

NBOX/XNC220 Node Controller



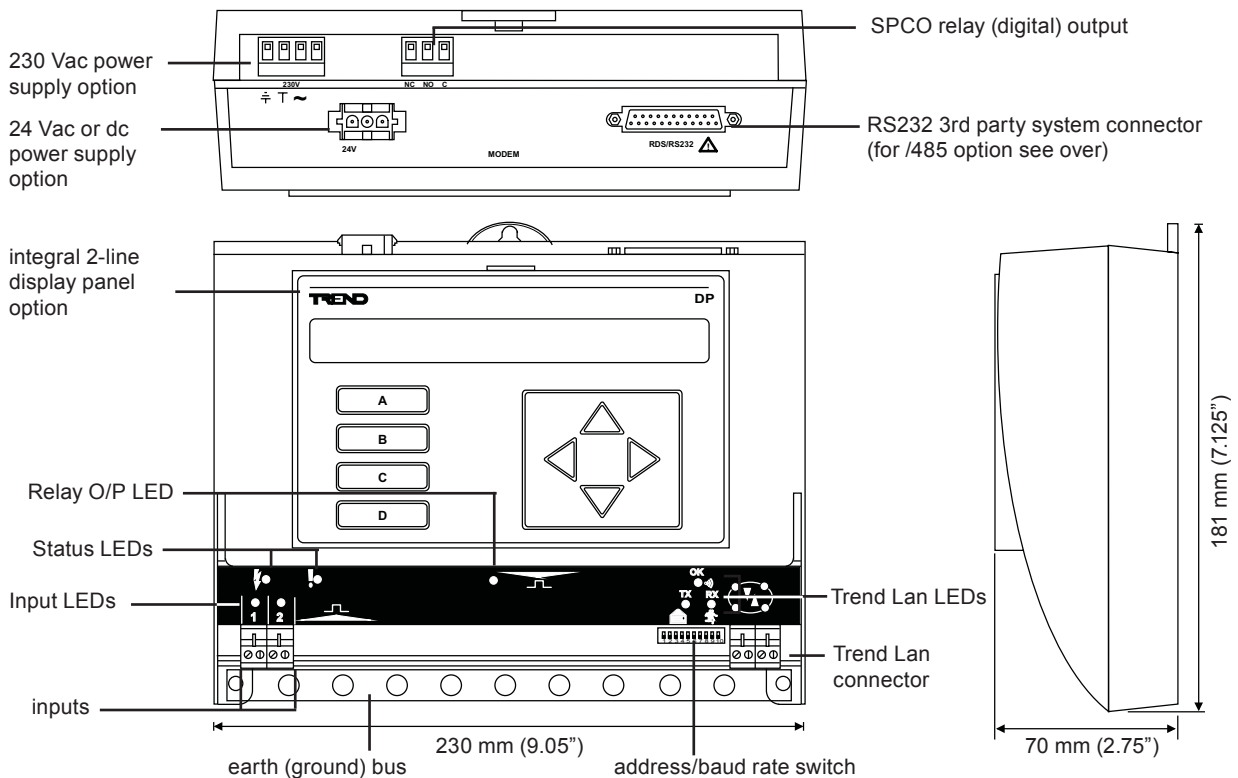
Description

The NBOX/XNC220 provides a flexible way of interfacing the IQ system with 3rd party systems. It utilises both standard IQ configuration modules, and the Custom Language (TCL) to present information from other systems as though it were from an IQ controller. It also allows parameters within the 3rd party system to be adjusted from IQ system Supervisor, and Tool software. It has an optional integral 2-line display, and limited I/O capability.

Features

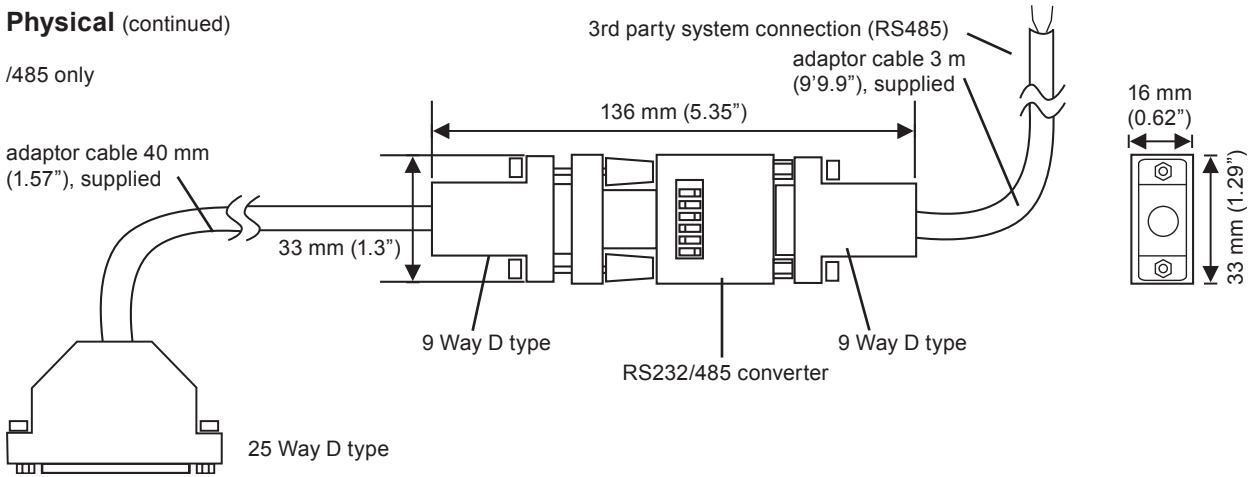
- Flexible method of interfacing with 3rd party systems.
- Custom Language (TCL) compatible.
- Standard IQ configuration modules.
- 230 Vac, or 24 V versions.
- Small footprint.
- 3 point mounting.
- 2 digital inputs, and 1 SPCO relay output.
- Optional integral 2-line display.

Physical



Physical (continued)

/485 only



FUNCTIONALITY

The NBOX/XNC220 enables interfacing between the IQ system, and 3rd party systems. The functionality can be divided into two sections the firmware, and the hardware.

FIRMWARE

The firmware within the NBOX/XNC220 consists of two parts: the device part, and the TCL part. The device part (standard IQ2 v3.2 firmware) consists of a number of standard IQ configuration modules, and functions in exactly the same way as a IQ controller. These modules can be linked together to form a strategy to manipulate the data from the 3rd party system in the normal way. The TCL part runs a Custom Language (TCL) program. It communicates with the 3rd party system, passing information from the analogue and digital arrays in the device part to the 3rd party system, and writing values from the 3rd party system to the analogue and digital arrays in the device part. It can also receive, and send messages to/from the IQ system current loop Lan via a second address (set up with a Comport module).

Configuration: The device part of the NBOX/XNC220 uses the standard IQ configuration mode which enables configuration via the network. SET can be used to create a strategy data file (.IQF) which can then be downloaded to the controller. SET can also be used to upload, and download .IQF files for backup purposes. The TCL part is configured using a TCL Programming Tool to download a TCL program.

Communications: When operating as part of a Building Management System, the IQ22x will be connected to other devices via the IQ system Network. This means that information within the IQ22x can be accessed using one of the IQ system supervisor programs, or passed to other IQ controllers using inter-controller communication, enabling the sharing of information across the whole system.

When connected to the network the controller can use up to 2 different addresses. One address is for the controller itself (set by front panel switch), and the second is optional, and is used by a comport module (communications from TCL code). There are 2 comport modules, but one would be used for the RS232(RS485) connection to the 3rd party system.

The controller's address is set by a switch, and the comport addresses are set up in the strategy configuration (comport modules).

Custom Language: This is a programming language, based on BASIC, which enables interfacing between the IQ System, and 3rd party systems. A full description of the language can be found in the Custom Language (TCL) Manual.

Address module: The address module functions as described in the IQ Configuration Manual plus Addendum, except that the local supervisor address parameter is ignored because it is used for connection to the 3rd party system.

store module: Store modules are used to hold strings of information that can be assessed by the TCL program.

Each store module can hold a sting of up to 40 characters. The store is accessed in configuration by using 's' followed by the module number (e.g. s1 specifies store module 1). Store modules have a single parameter '\$' which holds the 40 character string. The TCL program reads from the store modules using the STORE\$ function (described in the TCL Manual).

Parameter	Description	ID
String	The string that the module is to store. It can be up to 40 characters long.	\$

Modules: The strategy within the device part consists of a number of individual functional blocks known as configuration modules. These blocks can be linked in various combinations to perform manipulation of parameters from the 3rd party system. The table lists the different types of configuration modules and the number of each type available within the NBOX/XNC220.

Module Type	Number	Module Type	Number
†Sensor	32	†Critical Alarm	4
‡Sensor type	10	†Alarm History	20
†Loop	16	†IC Comms	16
†Function	90	†Digital Inputs	48
†Logic	90	†Fast Sequence	8
†Driver	12	†Zone	5
†Knob	30	†Schedule	8
†Switch	20	†Calendar	20
‡Sensor log	20	†User Password	6
†Sequence step	240	†Sequence time	1 s
†Analogue Nodes	256	†Digital Nodes	506
page	30	group	10
route	50	destination	10
New alarm log	100	Display	140
*Comport	2	Directory	25
*store	50		

† Explained in IQ Configuration Manual. ‡ Explained in IQ Config. Manual Addendum. * Explained in this document.

FIRMWARE (continued)

Full details of the modules are given in the IQ Configuration Manual and Addendum. The NBOX/XNC220 contains the normal IQ2 v3.1 features as described in the IQ Configuration Manual Addendum; Engineers Journal (J), I/O Summary (i/o), Loader Issue (R(c), 'c' lower case), Serial Number (R(s), 's' lower case, Supply Frequency Option, Enhanced Logging.

Comport module: Comport modules are used to define the setup of serial ports used to communicate with the 3rd party system, and IQ system ports used to enable the TCL part to communicate directly over the IQ system network. Comport modules are assessed in configuration by using 'c' followed by the module number (e.g. c1 specifies comport module 1). The parameters held within a particular comport module vary depending on whether it is a serial port, or a IQ system port.

Each module has the following parameters:

Parameter	Description	ID
Label	20-character user-friendly label for the module	\$
Port Type	The type of port the module is defining. <i>Range = Serial, or IQ system Lan</i>	Y

The other parameters vary depending on the port type that has been selected. If a serial port has been specified the following parameters need to be defined.

Parameter	Description	ID
Baud Rate	The baud rate of the port. <i>Range = 300 baud, 600 baud, 1200 baud, 2400 baud, 4800 baud, 9600 baud, or 19200 baud</i>	B
Data Bits	The required number of data bits. <i>Range = 7 or 8</i>	D
Parity	The parity that is to be used. <i>Range = Odd, or Even</i>	
Port Number	The number of the com port being used.	N
Rx Termination	The RX terminator character. <i>Range = 0 to 255</i>	R
Stop Bits	The required number of stop bits. <i>Range = 1, or 2</i>	S
Timeout	The timeout in milliseconds. <i>Range = 0 to 32767</i>	T

If an IQ system port has been specified the following parameters need to be defined:

Parameter	Description	ID
Destination Address	The network address to which the next message will be sent. <i>Range 1 to 119 excluding addresses 2, 3, and 10.</i>	D
Destination Lan	The Lan number of the device to which the next message will be sent. <i>Range 1 to 119 excluding numbers 2, 3, and 10.</i>	L
Own Address	The IQ network address of the port. <i>Range 1 to 119 excluding addresses 2, 3 and 10.</i> <i>If set to zero the address wil be the address switch setting plus 1.</i>	A
Tx Protocol	The protocol used for transmission.	P

Note that for the /485 option , the Baud rate and Data bits must be set to match those of the interface. The following settings are possible 1200,8; 2400,8; 4800,8; 9600,8; 19200,8; (baud rate, data bits respectively).

I/O Channels: Care should be taken to distinguish between configuration channel numbers used in configuration mode and printed on the board (input channels 1 to 2, relay output channel 8) and external connection numbers shown on the label (numbered differently, inputs 1 to 2 and relay output 16). Once the configuration channel is selected in configuration mode, the external connection is displayed alongside.

HARDWARE

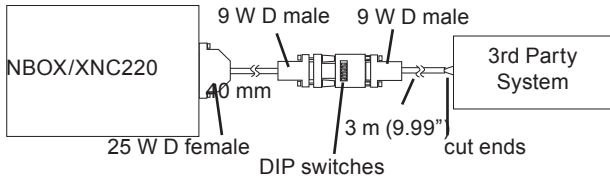
Unit: The NBOX/XNC220 is in a plastic enclosure with a transparent plastic flip-up terminal cover. It has a 3 point mounting to facilitate installation and must be mounted within a secondary/protective enclosure rated to IP20 or equivalent. An optional metal enclosure with cable glanding knockouts (ENCLS/MBOX/IQ22x) is available for this purpose.

IQ system Network: The network terminals facilitate connection of 2 wire cables. The address and baud rate (19k2, 9k6, or 1k2) are selected by switches. The standard IQ system network node features are included (TX, RX, and network OK[®]), indicators, bypass relay, and network alarm generation).

Connectors: 2 part connectors are used throughout to facilitate wiring. A bus bar is provided for screen termination.

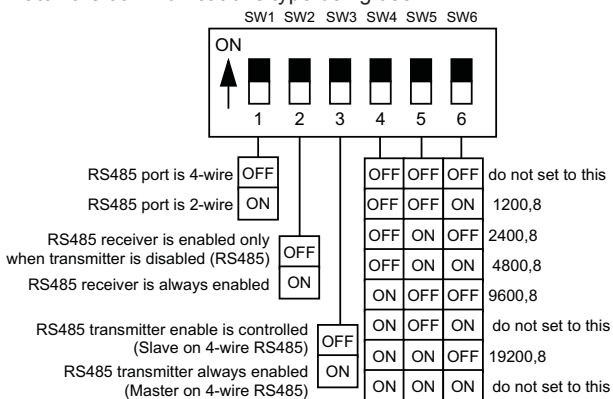
Address/Baud rate switch: The address on the Lan is set by poles 1 to 7 in range 1, 4 to 9, 11 to 119 and must be unique on the Lan. The baud rate is set by poles 8 to 10 in the range 1k2, 9k6, 19k2 and must match the other nodes on the Lan. The address/ baud rate switch may also be used to perform a strategy clear-down; this is done by setting all the address/ baud rate poles to zero before power up (see Installation Instructions, TG200019 sheet 3 and IQ Configuration Manual Addendum). For this reason the address should normally be set non-zero.

RS485 to 3rd Party System: The /485 option has an RS232/RS485 converter module which is connected to the rear of the unit by means of a 40 mm 25 way female D connector to 9 Way male D connector cable. The converter module is connect to the 3rd Party System by a 3 metre screened 9 way male D connector to open ends 2 wire cable, and screen. Both of these adapter cables are supplied with the unit.

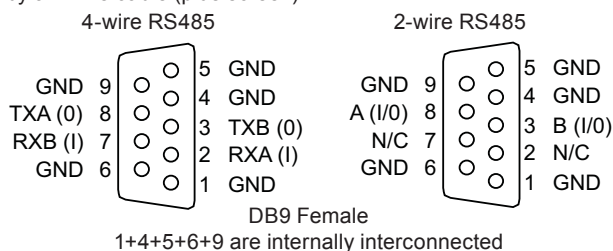


Note: The internal wiring to the rear RS232 plug is non-standard and is only intended for the NBOX/XNC220/485 application. If any other device were to be connect to this plug, damage may occur.

The converter module has DIP switches which can be set to match the communications type being use.



If a 4 wire RS485 is used, the 3 m cable needs to be replaced by a 4 wire cable (plus screen).

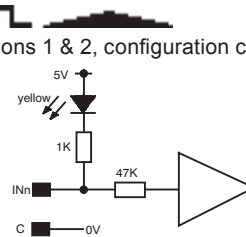


A or B: Following RS485 standards, the RS422/485 connections above are marked A and B. They are defined as follows: When the RS232 TX input is at the RS232 HIGH level the A output is at the RS485 HIGH level (+5V nominally) and the B output is at the RS485 LOW level (0V nominally).

When connecting to other RS485 equipment, you may encounter markings such as HI/LO or +/- . Such non-standard markings are unclear and you may need to experiment. Normally, one assumes that the converter's A/B corresponds to the other devices's A/B, HI/LO or +/- marking respectively but sometimes, this is wrong. One simple way to help establish which is which is to measure the voltages on the other product when no communications is taking place: B should be more positive than A.

RS422/485 Grounding: A connection between the converter's GND and the other device(s) interface ground is highly desirable for proper noise immunity. The cable shield can be used for this connection. However, unless the other device's interface is isolated (i.e. floating) there is a risk of a ground loop current and this can result in equipment damage. In such a situation the GND connection can be omitted but only if the common mode voltage (the ground potential difference between the two interfaces) is within the common mode voltage range of -0.5 V to +5 V.

Digital Inputs (external connections 1 & 2, configuration channels IN1, IN2)






Battery Backup: Details about the strategy configuration, TCL program, 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.

Power: 230 Vac 50/60 Hz, 24 Vac, or 24 Vdc.

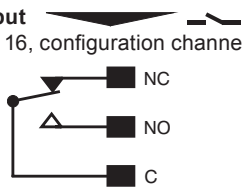
Note that the unit must be earthed (grounded) using the Earth terminal on the power supply input connector.

Fusing: The unit has no replaceable fuses; protection is provided by means of a self-resetting thermally protected transformer. The 24 Vac or dc version has a solid state multifuse.

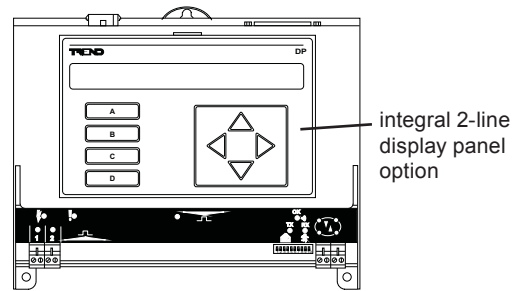
HARDWARE (continued)

Indicators: LED indicators for receive and transmit network current flow (RX, TX) and network OK (LAN, ), also for all I/O channels, power (PWR, ), and watchdog (WD, ), see specification section for details.

Digital (Relay) Output
(external connection 16, configuration channel OP8)



2-line Display Panel: The controller may be purchased with a 2DP option fitted in the cover or there is a retrofit kit comprising a replacement cover with integral 2DP (COVER/DP/IQ22x).

**COMPATIBILITY**

Supervisors :916, 963, IQView, Viewpoint.
Utility Software :SET, TCL Tool (/485 only).
Controllers :It can communicate to IQ controllers using inter-controller communications.

Strategy files: A standard uploaded strategy file (.IQF) can be downloaded to an NBOX/XNC220, but an .IQF file uploaded from an NBOX/XNC220 cannot be downloaded into IQ1xx series controllers. If this is attempted, the controller will fail to send 'Load OK'.

Note that after downloading a strategy the TCL code must be downloaded using TCL Tool.

The IQ Configuration Reference Manual Addendum covers the compatibility between different types of strategy files.

Sensor Logs: The IQ Configuration Reference Manual Addendum covers the compatibility between the NBOX/XNC220 sensor logs and supervisors and software tools.

INSTALLATION

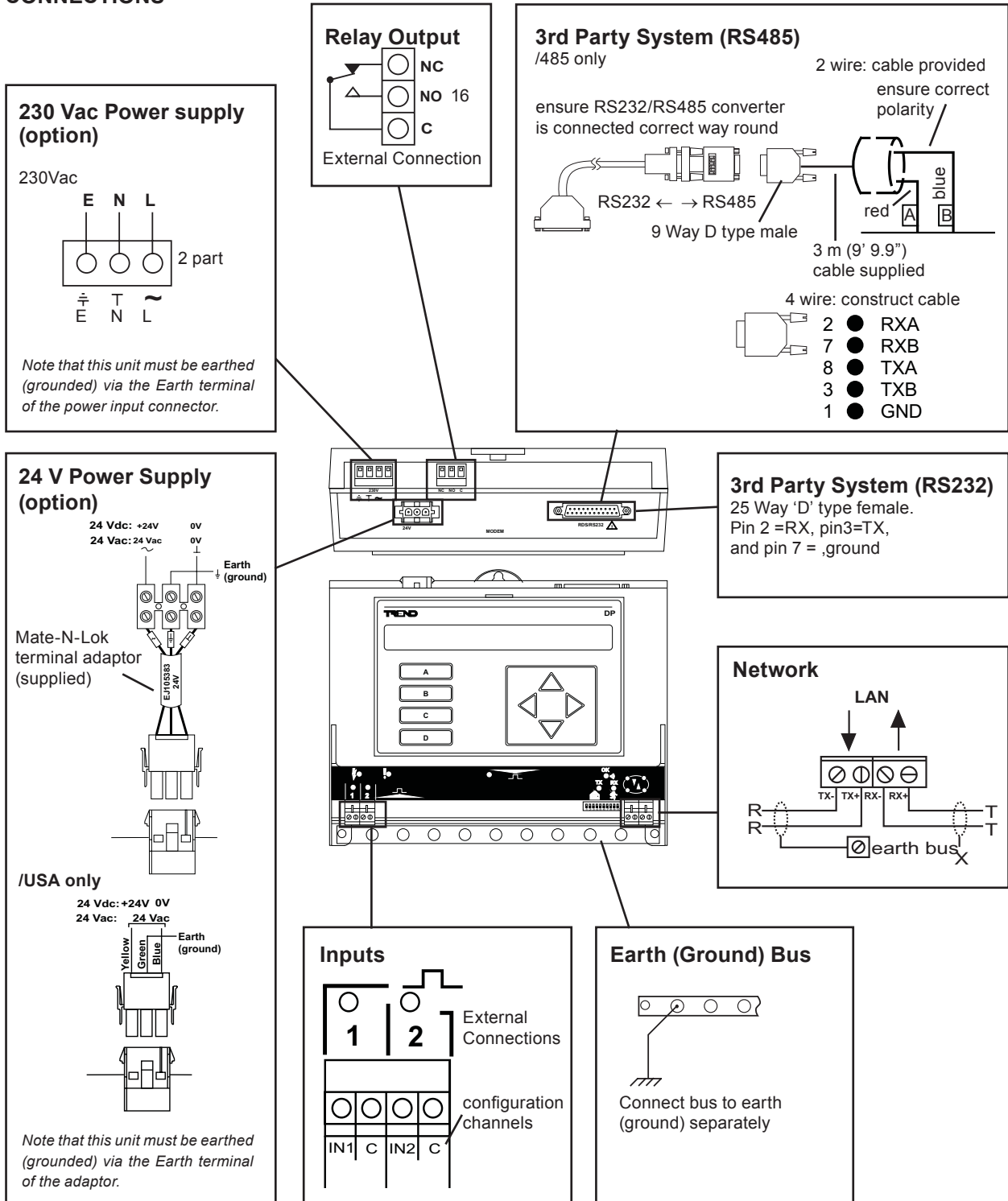
The NBOX/XNC220 must be mounted within a secondary/protective enclosure rated to IP20 or equivalent, using 3 screws and washers. The procedure involves:

- mount the unit in position
- connect power, do not power up
- connect the network
- connect to 3rd party system
- terminate I/O leave unconnected
- specify network address and baud rate

- disconnect I/O, network
- power up and check network
- configure the strategy, and download TCL Program
- check operation
- connect output
- backup configuration

This installation procedure, is covered the NBOX/XNC220 Installation Instructions, TG200019. The installation of an ENCLS/MBOX/IQ22x is covered by ENCLS/MBOX/IQ22x Installation Instructions, TG200204.

CONNECTIONS



FIELD MAINTENANCE


The NBOX/XNC220 requires virtually no routine maintenance, however it is recommended that the lithium battery be replaced every 5 years, as explained in the NBOX/XNC220 Installation Instructions, TG200019.

DISPOSAL

COSHH (Control of Substances Hazardous to Health, UK Government Regulation 2002) ASSESSMENT FOR DISPOSAL OF NODE CONTROLLER. The only part affected is the lithium battery which must be disposed of in a controlled way.

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, product, and battery (if fitted) should be disposed of by a suitable recycling centre. Do not dispose of with normal household waste. Do not burn.

ORDER CODES

NBOX/XNC220/[Display]/[Power]

NBOX/XNC220/485/[Power] RS485 interface version

Note that NBOX/XNC220/.. cannot be upgraded to NBOX/XNC220/485/.. ; there is no upgrade kit available.

NBOX/XNC220/USA/UL/24 UL version for USA (24 Vac or Vdc only)

[Display]		[Power]	
Blank	No display	230	230 Vac power supply
DP	XNC220 with integral 2-line display	24	24 Vac or Vdc power supply

ENCLS/MBOX/IQ22x

261 mm (10.28") x 285 mm (11.22") x 77 mm (3.03"). IP30 enclosure for wall mounting NBOX/XNC220 with glanding knockouts and aperture for LEDs, and integral busbar.

COVER/DP2/IQ22x

Retrofit cover with integral 2-line display panel.

ENCLS

600 mm (23.6") x 600 mm (23.6") x 210 mm (8.26"). IP55 enclosure.

TP/1/1/22/HF/200

200 m of screened single twisted pair cable for use on IQ system current loop Lan (or inputs). Belden equivalent 8761NH.

TP/2/2/22/HF/200

200 m of screened twin twisted pair cable for use on IQ system current loop Lan. Belden equivalent 8723NH.

SPECIFICATIONS

Electrical

CPU :68334 32 bit micro controller
 CPU speed :16.78 MHz
 Cycle time :1 s
 Memory :128 kbyte battery backed SRAM, and 256 kbyte Flash.

Power
 /230 :230 Vac +15 -10 %, 50 to 60 Hz
 /24 :24 Vac ±10%, 50 to 60 Hz, or 24 Vdc (24 V to 36Vdc)

Consumption :13 VA max
 Fusing :No replaceable fused required. All protection self-resetting.

Battery backup :Battery maintains time, and logged data with mains off for at least 5 years.

Battery :CR2032, 3 V, or equivalent
 Clock accuracy :30 s per month (typical).
 2-line display panel :Optional 2x40 character display, with 4 programmable softkeys. Can be mounted in front cover.

Network transmission :20 mA serial 2 wire current loop, opto-isolated, polarity independent receiver.

3rd Party transmission
 RS232 :EIA/TIA/232E, V28
 RS485 :/485 only, 2 wire or 4 wire

Distance
 Network :Dependent on cable type, see table below:

Cable	1k2 baud	9k6 baud	19k2 baud	No. of Wires
Belden 9182	1000 m 1090 yds	1000 m 1090 yds	700 m 765 yds	2
Belden 9207	1000 m 1090 yds	1000 m 1090 yds	500 m 545 yds	2
IQ system TP/1/1/22/HF/200 (Belden 8761)	1000 m 1090 yds	700 m 765 yds	350 m 380 yds	2
IQ system TP/2/2/22/HF/200 (Belden 8723)	1000 m 1090 yds	500 m 545 yds	250 m 270 yds	4

3rd party system :15 m (17 yds)
 Baud rate
 IQ system network :Selectable by switch 1k2, 9k6, or 19k2. Set to be same as other nodes on lan.

3rd party system
 RS232 :Software selectable 300 baud, 600 baud, 1k2 baud, 2k4 baud, 4k8 baud, 9k6 baud, or 19k2 baud, 7 or 8 bits selectable.
 RS485 :/485 only 1200, 2400, 4800, 9600, 19200, 8 bit only.

SPECIFICATIONS (continued)

Electrical (continued)

Network addresses	
Controller	:Selectable by switch, 116 nodes addressable (1,4 to 119 excluding 10), set to be unique on Lan.
COM port	:By default Com port 2 is set to Trend, and its address setting is zero which means it uses the controller network address switch setting plus 1. This can be changed in configuration mode to be in the normal range (1, 4 to 119 excluding 10), set to be unique on Lan.
Signal Cable	:IQ system TP/1/1/22/HF/200 (Belden 8761) recommended for digital inputs
Digital inputs (D)	:External connections 1, 2, configurable channels IN1, IN2. 2 inputs, Volt free contact, count rate 30 Hz. Wetting current = 3 mA, nominal 5 V supply. Status LED per channel (ON=closed contact).
Relay output	:External connection 16, configuration channel OP8. 1 output,1 pole changover relay.
Contact rating:	:8A @ 240 Vac (resistive), 5A @ 240 Vac (CosØ=0.4), Single phase only. 5A @ 30 Vdc (resistive), 2A @ 24 Vdc (inductive, T<=30ms). Arc suppression recommended, see Relay Output Arc suppression Installation Instructions, TG200208. Status LED per channel (ON=relay energised). For /USA/UL/24 units the UL rating applies up to 30V.
Indicators	
Digital inputs	:(yellow) Indicates status (ON=contact closed).
Relay output	:(yellow) ON if relay energied.
⚡ (power)	:(green) ON when supply is conneted
🐶 (watchdog)	:(red) ON if controller has a software faul
OK 📶 (network)	:(green) ON if network is operating. Flashes if prohibited controller network address set (0, 2, 3, >119).
RX	:(yellow) ON if current is entering the network receiver
TX	:(yellow) ON if current is flowing from network transmitter

Note that the 🐶 (watchdog) LED flashes momentarily on power up.

Mechanical

Dimensions	:230 mm (9.05") x 181 mm (7.125") x 70 mm (2.78")
Material	
Box	:ABS
Terminal cover	:Clear Styrolux
Protection	:IP30, NEMA 1
Weight	:1.4 kg (3lb 2oz) including display 100 g (14 oz)
Connectors	
/230	:2 part connector for 0.5 to 2.5 mm ² cross section area (20 to 14 AWG) cable
/24...	:Mate-N-Loc to terminal adaptor (supplied). Terminals for 0.5 to 2.5 mm ² cross section area (20 to 14 AWG) cable.
Network	/USA only: Mate-N-Loc 2 part connector. :2 part connector with 4 screw terminals for 0.5 to 2.5 mm ² cross section area (20 to 14 AWG) cable.
3rd party system	:RS232 25 way D type female. RS485 (/485 only) 9 way D type female to 2 single cores cable.

Environmental

EMC	:EN61326-1: 2006
Immunity	:(table 2): for equipment intended for use in industrial locations.
Emissions	:Class B
Safety	:EN61010-1: 2001.
UL	:(/USA/UL/24 only) The unit is UL rated as 'UL916, listed open energy management equipment'.
Flammability	
Casing material	:Flame retardance, UL99V0 Glow wire test, UL746A(3)
Ambient limits	
Storage	:-10 °C (14 °F) to 50 °C (122 °F)
Operating	:0 °C (32 °F) to 45 °C (113 °F)
Humidity	:0 to 90 %RH non-condensing
Altitude:	<2000m (6562 ft)

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

© 2012 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-america.com