GE IS220PDOAH1A

Discrete Output I/O Pack



GE IS220PDOAH1A is a Mark VIe discrete output I/O pack that converts commands from the I/O Ethernet network into relay-control actions through a compatible output terminal board. It can control up to twelve relays and receives board-specific feedback to support supervision of the output assembly. Electromagnetic or solid-state relay operation depends on the selected TRLY board variant. The pack therefore provides the networked output-control electronics, while the terminal board defines the relay arrangement; indicator LEDs provide local status and diagnostic information.

Technical Specifications

Product Identity	
Control system	GE Mark VIe
Functional Configuration	
Product function	Discrete output I/O pack
Controlled outputs	Up to 12 relays on the compatible terminal board
Relay technology	Electromagnetic or solid-state, according to terminal board
Network connectors	2 RJ45 I/O Ethernet ports
Terminal-board connector	DC-37
Load rating	Defined by the exact terminal board and output option
Diagnostics	Output feedback and terminal-board-specific feedback
Performance & Power	
Nominal pack supply	28 V DC
Environment	
Internal temperature monitoring	The processor board includes a sensor for the temperature inside the output pack.

Selected original manufacturer material follows on pages 3–6.

Compatibility & Selection Guide

System and software compatibility. GE documents TRLYH1B, H1C, H1D and H1F electromagnetic relay boards and TRLYH1E solid-state relay boards. The compatibility table lists simplex/TMR operation for the relevant TRLY arrangements and simplex for SRLYH1A/H1B. Match the exact board and control mode before replacement.

Wiring & Installation Reference

Connections and terminal board

ENET1 / ENET2 · I/O Ethernet · Connect only the required IONet paths

Three-pin power input · 28 V DC supply · Verify polarity and the pack rating

DC-37 connector · Compatible TRLY / SRLY · Align the mating connector without side force

Pack mounting and configuration

1. Confirm the assembly Check the terminal-board type and revision against the pack compatibility table.

2. Seat and secure the pack Align the connector and support studs; avoid forcing or bending the connector.

3. Verify configuration Apply the documented power and network sequence, then check identification, configuration and diagnostic indicators.

Installation precautions

Isolate the equipment before handling field wiring and follow the applicable GE site safety instructions.

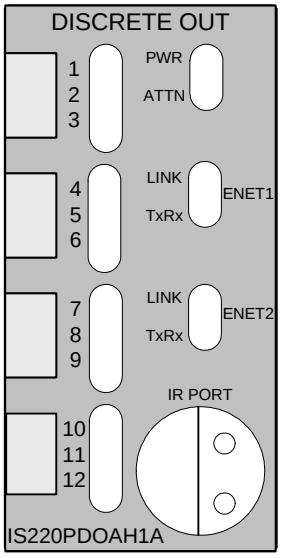
Terminal-board voltage, load and certification limits are board-specific; a similar connector does not establish compatibility.

View terminal diagram (PDF) — page 3 · View mounting instructions (PDF) — page 4

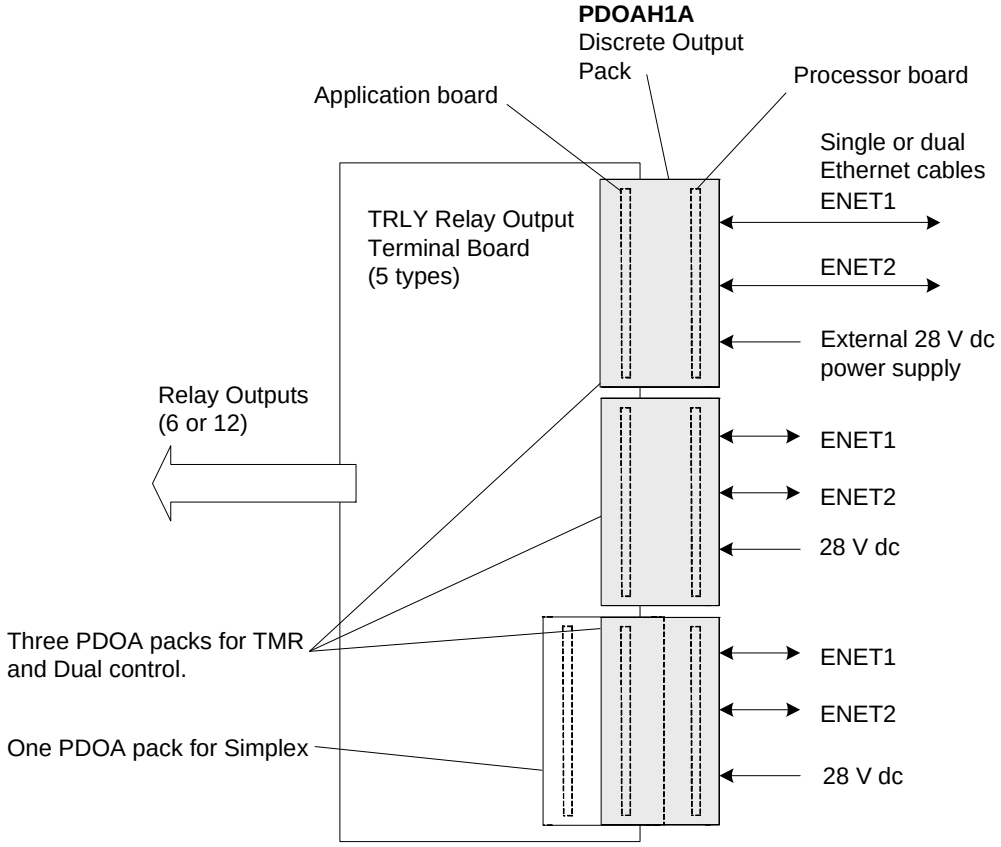
PDOA Discrete Output

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Functional Description



The Discrete Output (PDOA) pack provides the electrical interface between one or two I/O Ethernet networks and a discrete output terminal board. The pack contains a processor board common to all Mark* VIe distributed I/O packs and an acquisition board specific to the discrete output function. The pack is capable of controlling up to 12 relays and accepts terminal board specific feedback. Electromagnetic relays (with types TRLYH1B, C, D, and F terminal boards) and solid-state relays (with type TRLYH1E boards) are available. Input to the pack is through dual RJ45 Ethernet connectors and a three-pin power input. Output is through a DC-37 pin connector that connects directly with the associated terminal board connector. Visual diagnostics are provided through indicator LEDs, and local diagnostic serial communications are possible through an infrared port.



Compatibility

PDOAH1A is compatible with six types of discrete (relay) output terminal boards, including the TRLY boards and SRLY boards, but not the DIN-rail mounted DRLY boards. The following table gives details of the compatibility:

Terminal Board	TRLYH1B, H1C, H1D, H1E & H1F			DRLY	SRLYH1A & B
Control mode	Simplex -Yes	Dual-No	TMR -Yes	No	Simplex -Yes

Control mode refers to the number of I/O packs used in a signal path:

- Simplex uses one I/O pack with one or two network connections.
- Dual uses two I/O packs with one or two network connections.
- TMR uses three I/O packs with one network connection on each.

Installation

➢ **To install the PDOA pack**

1. Securely mount the desired terminal board.
2. Directly plug one PDOA I/O pack for simplex or three PDOA I/O packs for TMR into the terminal board connectors.
3. Mechanically secure the packs using the threaded studs adjacent to the Ethernet ports. The studs slide into a mounting bracket specific to the terminal board type. The bracket location should be adjusted such that there is no right-angle force applied to the DC37 connector between the pack and the terminal board. The adjustment should only be required once in the life of the product.
4. Plug in one or two Ethernet cables depending on the system configuration. The pack will operate over either port. If dual connections are used, the standard practice is to connect ENET1 to the network associated with the R controller.
5. Apply power to the pack by plugging in the connector on the side of the pack. It is not necessary to insert this connector with the power removed from the cable as the I/O pack has inherent soft-start capability that controls current inrush on power application.
6. Configure the I/O pack as necessary.

Note The PDOA mounts directly on a Mark VIe terminal board. Simplex terminal boards have a single DC-37 connector that receives the PDOA. TMR-capable terminal boards have four DC-37 connectors, one used for simplex operation and three used for TMR operation. PDOA directly supports all of these connections.

Operation

Processor

The processor board in the pack is common to all Mark VIe Ethernet I/O packs. It contains the following:

- High-speed processor with RAM and flash memory
- Two fully independent 10/100 Ethernet ports with connectors
- Hardware watchdog timer and reset circuit
- Internal I/O pack temperature sensor
- Infrared serial communications port
- Status-indication LEDs
- Electronic ID and the ability to read IDs on other boards
- Substantial programmable logic supporting the acquisition board
- Input power connector with soft start/current limiter
- Local power supplies, including sequencing and monitoring

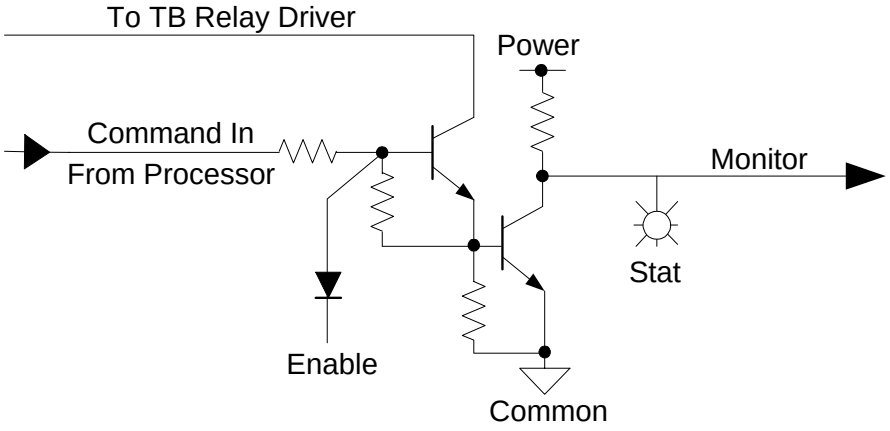
The processor board connects to an acquisition board specific to the I/O pack function. Upon application of input power, the soft-start circuit ramps up the voltage available on the processor board. The local power supplies are sequenced on, and the processor reset is removed. The processor completes self-test routines and then loads application code specific to the I/O pack type from flash memory. The application code reads board ID information to ensure the correct matching of application code, acquisition board, and terminal board. With a good match, the processor attempts to establish Ethernet communications, starting with request of a network address. The address request uses the industry standard dynamic host configuration protocol (DHCP) and the unique identification read from the terminal board. After Ethernet initialization, the processor programs the on-board logic, runs the application, and enables the acquisition board to begin operation.

The processor application code contains all the logic necessary to allow the pack to operate from one or two Ethernet inputs. When operated from two Ethernet inputs, both network paths are active all the time. A failure of either network will not result in any disturbance to the I/O pack operation, and the failure will be indicated through the working network connection. This arrangement is more tolerant of faults than a classic hot-backup system where the second port is only used after a primary port failure is detected. The Ethernet ports on the processor auto-negotiate between 10 MB/s and 100 MB/s speed, and between half-duplex and full-duplex operation.

An industry-standard infrared serial communications port is provided on the processor board. Accessible through the pack front, this port provides diagnostic information on the pack status and an ability to program the pack when both Ethernet connections fail. It is possible to communicate with this port using most notebook computers and most hand-held Personal Digital Assistants (PDA).

Relay Command Signals

The PDOA relay command signals are the first stage of signal conditioning and level shifting to interface the terminal board outputs to the control logic. Each output is an open collector transistor circuit with a current monitor to sense when the output is picked up and connected to a load. The status LEDs and monitor outputs indicate when an output is picked up and connected to the terminal board. If an output is picked up and the correct load is not sensed, the status LED will be off and the monitor line will be false.



Relay Command Signals

Output Enable

All of the outputs are disabled during power application until a variety of internal self-tests are completed. An enable line reflects the status of all required conditions for operation. This function provides a path independent of the command to ensure relays stay dropped-out during power-up and initialization.

Monitor Inputs/Control

There are 15 inverting level shifting monitor input circuits. On a typical TRLY terminal board 12 of these circuits are used as relay contact feedbacks and the other three are used for fuse status. An inverting level shifting line is also provided from the control to the terminal board for status feedback multiplexing control allowing the pack to receive two sets of 15 signals from a terminal board.

ID Line

The processor board and acquisition board within the I/O pack contain electronic ID parts that are read during power initialization. A similar part located with each terminal board DC-37 pin connector allows the processor to confirm correct matching of I/O pack to terminal board and report board revision status to the system level control.

Power Management

The I/O pack includes power management in the 28 V input circuit. The management function provides soft start to control current inrush during power application. After applying power, the circuit provides a fast current limit function to prevent a pack or terminal board failure from propagating back onto the 28 V power system. When power is present and working properly, the green PWR indicator will light. If the current limit function operates, the indicator will be out until the problem is cleared.