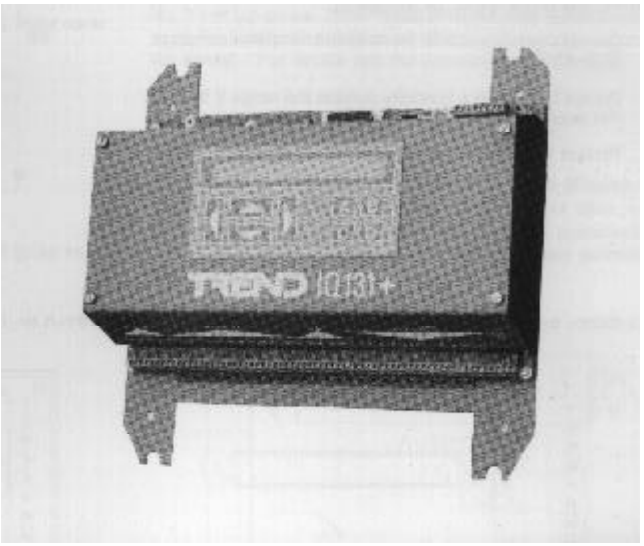
Data Sheet

IQ131+ Controller

IQ131+ CONTROLLER



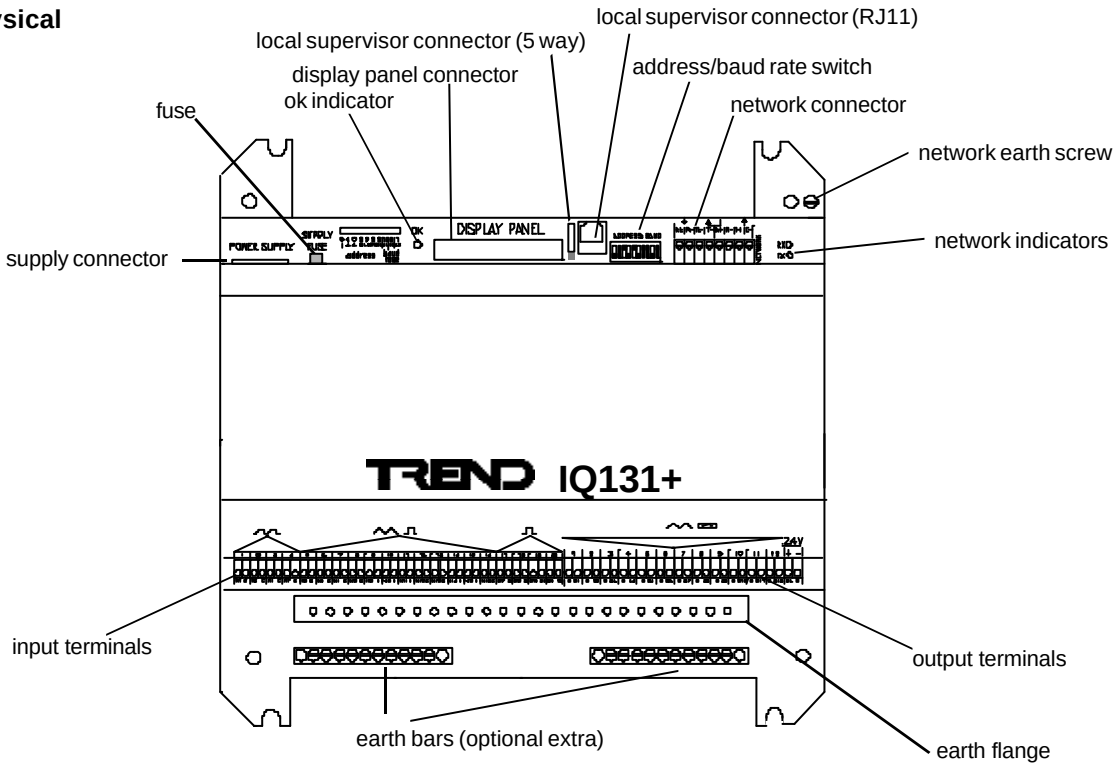
Description

The IQ131+ is a medium sized controller in the Trend range with 4 analogue, 12 universal, and 4 digital inputs and 12 analogue outputs. It provides DDC with PID loops and is supplied in a range of options (stand alone, system, display panel, modem and enclosures).

Features

- Full DDC control with PID control loops.
- Stand alone or integrated system operation.
- Communicates to a local supervisor.
- 20 input channels
- 12 output channels

Physical



INSTALLATION

MECHANICAL (dimensions in mm)

Site locations for the controller should provide safe access for maintenance and a suitable operating environment.

(1) Fix the controller to a permanent structure using four screws or lugs as shown below.

Notes: Do not cover, allow air circulation.

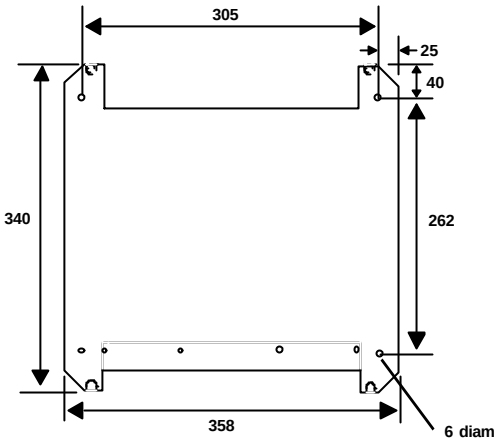
Do not operate outside the ambient temperature range (0 to 45°C).

Do not operate in a humidity outside the range 0 to 90% RH non-condensing.

Protect from direct contact with steam or water.

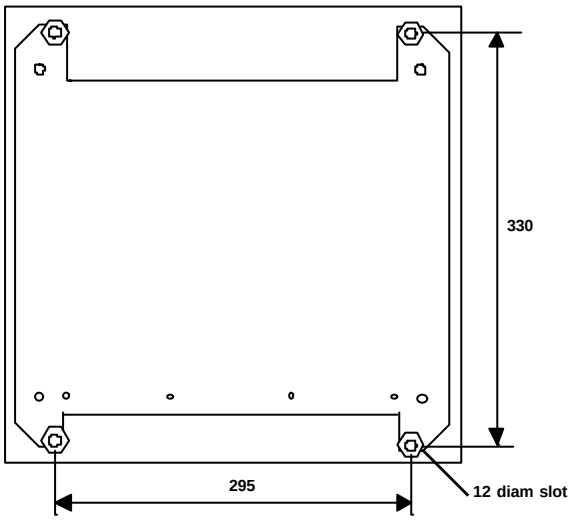
cable entry area.
If an optional communications node controller is fitted in the IQ131+, refer to the appropriate data sheet for installation and commissioning details. Connection details are shown in the maintenance section of this data sheet.

IQ131+/UNB/: chassis only version



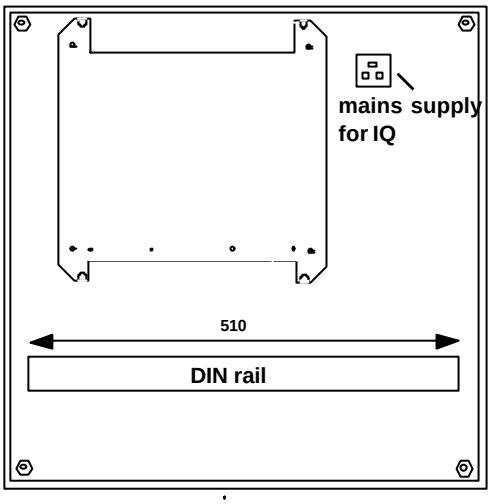
Mount using four screws in 6 mm diameter holes.

IQ131+/BOX/: boxed version



Supplied in a 380 mm x 380 mm x 210 mm cabinet, the boxed version IQ is mounted on the four cabinet studs via the four 12 mm slots using nuts and washers. The standard cabinet is fitted with a gland plate in the base with a 60 mm x 300 mm cable entry area.

IQ131+/LB/: large box version

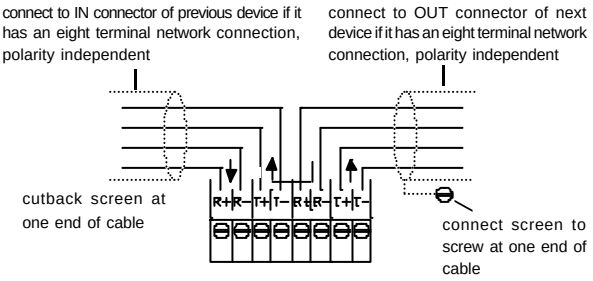


The large box version is supplied as shown in a 600 mm x 600 mm x 210 mm cabinet. The cabinet is fitted with a backplate and the IQ is mounted on the backplate using 4 screws in the 6 mm diameter holes. The DIN rail is fitted below the controller and may be used for mounting interface modules. The large box is fitted with a gland plate in the base with a 120 mm x 510 mm

ELECTRICAL

Network Connection

(2) Make the necessary network connections as indicated in the diagram, connecting T+ and T- to R+ and R- of the other device and vice versa.



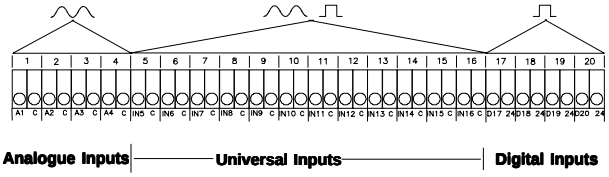
If the adjacent devices have four terminal network connections, connect as described in the Network Engineering Manual.

The choice of network cable should be made according to distance and baud rate as shown in the table.

Cable	1k2 baud	9k6 baud	19k2 baud
Belden 9182	1000 metres	1000 metres	700 metres
Belden 9207	1000 metres	1000 metres	500 metres
Belden 8761	1000 metres	700 metres	350 metres
Belden 8723	1000 metres	500 metres	250 metres

INSTALLATION

INPUT CONNECTIONS

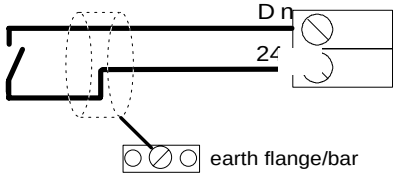


(3) Make the necessary input connections.

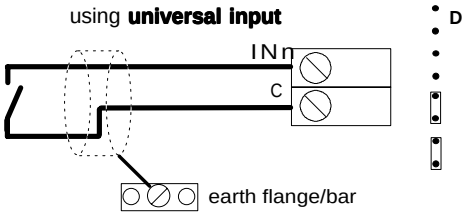
The input linking must be established before power is applied (see commissioning). All inputs should use screened cable to reduce nuisance readings, especially with thermistors. Cable screens are screwed to the earth flange, or connected to the earth bars. The two earth bars are optional extras and each have ten 4.2 mm diameter terminals. On the earth flange the screen is terminated in a crimped eyelet and attached to the flange by a No. 8 self tap screw. Other types of inputs may be catered for by using the Input Isolation Module, 4DIX (input multiplexer), or 4SIM (ac inputs). For details see the appropriate data sheets.

Digital Inputs

using **digital input**



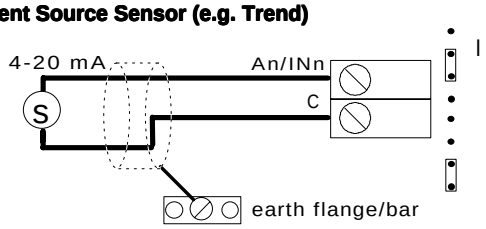
using **universal input**



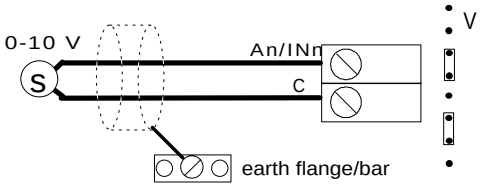
Analogue Inputs

using **analogue input/universal input**

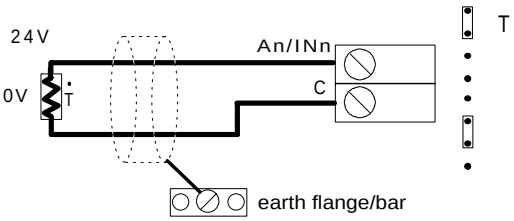
Current Source Sensor (e.g. Trend)



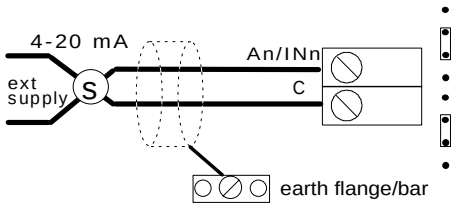
Voltage Output Sensor



Thermistor



Externally Powered Current Output Sensor

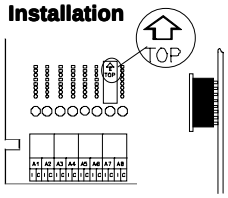


Warning: With analogue or universal inputs, the 24 V instrument supply will destroy the precision 250 Ω scaling resistor if it is connected directly to an input set for 20 mA (e.g. if linked for I and connected as a digital input). Power off the IQ131+ before wiring or unwiring a current sensor.

Link Headers

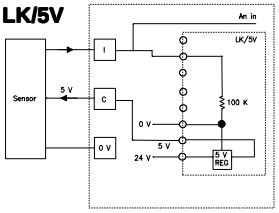
Additional types of inputs may be catered for by link headers. These link headers, LK/5V,LK/15V, LK/10mA are the only link headers that may be used on IQ131+ 's. For more details on all link headers see the Link Header Data Sheet, 91-0905.

Installation



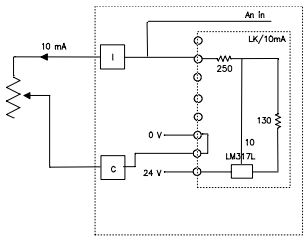
The links should be removed, and the link header boards should be fitted to the linking pins of the input board with the components on the underside, and the arrow pointing upwards.

LK/5V



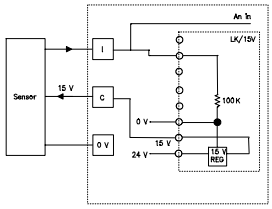
This link header provides a regulated 5 V supply at 20 mA maximum to an analogue input device.

LK/10mA



This link header provides a regulated 10 mA through the analogue input device. If the input device is 100 to 1000 ohm potentiometer, the analogue input will measure 1 to 10 V.

LK/15V



This link header provides a regulated 15 V supply at 20 mA maximum to an analogue input device.

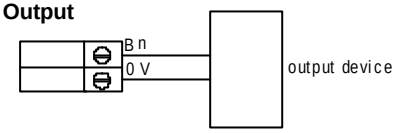
INSTALLATION

OUTPUT CONNECTIONS

(4) Make the necessary output connections (see below).

We recommend outputs should be screened. The cable screen should be connected to the earthing flange or bar (optional extra).

Ordinary Output



POWER CONNECTION

(5) Connect the controller to the supply using the cable provided.

110, 230 Vac versions

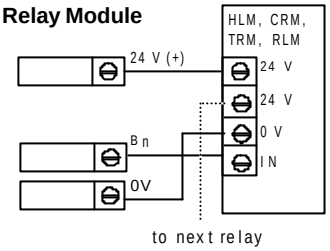
- Connect Line (~), Neutral (N), and Earth (⏚) via IEC connector

The earth line (⏚) is internally connected to the chassis.

WARNING:This equipment must be earthed.

Note: The 0 V signal line is internally connected to the chassis in all versions.

Output using Relay Module



It is recommended that the installation should comply with the HSE Memorandum of Guidance on Electricity at Work Regulations 1989.

Note that the output supplies 0-10 Vdc. If a single relay is required, use SRMV.

24 Vac version

- Connect 24 Vac (~), Common (N), and Earth (⏚) via 2 part screw terminals.

24 Vac supply must be isolated. The chassis terminal must be earthed.

24 Vdc version.

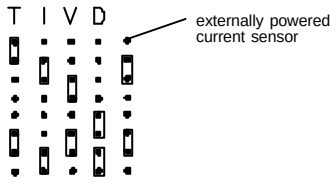
- Connect +24 Vdc (marked ~), 0 Vdc (N), and Earth (⏚) via 2 part screw terminals.

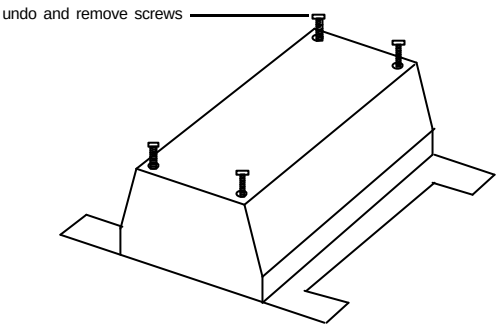
COMMISSIONING

INPUT LINKING

(1) Set the input linking.

Remove the cover by undoing the 4 screws. The input link is located behind each analogue or universal input terminal group. If the link is omitted an open circuit input will result in random values being read by the controller sensor module.





AUXILIARY SUPPLY

The auxiliary 24 Vdc supply is available to supply interface modules (e.g. 2RM, 3RM, 6RM).
It has a maximum current of 200 mA, protected by the fuse, F2, taken from the 24 Vdc supply (see below).

24 VDC SUPPLY

The 24 Vdc supply has a total of 530 mA available for inputs (I:20 mA, D:8 mA, V&T:0 mA per channel), outputs (20 mA max per channel), display panel (backlit version takes 30 mA indirectly), and auxiliary node supply. Care should be taken to see that the current limit is not exceeded when adding an auxiliary node or display panel.

POWER UP

(2) Power up the controller.

Ensure that the cover is fitted before powering up the unit. On power up, the OK indicator will light. If it does not, check the power supply and fuse.
If the fault is corrected, the OK indicator will light after a few seconds and the network bypass relay will be heard to operate.
If this does not happen the unit is faulty.

DIGITAL INPUTS

(3) To monitor the digital inputs remove the cover by unscrewing the 4 screws that hold it in place and lifting it off.

(4) The state of the digital inputs can be monitored by the indicators. If the digital input contact is closed, its indicator will illuminate.

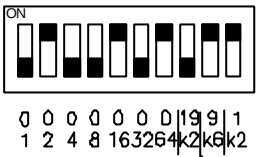
WARNING: This unit contains hazardous voltages, which are exposed on removal of cover.

INSTALLATION

NETWORK

Necessary only for those controllers networked to other devices.

(4) Set the address switch to a unique valid address (that is in the range 1, 4 to 119, excluding address 10).



The address is formed by summing the values of all poles which are down (labelled off). The illustration shows 1+4+8+32 which equals 45.

(5) Set up the baud rate so that all nodes on the local network are at the same baud rate. The illustration shows 19k2 baud.

On power up the TX and RX indicators will light indicating network current flow. If TX is off then the cable to the following controller may be faulty (open circuit). If RX is off then the cable from the previous controller may be faulty (open or short circuit). Check the leads and connections.

TX

RX

To check the controller alone wire T+ and T- to R+ and R- and confirm the TX and RX indicators light. No indicators lit, and correct power applied indicates a faulty unit.

The 822+/Toolbox program may be used from more extensive network diagnosis by identifying the nodes responding on the network (map function). Network alarms will indicate if there is a broken network. A commissioning and fault procedure is described in the Network Engineering Manual.

STRATEGY

The controller may be supplied preconfigured with an application strategy or it may be supplied without a strategy, in which case it will need to be configured by the user. Details of configuration are given in the IQ Configuration Reference Manual.

The strategy can be configured over the network or via the local supervisor connector using a PC running 822+/Toolbox utility.

The PC can be connected either to the 5 way in-line local supervisor connector via a 9F to 25M cable (PART/58/0750) plus a 25F to 5 way in-line (PART/78/1172), or to the RJ11 connector via the 9F to RJ11 cable (PART/10/1442).

Once the strategy is configured, check that it functions correctly by exercising the inputs (e.g. warming a sensor) and checking that the correct response is given by the outputs (i.e. check plant operation).

The sensor module will need to be set to the correct sensor type scaling for the particular type of sensor being used. The table relates the sensor type to its configuration parameters.

The parameters T and B in sensor type module should be set to the value of the variable being sensed which produces the sensor output level shown e.g. for a 4 to 20 mA linear sensor, T should be set to the sensed variable value which produces a sensor output of +20mA.

Sensor type	Sensor type scaling	Range	
		T	B
Thermistor	Linearise	See sensor brochure for 10 V reference	
4 to 20 mA	Linear	+20 mA	-20 mA
4 to 20 mA (externally powered)	Linear	+20 mA	-20 mA
0 to 10V	Linear	+ 10V	-10 V

CONFIGURATION MODULES

Sensor	32
Sensor Type	8
Loop	16
Function	90
Logic	90
Driver	12
Knob	30
Switch	20
Sensor Log	32
Sequence	180
Critical Alarm	4
Alarm History	20
I/C Communications	16
Digital Inputs	32
Fast Sequence	8
Zone	5
Schedule	8
Calendar	20
User Password	6
Sequence Cycle time	5 secs

The sensor and digital input module types can be set up differently from that normally available in an IQ controller due to the fact that the first 4 input channels are analogue only and the last 4 inputs are digital only. The types are listed in the table below.

Module/Channel	Channel type	Sensor Module Input type	Digital Input Module
Channel/module 1-4	Analogue I/P	All except Digital	Internal
Channel/module 5-16	Universal I/P	All	Real
Channel/module 17-20	Digital I/P	All except Analogue Input	Real
Module 21-32		Internal Analogue or Internal Digital	Internal

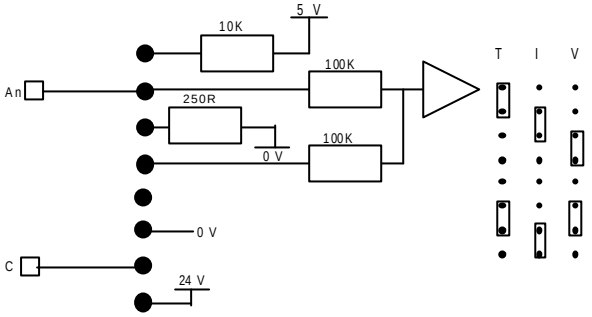
On other IQ controllers fast sequencing of digital inputs is available on the first few inputs (normally the first 8), but on the IQ131+ the fast sequence digital input facility is modified so that the eight fast response inputs are the four digital input channels (D17 to D20), and the first four universal input channels (In5 to In8). Hence the cross-reference to the digital input in the sequence table is special as shown in the table below. All other references to the inputs are normal, hence: D17 node is 3,0; node 1,0 is internal digital input 1 for node 1,0; configuring I1 sets up internal digital input 1 for node 1,0; and configuring I17 sets up module for channel 17.

Fast Sequence No:	Sequence table reference	Input channel
1	I1	D17
2	I2	D18
3	I3	D19
4	I4	D20
5	I5	In5
6	I6	In6
7	I7	In7
8	I8	In8

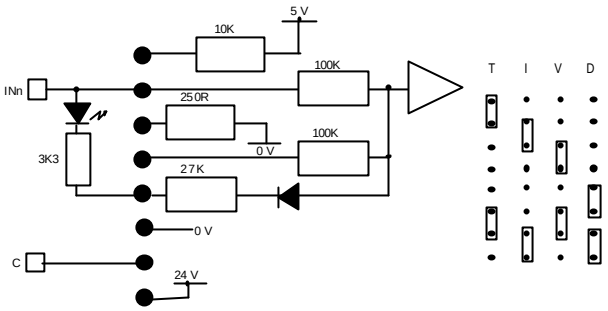
e.g To start a fast sequence for channel 17 at sequence step 172, configure Q172 to have module I1

INPUT/OUTPUT CIRCUITS

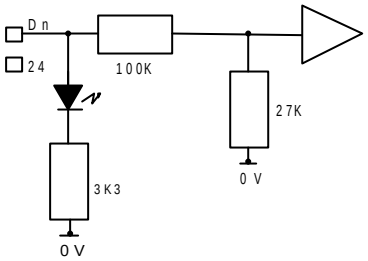
Analogue Input circuit (4 identical circuits, channels 1-4)



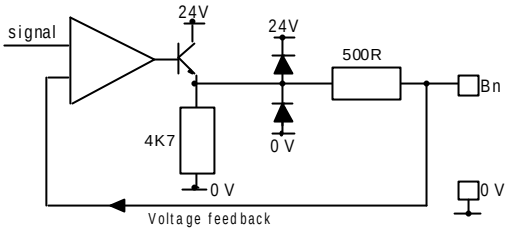
Universal Input (12 identical circuits, channels 5 - 16)



Digital Input (4 identical circuits, channels 17 - 20)

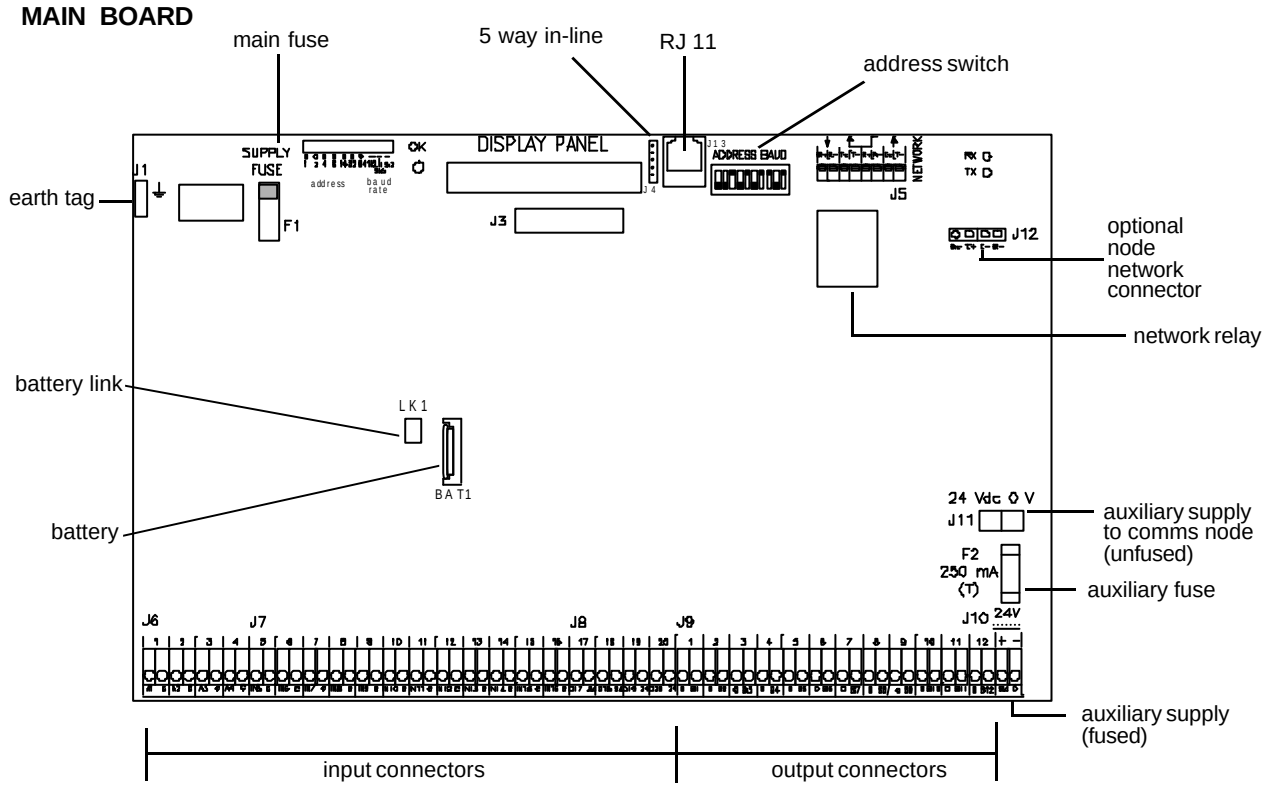


Output Circuit (12 identical circuits)



FIELD MAINTENANCE

MAIN BOARD



Warning: Removal of the cover exposes dangerous voltages.
417-IEC-5063

Warning: Static Sensitive devices.
417-IEC-5134

FUSE RATINGS

	PSU version	Fuse
Main fuse	24 Vac or 24 Vdc	1.6 A
	110 to 120 Vac (110)	315 mA(T)
	220 to 240 Vac (230)	160 mA(T)

Auxiliary Supply Fuse = 250 mA(T)
All fuses 5 x 20 mm

The supply fuse is accessible from the top of the unit.

FIELD MAINTENANCE

BATTERY REPLACEMENT

The IQ131+ is normally supplied with the battery link fitted in the ON position. In this position the controller memory and internal clock are kept supplied in the event of supply failure. If this link is removed and pushed back onto one pin only, all memory contents (application strategy) are lost and the clock will lose its time synchronisation if the supply fails. If users are designing their own strategies they may wish to move the link to the OFF position to prolong battery shelf life. The normal battery life with no power fail is 14 years.


battery on


battery off

To move the battery link:

(1) Power off the controller, unplug the supply cable, and remove the cover.

(2) Be aware of static precautions and locate the battery link and move it.

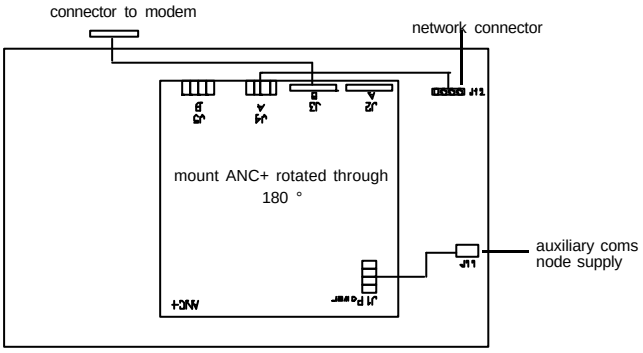
If the battery link has been restored to the ON position, the controller will need reconfiguring and the clock will need to be synchronized.

OPTIONAL NODE CONTROLLERS

The optional node controllers are fitted onto four standoffs mounted on the IQ131+ board. They should be connected and set up as described in the node controller data sheet. Check 24 Vdc supply available current limit is not exceeded. Examples of installed ANC+ or MNC+ are shown below.

The network connection normally has links fitted (R+ to T+, T- to R), these have to be removed before connecting the node controller network cable (part no.50-2781). Note that if the IQ is autodialled (ANC+ or MNC+) and stand alone, the external network connectors must be linked as shown.

Internal cabling for IQ131+ with optional ANC+



BATTERY REPLACEMENT

If the battery has run-down due to a period of power failure, it will need to be replaced. The battery is a non-rechargeable lithium thionyl chloride plug in cell size 2450 nominal voltage of 3.0 V and capacity of 500 mAh.

To replace the battery:

(1) Take a strategy backup (see 822+/Toolbox User Manual).

(2) Power off the controller, disconnect the supply cable and remove the cover.

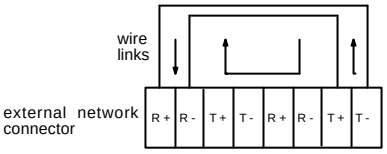
(3) Be aware of static precautions, locate the battery and lift it from its holder.

(4) Replace the battery, ensuring correct polarity.

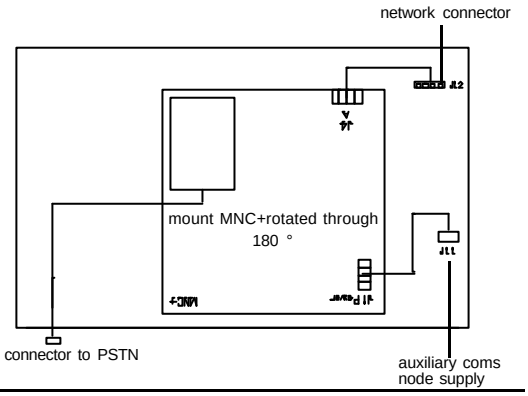
(5) Download strategy (see 822+/Toolbox User Manual). This maybe done from a local supervisor or over the network. Access via the network may need a Personal Identification Number obtainable from Trend Technical Support.

WARNING: The lithium battery must not be recharged, disassembled, burnt or short circuited. Misuse may cause explosion or fire. Dispose of carefully. Refer to Health and Safety Executive Guidance Note GS43.

Links to be fitted if autodialled and stand alone.



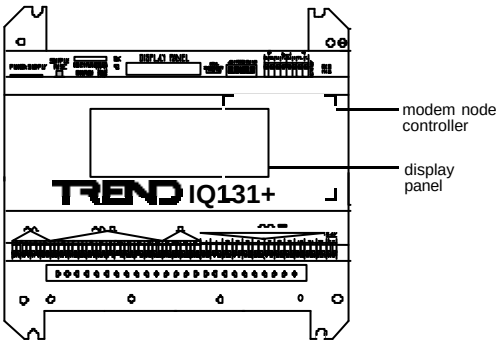
Internal cabling for IQ131+ with optional MNC+



PRODUCT CODES

IQ131+/[Enclosure]/[DP]/[Node controller]/[PSU] e.g. IQ131+/UNB/DP/MNC/230

[Enclosure]	[DP]	[Node controller]	[PSU]
BOX box	blank, no display panel	CNC	230: 220 to 240 Vac 50 Hz
LB large box	DP integral display panel	PNC	115: 110 to 120 Vac 60 Hz
UNB no box	FPK front panel display panel kit	INC	24vac: 24 Vac
	HDP hand held display panel	MNC	24vdc: 24 Vdc
	FP front panel display panel	ANC	



PART/15/3003: Earth bar option (up to two may be fitted on IQ131+)

SPECIFICATIONS

Absolute Maximum Ratings (see below for details)

Ambient limits, -10 to 50 °C (storage)
Electrical supply, Nominal voltage -15% + 10%
Battery life, 2 years minimum (full shut down)

Electrical

Wiring	:2 part connector screw terminals for 0.5 to 2.5 mm² cross section area cable.
Supply	:Nominal voltage -15 to +10%, 47 to 63 Hz
Voltage	:220 to 240 Vac **(230)**, 110 to 120 Vac **(115)**, **24Vac, 24 Vdc.**
Power consumption	:35 VA max
Supply Connector	:
115, 230	:IEC plug
24 Vac, 24 Vdc	:2 part screw connector 0.5 to 2.5 mm² cable
Battery backup	:Non-rechargeable plug-in lithium cell (lithium thionyl chloride) size 2450, 3.0 V nominal 500 mAh. Maintains data memory and time clock with mains off for two years minimum (at 25°C). Nominal shelf life 14 years.
Clock accuracy	:15 secs per month
Auxiliary supply	:24 Vdc ±5% + supply tolerance, 200 mA maximum to supply output accessory loads (e.g. relay modules) fused at 250 mA. Taken from 24 Vdc supply (see p4).
Auxiliary Coms Node Supply	:24 Vdc ±5% + supply tolerance. Available inside the IQ for auxiliary communications node (e.g. MNC+). Taken from 24 Vdc supply (see p4).
Network transmission	:20 mA 2-wire current loop, opto-isolated polarity independent receiver. Normally wired using a four wire cable to facilitate return path wiring.
Network distance	:Between units dependent on cable type (see table on page 2).
Baud rate	:Selectable by board switches 1k2, 9k6, or 19k2 baud.
Addresses	:Selectable by board switches, 116 nodes addressable (1,4 to 119, excluding address 10) per Lan.
Supervisor transmission	:EIA RS232
Supervisor distance	:15m between IQ131+ and local supervisor
Supervisor baud rate	:9k6 baud
Supervisor connector	:5 way pin header (polarity independent), 0.1" pitch, adaptor cables needed; 9F to 25M (PART/58/0750) plus 25F to 5 way in-line (PART/78/1172). :RJ11, adaptor cable needed; 9F to RJ11 (PART/10/1442).
Display panel	:optional, integral backlit (DP), or if in a box on the front panel (FP), or external, either hand held (HDP) or for cabinet panel (FPK). A backlit display panel will consume 30 mA indirectly from 24 Vdc supply.
DP connector	:25 way D type socket for external DP
DP cable	:Trend cable PART/58/0935 (1m supplied with HDP) or PART/58/0836 (3m supplied with FPK).
Distance IQ131+ to Display panel	:3 m max
Outputs (channels 1 to 12)	:Analogue. 8 bit resolution (256 steps). 0 to 10 Vdc with 20 mA current limit accuracy 3%. Can be extended to drive loads digitally by using external Trend interface modules.
Analogue Inputs (channels 1 to 4)	:Gold plated screw terminals, 12 bit resolution (4096 steps). Linkable for analogue current (I), analogue voltage (V), or thermistor (T).
:V	0 to 10 V, input resistance 200 kΩ 1% accuracy 50 mV
:I	4 to 20 mA input resistance 250 Ω 0.1%, accuracy 100 µA
:T	Thermistor, bridge resistor 10 kΩ 0.1%, accuracy 2% span
Universal Inputs (channels 5 to 16)	Bridge supply 5 V 0.5% internal reference as analogue input plus an additional link for digital (D).
:D	13 to 50 Vdc by volt free contacts upper threshold 13 V lower threshold 9 V count rate 30 Hz max.
Digital Inputs (channels 17 to 20)	as per universal input D links

Mechanical

Dimensions	:Unboxed (UNB) 358 mm x 340 mm x 80 mm typical
Material	:Mild steel, plated and coated
Enclosure dimensions	:Boxed (BOX) 380 mm x 380 mm x 210 mm typical :Large box (LB) 600 mm x 600 mm x 210 mm typical
Unboxed weight	:5 kg (approx)
Boxed weight	:Box 16 kg (approx) :Large box 33 kg (approx)
Protection	:IP55 (enclosure)

Environmental

EMC emissions	:EN50081-1
EMC immunity	:EN50082
Ambient limits	:-10 to 50 °C (storage), 0 to 45°C (operating) 0 to 90 %RH non-condensing

Indicators

TX	:ON if current is flowing from the network transmitter
RX	:ON if current is entering the network receiver.
OK	:ON if the processor healthy and network relay energised
Digital Inputs	:ON if digital input is on

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