

## IQ24x SERIES CONTROLLERS



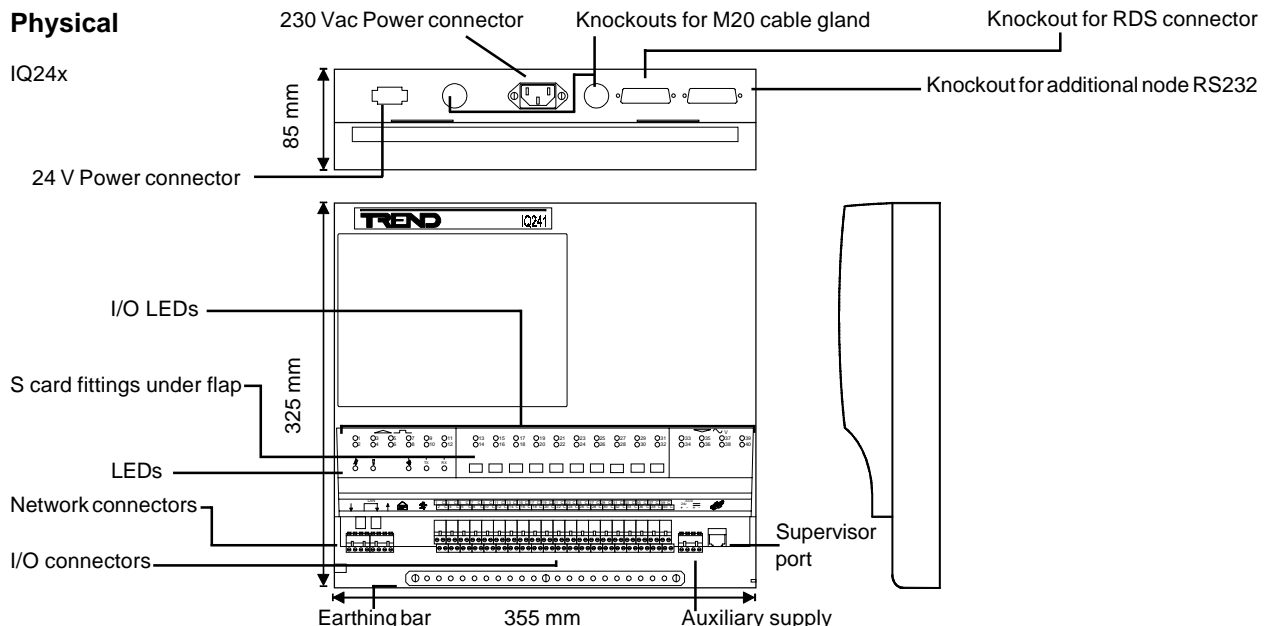
### Description

The IQ24x series controllers are of medium capacity designed for the control of all types of building plant. They can provide a minimum of 12 digital inputs, and 8 analogue voltage outputs. A further 20 I/O points can be made available by using up to 10 S cards, each providing 2 inputs or outputs of the same type (8 input only, 12 input or output). The IQ242 has 8 thermistor inputs pre-fitted via 4 S cards. S cards can provide analogue current, analogue voltage, thermistor, or digital inputs, or analogue voltage outputs giving the IQ24x sufficient capability for more complex strategies. It can operate either as a stand alone device or as part of a Building Management System. If required a Network Display Panel can be mounted on the front cover, or externally, using a node controller built into the IQ24x. A standard Display Panel can also be mounted on the front cover, or externally. The IQ24x also has the facility to connect any Trend supervisor or Engineering Tool to the network without a separate node controller.

### Features

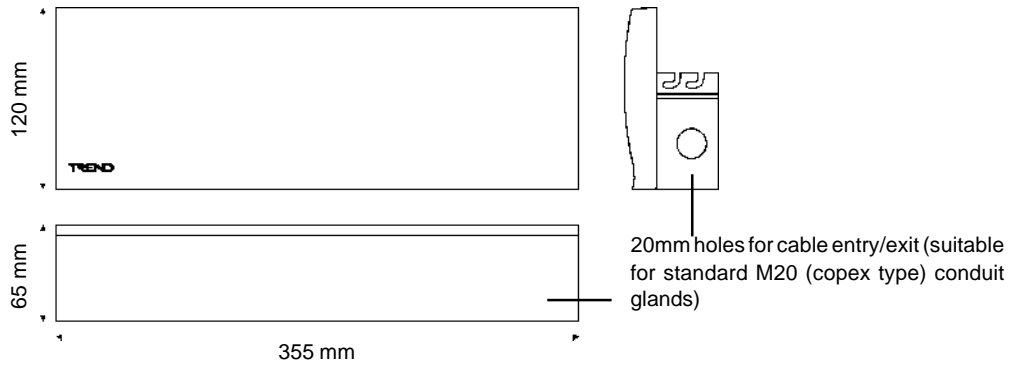
- 1 second cycle time.
- Optional integral/external Network Display Panel.
- Optional integral/external Display Panel.
- Access to entire network via local supervisor connection.
- Facility for mounting an additional node controller.
- High capacity DDC with PID control loops.
- Stand alone or integrated system operation.
- 12 digital inputs.
- 8 analogue voltage outputs.
- 10 slots for S cards (20 I/O points)(IQ242 has 4 cards pre-fitted)
- Optional cable management system.
- Optional relay extension system.

### Physical

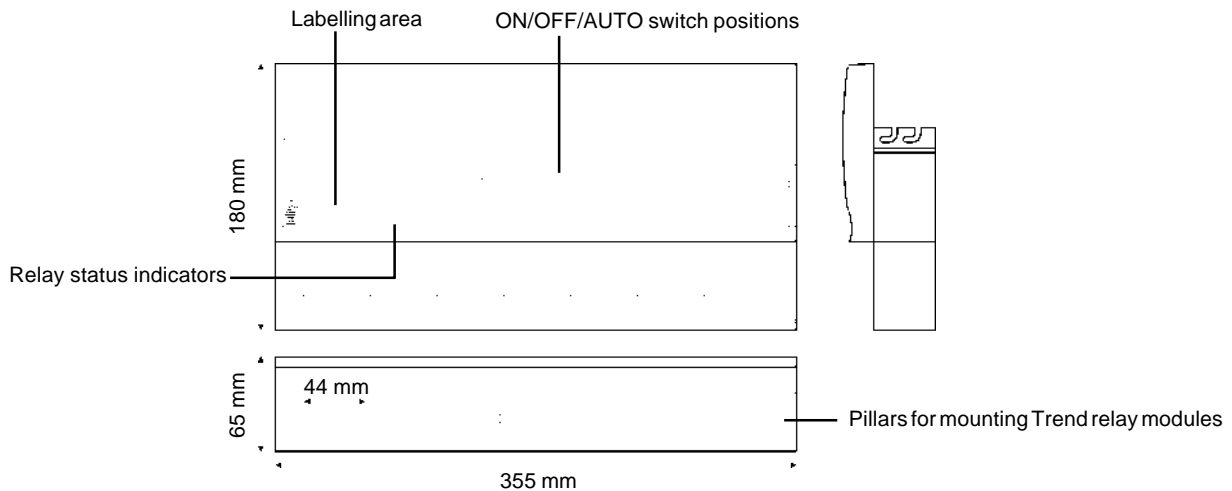


**PHYSICAL** (Continued)

Cable Management System



Relay Management System



**FUNCTIONALITY**

The IQ24x Controller’s functionality can be divided into two sections, the strategy, and the hardware.

**STRATEGY**

The strategy processes inputs according to a set of instructions and then outputs signals which can be used to control plant.

**Communications:** When operating as part of a Building Management System, the IQ24x will be connected to other devices via the Trend Network. This means that information within the IQ24x can be accessed using one of the Trend supervisor programs, or passed to other Trend IQ controllers using inter-controller communications, enabling the sharing of information across the whole system.

When connected to the network the controller can use up to 3 different addresses. One address is for the controller itself, the second and third are optional, and are for the Network Display Panel, and locally connected supervisor. This means that both the Network Display Panel and supervisor have their own network addresses when connected to the network via the controller.

The controller’s address is set by a switch on the module, and the addresses for the network display panel, and supervisor are software selectable.

**Configuration:** The IQ24x uses the standard IQ configuration mode which enables configuration via the network, or by direct connection. Alternatively the ACE+ utility can be used to create a strategy data file which can then be downloaded to the controller by the 822+/Toolbox. The 822+/Toolbox version 6 can be used to upload, and download IQF files for backup purposes.

**The Engineer’s Journal:** This enables information about changes made to the strategy to be entered. Pressing ‘J’ while in configuration mode displays existing messages. A new message can be entered by entering the next number (e.g. if there are 3 messages, enter 4,) and then the message. There may be a maximum of 4 messages of up to 60 characters each.

**I/O Summary:** The I/O Summary lists all the I/O channels available including the S Cards that are fitted. Typing ‘io’ while in configuration mode on the top menu page displays this list.

**STRATEGY** (Continued)

**Modules:** The strategy consists of a number of individual functional blocks known as configuration modules. These blocks can be linked in various combinations to enable plant to be controlled appropriate to the building's requirements. The table lists the different types of configuration modules and the number of each type available with IQ24x. Full details of the modules are given in the IQ Configuration Manual. Differences between the modules covered in the manual and the IQ24x's modules are described below.

Module Type	Number	Module Type	Number
Sensor	48	Critical Alarm	4
Sensor type	12	Alarm History	20
Loop	32	IC Comms	16
Function	160	Digital Inputs	48
Logic	160	Fast Sequence	8
Driver	32	Zone	5
Knob	30	Schedule	32
Switch	20	Calendar	20
Sensor log	32	User Password	6
Sequence step	400	Sequence time	1 s

*Note that the sequence cycle time is 1 second. This will enable the IQ24x to control faster processes, and respond more rapidly to alarm conditions than IQ1x series controllers.*

**Sensor Types:** The IQ24x is inherently more accurate at thermistor temperature measurement than Series 1 IQ controllers as it measures both the reference voltage and the voltage developed across the thermistor and using a 0.1% bridge resistor then calculates the thermistor resistance. The IQ24x has five sensor types:

- 0 linear
- 1 log
- 2 linearise thermistor volts
- 3 linearise volts
- 4 linearise thermistor ohms

Type 0, linear, has been changed relative to the IQ151+ (or earlier controllers using  $\pm 5$  V for linear voltage T and B parameters - IQ111, 131, 151) for linear voltage only in that T and B must be set to the values of the variable being sensed which give outputs of +10 V and -10 V respectively.

Type 1, log, is the same as before.

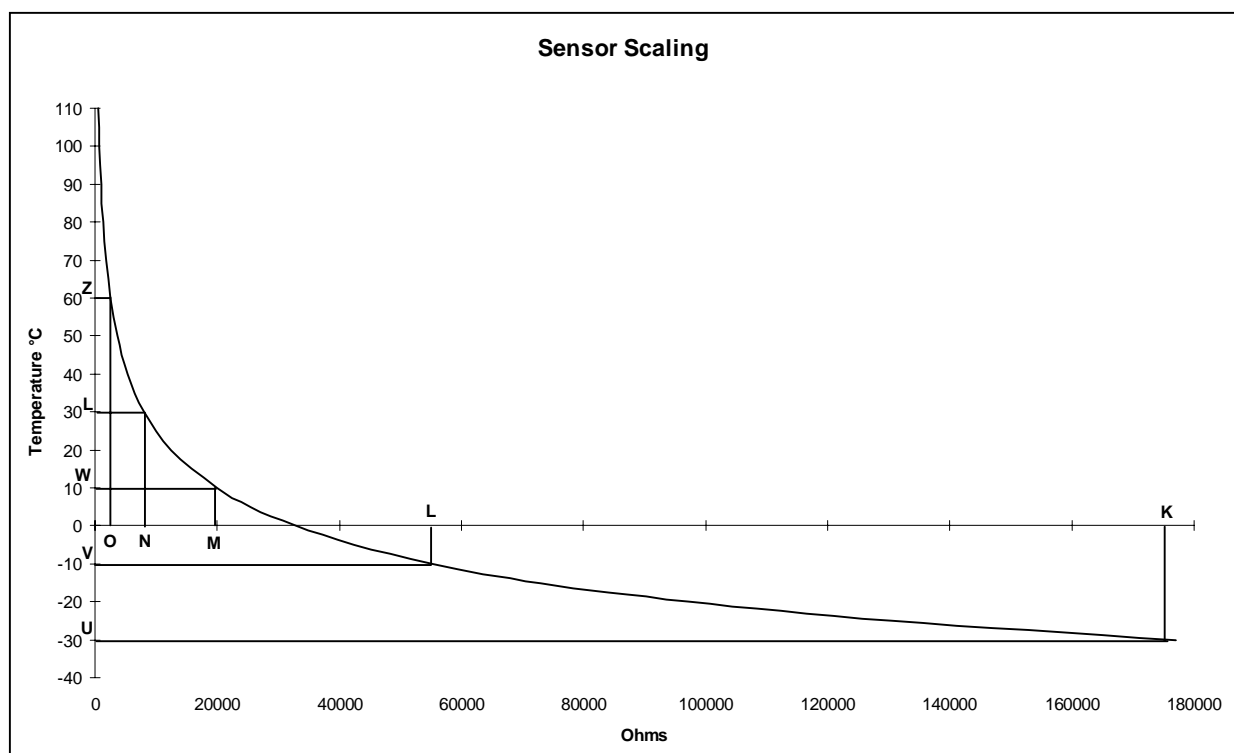
Type 2, linearise, is now 'linearise thermistor volts', and is reserved for thermistors only.

Type 3, linearise volts, is to be used for voltage or current signals which need to be linearised and is the same format as sensor type 2.

Type 4, linearise thermistor ohms, may be used instead of type 2. It presents a logical method of defining the thermistor linearisation requiring entry of ohms against temperature directly from the sensor characteristic. It enables the linearisation points on the temperature scale to be individually chosen so that they can be closer together over a part of the characteristic where the gradient is changing rapidly, and further apart where the gradient changes only gradually. A sensor type 4 appears in configuration mode as shown.

Scaling 4	linearise thermistor ohms				
U	V	W	Y	Z	
units	0.00	0.00	0.00	0.00	0.00
kohms	0.00	0.00	0.00	0.00	0.00
K	L	M	N	O	

The parameters U, V, W, Y, Z and K, L, M, N, O are obtained from a characteristic graph of the sensor. For example:



**STRATEGY** (Continued)

The graph shows the temperature characteristic for a Trend thermistor sensor. If the sensor is to be used for a temperature range -30 °C to +60 °C, then this defines points U, K and Z, O. The other three points have now to be chosen:

The gradient changes most rapidly over the 'knee' of the characteristic therefore around this area the points should be closer together. The points are found by drawing four straight lines, approximating as closely as possible to the curve. Each of these lines should provide a best fit straight line approximation to that curve segment. The actual point values should be obtained from a table rather than a graph, for greater accuracy. The standard Trend table (see IQ Configuration manual) gives the following points for the -30 °C to +60 °C example.

	°C		k $\omega$
U	-30	K	177.00
V	-10	L	55.34
W	10	M	19.98
Y	30	N	8.06
Z	60	O	2.49

Table showing recommended sensor type 4 settings for standard temperature ranges of Trend thermistor sensors.

		-10 °C to 110 °C	-10 °C to 40°C	-40 °C to 50°C	-10 °C to 70°C
U	°C	-10	-10	-40	-10
V		2.5	-5	-28.5	0
W		16.5	4.5	-14	12.5
Y		42	19	8.5	33
Z		110	40	50	70
K	k $\Omega$	54.06	55.34	328.87	54.44
L		28	40.5	157.9	32.49
M		14.06	25.26	64.35	16.93
N		3.9	12.63	19.18	6.38
O		0.51	5.32	3.6	1.75

**Address module:** The address module has two extra addresses for the NDP and Supervisor (3 in total).

**Supervisor portaddr:** This should be set to the network address of the supervisor connected via the IQ24x supervisor port (this could also be an NDP). It can take the normal range of addresses on the network, as long as an address is not duplicated. If set to address zero the supervisor will only communicate with the local IQ24x.

**ndp pOrt addr:** This should be set to the network address of the NDP connected via the NDP port (this could also be a local supervisor). It can take the normal range of addresses on the network, as long as an address is not duplicated. If set to address zero the NDP will only communicate with the local IQ24x.

**Supply frequency option:** There is no supply frequency option on the address page as the problem of mains pick-up is dealt with automatically by the hardware.

**Serial number:** This is factory set to the serial number on the main board. It can be accessed with text comms using 'R(s)' (s must be lower case).

**Loader Issue:** This displays the issue and date of the download kernel that is in the controller. It can be accessed with text comms using 'R(c)' (c must be lower case).

**Identity:** The IQ24x will identify itself (e.g. to the 945 and the NDP) as an 'IQ2xx v1'. This is so that existing versions of these programs can operate with the IQ24x.

If the IQ24x receives an identify message aimed at either the supervisor, or NDP port it will identify the attached device. If there is no device attached then it will identify the port as a CNC.

**Battery Status:** The IQ24x has a battery status checking circuit which will check the battery on power up and thereafter at every midnight and generate a digital bit if the battery voltage has fallen below a threshold value. If the voltage has fallen below this value it will set byte 506 bit 0. This bit being set is an indication that the battery needs to be changed. It should be used within the strategy to generate an alarm (e.g. critical alarm). The battery should be changed after the first indication. The battery will have a typical life of 10 years at 20 °C. This will be derated as the temperature increases with a minimum guaranteed life of about 5 years. It is recommended that the battery is replaced every 5 years.

**Time Resolution:** The faster processor improves the time resolution on various modules. Loop and logic reschedule times now have a resolution of 1 s, and drivers start delay, TP period, and RL drive time have increments of 1 s with a maximum of 32767 s.

**Large numbers:** As a result of certain calculations (e.g. divide by zero), an analogue value may be returned as 'infinity', and similarly, dividing infinity by infinity gives 'NaN' (not a number). Both these values are represented by alpha characters; they never appear in analogue nodes but may appear in certain module parameters (e.g. OSS logs) where they are treated as very large numbers.

**Sensor Log:** The IQ24x has 32 logging channels. Each channel can sample a sensor value at a prescribed interval (period), and store up to 1000 values. After 1000 values have been recorded the oldest value is overwritten. This means that the last 1000 values are always available. Logging is performed at 10 different intervals (1s, 1m, 5m, 10m, 15m, 20m, 30m, 1h, 6h, and 24h). The interval can be specified from any of those listed in the table below.

Period	Duration	Period	Duration
1 s	16 m 40 s	20 m	13 days 21 h 20 m
1 m	16 h 40 m	30 m	20 days 20 h
5 m	3 days 11 h 20 m	1 h	41 days 16 h
10 m	6 days 22 h 40 m	6 h	250 days
15 m	10 days 10 h	24 h	1000 days

**I/O Channel reference:** The IQ24x has very flexible I/O which can be configured in a number of ways. The configuration input modules (sensors and digital inputs) and the output modules (drivers) are related to the external channels as shown in the table below. The external channel reference for these modules is displayed in configuration mode.

Module type	Module reference	External channel
Sensor-analogue input	S1 to S20	13 to 32
Sensor-digital input	S1 to S32 (not normally used*)	1 to 32
Digital input	I1 to I32	1 to 32
Driver	Driver channel 1 to driver channel 20	40 to 21

The table below specifies the possible modes for each channel.

Module	Input Modes
S1 to S20	analogue input, digital input*, internal analogue, internal digital
S21 to S32	digital input*, internal analogue, internal digital
S33 to S48	internal analogue, internal digital
I1 to I32	digital input
I33 to I48	internal digital

*Note that as sensors and digital inputs are supported separately on the display panel, and have separate labels, use of sensor modules in digital input mode is not normally required.*

**HARDWARE**

**Unit:** The IQ24x is supplied in a metal and plastic enclosure which provides IP40 protection for the unit. The controller can be fitted with an optional cable management system or relay extension system.

**Cable management system:** The cable management system comprises of a metal box with 17 off 20 mm metal knockouts (4 rear, 11 bottom, 1 each side). The knockouts can be removed to provide cable entry/exit holes suitable for grommets, or standard M20 (copex type) conduit glands. It fits immediately underneath the controller, or the relay extension system (if fitted) using a simple hooking method preventing accidental contact with the terminals.

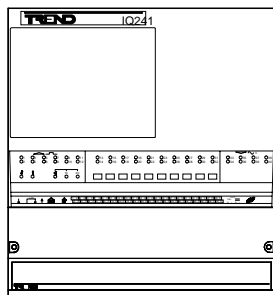
**Relay extension system:** The relay extension system provides an easy way to mount Trend relay modules, it also IP40 protection to the relay modules inside. If required more than 1 relay extension system can be fitted. It fits immediately underneath the controller or other relay extension system using a simple hooking method. If the relay extension system is to be fitted the cable management system must also be fitted. The relay extension system consists of a metal tray with mounting pillars for Trend relay modules, and a fire retardant ABS cover, an insulating plate, a paper label for labelling of relays, and switches (if fitted), a sticky label to protect the relay label, 16 light pipes, and a bracket for mounting ON/OFF/AUTO switches. The relay modules clip onto the mounting pillars. The table below illustrates the possible combinations of relay modules that may be mounted using 1 relay extension system.

**ON/OFF/AUTO Switches:** Each relay mounted in the relay extension system can be equipped with an ON/OFF/AUTO switch using the ON/OFF/AUTO switch kit that fits onto the bracket supplied with the relay extension system. This kit consists 1 ON/OFF/AUTO switch with cable and connector.

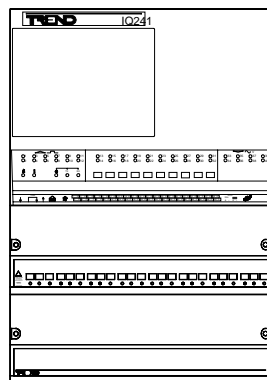
The relays can be linked to the IQ's auxiliary power supply, and signal output using relay connector leads (CABLE/RMT/10, and CABLE/RMT/30). If required other relay extension systems can be mounted underneath the first to provide additional relay mounting space in which case longer relay connector leads are required. *Note that if the relay extension system is to be fitted the cable management system must also be fitted.*

Max Number of Relay Module per relay extension system		
2RM or 2SRM	3RM	6RM
8	0	0
6	1	0
5	0	1
4	2	0
3	1	1
2	0	2
0	1	2
0	4	0

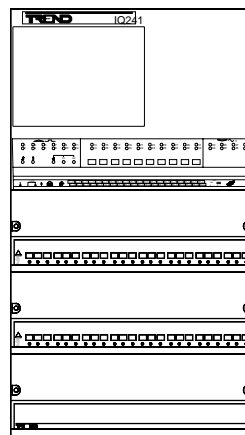
The diagrams below illustrates how up to 3 relay extension system and an cable management system can be fitted to an IQ24x



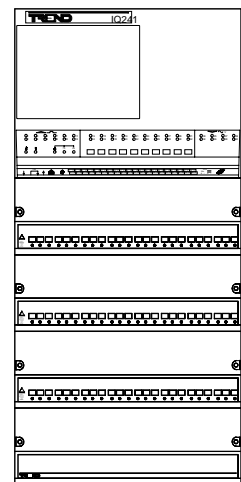
IQ24x  
Cable Management System



IQ24x  
Relay Extension System  
Cable Management System



IQ24x  
Relay Extension System  
Relay Extension System  
Cable Management System



IQ24x  
Relay Extension System  
Relay Extension System  
Relay Extension System  
Cable Management System

**Network:** The network terminals facilitate connection of 4 or 2 wire cables. The address and baud rate (19k2, 9k6, or 1k2) are selected by switches. The standard Trend node features are included (TX RX, and LAN indicators, bypass relay, and network alarm generation). There is also the facility for connection of a Network Display Panel, and/or supervisor to the network via the controller without the need for additional node controllers. A location is also provided for mounting an extra node controller, e.g. MNC, should this be required.

**Connectors:** Two part connectors are used throughout to facilitate wiring. The 230 Vac power supply uses a standard IEC connector.

**Power:** 230 Vac 50/60 Hz, 24 Vac. 24 V supply must be isolated.

**Fusing:** The controller has no fuses; protection is provided by means of a self resetting thermally protected transformer. The I/O modules are also individually protected against short circuits.

**Battery Backup:** Details about the strategy configuration, time and date, and logged data are stored in RAM. A plug-in lithium cell provides power to maintain the data in the event of power failure, or the controller being switched off.

**S Cards:** S Cards enable the IQ configuration of the controller to be set up according to user requirements. Each card provides 2 input/output channels of the same type. The range of S Cards provides analogue current, analogue voltage, thermistor, and digital inputs, or analogue voltage outputs. The IQ24x has space for 10 S Cards providing up to 20 additional I/O channels (8 input only, 12 input or output). The IQ242 has 8 thermistor inputs pre-fitted via 4 S cards.

**HARDWARE** (Continued)

**Auxiliary Supplies:** The IQ24x has two types of auxiliary supplies which share 1000 mA. Both are thermally protected and can supply 24 Vdc at a maximum of 500 mA. The first is a single connector for relay modules, sensors external NDP, external DP etc.

The second consists of 20 connectors for relay modules etc connected to channels 21 to 40. The 1000 mA will normally be available, but if the IQ24x has an integral NDP and an additional communications node fitted, only 900 mA will be available to be shared between the two supplies.

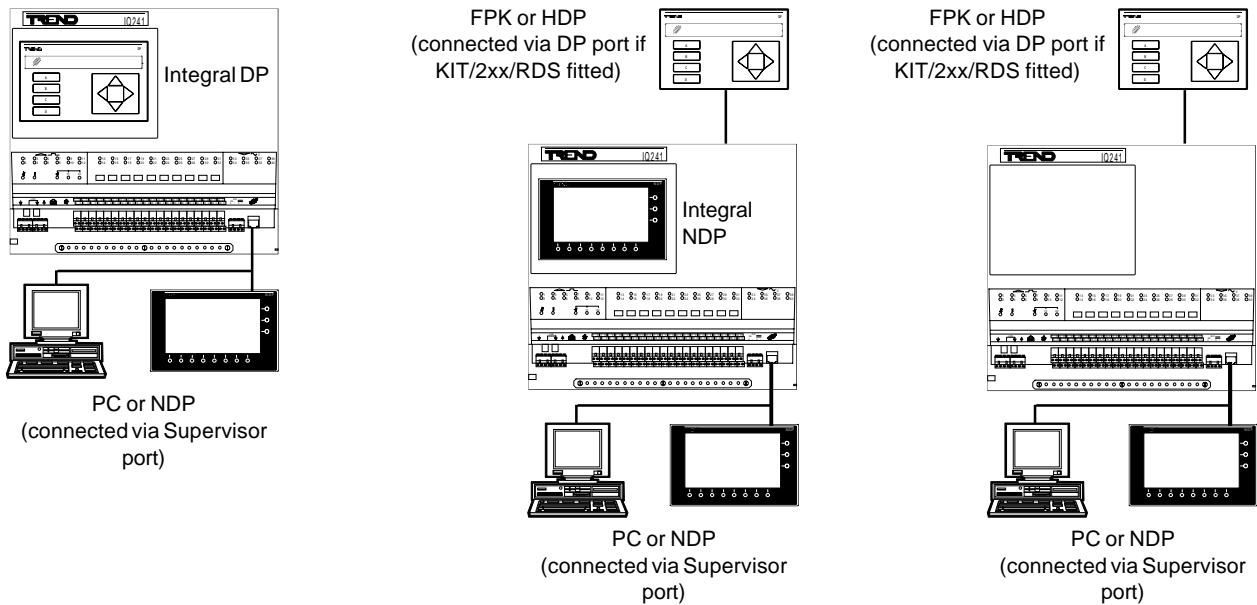
**Displays:** The IQ24x can be fitted with 3 different types of display, a Display Panel, a Network Display Panel, and a PC.

**Display panel:** A display panel can be mounted externally, or in the front cover, to provide access to parameters within the controller. External connection of a display panel requires the KIT/2xx/RDS option to be fitted, this makes it possible to connect standard FPK, or HDP display panels. If mounted in the front cover, the KIT/2xx/RDS option is not required, because the display panel is an IQ2 display panel which does not require the Kit. If a display panel is fitted in the front cover it will not be possible to connect an external display panel or mount an internal Network Display Panel.

**Network Display Panel:** A Network Display panel can be mounted externally or in the front cover to provide access to parameters within all IQ controllers on a single or multi-Lan system. Using icons, and softkeys it allows an operator to perform, under password protection, supervisory functions, such as setpoint adjustments, or to view logs and alarms from all controllers on the system. It can be powered from the IQ24x. Connection is via via the internal NDP port (when mounted in front cover), or the supervisor port (when mounted externally). If mounted in the front cover, it is not possible to mount an internal Display Panel, and if the supervisor port is used to connect the NDP it is not possible to connect a Supervisor/Engineering Tool.

**PC:** A computer running a Trend Supervisor or Engineering Tool can be connected to the Trend network via the controller's supervisor port without the need for an additional node controller although it does have its own network address. When connected in this way the supervisor will have access to all devices on the network, and will function as if it were connected via its own node controller. If a supervisor/engineering tool is connected to the controller it is not possible to connect an external NDP

The diagrams below illustrate the various combinations in which the display panels, network display panels and supervisor/engineering tools can be connected.



**Inputs/Outputs:** The IQ241 and IQ242 both have 12 digital inputs and 8 analogue voltage outputs, in addition the IQ242 has 8 thermistor inputs provided by 4 pre-fitted S cards. The maximum number of additional channels provided via S Cards (2 per S card) is 20 for IQ241 and 12 for IQ242.

IQ24x	Inputs			Outputs		Max No. of additional S cards which can be fitted
	Digital	Thermistor	Additional S card channels	Analogue Voltage	Additional S card channels	
IQ241	12	0	20 (10 S cards)	8	12 (6 S cards)	10
IQ242	12	8	12 (6 S cards)	8	12 (6 S cards)	6

S cards ( 2 channels per card ) :Analogue current inputs  
 Analogue voltage inputs  
 Analogue thermistor inputs  
 Digital inputs  
 Analogue voltage outputs

**COMPATIBILITY**

**Supervisors:** 94x series, 921.  
**Utility software:** 822+/Toolbox version 6, 841 Strategy Browser, 842 Change Tracker, ACE+.  
**Controllers:** It can communicate to other Trend IQ controllers using inter controller communications.

**Interface:** It can be connected to Trend interface modules. Check interface module specification to ensure compatibility.  
**Local Display:** Network Display Panel, standard Display Panel.

**Strategy files:** A standard uploaded strategy file (.IQF) can be downloaded to an IQ24x (see loop reschedule time below), but an .IQF file uploaded from an IQ24x has a different format to all other controller files. It cannot be downloaded into IQ1 series controllers. If this is attempted, the controller will fail to send 'Load OK'. Because of the IQ24x's flexible I/O the I/O channel reference will be different as described earlier in this data sheet.

**Sensor types:** For sensor type 0, if the data file has been uploaded from an IQ151+ (or earlier controller using  $\pm 5$  V for linear voltage T and B parameters) and if the sensor outputs a voltage signal, the T and B values will have to be multiplied by 2 and re-entered by the user.

**Loop reschedule time:** The strategy file uploaded by the 822+/Toolbox is designated the .IQF file. If an IQxx.IQF is downloaded to the IQ24x, the loop reschedule and integral times are transferred as multiples of the cycle time so that for an IQ151 or IQ151+ they are divided by 15 and for other IQ1xx's they are divided by 5 (for IQ2xx the times are unchanged) e.g. if a file uploaded from an IQ131+ is downloaded to an IQ24x, then loop reschedule and integral times should be multiplied by 5.

For sensor type 2, parameters set up in all other IQ controllers will operate correctly in a IQ24x for a thermistor, but if the sensor is current or voltage it will need to have the sensor type changed to 3. When the sensor type is changed, the other parameters (B, T, F, G etc) will stay the same and hence be correct.

**Sensor logs:** Although the IQ24x has 1000 values per logging channel, some Trend display panel and supervisor/tool applications can only accept the first 96 values of logs using 1 minute, 15 minute, 1 hour, and 24 hour time intervals. This is shown in the table below.

Not all Trend display panels, and supervisor/tool applications can set up or change logging channels for the new time bases. This is summarised in the table below.

All 921, 822, 942, 943, NDP, and pre 945 Issue 2.0.	Access first 96 values of 1 minute, 15 minute, 1 hour and 24 hour logs.
945 Issue 2.0.	Access all values from all logs except 1 s.
NDP 2.20.	Access first 96 values from all logs.

All 921, 822, 942, 943, and pre 945 Issue 2.0.	Can edit existing channels, and set up new ones using 1 minute, 15 minute, 1 hour, and 24 hour time intervals unless any channel has been set up using 1 second, 5 minute, 10 minute, 20 minute, 30 minute, and 6 hour time interval.
945 Issue 2.0	Can edit existing channels, and set up new ones using all time intervals except 1s.

**INSTALLATION**

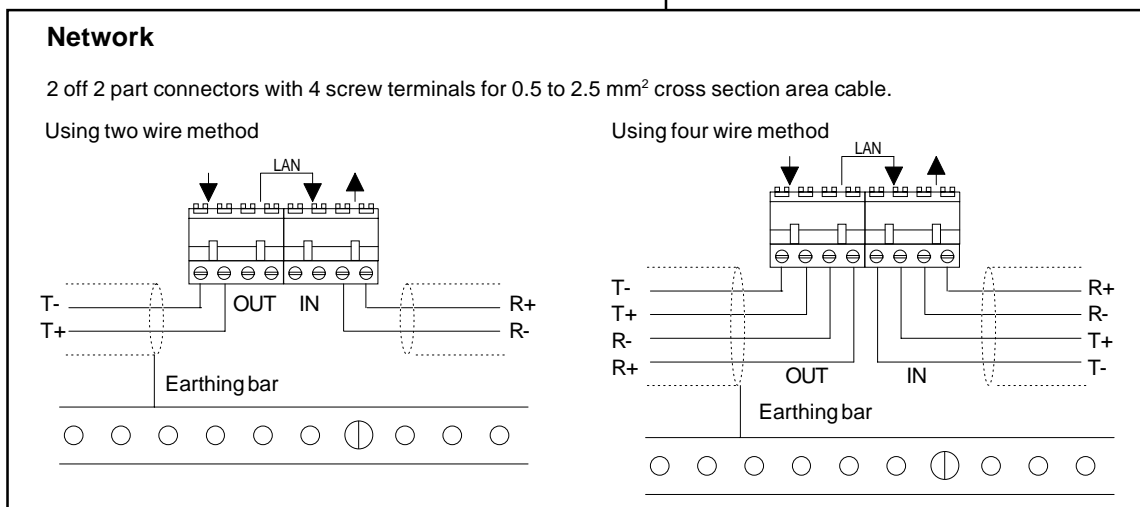
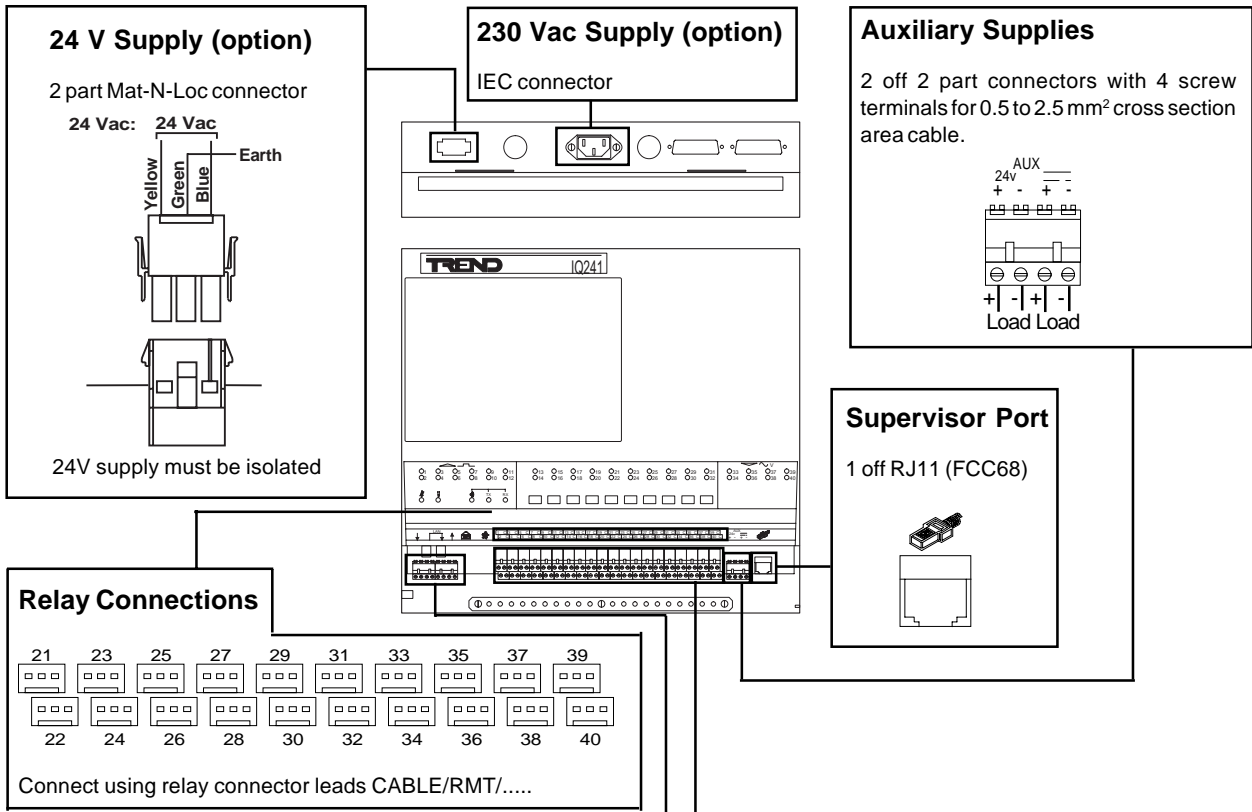
The IQ24x Controller must be installed on a flat surface such as, a wall, or panel, using screws and washers. The procedure involves:

- mounting the controller in position
- routing the cable to the controller
- connecting the I/O
- fitting the S cards
- connecting the auxiliary supply

- specifying network address and baud rate
- connecting to network
- Powering up
- configuring the strategy

The installation procedure is covered in the IQ24x Installation Instructions (TG103012). More detailed connection information is shown on the next page.

**CONNECTIONS**



**I/O**

	Built in digital input												Input only S cards												Input or Output S cards												Built in voltage outputs											
external reference	C 1	C 2	C 3	C 4	C 5	C 6	C 7	C 8	C 9	C 10	C 11	C 12	C 13	C 14	C 15	C 16	C 17	C 18	C 19	C 20	C 21	C 22	C 23	C 24	C 25	C 26	C 27	C 28	C 29	C 30	C 31	C 32	C 33	C 34	C 35	C 36	C 37	C 38	C 39	C 40								
Digital Input	I 1	I 2	I 3	I 4	I 5	I 6	I 7	I 8	I 9	I 10	I 11	I 12	I 13	I 14	I 15	I 16	I 17	I 18	I 19	I 20	I 21	I 22	I 23	I 24	I 25	I 26	I 27	I 28	I 29	I 30	I 31	I 32																
Sensor	S 1-12												S 1-12												S 1-12												S 1-12											
Driver Output channel	L 1-12												L 1-12												L 1-12												L 1-12											
	S cards												S cards												S cards												S cards											
	1	C 3	C 5	C 7	C 9	C 11	C 13	C 15	C 17	C 19	C 21	C 23	C 25	C 27	C 29	C 31	C 33	C 35	C 37	C 39	C	2	C 4	C 6	C 8	C 10	C 12	C 14	C 16	C 18	C 20	C 22	C 24	C 26	C 28	C 30	C 32	C 34	C 36	C 38	C 40	C						



**FIELD MAINTENANCE**

The IQ24x Controller requires virtually no routine maintenance, however it is recommended that the lithium battery be replaced every 5 years, as explained in the Installation Instructions (TG103012).

**ORDER CODES**

**IQ241/[Display]/[Node]/[PSU]** :12 digital inputs, 8 analogue voltage outputs, and 20 configurable channels

**IQ242/[Display]/[Node]/[PSU]** :12 digital inputs, 8 thermistor inputs, 8 analogue voltage outputs, and 12 configurable channels

[Display]		[Node]		[PSU]	
Blank	No display.	blank	No node	230	230 Vac power supply
ENDP	IQ241 with NDP in front cover.	MNC	Node including Trend MODEM	24VAC	24 Vac power supply
DP	IQ241 with DP in front cover.	ANC	Node for proprietary MODEM	24VDC	24 Vdc power supply
		CNC	Node for Trend network		
		PNC	Node for remote printer		
		INC	Node for Trend Internetwork		
		AND	Node for ISDN		
		XN28	Node for PSDN		
		XNC	Node for user configuration		

e.g. IQ24x/ENDP/MNC/230 Specifies an unboxed IQ24x with integral NDP, integral MNC, and 230 Vac power supply.

S cards IQ241 (10 input cards max, 6 output cards max, 10 cards in total max). IQ242 (6 input cards max, 6 output cards max, 6 cards in total max).

- SCVO 2 Analogue voltage outputs S card.
- SCVI 2 Analogue voltage inputs S card.
- SCCI 2 Current inputs S card.
- SCTI 2 Thermistor inputs S card.
- SCDI 2 Digital inputs S card.

**Cable management system**

ENCLS/CMtray/241 1 cable management tray and cover (only 1 may be fitted to a single IQ24x).

**Relay extension system**

- ENCLS/RMtray/241 1 relay management tray, fixing bar, cover, insulating plate, 1 paper label, 1 sticky label, and 16 light pipes.
- CABLE/RMT/10 8 off 10 cm relay connection leads
- CABLE/RMT/30 8 off 30 cm relay connection leads
- 2RM/241 Double relay module for mounting in relay extension system
- 2SRM/241 2 single relay module on a single PCB for mounting in relay extension system
- 3RM/241 Triple relay module for mounting in relay extension system
- 6RM/241 Six relay module for mounting in relay extension system

*Note that if any ENCLS/RMtray/241 option is ordered the ENCLS/CMtray/241 option must also be ordered.*

**ON/OFF/AUTO Switch Kit**

HOA/241 1 ON/OFF/AUTO switch with cable and connector.

*Note that this option can only be fitted if the relay extension system is being used.*

**Retro fit kits**

- KIT/ENDP/IQ24x Kit to retrofit Network Display Panel in front cover
- KIT/DP2 Kit to retrofit 2-line Display Panel, HDP, FPK to front cover of IQ22x, 24x, 250
- KIT/2xx/RDS Kit to enable connection of FPK or HDP externally
- KIT/node/IQ24x Kit for fitting additional node

**Enclosures**

- ENCLS 600 mm x 600 mm x 210 mm IP55 enclosure
- ENCLS/FPK 600 mm x 600 mm x 210 mm IP55 enclosure with FPK on front.
- ENCLS/NDP 600 mm x 600 mm x 210 mm IP55 enclosure with NDP on front.

## SPECIFICATIONS

## CONTROLLER

## Electrical

CPU	:68332 32 bit micro controller
CPU speed	:16.78 MHz
Cycle time	:1 s
Memory	:256 kbyte battery backed SRAM, and 256 kbyte Flash.
Supply voltage	
/230	:230 Vac +15 -10 %, 50 to 60 Hz
/24VAC	:24 Vac +15 -10 %, 50 to 60 Hz (24Vac supply must be isolated).
Auxiliary supply	:24 Vdc, 1000 mA dependent on configuration, see page 5 for further details.
Consumption	:60 VA max
Battery backup	:Battery maintains time, and logged data with mains off for at least 5 years.
Battery	:Saft LM2450, 3 V, or equivalent
Clock accuracy	:30 s per month (typical).
Network	:20 mA serial 2 wire current loop, opto isolated, polarity independent receiver.
Network display panel	:Icon driven display panel with backlit display, for use on single or multi Lan systems. Can be mounted in front cover, or externally.
Display panel	:2x40 character display, with 4 programmable softkeys. Can be mounted in front cover, or externally via display panel connector
Distance	
Supervisor	:15 m
Network	:Dependent on cable type, see table below.
Baud rate	

Cable	1k2 baud	9k6 baud	19k2 baud	No. of Wires
Belden 9182	1000 m	1000 m	700 m	2
9207	1000 m	1000 m	500 m	2
8761	1000 m	700 m	350 m	2
8723	1000 m	500 m	250 m	4

Network	:Selectable by switch 1k2, 9k6, or 19k2.
NDP	:9k6.
Supervisor	:9k6.
Network addresses	
Controller	:Selectable by switch, 116 nodes addressable (1,4 to 119 excluding 10).
Supervisor port	:Software selectable, 116 nodes addressable (1,4 to 119 excluding 10).
NDP port	:Software selectable, 116 nodes addressable (1,4 to 119 excluding 10).

## I/O

Channels 1 to 12	12 digital inputs. Internally, or self powered volt free contact. Wetting current 4 mA @ 24 Vdc, count rate 32 Hz max. 1 Status LED per channel. ON if input is closed.
Channels 13 to 20	IQ241: 8 universal inputs, 4 slots to fit Trend analogue voltage input, current input, thermistor input, or digital input S cards. IQ242: 8 thermistor inputs (via 4 slots pre-fitted with S cards).
Channels 21 to 32	12 universal I/O, 6 slots to fit Trend analogue voltage input, current input, thermistor input, digital input, or analogue voltage output S cards.
Channels 33 to 40	8 analogue voltage outputs. 8 bit resolution (256 steps). 0 to 10 V with 20mA current limit, accuracy $\pm 100$ mV equivalent to $\pm 1$ % span. 1 Status LED per channel. Light intensity increases with output voltage.




## Mechanical

Dimensions	:325 mm x 355 mm x 85 mm
Material	
Chassis	:Steel
Cover	:Fire retardant ABS
Protection	:IP40
Weight	:5.6 kg
Connectors	
/230	:IEC plug
/24	:Mat-N-Loc
Network	:2 part connector with 4 screw terminals for 0.5 to 2.5 mm <sup>2</sup> cross section area cable.
I/O	:2 part connector with 2 screw terminals for 0.5 to 2.5 mm <sup>2</sup> cross section area cable.
Supervisor	:RJ11 (FCC68), for Trend utility software connected via adaptor cable PART/10/1442.
Display panel	25 way D type if fitted.
Relay	:2 part 3 pin in line connector for power.
Relay connector leads	:100 mm, or 300 mm long with 2 part 3 pin in line connectors.

## Environmental

EMC	
Emissions	:EN50081-1.
Immunity	:EN50082-2.
Safety	:EN61010.
Ambient limits	
storage	:-10 °C to 50 °C
operating	:0 °C to 45 °C
humidity	:0 to 90 %RH non-condensing

## Indicator Lamps

 PWR	:ON when power supply is connected.
 WD	:ON if controller has a software fault.
 LAN	:ON if network is operating.
TX	:ON if current is flowing from the network transmitter.
RX	:ON if current is entering the network receiver.

**SPECIFICATIONS** (Continued)

**S CARDS**

Dimensions :32 mm x 45 mm x 10 mm

**Analogue voltage input card**

Analogue voltage inputs:2 channels per card, 12 bit resolution (4096 steps). Minimum 60 dB series mode rejection at supply frequency. 0 to 10 V, input resistance 200 k $\Omega$ , accuracy 50 mV equivalent to  $\pm$ 0.5% of span.

**Analogue Current input card**

Analogue current inputs :2 channels per card, 12 bit resolution (4096 steps). Minimum 60 dB series mode rejection at supply frequency. 0 to 20 mA, input resistance 250  $\Omega$  0.1%, accuracy 0.5 % of span (i.e. 100  $\mu$ A).

**Analogue Thermistor input card**

Analogue Thermistor inputs :2 channels per card, 12 bit resolution (4096 steps). Minimum 60 dB series mode rejection at supply frequency. Thermistor, bridge resistor 10 k $\Omega$  0.1%, accuracy 0.5 % of span. Bridge supply 5 V.

**Digital input card**

Digital inputs :2 channels per card. 1 Status LED per channel. ON if contact closed.

**Analogue voltage output card**

Analogue voltage outputs 2 channels per card , 8 bit resolution (256 steps). 0 to 10 V with 20 mA current limit, accuracy  $\pm$ 100 mV equivalent to  $\pm$ 1 % span. 1 Status LED per channel. Light intensity increases with output voltage.

**RELAY EXTENSION SYSTEM**

Dimensions :120 mm x 355 mm 85 mm (including cover)

Material tray :Steel  
 cover :Fire retardant ABS  
 insulating plate :Plastic  
 Protection IP40 (when fitted to IQ24x)  
 Weight 0.4 kg  
 Light pipes :40 mm, 3mm diameter perspex piping.

**CABLE MANAGEMENT SYSTEM**

Dimensions :60 mm x 355 mm 85 mm (including cover)

Material tray :Steel  
 cover :Fire retardant ABS  
 Protection IP40 (when fitted to IQ24x)  
 Weight 0.3 kg

**SWITCH KIT**

Switch :1 off SPDT switches for ON/OFF/AUTO control of relays.

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