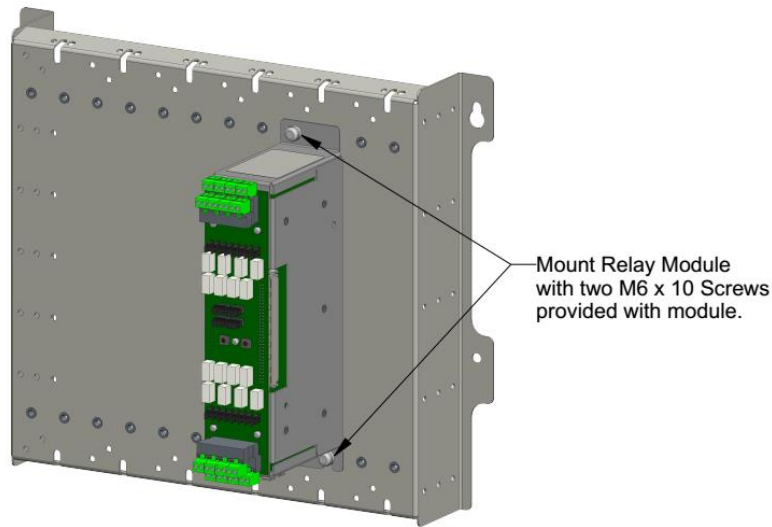


Figure 2 – QE20 Relay Output Module Mounting

#### 4. Replacing a Relay Output Module

Disconnect the field wiring from the ROM (noting where each cable is connected to).

Disconnect the QBus 4way loom(s) and the 24V Power cable to the ROM.

Remove the top mounting screw and loosen the lower mounting screw.

Remove the module from the frame.

Set the ADDRESS rotary switches and the links of the new module to match the replaced module's settings. Refer to Figure 3 for the switch and link locations.

Position the new module on the lower screw on the frame and insert the top mounting screw. Tighten both screws.

Connect the QBus loom(s) and 24V Power cable to the ROM.

Reconnect the field wiring connectors. Check that each field wire is reconnected to the correct terminal block on the ROM.

#### 4. Adding a Relay Output Module

When adding a ROM to an existing QE20, the module will need to be added to the QE20 site configuration using QE20Config and the outputs mapped to zones or functions. When the ROM is enabled in QE20Config the Card Address used will be the QBus address assigned to the module, so set the Address Rotary switches on the new ROM to that address.

##### Set Module Address

Set the ADDRESS rotary switches (SW1 - TENS and SW2 - ONES) to match the Card Address assigned to the Relay Output Module in the QE20 configuration. Note if the ROM is powered up with an address of 00, it will enter Bootloader mode. Set the switches to the required address and power the ROM down and up again to use the new address.

##### Set Output Jumpers

Set the Output Links to match the functions assigned to each output in the configuration.

Outputs 1-8 can be assigned to be VAD mode (supervised dual polarity switched 24V) or clean contact relay RLY mode.

For each output 1-8 in VAD mode (factory default) fit the appropriate +V and 0V links (on J27-J30) and fit the appropriate RLY / VAD link (LK27, LK29, .. LK41) to the VAD position.

For each output 1-8 in normally open relay mode remove the appropriate +V and 0V links (on J27-J30) and fit the appropriate RLY / VAD link (LK27, LK29, .. LK41) to the RLY position.

Relay Outputs 9-16 are permanently in Relay mode, with the output pair on the screw terminals able to be selected to be normally open (NO) or normally closed (NC) on LK18 – LK25.

## 5. Internal Wiring

The QE20 Relay Output Module requires:

- 24V power to be supplied. Use one of the 2-way 500mm power looms included to connect a 27A PSE output directly to the ROM if the module is fitted to the frame above, or the same as, the frame containing the PSE. If the ROM is on the top frame in a 40U cabinet then use the two 2-way power looms to run the DC power from the PSE to the ROM. Make sure the PSE used has sufficient current capacity to power the ROM with all its outputs activated, as well as all the other modules the PSE provides power to.
- A 4-way QBus loom to be connected from a spare QBus connector on another QE20 Relay Output Module, QE20 Controller, QE20 WIP, or QE20 PSE Module. The 1.2m lead provided allows connection to a module on a different frame. Coil up and secure any excess wire.

## 6. Field Wiring

The Solista/ROLP range of LED VADs are recommended for use on the QE20. These are low current, high intensity VADs, with synchronised self-flashing and an in-built diode.

For evacuate VADs (red flash) use:

- 576.080.022 Wall Mount Red Flash VAD
- 576.080.023 Ceiling Mount Red Flash VAD

together with a suitable Tag Plate (EA0345, EA0347 or EA0349) to comply with AS 1670.4 / NZS 4512 installation requirements.

For alert VADs (white flash), if required, use:

- 576.080.018 Wall Mount White Flash VAD
- 576.080.017 Ceiling Mount White Flash VAD

with a FIRE tag plate EA0346 or EA0348.

As these VADs draw a higher current at lower supply voltage, it is necessary to determine the maximum current consumption at the lowest operating voltage (say 18V) and use this to determine the quantity that can be supported on each output. With High Power and 1Hz selected, these VADs draw 25mA at 24V. At 18V they draw approximately 33mA, so this figure should be used to determine how many can be supported on an output. Each VAD output is rated at 1A max, so a total of 33 VADs are supported on each output.

Table 6.1 shows the minimum cable size that should be used for various VAD currents and cable length.

Table 6.1 Minimum Cable Size for Various VAD Load Currents and Cable Length

| Cable Length | 100mA Load           | 250mA Load           | 500mA Load          | 1000mA Load         |
|--------------|----------------------|----------------------|---------------------|---------------------|
| 100m         | 0.75 mm <sup>2</sup> | 0.75 mm <sup>2</sup> | 1.5 mm <sup>2</sup> | 2.5 mm <sup>2</sup> |
| 200m         | 0.75 mm <sup>2</sup> | 1.5 mm <sup>2</sup>  | 2.5 mm <sup>2</sup> | 4 mm <sup>2</sup>   |
| 300m         | 1 mm <sup>2</sup>    | 2.5 mm <sup>2</sup>  | 4 mm <sup>2</sup>   | 6 mm <sup>2</sup>   |
| 500m         | 1.5 mm <sup>2</sup>  | 4 mm <sup>2</sup>    | 6 mm <sup>2</sup>   | 10 mm <sup>2</sup>  |
| 700m         | 2.5 mm <sup>2</sup>  | 4 mm <sup>2</sup>    | 6 mm <sup>2</sup>   | 16 mm <sup>2</sup>  |
| 1000m        | 2.5 mm <sup>2</sup>  | 6 mm <sup>2</sup>    | 10 mm <sup>2</sup>  | 25 mm <sup>2</sup>  |

Connect the A wire of the VAD output to the +VE terminal of any Alert VADs and the B wire to the -VE terminal. Connect the B wire of the VAD output to the +VE terminal of any Evacuate VADs and the A wire to the -VE terminal. Wire into and out of each VAD, so that any wire coming loose breaks the circuit. Fit a 2k7 EOL resistor across the output terminals of the last VAD. Multi-branch wiring is not supported.

Refer to drawing 2001-2 Sheet 500 (included later) for wiring to the Solista range of LED VADs.

VAD outputs that are not configured (Mode set to **None**) in the site configuration or set to relay mode (**Zone Active**, or **Logic**) do not require the 2k7 EOL resistor to be fitted.

Relay outputs (9-16) or VAD outputs in Relay Mode can be wired to control an external device as required. An EOL resistor is not required. Refer to drawing 2001-2 Sheet 501 (included later) for wiring.

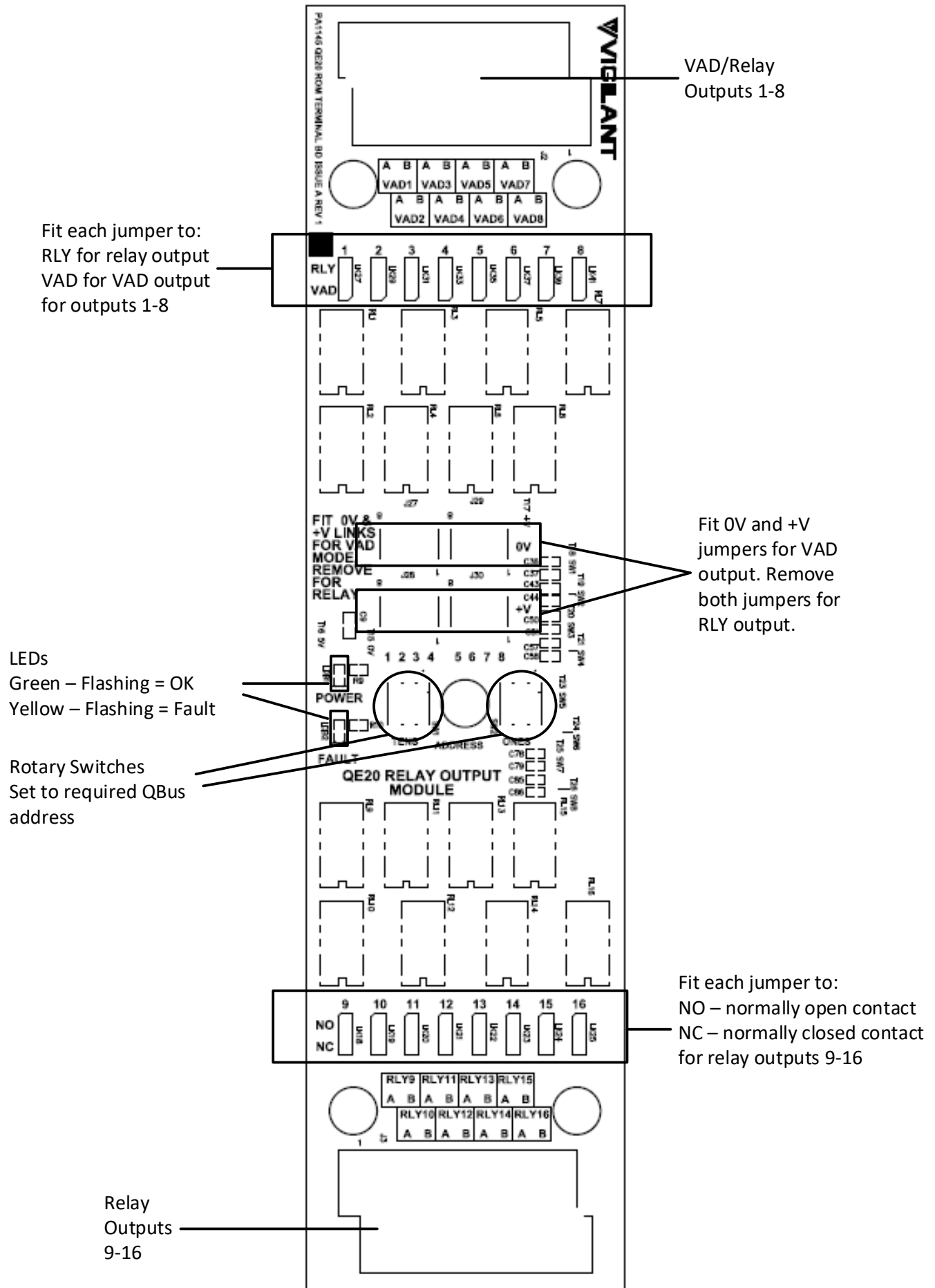


Figure 3 – Terminal Board Link, Switch, LED and Connector locations

## 7. LED Indications

There are two LED indicators on the QE20 Relay Output Module.

- **LDB1 POWER** is on green, blinking off every few seconds or so as it communicates with the Controller Module, when power is applied. Off means 24V power is not supplied or the module is faulty. Steady on means the module is not communicating with the Controller, or the module is faulty.
- **LDB2 FAULT** will flash yellow when there is a fault with any of the supervised (VAD) outputs or with the module itself. A sequence of 23 flashes is shown, with a long flash indicating that a specific fault is present, and a short flash that the specific fault is not present. For example, if the fourth flash is long, then a short circuit fault or excessive current draw is present on Output 4. Refer to Table 7.1 for details.

If both **POWER** and **FAULT** are flashing at ~8Hz then the ROM is in Bootloader mode. Change the address switches to the required address and power the ROM down and up again to exit Bootloader mode.

Table 7.1 LDB2 FAULT LED Flash Indications

| Flash Number | Description  | Explanation / Action  |
|--------------|--|---|
| 1-8          | Short circuit or excessive current draw (>1A) on VAD outputs 1-8 | Field wiring issue, or incorrect setting of the links on the module. Check the connected loads, field wiring and link settings.   |
| 9-16         | Open circuit on VAD outputs 1-8                                  | Field wiring issue, no 2k7 EOL resistor fitted, or incorrect setting of the links on the module. Check the field wiring, EOL and link settings.   |
| 17           | Over Current   | Total load on the VAD outputs exceeds maximum. Determine which outputs are drawing excessive current and reduce the load.   |
| 18           | Not communicating with the Controller over QBus                  | Module not configured in site configuration. Incorrect address set on the rotary switches, QBus wiring not connected from the Controller to the module (possibly via other modules), faulty module on QBus. Check the site configuration, address switch settings, QBus wiring, and for a different module that is faulty or mis-addressed. |
| 19           | Invalid address on the ADDRESS rotary switches                   | Check the rotary switches are not set to 00 (an address not generally used in QE20). Check with JCI Technical Support, as the module could require a firmware upgrade. If powering the ROM down and up again does not clear the fault, the ROM is faulty so replace it.   |
| 20           | Firmware CRC fault   | Check with JCI Technical Support, as the module could require a firmware upgrade. Otherwise, it is faulty so replace it.  |
| 21           | Software Fault   | Should not occur in operating system. Diagnostic function only. If powering the ROM down and up again does not clear the fault, the ROM is faulty so replace it.  |
| 22           | System Fault   | Unexpected restart (watchdog). Should clear after 30s comms with Controller. Check with JCI Technical Support as may need a firmware upgrade. Otherwise replace module.   |
| 23           | I2C connection fault between the Terminal and Main Bds           | Faulty Module. Replace the module.  |

## 8. Power On & Testing

Power up the QE20 system and install the site configuration. Check for any fault conditions and resolve these.

- Check each configured output on the ROM operates as required by the configuration.
- Check the correct VADs flash in the alert state (if fitted) and evacuate state in the correct areas.
- Check the Relay contacts are in the correct condition for the required logic.

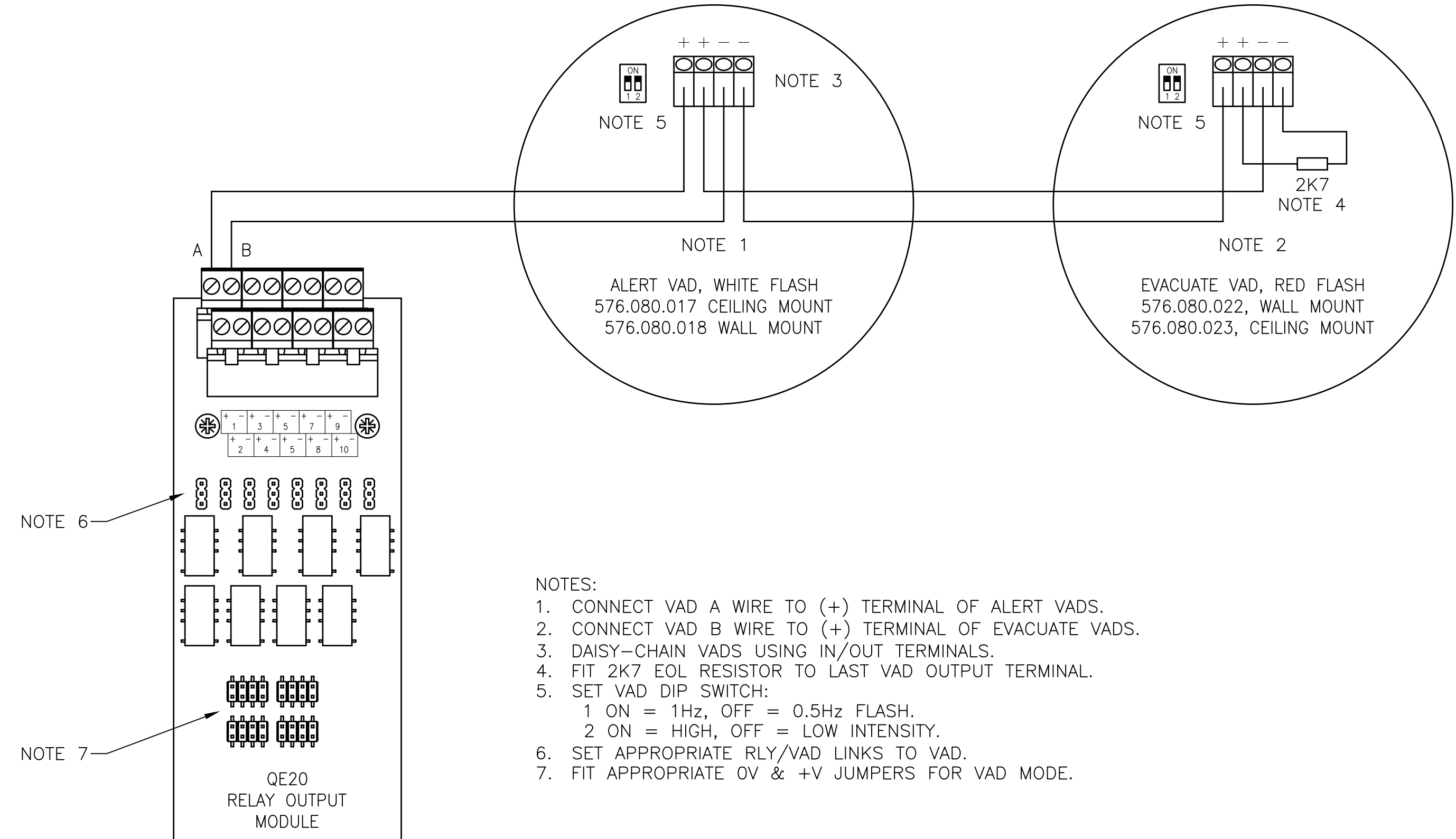
## 9. Relay Output Module Specifications

|                             |  |
|-----------------------------|--|
| Power Requirements          | 18V – 32Vdc<br>20mA typ @ 24V all outputs off<br>210mA typ @ 24V all outputs on (excluding VAD load) |
| Operating Temperature Range | -5°C to +45°C 10% to 93% RH non-condensing   |
| VAD Outputs                 | Each output polarity-switched 24V (supply), max 1A, 2k7 EOL resistor.<br>Max total output current 8A |
| EOL Supervision             | < 1K short circuit, 1k1 – 5k1 normal, >5k2 open circuit.   |
| Relay Outputs               | Voltage free normally-closed or -open contact: 2A @ 30Vdc resistive                                  |

## **10. End User Licence Agreement, Privacy and Licensed Software**

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[www.johnsoncontrols.com/techterms](http://www.johnsoncontrols.com/techterms)



**NOTES:**

1. CONNECT VAD A WIRE TO (+) TERMINAL OF ALERT VADS.
2. CONNECT VAD B WIRE TO (+) TERMINAL OF EVACUATE VADS.
3. DAISY-CHAIN VADS USING IN/OUT TERMINALS.
4. FIT 2K7 EOL RESISTOR TO LAST VAD OUTPUT TERMINAL.
5. SET VAD DIP SWITCH:
  - 1 ON = 1Hz, OFF = 0.5Hz FLASH.
  - 2 ON = HIGH, OFF = LOW INTENSITY.
6. SET APPROPRIATE RLY/VAD LINKS TO VAD.
7. FIT APPROPRIATE 0V & +V JUMPERS FOR VAD MODE.

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3rd ANGLE PROJECTION

| ISS/REV | AMENDMENTS | ECO | DRN | CHKD | AUTH | APVD | DATE    |
|---------|------------|-----|-----|------|------|------|---------|
| A       | ORIGINAL.  | -   | KJS | RC   | MH   | DC   | 11-3-20 |
|         |            |     |     |      |      |      |         |
|         |            |     |     |      |      |      |         |
|         |            |     |     |      |      |      |         |
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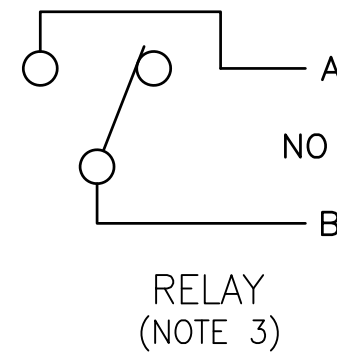
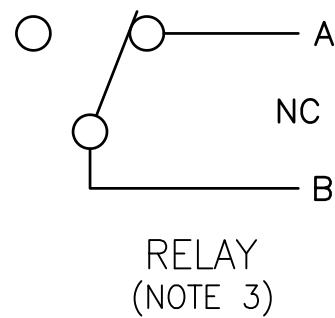
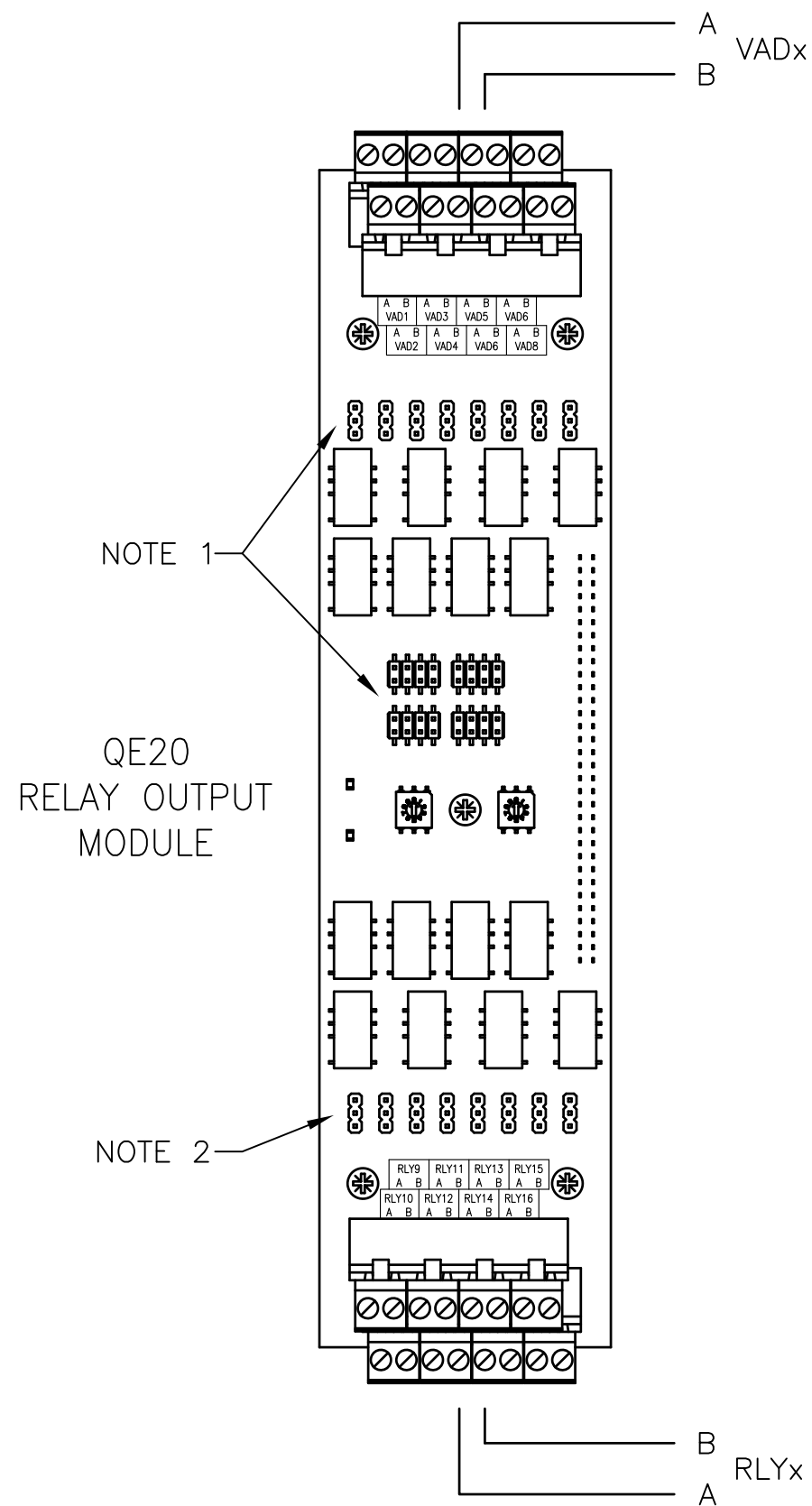
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**QE20  
RELAY OUTPUT MODULE  
WIRING DIAGRAM**

DRAWING No: 2001-2 SHEET 500 of N

|           |                  |          |
|-----------|------------------|----------|
| <b>A3</b> | ISS/REV <b>A</b> | PART No: |
|-----------|------------------|----------|





NOTES:

1. RELAY OUTPUT MODULE VAD 1-8 OUTPUTS SELECTABLE FOR NORMALLY OPEN RELAY OPERATION. FIT RLY/VAD LINK TO RLY & REMOVE 0V & +V LINKS FOR OUTPUTS.
2. SELECT RELAY OUTPUT MODULE LINKS RLY9-16 AS NC OR NO OUTPUT IN DE-ENERGISED STATE.
3. RELAY SHOWN IN DE-ENERGISED STATE (NON-OPERATED).

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3rd ANGLE PROJECTION

| ISS/REV | AMENDMENTS | ECO | DRN | CHKD | AUTH | APVD | DATE    |
|---------|------------|-----|-----|------|------|------|---------|
| A       | ORIGINAL.  | -   | KJS | RC   | MH   | DC   | 11-3-20 |
|         |            |     |     |      |      |      |         |
|         |            |     |     |      |      |      |         |
|         |            |     |     |      |      |      |         |
|         |            |     |     |      |      |      |         |

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**QE20  
 RELAY OUTPUT MODULE  
 WIRING DIAGRAM**

DRAWING No: 2001-2 SHEET 501 of N

A3 | ISS/REV A | PART No: