GE IS220PDIAH1A

24-Channel Discrete Input I/O Pack

GE IS220PDIAH1A is a Mark VIe discrete input I/O pack for bringing field contact states into the controller's I/O Ethernet network. It accepts up to 24 contact inputs together with terminal-board feedback, giving the control application access to discrete equipment conditions through the matched input assembly. The selected terminal board determines the supported contact-voltage arrangement or isolated voltage-sensing option. Dual Ethernet connectors support the configured network connection, and local indicators help distinguish input states, network activity and diagnostic conditions when identifying or maintaining this input pack.



Technical Specifications

Product Identity	
Control system	GE Mark VIe
Functional Configuration	
Product function	Discrete contact input I/O pack
Network connectors	2 RJ45 I/O Ethernet ports
Terminal-board connector	DC-37
Input isolation	Optically isolated from logic; not channel-to-channel
Diagnostics	Input-state LEDs and pack diagnostics
Performance & Power	
Input capacity	Up to 24 contact inputs
Nominal pack supply	28 V DC
Wetting voltage	Determined by compatible terminal-board type
Environment	
Internal temperature monitoring	An internal sensor on the processor board monitors the I/O pack temperature.

Selected original manufacturer material follows on pages 3–6.

Compatibility & Selection Guide

System and software compatibility. The associated TBCI terminal-board type determines the contact wetting-voltage arrangement. GE also documents TICI voltage-sensing applications. Control-mode support depends on the selected terminal board: the listed TBCI and TICI combinations support simplex, dual or TMR, whereas STCIH1A is simplex.

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 TBCI / TICI / STCI · 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.

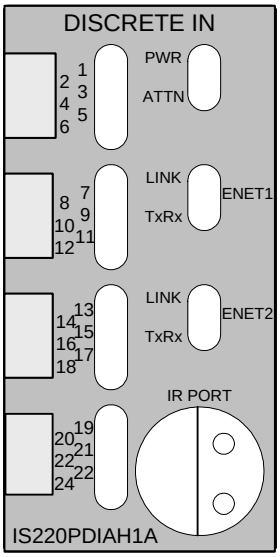
Terminal-board voltage, load and certification limits are board-specific; a similar connector does not establish compatibility.

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

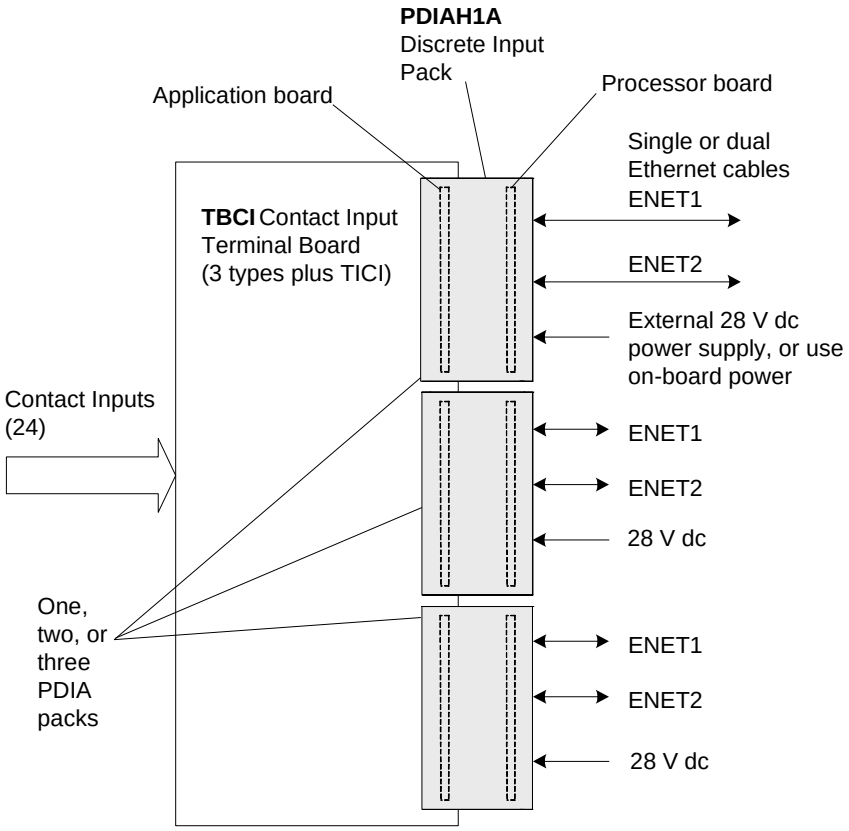
PDIA Discrete Input

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Functional Description



The Discrete Input (PDIA) pack provides the electrical interface between one or two I/O Ethernet networks and a discrete input 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 input function. The pack accepts up to 24 contact inputs and terminal board specific feedback signals, PDIA accepts three different voltage levels (with types TBCIH1, H2 and H3 terminal boards). Connections for the isolated discrete input board with voltage sensing (with type TICI board) are available. System input to the pack is through dual RJ45 Ethernet connectors and a three-pin power input. Discrete signal input 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

PDIAH1A is compatible with five types of discrete contact input terminal boards, including the TBCI boards, TICI boards, STCI boards, but not the DIN-rail mounted DTCI board. The following table gives details of the compatibility:

Terminal Board	TBCIH1, H2, H3 & TICI			DTCI	STCIH1A
Control mode	Simplex-yes	Dual - yes	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 PDIA pack**

1. Securely mount the desired terminal board.
2. Directly plug one PDIA I/O pack for simplex or three PDIA 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 DC-37 pin 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 PDIA mounts directly on a Mark VIe terminal board. Simplex terminal boards have a single DC-37 pin connector that receives the PDIA. TMR-capable terminal boards have three DC-37 pin connectors, one used for simplex operation, two for dual operation, and three for TMR operation. PDIA 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

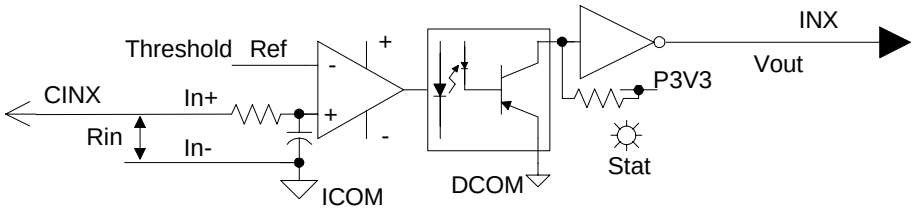
The processor board connects to an acquisition board specific to the I/O pack function. Upon application of input power, the soft-start circuit ramps up the voltage available on the processor board. The local power supplies are sequenced on, and the processor reset is removed. The processor completes 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).

Input Signals

The discrete input acquisition board provides the second stage of signal conditioning and level shifting to interface the terminal board inputs to the control logic. Initial signal conditioning is provided on the terminal board. The discrete input acquisition input circuit is a comparator with a variable threshold. Each input is isolated from the control logic through an opto-coupler and an isolated power supply. The inputs are not isolated from each other. Each of the twenty-four inputs has filtering, hysteresis, and a yellow status LED, that indicates when an input is picked up. The LED will be OFF when the input is dropped-out.



Variable Threshold

The input threshold is derived from the contact wetting voltage input terminal. In most applications this voltage is scaled to provide a 50% input threshold. This threshold is clamped to 13% to prevent an indeterminate state if the contact wetting voltage drops to zero. If the contact wetting voltage drops below 40% of the nominal voltage, the under-voltage detector annunciates this condition to the control. A special test mode is provided to force the inputs from the control pack. Every four seconds, the threshold is pulsed high and then low and the response of the opto-couplers is checked. Non-responding inputs are alarmed.

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.