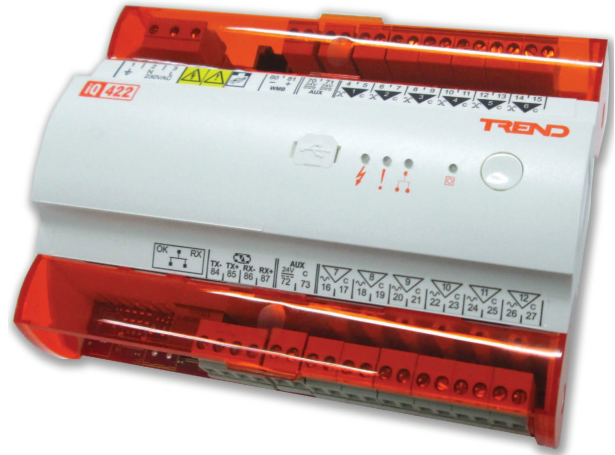


IQ422 Controllers



Description

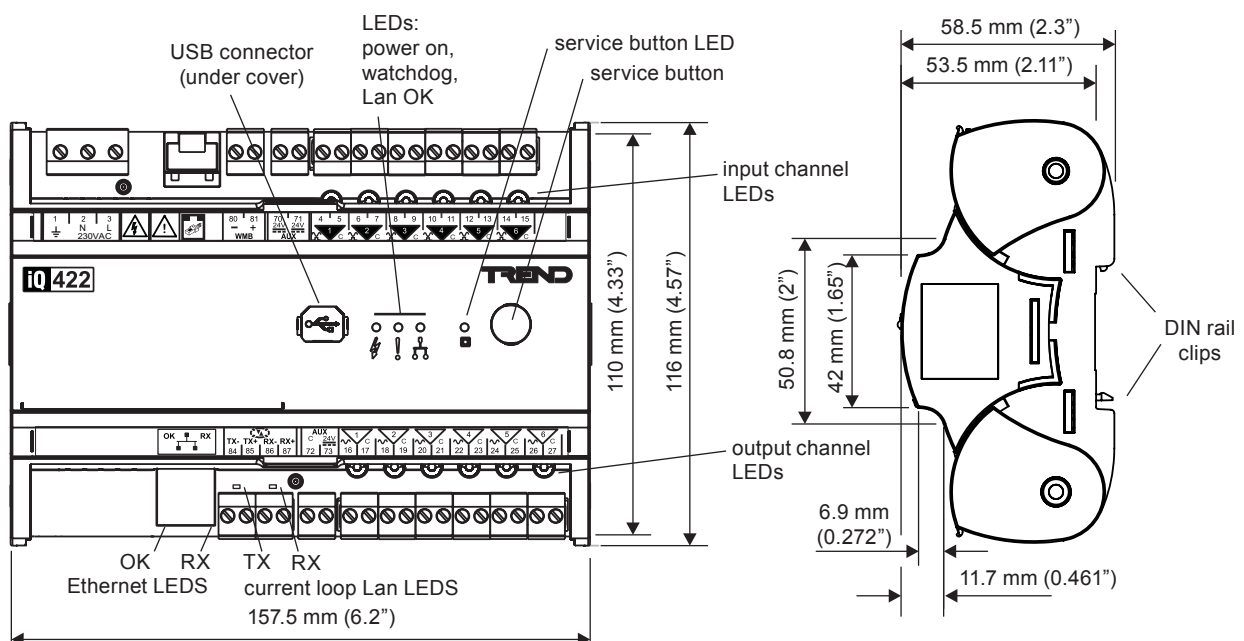
The IQ422 intelligent controllers are designed for use as unitary controllers in building control systems. Full compatibility with other Trend IQ controllers enables the IQ422 to integrate the local environmental needs with the bulk air conditioning system in order to optimise both comfort and running costs. The controllers have 6 universal inputs and 6 analogue voltage outputs.

IQ422 controllers use Ethernet and TCP/IP networking technologies with embedded XML. Trend current loop Lan, and BACnet over IP communications are available as options.

Features

- 230 Vac or 24 Vac input power supply options
- Ethernet 10/100 Mbps main network with TCP/IP protocol
- Embedded XML Web Services as standard
- Trend current loop Lan option
- BACnet over IP option
- Small footprint with DIN rail mounting
- RS232 and USB local supervisor/engineering ports
- DIN43880 standard enclosure

Physical

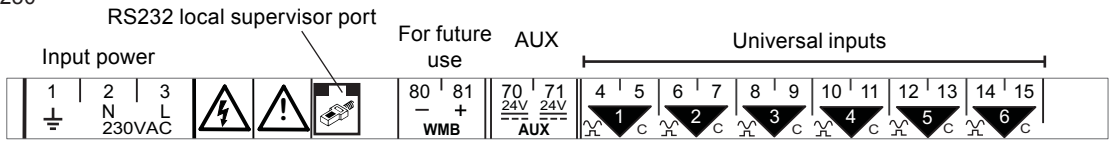


Physical (continued)

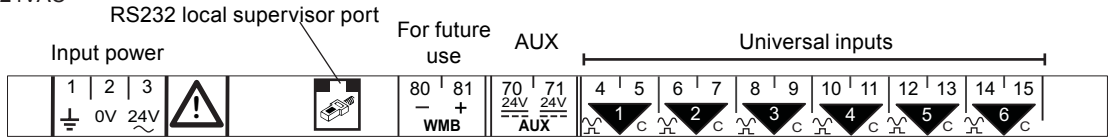
Terminal Labels

Upper Labels

IQ422/230

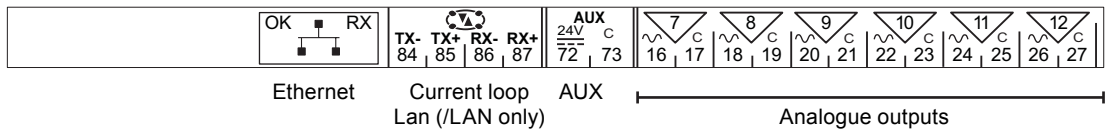


IQ422/24VAC



Lower Label

IQ422/230 and IQ422/24VAC



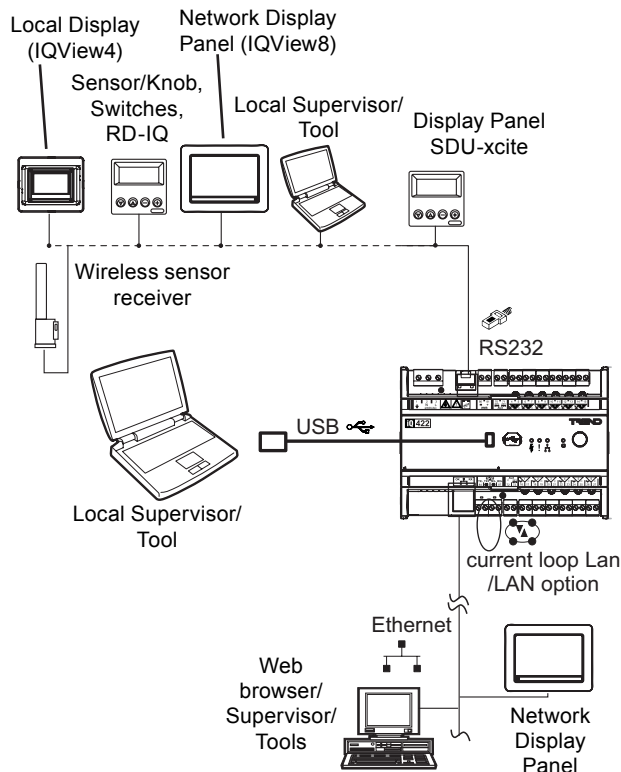
FUNCTIONALITY

The IQ422's functionality can be divided into four sections: [System](#), [Hardware](#), [Firmware](#), and [Strategy](#).

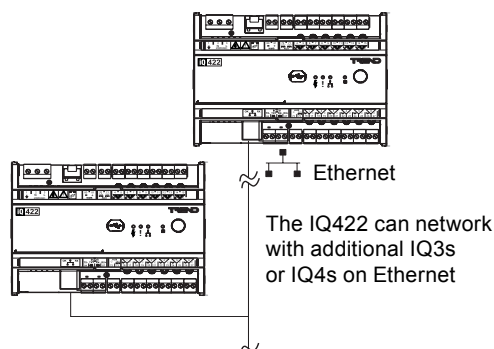
SYSTEM

Standard Communications

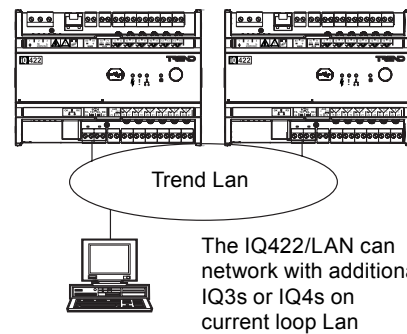
The IQ422 has Ethernet, USB, and RS232 ports. The /LAN option also has current loop Lan connections which enable it to communicate with other devices as illustrated in the diagram below.



Without the /LAN option (or with /LAN option and /LAN option disabled) the IQ422 can form a Trend network over Ethernet (but not over the current loop Lan).



If the IQ422 is fitted with the /LAN option (and the /LAN option is enabled), it can form a network over the current loop Lan, (but not over Ethernet).



Ethernet Port

The Ethernet port is used to connect the controller to an Ethernet network. It enables PCs connected to the Ethernet network to communicate with the IQ422 using IP addressing. Remote PCs can communicate through standard IT networks using IP, enabling communication from anywhere in the world. The IP connection will support a web browser. Communication with the Trend network by an IQ System supervisor or tool (e.g. 963) will require the use of a virtual CNC (vCNC) in the IQ422 (or another CNC on the network).

The strategy and backdrop configuration files may be downloaded to the IQ422 from the System Engineering Tool (SET) across Ethernet.

Ethernet without current loop Lan option (/LAN): In this case the IQ422 will become part of the Trend network over Ethernet. It can communicate with other controllers using Inter-Controller Communications (IC Comms - peer to peer communications over Ethernet).

Ethernet with current loop Lan option (/LAN): If the IQ422 has the current loop Lan option fitted, and the current loop Lan is enabled (enabled by default), it cannot join a Trend Lan over Ethernet. If the current loop Lan is disabled it will behave as Ethernet without current loop Lan option described above.

XML Web Services: XML is a general purpose specification for creating custom markup languages. It helps developers create web pages and also provides a basic syntax that enables information to be shared by different computers and applications. The IQ422 XML syntax is described in the IQ4 Configuration Manual. XML web services are fitted as standard in the IQ422

RS232 Port

The RS232 port is used as the controller's local supervisor port. A sensor/display (RD-IQ), 4 line display panel (SDU-xcite), network display (IQView8), local display (IQView4), wireless sensor receiver (XW/R/IQ) or PC running a supervisor/tool may be connected to the RS232 port. Only one device may be connected.

When the port's address is set to 0 it only allows connected devices to communicate with the IQ422. When the address is set to another value it allows connected devices to communicate across the entire Trend network (dependant on device functionality).

The IQView4, RD-IQ or SDU-xcite communicate only with the local IQ422 so the IQ422's address module local supervisor port address must be set to '0'.

The connection allows the strategy configuration file (but not backdrop files) to be downloaded to the IQ422 from SET.

Standard Communications (continued)

Current Loop Lan (/LAN only)

The current loop Lan connection is only available on the /LAN option. It option enables the IQ422 to join a current loop Lan. The strategy configuration file (but not backdrop files) may be downloaded to the IQ422 from SET across the current loop Lan. It can communicate with other controllers using Inter-Controller Communications (IC Comms - peer to peer communications over the current loop Lan).

USB Port

The USB port is used as the controller's engineering port. A PC running SET may be connected to an IQ422 by using its USB port. When connected in this way SET can communicate across the entire Trend network. The connection allows the strategy configuration file (but not backdrop files) to be downloaded to the IQ422 from SET.

BACnet Communications (/BAC only)

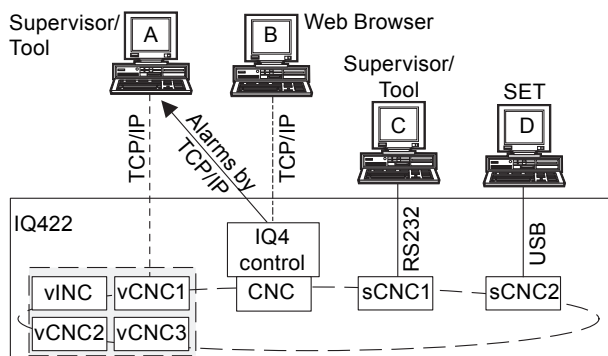
The IQ422/BAC controller is designed to be a BACnet Application Specific Controller. BACnet is an open protocol that enables the products of a number of different manufacturers of building automation and control equipment to communicate with each other. It supports communication with the IQ422 using BACnet over IP (Ethernet) including:

- Access to parameters over BACnet.
- BACnet Alarms - IQ422/BAC is able to send alarms using BACnet protocol.
- BACnet IC Comms - IQ422/BAC controllers support BACnet IC comms. This enables it to send IC Comms to a BACnet device using BACnet protocol.

A full specification of the objects, properties, and BIBBS (BACnet Interoperability Building Blocks) supported by the IQ422 are given in the IQ4 Protocol Implementation Conformance Statement (TP201248). The mapping of the BACnet properties to the Trend parameters is covered in the IQ4 Configuration Manual (TE201263).

Networking

In order to connect to the Trend network the IQ422 will create its own internal Lan which includes a node for its own controller, a CNC for its local RS232 supervisor port (sCNC1 - if supervisor port address is set non-zero), 3 virtual CNCs (vCNCs), and a virtual INC (vINC - address 126).



There can also be an additional sCNC (sCNC2) for the USB local engineering port.

A PC running SET is able to use the IQ422's local engineering port (USB) to communicate with the entire Trend system to which the IQ422 is connected. If the USB port address in the IQ422 is set to 0 (default), a supervisory CNC (sCNC2) at address 125 is dynamically created for the period of the SET session. When the PC is removed the sCNC times out and no longer exists on the network. If the sCNC address is configured to be non-zero, the sCNC2 remains on the network map when the SET PC is removed.

With the current loop Lan option fitted and the Lan enabled the Lan must be intact for the Lan communications to operate; if the Lan is not connected, a loop back connector (which connects TX+ to RX+, TX- to RX-) should be fitted.

When the IQ422 joins an Ethernet Lan, the controller with the lowest IP address assumes the INC functionality, and vINCs in other controllers disappear. The vINC does not exist on a current loop Lan.

IC Comms: IQ4s may communicate with each other and IQ3, IQeco, and earlier IQ (and IQL) controllers using Inter Controller Communications (peer to peer communications). This will use Trend Lan/node addressing (not direct IP addressing).

Alarm Delivery: Alarms can be delivered to the local supervisor port or to a supervisor making a permanent connection to the virtual CNC by normal IQ system comms. Alarms can be delivered to supervisors making temporary connections to the virtual CNC using TCP/IP by setting the supervisor's IP address and port number in the alarm destination module (i.e. IP alarms). Alarms may also be sent by email.

Note that network alarms are sent to any connected port (e.g. to supervisors connected to local supervisor port, local engineering port, or supervisor connected to virtual CNC).

System Configuration

The IQ422 can operate in a number of system configurations. These are described in detail in the IQ4 Configuration Manual (TE201263).

Ethernet Routers: The IQ422 can construct an internetwork across a router.

Note that IQ422 to IQ422 networking communications will not operate across a firewall (i.e. virtual networks cannot be built across firewalls).

EINC, 3xtend/EINC L: The IQ422 can be used with EINC or 3xtend/EINC L. These both enable the Trend network to be extended from Ethernet over the Trend current loop Lan (see diagram above). The 3xtend/EINC L also allows its extension over Trend Lan on LonWorks (i.e. communication with IQLs).

The 3xtend/EINC L (and not EINC) can operate in an automatic IP addressing environment (e.g. with DHCP) - see below.

IQ3/BINC: The IQ3/BINC can extend the Trend network over MS/TP BACnet to enable the IQ422 to communicate with IQecos.

TMN: The IQ422 can use a TMN for PSTN, ISDN or GSM telephone services. The TMN should be connected to a Trend current loop internetwork (or internetwork section). However, this will only give normal IQ System Communications (i.e. text communications), it cannot provide web pages.

Automatic IP Addressing Mode: The IQ422 is able to operate in a system where the IP addresses are automatically allocated by a DHCP (Dynamic Host Configuration Protocol) server (i.e. the IP addresses are not fixed).

HARDWARE

Box: The controller box is DIN rail mounting. It has sprung DIN rail clips enabling it to be clipped on and unclipped from the DIN rail. The /230 version must be installed inside an enclosure rated to at least IP20 or equivalent. The /24VAC version should be installed in an enclosure or outside normal reach (e.g. in a plenum).

The units have a plastic housing with rotating clear polycarbonate covers for the top and bottom terminal rows. The current loop Lan LEDs (TX, RX) can be viewed through one cover. The Ethernet LEDs (RX, OK) are fitted into the end of the Ethernet connector. The input/output LEDs have light pipes so they can be seen adjacent to the appropriate terminal label.

The USB connector in centre of the cover is protected by a retained flexible plastic plug. The cover is pierced with holes to expose the power, watchdog and service button LEDs, and the service button is fitted alongside.

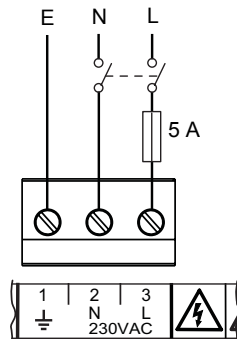
The unit may be mounted vertically in a panel, or vertically side on, but not vertically upside down nor flat on its base.

Input Power

The IQ422 has both 230 Vac and 24 Vac input power options.

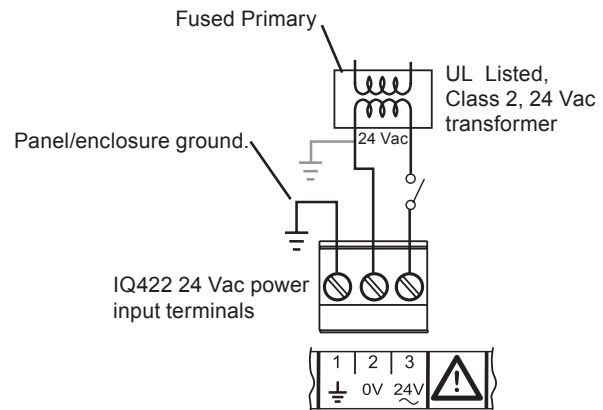
/230: This option requires 230 Vac $\pm 10\%$, 50/60 Hz. The IQ422 input power earth (ground) terminal is isolated from the input power neutral, and must be separately earthed (grounded) locally; this ground terminal is internally connected to the IQ422 electronics earth (ground).

The 230 V supply must include a dedicated 5 A fuse complying with BS1362 and a suitably rated switch in close proximity and be clearly marked as the disconnecting device for the unit. A 5 A circuit breaker with high breaking capacity may be used as an alternative.



/24VAC: This option requires 24 Vac $\pm 10\%$, 50/60 Hz. The 24 Vac uses an half wave rectifier internal power supply unit. Multiple controllers with half wave power supplies may be powered from a single grounded transformer but the supply polarity must be maintained across all units supplied from the same transformer.

The 24 V supply must include a suitably rated switch in close proximity and be clearly marked as the disconnecting device for the unit.



The local earth terminal (1) must be earthed (grounded) at the controller.

If one side of the transformer secondary is earthed, then this MUST be connected to the controller's 0 V terminal (2).

Current Loop Lan

The current loop Lan is an optional feature (IQ422/LAN). The current loop Lan is enabled as prime network in the IQ LAN network module, otherwise Ethernet is the prime network.

Address/Baud rate: The address on the Lan is soft-configured in the Address module to be unique on the Lan. The address and Lan number are set up in the factory on a rolling basis, so in a batch of IQ422's, each will have a different default address (printed on the unit's label).

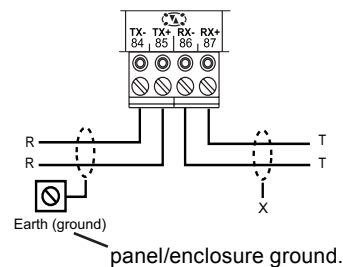
By default the baud rate is auto-detected in the range 1k2, 4k8, 9k6, 19k2, 38k4 (where 4k8 = 4.8 kilobaud). Automatic baud rate detection (autobaud) may be disabled, in which case the baud rate must be soft configured to be the same as the rest of the Lan. Autobaud should be disabled if:

The Lan consists of all IQ4s, and this IQ422 is set to be the baud rate master; it must have its baud rate fixed by setting it manually.

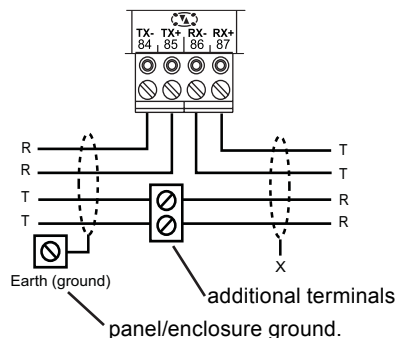
The IQ422 has problems detecting the baud rate indicated by the Lan OK green LED flashing for longer than 30 s.

Network terminals: The network terminals facilitate connection of 2 wire cables.

Example 2 wire wiring



Example 4 wire wiring



Indicators: The standard TX and RX LEDs are fitted adjacent to the network terminals. The current loop OK condition is indicated by the network OK LED (located in the centre of the cover) when the current loop Lan is enabled.

Bypass relays: The unit contains 2 changeover relays which bypass the receive and transmit circuitry and maintain network integrity during power fail.

Ethernet Port

The Ethernet port uses an RJ45 connector for connection to an Ethernet network. Unshielded or shielded twisted pair (UTP or FTP) cable 20 Mbps, 100 m (109 yds), 10BASE-T/100 BASE-T may be used. There is no need for a crossover adaptor as unit self-corrects for cable polarity.

RS232 Port

The RS232 port uses an RJ11 connector containing a supply connection which can supply power to SDU, RD, and XW/R/IQ Wireless Sensor Receiver (not IQView, IQView4, or IQView8).

It allows connection of a supervisor or display as explained in RS232 Port section on page 3

USB Port

The IQ422's USB port uses a Micro B USB connector (USB 2.0 Hi-Speed); it is located in the centre of the cover and is protected by a retained flexible plastic plug. It allows SET to connect to the complete Trend network, as explained in the Networking section on page 4.

Connection to a PC is made by using a USB cable with a USB connector appropriate to the PC on one end and a Micro B USB cable on the other (maximum cable length is 5 m, 5 yds 1').

Service Button

Pressing the IQ422's Service Button generates a message which identifies the IQ422 by means of its unique serial number; this can be interpreted by system tools and can be used to find the IQ422's device address and Lan number.

The IQ422 can be restored to defaults by holding down the service button for greater than 2 s (but less than 15 s) as the IQ422 is powered up. *Note that this will clear the strategy; the data cleared down is defined in the [Strategy](#) section on page 9.* The IQ422 should be then be re-configured from scratch.

Labels

A small two part label is attached to the unit. It has a tear-off adhesive label strip with serial number (both as text and as a small barcode), and address information which can be used for a paper record e.g. a log book. A configured address should be written on this label. A second large adhesive label is supplied to be mounted outside the metal work containing the IQ422 with similar information. This will also have the serial number as text and as a barcode; this can be read by a barcode scanner from a distance (e.g. scanning a unit mounted in the ceiling from the floor).

The large barcode label is intended to be mounted on the outside of the metal work containing the IQ422; this will enable the label to be scanned at a distance by a barcode scanner (*note that the small barcode labels can be collected together and scanned in when required*).

The scanner should conform to the following requirements:

Laser scanner able to read "code 128 auto"

It must be able to work close up and from about 3.5 m (12') away. The distance it can read depends on the user requirements (e.g. scanning a unit mounted in the ceiling from the floor).

Indicators

Note that all LEDs illuminate for several seconds after switch on.

General LEDs: (in centre of cover).

Power (⚡): (green) ON when input power supply is connected. Flashes briefly at 1 second intervals if input power supply fault; return unit to supplier.

Watchdog (🐶): (red) ON if controller has a software fault (i.e. strategy or firmware).

Lan OK (📶): (green) Operational on /LAN option only. ON if current loop Lan is operating. Flashes while trying to auto-set baud rate. If lasts longer than 30 s, set baud speed manually to known baud rate. If still flashing, check Lan connections.

Service Button (🔧): (yellow) ON when service button is pressed. Flashes if device connected to USB port with no input power supply.

Current Loop Lan (adjacent to Lan connector - operational on LAN option only).

RX: (yellow) ON if current is entering the network receiver.

TX: (yellow) ON if current is flowing from network transmitter.

Ethernet (on end of Ethernet connector).

OK: (green) Normally called LINK on Ethernet systems. ON indicates a good Ethernet connection. If OFF indicates faulty Ethernet connection.

RX: (yellow) Flashes when packet of data is being received across the Ethernet.

I/O LEDs (in line with the appropriate I/O terminals and next to the label).

Inputs LEDs: (yellow - 6 off) Each input channel has an LED to monitor the input state when the input channel is set to a digital input. The LED will illuminate when the associated input contact is closed.

Outputs LEDs: (yellow - 6 off) Each output channel has an LED whose light intensity increases with output voltage.

Backup

A supercap is used to maintain the real time clock (time and date). In the event of power failure this will support the clock for 8 days (typically).

Note operation at elevated temperature or high humidity levels will reduce the lifetime of the supercap. Extended operation in these conditions may permanently reduce the capacity of this component and result in a reduction in the number of days that the controller can successfully backup the time and date.

The data (firmware, strategy, parameters) is stored in flash memory which is non-volatile in the case of power failure. Changes to the address module are stored immediately. Changes are generally stored around midnight, in addition structural changes (e.g. module interconnections) are stored 15 s after the last change, and critical data changes (e.g. strategy values), are stored on power failure or other similar fault condition.

The tools (e.g. SET Live Adjustment, IQTool) will send the archive instruction after the parameter changes.

Inputs and Outputs

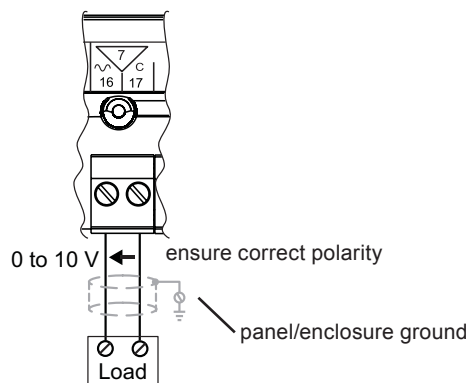
The IQ422 has 6 universal analogue inputs and 6 analogue (0 to 10 V) outputs with 3 off 24 Vdc auxiliary supply output terminals:

Analogue Outputs

6 channels (OUT7 to OUT12)

0 to 10 Vdc at up to 20 mA; reduce to 18 mA maximum above +40 °C (+104 °F). *Note for combined supply see the limitation in the 'Auxiliary Supply Output' on page 7.*

Terminals and Example wiring



Connect the analogue output return to the C terminal (e.g. terminal 17) not to an input common. If screened cable is used the screen must be connected to the panel/enclosure ground and unterminated at far end. The above diagram shows wiring for OUT7.

Auxiliary Supply Output

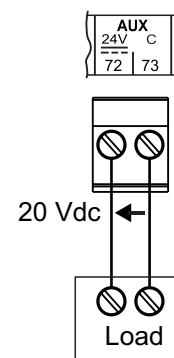
The auxiliary supply out can be used to supply I/O devices e.g. sensors. It provides 20 Vdc $\pm 10\%$.

On the /230 version, 120 mA is available shared between the top edge terminals, 70, 71 ($\frac{24V}{2}$), and another 120 mA from the bottom edge terminal 72, each edge being independently fused.

On the /24VAC version 240 mA is available shared between all three terminals, 70, 71, 72 ($\frac{24V}{2}$) which are jointly fused. Reduce maximum current to 200 mA above 40 °C. The combined current from the auxiliary supply outputs, Wallbus (not currently available), RS232, and analogue outputs is 240 mA. Exceeding this current may cause the auxiliary supply output voltage to fall out of specification.

The return is through terminal 73 and other 'C' terminals; for example the AUX supply terminal 72 current can return through terminal 73 as shown in the diagram below.

Example wiring

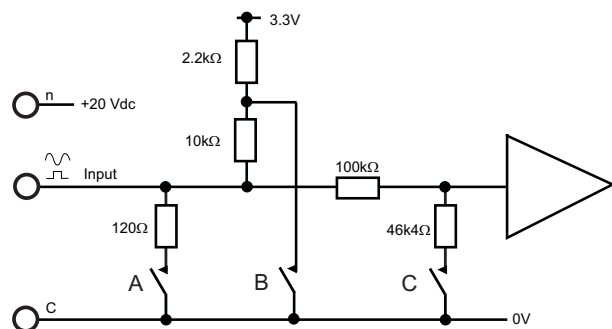


Universal Inputs

6 channels (IN1 to IN6)

The universal input channels can either be voltage input (0 to 10 V), thermistor input (0 to 200 kohm), digital input (volt free contact/open collector), or a current input (0 to 20 mA).

The input type is set automatically by strategy configuration (rather than having to also set hardware links) and this will switch in the required resistors using switches A, B, and C. These switches are set appropriately by connecting the channel in the strategy to a digital input module or a sensor module (the sensor type defines the switch settings).

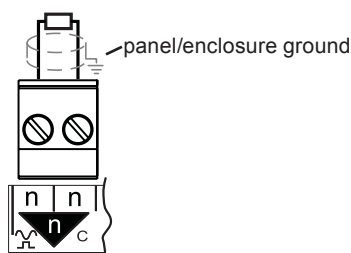


The switches are automatically selected as shown in the table below:

Input type	Switch A	Switch B	Switch C
Current	ON	ON	off
Voltage	off	ON	ON
Thermistor	off	off	off
Digital	off	off	off

Thermistor input (0 to 200 kohm): Can be used for a thermistor or a potentiometer. The thermistor bridge resistor is 12 kohm with a bridge supply 3.3 V.

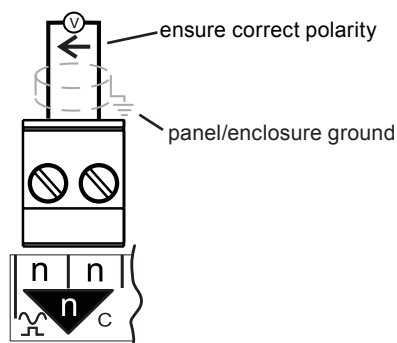
Example wiring



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

Voltage input: Provides a 0 to 10 Vdc input. *Note that the input resistance of the IQ422 analogue voltage input configuration is 9.4 kohm as opposed to 208 kohm in the equivalent IQ3 input so that the scaling for a potential divider input will be different; the selection is facilitated by SET.*

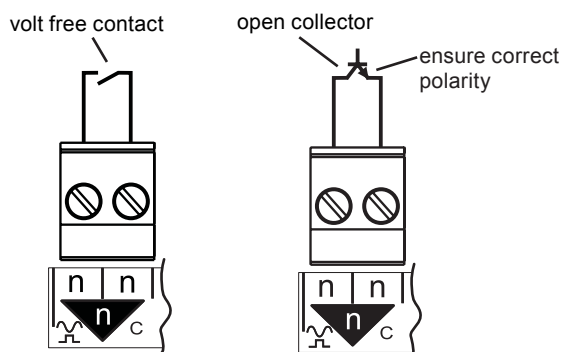
Example wiring



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

Digital input: Can be used for a volt free contact, or for an open collector. For digital inputs no sensor type is selected so all three switches (A, B, C) are de-energised as required for digital input signal conditioning.

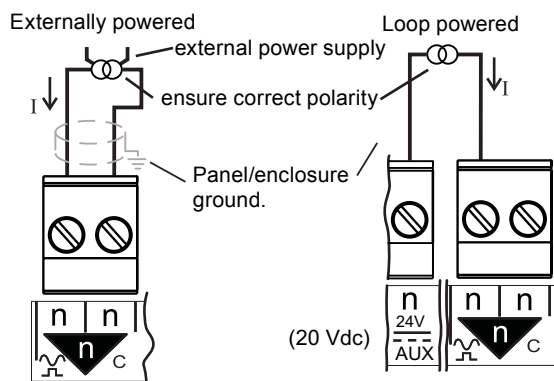
Example wiring



- The volt free contact has a nominal wetting current of 270 μ A. The input is on when the contact is closed. There is no polarity.
- The open collector or open drain (FET) must be able to sink 270 μ A. When the transistor or FET conducts, the digital input will be on. Polarity must be observed.

Current input: Supports 0 to 20 mA. May be either loop powered or external powered; the type is selected by connecting the sensor to different terminals as shown.

Example wiring



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

A loop powered sensor can be connected to the Auxiliary Supply Output.

Sensors

TB/TS Series: The TB/TS provides a wall mounting thermistor space sensor that can be connected to an IQ422 input. The TB/TS/K also provides setpoint adjustment as a potentiometer input. The TB/TS/KO has the TB/TS/K features plus an occupation override push button. The TB/TS/KOF is similar to the TB/TS/KO but also has fan speed control. The TB/TS/KOSF is similar to the TB/TS/KOF but also has additional occupation status LEDs. The TB/TS/KOS is similar to the TB/TS/KO but also has occupation status LEDs.

Displays

The IQ422 controller can be used with IQView, IQView4, IQView8, SDUxcite, and RD-IQ displays.

IQView8: The IQView8 is a touch screen network display. In addition to showing all the normal strategy items, it can access directories, timezones, and alarms, and users can be set up with configurable access rights. Schematic displays provide the ability to view, change and graph data from colour graphics pages. (These pages are created in the 963 supervisor and exported to the IQView8). Alarms can be sent directly to the IQView8. It can be connected to network by Ethernet, Trend Current loop Lan, or by RS232. The Ethernet connection can either be by the IQView8's own virtual CNC or by an external vCNC (e.g. the IQ422's). The RS232 connection enables the IQView8 to communicate either only with that IQ422 (if local supervisor port address is zero), or with the network (if local supervisor port address is non-zero). It has standard 4 wide terminals to connect to a Trend current loop

IQView4: The IQView4 is a touch screen colour display panel. It can access inputs, outputs, alarms, and plots, and allows knobs, switches, timezones, and time to be adjusted. Users can be set up with configurable access rights. It connects to the IQ422 by its RS232 port, and it can only communicate with that IQ422.

SDU-xcite: The SDU-xcite is a wall mounting 4 line display. In addition to showing all the normal strategy items, it can access directory modules and the IQ422's alarm log. It connects to the IQ422 by its RS232 port, and it can communicate only with that IQ422.

RD-IQ: The RD-IQ is a wall mounting temperature sensor and 3 digit display. It has the following variants:

RD-IQ/K: Room display with local temperature sensor and setpoint control

RD-IQ/KOS: As RD/K plus occupation override and occupation status display.

RD-IQ/KOSF: As RD-IQ/KOS plus fan speed control.

It connects to the IQ422 by its RS232 port, and it can communicate only with that IQ422. By default it accesses the following fixed strategy items (although these can be changed):

Local temperature S9
Setpoint K1
Occupation status K6
Fan speed status K7

FIRMWARE

The firmware in the IQ422 CPU board and baseboard can be upgraded over Trend current loop Lan or Ethernet (Ethernet recommended for speed).

STRATEGY

The IQ422's strategy modules are based on the traditional IQ paradigm with minor changes to increase capability and efficiency. The strategy file (.IQ4) is created and downloaded using SET.

SET facilitates strategy creation by providing an indexed library of pre-configured strategy blocks or custom solutions (entire controller strategies); these may be viewed, printed, or edited to suit the user. Once the strategy is complete it can be tested prior to download by using the SET controller simulator mode.

The strategy file and the other configuration file (backdrop) can be downloaded or uploaded across Ethernet (FTP). Only the strategy file (and not back drop files) can be downloaded over Trend current loop Lan (IQ422/LAN only - at baud rates 9k6 or greater), RS232 local supervisor port, and USB local engineering port. *Note that Lan, RS232, and USB port upload/downloads will be slower than for Ethernet.*

An Ethernet download requires the PC running SET to be connected to Ethernet, and to communicate with the IQ422 using the IQ422's IP address (SET will actually obtain the IP address from the IQ422 using the IQ System Lan number and device addresses). Downloads using the other interfaces are performed over the Trend network (using CNCs).

As explained in the [Hardware](#) section, the IQ422 can be restored to defaults by pressing the Service Button (e.g. to recover from a lost PIN when the user hasn't recourse to Trend Technical Support). This will clear down strategy files. It will restore the following strategy data to defaults (Lan number, outstation address, IP addressing mode, IP address, subnet mask, UDP port, identifier, Router 1, remote Trend devices, vCNC). It clears all user modules (passwords, PINs etc), alarm logs, and plots. Backdrop files are unchanged and time and date left at their current settings. After the reset the IQ422 should be re-configured from scratch and the strategy downloaded.

The IQ422's web server provides pages (HTML) which enable limited configuration from a web browser; most module parameters may be viewed and adjusted, but the strategy structure (module interconnections, adding or deleting a module) cannot be modified from a web browser.

Addressing

The Trend device Address is set up in the factory on a rolling basis in the range 11 to 119. The Lan number is set to 20 by default.

If the IQ422 has an Ethernet connection the Ethernet addressing parameters should be set up. Each IQ422 has a unique MAC (Media Access Control) address allocated to its Ethernet node. IP Tool enables the IQ422's address settings (IP address and other Ethernet parameters, Lan number and device address), and virtual CNCs to be set up.

For IQ4s on a Trend current loop Lan without an Ethernet connection, IQTool can be used for addressing. If the current loop Lan contains other controllers (e.g. IQ3s, IQ2s) then IQTool can discover these automatically, but the IQ4s should be added to the grid by entering the serial numbers; IQTool can then re-address the IQ4s if required.

If the current loop Lan consists exclusively of IQ4's, IQTool can be used to automatically discover them, and resolve the addresses. Alternatively they can be discovered manually either by pressing their service buttons, or by using a barcode scanner to scan their barcodes on either of the labels.

The Lan number should be set up using the SET Device View.

Strategy Modules

In the IQ422 the number of each type of module may be adjusted to match the requirements of the application as long as the memory capacity of the controller is not exceeded. The IQ422 has an absolute limit of 4000 modules of which 600 may be sequenced.

Each type of module has memory requirement in brIQs as listed below; SET also limits the number of modules as shown in the column below.

Module	brIQs	SET maximum
Address	24	1 (fixed) §
Digital Input	28	1000
Alarm Destination	14	(8)
Alarm Group	9	500
Alarm Route	9	500
Alarm Log†	0	1 (fixed) (up to 300 alarms) §
Analog Node	16	510
Digital Byte	16	1012
Digital Input#	28	1000
Directory	13	500
Display	19	500
Driver#	57	500
Function#	19	500
IC Comms#	19	250
Knob	13	1000
Logic#	19	500
Loop	55	500
Network	0	§
NTD	30	†††
Option	0	§
OSS	34	500
Page	4	500
Plot	12	500 ††
Program	0	1 (fixed) §
Schedule	21	500
Sensor#	76	1000
Sensor type	12	99
Sequence	106†	1 (fixed) (600 steps) §
Switch	10	1000
Time	38	1 (fixed)
Time Zone*	566	100
User	12	500
Virtual CNC	9	1 §

Notes:

For these modules the actual size (numbers of brIQs) varies with module type. The largest size is shown here.

* The time zone brIQ count allows for an average of 20 exceptions.

§ These modules are always in the IQ422 (not optional), but the number of Network modules (1 - Ethernet, 2 - IQ Lan, 3 - BACnet IP, BACnet Application etc), and Option modules (BACnet etc) depends on the IQ422's option build.

† The sequence table takes 106 briQs; the table includes 300 steps.

†† The maximum number of records for a plot is 1000 (5000 log points), but maximum total records varies with the type of plots used as explained above. The maximum number of plots which can occur in 1 s is 100 so there could be 100 off 1 s plots (but no others). This is calculated on the average plots service in 1 s, so a 1 minute plot would contribute a 1/60. For example 90 off 1s, +360 off 1 min would give 90+6= plots/s on average. The periodic and triggered plots must also be counted and it's up to the engineer to make his best estimate.

††† The number of NTDs in the IQ422 is only limited by the available briQs

‡ The alarm log can record up to 300 alarms after which the next alarm will overwrite the first alarm (FIFO). They can be viewed on the IQ422 web pages (up to 6 pages of 50 alarms)

The available capacity is measured in briQs. The total available capacity in an IQ422 is 16,000 briQs with 1000,000 log points of plot memory.

For synchronised plots each plot record requires 5 log points, so the IQ422 can have up to 200,000 synchronised plot records. For triggered or periodic plots, each record requires 10 log points, so the IQ422 can have up to 100,000 triggered or periodic plot records.

SET imposes the limit of 4000 modules. The IQ422 limits the number of destination modules to 8 as shown in the table. Alarm log, Network, Option, and Program modules have zero briQs.

In SET, as the modules are created, a tally is kept of the briQs used and the amount available to be used; an indication of this can be viewed. If the limit is exceeded, then SET will prohibit the creation of further modules.

It is possible to create modules which are not numerically sequential so module lists can be non-continuous (e.g. L1, L2, L5, L7...).

IC Communications

The IQ4s may communicate with each other and IQ2, IQ3, IQeco, and IQL controllers using inter controller communications (peer to peer communications) using Trend Lan/node addressing.

The IQ422/BAC is also able to communicate with BACnet devices using IC Comms; the 'Protocol' parameter specifies either Trend or BACnet protocol. The remote controller in the BACnet IC Comms module specifies a Non-Trend Device(NTD) module which is set up with BACnet device's BACnet address information. The table specifies the types of IC Comms with which the IQ422 will operate.

IC Comms Type	Initiated in					
	IQ4 or IQ3				IQeco	IQ2
	To IQ2	To IQeco	To IQ3/4	To BACnet	To IQ4	To IQ4
Data From Analogue	†Yes	§Yes	†Yes	†Yes	†Yes	*Yes
Data From Digital Byte	†Yes	††Yes	†#Yes	No	†Yes	*#Yes
Data From Digital Bit	†Yes	‡Yes	†#Yes	†Yes	†Yes	*#Yes
Data To Analogue	Yes	§Yes	Yes	†Yes	§Yes	Yes
Data To Digital Byte	*Yes	††Yes	*Yes	††Yes	No	Yes

IC Comms Type	Initiated in					
	IQ4 or IQ3				IQeco	IQ2
	To IQ2	To IQeco	To IQ3/4	To BACnet	To IQ4	To IQ4
Data To Digital Bit	Yes	‡Yes	Yes	†Yes	‡Yes	Yes
Global To Analogue	Yes	§Yes	Yes	†Yes	§Yes	Yes
Global To Digital Byte	*Yes	††Yes	*Yes	††Yes	No	Yes
Global To Digital Bit	Yes	‡Yes	Yes	†Yes	‡Yes	Yes
Minimum	Yes	§Yes	*Yes	No	No	*Yes
Maximum	Yes	§Yes	*Yes	No	No	*Yes
Sum	Yes	§Yes	*Yes	No	No	*Yes
Average	Yes	§Yes	*Yes	No	No	*Yes

*Only available on v1.2 or greater firmware.

†Only available on v2.0 or greater firmware.

§Only if item is a knob or sensor

‡Only if item is a switch or digital input.

#Although the IQ3/4 will respond to these requests, the digital byte module in the IQ3/IQ4 cannot be set up by the strategy. However, Digital Bit Data From IC Comms using switch or digital input status as the parameter value being transferred works fine.

†† Requires IQeco v2.0 or greater.

Note that IC Comms with IQ1v3 controllers are similar to those with IQ2 controllers except the IQ422 can only receive messages (i.e. Data To from IQ1), not send them. However, IC Comms with IQ1v4.1 or greater controllers can be considered to be the same as those with IQ2 controllers.

The receipt of IC Comms by an analogue node or digital bit/byte is implemented by creating analogue node or digital byte modules during the strategy creation process on SET.

Identification

The IQ422 will identify itself as an IQ4 to w comms.

Alarms

The IQ422 will generate Network, General, and Item alarms. Network alarms are generated by the Trend Network nodes, General alarms are generated when the IQ422 detects a problem within its own hardware or program, and Item alarms are generated by the strategy, and are normally due to a faulty plant condition.

Network alarms are sent to supervisors or tools connected to the RS232 local supervisor port, USB local engineering port, or to the controller's vCNC

Network, General, and Item alarms can either be sent in text, coded, or attribute format, and can be sent either to a designated Trend Lan address, to an IP address, as an email, or to a BACnet device (IQ4/BAC only). They are also stored locally in the Alarm Log. Only sensor, digital input, digital driver readback, and plot alarms can be sent to a BACnet device.

For coded alarms the protocol limits the item number to 255 maximum. For text alarms the maximum item label length is 20 characters (although the 963 can be setup to use labels previously learnt).

Sending an Email alarm requires the Email Server Address to be set up in the address module. The Email Server Address can be set up as an IP address, an internet domain name, or a host name; the internet domain name or host name require a DNS server address or a WINS server address respectively to be set up in the network module so that the name can be resolved.

Timemaster

The IQ422 can act as a Timemaster but doesn't have a battery-backed real time clock to support it in case of power failure. However, the supercap will support the clock for 8 days (typical) in the case of power failure.

Plots

The IQ422's plot modules can plot any connectable module output (analogue or digital). There are three types of plot module: synchronised, triggered, and periodic. Although all three types are BACnet interoperable, only periodic plots can be compliant with the BACnet standard. All plot modules can generate a buffer ready alarm when the number of records equals the notification threshold.

Language

The user can specify which language the IQ422 uses for the display of web pages and for transmitted alarms. The language files are embedded in the controller. In the controller the Address module has a language parameter which will be set by default to the default language, but can be changed to any one of the other available language files or English (e.g. change to English by setting the language parameter to 'english' on the address module web page). The IQ422 can use languages which require 8 bit code (i.e. special or accented characters) and can also operate with right to left languages (e.g. Chinese, Arabic).

Web Pages

Information from an IQ422 controller can easily be accessed using a Web browser over any TCP/IP network (e.g. a company Intranet). All that is required is the IP address or host name of the controller, and a valid user name and password (if users are set up in the controller). Once connection to the controller has been made, it is possible to view and adjust occupation times, view the alarm history, and view/adjust/graph individual module parameters.

Web pages may also be accessed by mobile smart phones and tablets (see Compatibility section below for details of compatible web browsers).

Module parameters may be monitored and changed using web pages but module creation, deletion, and linking can only be done using SET.

The IQ422 is provided with a standard set of web pages which covers all accessible modules.

Graphical display pages (GraphIQs) which are configured using IQ422's display and directory modules, can also be accessed. They can be shown over backdrop files which are separately downloaded.

For further details of web pages see the IQ4 Configuration Reference Manual (TA201263), the IQ4 Web User Guide, (TC201256), and the Graphical Display Pages Editor Manual, (TE200629).

FIELD MAINTENANCE

The IQ422 Controllers require virtually no routine maintenance. The unit should be cleaned with a cloth moistened with water in order to avoid buildup of dust or other contaminants. Disconnect power before carrying out any cleaning.



WARNING: Contains no serviceable parts. Opening the unit exposes hazardous voltages

DISPOSAL

COSHH (Control of Substances Hazardous to Health - UK Government Regulations 2002) ASSESSMENT FOR DISPOSAL OF IQ422 Controllers.

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

Browsers: This device has been successfully tested with Internet Explorer 8 and with the default browser on the following devices:

iPhone, v5.1 (9B176), MC603ZA,
iPad, v5.1 (9B176), MC979HN,
HTC One X, v4.03 (Android™),
Karbonn tablet, v4.03 (Android), SmartTab2.

It should work with all modern browsers, smart phones, and tablets (with JavaScript enabled) available at the date of release of this product.

Owing to the rapidly changing nature of web devices, new devices and browsers will become available after the release of this product. If you would like to check the compatibility of IQ422 with your device, please connect to: iq4demo.trendcontrols.com. Log in with username: mobile and password: trend

Supervisors and Displays: 963 v3.5 or greater, 916, IQView, IQView4, IQView8, RD-IQ, SDU-xcite.

Note that the NDP is not compatible with IQ422; it will not recognise an IQ422 connected to its network.

Utility software: SET v6.8 or greater

IC Comms: IQeco, IQ3, IQ2, IQL, and IQ1 (v3 onwards).

Controllers: IQ3/IQ4 directly and IQ1, IQ2, IQL by way of 3xtend/EINC L. IQ422/LAN communicates with IQ2, IQ1 directly. IQeco by way of IQ3/BINC.

Strategies: IQ1, IQ2, IQ3 can be imported into SET, converted into IQ4 strategies, and then downloaded into an IQ422. If the strategy file accesses I/O channels beyond those available in the IQ422 the strategy will be rejected.

Ethernet Nodes: 3xtend/EINC L, NXIP, or EINC. NXIP or EINC must not be used in an automatic IP addressing environment.

COMPATIBILITY (continued)

BACnet Devices: IQ4/BAC only. Being tested as a BACnet Application Specific Controller (B-ASC). Compatibility defined in IQ4 Product Implementation Conformance Statement (TP201248). All references to BACnet compatibility in Trend documentation are reliant on successful certification (not yet achieved).

INSTALLATION

The IQ422 is installed on a DIN rail by using the DIN rail clip. The /230 version must be installed inside an enclosure rated to at least IP20 or equivalent. The /24VAC version should be installed in an enclosure or outside normal reach (e.g. in a plenum). The installation procedure involves:

- Mounting the controller in position
- Connecting power, do not power up
- Connecting Ethernet if required
- Connecting RS232 if required for supervisor/tool/display.
- Connecting USB if required for tool
- Connecting IQ system Lan (IQ4/LAN only)
- Terminating the I/O channels, leave unconnected
- Powering up
- Setting up IP address parameters (if Ethernet used)
- Setting up Lan number and Device address,
- Checking network
- Configuring the strategy
- Testing strategy using controller simulation in SET
- Downloading strategy and other configuration files
- Check BACnet communications (IQ4/BAC only)
- Connecting inputs and checking operation
- Connecting outputs and checking operation

A full description of installing the unit is given in the IQ422 Installation Instructions - Mounting (TG201264) and IQ422 Installation Instructions - Configuration (TG201265).

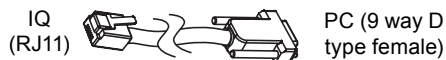
CONNECTIONS

This section provides an overview of the location of the connectors and the types of connections that can be made. For detailed information about each connection see the appropriate section of this data sheet.

RS232 Local Supervisor Port (RJ11)

For connection of supervisor, tool or display)

RJ11 to 9 way 'D type' female cable
CABLE/EJ101442 for PC connection



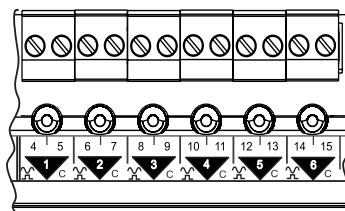
RJ11 to RJ11

RD/SDU-IQ2COMMSCABLE/nM (n=3, 3m; n=10, 10m)
for RD-IQ, SDU-xcite, IQView4 connection

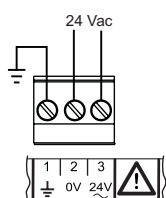
CABLE/EJ105650 for IQView8 connection

**Universal Inputs (IN1, to IN6)**

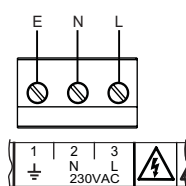
Voltage input (0 to 10V), current input (0 to 20 mA),
thermistor input (0 to 200 kohms, or digital input

**Input Power Connector**

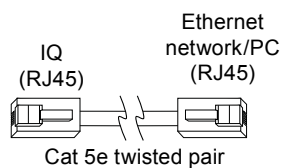
24 Vac



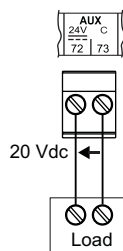
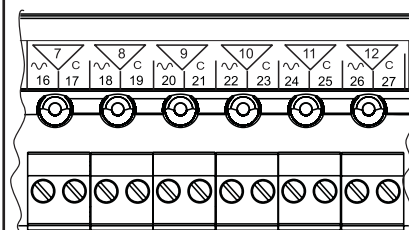
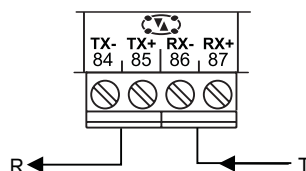
230 Vac

**Ethernet Port**

For connection of Ethernet
network or directly to PC
(crossover adaptor not required)

**USB Local Engineering Port (Micro B USB)**

For connection of SET

**Auxiliary Supply Output****Analogue Outputs (OUT7 to OUT8)****Current Loop Lan (/LAN only)**

ORDER CODES

IQ422 Basic Order Code Structure
IQ422/[LAN]/[BAC]/[Power]

[LAN]	Blank	No Trend current loop Lan
	LAN	Trend current loop Lan option fitted
[BAC]	Blank	No BACnet protocol
	BAC	BACnet over IP protocol capability option included
[Power]	230	230 Vac input power supply
	24VAC	24 Vac input power supply

Note that XML web services are standard supply in the IQ422.

Available Order Codes

IQ422/12/230	:IQ422 with 230 Vac supply with Ethernet
IQ422/12/BAC/230	:IQ422 with 230 Vac supply with Ethernet and BACnet over IP
IQ422/12/LAN/230	:IQ422 with 230 Vac supply with Trend current loop Lan and Ethernet
IQ422/12/LAN/BAC/230	:IQ422 with 230 Vac supply with Trend current loop Lan, Ethernet, and BACnet over IP
IQ422/12/24VAC	:IQ422 with 24 Vac supply with Ethernet
IQ422/12/BAC/24VAC	:IQ422 with 24 Vac supply with Ethernet and BACnet over IP
IQ422/12/LAN/24VAC	:IQ422 with 24 Vac supply with Trend current loop Lan and Ethernet
IQ422/12/LAN/BAC/24VAC	:IQ422 with 24 Vac supply with Trend current loop Lan, Ethernet, and BACnet over IP

ACCESSORIES

CABLE/EJ101442	:Adaptor cable to connect PC to IQ422 RS232 local supervisor port
RD/SDU-IQ2COMMSCABLE/3M	:3 m, 3 yds 10" cable to connect RD-IQ, SDU-xcite, IQView4 to IQ422 RS232 local supervisor port (supplied with IQView4)
RD/SDU-IQ2COMMSCABLE/10M	:10 m, 11 yds cable to connect RD-IQ, SDU-xcite, IQView4 to IQ422 local supervisor port
CABLE/EJ105650	RJ11 plug to RJ11 plug with crossover to connect IQview8 to IQ422 RS232 local supervisor port connector
TP/1/1/22/HF/200	:200 m of screened single twisted pair 0.34 mm ² (22AWG) (Belden equivalent 8761NH), for use on current loop Lan (IQ4/LAN version), input/output channel wiring (not USA).
TP/2/2/22/HF/200	:200 m of screened twin twisted pair 0.34 mm ² (22AWG) (Belden equivalent 8723NH), for use on current loop Lan (IQ4/LAN version) (not USA).

SPECIFICATIONS

ELECTRICAL

Input power supply voltage	:230 Vac $\pm 10\%$ 50/60 Hz at up to 42 VA
/230	:24 Vac $\pm 10\%$ 50/60 Hz at up to 38 VA
/24VAC	:No replaceable fuses required.
Fusing	:All strategy and data in nonvolatile memory. Supercap maintains real time clock for up to 8 days (typical).
Power failure protection	:10 s per month (typical).
Clock accuracy	:Sequence table 1s.
Cycle time	:Main bus, 10BASE-T, 100BASE-T (IEEE 802.3). Supports TCP/IP, FTP. IQ422 supports auto MDI/MDI-X which eliminates need for crossover adaptor
Ethernet	:100 m, 109 yds
Distance	:vCNC address to be configured in strategy.
Virtual CNC address	:RS232, EIA/TIA/232E, V28 supports IQ System comms
RS232 Local Supervisor Port	:15 m, 16 yds
Transmission	:9k6.
Distance	:Selectable by software, 116 nodes addressable (1, 4 to 119 excluding 2,3,10) set to be unique on Lan.
Baud rate	:230, 21 Vdc $\pm 5\%$ at 60 mA maximum
Address	:24VAC, unregulated supply will vary with input supply voltage and controller loading between 17 to 35 Vdc at 60 mA maximum.
Supply Output	<i>Note for combined supply see the limitation in the 'Auxiliary Supply Output' on page 7.</i>
USB Local Engineering Port	:Micro B connector. USB 2.0. Supports 480 Mbits/s (Hi-Speed). Maximum cable length 5 m
Current Loop Lan (/LAN only)	:20 mA two wire current loop, opto-isolated, polarity independent receiver, balanced transmitter
Transmission	:Dependent on cable type, see table below.
Distance	

Cable	Baud Rate					No. of Wires
	1k2	4k8	9k6	19k2	38k4	
Belden 9182	1000 m (1090 yds)			700 m (765 yds)	500 m (545 yds)	2
Belden 9207				500 m (545 yds)	350 m (380 yds)	2
Trend TP/1/1/22/HF/200 (Belden 8761)	1000 m (1090 yds)		700 m (765 yds)	350 m (380 yds)	250 m (270 yds)	2
Trend TP/2/2/22/HF/200 (Belden 8723)			500 m (545 yds)	250 m (270 yds)	125 m (135 yds)	4

Baud rate	:Auto-detected in range 1k2, 4k8, 9k6, 19k2, 38k4 - set to be same as other nodes on Lan.
Address	:The IQ422 address on Lan is set by software. Set to be unique on network; 116 nodes addressable (1 to 119 excluding addresses 2,3, and 10)

Inputs/Outputs

Signal Cable	:Universal inputs, and analogue voltage outputs; TP/1/1/22/HF/200 recommended (Belden 8761)
Universal inputs	:6 universal input channels IN1 to IN6. Can be set by software to voltage input (0 to 10 V), current input (0 to 20 mA), thermistor input (0 to 200 kohm), or digital input (volt free contact/open collector).
Voltage input	:12 bit resolution. Minimum 60 dB series mode rejection at input power supply frequency. 0 to 10 V, input resistance 9.4 kohm, accuracy 50 mV equivalent to $\pm 0.5\%$ of span.
Current input	:12 bit resolution (4096 steps - effective). Minimum 60 dB series mode rejection at input power supply frequency. 0 to 20 mA, input resistance 120 ohm, accuracy 0.5% of span (i.e. 100 μ A). Can connect either loop powered or external powered sensors. Supply to loop powered sensors by Auxiliary Supply Output.
Thermistor input	:(potentiometer, thermistor, fan speed control). 0 to 200 kohm 12 bit resolution. Minimum 60 dB series mode rejection at input power supply frequency. Thermistor bridge resistor 12.2 kohm, accuracy $\pm 0.5\%$ typical at 25 °C (1 kohm to 100 kohm). Bridge supply 3.3 V.
Digital input	:(volt free contact, open collector (or drain)). Count rate 30 Hz (minimum pulse width of 16.6 ms). 3.3 V supply through 12 kohm.
Volt free contact input	:Wetting current = 270 μ A nominal. (ON = closed contact.)
Open collector (or drain) input	:Must be able to sink 270 μ A. Must be earthed (grounded) to same earth (ground) as IQ422. Polarity dependent. (ON = transistor/FET conducts.)
Analogue Outputs	:6 analogue output channels OUT7 to OUT12. 11 bit resolution (2048 steps). 0 to 10 Vdc at up to 20 mA, reduce to 18 mA maximum above +40 °C (+104 °F). Accuracy $\pm 0.5\%$ of span. <i>Note for combined supply see the limitation in the 'Auxiliary Supply Output' on page 7.</i>
Auxiliary Supply Output	:20 Vdc $\pm 10\%$. Return through terminal 73 and other 'C' terminals.
/230	120 mA maximum shared between terminals 70, 71, plus 120 mA maximum from terminal 72
/24VAC	240 mA maximum shared between all three terminals, 70, 71, 72. Reduce maximum current to 200 mA above 40 °C. <i>Note for combined supply see the limitation in the 'Auxiliary Supply Output' on page 7.</i>

INDICATORS

Power (P)	:Green LED
Watchdog (W)	:Red LED
Lan OK (L)	:Green LED
Service Button (S)	:Yellow LED
RX	:Yellow LED
TX	:Yellow LED
OK	:Green LED
RX	:Yellow LED
IN1 to IN6	:Yellow LED
OUT7 to OUT12	:Yellow LED

MECHANICAL

Dimensions	:116 mm (4.57") x 157.5 mm (6.2") x 58.5 mm (2.3").
Material	
Main body	:PCABS FR
Terminal covers	:Translucent PC FR
Weight	:
/24VAC	:366 gm (0.8 lb)
/230	:402 gm (0.88 lb)
Connectors	
Power	:2 part connectors with rising cage clamp screw terminals for 0.5 to 2.5 mm ² cross section area (20 to 14 AWG) cable.
I/O	:2 part connectors with rising cage clamp screw terminals for 0.5 to 2.5 mm ² cross section area (20 to 14 AWG) cable.
Current loop Lan	:2 part connectors with rising cage clamp screw terminals for 0.5 to 2.5 mm ² cross section area (20 to 14 AWG) cable.
Supervisor port	:RJ11 (FCC68).
Ethernet	:RJ45 connector.
USB	:Micro B connector. USB 2.0.

ENVIRONMENTAL

EMC	:EN61326-1:2006
Immunity	:Table 2 - for equipment intended for use in industrial locations
Emissions	:Class B
Safety	:EN61010-1:2010
CB Certification Scheme	:TBA
Ambient limits	
Storage	:-25 °C (-13 °F) to +60 °C (+140 °F)
Operating	:-25 °C (-13 °F) to +55 °C (+131 °F).
Humidity	:0 to 90 %RH non-condensing
Altitude	:<4000 m (13124')
Pollution degree	:2 (Only non-conducting pollution occurs)
Protection	
/230	:IP20 if mounted in an enclosure rated at IP20 or equivalent
/24VAC	:IP20

IPad and iPhone are trademarks of Apple Inc., registered in the U.S and other countries. Android is a trademark of Google Inc.

Please send any comments about this or any other Trend technical publication to techpubs@trendcontrols.com

© 2013 Honeywell Technologies Sàrl, ECC Division. All rights reserved. Manufactured for and on behalf of the Environmental and Combustion Controls Division of Honeywell Technologies Sàrl, Z.A. La Pièce, 16, 1180 Rolle, Switzerland by its Authorized Representative, Trend Control Systems Limited.

Trend Control Systems Limited reserves the right to revise this publication from time to time and make changes to the content hereof without obligation to notify any person of such revisions or changes.

Trend Control Systems Limited

Albery House, Springfield Road, Horsham, West Sussex, RH12 2PQ, UK. Tel:+44 (0)1403 211888 Fax:+44 (0)1403 241608 www.trendcontrols.com

Trend Control System USA

6670 185th Avenue NE, Redmond, Washington 98052, USA. Tel:(425) 869-3900 Fax:(425) 869-8445 www.trend-americas.com