NXCBH-6001
August 11, 2017

NXCBH CANbus Hub For Use With Nexus 6000 Series Controls

DESCRIPTION

The NXCBH provides addition power capacity to drive additional CANbus servomotors from either the Fireye PPC6000 or NX6100. This CANbus Hub is simply wired to one of the two CANbus connection points on the main control via four conductor braided shielded wire as specified in this bulletin. The additional motors are wired to the two CANbus Out connectors.

Power to the NXCXBH can be either 120 or 230Vac, selectable by jumper links. The NXCBH comes set for 120Vac.

Safety information

WARNING

The equipment described in this manual is capable of causing property damage, severe injury, or death. It is the responsibility of the owner or user to ensure that the equipment described herein is installed, operated and commissioned in compliance with the requirements of all national and local legislation, which may prevail.

When this equipment is fitted to an appliance due regard must also be given to the requirements of that appliance.

Before attempting to install, commission or operate this equipment all relevant sections of this document must be read and fully understood. If in doubt about any requirements consult Fireye.

Installation, commissioning or adjustment of this product MUST be carried out by suitably trained engineers or personnel qualified by training and experience.

After installation or modifications to the installation all functions of the equipment MUST be checked to ensure safe and reliable operation of the control.

The manufacturer of this equipment accepts no liability for any consequences resulting from inappropriate, negligent or incorrect installation, commissioning or adjustment of operating parameters of the equipment.
Control panels **must not** be left uncovered while power is on. If it is essential to do so while rectifying faults only personnel qualified by training and experience should be involved.

The time any covers are off must be kept to a minimum and warning notices **must** be posted.

Before attempting any work on this equipment or any equipment controlled by or connected to this equipment, all related electrical supplies **must** be isolated.

Safety interlocks **must not** be removed or over-ridden. Any faults once detected **must** be corrected before the control is operated.

NOTE

The manufacturer of this equipment has a policy of continual product improvement and reserves the right to change the specification of the equipment and the contents of this manual without notice.

1. Technical specification

1.1 General

Supply voltage	120/230Vac +10% - 15%
Power consumption	Approx. 60VA
Supply frequency	50/60 Hz ±5%
Ambient temperature range	0 to 60°C (32 to 140°F)
Control unit protection category	IP20. The control must be situated in a P1 or P2 environment according to EN6730-1. Indoor: Control must be mounted in an NEMA1 (IP40) enclosure Outdoor: Control must be mounted in an NEMA3 (IP54) enclosure
Unit dimensions	Control unit 210 x 125 x 80mm (8.27 x 4.92 x 3.15 in) deep Display 158 x145 x 44mm (6.22 x 5.71 x 1.73 in) deep
Weight	Control unit 2.13kg (4.70 lbs) Display 0.90Kg (1.98 lbs)

2. Installation

This section contains basic installation information concerning choice of control and servomotor environment, wiring specification and connection details.

WARNING

EXPLOSION OR FIRE HAZARD
CAN CAUSE PROPERTY DAMAGE,
SEVERE INJURY OR DEATH

To prevent possible hazardous burner operation, verification of safety requirements must be performed each time a control is installed on a burner, or the installation modified in any way.

This manual may cover more than one model of the NX6100 control. Check for Additional Information at the end of this chapter.

This control must not be directly connected to any part of a Safety Extra Low Voltage (SELV) circuit.

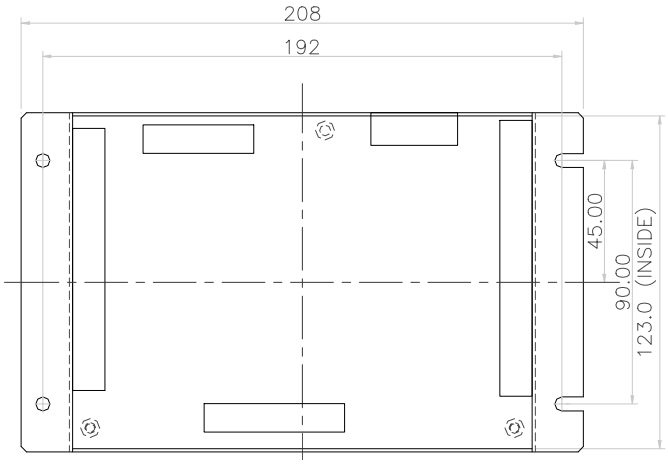
When Installing This Product:

- **Safe, reliable and proper operations of this product requires the use of the specified type shielded cable. See Section 2.5**
- Read these instructions carefully and ensure you fully understand the product requirements. Failure to follow them could damage the product or cause a hazardous condition.
- Check the ratings given in these instructions to ensure the product is suitable for your application.
- After installation is complete, check the product operation is as described in these instructions

CAUTION

- Disconnect the power supply before beginning installation to prevent electrical shock, equipment and/or control damage. More than one power supply disconnect may be involved.
- Wiring must comply with all applicable codes, ordinances and regulations.
- Loads connected to the PPC6000 series must not exceed those listed in the specifications as given in this manual.
- All external components connected to the control must be approved for the specific purpose for which they are used.

2.3 Mechanical mounting details for the NXCBH



There are two versions of the control, one that is intended to be mounted inside of a burner control cabinet, the other which has provision for conduit storage of field wiring etc. that can be mounted without the need for a burner control cabinet. If the version which is designed to be fitted inside of a burner control cabinet is being used the cabinet should have a minimum protection level of NEMA1 (IP40) for indoor use or NEMA3 (IP54) for outdoor use.

The control can be mounted in any attitude; clearances of a least 2.36-inch (60mm) should be left around the unit to allow sufficient space for wiring and to ensure reliable operation.

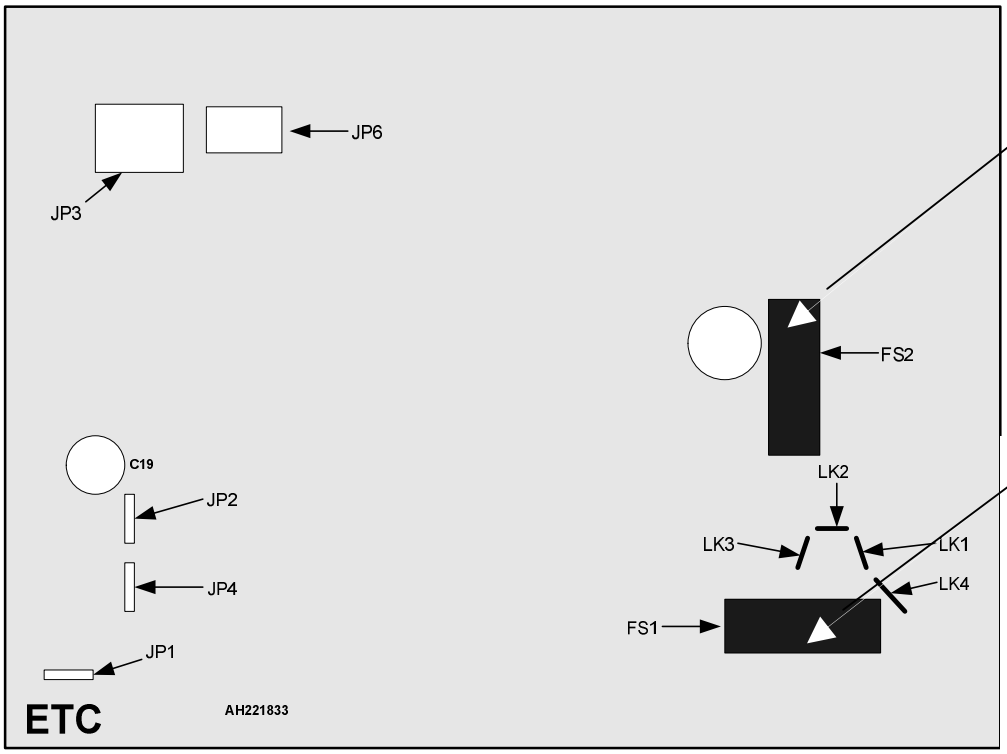
The ambient operating temperature range of the equipment is 0 to 60°C (32 to 140°F). Refer to section 7 for more details

2.4 Option link selection *(NXCBH)*

2.4.1 General

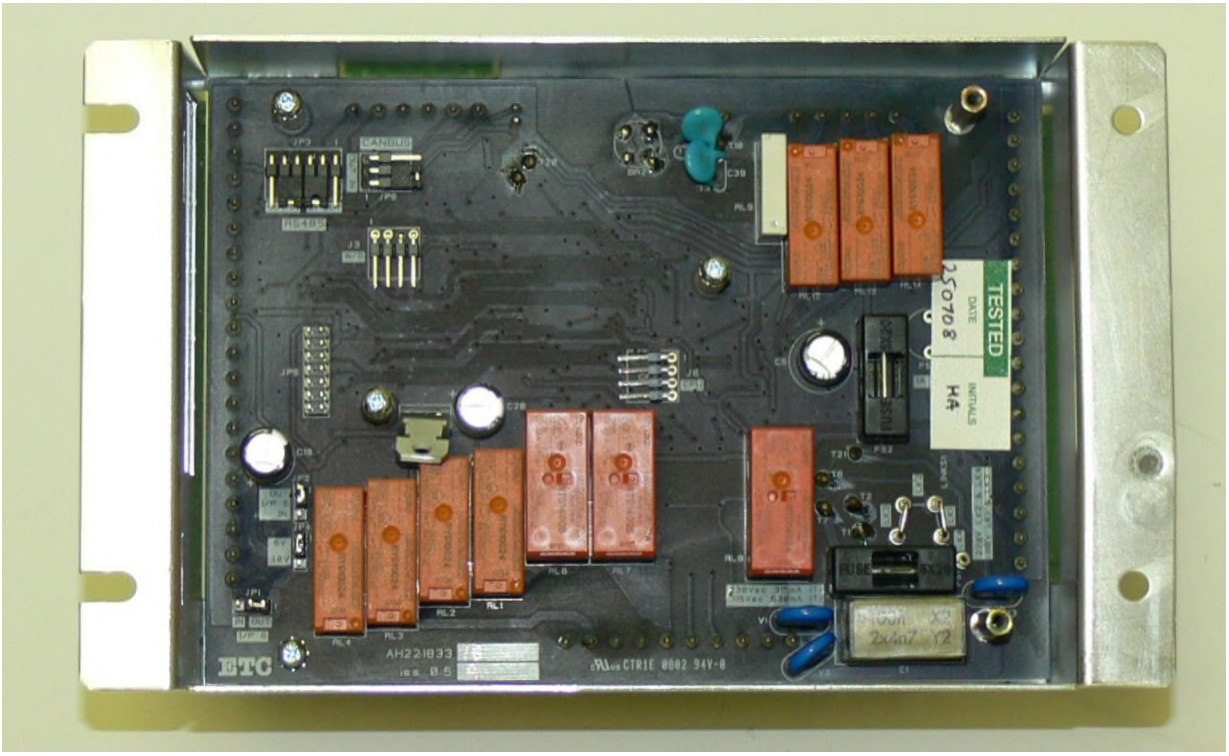
(Access to jumper's and fuses is gained by removing the back cover of the NXCBH)

The NXCBH has a option selection links, located on the circuit board. The function and settings are marked on the board alongside each link. **These links must be set to the correct position before power is applied to the control.**



Bussman S504 series
PN GMA-1
1 AMP (Fast Acting)
(to protects 5V DC circuit)
Alternate Source:
Mouser Electronics
PN 504-GMA-1

Bussmann - S504 series
P/N GMD-630 (TIME Delay)
for 115V
P/N GMD-315 (TIME Delay)
for 230V
(to protect 24V circuit
Alternate Source::
Mouser Electronics
PN 504-GMD-630mA
PN 504-GMD-315mA



2.4.2 Line supply voltage (LK1 - 4) *(NXCBH)*

> ***WARNING***
>
> Incorrect setting of the Links **WILL** damage or destroy the unit.

The possible supply voltages are shown below, together with the necessary fuse rating. Incorrect setting of the 'supply selection links' will cause damage to the unit.
The correct fuse (type and rating) must be fitted; failure to do so may result in damage to the control.

Supply voltage (V)	Links required	Fuse rating (mA)
120	LK1 and LK3	630 anti-surge – TIME DELAY
230	LK2 and LK4	315 anti-surge – TIME DELAY

2.5 Wiring

2.5.1 General

READ THIS FIRST!!!!

There are numerous mentions of "….overall braided shielded (screened) wire" throughout this manual. This is an important aspect to reliable operation. **Table 2.5.1-A** lists **the only approved wire** for this control. While one of the specifications relating to shielded wire indicates the amount of coverage (0-100%), this is not the only factor in selecting wire. While it is true, "foil and drain" shielded wire specifications indicate 100% coverage as compared to approximately 85% for braided type, the cross sectional area of the braid provides the required noise immunity. Also, the special grounding clamp bars on this control do not provide adequate connection to foil shield. In fact most foil shields do not conduct on the surface. **Using the "drain" wire to a ground stud does not properly protect the control.**

CAUTION

- Disconnect the power supply before beginning installation to prevent electrical shock, equipment and/or control damage. More than one power supply disconnect may be involved.
- Wiring must comply with all applicable codes, ordinances and regulations.
- Loads connected to the PPC6000 series, optional daughter board and optional oxygen probe interface must not exceed those listed in the specifications as given in this manual.
- Ensure the maximum total load on the CANbus cabling (servo-motors, display etc) is within the specifications of the main unit and for the cable being used.
- This control MUST NOT be directly connected to any part of a Safety Extra Low Voltage (SELV) circuit.

WIRING INSTALLATION MUST BE CARRIED OUT BY A COMPETENT ELECTRICIAN AND IS SUBJECT TO I.E.E. WIRING REGULATIONS (BS 7671:1992), NEC AND/OR LOCAL STANDARDS, WHICH MAY PREVAIL.

HAZARDOUS VOLTAGES MUST BE ISOLATED BEFORE SERVICE WORK IS CARRIED OUT.

The NXCBH unit MUST be mounted within a 'burner cabinet' or similar and MUST be grounded (earthed) to the overall enclosure to ensure safe and reliable operation.

Do not use a green or green/yellow conductor for any purpose other than ground (earth). The metal body of all component parts MUST be connected to ground (earth) using a green or green/yellow conductor.

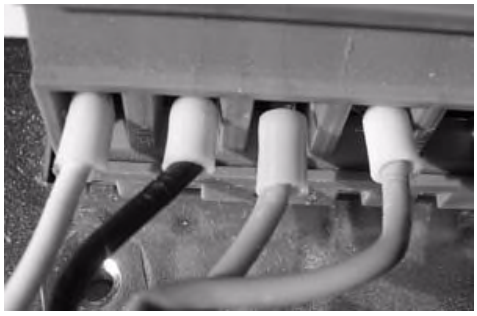
The screen of the signal cable MUST not be used to provide the safety ground (earth), a separate connection using the largest cross-sectional area green or green/yellow ground (earth) wire possible MUST be made.

The screen termination clamps on the control are only provided to allow connection of the cable screens to the main unit they do not provide strain relief. The signal cable screens MUST be connected at the screen termination clamps only, unless stated otherwise. **Screened cables MUST be of the 'copper braid shield' type** and not 'foil with drain wire', the cross section of the drain wire is insufficient to provide correct screening of the signals and there is also no provision to connect the foil or drain at the main unit.

Secure all cables carried in conduit at both ends using a suitable anchorage method in the cabinet.

All cabling that is required to operate at above 50v must be multi-strand single conductor (core), PVC insulated, 16 AWG (19/0.3mm) and should meet the requirements of I.E.C. 227 or I.E.C. 225, NEC

To comply with EMC requirements, wire the control and any optional units using the specified cable sizes and screen connections observing any maximum cable length limitations. **The manufacturer of this equipment recommends the use of bootlace ferules on all wire ends, as a "best practice".**



Bootlace
Ferules

The equipment described in this manual has been tested for compliance to the CE and UL directives listed in the section headed 'approvals'. However, once connected to a burner and other associated controls it is the responsibility of the installer to ensure the complete installation meets the requirements of the UL or CE directives relevant to the particular installation.

IMPORTANT: Wiring Guidelines

All wiring to this control *must* comply with National, State and Local electrical codes. In general, all insulation must meet or exceed the highest voltage present on any conductor in a conduit, raceway or panel, e.g. 480 volt motor wiring would require at least 600-volt insulation. Consult the National Electric code for guidance.

IMPORTANT: Low Voltage (vertical terminal strips)

All low voltage circuits and communication wire must be fully shielded braided (screened) type wire of the specified gauge and number of conductors. **Table 2.5.1-A provides the only approved wire for this application. No "or equal" is provided. Use of wire not approved by Fireye may VOID warranty.**

All wiring to terminal block "PA" & "PB" as well as to any optional daughter board (e.g. VFD) and the Power/CANbus wiring to the display, must be fully shielded braided (screened) wire per **Table 2.5.1-A**.

	Alpha (conductors)		**Carol** (conductors)		**Belden** (conductors)	
	4	2	4	2	4	2
300V	25164	25162	---		9940	
600V	25524	25522	C2688		7895A*	

*NOTE: If Belden 7895A wire is used it will be necessary to use 2 conduit adapters per device if wired as a "daisy chain."

Table 2.5.1-A

All line voltage wiring must be no greater than 16 AWG (19/0.3mm) THHN, TFFN or equal.

The following table provides a guide for converting from NEMA Enclosure Type Numbers of IEC Enclosure Classification Designations. The NEMA Types meet or exceed the test requirements for the associated IEC Classifications; for this reason the table should not be used to convert from IEC classifications to NEMA Types and the NEMA to IEC conversion should be verified by test.

NEMA Enclosure Type Number	IEC Enclosure Designation
1	IP10/IP40/IP20
2	IP11
3	IP54
3R	IP14
3S	IP54
4 and 4X	IP56
5	IP52
6 and 6P	IP67
12 and 12K	IP52
13	IP54

Table 2.5.1-B

International Wire Size Conversion Table: All dimensions shown are as accurate as possible, however, when converting AWG, SWG, inches and metric dimensions, round-off errors do occur. Wire and cable also vary depending upon manufacturer.

American or Brown & Sharpe's AWG	British Standard SWG	Nominal Conductor Diameter (0) (inches)	Fractional Equivalent (inches)	Nominal Conductor Diameter (0) (mm)	Cross Sectional Conductor Area Sq mm (mm^2)	** Stranded Wire Construction Number of Strands x Diameter of Strands (inches)	(mm)
16	-	0.051	-	1.30	1.33	26 x .010	19 x .30
18	19	0.040	-	1.02	0.82	16 x .010	7 x .4
20	21	0.032	-	0.81	0.52	10 x .010	16 x .2
24	25	0.020	-	0.51	0.20	7 x .008	7 x .2

Table 2.5.1-C

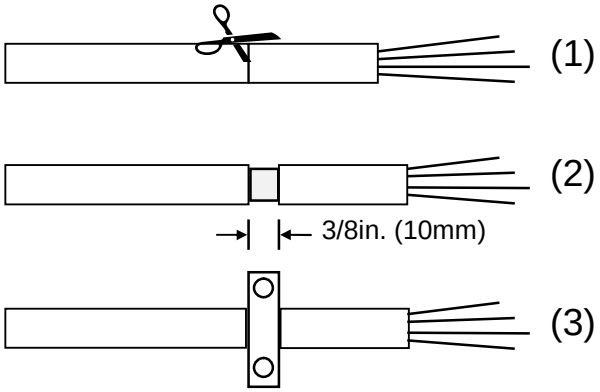
CONDUIT CONNECTOR ADAPTERS	
DEVICE	**Fireye Part Number**
NXC04 Servomotor	35-321
NXC12 Servomotor	35-321
NXC20 Servomotor	35-322
NXC40 Servomotor	35-372
NXIATS Inlet Air Sensor	35-336
NXOINT Oxygen Interface	35-372
All O2 Probe Assembly	35-372

Table 2.5.1-D

2.5.2 Grounding cable screens.

Two screen termination clamps are provided on the NXCBH for termination of cable screens (copper braid type) where necessary, if the unit is used with a daughter board the screens of these cables MUST also be terminated to the cable clamps and the screen and associated insulation left on the cable until as close as possible to the terminals to which they are connected. Where screened cables are required to run through one unit to connect to another a terminal is provided to allow the screens to be connected, by forming a 'tail' with the braided shielded (screened) of each cable, the length of unscreened cable short be kept as short as possible but in any case MUST not exceed $1^{3}/_{16}$" (30mm), per cable 'tail'.

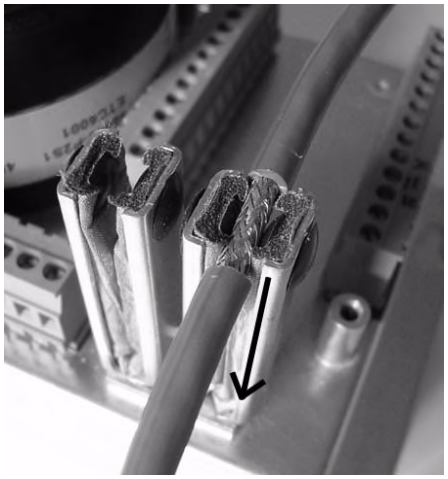
Connect all braided shielded (screened) signal cables to ground (earth) using the screen termination clamps provided on the control. Connect all cable screens to ground (earth) at the *control only*, with the exception of the cables that connect the temperature and pressure sensors where fitted. Where the wiring is 'run through' one unit to connect to another terminals are provided to ensure the screen connection is maintained.



The cable should be prepared by cutting around the outer insulation, taking care not to damage the screen (1).

Pull the insulation apart to expose 3/8 in. (10 mm) of the screen (2).

Slide the exposed braid screen down between the vertical cable clamps on the NXCBH. The conductive cushion provides an earth ground.



2.5.3 GROUND (EARTH) connection

The main unit MUST be connected to ground (earth); the connection should be made at the stud with the tag showing the Ground (earth) symbol. This connection is required to maintain the

overall electrical safety of the installation and ensure the EMC performance of the equipment; failure to comply with the wiring requirements will affect the performance of the system and may cause a hazardous condition to occur. Ensure that a good electrical connection is made between both the unit and the burner panel then between the burner panel and ground (earth). Where necessary, scrape any paint away from connection points and use shake-proof washers to ensure a reliable electrical connection. Always use the largest cross-sectional area ground (earth) wire possible.

2.5.4 Ground (earth) Connection *(display unit)*

The display unit MUST be connected to ground (earth); the connection should be made at the stud with the tag showing the Ground (earth) symbol. This connection is required to maintain the overall electrical safety of the installation and ensure the EMC performance of the equipment; failure to comply with the wiring requirements will affect the performance of the system and may cause a hazardous condition to occur. Ensure that a good electrical connection is made between both the unit and the burner panel then between the burner panel and ground (earth). Where necessary, scrape any paint away from connection points and use shake-proof washers to ensure a reliable electrical connection. The screen of the signal cable MUST not be used to provide the electrical safety ground (earth), a separate connection using the largest cross-sectional area ground (earth) wire possible MUST be made.
If the display unit is mounted into a burner cabinet door ensure there is a good electrical connection between the door and the main cabinet in addition to a good electrical contact between the display unit and the door.

2.5.5 Ground (earth) Connection *(oxygen probe interface)*

The oxygen probe interface unit MUST be connected to earth; the connection should be made at the tag showing the Earth symbol. This connection is required to maintain the overall electrical safety of the installation and ensure the EMC performance of the equipment; failure to comply with the wiring requirements will affect the performance of the system and may cause a hazardous condition to occur. Where necessary, scrape any paint away from connection points and use shake-proof washers to ensure a reliable electrical connection. The screen of the signal cable will not provide an earth connection since it is not connected to the oxygen probe interface enclosure, a separate connection, as described above, using the largest cross-sectional area earth wire possible MUST be made.

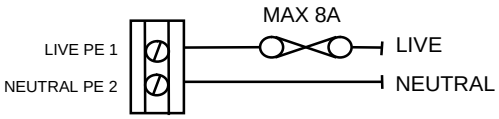
2.5.6 Ground (earth) Connection *(servo motors and sensors)*

All sections of the control with metal enclosures MUST be connected to earth; the connection should be made at the tag showing the Earth symbol or to the body of the device. These connections are required to maintain the overall electrical safety of the installation and ensure the EMC performance of the equipment; failure to comply with the wiring requirements will affect the performance of the system and may cause a hazardous condition to occur. Where necessary, scrape any paint away from connection points and use shake-proof washers to ensure a reliable electrical connection. The screen of the signal cable will not provide an earth connection since it is not connected to the servo motor metal body, a separate connection, as described above, using the largest cross-sectional area earth wire possible MUST be made.

2.5.7 Terminal Designation

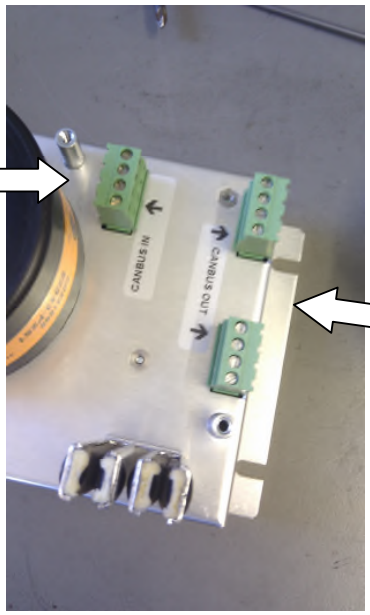
2.5.8 LIVE and NEUTRAL supply *(NXCBH)*

> ***WARNING***
>
> Incorrect setting of the Supply Voltage Links **WILL** damage or destroy the unit.



The LINE and NEUTRAL supplies must be connected using multi-strand single conductor (core) PVC insulated 16 AWG (19/0.3mm) wire. The live connection MUST be fused with a **maximum rating** as shown.

Connect CanBus in to terminals PA/PB of PPC/NX6100 1-4



Connect CanBus out to addition servomotors.

NOTICE

When Fireye products are combined with equipment manufactured by other and/or integrated into systems designed or manufactured by others, the Fireye warranty, as stated in its General Terms and Conditions of Sale, pertains only to the Fireye products and not to any other equipment or to the combined system or its overall performance.

WARRANTIES

FIREYE guarantees for *one year from the date of installation or 18 months from date of manufacture* of its products to replace, or, at its option, to repair any product or part thereof (except lamps and photocells) which is found defective in material or workmanship or which otherwise fails to conform to the description of the product on the face of its sales order. **THE FOREGOING IS IN LIEU OF ALL OTHER WARRANTIES AND FIREYE MAKES NO WARRANTY OF MERCHANTABILITY OR ANY OTHER WARRANTY, EXPRESS OR IMPLIED.** Except as specifically stated in these general terms and conditions of sale, remedies with respect to any product or part number manufactured or sold by Fireye shall be limited exclusively to the right to replacement or repair as above provided. In no event shall Fireye be liable for consequential or special damages of any nature that may arise in connection with such product or part.

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