

IQ5-IO I/O Modules



Description

The IQ[®]5-IO range of I/O modules are designed for use with the IQ5 controller, to provide input and output channel connection points.

A comprehensive choice of I/O types is available including universal inputs/outputs (UIO), digital inputs (DI) and digital/relay outputs (DO). There are two 'hand-off-auto' variants (8DO-HOA and 8UIO-HOA) offering manual override of module inputs and outputs. All modules are also available with BLE connectivity, enabling wireless configuration by the XXXX app.

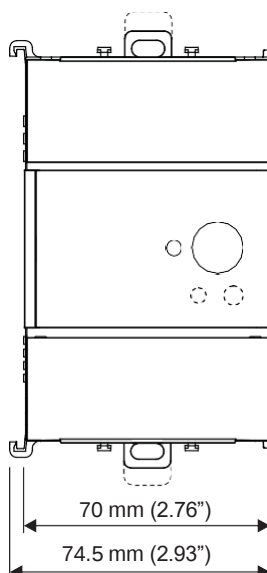
Integral I/O bus connectors allow easy and convenient 'side-by-side' module installation or, by using wiring adapters, modules can be installed up to 300 metres apart.

Features

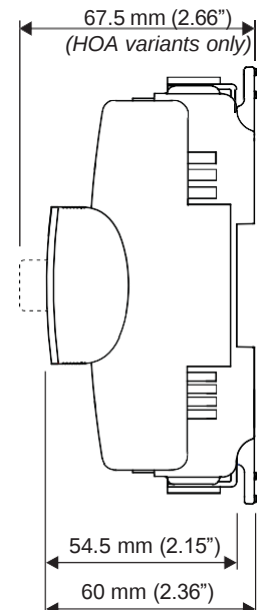
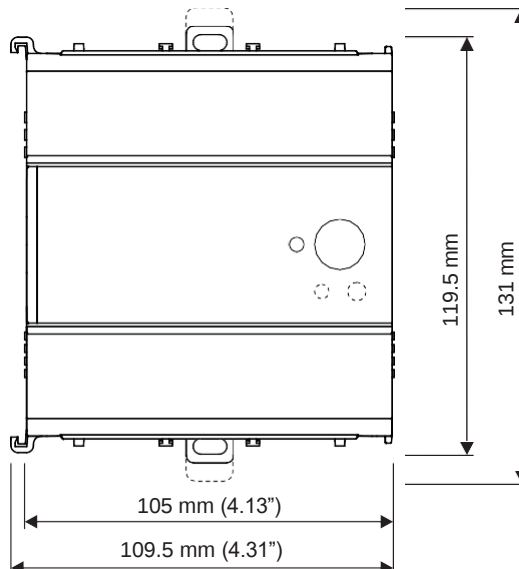
- Secure T1L high-speed IO bus connection to controller
- Universal input/output, digital input, digital output variants
- Hand-off-auto option (on 8DO-HOA and 8UIO-HOA)
- Up to 300 I/O channels per controller (subject to licence)
- Up to 300 metres (1000 ft) between cable connected modules
- Powered from controller or external PSU
- Two part I/O connectors for easy installation/commissioning
- Side-by-side or remote connection options
- DIN rail mounting, DIN 19 size 2 standard enclosure
- Wireless configuration of BLE variants using XXXX app

Physical

8UIO, 4UIO, 8DI, 4DO



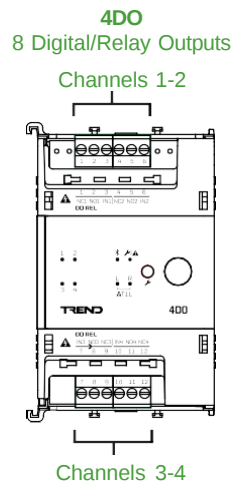
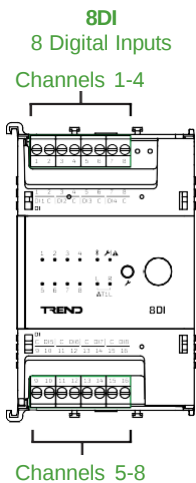
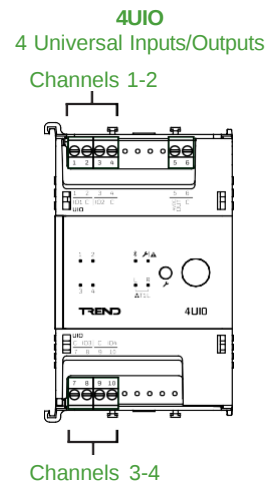
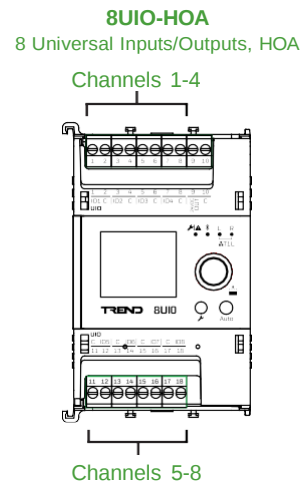
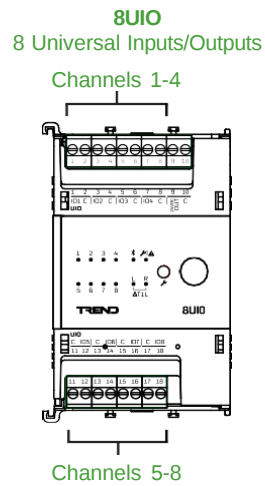
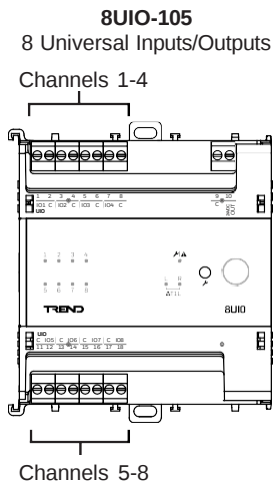
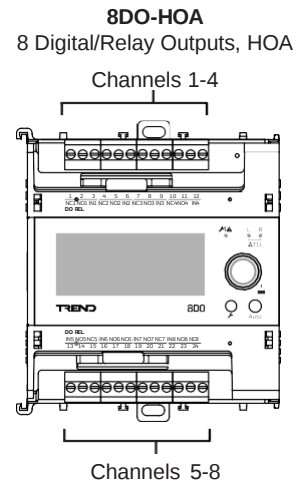
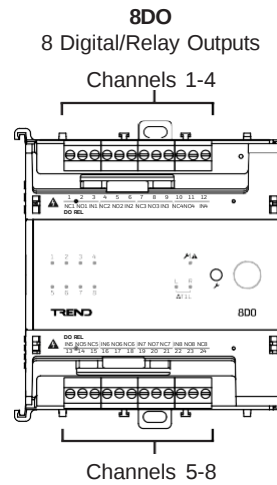
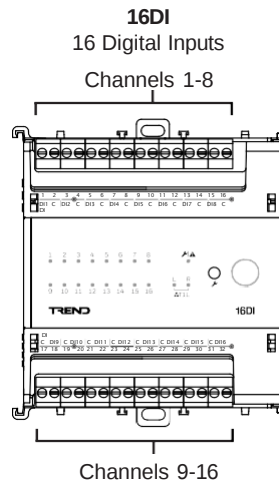
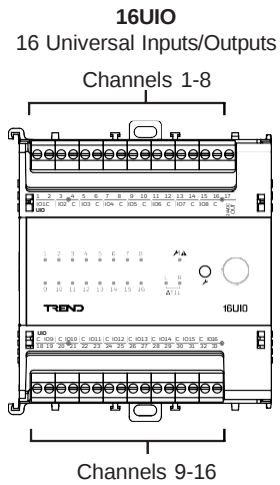
16UIO, 8UIO-105, 16DI, 8DO



FUNCTIONALITY

HARDWARE

The range of IQ5-IO Modules comprises the following variants:



Note: All modules are shown with the terminal covers removed.
BLE variants have an additional indicator (see page 7).

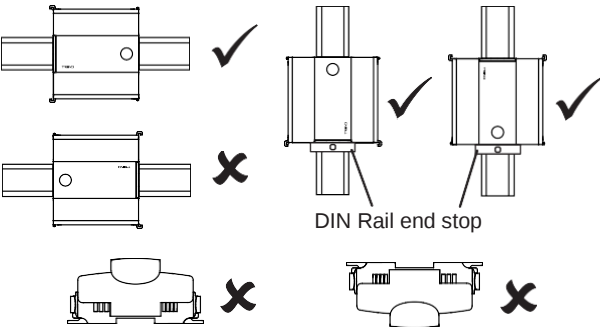
Enclosure

Each IQ5-IO Module is housed in a polycarbonate enclosure compatible with the DIN43880 and DIN 19 size 2 standard and with a complimentary styling to the IQ5 controller. **The modules come in one of two widths – 70 mm or 105 mm – depending on the variant.**

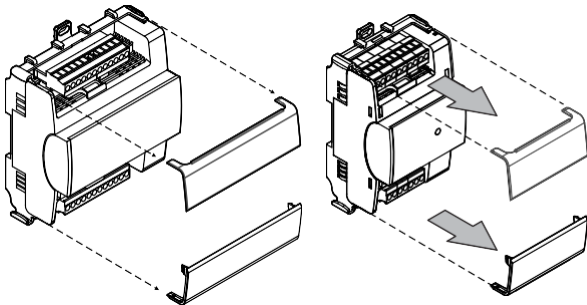
Integral clips on the back of the case enable the unit to be clipped on to (and quickly released from) a standard TS35 DIN rail.

IQ5-IO Modules must be installed in a secondary enclosure with a minimum protective rating of IP20 (or equivalent) or mounted outside normal reach (e.g. in a plenum).

A module may be mounted horizontally or vertically but not upside down or on its back:



Removable clip-on polycarbonate covers provide access to the various onboard terminal connections.



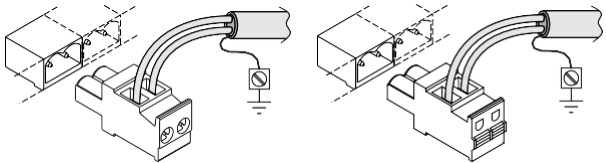
Spare covers are available (see 'Order Codes' on page 14)

Terminal Connectors

Connections for the various I/O channels are via two-part plugable screw terminal connectors which are supplied as standard with the modules and available in packs for spares. Optional connectors with push-fit terminals are also available (see 'Order Codes' on page 14).

Screw terminal plug

Push-fit terminal plug

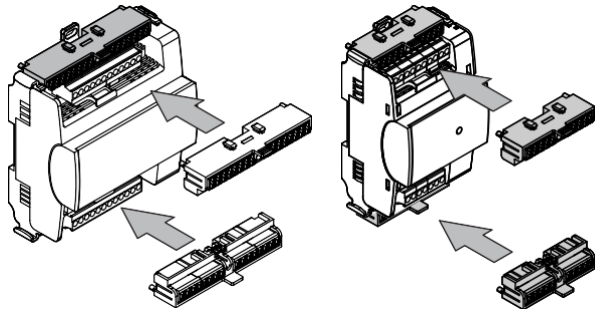


Function	Connector Type
Universal Input/Output (UIO)	2-way*
Digital Input (DI)	2-way
Digital/Relay Output (DO)	3-way

*On the 16UIO, input IO8 uses a 3-way connector with the extra terminal providing a connection to the 24 Vdc supply output.

Auxiliary Terminal Block

Optional terminal blocks are available that can be clipped on to an IO module to provide additional common terminals. These can be used (for example) to provide multiple 24 Vdc connections from the single 24 Vdc terminal on UIO type modules, or to provide ground/earth connections for cable screens.



The AUX-TRM-16 has 16 push-fit terminals, configured as two common groups of 8 and suitable for all 105mm wide modules. **The AUX-TRM-10 has 10 push-fit terminals, configured as two common groups of 5 and suitable for all 70mm wide modules. Both blocks can carry a maximum load of 12 A.**

If more terminals are needed the connectors can be 'double-stacked'.

Input/Output Channels

The following types of input and output channel are supported:

- Universal Input/Output (UIO)
- Digital Inputs (DI)
- Digital/Relay Output (DO)

Cable Screening

The use of screened cable for input and/or output connections is optional and not generally required unless the cable passes through electrically noisy environments.

If screened cable is used the screen must be connected to the local panel/enclosure ground and left unterminated at the far end.

Universal Input/Output (UIO)

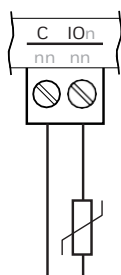
These channels will function in one of the following modes:

- thermistor input,
- voltage input,
- digital input,
- current input, or
- analogue output.

The input/output mode of each channel is set by the strategy configuration in the controller.

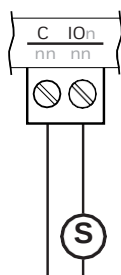
Thermistor input: Used for a thermistor (e.g. NTC (2K, 3K, 10K, 20K), PT100, PT1000, NI1000), potentiometer (0 to 300 k Ω) or fan speed control. The thermistor bridge resistor is 12 k Ω with a bridge supply 3.3 V.

Example wiring



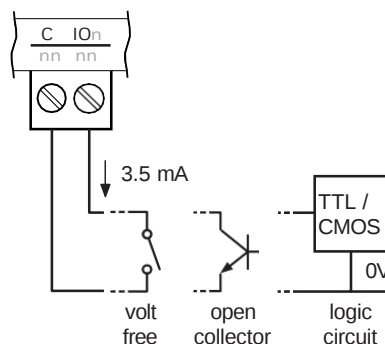
Voltage input: Used with a 0 to 10 Vdc or 2 to 10 Vdc source.

Example wiring



Digital input: Used for a volt free contact, logic circuit (e.g. TTL, CMOS), open collector (transistor), open drain (FET) or external voltage.

Example wiring



	volt-free input	external voltage
Input Inactive (OFF)	$\geq 3 \text{ k}\Omega$	$\geq 4 \text{ Vdc}$ (max 40V)
Input Active (ON)	$\leq 500 \Omega$	$\leq 2 \text{ Vdc}$ (min 0V)

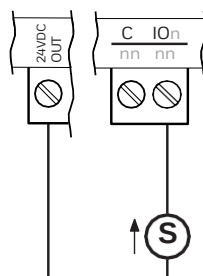
The input has a nominal wetting current of 3.5 mA.

Note: Voltage levels or resistances outside the values above may cause indeterminate operation.

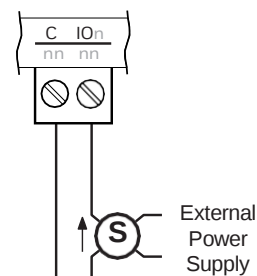
The input can be configured for pulse count operation (maximum 100 Hz with 50% / 50% duty cycle, 5 ms ON / 5 ms OFF).

Current input: Used for 0 to 20 mA or 4 to 20 mA sources. May be either loop powered (from onboard 24VDC OUT terminal) or externally powered.

Example wiring - loop



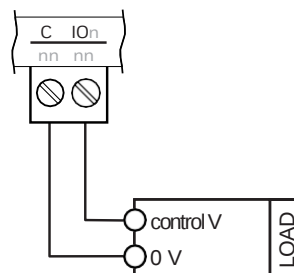
Example wiring - external



Note: The 24VDC OUT terminal can source up to 75 mA.

Analogue output: Provides a variable voltage output (0 to 10 Vdc, 1 to 10 Vdc or 2 to 10 Vdc).

Example wiring

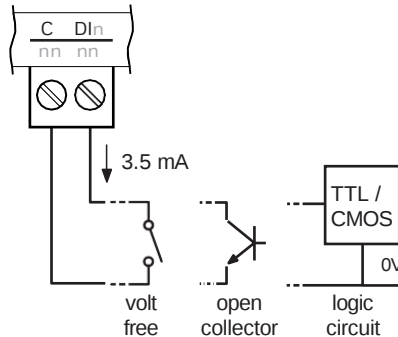


Digital Input (DI)

These channels are compatible with the following input devices:

- volt free contact (e.g. switch or relay),
- logic circuit (e.g. TTL, CMOS),
- open collector (transistor) or open drain (FET),
- external voltage.

Example wiring



	volt-free input	external voltage
Input Inactive (OFF)	$\geq 3 \text{ k}\Omega$	$\geq 4 \text{ Vdc (max 40V)}$
Input Active (ON)	$\leq 500 \Omega$	$\leq 2 \text{ Vdc (min 0V)}$

The input has a nominal wetting current of 3.5 mA.

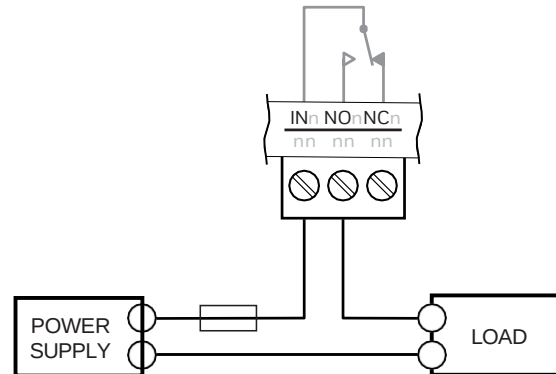
Note: Voltage levels or resistances outside the values above may cause indeterminate operation.

The input can be configured for pulse count operation (maximum 100 Hz with 50% / 50% duty cycle, 5 ms ON / 5 ms OFF).

Digital/Relay Output (DO)

These channels provide a single pole dry contact changeover relay.

Example wiring

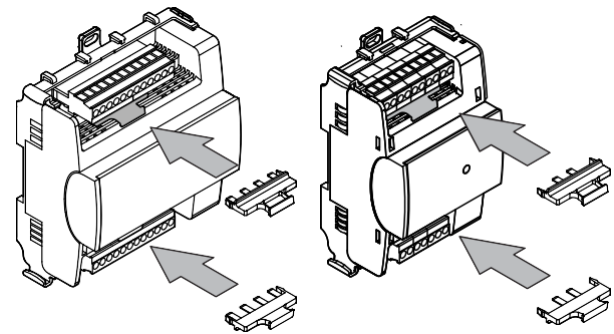


Ensure that external circuits are suitably protected against fault currents that would exceed the ratings for the switching circuits provided in this product.

The relay contacts close (i.e. NO makes with IN) when the output channel is ON.

Note: The relay on channel 5 on the 8DO and 8DO/HOA has a higher contact rating than the other channels. All relays on the 4DO-G variant have gold plated contacts suitable for switching low voltage/current. See 'Digital/Relay Outputs (DO)' on page 11 for further details.

An optional jumper can be inserted adjacent to the connectors which will link the IN terminals. The IO-JUMPER-4 can be used on the 8DO modules, enabling a common supply to be used on channels 1 to 4 or 5 to 8. The IO-JUMPER-2 can be used on the 4DO modules, enabling a common supply to be used on channels 1 and 2 or 3 and 4:



Jumpers are supplied with the modules and are also available as spares.

Note: If required, pins can be removed from the 4-way jumper to prevent a certain channel from being linked. For example, remove the pin from channel 4 position to only have channels 1, 2 and 3 linked.

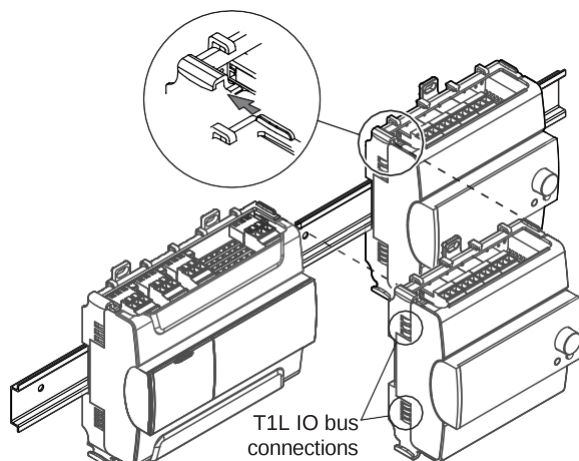
Caution: Mains and low voltage must not be mixed within relay block 1 (ch.1-4 on 8DO, ch.1-2 on 4DO) or relay block 2 (ch.5-8 on 8DO, ch.3-4 on 4DO). If both mains and low voltages are to be switched, connect mains to block 1 and low voltage to block 2, or vice versa. If switching mains, all relays must switch the same phase and polarity. Arc suppression circuit (RC) recommended for inductive loads (see TG200208). UL rating applies up to 240 Vac (120 VA) maximum.

T1L IO Bus

IQ5-IO modules interconnect with each other and the IQ5 controller via the T1L IO bus, which comprises the following power and signal connections:

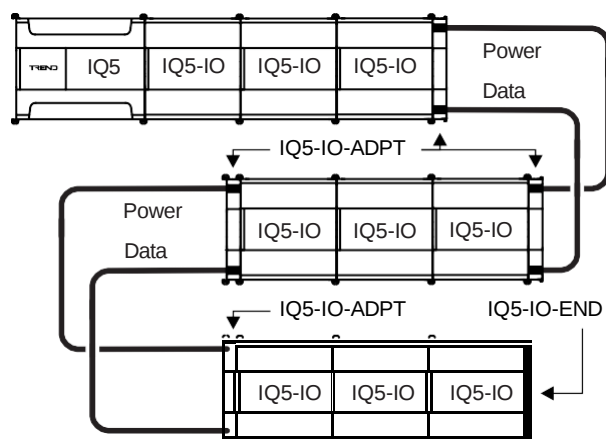
- 24 Vac (50/60Hz) or 24 Vdc
- 0 V
- Ground
- Data Hi
- Data Lo
- Screen

Modules can be slotted together, adjacent to the controller (or other I/O modules) with inter-module connections being made via integral spring connectors.



Note: Modules can easily be removed without disturbing adjacent modules.

Modules can also be mounted remotely from the controller (or from neighbouring I/O modules) and connected to the I/O bus by using IQ5-IO-ADPT wiring adapters and suitable cable.



Note: The IQ5-IO-ADPT wiring adapter includes a self-resetting fuse and transient voltage suppression that protects the I/O bus from over-current and over-voltage conditions caused by electrical transients or incorrect wiring. No protection is provided against accidental connection of mains voltages.

Cabling between modules on the I/O bus may be wired from right to left side, right to right or left to left, as long as correct bus polarity is maintained. Spurs are not permitted.

A cover plate (IQ5-IO-END) must be fitted to the last module on the bus, to protect the exposed bus connectors.

Note: A cover is supplied with each IQ5 controller which can be used for this purpose. A pack of spare covers is also available.

Maximum T1L I/O Bus Length

It is recommended that the maximum distance between I/O modules is *300 meters so that communication between the controller and the I/O modules will be maintained even if two sequential I/O modules lose power. If more than 2 sequential modules lose power, the communication between the controller and I/O modules downstream of the offline I/O modules may be compromised.

Maximum Number of Modules

Up to 64 modules can be connected to the I/O bus. The maximum number of I/O channels is subject to the number of points licenced on the controller.

Module Power Supply

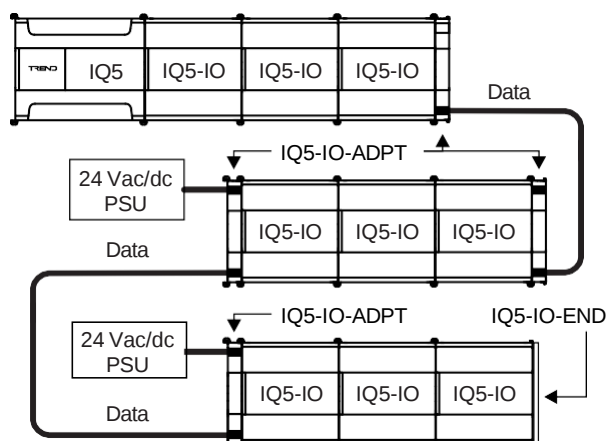
I/O modules can typically be powered from the controller via the I/O bus supply. This bus supply is derived from the controller's 24 Vac/dc supply and, therefore, the maximum current available to the I/O bus depends upon other current demands placed on the controller.

The maximum current required by each type of I/O module is listed in the table below – these values can be used to estimate the total current required by the I/O bus:

Module	Device Status	Current (Max)		Power (Max)	
		24 Vac (mA)	24 Vdc (mA)	24 Vac (VA)	24 Vdc (W)
16UIO	All channels set to AO 20 mA	1000	500	24	12
8UIO-105		708	333	17	8
8UIO-8UIO-HOA		800	400	19	8
4UIO		700	350	18	7
16DI	All inputs ON	375	146	9	3.5
8DI		180	70	5	2
8DO	All relays ON	333	125	8	3
8DO-HOA		190	80	4.4	1.7

Where the total current requirement of the I/O bus exceeds the maximum available from the controller, one or more additional 24 Vac/dc power supplies may be installed. Additional supplies may also be required in the following circumstances:

- at the end of a long I/O bus cable run, to prevent voltage drop on the bus supply (minimum 19V supply required),
- where the current flow through the power line of any one module would exceed the maximum of 2 A, thus requiring the I/O bus power line to be split or segmented.



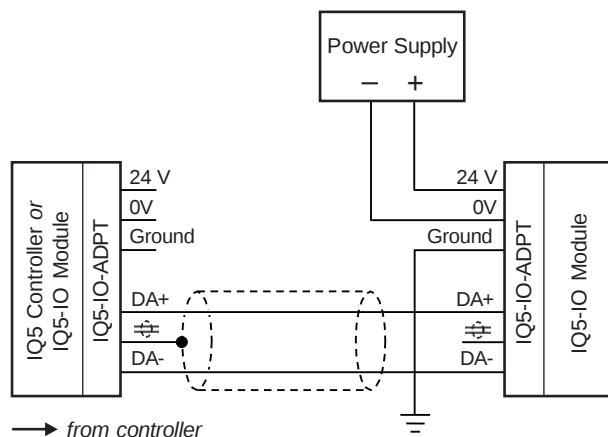
Additional Power Supplies

Important: Not permitted for UL compliant installations.

Where it is necessary to install an additional power supply along the I/O bus, the supply output must be isolated from earth (ground). The supply unit must also comply with the relevant EMC and safety standards.

Note: Trend offer a range of DIN rail mounted auxiliary power supplies that are suitable for this purpose.

The I/O wiring adapter (IQ5-IO-ADPT) is used to make the connection of external power supply units to the I/O bus as shown below:



Important: The 24 Vdc connection from the previous module must **not** be made. The 0 V connection must be made when an external supply is used and the 0 V line must be continuous for the entire length of the I/O bus.

Earthing/Grounding Arrangements

It is important that correct earthing/grounding is provided for the controller and modules on the I/O bus.

The I/O bus ground is connected to earth/ground via the controller. Modules located within the same secondary enclosure are earthed/grounded via the I/O bus ground connection.

Where modules are located in different secondary enclosures or where I/O bus cables exceed 1 m (39"), a local earth/ground connection must be provided. For further details refer to the IQ5-IO Modules Installation Instructions - Mounting (TG201484).

All DIN rails must be earthed/grounded.

I/O Module Addressing

Each module on the I/O bus must be assigned a unique address between 1 and 284.

Note: If a mix of IQ5-IO and IQ3/4 modules is used, it is recommended that the IQ5-IO use address range 31 to 284, with 1 to 30 being reserved for IQ3/4 modules.

The controller will automatically attempt to match each physical I/O module with its corresponding strategy I/O module and set its address accordingly.

Module addresses can be configured within the controller strategy, or manually changed using IQ*SET or the controller's web page interface. Refer to the IQ5 Configuration Manual (TE201486) for further details on addressing.

Indicators

Various indicators are provided to give user feedback on the operational status of the module and its inputs/outputs.

General Indicators (all variants):

Indicator	Colour	Function
	Green Amber Red	Device status. Green indicates normal operation. Amber or Red indicates an issue that needs resolving.
	Green Yellow	Service status. Normally OFF.
	??	BLE connectivity status. (only applicable to 'B' variants)
	Green Red	Status of the T1L I/O bus connected to the left (L) or right (R) side of the module.

Input/Output Indicators (depending on module type):

Indicator	Colour	Function
1 - 16 (16UIO) 1 - 8 (8UIO) 1 - 4 (4UIO)	Green	State of associated universal input/output: unlit = OFF, fully lit = ON.
1 - 16 (16DI) 1 - 8 (8DI)	Green	State of associated digital input: unlit = OFF, lit = ON.
1 - 8 (8DO) 1 - 4 (4DO)	Green	State of associated digital output: unlit = OFF (IN connected to NC), lit = ON (IN connected to NO).

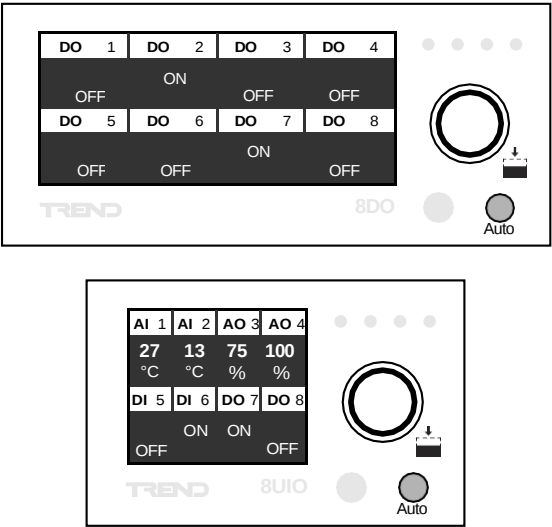
Service Button

This is a multi-function button located on the front of the module and can be used to:

- assign an unaddressed module to a strategy module (or next available bus address if a strategy module does not exist),
- display the module's address by flashing the I/O bus indicator,
- pair a BLE variant module with the XXXX app, or
- perform a module reset.

Hand-Off-Auto (HOA) Control

The 8DO-HOA and 8UIO-HOA modules have a rotary/push-button control which allows the normal channel operation (Auto Mode) to be manually overridden. A back-lit LCD screen shows the current state of each channel.



Note: The language used for the display text can be changed.

While in Manual Mode, the rotary control can be used to select a particular channel and change/override its current state.

Pressing the **Auto** button returns channels to Auto Mode (short press for selected output, long press for all channels). In Auto Mode the output channels behave as follows:

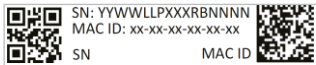
Connected to Controller?	Strategy Defined?	DO Output	AO Output
Yes	Yes	set by strategy	set by strategy
Yes	No	OFF	0%
No	—	OFF	0%

Important: All outputs on a new (factory-set) module will power up in Auto Mode. The outputs of a previously used module will power up in whichever mode was selected when the module was powered down.

Warning: Manual operation of the HOA module does not provide a safe environment for working on electrical equipment, and must not be used as a substitute for appropriate lockout-tagout procedures during maintenance operations.

Labelling

Two removable self-adhesive labels detailing the module's serial number (SN) and its T1L MAC address (MAC ID) are supplied which can be adhered to plant room panels, cabinets or schematic plans as required:



The serial number is also provided as a QR code, and the MAC ID is provided as a Data Matrix (2D barcode) such that both can be read using a suitable hand-held scanner.

A non-removable label containing both of these codes is fixed to the front panel of the module.

BLE CONNECTIVITY

All 'B' variant modules in the IQ5-IO range have BLE (Bluetooth Low Energy) connectivity, enabling module configuration using the XXXX app.

More information needed !!!!

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FIRMWARE

The firmware in each IQ5-IO Modules controls its basic functionality.

New versions of firmware may be made available from time to time to change or add functionality or to provide support for new products.

New firmware will be installed as part of an upgrade to the IQ5 controller. Once the controller has been upgraded it will automatically update the firmware of any attached I/O modules using the T1L IO bus.

FIELD MAINTENANCE

The IQ5-IO Modules require no routine maintenance.



WARNING: Contains no serviceable parts. Do not attempt to open the unit. Failure to comply may cause damage to the unit.

DISPOSAL

COSHH (Control of Substances Hazardous to Health - UK Government Regulations 2002) ASSESSMENT FOR DISPOSAL OF IQ5-IO Modules.

RECYCLING

All plastic and metal parts are recyclable. The printed circuit board may be sent to any PCB recovery contractor to recover some of the components for any metals such as gold and silver.



WEEE Directive:

At the end of their useful life the packaging, and product, and battery (if fitted) should be disposed of by a suitable recycling centre.

Do not dispose of with normal household waste.
Do not burn.

COMPATIBILITY

Controllers: IQ5.

INSTALLATION

The IQ5-IO Modules are designed to be clipped on to a standard TS35 DIN rail or be screwed directly to a flat surface. They must be installed inside an enclosure rated to at least IP20 (or equivalent) or mounted outside normal reach (e.g. in a plenum). The modules are UL rated as 'UL60730 listed open energy management equipment'. The installation procedure involves:

Mounting the I/O module(s) in position
Connecting the I/O bus to remote modules (if required)
Connecting additional PSUs (if required)
Connecting module inputs and outputs as required

Isolating all I/O connections
Downloading strategy to controller
Reconnecting all inputs and checking operation
Reconnecting all outputs and checking operation

A full description of installing the IQ5-IO modules is given in the IQ5-IO Modules Installation Instructions - Mounting (TG201484) and IQ5, IQ5-IO Installation Instructions - Configuring (TG201483).

RADIO FREQUENCY STATEMENTS AND REQUIREMENTS

The following information applies to modules with BLE function:

Frequency Band

BLE 2400 MHz - 2483.5MHz

Maximum RF Power (in above range)

CE BLE 10dBm (E.I.R.P)

- This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.
- Important: Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation.

This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna;
- Increase the separation between the equipment and receiver;
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected;
- Consult the dealer or an experienced radio/TV technician for help.

- To maintain compliance with the RF exposure requirement, a separation distance of 20 cm between the device and the human should be maintained.

Déclaration d'exposition Attention: Cet émetteur doit être installé pour fournir une distance de séparation d'au moins 20 cm de toute personne.

- This device complies with Industry Canada license-exempt RSS standard(s).

Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

ORDER CODES

IQ5-IO-16UIO	IQ5 I/O Module with 16 universal input/output channels
IQ5-IO-8UIO-105	IQ5 I/O Module with 8 universal input/output channels (105mm wide enclosure)
IQ5-IO-8UIO	IQ5 I/O Module with 8 universal input/output channels (70mm wide enclosure)
IQ5-IO-8UIO-HOA	IQ5 I/O Module with 8 universal input/output channels with LCD and hand-off-auto controls
IQ5-IO-4UIO	IQ5 I/O Module with 4 universal input/output channels
IQ5-IO-16DI	IQ5 I/O Module with 16 digital input channels
IQ5-IO-8DI	IQ5 I/O Module with 8 digital input channels
IQ5-IO-8DO	IQ5 I/O Module with 8 digital/relay output channels
IQ5-IO-8DO-HOA	IQ5 I/O Module with 8 digital/relay output channels with LCD and hand-off-auto controls
IQ5-IO-4DO	IQ5 I/O Module with 4 digital/relay output channels
IQ5-IO-4DO-G	IQ5 I/O Module with 4 digital/relay output channels with gold plated relay contacts
IQ5-IO-16UIO-B	IQ5 I/O Module with 16 universal input/output channels with BLE for local commissioning
IQ5-IO-8UIO-B	IQ5 I/O Module with 8 universal input/output channels (70mm wide enclosure) with BLE for local commissioning
IQ5-IO-8UIO-HOA-B	IQ5 I/O Module with 8 universal input/output channels with LCD and hand-off-auto controls with BLE for local commissioning
IQ5-IO-4UIO-B	IQ5 I/O Module with 4 universal input/output channels with BLE for local commissioning
IQ5-IO-16DI-B	IQ5 I/O Module with 16 digital input channels with BLE for local commissioning
IQ5-IO-8DI-B	IQ5 I/O Module with 8 digital input channels with BLE for local commissioning
IQ5-IO-8DO-B	IQ5 I/O Module with 8 digital/relay output channels with BLE for local commissioning
IQ5-IO-8DO-HOA-B	IQ5 I/O Module with 8 digital/relay output channels with LCD with hand-off-auto controls and BLE for local commissioning
IQ5-IO-4DO-B	IQ5 I/O Module with 4 digital/relay output channels with BLE for local commissioning
IQ5-IO-4DO-G-B	IQ5 I/O Module with 4 digital/relay output channels with gold plated relay contacts and BLE for local commissioning

ACCESSORIES

IQ5-IO-ADPT-2	Pack of 2 I/O bus wiring adapters (for IQ5 controller and IQ5/IO modules)
IQ5-IO-END-10	Pack of 10 spare end covers (for IQ5 controller and IQ5/IO modules)
IQ5-TCVR-105-10	Pack of 10 spare 105mm terminal covers (for 105 mm IQ5/IO modules)
IQ5-TCVR-70-10	Pack of 10 spare 70mm terminal covers (for 70 mm IQ5/IO modules)
DIN-CLIP-10	Spare DIN Clip (pack of 10)
AUX-TRM-16-10	Auxiliary Terminal Block 16-way (pack of 10)
AUX-TRM-10-10	Auxiliary Terminal Block 10-way (pack of 10)
IO-JUMPER-4-10	4 Pin Relay Output Jumper (pack of 10)
IO-JUMPER-2-10	2 Pin Relay Output Jumper (pack of 10)
SCRW-TB-2-BLK-50	Spare 2-way Screw Terminal Plug Black (pack of 50)
SCRW-TB-2-PUR-50	Spare 2-way Screw Terminal Plug Purple (pack of 50)
SCRW-TB-2-YEL-50	Spare 2-way Screw Terminal Plug Yellow (pack of 50)
SCRW-TB-3-ORN-50	Spare 3-way Screw Terminal Plug Orange (pack of 50)
PUSH-TB-2-BLK-50	Spare 2-way Push-fit Terminal Plug Black (pack of 50)
PUSH-TB-2-PUR-50	Spare 2-way Push-fit Terminal Plug Purple (pack of 50)
PUSH-TB-2-YEL-50	Spare 2-way Push-fit Terminal Plug Yellow (pack of 50)
PUSH-TB-3-ORN-50	Spare 3-way Push-fit Terminal Plug Orange (pack of 50)

Note: Spare connectors are not pre-marked with terminal numbers.

SPECIFICATION

ELECTRICAL

Supply Voltage	24 Vac/dc $\pm 20\%$, derived from T1L bus on IQ5 controller or optional external isolated output power source.
Supply Current	dependant on module type and input/output usage (see page 6). Maximum current flow through module on I/O bus = 2 A.
I/O Bus	
Max. modules	64.
Data cable type	Screened twisted pair (e.g. TP/1/1/24/HF/305 or Belden equivalent 9841NH). (requires IQ5-10-ADPT wiring adapters)
*Cable length	
Lon cable TP/1/0/16/HF/200 (Belden 8471) - up to 300 m (1000 ft) between modules.	
MSTP cable TP/1/1/24/HF/305 or Belden equivalent 9841NH - up to 100 m (320 ft) between modules	

Inputs/Outputs

Universal Input/Output (UIO)

Function	Measuring voltage, current, thermistor or digital input, or provide analogue control output (function set by strategy).
Input Noise Rejection	Minimum 60 dB series mode rejection at input power supply frequency.
Analogue Resolution	
Input modes	16 bit (65,536 steps)
Output modes	13 bit (5019 steps)
Voltage Input	
Input range	0 to 10 Vdc, 2 to 10 Vdc.
Input resistance	9.4 k Ω .
Accuracy	$\pm 0.5\%$ of full scale range (50 mV).
Current Input	
Input range	0 to 10 mA, 4 to 10 mA, 0 to 20 mA, 4 to 20 mA.
Input resistance	120 Ω .
Accuracy	$\pm 0.5\%$ of full scale range (100 μ A).
Thermistor Input	
Input range	0 to 1 M Ω .
Accuracy	0 to 80 Ω = 0.5% ± 0.5 Ω ; 80 to 200 Ω = 0.3%; 200 to 10 k Ω = 0.2%; 10 k Ω to 20 k Ω = 0.3%; 20 k Ω to 100 k Ω = 0.8%; 100 k Ω to 200 k Ω = 1%; 200 k Ω to 1 M Ω = 8%.
Bridge resistor	12.2 k Ω .
Bridge supply	3.3 V.
Digital Input (wetting current = 3.5 mA)	
Volt-free input	
ON state	≤ 500 Ω .
OFF state	≥ 3 k Ω (or open circuit)
Input voltage	0 to 40 Vdc.
ON state	0 to 2 Vdc.
OFF state	4 to 40 Vdc.
Pulse rate	100 Hz max. (min. duty cycle 50% / 50% = 5 ms ON / 5 ms OFF).
Analogue Output	
Voltage range	0 to 10 Vdc, 1 to 10 Vdc, 2 to 10 Vdc.
Accuracy	$\pm 0.5\%$ of span (50 mV).

Digital Inputs (DI)

Function	On/off state (or pulse count) to strategy from volt free contact, logic circuit (e.g. TTL, CMOS), open collector (transistor) or open drain (FET).
Volt-free input	
ON state	≤ 500 Ω .
OFF state	≥ 3 k Ω (or open circuit)
Input voltage	0 to 40 Vdc.
ON state	0 to 2 Vdc.
OFF state	4 to 40 Vdc.
Pulse rate	100 Hz max. (min. duty cycle 50% / 50% = 5 ms ON / 5 ms OFF).

Digital/Relay Outputs (DO)

Function	Single pole changeover control from strategy for general purpose use.
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Contact Rating

Module Type		8DO		4DO, 4DO-G	4DO, 4DO-G
Channel Number		1-4, 6-8	5	1,2,4	3
Voltage	Vac	19 to 250		19 to 250	19 to 250
	Vdc	12 to 30		12 to 30	2 to 30
Current	resistive	5 A	10 A	5 A	10A
	inductive	3 A	6 A	3 A	
	inrush (max)	7.5 A	15 A	7.5 A	
	minimum	10 mA		10 mA	2 Vdc @ 2 5 mA

Maximum Total Load 12 A (across all channels).

Minimum Cable Size 1.5mm² (16 AWG).

Caution: Mains and low voltage must not be mixed within relay block 1 (ch.1-4 on 8DO, ch.1-2 on 4DO) or relay block 2 (ch.5-8 on 8DO, ch.3-4 on 4DO). If both mains and low voltages are to be switched, connect mains to block 1 and low voltage to block 2, or vice versa. If switching mains, all relays must switch the same phase and polarity. Arc suppression circuit (RC) recommended for inductive loads (see TG200208). UL rating applies up to 240 Vac (120 VA) maximum.

CONTROLS

All variants	
Service Button	Momentary action push-release.
HOA variants	
Control	Rotary/push-button.
Display	Backlit monochrome LCD panel.

SPECIFICATION (continued)**MECHANICAL**

Dimensions (overall WxHxD)

105 mm modules	109.5 x 131 x 60 mm (4.31 x 5.16 x 2.36").
HOA modules	109.5 x 131 x 67.5 mm (4.31 x 5.16 x 2.66").
70 mm modules	74.5 x 131 x 60 mm (2.93 x 5.16 x 2.36").
HOA modules	74.5 x 131 x 67.5 mm (2.93 x 5.16 x 2.66").

Material (enclosure) Flame Retardant Polycarbonate.

Weight

16UIO	0.344 kg (0.76 lb);
8UIO-105	0.306 kg (0.68 lb);
16DI	0.336 kg (0.74 lb);
8DO	0.363 kg (0.80 lb);
8DO-HOA	0.382 kg (0.84 lb);
8UIO	0.?? kg (0.?? lb);
8UIO-HOA	0.?? kg (0.?? lb);
4UIO	0.?? kg (0.?? lb);
8DI	0.?? kg (0.?? lb);
4DO	0.?? kg (0.?? lb).

Mounting (DIN Rail) IEC/EN 60715 TH35x7.5 or TH35x15 (1.5 mm maximum thickness).

Connectors

I/O Bus Integral spring contacts for inter-module connection. IQ5-IO-ADPT wiring adapter required for cable connection.

Inputs/Outputs 2 part connectors (5 mm pitch) with rising cage clamp screw terminals.

Cable size 0.2 to 2.5 mm² (24 to 12 AWG). *For UL compliance the input power connections must be made using 18 AWG or larger wire rated at least 90°C (194°F).*

ENVIRONMENTAL

This device is suitable for indoor use only.

Approvals and Certifications

- UL 60730-1, Standard for Automatic Electric Controls for Household and Similar Use, Part 1: General Requirements;
- UL 60730-2-9;
- CAN/CSA-E60730-1:13, Standard for Automatic Electrical Controls for Household and Similar Use, Part 1: General Requirements;
- CAN/CSA-E60730-2-9;
- CAN ICES-3 (B)/NMB-3(B);
- Complementary listing for UL916, CSA C22.2 No. 205;
- SASO-approved;
- CE-approved;
- FCC part 15B and 15C;
- RSS-247 Issue 3;
- RSS-Gen Issue 5.

Classification According to EN60730-1 and UL60730-1

Environmental conditions Equipment intended for use in industrial environments.

Construction Independently mounted electronic control unit with fixed wiring; panel-mounted on DIN rail.

Action type 1.B.

Rated impulse voltage 24 V circuits: 500 V;
Relay outputs (DO): 2500 Vac.

Pollution degree 2.

Protection against shock Class 0 (without terminal covers);
Class II (with terminal covers).

Software class A.

Energy Performance of Buildings

EN ISO 52120-1 This controller, when used as part of a complete Trend Controls system AND when programmed with an appropriate application/strategy can support compliance with EN ISO 52120-1. This enables buildings to achieve up to 30% energy cost savings (Energy classification "A") alongside maximizing comfort and well being.

EN12098-1 This control equipment complies with the performance specification defined in EN12098-1. With an appropriate application/strategy it can make use of operation modes, scheduling, optimum start/stop, outside air temperature and frost protection to enhance the energy performance of buildings.

Ambient Environmental Limits

Humidity 5 to 95%RH non-condensing.

Temperature

Storage -40 to +70°C (-40 to +158°F).

Operating

HOA modules -20 to +65.5°C (-4 to +150°F).

All other items -40 to +65.5°C (-40 to +150°F).

Note: For temperatures below 0°C (32°F) special care must be taken that there is no condensation on or within the unit.

Altitude ≤4000 m (13124 ft).

Pollution Degree 2 (only non-conducting pollution occurs).

Protection IP20 if mounted in an enclosure rated at IP20 or equivalent.

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