800xA Networks

NE870
User Manual

ABB

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NE870
User Manual

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TRADEMARKS

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Table of Contents

Safety

Warning

⚠️ Do not look directly into fibre optical fibre port or any connected fibre although this unit is designed to meet the Class 1 Laser regulations.

When this unit is operated at an ambient temperature above 60°C, the External Surface of Equipment may exceed Touch Temperature Limit according to EN/IEC/UL 60950-1. To reduce the risk of fire, use only No. 26 (e.g. 24 AWG) UL listed or CSA certified telecommunication line cord.

Licensing Information

This device contains public available software which is under the GPL license. For more information see legal.pdf included with all firmware releases. This product includes software developed by the OpenSSL Project for use in the OpenSSL Toolkit- http://www.openssl.org.

Section 1 RNRP Router/Firewall

NE870 is an industrial router which also acts as a firewall. The router/firewall can be utilized to segment a system in to network areas and also security zones. NE870 is primarily intended to be used to separate client/server networks and control networks, to separate different control and safety networks, but also to create RNRP tunnel areas between RNRP networks.

The concept of security zoning is described in IEC62443. In short, security zoning is a method to segment a system into zones with different security levels. A security level is complied with by implementing a combination of security countermeasures. The reason why it potentially could make sense to divide a system into security zones, which comply with different security levels, could be that the risk for different parts of the system varies. Another could be that the impact of a potential incident varies.

NE870 supports RNRP (Redundant Network Routing Protocol), which enables 800xA to have two physically separate networks, and thereby avoid single point of failure.

Housing

The back end holds a casted DIN-clip for stable mounting on a DIN-rail. Direct wallmount is also possible using the four brackets in each corner. The back end also holds the earth connection. For detailed ground connection information, refer to section on "Earth Connection".

2-Slot Enclosure
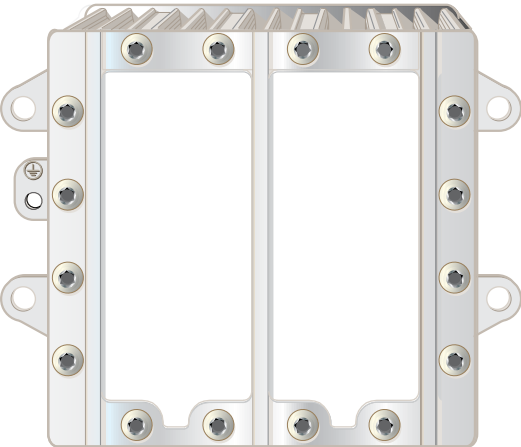
Figure 1. 2-Slot Enclosure

Specification	
Dimension W x H x D	134 x 105 x 122 mm (without connectors)
Weight	1.5 kg
Number of slots	2
Degree of protection	IP40 according to EN 60529
Cooling	Convection
Mounting	Horizontal on 35 mm DIN-rail or wall-mounted

Power and CPU Module

Regardless of NE870 model, all units will be delivered with the power and CPU interface in the slot on the far left. The power and CPU module holds a power board and a CPU board. The isolated power supply has redundant power inputs and allows for a wide operating voltage range (refer to "Section 3 Interface Modules"). The digital IO-port can be used for monitoring the unit. For more information, see *ABB NEOS User Manual*.
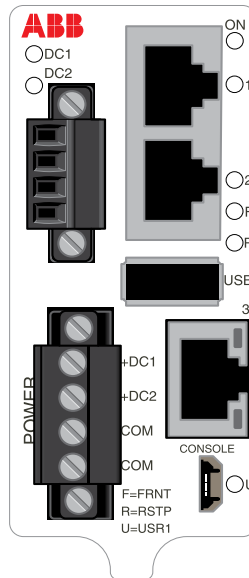
Figure 2. Power and CPU Module

The CPU module holds several interfaces. Three RJ-45 connectors with support for Ethernet 1000BaseTX, a USB port for easy save/load of system configuration and a console port. The console connector is a micro USB cable that connects to a FTDI FT232R USB to serial converter internally. For drivers, please go to www.ftdichip.com and download the appropriate VCP driver. For detailed information on LED indicators, see section on LED indicators Power/CPU.

Power and CPU

- Redundant power supply and alarm function

- Wide operating voltage range (16 VDC to 60 VDC)

- Digital IO for monitoring

- Console port for management using CLI

- USB port for easy save and load system configuration

- 3 x RJ-45 Ethernet 1000BaseTX connectors

- Status LEDs

Section 2 Interface specifications

Power and CPU	
Rated voltage	20 to 48 VDC
Operating voltage	16 to 60 VDC
Rated frequency	DC
Polarity	Reverse polarity protected
Redundant power input	Yes
Isolation to	All other
Connection	Detachable screw terminal
Connector size	0.2 – 2.5 mm^2 (AWG 24 – 12)
Shielded cable	Not required

Power	
Rated voltage	20 to 48 VDC
Operating voltage	16 to 60 VDC
Rated current	0.43 (0.60*) A @ 20 VDC 0.19 (0.25*) A @ 48 VDC
Inrush current	40 mA2s @ 20 VDC 257 mA2s @ 60 VDC
Startup current**	2x Rated current
Rated frequency	DC
Polarity	Reverse polarity protected
Redundant power input	Yes
Isolation to	All other
Connection	Detachable screw terminal
Connector size	0.2 – 2.5 mm2 (AWG 24 – 12)
Shielded cable	Not required

* With 500mA USB load
** External supply current capability for proper start-up

Connection to Console Port

The console port can be used to connect to the CLI (Command Line Interface). The console connector is a micro USB cable that connects to a FTDI FT232R USB to serial converter internally. For drivers please see www. ftdichip.com and download the appropriate VCP driver.
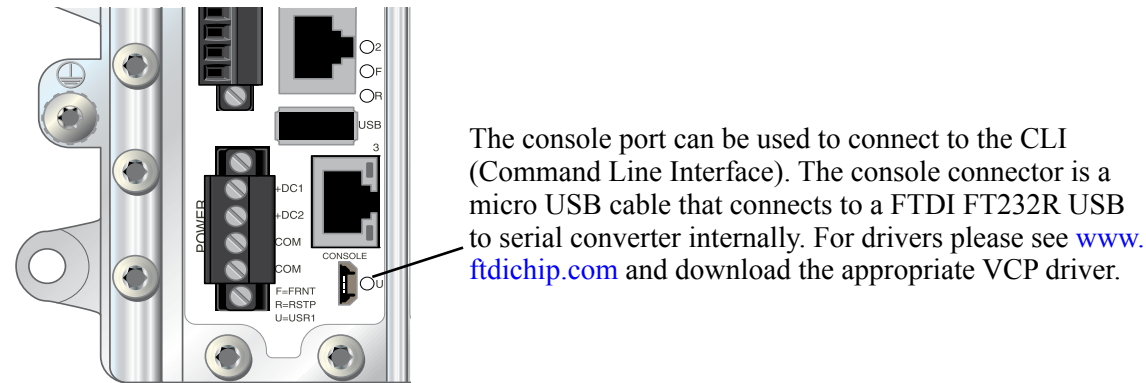
Figure 3. Connection to Console Port

Console	
Electrical specification	USB 2.0 device interface
Data rate	High speed 480mbit/s
Circuit type	SELV
Maximum supply current	100 mA
Isolation to	All other except USB
Galvanic connection to	USB
Connection	USB Micro-B connector in device mode

USB	
Electrical specification	USB 2.0 host interface
Data rate	High speed 480mbit/s
Circuit type	SELV
Maximum supply current	500 mA
Isolation to	All other except Console
Connection	USB receptacle connector type A
Conductive housing	Yes

IO / Relay output	
Connect resistance	30 W
Isolation to	All other
Connection	Detachable screw terminal
Connector size	0.2–2.5 mm2 (AWG 24–12)
Maximum voltage/current	60 VDC/80 mA

IO / Digital input	
Voltage levels	Vih>8V Vil<5V Iin=2.9mA @60V
Isolation to	All other
Connection	Detachable screw terminal
Connector size	0.2–2.5 mm2 (AWG 24–12)
Maximum voltage	60 VDC

Ethernet TX	
Electrical specification	IEEE std 802.3. 2005 Edition
Data rate	10 Mbit/s, 100 Mbit/s, 1000 Mbit/s, manual or auto
Duplex	Full or half, manual or auto
Circuit type	TNV-1
Transmission range	Up to 150 m with CAT5e cable or better*
Isolation to	All other
Connection	RJ-45 auto MDI/MDI-X
Shielded cable	Not required, except when installed in Railway applications as signalling and telecommunications apparatus and located close to rails*.
Conductive housing	Yes
No. of ports	3

* **Note**: Railway installation close to the rails.

To minimise the risk of interference, a shielded cable is recommended when the cable is located inside 3 m boundary to the rails and connected to this port. The cable shield should be properly connected (360°) to an earthing point within 1 m from this port.

This earthing point should have a low impedance connection to the conductive enclosure of the apparatus cabinet, or similar, where the unit is built-in. This conductive enclosure should be connected to the earthing system of an installation and may be directly connected to the protective earth.

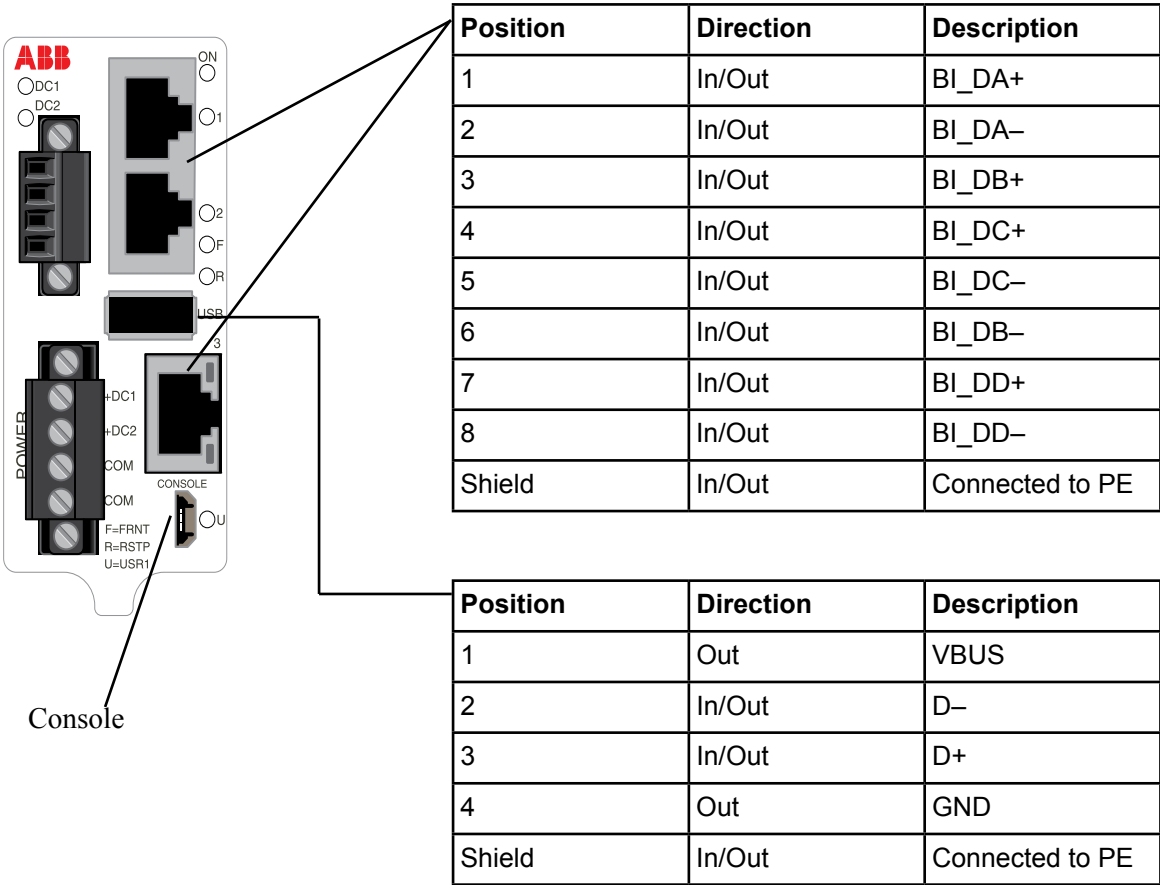Refer to "Safety" section for more information.

Position	Direction	Description
1	In/Out	BI_DA+
2	In/Out	BI_DA–
3	In/Out	BI_DB+
4	In/Out	BI_DC+
5	In/Out	BI_DC–
6	In/Out	BI_DB–
7	In/Out	BI_DD+
8	In/Out	BI_DD–
Shield	In/Out	Connected to PE

Position	Direction	Description
1	Out	VBUS
2	In/Out	D–
3	In/Out	D+
4	Out	GND
Shield	In/Out	Connected to PE

Console

Figure 4. In/Out Directions Description

Power Connection

NE870 supports redundant power connection. The positive inputs are +DC1 and +DC2, the negative input for both supplies are –COM. Connect the primary voltage (e.g. +24 VDC) to the +DC1 pin and return to one of the –COM pins on the power input.
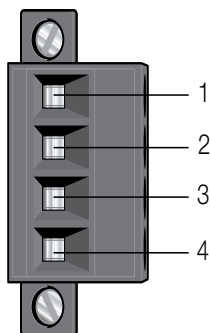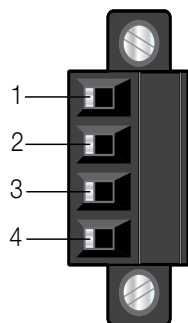
4-position	Product marking	Direction	Description
No. 1	+DC1	Input	Supply voltage input DC1
No. 2	+DC2	Input	Supply voltage input DC2
No. 3	-COM	Input	Common
No. 4	-COM	Input	Common

Figure 5. Power Connections

I/O Connection

The Status output is a potential free, opto-isolated normally closed solid-state relay. This can be configured to monitor various alarm events within the NE870 unit, see *ABB NEOS User Manual*. An external load in series with an external voltage source is required for proper functionality. For voltage/current ratings, see "Section 2 Interface specifications" section.

4-position	Product marking	Direction	Description
No. 1	Status +	Output	Alarm relay (status) contact
No. 2	Status –	Output	Alarm relay (status) contact
No. 3	Digital In +	Input	Digital in +
No. 4	Digital In –	Input	Digital in –

Figure 6. I/O Connection

The Digital In is an opto-isolated digital input which can be used to monitor external events. For voltage/current ratings, see "Section 2 Interface specifications" section.
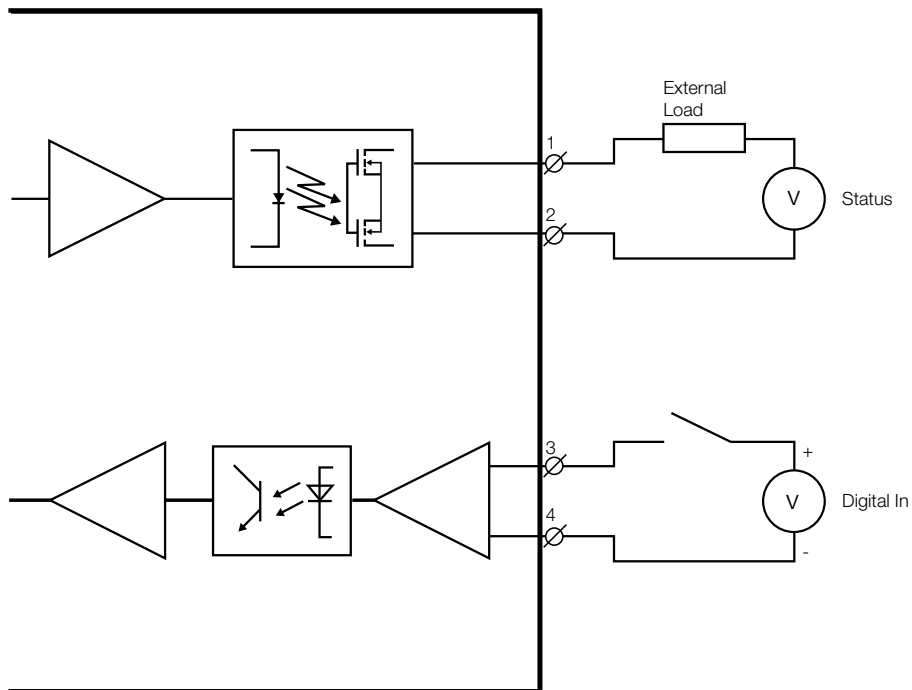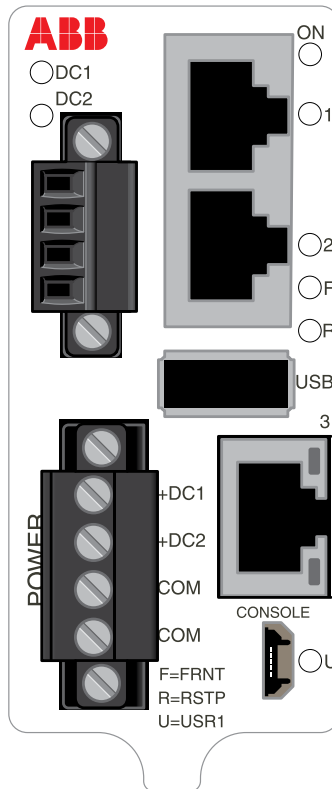

Figure 7. I/O Schema

LED Indicators Power/CPU

Figure 8. LED Indicators

LED	Status	Description
ON	OFF	Unit has no power
	GREEN	All OK, no alarm condition
	RED	Alarm condition, or until unit has started up. (Alarm conditions are configurable, see *NEOS User Manual*)
	BLINK	Location indicator **"Here I am"**. Activated when connected to NECO Tool, or upon request from Web or CLI
DC1	OFF	Unit has no power
	GREEN	Power OK on DC1
	RED	+DC1 input voltage is below operating voltage limit
DC2	OFF	Unit has no power
	GREEN	Power OK on DC2
	RED	+DC2 input voltage is below operating voltage limit
FRNT	OFF	FRNT disabled
	GREEN	FRNT OK
	RED	FRNT Error
	BLINK	Unit configured as FRNT Focal Point
RSTP	OFF	RSTP disabled
	GREEN	RSTP enabled
	BLINK	Unit elected as RSTP/STP root switch
USR1	Configurable, see *NEOS User Manual*	
Copper ports 1-3	OFF	No link
	GREEN	Link established
	GREEN FLASH	Data traffic indication
	YELLOW	Port alarm and no link. Or if FRNT, RSTP or Link Aggegation mode, port is blocked.

Section 3 Interface Modules

Eight Copper Ports

All ports support category 5e cable or better and can handle cable lengths up to 150 m (492 ft).

Interface Specifications

8-Copper Ports	
Electrical specification	IEEE std 802.3. 2005 Edition
Data rate	10 Mbit/s or 100 Mbit/s, Manual or Auto
Duplex	Full or half, Manual or Auto
Circuit type	TNV-1
Transmission range	Up to 150 m with CAT5e cable or better*
Isolation to	All other
Connection	RJ-45 auto MDI/MDI-X
Shielded cable	Not required, except when installed in Railway applications as signalling and telecommunications apparatus and located close to rails*
Conductive housing	Yes
Number of ports	8

* Note: Railway installation close to the rails. To minimise the risk of interference, a shielded cable is recommended when the cable is located inside 3 m boundary to the rails and connected to this port. The cable shield should be properly connected (360°) to an earthing point within 1 m from this port. This earthing point should have a low impedance connection to the conductive enclosure of the apparatus cabinet, or similar, where the unit is built-in. This conductive enclosure should be connected to the earthing system of an installation and may be directly connected to the protective earth. For more information, see "Safety".

LED Indicators 8-Copper Ports

LED	Status	Description
Copper ports 1 – 8	OFF	No Link
	GREEN	Link established
	GREEN FLASH	Data traffic indication
	YELLOW	Port alarm and no link. Or if FRNT, RSTP or Link Aggregation mode, port is blocked.

Position	Direction*	Description
1	In/Out	TD+
2	In/Out	TD–
3	In/Out	RD+
4	–	Not connected
5	–	Not connected
6	In/Out	RD–
7	–	Not connected
8	–	Not connected
Shield	In/Out	Connected to PE
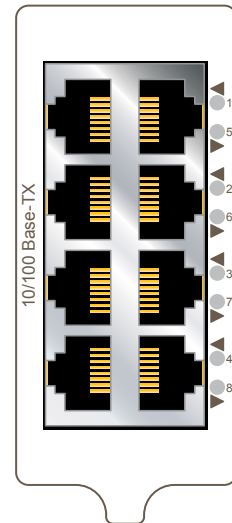
* Direction relative this unit.

Figure 9. LED Indicators 8-Copper Ports

Mounting

The unit can be mounted on a 35 mm DIN-rail, which is horizontally mounted inside an apparatus cabinet, or similar. Snap on mounting as shown in "Figure 10. Mounting, 35 mm DIN-rail".
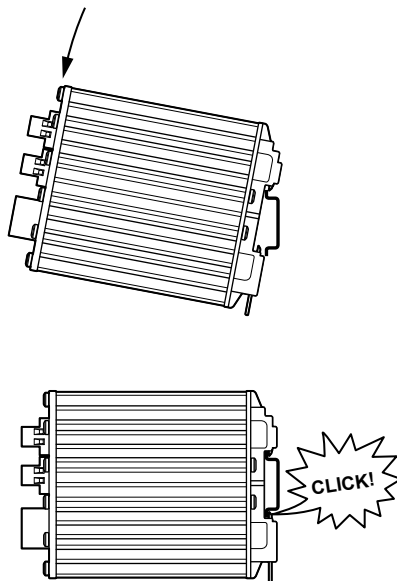

Figure 10. Mounting, 35 mm DIN-rail

For proper vibration and chock performance ABB recommends standard top-hat DIN-rail TH 35-15 according to EN 60715.

Removal

Press down the support at the back of the unit using a screwdriver as shown in Figure 11.

Wall Mounting

This unit can also be wall-mounted as shown in "Figure 12. Wall Mounting the Unit".
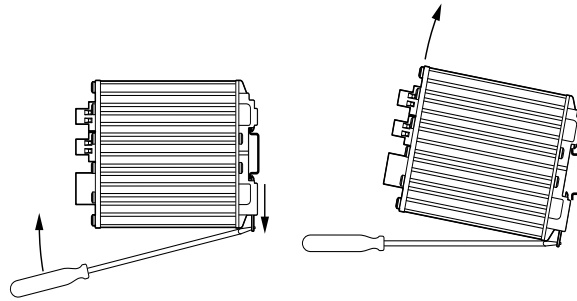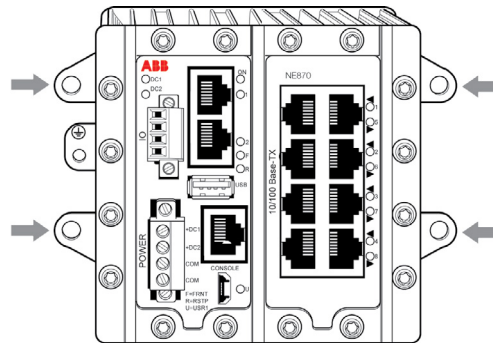
Figure 11. Removing 35 mm DIN-rail

Figure 12. Wall Mounting the Unit

Earth Connection

For correct function the ground connection on the unit needs to be properly connected to a solid ground as shown in "Figure 13. Earth Connection".

Cooling

This unit uses convection cooling. To avoid obstructing the airflow around the unit, use the following spacing rules. Minimum spacing 25 mm (1.0 inch) above /below and 10 mm (0.4 inches) left /right the unit.
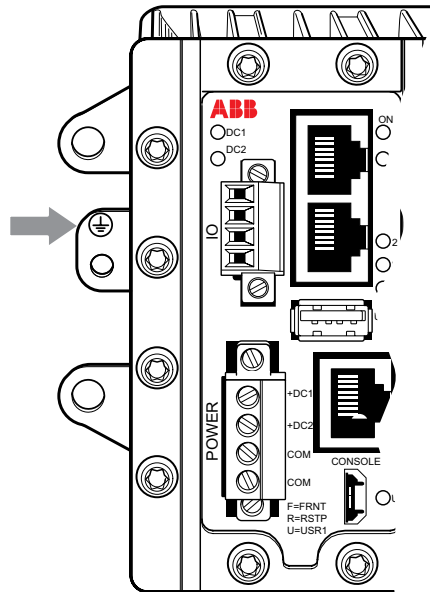
Figure 13. Earth Connection

Spacing is recommended for the use of unit in full operating temperature range and service life as shown in "Figure 14. Cooling".
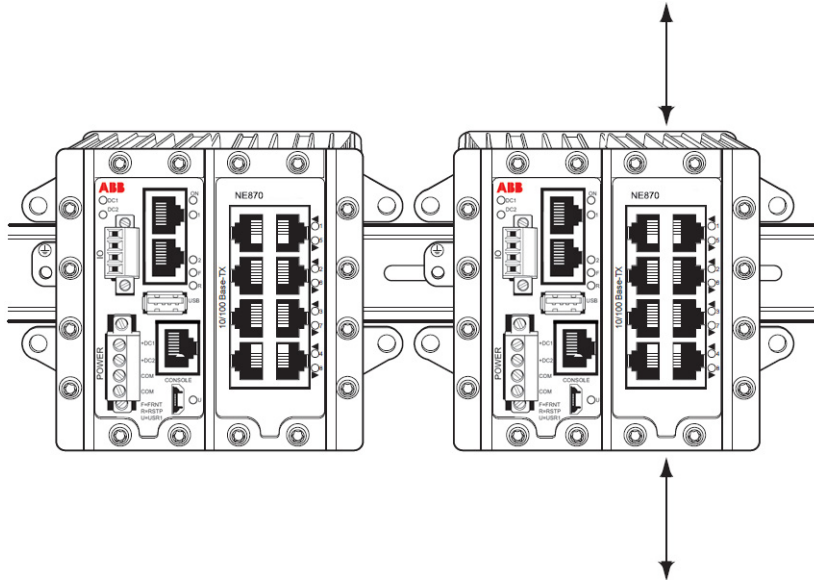
Figure 14. Cooling

Getting Started

This product runs ABB Network Equipment Operating System (NEOS) which provides several management tools that can be used for configuration of the unit.

NECO - is a Network configuration management tool made for commissioning and maintenance of components in a network.

Web - Configuration of the unit using the web browser.

CLI - Configuration of the unit via the Command Line Interface.

If the computer is located in the same subnet as the switch you can easily use a web browser to configure the unit. Within the web you can configure most of the available functions.

For advanced network settings and more diagnostic information, please use the CLI.

Detailed documentation is available in the chapter **The Command Line Management Tool** in the NEOS User Manual.

Factory default:

   – IP address: 172.16.5.245

   – Netmask: 255.255.252.0

   – Gateway: Disabled

Consult your network administrator to know more on subnet.

Configuration

Configure the unit via web browser. The unit can easily be configured through a web browser. Open the link http://172.16.5.245 in your web browser, and you will be prompted with a login screen, where the default settings for username and password are:

   – Username: admin

   – Password: CS4dmin

Once you have logged in, you can use the extensive integrated help function describing all configuration options. Two common task when configuring a new switch is to assign appropriate IP settings, and to change the password of the admin account.

The password can be up to 64 characters long, and should consist of printable ASCII characters (ASCII 33-126); **Space** is not a valid password character.

For additional configuration information, *refer to System 800xA Network Configuration (3BSE034463)* manual.

Agency Approvals and Standards Compliance

ABB Article Number	Denomination	Type	Approval / Compliance
3BSE080208R1	NE870	EMC	EN 61000-6-1, Electromagnetic compatibility – Immunity for residential environments EN 61000-6-2, Electromagnetic compatibility – Immunity for industrial environments EN 61000-6-3, Electromagnetic compatibiliy – Emission standards for residential, commercial and light-industrial environments EN 61000-6-4, Electromagnetic compatibility – Emission for industrial environments EN 50121-4, Railway applications – Electromagnetic compatibility – Emission and immunity of the signalling and telecommunications apparatus
		Safety	UL/IEC/EN 60950-1, IT equipment
		Marine	DNV GL rules for classification – Ships and offshore units

Notice: FCC Part 15.105

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications.

Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Notice: Corrosive environment

This product has been successfully tested in a corrosion test according to IEC 60068-2-60, method 3. This means that the product meets the requirements to be placed in an environment classified as ISA-S71.04 class G3.

Note! If the product is placed in a corrosive environment, it is important that all unused connector sockets are protected with a suitable plug in order to avoid corrosion attacks on the gold plated pins in connectors.

Safety Control Drawing

Position	Direction/description	Input/Output values
1	IO / Status +	U_{in} = 60 VDC max
2	IO / Status –	I_{in} = 80 mA max
3	IO / Digital in +	U_{in} = 60 VDC max
4	IO / Digital in –	I_{in} = 2.9 mA max
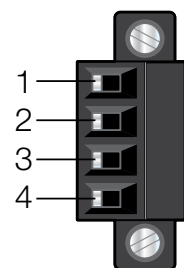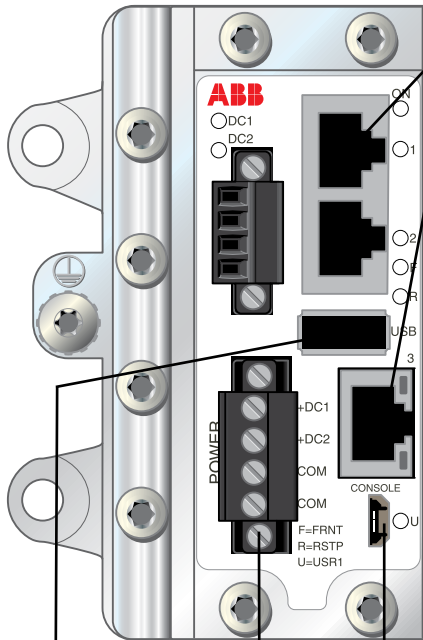
Position	Direction/description	Input/Output values
1	In/Out / BI_DA+	Per port:
2	In/Out / BI_DA–	U = ± 1 V (4V/us)
3	In/Out / BI_DB+	I = ± 20 mA
4	In/Out / BI_DC+	Data rate:
5	In/Out / BI_DC–	10/100/1000 Mbit/s
6	In/Out / BI_DB–	
7	In/Out / BI_DD+	
8	In/Out / BI_DD–	
Shield	PE	

Galvanically isolated via signal transformers and capacitively isolated to GND/PE through a 2kV 1000pF capacitor. See user manual for proven transient protection.
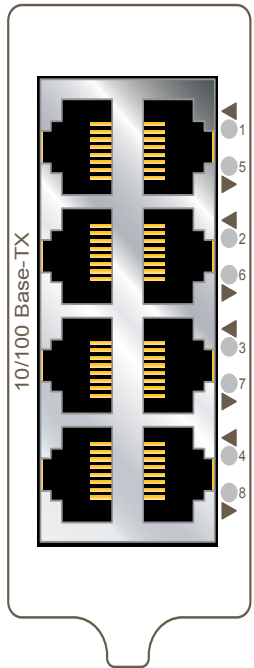
Position	Direction/description	Input/Output values
1	In/Vbus	U = 5V VDC max
2	In/Out D-	I = 100 mA max
3	In/Out D+	
4	Not connected	
5	GND	

Position	Direction/description	Output values
1	Out / VBUS	U_{out} = 5 VDC max
2	In/Out / D–	I_{out} = 500 mA max
3	In/Out / D+	
4	GND	
Shield	PE	

Position	Direction/description	Output values
1	In / +DC1	U_{in} = (16 – 60) VDC
2	In / +DC2	I_{in} = 2.0 A @ 16 VDC
3	In / COM	P_{In} = 31.5 W @ 16 VDC
4	In / COM	

Degree of protection	IP 40
Ambient temperature	–40°C to +70°C
Installation spacing	Minimum 25 mm above/below Minimum 10 mm left/right

Safety Control Drawing

Position	Direction*/description	Input/Output values
1	In/Out / TD+	Per port: U = ± 1 V (4V/us) I = ± 20 mA Data rate: 10/100 Mbit/s
2	In/Out / TD–	
3	In/Out / RD+	
4	Not connected	
5	Not connected	
6	In/Out / RD–	
7	Not connected	
8	Not connected	
Shield	PE	

* Direction relative this unit.

Galvanically isolated via signal transformers and capacitively isolated to GND/PE through a 2kV 1000pF capacitor. See user manual for proven transient protection.

Type Tests and Environmental Conditions

Environmental phenomena	Test	Description	Test levels
ESD	EN 61000-4-2	Enclosure contact	±6 kV
		Enclosure air	±8 kV
RF field AM modulated	IEC 61000-4-3	Enclosure	20 V/m 80% AM (1 kHz), 80–2700 MHz 10V/m 80% AM (1 kHz), 2700-6000 MHz
Fast transients	EN 61000-4-4	Power port	±2 kV
		Signal ports	±2 kV
Surge	EN 61000-4-5	Power port	± 2 kV line to earth, ± 1 kV line to line
		Signal ports	± 2 kV line to earth, ± 1 kV line to line
RF conducted	EN 61000-4-6	Power port	10 V 80% AM (1 kHz), 0.15–80 MHz
		Signal ports	10 V 80% AM (1 kHz), 0.15–80 MHz
Power frequency magnetic field	EN 61000-4-8	Enclosure	300 A/m 0, 16.7, 50, 60 Hz
Pulsed magnetic field	EN 61000-4-9	Enclosure	300 A/m
Radiated emission	CISPR 16-2-3	Enclosure	Class B
	ANSI C63.4 (FCC part 15)	Enclosure	Class B, 30 - 6500 MHz
Conducted emission	CISPR 16-2-1	DC power ports Telecommunication ports Class B	Class B

Dielectric strength	EN 60950	Power port to all other ports	1.5 kVrms, 50 Hz, 1 min
		Signal ports to all other ports	1.5 kVrms, 50 Hz, 1 min
Temperatures		Operating	–40 to +70°C (–40 to +158°F)
		Storage and transport	–50 to +85°C (–58 to +185°F)
		Maximum surface temperature	135°C (temperature class T4)
Humidity		Operating	5 to 95% relative humidity
		Storage and transport	5 to 95% relative humidity
Altitude		Operating	2 000 m / 70 kPa
Service life		Operating	10 years
Vibration	IEC 60068-2-6	Operating	7.5 mm, 5 – 8 Hz 2 g, 8 – 500 Hz (Wall-mounted or DIN-rail mounted using TH 35- 15 according to EN 60175)
Shock	IEC 60068-2-27	Operating	15 g, 11 ms (Wall-mounter or DIN-rail mounted using TH 35-15 according to EN 60175)
Enclosure	UL 94	Aluminium / Zink	Flammability class V-0

Referring Documents

Type	Description	Document Number
User Manual	ABB NEOS User Manual	3BSE080654 en
Network Configuration Guide	System 800xA Network Configuration Guide	3BSE034463 en

Cable Factory Reset on NE870

It is possible to set the unit to factory default settings by using two straight standard Ethernet RJ-45 cables.

1. Power off the switch and disconnect all Ethernet cables (copper and fibre).

2. Connect an Ethernet cable between Ethernet port 1/1 and Ethernet port 1/2 (that is, connect Ethernet ports 1 and 2 on in the left most slot by an Ethernet cable).The ports need to be connected directly by an Ethernet cable, that is, not through a hub or switch. Use a straight cable – not a cross-over cable – when connecting the ports.

3. Power on the unit.

4. Wait for the unit to start up. Control that the ON LED is flashing red.

The ON LED flashing indicates that the unit is now ready to be reset to factory default. You now have the choice to go ahead with the factory reset, or to skip factory reset and boot as normal.

Proceed with Factory Reset

Acknowledge that you wish to conduct the factory reset by unplugging the Ethernet cables. The ON LED will stop flashing. This initiates the factory reset process, and the unit will restart with factory default settings.

Skip the Factory Reset

To skip the factory reset process, just wait for approximately 30 seconds (after the ON LED starts flashing RED) without unplugging the Ethernet cables. The switch will conduct a normal boot with the existing settings.

Do not power off the unit while the factory reset process is in progress.

Contact us

www.abb.com/800xA
www.abb.com/controlsystems

3BSE083159 en A

ABB