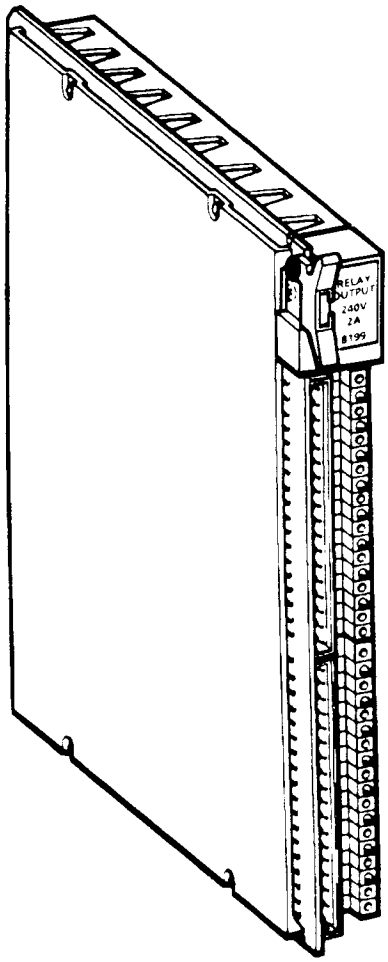
CEGELEC

VERIFICATION RELAY OUTPUT MODULE 8199



GEM80 USER INFORMATION

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1. INTRODUCTION

The 8199 Verification Relay Output module can be used for switching plantside loads or circuits Off or On. It provides 16 independant relay outputs and can be configured to give 16 x 1 or 8 x 2 sets of output contacts.

Each module relay has a set of two normally open (N.O) contacts, one contact is available to the user at the relay output channel, the second contact is used to provide an indication of relay status to the host controller.

The 8199 module must be used in connection with a GEM 80 Controller that has a Verification I.O highway.

2. SPECIFICATION

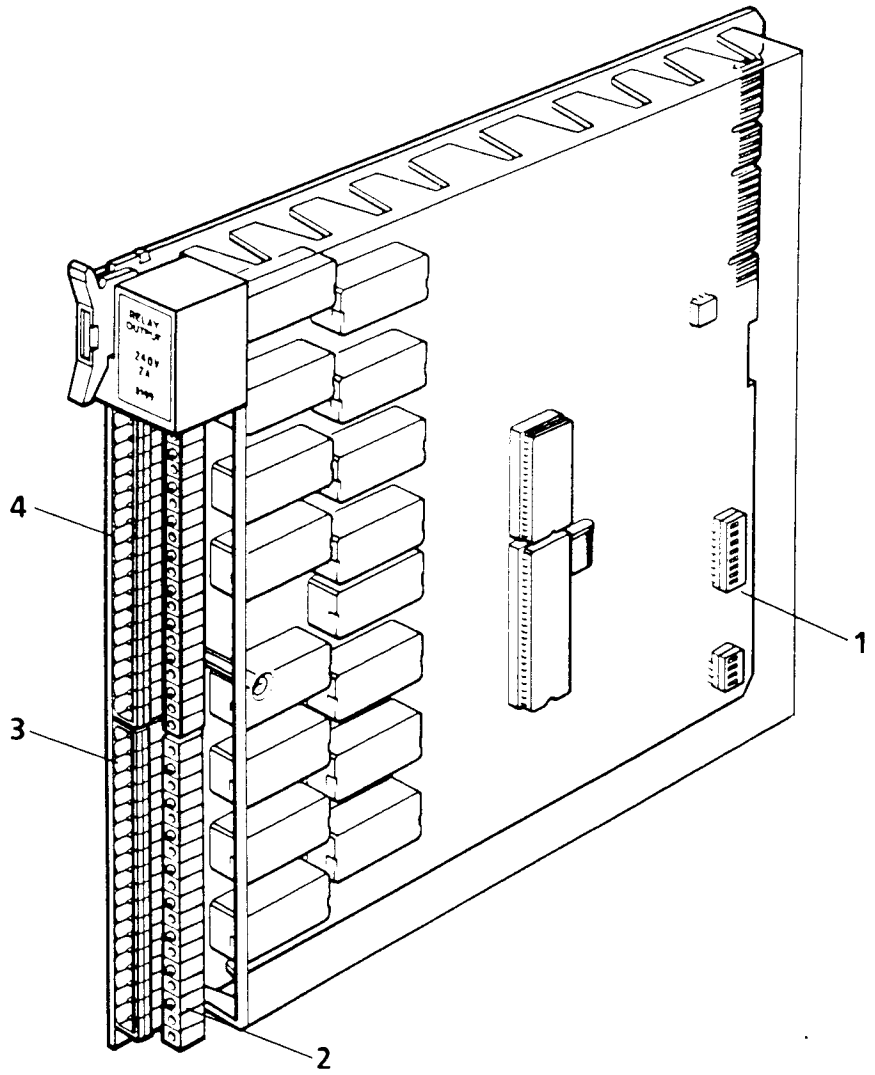
Power Requirements	:	+15V dc @ 450mA (all outputs 'on')
From Subrack	:	+5V dc @ 300mA (all outputs 'on')
Power consumption from host Controller	:	All relays ON: 8.25W
	:	All relays OFF: 2.1W
Number of channels	:	Mode 1: 16 — Mode 2: 8
Number of contacts per channel	:	1 x N.O — 2 x N.O
Contact life	:	5×10^7

INDIVIDUAL OUTPUTS

Contact Breakdown Voltage	:	1.5kV
Common Mode Isolation Voltage	:	2kV rms
Maximum switchable voltage	:	380V a.c.
	:	48V d.c.
Maximum switchable load	:	150W (2kVA)
Maximum Current	:	2A continuous a.c. (resistive load)
	:	1.25A continuous d.c. (resistive load)
Contact Resistance	:	8m ohms
Insulation resistance @ 500V dc	:	10^9 ohms
Response Time ON	:	12ms maximum
Response Time OFF	:	12ms maximum
Temperature	:	0°C to 60°C operating -20°C to 70°c storage
Humidity	:	5% to 95% non-condensing
Fire Resistance	:	UL94 Class V0
Weight	:	0.55 Kg
Dimensions	:	233mm x 28mm x 250mm (h) (w) (d)
Mechanical Interlocks	:	12, 18 and 31

3. HARDWARE LAYOUT

Figure 3.1 shows the layout of the 8199 Relay Output module.



1. Address Switches
2. LED Status Indicators
3. PLY Channels 8-15
4. PLX Channels 0-7

Figure 3.1 - Layout of the 8199 Relay Output Module

4. OPERATION

4.1 Introduction

The 8199 module provides a maximum of: 16 normally open, volt free, relay outputs, each one independently operated from the Verification I/O Highway.

When power is applied, all relay outputs are held in a normally open state until Verification I/O highway scanning commences. If Verification I/O highway scanning ceases the module maintains the relay output states.

All outputs revert to the de-energised state (N/O) if :-

The Host Controllers power fails.
or
The Module Processor fails.

Note... Enable signals should be connected via the watchdog relay contacts.

4.2 Addressing

An 8199 output module occupies two addresses on the Verification I/O highway, a lower and an upper address. The lower address is used by the Host Controller to write data to the module. The upper address is used as an input by the 8199 Output module to convey the status of each relay to the Host Controller. See Table 4.1.

Table 4.1

Lower Address	B-Table Output	Required Outputs
Upper Address	A-Table Input	See Section 4.4

4.2.1 Address Switches

At the bottom rear corner of the module there are two blocks of switches, these are used to set the module address. There are 12 switches in all, a group of eight (bits 0-7) and a group of four (bits 8-11). Access to the switches is possible without removing the module cover.

Figure 4.1 shows the layout of the Address Switches.

4.2.2 Address Setting

The Address switches are configured with the eqivalent 12 Bit Binary number of the Module Address.

Figure 4.1 shows the address switches set to logical "1" for bits 8 (256), 9 (512), and 10 (1024) giving a module address of 1792 (256 + 512 + 1024).

Care must be taken to ensure that the choosen address is not allocated to any other module.

The number of addresses on the Verification I/O highway depends on the Host Controller, however it is possible to have a maximum of 4096 addresses which is 2^{12}.

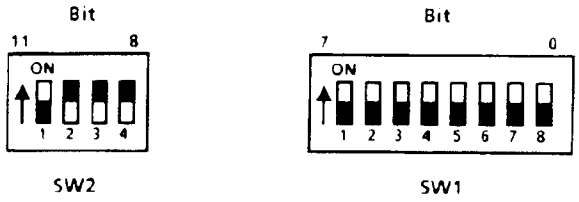


Figure 4.1 - Address Switch Layout

4.3 Dual Mode

Depending on requirments, the relay outputs can be configured as 16 separate channels (normal mode) or as 8 channels (dual mode). Each one of the eight channels is made by ANDing together 2 individual channels to make an output. This section contains programming instructions and details on selecting 16 separate or 8 ANDed outputs.

4.3.1 Programming

Configuration data for Verification I/O modules is stored in a set of P-tables. The Host Controller automatically allocates a number of P-tables to each Verification I/O module. The start address of the configuration P-tables is located at P-table P53 for all controllers except the GEM80/400. In GEM80/400 controllers the base P-table location is P92.

The 8199 module is allocated two P-tables for its configuration data, however only the l.s.b of the P-table associated with the lower address is used to set the mode of operation.

To configure the module for dual mode, i.e. eight outputs, set the l.s.b. of the P-table to '1'. See Table 4.2.

To configure the module as 16 independent outputs, set the l.s.b. of the P-table to '0'. See Table 4.2

For full details about P-table selection, refer to the Technical Manual for your GEM80 Controller.

Table 4.2

P-Table l.s.b. Setting	Mode of Operation	Number of Channels
0	Normal	16
1	Dual	8

In dual mode, only the lower 8 bits of data sent to the module are used to set the relays, data bit '0' sets channels 1 and 2, data bit '1' sets channels 3 and 4, etc. This is shown in figure 4.2.

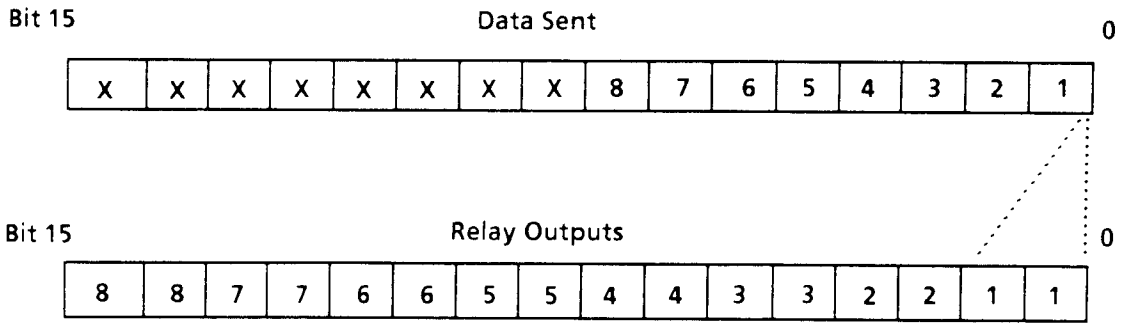


Figure 4.2 - Dual Mode Selection

4.4 Fault Finding

The A table (input) address contains information that can be used to check the status of the 16 x 1 or 8 x 2 channels of the 8199 module.

If all relay channels are operating correctly, the A table contains a '0' at each bit location. Should a channel or relay develop a fault, the A table bit corresponding to the faulty channel or relay will be set to '1'.

The B table (output) address contains information, derived from the execution of the user programme, about the output states of all 16 x 1 or 8 x 2 channels.

4.4.1 Fault Indication

Each I/O address has a corresponding pair of bits in an F-table location to indicate correct operation of that address. The least significant bit of each pair is the Fault bit (F) and the most significant bit is the Warning bit (W). See the example figure 4.3.

The warning bit is set if a difference is detected between the data sent and the data set in the relays. The fault bit is set if a total module failure or Verification I/O highway problem is detected.

Under normal operation all F-table locations monitoring I/O operation will be at zero.

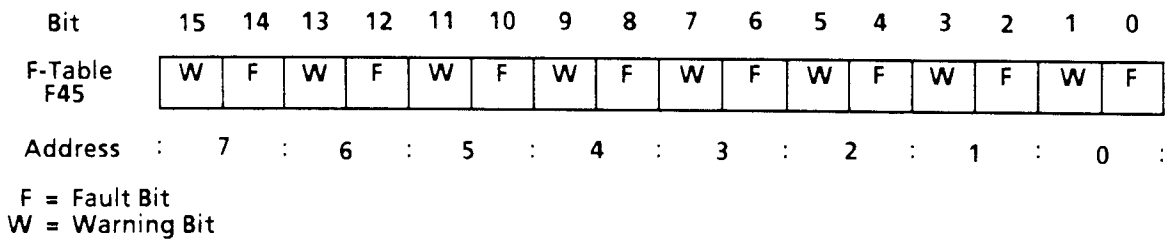


Figure 4.3 - Fault and Warning Bit Address Relationship

5. INSTALLATION

The 8199-4002 module can only be installed or used with the following Controllers and subracks :-

The 160 series Controllers

The 310 series Controllers

The 734 series Controller

8 slot or 12 slot I.O subracks connected to a Verification I.O highway.

Each subrack backplane edge connector is fitted with plastic coding keys (called Mechanical Interlocks) in positions 10, 12, 18 and 31. The key in position 31 is used as a guide to accurately locate the module's edge connector and must not be removed.

The module is constructed to accept the coding keys in slots 12, 18, and 31, therefore, the coding key in position 10 must be removed. The remaining coding keys identify the slot as being allocated for a Verification output module. See Figure 5.1.

5.1 Relay Protection

Protection must be provided for the module's relay contacts, against damage due to high inrush current through inductive or capacitive discharge loads.

High inrush currents caused by a capacitive load charging or discharging through the contacts should be limited by the addition of a series resistor.

Inductive d.c. loads should be suppressed by the addition of a diode of suitably rated inverse voltage. The diode should be connected in parallel with the load, its anode being connected to the positive side of the plant-side power source. This is shown in Figure 5.2.

Inductive a.c. loads should have a resistor/capacitor (RC) network connected in parallel with them as shown in Figure 5.5. The values of the componants selected for the network are a function of the resistance and inductance of the load.

Under switching or transient conditions, specified switching limits must not be exceeded.

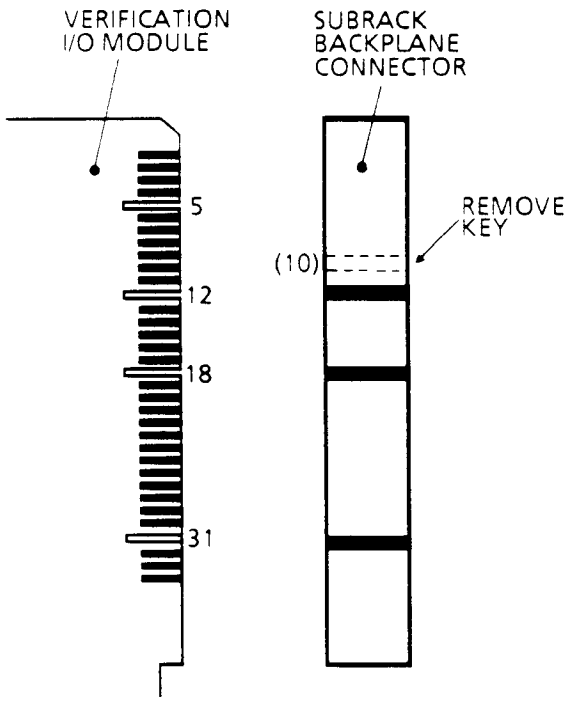


Figure 5.1 - Verification Output Module Coding

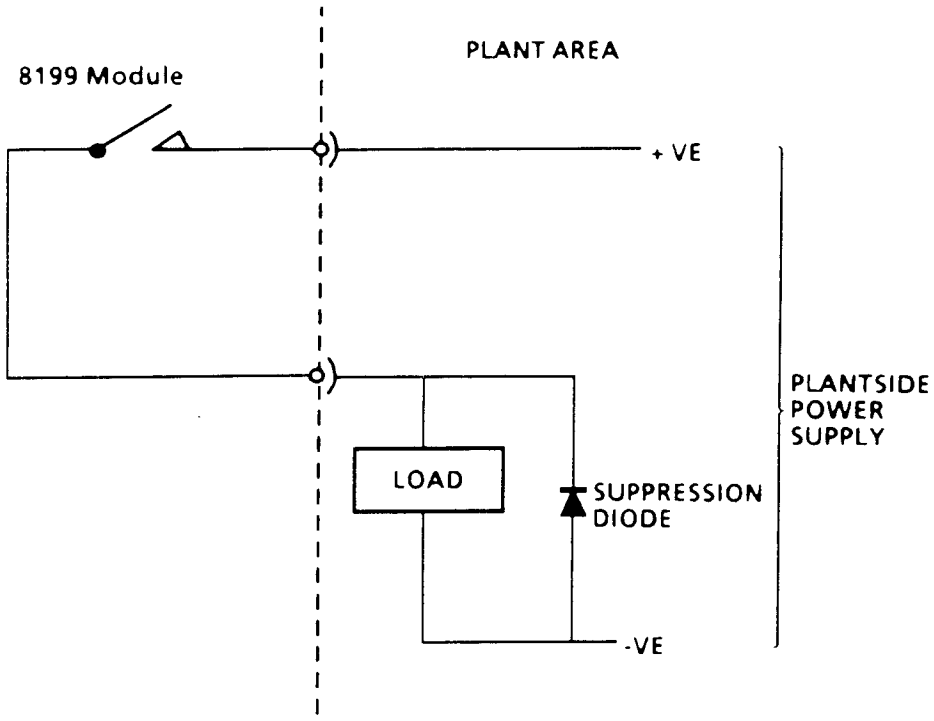


Figure 5.2 - Diode Suppression on D.C. Inductive Loads

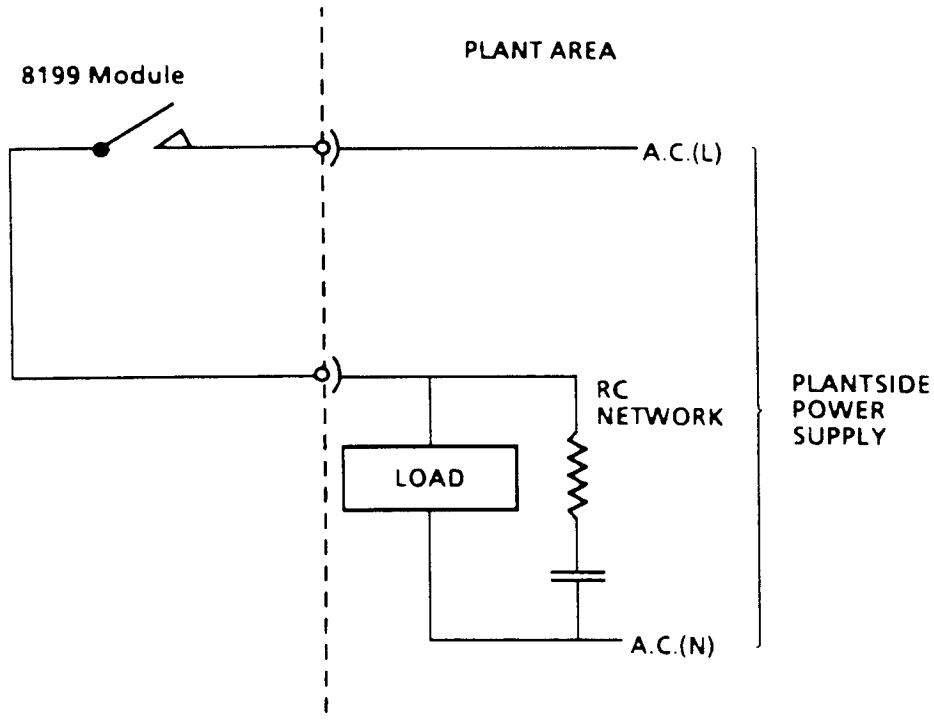


Figure 5.3 - RC Suppression on A.C. Inductive Loads

6. CONNECTIONS

Cabling from plant-side equipment is terminated on two flying sockets (supplied with the module) that connect with two panel mounted plugs on the front of the module. The flying socket accepts conductors of up to 1.5mm^2 and firmly fastens each conductor with a screw terminal.

Figure 6.1 contains a schematic of the output contacts showing the connector pin details.

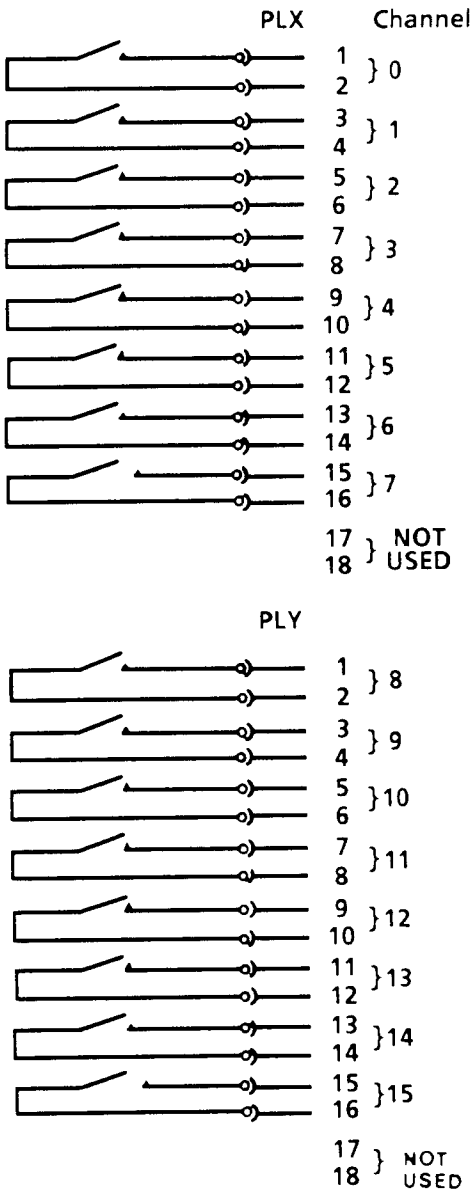


Figure 6.1 - Plant-side Connector Details

Typical system connections are shown in Figures 6.2 and 6.3.

The example shown in Figure 6.2 permits 16 independent output channels.

The example shown in 6.3 permits eight outputs, it shows how two independant output channels are ANDed together to form a single output and is designed to permit switching of both the Line and Neutral sides of an a.c. supply.

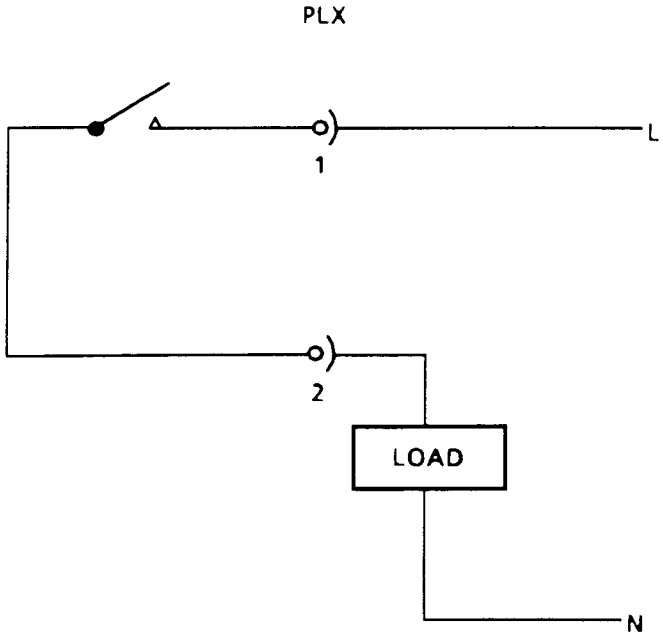


Figure 6.2 - Example of Normal Mode Connections

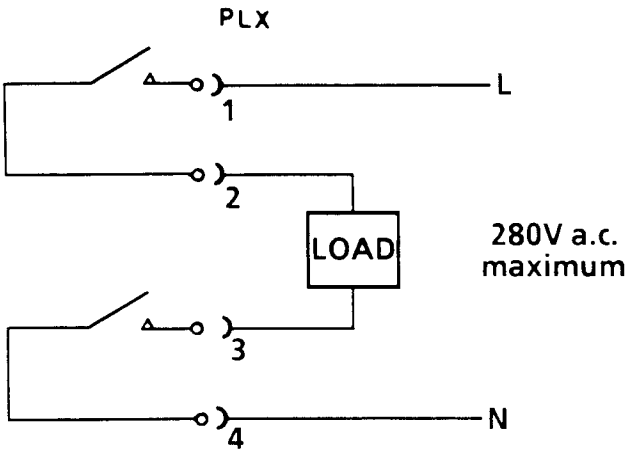


Figure 6.3 - Example of Dual Mode Connections

For ease of understanding, only channels 1 and 2 are used in these examples.

6.1 Output Enable

The 8199 module incoporates an output enable circuit which ensures that all outputs are held in the off state (N O) until :-

An enable signal is present at +15V d.c. ± 10%

and

The GEM 80 Controller initiates the outputs 'ON'

Provision of the enable signal would normally be via the watchdog relay of the Host Controller, this will inhibit outputs at initial switch on and if the watchdog contacts open.

Application of the enable signal is achieved by way of the upper backplane on an 8 or 12-slot I/O subrack and will enable all output enable modules contained in the subrack.

Moulded I/O subracks that have this feature are the :-

8857-4006 - 8 Slot I/O subrack and power supply

8859-4003 - 12 Slot I/O subrack

6.1.1 Output Enable Connections

Figures 6.4 and 6.5 show the output enable connections for an 8 Slot Subrack.

Figures 6.6 and 6.7 show the output enable connections for a 12 Slot Subrack

Resistors shown in dashed outline should be removed for those particular enable connections.

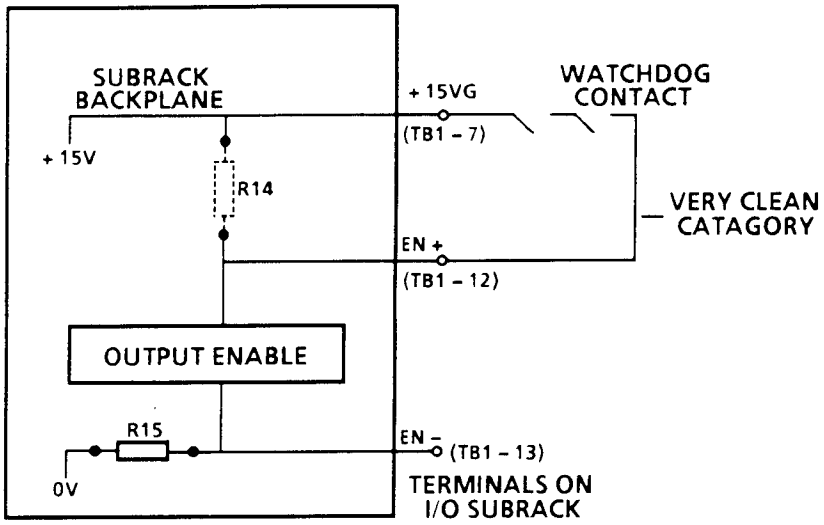


Figure 6.4 - 8 Slot Subrack Output Enable Connection using the GEM 80 Power Supply

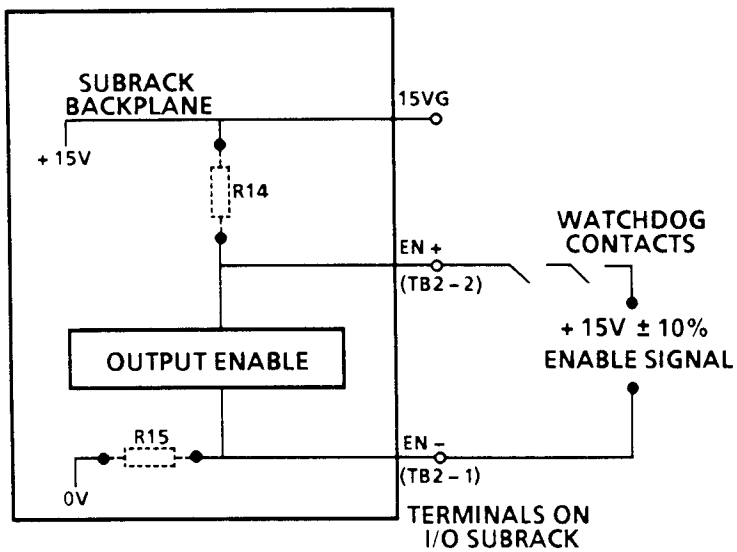


Figure 6.5 - 8 Slot Subrack Output Enable Connection using an External Power Supply

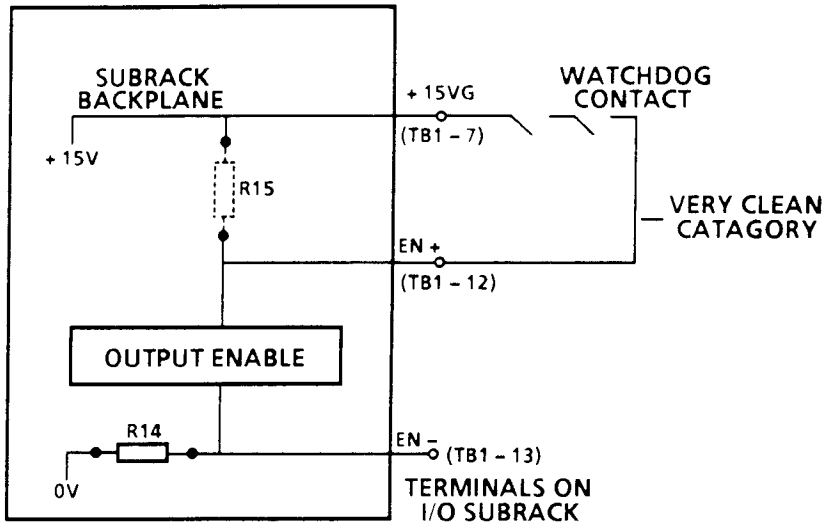


Figure 6.6 - 12 Slot Subrack Output Enable Connection using the GEM 80 Power Supply

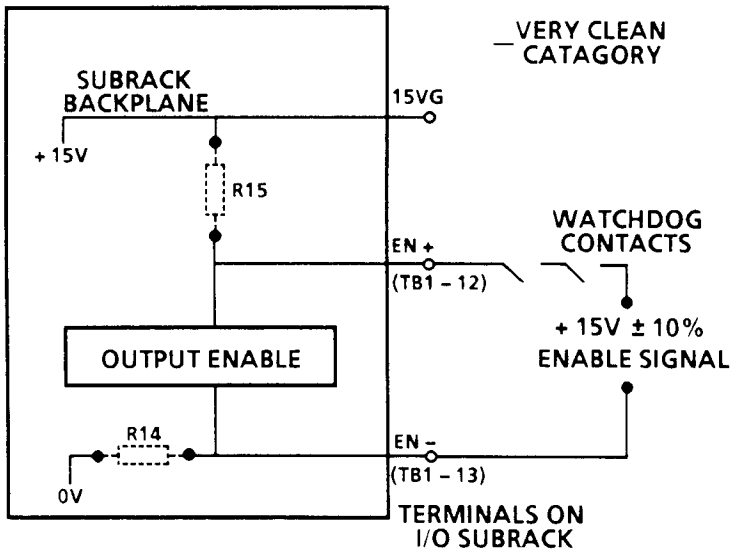


Figure 6.7 - 12 Slot Subrack Output Enable Connection using an External Power Supply

6.1.2 Wiring Segregation

The segregation category depends on the power supply providing the enable signal. If the signal is derived from a GEM 80 power module then it is considered to be "very clean" and must be separated from any 'dirty' plant side wiring. If the signal is supplied from a remote power supply which is also supplying 'dirty' circuits then the enable wiring can be run with other 'dirty' plant-side wiring. It must not be run alongside 'clean' or 'very clean' plant-side wiring.

7. ORDERING CODES

16-Way Verification Relay Output Module. Complete with plant connectors.	8199-4001
16-Way Verification Relay Output Module only.	8199-4002
Plant Connector Kit and coding keys.	8890-4740

8. ADDITIONAL INFORMATION

Further information and help on GEM 80 products or applications can be obtained from:

your local GEM 80 Representative.

or Customer Support Unit.

Tel: 0782 783511. Ext. 2651.
International Code. 44 782 783511

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