

IQX Controller & I/O Modules



Description

The IQ™X controller uses the powerful Niagara 4 Framework® for plantroom and unitary control and advanced integration. The integrated 4-port gigabit Ethernet switch enables fast, easy communication with other IQX controllers and IP-enabled devices, together with easy integration with third party OT (operational technology) networks and cloud-based solutions. The switch includes diagnostics, the ability to disable ports 2, 3 and 4, and to limit access to up to 16 specified MAC addresses.

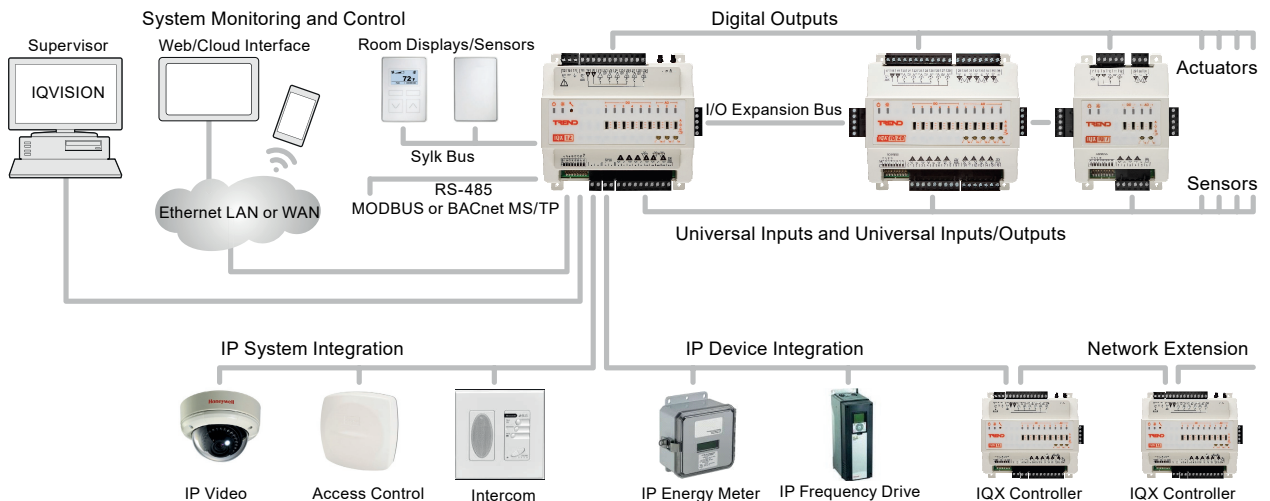
The onboard inputs/outputs (3 universal inputs, 3 universal inputs/outputs and 6 digital outputs) allow interfacing to traditional sensors/actuators, etc, and can be expanded up to 172 channels (i.e. physical points) using IQXIO Expansion Modules. Sylk™ bus connectivity is provided for room control devices.

System programming is accomplished using IQ™VISION, and a feature-rich HTML5 interface can be fully customised to provide end users with web-enabled monitoring and control.

Features

- Suitable for both plant and unitary applications
- Integrated 4-port gigabit Ethernet switch
- Limit connected Ethernet devices by MAC address.
- Open Protocol Support (Modbus or M-Bus or BACnet MSTP) via USB connector
- Daisy chain networking with fault tolerance using RSTP
- BACnet B-BC and AMEV AS-B compliant
- IOT ready JSON, MQTT & Honeywell Forge Cloud connections
- Cyber security based on ISA 62443-3-3 SL4
- 12 points of onboard I/O expandable up to 172 channels
- Built-in HOA (hand, off, auto) control functionality
- HTML5 views and analytics from any level of the system

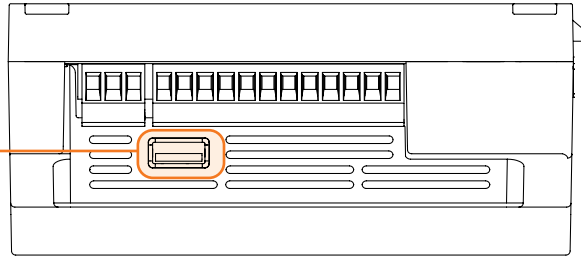
System Overview



HARDWARE

IQX Controller

USB Port A



Digital Outputs

Power Supply Input

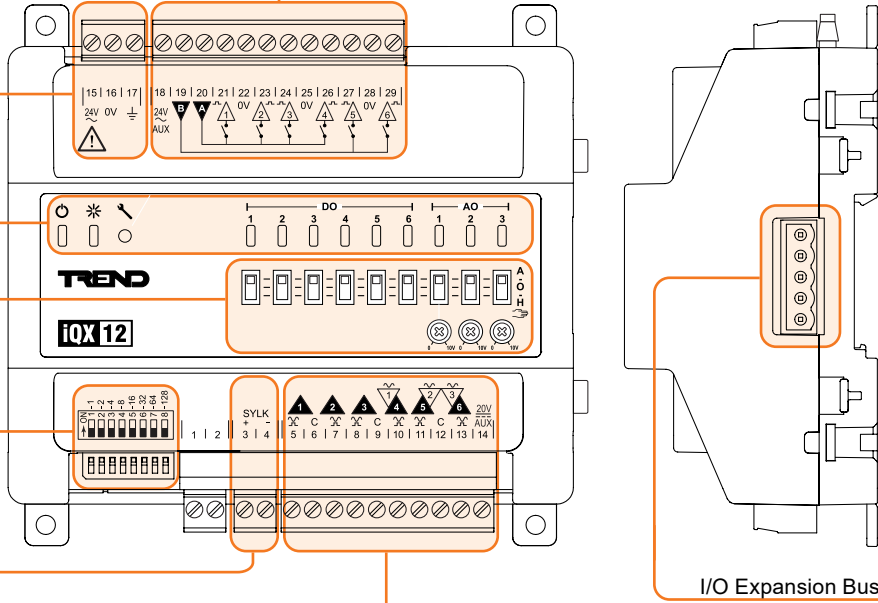
Status Indicators

Hand / Off / Auto Controls

Address Switches
(reserved for future use)

Sylk™ Bus

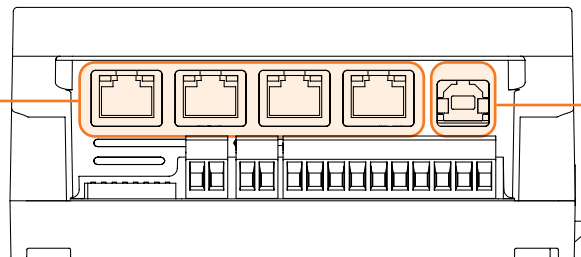
Universal Inputs & Outputs



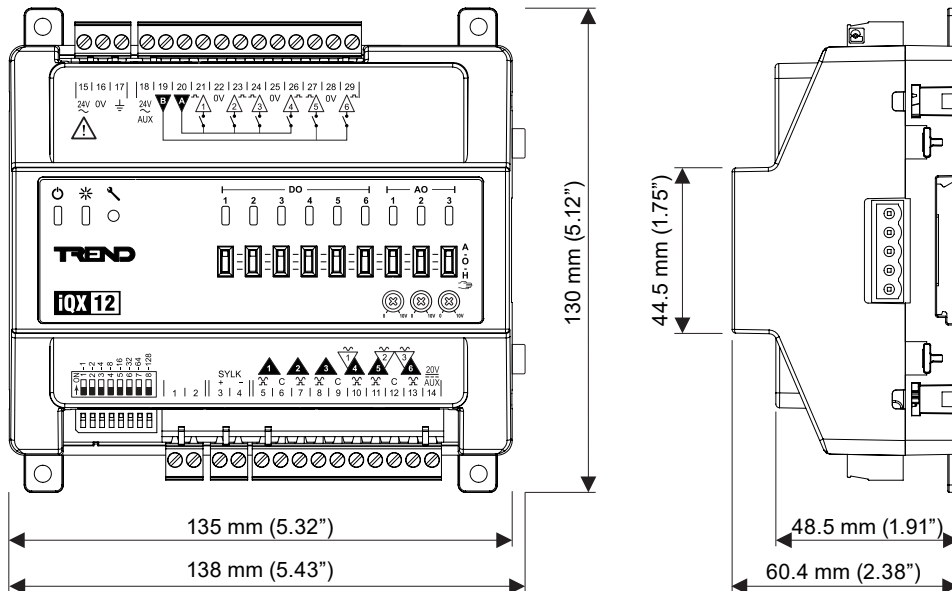
I/O Expansion Bus

Ethernet Switch

USB Port B



Dimensions



IQXIO Expansion Modules

Digital Outputs

Universal Inputs/Outputs

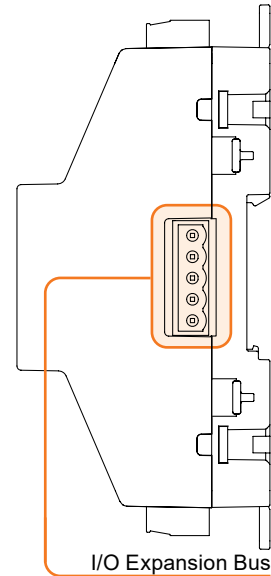
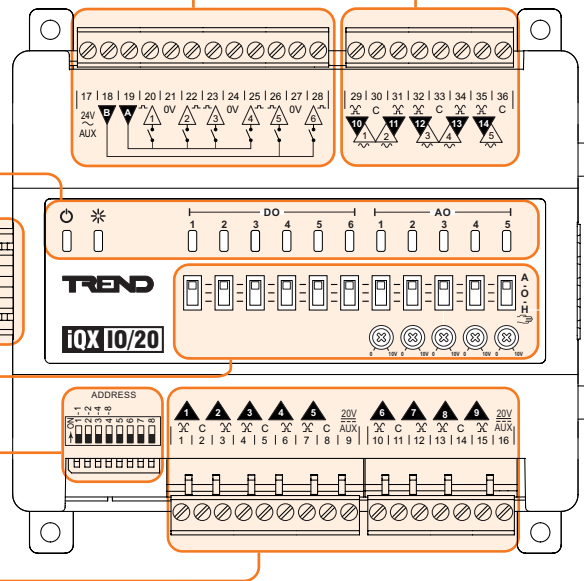
Status Indicators

I/O Expansion Bus

Hand / Off / Auto Controls

Address Switches

Universal Inputs



Digital Outputs

Universal Inputs/Outputs

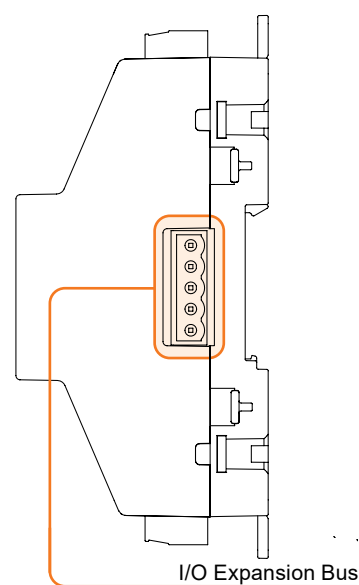
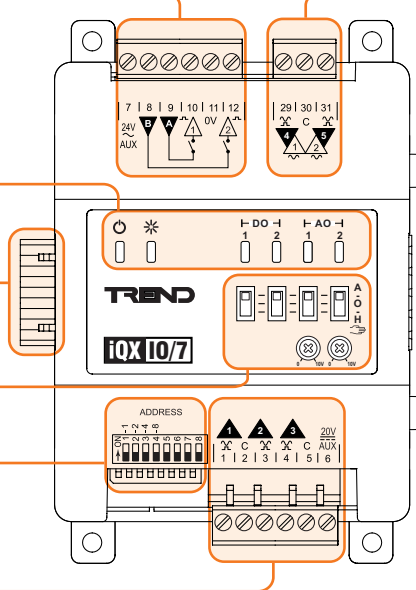
Status Indicators

I/O Expansion Bus

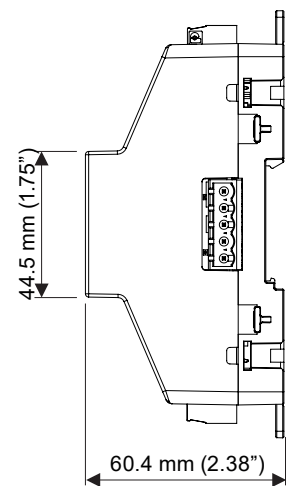
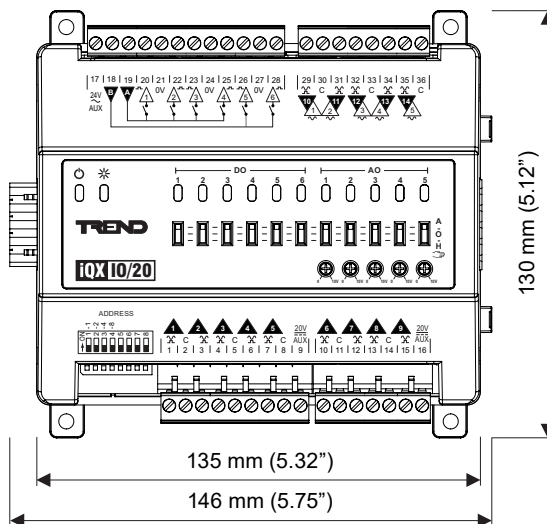
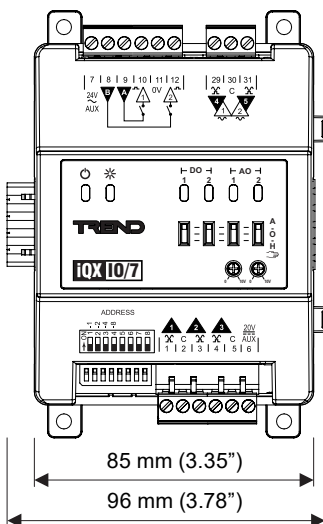
Hand / Off / Auto Controls

Address Switches

Universal Inputs



Dimensions



Ethernet Switch

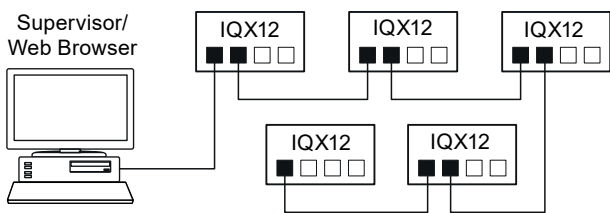
The IQX Controller features a 4-port gigabit Ethernet switch that supports IPv4, IPv6, DHCP and IEEE 802.1x. Each port can be used for:

- IP-based communication with field devices,
- connection to the IQVISION supervisor for configuration and system monitoring,
- accessing Px pages via the onboard web server,
- integration with third party IP systems
- communication between IQX Controllers.

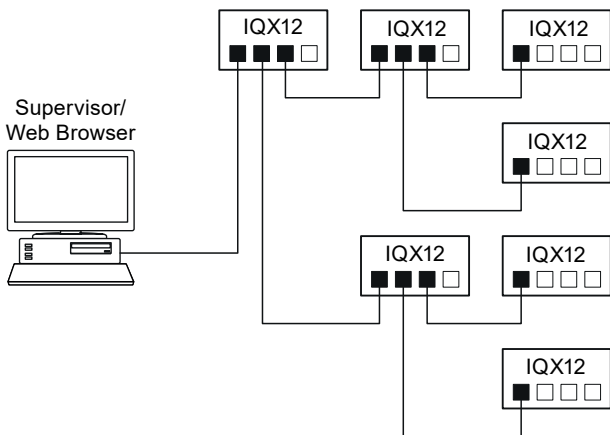
Port 1 is permanently enabled while ports 2, 3 and 4 can be individually enabled or disabled. IQX Controllers are compatible with a range of network topologies, allowing a potential reduction in the cost and complexity of the Ethernet infrastructure.

MAC Address filtering enables connections to each Ethernet port to be independently restricted to a list of up to 16 MAC addressees.

Daisy-chain topology example

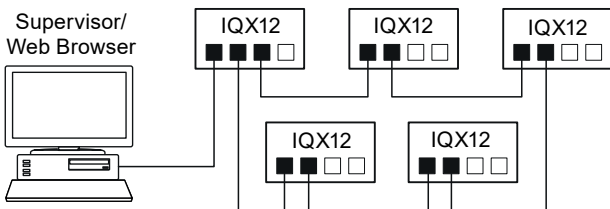


Tree/Star topology example



RSTP (Rapid Spanning Tree Protocol)

The IQX Controller also supports the use of RSTP. In this configuration up to 40 controllers can be connected in a ring or loop, in order to provide high resilience to network failure.



In the event of a communications break anywhere in the loop, all controllers are still able to communicate with each other and any connected supervisor.

Sylk™ Bus

The IQX Controller features a Sylk bus interface that facilitates the connection of room sensor and display devices (e.g. the TR40 and TR42 series). These devices offer control and indication of parameters such as setpoint, fan speed and occupancy, as well as sensing temperature, humidity and CO2 levels.

Up to 7 devices can be wired to the bus (subject to device power loading) using either daisy-chain or star topology.

Inputs and Outputs

The IQX Controller has 12 onboard I/O channels to enable interfacing with field devices. These comprise a mix of universal input channels, universal input/output channels and digital output channels (See 'Default Output' on page 5 for further details.)

If the number of onboard I/O channels is insufficient for your application, IQXIO expansion modules can be added using the I/O expansion bus.

I/O Expansion Bus

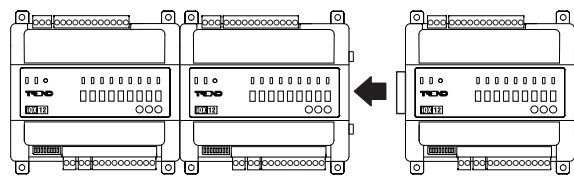
The IQX Controller can support up to 8 IQXIO Modules. Depending on the type of controller and modules used this can provide up to 160 additional I/O channels (or points).

The IQX12/50 controller is supplied with a fixed (non expandable) 50 point licence.

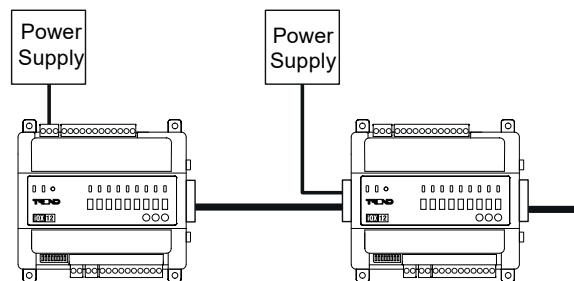
The IQX12/100 controllers are supplied with an initial 100 point licence that can be expanded by purchasing additional open point licences (see 'Order Codes' on page 11).

Side connectors enable modules to be mounted adjacent to the controller and directly plugged into it without the need for additional power or data wiring. The number of modules that can be connected in this way will depend on the power available from the controller and the power requirements of the modules (see 'Calculating Power Requirements' on page 8).

Direct connection example



Modules can be mounted remotely. Remote modules, or modules requiring additional power, must be connected to the controller via a data cable, and powered using a separate power supply. Remote connection example



Two-core screened data cable is used to connect the controller to the first module and between subsequent modules. An additional power supply must be provided for each module (or block of directly connected modules), according to the power requirements of the module plus its associated digital outputs.

The maximum I/O bus length (i.e. the total for all cables between devices) is 40 m (131 ft), subject to cable type. The controller and all modules must lie within the same building ground plane.

Default Output

Default output enables each output to be set to a specified value when:

- the controller's station is restarted, e.g. on power up

or

- the controller loses communication with the controller board or expansion I/O module.

This feature can be used to prevent damage to the attached equipment under these conditions.

Universal Inputs & Outputs

The IQX Controller and I/O Modules have a mix of universal input (UI) channels and universal input/output (UIO) channels, suitable for interfacing with field devices such as sensors or actuators:

Device	Number of channels	
	UI	UIO
IQX Controller	3	3
IQXIO7 Module	3	2
IQXIO20 Module	9	5

Each channel can be independently configured to operate in the following modes to suit the signal type of the connected device:

Operating Mode	UI	UIO
modulating (analogue) input	✓	✓
binary (digital) input	✓	✓
modulating (analogue) output		✓
binary (digital) output		✓

All connections are made using a 2-part screw terminal connector. Ground connections for UI and UIO channels must be made via the common 'C' terminals. Each common terminal is intended to be shared by the two adjacent UI/UIO channels.

Note: The 'C' and '0V' terminals are electrically common.

The use of screened cable is 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.

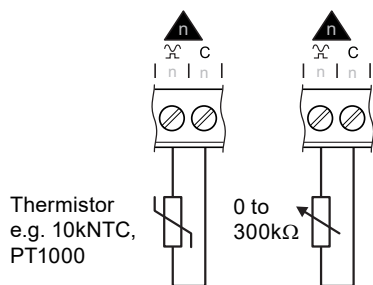
Modulating Input (UI and UIO channels)

A modulating input can be configured to operate with a wide range of analogue sensors and input devices that provide one of the following signal types:

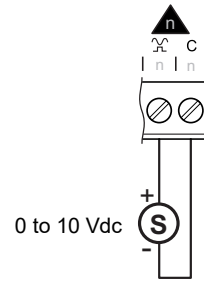
- resistive (0 to 300 kΩ).
- voltage (0 to 10 Vdc)
- current (0 to 20 mA),

The type and characteristics of each input (e.g. upper and lower limits, linearity, etc.) are defined within the controller strategy.

Resistive Input - example wiring

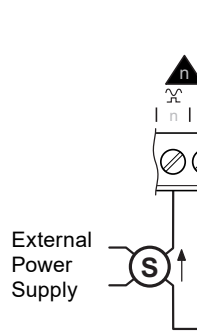


Voltage Input - example wiring

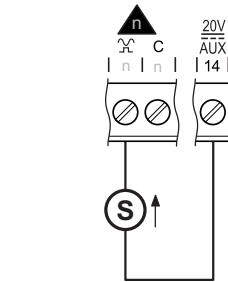


Current Input - example wiring

Externally powered



Loop powered (using 20 Vdc AUX output supply, 100mA maximum)



A modulating input can also be configured as a pulse counter, enabling operation with devices such as utility meters. The pulse count can be configured to be cumulative or average.

Note: Modulating inputs configured as a Totalizer, Counter or Pulse Meter are NOT supported on I/O modules. Modulating inputs on the IQX Controller baseboard must use the 20Vdc Aux as shown above.

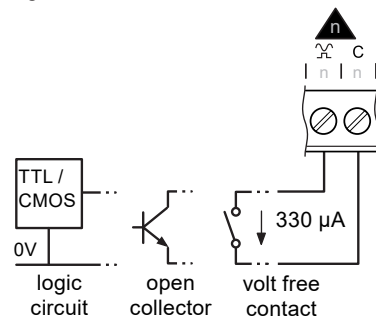
The input can handle pulse frequencies up to 100Hz, with a minimum duty cycle of 5 ms ON / 5 ms OFF.

Binary Input (UI and UIO channels)

A binary input can be used with any 2-state (on/off) signal provided by a volt free contact, logic circuit (e.g. TTL, CMOS), open collector (transistor) or open drain (FET).

The input can be configured to be active when the contact is closed or open.

Example wiring



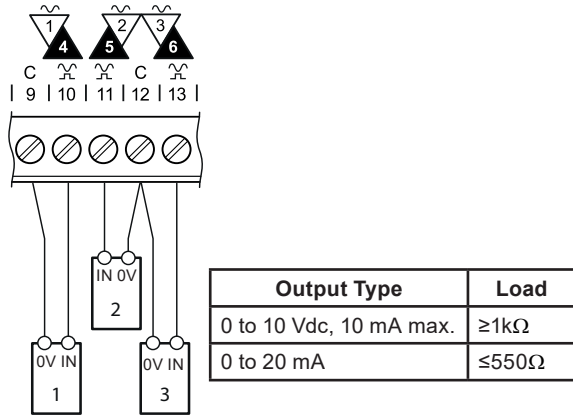
Modulating Output (UIO channels only)

A modulating output can be configured to operate with a wide range of devices that can be controlled by one of the following signal types:

- voltage (0 to 10 Vdc)
- current (0 to 20 mA),

The type and characteristics of each input (e.g. upper and lower limits, linearity, etc.) are defined within the controller strategy.

Example wiring using IQX12



Binary Output (UIO channels only)

A binary output can be used with any 2-state (on/off) device that can be controlled by a 10 Vdc voltage, i.e. ON = 10 Vdc, OFF = 0 V (or vice versa).

Connection is the same as for Modulating Outputs above.

Digital Outputs

The IQX Controller and I/O Modules all feature a number of digital output (DO) channels suitable for driving a range of medium power devices (e.g. actuators and valves):

Device	Number of DO channels
IQX Controller	6
IQXIO7 Module	2
IQXIO20 Module	6

Each channel provides solid state relay (SSR) operation with a voltage rating of 20 to 30 Vac @ 50/60 Hz, and maximum continuous current of 1.5A (maximum 3.5A in-rush for 100 ms).

Each digital output derives its supply from one of two common terminals: 'A' and 'B':

Device	Supply / Channel	
	A	B
IQX Controller	1,2,3,4	5,6
IQXIO7 Module	1	2
IQXIO20 Module	1,2,3,4	5,6

Supply terminals A and B can be connected either to the adjacent 24V AUX terminal (subject to loading – see 'Auxiliary Supply Outputs' on page 7) or to an external power supply.

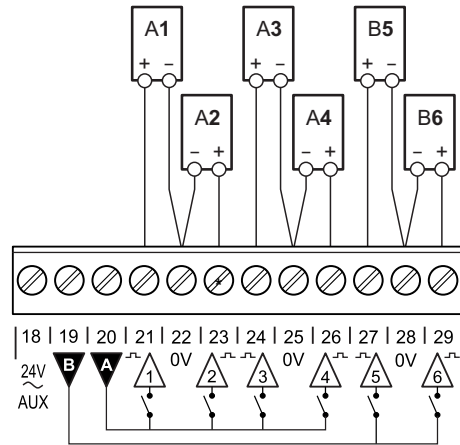
Any additional power supplies must be wired in the same phase as the power input and grounded within the same building's earth ground plane. These supplies must be limited to a maximum of 100 VA (e.g. by the use of class 2 transformers or a suitable fuse /circuit breaker.)

Note: On the IQX12 controller and IQXIO/20 module, the total simultaneous power consumption of all four digital outputs supplied by terminal A must not exceed 100VA.

All connections are made using a 2-part screw terminal connector. Ground connections for the digital outputs must be made via the common '0V' terminals. Each common terminal is designed to be shared by the two adjacent output channels.

Note: The universal input/output 'C' terminals are electrically common with the digital output '0V' terminals.

Example wiring using IQX12

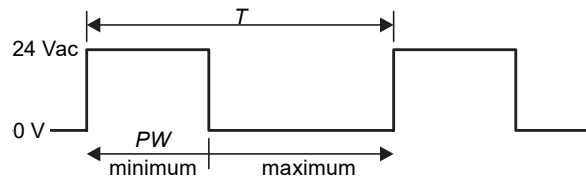


Each digital output can be independently configured to operate in one of two modes:

- Direct (active = 24 Vac, inactive = 0 V)
- Slow Pwm (pulse width modulation)
- Floating Motor

Note: Binary outputs configured as a Slow Pwm are NOT supported on I/O modules.

Slow Pwm mode provides a pulse wave output where the duty cycle or pulse width (PW) can be varied between specified minimum and maximum values. The overall cycle time (T) is variable between 0.1 and 3276.7 seconds (in 0.1s increments).



Auxiliary Supply Outputs

The following auxiliary supply outputs are provided on all controllers and modules:

- 24V AUX: This is internally connected to the main 24 Vac supply input and is provided for linking to the supply terminals (A and B) used by the digital outputs, if required.
- 20V AUX: A 20 Vdc regulated supply derived from the main 24 Vac supply input, used to provide power to external sensors that are connected to the universal inputs. Maximum current is 250 mA on IQX12 and IQXIO20, 100mA on IQXIO7.
- I/O Expansion Bus Supply: This is internally connected to the main 24 Vac supply input and used to power directly connected I/O expansion modules.

When using these outputs you will need to ensure that the available power is sufficient for the intended use, otherwise additional power supplies must be provided.

Hand-Off-Auto (HOA) Controls

Each of the digital outputs and modulating outputs (on UIO channels) can be overridden ON or OFF by means of a 3-position miniature slide switch:



- A = Output set by strategy (i.e. normal operation).
- O = Output overridden OFF
- H = Output overridden ON

The override ON voltage/current for modulating outputs can be preset using the trim pots located below the corresponding HOA switches.

Note: The trim pots allow full control of voltage between 0 and 10V (or current between 0 and 20 mA), regardless of any upper or lower limit set by the strategy.

Status Indicators

The following indicators are provided giving feedback on the operational status of the controller.

Indicator	Colour	Function
Power 	White/Blue	Status of boot up and power supply
Status 	Amber	Status of boot up and of the station

Digital / UIO (analogue) Outputs:

Indicator	Colour	Function
DO-x	Green	On/Off state of the associated digital output channel
AO-x	Green	Light intensity varies with the output voltage of the associated UIO channel

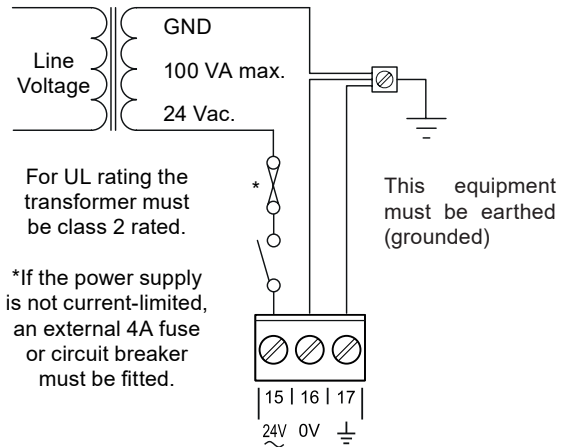
Ethernet: (on each controller Ethernet port):

Indicator	Colour	Function
OK	Green	Status of connection (Ethernet LINK)
RX	Yellow	Presence of data reception

Power Supply Input (Controller)

The IQX Controller requires a 24 Vac (20 to 30 Vac) 50/60Hz supply with a maximum rating of 100 VA. This provides power to the controller's internal electronics and its auxiliary supply outputs (see 'Calculating Power Requirements' on page 8).

Example power supply



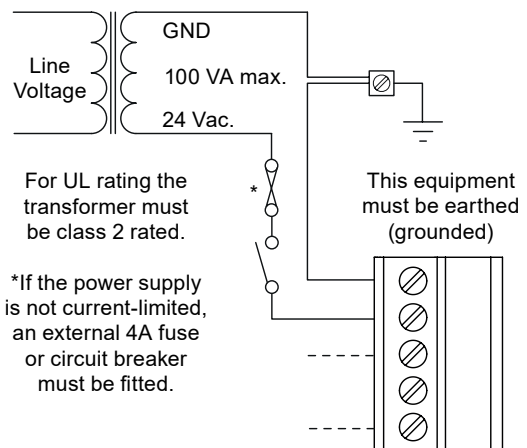
The local earth terminal must be earthed (grounded) as near as possible to the controller. The ground side of the transformer secondary must also be connected to earth (ground).

The supply must include a suitably rated switch in close proximity and be clearly marked as the disconnecting device for the unit. Do not position the equipment so that the disconnecting device is difficult to operate.

Power Supply Input (I/O Modules)

The I/O Modules require a 24 Vac (20 to 30 Vac) 50/60Hz supply with a maximum rating of 100 VA. This provides power to the module's internal electronics and its auxiliary supply outputs (see 'Calculating Power Requirements' on page 8).

If the module is directly connected to the controller, its supply is obtained through the I/O bus connector. If there is insufficient power available from the bus then a separate power supply must be provided:



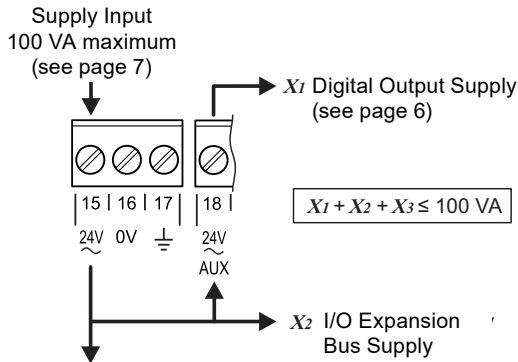
The ground side of the transformer secondary must be connected to earth (ground) as near as possible to the module.

The supply must include a suitably rated switch in close proximity and be clearly marked as the disconnecting device for the unit. Do not position the equipment so that the disconnecting device is difficult to operate.

Calculating Power Requirements

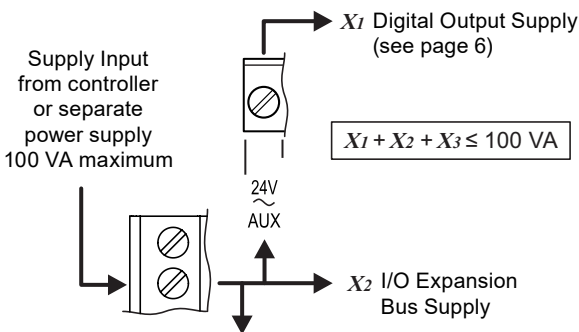
To determine the rating of the controller power supply (or any additional supplies for digital outputs or I/O modules) you need to calculate the power required for each of the possible loads on the controller and any connected I/O modules. An IQX Power Estimator Tool is available on PNet to enable you to work this out. The details below provide a rough guide to typical maximum/minimum values.

Controller power usage and distribution



IQX12 Load		Min VA	Max VA
Internal electronics		12.7	12.7
Ethernet ports	1 port used	1.9	
	4 ports used		7.3
Syk bus	not used	0	
	fully loaded		3.5
UIOs	3 x inputs / voltage out	0	
	3 x binary / current out		5.5
20 Vdc AUX	not used 250 mA max load	0	20.6
TOTAL (X ₃)		14.6	49.6

I/O Module power usage and distribution



IQXIO20 Load		Min VA	Max VA
Internal electronics		5.8	5.8
UIOs	5 x inputs / voltage out	0	
	5 x binary / current out		8.8
20 Vdc output	not used 250 mA max load	0	20.0
TOTAL (X ₃)		5.8	34.6

IQXIO7 Load		Min VA	Max VA
Internal electronics		3.0	3.0
UIOs	2 x inputs / voltage out	0	
	2 x binary / current out		3.5
20 Vdc output	not used 100 mA max load	0	21.3
TOTAL (X ₃)		3.0	27.8

USB Ports

Two USB ports are provided on the IQX controller.

The type B connector is used for advanced engineering using a suitable Telnet application (e.g. MobaXterm™ or HyperTerminal™).

The type A connector allows serial communication via a USB converter. Depending on the USB converter chosen it can enable half-duplex communication on a single pair of wires, plus a ground wire with distances up to 1200 meters (4000 feet).

The communication has been tested with MODBUS, BACnet MSTP and M-bus protocols and these protocols require a USB to serial converter using either the FTDI (FT232 series) chipset or the prolific (PL2303) chipset.

MODBUS: Up to 32 devices and up to 640 points (20 points per device).

BACnet MS/TP: Up to 32 devices and up to 640 points (20 points per device).

M-Bus: Up to 60 devices and up to 720 points (12 points per device).

Note: Only one protocol can be used at a time.

The number of points used in the USB connector count towards the controllers' open points licence count. If the number of open points the controller is licenced for is exceeded it will be necessary to purchase a licence upgrade.

The IQX12/100 ships with 100 open points and further points can be added by purchasing an appropriate licence.

The IQX12/50 controller includes 50 open points which cannot be increased, and only supports MODBUS.

Service Button

A push-button that can be used for any other user-defined purpose.

Backup

In the event of a power failure, system configuration and data is maintained in the onboard memory.

The internal real time clock (RTC) is maintained for up to 24 hours, depending on ambient temperature.

Enclosure & Mounting

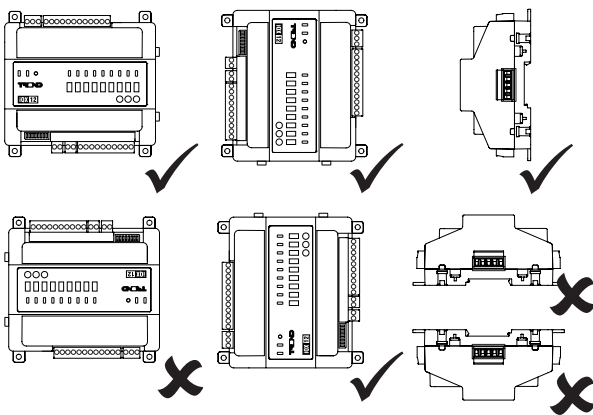
The IQX Controller and I/O Modules are housed in a white polycarbonate case that is designed to be clipped on to a standard TS35 DIN rail. Alternatively, the controller and modules can be screw-mounted using the four integral mounting tabs.

Note: These tabs may be cut off if needed in order to save space when DIN rail mounting.

The controller and modules may be housed within control cabinets, distribution panels and enclosures compliant with the DIN43880 standard, and having a maximum slot height of 45mm.

Caution: Do not mount in areas where acid fumes or other deteriorating vapours can attack the metal parts of the device, or in areas where escaping gas or other explosive vapours are present.

The controller and modules may be mounted horizontally or vertically but not upside down or on their back:



Note: For vertical mounting on a DIN rail a suitable end stop must be fitted to secure the controller and/or modules.

FIRMWARE

The IQX Controller uses the Niagara 4 framework.

The operation of the controller is set up within a station which contains the configuration of:

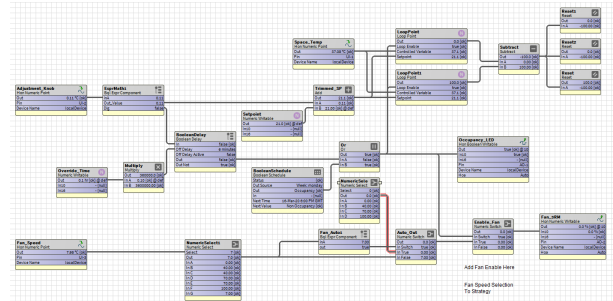
- the inputs and outputs of the controller plus any connected I/O expansion modules
- any devices on the Sylk bus
- the Ethernet ports
- the control strategy

The controller is shipped with a blank station that can be configured as required. Alternatively, a pre-configured station can be uploaded to the controller.

CONTROL STRATEGY

The station's control strategy determines how external equipment is to be controlled, via the controller's outputs, in response to data and measurements obtained from the controller's inputs (e.g. the onboard inputs or Sylk bus).

This functionality is provided by a range of software function blocks from the Niagara 'kitControl' palette. These can be configured and linked to the various I/O channels (and to each other) using a wiresheet:



PROTOCOLS

Drivers for the following third party IP protocols are included as standard:

Protocol	IQX12/50	IQX12/100
BACnet IP	✓	✓
Cloud Sentience Driver		✓
IO Driver	✓	✓
KNX-IP	✓	✓
LON*		✓
M-Bus*		✓
ModbusAsync*	✓	✓
ModbusSlave*	✓	✓
ModbusTcp*	✓	✓
ModbusTcpSlave*	✓	✓
MQTT		✓
BACnet MSTP*		✓
oBIX		✓
OPCUaClient		✓
OPCUaServer		✓
SNMP	✓	✓

* Requires additional interface hardware.

The IQX12/100 also supports all other Niagara compatible drivers. IQX12/50 controllers only support the included drivers shown above.

CLOUD CONNECTIVITY

The IQX12/100 controller supports connectivity with the Honeywell Forge Cloud solution. By default, up to 100 points can be uploaded to Honeywell Forge. Additional points can be licensed if required.

For further details refer to the Action Management Data Sheet (TA201429).

The IQX12/50 controller does not support cloud connectivity.

ANALYTICS

The IQX controllers support Analytics points. The IQX12/100 ships with 25 Analytics points and further points can be added by purchasing an appropriate licence. The IQX12/50 controller includes 10 Analytics points which cannot be increased.

For further details refer to the IQV-NA-x, TONN-NA-x Analytics Data Sheet (TA201430).

HEALTHY BUILDING DASHBOARD

IQX integrates with the Honeywell Healthy Building Dashboard to provide an overview of the performance, comfort level and environment safety of the building environment. For more details see the Healthy Buildings Dashboard Data Sheet (TA201468).

Note: IQX supports a maximum of 5 zones.

IQENERGY

IQENERGY is a versatile software tool that enables energy usage data from the Trend Building Energy Management System (BEMS) to be collected and presented using a range of visualisation and reporting methods.

By gathering and processing data from energy meters, utility meters and sensors, IQENERGY is able to monitor building performance and analyse energy usage within a building or estate, enabling facility managers to make informed decisions to optimise energy efficiency.

For more details see the IQENERGY Data Sheet (TA201424).

CONFIGURATION

The IQX Controller is configured using the IQVISION supervisor. For full details on configuring IQX please refer to the IQX Configuration Manual (TE201447).

Operating System

IQX ships with the Niagara 4 platform. During the commissioning process IQX will adopt the same version of Niagara as used by IQVISION.

BACnet Certification

IQX will adopt the BACnet certification status of the installed version of Niagara. For details, please refer to the IQVISION Data Sheet (TA201381).


TRAINING & NIAGARA CERTIFICATION

The IQX Controller is only available to partners and installers who are Niagara N4 certified. It is also recommended that installers have completed the Trend IQX e-learning course and the Trend IQVISION training course.

For details of this and other training courses provided by Trend, please visit: <https://www.trendcontrols.com>.

FIELD MAINTENANCE

The IQX Controller and I/O 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 IQX Controller.

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 should be disposed of by a suitable recycling centre.

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

COMPATIBILITY

Sylk Bus Devices: TR40-xx-D1, TR42-xx-D1.

Software: IQVISION (v2.70).

Niagara Compatibility Statement (NICS):

Property	Value
STATION COMPATIBILITY IN	All
STATION COMPATIBILITY OUT	All
TOOL COMPATIBILITY IN	All
TOOL COMPATIBILITY OUT	All

INSTALLATION

The IQX Controller is designed to be clipped on to a standard TS35 DIN rail, or affixed directly to a wall using four fixing screws. The IQX Controller 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). The installation procedure involves:

- | | |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> Mounting the controller in position Connecting power Connecting Ethernet (if required) Connecting SYLK devices (if required) Connecting universal inputs/outputs (if required) | <ul style="list-style-type: none"> Connecting digital outputs (if required) Mounting and connecting I/O modules (if required) Powering up Configuring the controller Checking operation |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

A full description of installing the unit is given in the IQX Installation Instructions (TG201446) and IQXIO Installation Instructions (TG201447). For instructions on configuring the controller - see IQX Configuration Manual (TE201447).

ORDER CODES

For Niagara analytics order codes see the Analytics Data Sheet (TA201430). For Healthy Building Dashboard order codes see the Healthy Building Dashboard Data Sheet (TA201468). For IQENERGY order codes see the IQENERGY Energy Manager Data Sheet (TA201424).

Controllers

IQX12/100/24VAC	IQX 12 point plant controller with 100 open points
IQX12/50/24VAC	IQX 12 point unitary controller with 50 open points

Expansion Modules

IQXIO20/5UIO/9UI/6DO	IQX 20 point IO Module with 5UIO, 9UI and 6DO
IQXIO7/2UIO/3UI/2DO	IQX 7 point IO Module with 2UIO, 3UI and 2DO

Additional Point Licences

The following options are available to extend the IQX12/100 plant controller's open point count. These are applied cumulatively, for example, purchasing both an IQX-50-EXT and an IQX-100-EXT licence will provide an additional 150 points.

IQX-50-EXT	Extend base IQX12/100 Plant Controller license with additional 50 open points
IQX-100-EXT	Extend base IQX12/100 Plant Controller license with additional 100 open points

Note: The IQX12/50 has a fixed (non expandible) 50 point licence.

ADDITIONAL DRIVERS

IQV-DR-HTTP N4	HTTP client driver for IQX Controller. Requires an active SMA.
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Note: The IQX50 does not require an SMA. Therefore, to use the HTTP client driver an IQX50 would need to be connected to a TONN8 or IQVISION with an active SMA.

Software Maintenance Agreements

The IQX12/100 plant controller ships with an initial 12 month software maintenance agreement. This can be extended by purchasing one of the following upgrades:

IQX-SMA-0-249-1YR	1 year software update agreement for a 0-249 point IQX12/100
IQX-SMA-0-249-3YR	3 year software update agreement for a 0-249 point IQX12/100
IQX-SMA-0-249-5YR	5 year software update agreement for a 0-249 point IQX12/100
IQX-SMA-250-499-1YR	1 year software update agreement for a 250-499 point IQX12/100
IQX-SMA-250-499-3YR	3 year software update agreement for a 250-499 point IQX12/100
IQX-SMA-250-499-5YR	5 year software update agreement for a 250-499 point IQX12/100

SPECIFICATION

ELECTRICAL

Power Input 24 Vac (20 to 30 Vac), 50/60 Hz

Power Consumption (see page 8)

IQX12	222 VA* max (controller & DO loads); 14.6 to 49.6 VA (controller only).
IQXIO/7	87 VA max (module & DO loads); 3.0 to 27.8 VA (module only).
IQXIO/20	207 VA* max (module & DO loads); 5.8 to 34.6 VA (module only).

*100 VA maximum on any one power input.

Processor (IQX12 only)

CPU Cortex A9 32-bit processor 1 GHz,
Cortex-M4 227 MHz

Operating System QNX based

Memory

MRAM	512 KB
RAM	1GB
FLASH RAM	4GB

Real Time Clock (RTC)

Accuracy	±1 minute per month at 25°C (77°F).
Power fail backup	up to 24 hours at 0°C to 38°C (32°F to 100°F), 22 hours at 38°C to 50°C (100°F to 122°F).

Ethernet Interface (IQX12 only)

1 Giga bit per second (Gbps) 4-port Ethernet IP switch

Transmission Protocols	10/100/1000 BASE-T (IEEE 802.3). IPv4, IPv6, DHCP, IEEE 802.1x.
Connection	RJ45, auto MDI-X.
Cable Type	Cat 5e, UTP (unshielded twisted pair).
Cable Length	100 m (109 yds) maximum.

Sylk Bus (IQX12 only)

Cable Type	Unscreened twisted pair.
Distance	60 m (200 ft) maximum.
Supply Current	50 mA maximum.
Number of Devices	up to 7 (subject to power loading)

USB Interface (IQX12 only)

Type/Function	Type B - low level commissioning; Type A - see 'USB Ports' on page 8.
Transmission	USB 2.0.
Data Rate	480 Mbps/s (Hi-Speed).
Distance	Type B - 5 m (5 yards) maximum. Type A - 800-1200 m (874 to 1312 yards).
Number of Devices	Type A - see 'USB Ports' on page 8

I/O Expansion Bus

Maximum Modules	8
Maximum Channels	172 (including 12 on controller).
Bus Supply	
Voltage	as per power input.
Power	50VA maximum.
Cable Type	Screened twisted pair.
Maximum Total Length	40 m (131 feet).

INPUTS/OUTPUTS

Universal Inputs (UI)

Number of Channels	
IQX12	3;
IQXIO/7	3;
IQXIO/20	9.
Function	Voltage, current, resistive or digital input.
Resolution	16 bit (65536 steps)
Voltage Input	
Input range	0 to 10 Vdc.
Input resistance	189 k Ω .
Accuracy	$\leq 0.5\%$ of full-scale (i.e. ± 50 mV).
Current Input	
Input range	0 to 20 mA.
Current source	Internal (loop power) or external PSU.
Input resistance	500 Ω .
Accuracy	$\leq \pm 0.5\%$ of full-scale (i.e. ± 100 μ A).
Resistive Input	
Resistance	
Input range	0 to 300 k Ω
Accuracy	Not specified.
Bridge resistor	10 k Ω .
Bridge supply	3.3 V.
Digital Input	
Voltage (open circuit)	3.3 V.
Wetting current	330 μ A (3.3 V / 10 k Ω)

Universal Input/Output (UIO)

Number of Channels	
IQX12	3;
IQXIO/7	2;
IQXIO/20	5.
Function	Voltage, current, resistive or digital input, or analogue (voltage/current) output.
Resolution	16 bit (65536 steps)
Voltage Input	same as UI (see above).
Current Input	same as UI (see above).
Resistive Input	same as UI (see above).
Digital Input	same as UI (see above).
Analogue Output	
Voltage mode	
Range	0 to 10 Vdc (source 10 mA max, sink 1 mA max, load ≥ 1 k Ω).
Accuracy	$\pm 0.5\%$ of full-scale (i.e. ± 50 mV)
Current mode	
Range	0 to 20 mA (load $\leq 550\Omega$).
Accuracy	$\pm 1\%$ of full-scale (i.e. $\pm 200\mu$ A).

Digital Outputs (DO)

Number of Channels	
IQX12	6;
IQXIO/7	2;
IQXIO/20	6.
Output Type	Solid state relays.
Function	Direct (on/off); Slow Pwm.
Voltage	As per supply voltage (20 - 30 Vac)
Current	1.5 A continuous, 3.5 A (100 ms inrush).
Slow Pwm Mode	
Duty cycle	0.1 to 3276.7s (in 0.1s increments).
Total cycle	0.1 to 3276.7s (in 0.1s increments).

INDICATORS

Power 	White/blue LED
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Please send any comments about this or any other Trend technical publication to techpubs@trendcontrols.com

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Trend Control Systems Limited

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Status 	Amber LED
DO-x	Green LED
AO-x	Green LED
Ethernet OK	Green LED
Ethernet RX	Yellow LED

MECHANICAL

Overall Dimensions	See pages 2 and 3.
Material (Main Body)	Flame Retardant Polycarbonate (white)
Weight	
IQX12	0.41 kg (0.90 lb);
IQXIO/7	0.21 kg (0.46 lb);
IQXIO/20	0.33 kg (0.73 lb);
Mounting	TS35 DIN Rail (EN500022) or four screw fixing.

Connectors

Power Supply Input, I/O Channels, Sylk Bus, I/O Bus.	
Type	2 part connectors (0.2" pitch) with rising cage clamp screw terminals.
Cable size	0.14 to 2.5 mm ² (22 to 12 AWG). <i>For UL compliance the input power connections must be made using 18 AWG or larger wire rated at least 90°C (194°F).</i>

ENVIRONMENTAL

Ambient Limits	
Storage	-20°C (-4°F) to +65°C (+150°F).
Operating	-20°C (-4°F) to +55°C (+131°F).
Humidity	5 to 95%RH non-condensing.
Pollution Degree	2, suitable for use in industrial environments.
Protection	IP20.

Standards and Approvals

UL/CUL (E87741) listed under UL 60730-1 and CSA E60730-1, UL 60730-2-9:2010.
 Meets FCC Part 15, Subpart B:2017, Class B (radiated emissions) requirements.
 Meets Canada ICES-003:2016.
 EMC Directive: 2014/30/EU. Standards Applied:
 EN 61000-6:2005; EN 61000-6-3:2007 + A1
 EN 60730-1: 2011, EN 60730-2-9: 2010
 RoHS Directive: 2011/65/EU. Standards Applied:
 EN 50581: 2012

Energy performance of buildings:

EN ISO 52120-1	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 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, OAT and frost protection to enhance the energy performance of buildings.

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TR CU Certification