

RIO

RIO 84 INSTALLATION

The Pharos RIO (Remote Input Output Device) is an ancillary device that provides additional input and output interfaces to a system. As such, it cannot be used on its own but must have at least one Pharos controller present on an Ethernet network to function. The unit is designed to be permanently installed in a central control room/cupboard or DIN consumer unit for remote deployment.

The unit is 100% solid state and has been qualified to operate in a dry environment:

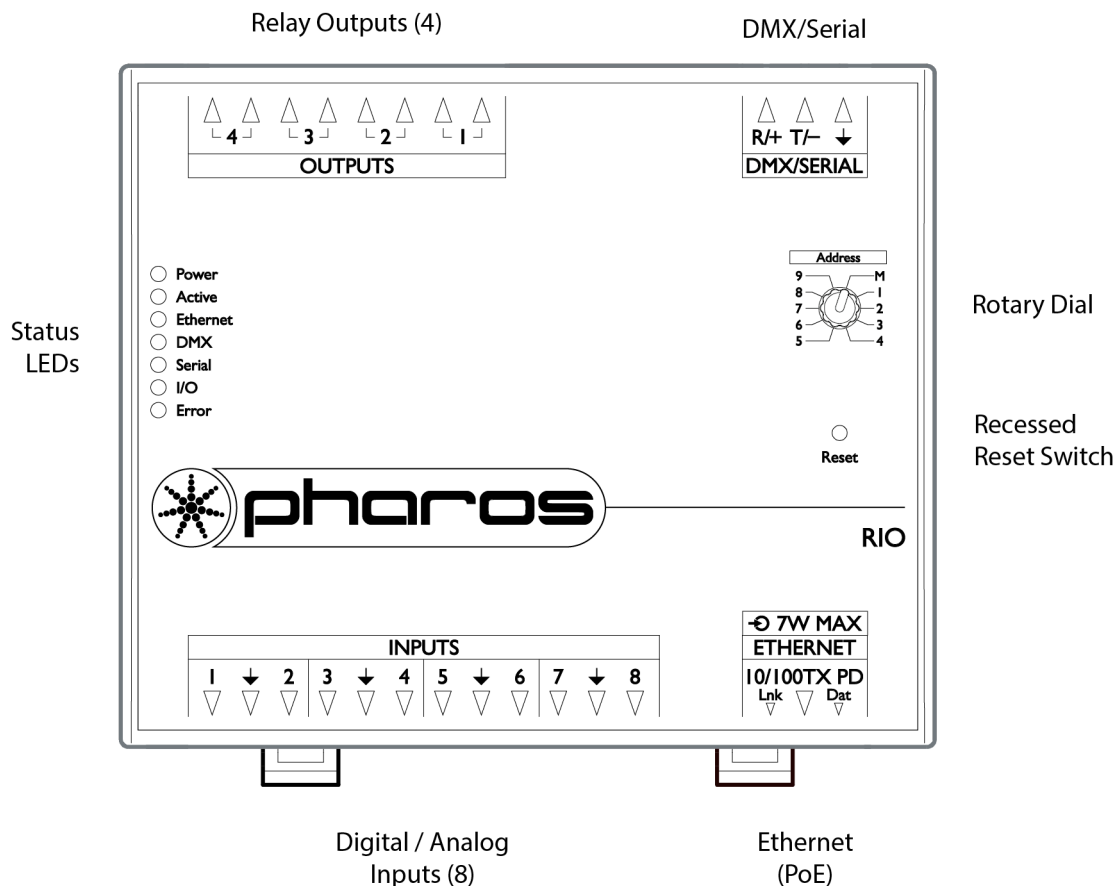
- Temperature range 0°C to 50°C (32°F to 122°F)
- Humidity 10-90% relative, non-condensing
- Ingress IP40

Sealed IP65 rated consumer units are available for outdoor use, please consult your Pharos distributor or representative.

NOTE: This equipment is not suitable for use in locations where children are likely to be present.

RIO LAYOUT

The following drawing illustrates the layout of the device, refer to the following sections for details:



POWER SUPPLY

The RIO is shipped without an external power supply.

- Power-over-Ethernet (PoE)

A standard (802.3af) Power-over-Ethernet switch should be used to provide both power and a network connection to the RIO using a single cable.

Alternatively, if a PoE switch is not available, a compliant PoE midspan injector could be used.

The RIO operates as a PoE Class 2 device (7W max).

STATUS LEDS

The red LEDs on the top of the RIO indicate the unit's status:

Power:	Indicates that power has been applied.
Active:	Indicates that the unit is functional.
Ethernet:	Indicates Pharos related network activity (not network link, see Ethernet port later).
DMX	Indicates that DMX512 data is being output from the DMX/Serial port if configured for DMX.
Serial	Indicates RS232 or RS485 activity on the DMX/Serial port, if configured for Serial.
I/O	Indicates digital, analog, contact closure or relay activity on the Input/Output ports.
Error:	Flashes to indicate an error condition.

ERROR CODES

Additionally, the red status LEDs are used to indicate any boot failures of the RIO that prevent the unit from operating. Error codes are displayed by a repeating pattern of flashing LEDs a number of times in succession, followed by a 1 second pause:

- 1 flash: Invalid firmware version (reset to factory default required).
- 2 flashes: Invalid device type or serial number.

The second error code indicates a hardware error; please consult your distributor, representative, or Pharos Support for assistance.

ADDRESS WHEEL

Multiple RIOs may be used on a single network. Each RIO is uniquely identified by its address setting. Address settings '1' to '9' directly set the RIO's address to the corresponding number. Up to 9 RIOs may be addressed in this way. For systems with more than 9 RIOs, the manual ('M') setting should be used to allow identification using the RIO's serial number rather than the address.

RESET SWITCH

RIO may be reset by inserting a small blunt object into the reset hole on the front of the unit to depress the reset switch. Press to reboot; long hold for factory reset.

NOTE: The reset must not be operated during bootloader/firmware updates to the RIO as corruption of the software may occur, perhaps even rendering the unit inoperable.

WATCHDOG

An internal "watchdog" will automatically reset the RIO in case of a software crash as a result of either a coding error ("bug") or a random electromagnetic event such as a power brown-out or spike, nearby lightning strike or static discharge.

PORTS

- Ethernet (PoE)

A standard 100TX Ethernet connection must be made to RIO. The LEDs on the RJ45 jack itself are useful for debugging the Ethernet installation:

- The Lnk LED will illuminate when an Ethernet link has been established.
- The Dat LED will illuminate to indicate Ethernet traffic (not just Pharos-relevant).

- Digital/Analog Inputs

The RIO features 8 digital/analog inputs on four 3-way connectors. To connect an input signal to the RIO, one connection should be made to the desired input pin, marked '1' to '8', and the other should be made to the adjacent common pin. All common pins are internally connected. The RIO inputs can be individually configured to operate in one of three modes:

Contact closure: An external volt-free switch may be connected between the input pin and the signal ground pin.

In this mode, the input pin is internally pulled-up to 5V via a 2.2Kohm resistor, so the switch only needs to be rated at 5V, 2.5mA or greater.

Digital input: An external voltage source (such as a 12VDC trigger output) may be connected between the input pin and the signal ground pin.

In this mode, the input pin is internally pulled down to 0V via a 2Mohm resistor and the maximum input voltage supported is 24VDC.

The input may be configured using Pharos commissioning software to specify what the 'high' and 'low' threshold voltages are. This facility can be used to provide 'Schmitt trigger' action.

Analog input: An external voltage source (such as a 0-10VDC analog signal) may be connected between the input pin and the signal ground pin.

In this mode, the input pin is internally pulled down to 0V via a 2Mohm resistor and the maximum input voltage supported is 24VDC.

The input may be configured using Pharos commissioning software to specify what the input voltage range is. Voltages inside this range are reported as 0% to 100%.

In all modes, the maximum rated input voltage is 24VDC. The inputs should never be driven with a higher voltage nor negative voltage or damage may occur.

- Relay Outputs

The RIO features 4 relay outputs on one 8-way connector.

The RIO relays are rated at 48V (AC or DC), 250mA. This comparatively low rating is due to the use of solid-state relays to ensure silent operation and long-term reliability.

All relay outputs are fully isolated from each other (1kV) and all other ports.

NOTE: An external power supply is required to power the relay outputs. An external PSU can be used to power one or more relay outputs.

- DMX / Serial Port

The serial port's protocol (RS232 or RS485), data rate and format settings (baud, parity, stop bits, etc.) are configured using Pharos commissioning software. The port can alternately be configured to output 512 channels of DMX512 control data (RDM is not supported).

In RS232 mode, the port operates in full duplex with the following pinout:

R/+ Receive

T/- Transmit

⏏ Signal ground

In RS485 & DMX modes, the port operates in half duplex with the following pinout:

R/+ Data +

T/- Data -

⏏ Signal Ground

To make up a cable to a 5 pin XLR the following connections should be made:

LPC: 5 pin XLR:

Data + + 3

Data - - 2

Shield ⏏ 1

DMX & RIO GUIDELINES

RIO is compatible with the DMX512, DMX512(1990), DMX512-A standards and care should be taken to ensure that your cabling, wiring topology and termination also complies with these standards.

Such compliance is beyond the scope of this document, but a good resource is "Recommended Practice in DMX 512" by Adam Bennette which is available through PLASA and USITT.

NOTE: Ports and third-party equipment can be damaged when plugging or unplugging an energised system (hot-plugging). It is therefore advisable to remove power before making or breaking port connections.