User Manual for the

HE500TIU050
HE500TIU1XX
HE500TIU20X
HENX2XXTXXX
HE500TIU3XX
HE500TIU4XX
HE500TIU5XX
HE500TIU6XX

And SmartStack Modules

Operator Station Hardware Manual

Fourth Edition
8th August 2005

MAN0356-04

PREFACE

This manual explains how to use the Horner APG Operator Station Hardware Modules (HE500TIU050, HE500TIU10X, HE500TIU11X, HENX2XXTXXX, HE500TIU3XX, HE500TIU4XX, HE500TIU5XX, HE500TIU6XX and SmartStack Modules).

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LIMITED WARRANTY AND LIMITATION OF LIABILITY

Horner APG, LLC. ("HE-APG") warrants to the original purchaser that the Operator Station manufactured by HE is free from defects in material and workmanship under normal use and service. The obligation of HE-APG under this warranty shall be limited to the repair or exchange of any part or parts which may prove defective under normal use and service within two (2) years from the date of manufacture or eighteen (18) months from the date of installation by the original purchaser whichever occurs first, such defect to be disclosed to the satisfaction of HE-APG after examination by HE-APG of the allegedly defective part or parts. THIS WARRANTY IS EXPRESSLY IN LIEU OF ALL OTHER WARRANTIES EXPRESSED OR IMPLIED INCLUDING THE WARRANTIES OF MERCHANTABILITY AND FITNESS FOR USE AND OF ALL OTHER OBLIGATIONS OR LIABILITIES AND HE-APG NEITHER ASSUMES, NOR AUTHORIZES ANY OTHER PERSON TO ASSUME FOR HE-APG, ANY OTHER LIABILITY IN CONNECTION WITH THE SALE OF THE Operator Station. THIS WARRANTY SHALL NOT APPLY TO THE Operator Station OR ANY PART THEREOF WHICH HAS BEEN SUBJECT TO ACCIDENT, NEGLIGENCE, ALTERATION, ABUSE, OR MISUSE. HE MAKES NO WARRANTY WHATSOEVER IN RESPECT TO ACCESSORIES OR PARTS NOT SUPPLIED BY HE. THE TERM "ORIGINAL PURCHASER", AS USED IN THIS WARRANTY, SHALL BE DEEMED TO MEAN THAT PERSON FOR WHOM THE Operator Station IS ORIGINALLY INSTALLED. THIS WARRANTY SHALL APPLY ONLY WITHIN THE BOUNDARIES OF THE CONTINENTAL UNITED STATES.

In no event, whether as a result of breach of contract, warranty, tort (including negligence) or otherwise, shall HE-APG or its suppliers be liable of any special, consequential, incidental or penal damages including, but not limited to, loss of profit or revenues, loss of use of the products or any associated equipment, damage to associated equipment, cost of capital, cost of substitute products, facilities, services or replacement power, down time costs, or claims of original purchaser's customers for such damages.

To obtain warranty service, return the product to your distributor with a description of the problem, proof of purchase, post paid, insured and in a suitable package.

ABOUT PROGRAMMING EXAMPLES

Any example programs and program segments in this manual or provided on accompanying diskettes are included solely for illustrative purposes. Due to the many variables and requirements associated with any particular installation, Horner APG, LLC cannot assume responsibility or liability for actual use based on the examples and diagrams. It is the sole responsibility of the system designer utilising the Operator Station to appropriately design the end system, to appropriately integrate the Operator Station and to make safety provisions for the end equipment as is usual and customary in industrial applications as defined in any codes or standards which apply.

NOTE: The programming examples shown in this manual are illustrative only. Proper machine operation is the sole responsibility of the system integrator.

DECLARATION OF EMC CONFORMITY

Manufacturer's Name:	Horner Ireland Ltd.
Manufacturer's Address:	Unit 1, Centrepoint, Centre Park Road, Cork, Ireland
Declares that the products	Models: HE500TIU050, HE500TIU100, HE500TIU101, HE500TIU102, HE500TIU110, HE500TIU111, HE500TIU200, HE500TIU201 and HE500TIU202.

Conforms to the following EMC standards:

EMC:	EN 55 022, Radiated and Conducted Emissions EN 50 082-1, RF, EFT/EFB, ESD Immunity

Supplementary Information:

The above conformity only relates to the products in a stand-alone capacity. The products are used as part of a system and are therefore classified as a component. As a component, the products are prohibited by EC regulations to carry a CE Mark for EMC conformity. Static discharge tests only apply to normal operation of the keyboards via the front panel. We would stress that the use of our products within your system, while helping to ensure compliance of your system to the same directives, do not necessarily guarantee that compliance will be achieved. We would also like to point out that the interpretation of the law concerning CE marking and its application to sub-assemblies and components is open to interpretation.

Date: 31 Mar 1999

REVISION TO THIS MANUAL

This version (MAN0356-05) of the Tiu Range hardware manual contains the following revisions, additions or deletions:

Inserted Section 7 Tiu4xx Hardware Guide
Inserted Section 8 Tiu5xx Hardware Guide
Inserted Section 9 Tiu6xx Hardware Guide
Modified Tiu3xx specific information in Section 7 Communications to include Tiu4xx /Tiu5xx/Tiu6xx
Modified TIU4/5/6xx specific information in Chapters 7,8,9 to include Hardware Specifications and Serial Port Details
Inserted Section 6 HENX2XXTXXX for NX Hardware Guide
Modified Chapter/Section numbers to allow inclusion of Chapter on NX

TABLE OF CONTENTS

CHAPTER 1: INTRODUCTION

1.1 Scope

The Operator Station (HE500TIU050/10X/11X/2XX/3XX,4XX,5XX,6XX & HENX2XXTXXX) is an Operator Station (OS) that provides extensive monitoring and control in an extremely small package. The Operator Station "OS" product line offers four distinct categories of products as described in Table 1.1.

Table 1.1 – Operator Station (OS) Product Line

Model	Description
TIU050: Text Only	
HE500TIU050-001	2 lines x 20 characters.
HE500TIU050-002	2 lines x 20 characters with Real Time Clock.
TIU10x: Text / Semi-Graphics	
HE500TIU100-01	8 Lines x 20 Characters plus 128 x 64 pixels.
HE500TIU100-02	8 Lines x 20 Characters plus 128 x 64 pixels with Real Time Clock.
HE500TIU100-03	8 Lines x 20 Characters plus 128 x 64 pixels with Current Loop.
HE500TIU100-04	8 Lines x 20 Characters plus 128 x 64 pixels with Current Loop and Real Time Clock.
HE500TIU100-05	8 Lines x 20 Characters plus 128 x 64 pixels with Stud Type Metalwork
HE500TIU100-06	8 Lines x 20 Characters plus 128 x 64 pixels with wide temperature display.
HE500TIU100-07	8 Lines x 20 Characters plus 128 x 64 pixels with Bezel
HE500TIU100-09	8 Lines x 20 Characters plus 128 x 64 pixels with no metal and dill connectors
HE500TIU101-01	8 Lines x 20 Characters plus 128 x 64 pixels with **CsCAN Network**.
HE500TIU101-02	8 Lines x 20 Characters plus 128 x 64 pixels with **CsCAN Network** and Real Time Clock.
HE500TIU102-01	8 Lines x 20 Characters plus 128 x 64 pixels with **Profibus™ Network**.
HE500TIU102-02	8 Lines x 20 Characters plus 128 x 64 pixels with **Profibus™ Network** and Real Time Clock.
HE500TIU103-01	8 Lines x 20 Characters plus 128 x 64 pixels with **DeviceNet™ Network**.
HE500TIU103-02	8 Lines x 20 Characters plus 128 x 64 pixels with **DeviceNet™ Network** and Real Time Clock.
TIU11X: Text / Semi Graphics with Numeric Keypad	
HE500TIU110-01	8 Lines x 20 Characters plus 128 x 64 pixels plus a Numeric keypad.
HE500TIU110-02	8 Lines x 20 Characters plus 128 x 64 pixels plus a Numeric keypad with Real Time Clock.
HE500TIU110-03	8 Lines x 20 Characters plus 128 x 64 pixels plus a Numeric keypad with Current Loop.
HE500TIU110-04	8 Lines x 20 Characters plus 128 x 64 pixels plus a Numeric keypad with Current Loop and Real Time Clock.
HE500TIU110-05	8 Lines x 20 Characters plus 128 x 64 pixels with Stud Type Metalwork.
HE500TIU110-06	8 Lines x 20 Characters plus 128 x 64 pixels with wide temperature display.
HE500TIU110-07	8 Lines x 20 Characters plus 128 x 64 pixels with Bezel
HE500TIU110-09	8 Lines x 20 Characters plus 128 x 64 pixels with no metal and dill connectors
HE500TIU111-01	8 Lines x 20 Characters plus 128 x 64 pixels plus a Numeric keypad with **CsCAN Network**.
HE500TIU111-02	8 Lines x 20 Characters plus 128 x 64 pixels plus a Numeric keypad with **CsCAN Network** and Real Time Clock.
HE500TIU112-01	8 Lines x 20 Characters plus 128 x 64 pixels plus a Numeric keypad with **Profibus™ Network**.
HE500TIU112-02	8 Lines x 20 Characters plus 128 x 64 pixels plus a Numeric keypad with **Profibus™ Network** and Real Time Clock.
HE500TIU113-01	8 Lines x 20 Characters plus 128 x 64 pixels with **DeviceNet™ Network**.
HE500TIU113-02	8 Lines x 20 Characters plus 128 x 64 pixels with **DeviceNet™ Network** and Real Time Clock.

TIU20X: Text / Full Graphics with Numeric / Function Keypad	
HE500TIU200	16 Lines x 40 Characters plus 240 x 128 pixels plus a Numeric keypad / Function keypad. Optional SmartStack I/O.
HE500TIU201	16 Lines x 40 Characters plus 240 x 128 pixels plus a Numeric keypad / Function keypad. Optional SmartStack I/O. Can be used with **CsCAN Network.**
HE500TIU202	16 Lines x 40 Characters plus 240 x 128 pixels plus a Numeric keypad / Function keypad. Optional SmartStack I/O. Can be used in a **Profibus™ Network**.
HE500TIU203	16 Lines x 40 Characters plus 240 x 128 pixels plus a Numeric keypad / Function keypad. Optional SmartStack I/O. Can be used with **DeviceNet™ Network.**
TIU2XX: Text / Full Graphics with Numeric / Function Keypad	
HENX22XTXXX	8 Lines x 20 Characters plus 128 x 64 pixels plus a Numeric keypad / Function keypad. Optional Compact Flash, Ethernet & FOX peripherals. Optional SmartStack & Fast I/O. Can be used with **CsCAN, Profibus™ and DeviceNet™ Networks.**
HENX25XTXXX	16 Lines x 40 Characters plus 240 x 128 pixels plus a Numeric keypad / Function keypad. Optional Compact Flash, Ethernet & FOX peripherals. Optional SmartStack & Fast I/O. Can be used with **CsCAN, Profibus™ and DeviceNet™ Networks.**
HENX26XTXXX	16 Lines x 40 Characters plus 240 x 128 pixels 16 ON/OFF touch screen plus a Numeric keypad / Function keypad. Optional Compact Flash, Ethernet & FOX peripherals. Optional SmartStack & Fast I/O. Can be used with **CsCAN, Profibus™ and DeviceNet™ Networks.**
TIU30X: Text / Full Graphics with Numeric / Function Keypad	
HE500TIU300	30 Lines x 52 Characters plus 320 x 240 pixels 16 greyscale touch screen
HE500TIU301	30 Lines x 52 Characters plus 320 x 240 pixels 16 greyscale touch screen with **CsCAN Network.**
HE500TIU302	30 Lines x 52 Characters plus 320 x 240 pixels 16 greyscale touch screen with **Profibus™ Network**.
HE500TIU303	30 Lines x 52 Characters plus 320 x 240 pixels 16 greyscale touch screen with **DeviceNet™ Network.**
TIU31X: Text / Full Graphics with Numeric / Function Keypad	
HE500TIU310	30 Lines x 52 Characters plus 320 x 240 pixels 16 colour STN touch screen
HE500TIU311	30 Lines x 52 Characters plus 320 x 240 pixels 16 colour STN touch screen with **CsCAN Network.**
HE500TIU312	30 Lines x 52 Characters plus 320 x 240 pixels 16 colour STN touch screen with **Profibus™ Network**.
HE500TIU313	30 Lines x 52 Characters plus 320 x 240 pixels 16 colour STN touch screen with **DeviceNet™ Network.**
TIU32X: Text / Full Graphics with Numeric / Function Keypad	
HE500TIU320	30 Lines x 52 Characters plus 320 x 240 pixels 16 colour TFT touch screen
HE500TIU321	30 Lines x 52 Characters plus 320 x 240 pixels 16 colour TFT touch screen with **CsCAN Network.**
HE500TIU322	30 Lines x 52 Characters plus 320 x 240 pixels 16 colour TFT touch screen with **Profibus™ Network**.
HE500TIU323	30 Lines x 52 Characters plus 320 x 240 pixels 16 colour TFT touch screen with **DeviceNet™ Network.**

The front panel of the OS has a bright and clear display (LCD with adjustable back lit) and easy-to-use push buttons. On the back panel are communication ports for connection to automation equipment (programmable logic controller, drive, weighing equipment or other equipment) and a PC (IBM or compatible computer). Also located on the back panel or end of the back panel depending on the model, the OS has clearly displayed features such as power input, PC and PLC port, Tx and Rx LEDs. Also,

depending on the model, a network port is provided for connection to whichever OS network you have chosen.

The OS supports a variety of protocols. Various protocols can be downloaded through the PC port and stored in the unit's flash memory. The operating system can also be downloaded through the PC port.

The OS range supports 3 network options. CsCAN and Device with the HE500TIUXX1 range and Profibus with the HE500TIUXX2 range.

✓ = Yes X = No O = Optional

	HE500 TIU 050	**HE500 TIU 10X**	**HE500 TIU 11X**	**HE500 TIU 20X**	**HENX 22X TXXX**	**HENX 25X TXXX**	**HE500 TIU 3XX**	**HE500 TIU 4XX**	**HE500 TIU 5XX**	**HE500 TIU 6XX**
Software Cbreeze Included?	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Programming Port - Standard RS232?	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
No. of Comms Ports? - RS232/485	1	1	1	1	1 or 2	1	1	1	1	1
Flash Memory (Words)	64 K	256 K	256 K	512 K	2M	1 M	1 M	8 M	8 M	8 M
Memory Upgrade (Bytes)	X	X	X	1 M	X	4M	512 K	8 M	8 M	8 M
Words Sram (Bytes)	32 K	128 K	128 K	128 K	16M (SDram)	16M (SDram)	2M (Dram)	16 M	16 M	16 M
Memory Upgrade (Bytes)	X	X	X	512 K	X	8M	512 K	512 K	512 K	512 K
Total Pages	300	300	300	300	300	300	300	300	300	300
Characters Per Page	2x20	8x20	8x20	16x40	8x20	16x40	30x52	75x128	75x128	75x128
Graphics pixels	Text Only	128 x 64	128 x 64	240 x 128	128 x 64	240 x 128	320 x 240	800 x 600	800 x 600	800 x 600
Data fields Per Page	8	8	8	24	8	24	24	24	24	24
No. of Text tables	250	250	250	250	250	250	250	250	250	250
Text table Size - Rows & Columns	No	No	No	256	256	256	256	256	256	256
Recipe Memory	0	64K	64K	64K	64K	64K	64K	64K	64K	64K
Recipes - Standard?	X	✓	✓	✓	✓	✓	✓	✓	✓	✓
Editable Fonts – Standard?	X	✓	✓	✓	✓	✓	✓	✓	✓	✓

Scaling Range checking – Standard?	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Trending – Standard?	X	✓	✓	✓	✓	✓	✓	✓	✓	✓
Graphing – Standard?	X	✓	✓	✓	✓	✓	✓	✓	✓	✓
Editable Graphics – Standard?	X	X	X	✓	✓	✓	✓	✓	✓	✓
Animated Bitmaps – Standard?	X	X	X	✓	✓	✓	✓	✓	✓	✓
Alarm and Status pages Standard?	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Numeric keys – Standard?	✓	X	✓	✓	✓	✓	X	✓	✓	✓
No. of System keys	4	4	4	4	6	6	1	1	1	1
No. of Function keys *	10	No	12	18	14	18	5	7	7	7
LED's	X	X	X	10	12	12	X	X	X	X
Touch Screen	X	X	X	X	X	✓ (26X)	✓	✓	✓	✓
SmartStack option – Standard?	X	X	X	✓	✓	✓	✓	✓	✓	✓
Battery Back Ram + Real Time Clock – Standard?	O	O	O	✓	✓	✓	O	✓	✓	✓
Comprehen -sive Maths Facilities (lines)	X	1024	1024	1024	1024	1024	1024	1024	1024	1024
Day & Time Scheduling, Background Task – Standard?	X	✓	✓	✓	✓	✓	✓	✓	✓	✓
Internal Registers (%R)	X	240	240	1200	1200	1200	2400	2400	2400	2400
Operating Temperature C°	0 - 50	0 - 50	0 - 50	0 - 50	0 - 50	0 - 50	0 - 50	0 - 50	0 - 50	0 - 50
Storage Temperature C°	-10 to +70	-10 to +70	-10 to +70	-10 to +70	-10 to +60	-10 to +60	-10 to +60	-10 to +60	-10 to +60	-10 to +60

Humidity Non Condensing Storage (%)	10 to 90	10 to 90	10 to 90	10 to 90	10 to 85	10 to 85	10 to 85	10 to 85	10 to 85	10 to 85
Environ -mental NEMA4 / IP65	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Y2K Certified CE Approved	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Size – Width X Height X Depth (mm)	180 X 120 X 60	121 X 105 X 38	172 X 105 X 38	281 X 192 X 58	230 X 155 X 70	230 X 155 X 70	182.5 X 138.8 X 57.3	233 X 178 X66.1	303.8 X 231 X 72	326.4 X 259.6 X 72
Cut-out – Width X Height (mm)	151 X 89	100 X 85	153 X 85	242 X 158	204 X 131	204 X 131	174 X 131	220.5 X 165.5	289 X 216.2	313 X 246.2
Screen dimensions (mm)	80 X 17	70 X 38	70 X 38	130 X 75	70 X 38	130 X 75	115 X 86	169 X 127	209 X 158	248 X 188
Input Voltage Range (Vdc)	9 – 35	9 – 35	9 – 35	9 – 35	9 – 35	9 - 35	22.6 - 26.4	22.6 - 26.4	22.6 - 26.4	22.6 - 26.4
Weight (grams)	325	370	450	1855	~550	~700	800	1500	2400	2700
Network – DeviceNet CsCan Profibus	X	O	O	O	O	O	O	O	O	O
Data Xfer from Automated device via network	X	O	O	O	O	O	O	O	O	O

* System keys can be programmed to be function keys at specific times in the project. See Function keys in CBREEZE Software Manual MAN0023

** The HE500TIU100/110 is available with two non-standard features: 20mA current loop communication and a real-time clock (RTC). Both can be ordered at the time of purchase. The current loop can be re-fit by the user later. The RTC requires factor re-fit. The HE500TIU050 is only available with the real-time clock option.

*** The HE500TIU20X provides for the display of both text and full graphics and has a Numeric/Function Keypad. It also allows the use of a wide range of SmartStack I/O options.

1.2 Equipment Needed

1. The current version of ***CBREEZE***™ software install on a PC running Windows 95™, Windows 98™ or Windows NT®.
2. HE500TIU050/10X/11X/20X Interface Unit.
3. PC to TIU Programming Cable HE693CBL232 or equivalent See Chapter on Communications

1.3 Technical Specifications

Table 1.2 – Technical Specifications

Parameter	Conditions	Min.	Typical	Max.	Units
Input voltage (V_I) Not Tiu3XX Input voltage (V_I) Tiu3XX		10 22.6	24	32 26.4	VDC
Typical power consumption HE500TIU050 HE500TIU10X HE500TIU11X HE500TIU20X HENX22X HENX25X HENX26X HE500TIU3XX	 V_I = 24VDC V_I = 24VDC V_I = 24VDC V_I = 24VDC V_I = 24VDC V_I = 24VDC V_I = 24VDC V_I = 24VDC		 130 130 130 350 400		 mA
Inrush input current	V_I = 24VDC for 4ms		260		mA
Operating temperature HE500TIU050 HE500TIU10X HE500TIU10X-6 HE500TIU11X HE500TIU11X-6 HE500TIU20XA HE500TIU20XB or higher HENX22X HENX25X HENX26X HE500TIU3XX		 0 0 -10 0 -10 0 0 0 0 0 0		 **50** **50** **60** **50** **60** **45** **50** **70** **70** **70** **50**	 °C
Storage Temperature NX Storage Temperature		-20 0		70 80	°C
Relative Humidity	(non-condensing)	10		90	%
Cable Lengths † RS-232 RS-485		 1		 15 1500	 m
IP rating	NEMA 4-12/IP65				
EMC Conformance	EN 55 022, Radiated and Conducted Emissions EN 61000-4-3, Radiated and Conducted RF Immunity **ENV 50144**				

† Cables beyond the maximum recommended length may create communication problems. Both ends of an RS-485 network must be properly terminated at 120Ω and grounded.

1.4 Upgrade Revision Software & Firmware

1.4.1 *Scope*

To make use of any new features that are included in this new release on units that were purchased previous to this release, both software and firmware require updating by the user. Any new unit will be set-up for the latest version released.

1.4.2 *Software Upgrade*

To update the software requires that the user install the new version of software from the installation CD. You may install the new software over any previous version installed. See section 1.4 Software Installation Instructions.

To update existing projects simple open the project from the newly installed version of the software. Once the project is saved to disk the update is complete. For backup reasons we recommend that you save the new version of your project in a different location or under a different file name.

1.4.3 *Firmware Upgrade*

The following steps assume that a project or configuration is loaded to the Operator Station and that the user is running the latest version of software.

a) Upload the project/configuration from the unit.
b) If a customised character set is loaded to the unit then upload the character set also.
c) Choose Automation Device from main menu Configure/Communication Settings.
d) From File menu choose Update TIU Operating System. (See Updating Operating System for more details).
e) From File menu choose Update TIU Protocol. If you are updating from firmware version 2.00 or later then you just have to update to the latest protocol file. However if you are updating from firmware version 1.24 or earlier you most update to a Upgrade.1xx protocol file first, then update to the latest firmware revision. See Note. (See updating protocol for further information).
f) Choose Download Character Sets to TIU from File menu.
g) Choose Download Project to TIU from File menu.

Note: When updating the protocol file the screen may go blank after the protocol file is complete. Continue with the procedure as described and the display will recover.

CHAPTER 2: HE500TIU050

2.1 Scope

The HE500TIU050 is a 2 line text only display terminal. The hardware description is detailed in this chapter.

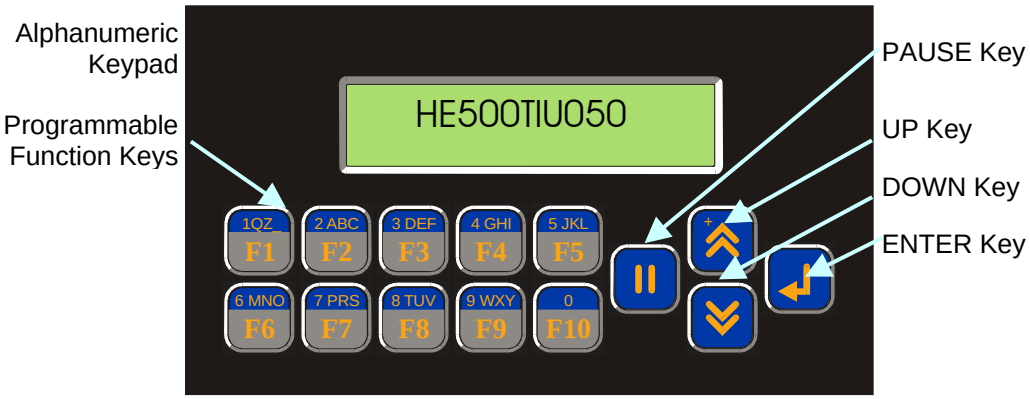


Figure 2.1 – Front View of HE500TIU050

2.2 HE500TIU050 Button Selection Actions

a) **PAUSE** key selects data for editing OR exits from data editing.
b) **PAUSE & DOWN** keys pressed together, enters sub menu pages.
c) **PAUSE & UP** keys pressed together, exits sub menus to the parent menu pages.
d) **UP** key selects the previous menu page, sub menu page, alarms, and increments data
e) **DOWN** key selects the next menu page, sub menu page, alarms and also decrements data.
f) **ENTER** key sends data to the automation equipment, accepts alarms, and displays accepted alarms.
g) **ALPHANUMERIC KEYPAD** and **FUNCTION KEYS** can be used to enter data or can be used to preform some pre-programmed action.

2.3 HE500TIU050 Contrast Adjustment

On menu page 1 (after the start-up screen), hold the **ENTER** key and press the **UP** or **DOWN** key to adjust the contrast. The contrast setting is stored and not lost after removing power.

CONTRAST BAND - allows the user to set the lower and upper limits of contrast. Adjust the lower limit using the UP or DOWN key and press Enter when done. Do the same for the upper limit.
WARNING: - Changes to the lower or upper limits may allow the user to set the contrast to a setting where the display may appear blank. It is recommended that the factory setting are used (Min 8A, Max FE).

2.4 HE500TIU050 Ports

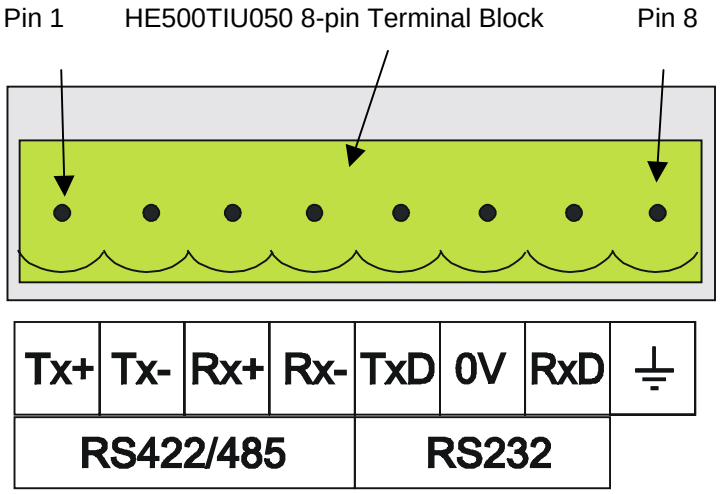


Figure 2.2 – Automation Equipment Serial Port

2.4.1 *HE500TIU050 Configuration of the RS-485 Port*

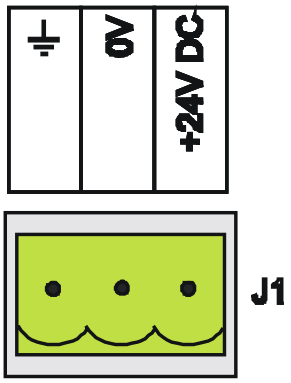


Figure 2.3 – Power Connector
Powered by +24VDC and Ground.

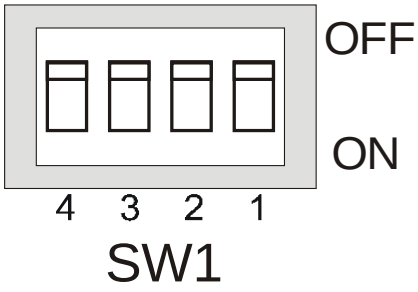


Figure 2.4 – Configuration Bank

The configuration bank (shown in Figure 2.5) sets the parameters of the RS-485 port as described in Table 2.1.

Table 2.1 – Configuration Bank	
Switch 1	ON: Pull-up (must be used together with switch 3) OFF: no Pull-up
Switch 2	ON: 120Ω termination OFF: no termination
Switch 3	ON: Pull-down (must be used together with switch 1) OFF: no Pull-down
Switch 4	Reserved for future use
NOTE: Switch 1 and 3 must be used together. Either both pull-up and pull-down are used or neither is used.	

Pull-up and **Pull-down** switches are used to increase the signal level on the RS-485 bus. This is useful if there is a long bus and a significant amount of attenuation is anticipated.

Termination resistance of 120Ω must be placed across each end of the RS-485 bus. With switch 2 ON, a 120Ω resistance is placed across the bus. This is only used if the HE500TIU050/100/110 is the last device at either end of the bus.

2.5 HE500TIU050 Dimensions

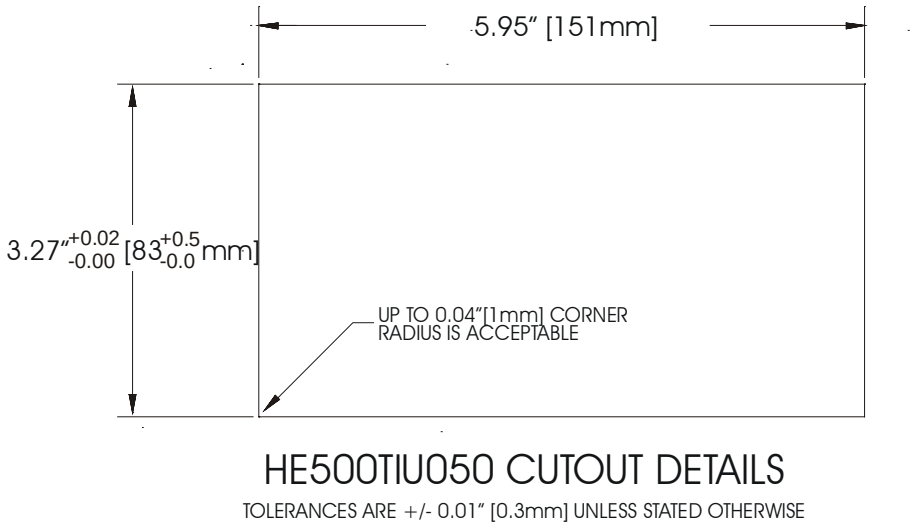


Figure 2.5 – HE500TIU050 Cutout

NOTES

CHAPTER 3: HE500TIU100/101/102/103

3.1 Scope

The HE500TIU10X 128 x 64 pixel display, which allows for some graphics and various fonts to be displayed. The hardware description is detailed in this chapter.

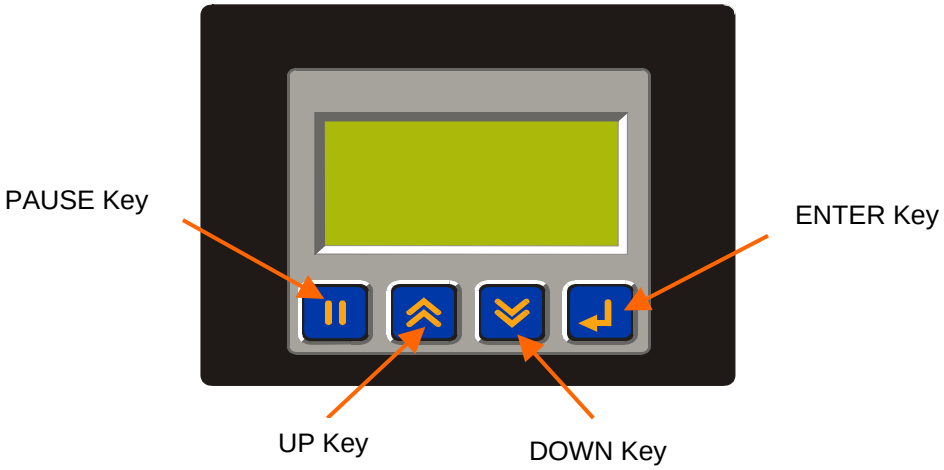


Figure 3.1 - Front View of HE500TIU100

3.2 HE500TIU10X Button Selection Actions

a) **PAUSE** key selects data for editing OR exits from data editing.
b) **PAUSE & DOWN** keys pressed together, enters sub menu pages.
c) **PAUSE & UP** keys pressed together, exits sub menus to the parent menu pages.
d) **UP** key selects the previous menu page, sub menu page, alarms, and increments data
e) **DOWN** key selects the next menu page, sub menu page, alarms and also decrements data.
f) **ENTER** key sends data to the automation equipment, accepts alarms, and displays accepted alarms.

3.3 HE500TIU10X Contrast Adjustment

On menu page 1 (after the start-up screen), hold the **ENTER** key and press the **UP** or **DOWN** key to adjust the contrast. The contrast setting is stored and not lost after removing power.

CONTRAST BAND - allows the user to set the lower and upper limits of contrast. Adjust the lower limit using the UP or DOWN key and press Enter when done. Do the same for the upper limit.
WARNING: - Changes to the lower or upper limits may allow the user to set the contrast to a setting where the display may appear blank. It is recommended that the factory settings are used (Min 8A, Max FE).

3.4 HE500TIUX Rear View

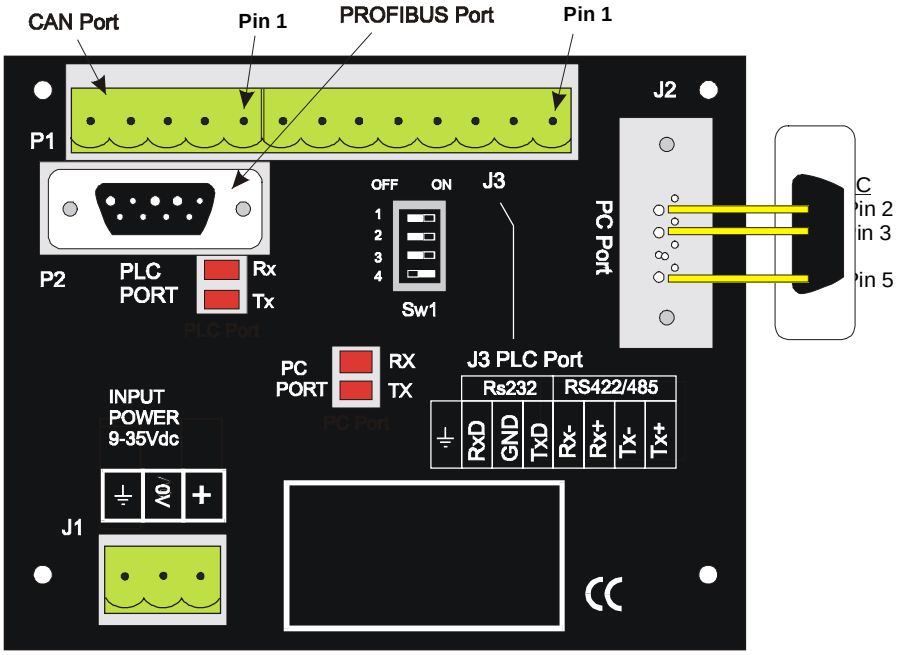


Figure 3.2 – Rear View of HE500TIU100/101/102

3.5 HE500TIU100 Ports

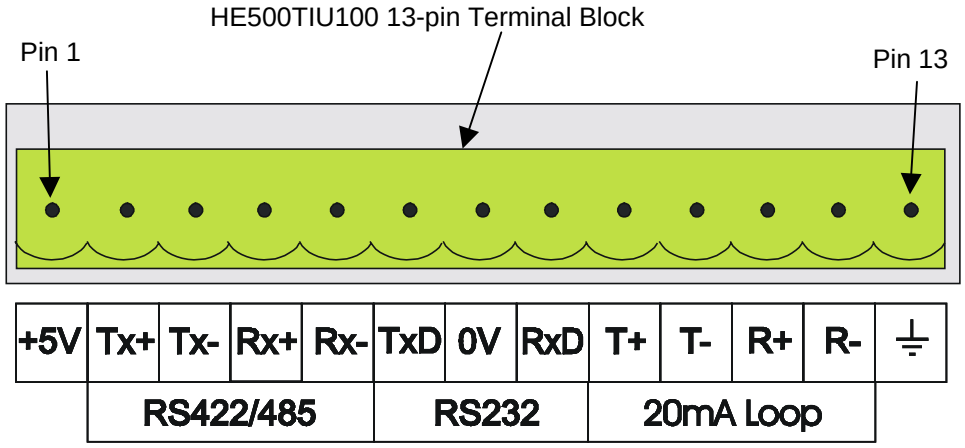


Figure 3.3 – Automation Equipment Serial Port

Figure 3.4 – Automation Equipment Port Receive & Transmit LEDs
The LED's flash when the HE500TIU100/110 is communicating.

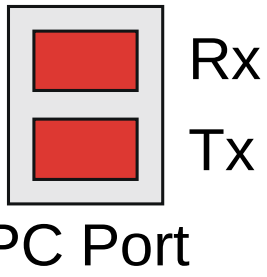


Figure 3.5 – PC Port Receive & Transmit LEDs
The LED's flash when the PC is communicating with the HE500TIU100/110

3.5.1 *HE500TIU10X Configuration of the RS-485 Port*

The configuration bank (shown in Figure 3.8) sets the parameters of the RS-485 port as described in Table 3.1.

Table 3.1 – Configuration Bank	
Switch 1	ON: Pull-up (must be used together with switch 3) OFF: no Pull-up
Switch 2	ON: 120Ω termination OFF: no termination
Switch 3	ON: Pull-down (must be used together with switch 1) OFF: no Pull-down
Switch 4	Reserved for future use
NOTE: Switch 1 and 3 must be used together. Either both pull-up and pull-down are used or neither is used.	

Pull-up and **Pull-down** switches are used to increase the signal level on the RS-485 bus. This is useful if there is a long bus and a significant amount of attenuation is anticipated.

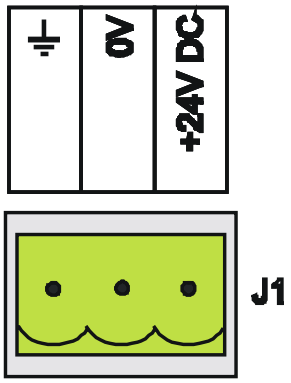


Figure 3.6 – Power Connector
Powered by +24VDC and Ground.

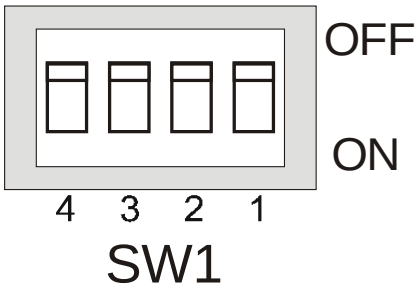


Figure 3.7 – Configuration Bank

Termination resistance of 120Ω must be placed across each end of the RS-485 bus. With switch 2 ON, a 120Ω resistance is placed across the bus. This should only be used if the HE500TIU050/100/110 is the last device at either end of the bus.

3.6 HE500TIU10X Dimensions

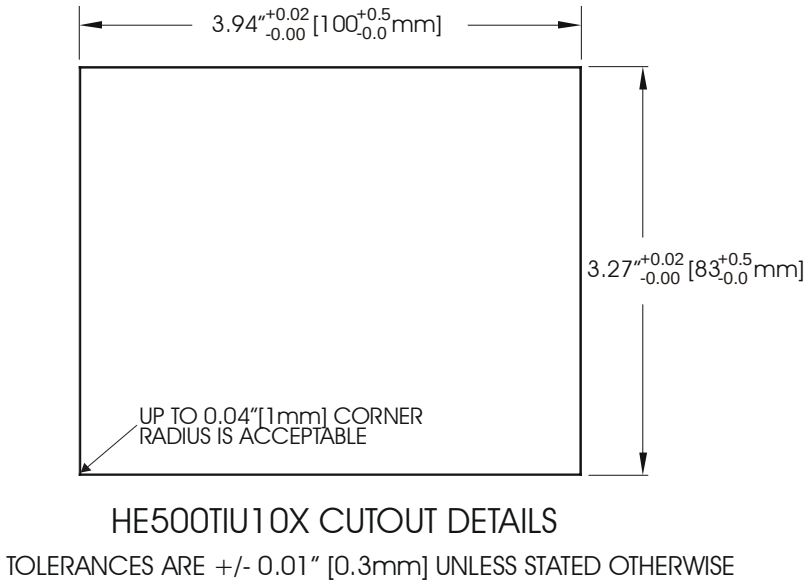


Figure 3.8 – HE500TIU10X Cutout

CHAPTER 4: HE500TIU110/111/112/113

4.1 Scope

The HE500TIU11X 128 x 64 pixel display, which allows for some graphics and various fonts to be displayed. The hardware description is detailed in this chapter.

Figure 4.1 – Front View of HE500TIU110

4.2 HE500TIU11X Button Selection Actions

a) **PAUSE** key selects data for editing OR exits from data editing.
b) **PAUSE & DOWN** keys pressed together, enters sub menu pages.
c) **PAUSE & UP** keys pressed together, exits sub menus to the parent menu pages.
d) **UP** key selects the previous menu page, sub menu page, alarms, and increments data
e) **DOWN** key selects the next menu page, sub menu page, alarms and also decrements data.
f) **ENTER** key sends data to the automation equipment, accepts alarms, and displays accepted alarms.
g) **ALPHANUMERIC KEYPAD** and **PROGRAMMABLE KEYS** can be used to enter data or can be used to preform some pre-programmed action.

4.3 HE500TIU11X Contrast Adjustment

On menu page 1 (after the start-up screen), hold the **ENTER** key and press the **UP** or **DOWN** key to adjust the contrast. The contrast setting is stored and not lost after removing power.

CONTRAST BAND - allows the user to set the lower and upper limits of contrast. Adjust the lower limit using the UP or DOWN key and press Enter when done. Do the same for the upper limit.
WARNING: - Changes to the lower or upper limits may allow the user to set the contrast to a setting where the display may appear blank. It is recommended that the factory setting are used (Min 8A, Max FE).

4.4 HE500TIU11X Rear View

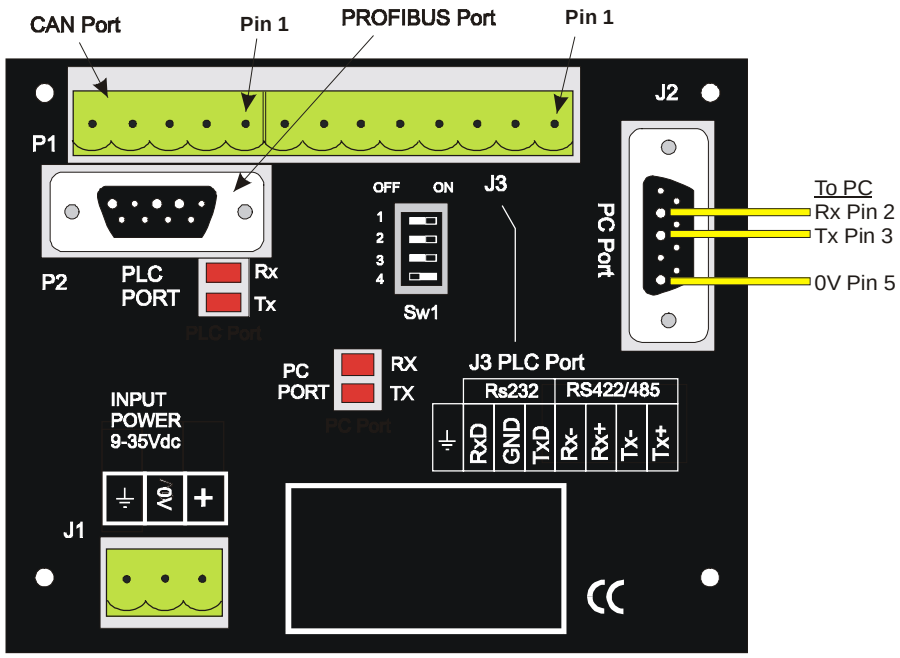


Figure 4.2 – Rear View of HE500TIU110/111/112

4.5 HE500TIU110 Ports

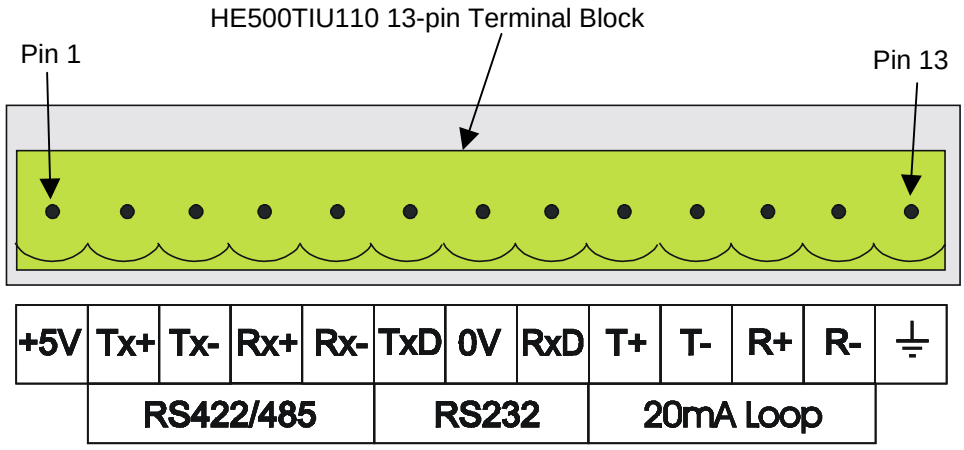


Figure 4.3 – Automation Equipment Serial Port

Figure 4.4 – Automation Equipment Port Receive & Transmit LEDs
The LED's flash when the HE500TIU100/110 is communicating.

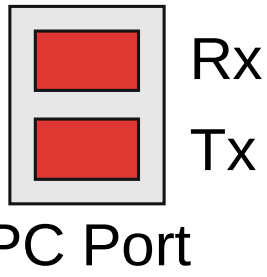


Figure 4.5 – PC Port Receive & Transmit LEDs
The LED's flash when the PC is communicating with the HE500TIU100/110

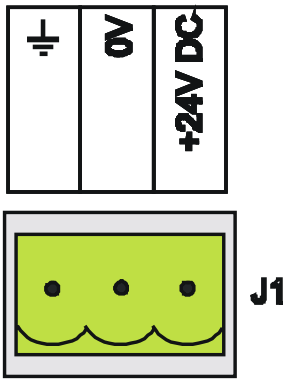


Figure 4.6 – Power Connector
Powered by +24VDC and Ground.

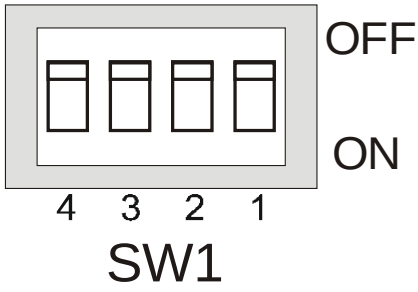


Figure 4.7 – Configuration Bank

4.5.1 *HE500TIU11X Configuration of the RS-485 Port*

The configuration bank (shown in Figure 4.8) sets the parameters of the RS-485 port as described in Table 4.1.

Table 4.1 – Configuration Bank	
Switch 1	ON: Pull-up (must be used together with switch 3) OFF: no Pull-up
Switch 2	ON: 120Ω termination OFF: no termination
Switch 3	ON: Pull-down (must be used together with switch 1) OFF: no Pull-down
Switch 4	Reserved for future use
NOTE: Switch 1 and 3 must be used together. Either both pull-up and pull-down are used or neither is used.	

Pull-up and **Pull-down** switches are used to increase the signal level on the RS-485 bus. This is useful if there is a long bus and a significant amount of attenuation is anticipated.

Termination resistance of 120Ω must be placed across each end of the RS-485 bus. With switch 2 ON, a 120Ω resistance is placed across the bus. This should only be used if the HE500TIU050/100/110 is the last device at either end of the bus.

4.6 HE500TIU11X Dimensions

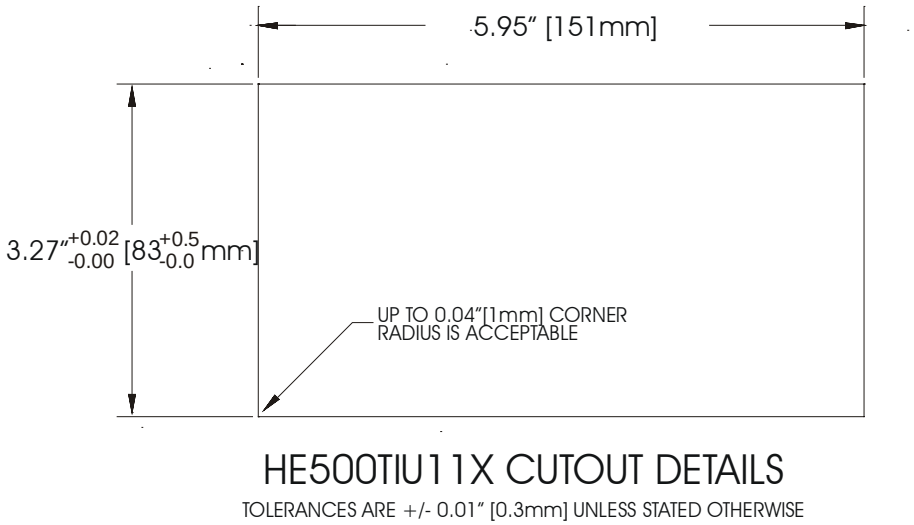


Figure 4.8 – HE500TIU11X Cutout

CHAPTER 5: HE500TIU200/201/202/203

5.1 Scope

The HE500TIU20X is 240 x 128 pixel display which allows for full graphic screen. The hardware description is cover under the following chapter

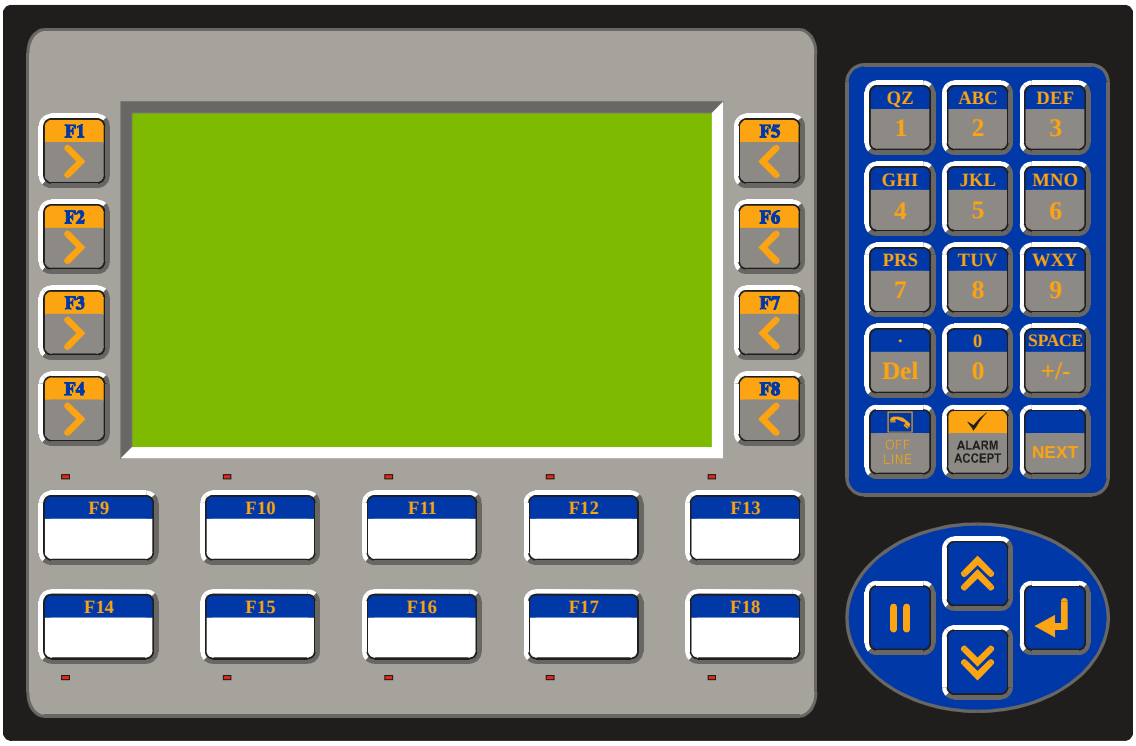


Figure 5.1 – Front View of HE500TIU20X

5.2 HE500TIU20X Button Selection Actions

a) **PAUSE** key selects data for editing OR exits from data editing.
b) **PAUSE & DOWN** keys pressed together, enters sub menu pages.
c) **PAUSE & UP** keys pressed together, exits sub menus to the parent menu pages.
d) **UP** key selects the previous menu page, sub menu page, alarms, and increments data
e) **DOWN** key selects the next menu page, sub menu page, alarms and also decrements data.
f) **ENTER** key sends data to the automation equipment, accepts alarms, and displays accepted alarms.
g) **ALPHANUMERIC KEYPAD** can be used to enter data
h) **PROGRAMMABLE KEYS** can be used to preform some pre-programmed action.

5.3 HE500TIU20X Contrast Adjustment

On menu page 1 (after the start-up screen), hold the **ENTER** key and press the **UP** or **DOWN** key to adjust the contrast. The contrast setting is stored and not lost after removing power.

CONTRAST BAND - allows the user to set the lower and upper limits of contrast. Adjust the lower limit using the UP or DOWN key and press Enter when done. Do the same for the upper limit.
WARNING: - Changes to the lower or upper limits may allow the user to set the contrast to a setting where the display may appear blank. It is recommended that the factory setting are used (Min 8A, Max FE).

5.4 HE500TIU20X Rear View

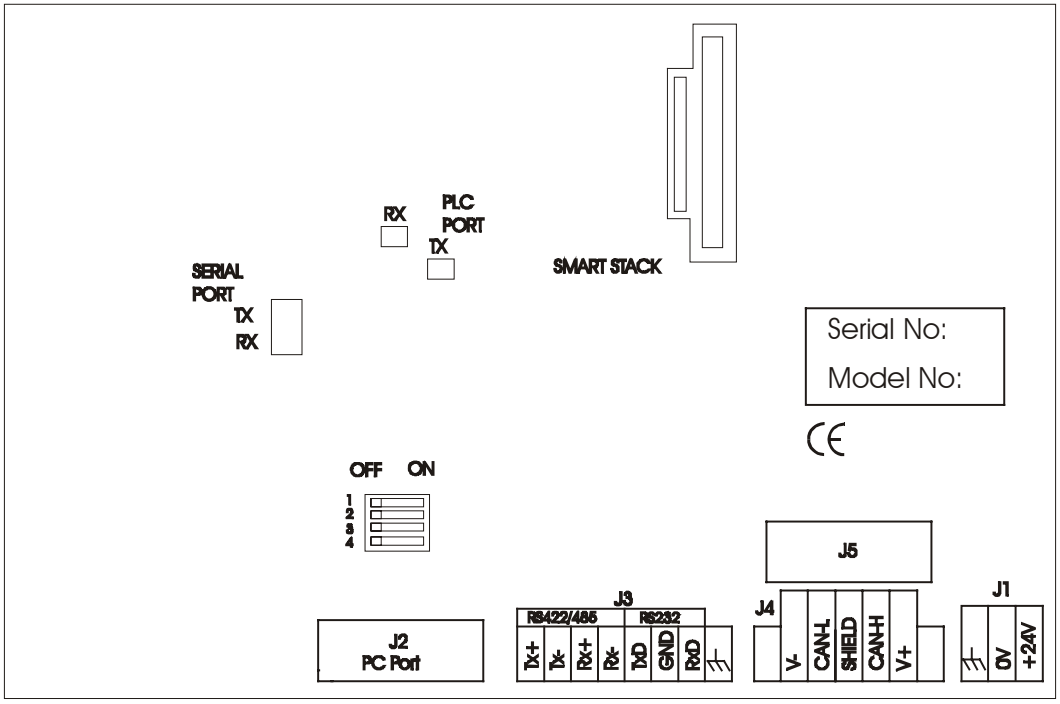


Figure 5.2 – Rear View of HE500TIU200/201/202

5.5 HE500TIU20X Ports

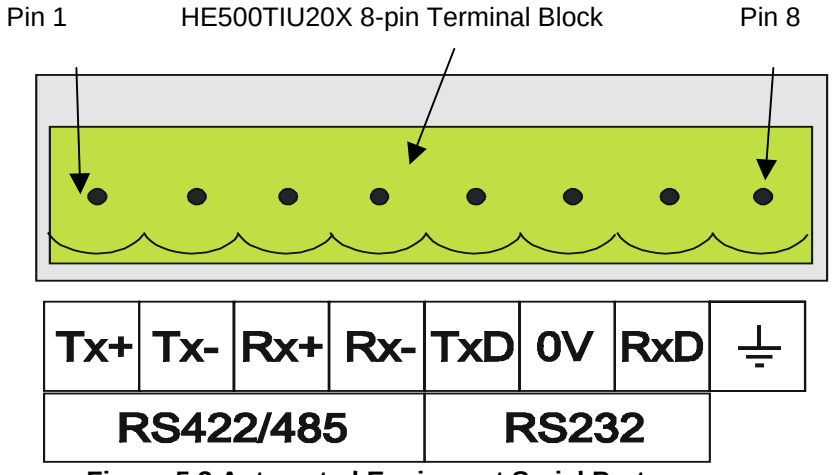


Figure 5.3 Automated Equipment Serial Port

Figure 5.4 – Automation Equipment Port Receive & Transmit LEDs
The LED's flash when the HE500TIU100/110 is communicating.

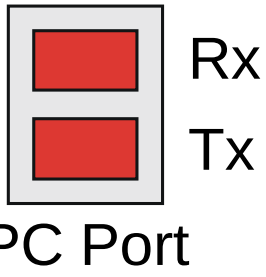


Figure 5.5 – PC Port Receive & Transmit LEDs
The LED's flash when the PC is communicating with the HE500TIU100/110

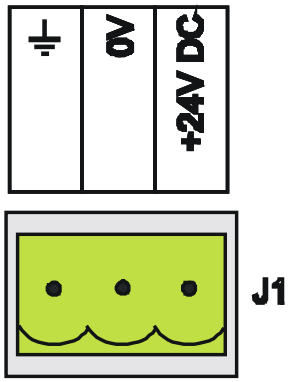


Figure 5.6 – Power Connector
Powered by +24VDC and Ground.

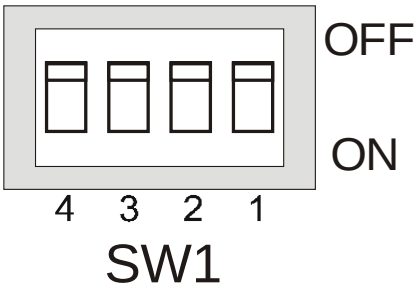


Figure 5.7 – Configuration Bank

6.5.1 *HE500TIU20X Configuration of the RS-485 Port*

The configuration bank (shown in Figure 2.23) sets the parameters of the RS-485 port as described in Table 5.1.

Table 5.1 – Configuration Bank	
Switch 1	ON: Pull-up (must be used together with switch 3) OFF: no Pull-up
Switch 2	ON: 120Ω termination OFF: no termination
Switch 3	ON: Pull-down (must be used together with switch 1) OFF: no Pull-down
Switch 4	Reserved for future use
NOTE: Switch 1 and 3 must be used together. Either both pull-up and pull-down are used or neither is used.	

Pull-up and **Pull-down** switches are used to increase the signal level on the RS-485 bus. This is useful if there is a long bus and a significant amount of attenuation is anticipated.

Termination resistance of 120Ω must be placed across each end of the RS-485 bus. With switch 2 ON, a 120Ω resistance is placed across the bus. This should only be used if the HE500TIU050/10X/11X/20X is the last device at either end of the bus.

5.6 HE500TIU20X Dimensions

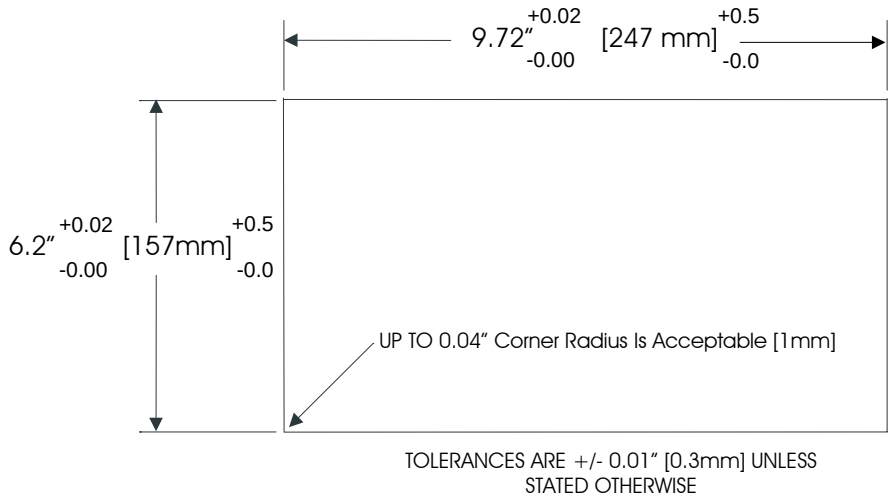


Figure 5.8 – HE500TIU20X Cutout

CHAPTER 6: HENX2XXTXXX

6.1 Scope

The HENX2XXTXXX can be either a 128 x 64 (NX22X) or a 240 x 128 (NX25X) pixel display which both allow for full graphic screen. The hardware description is covered under the following chapter.

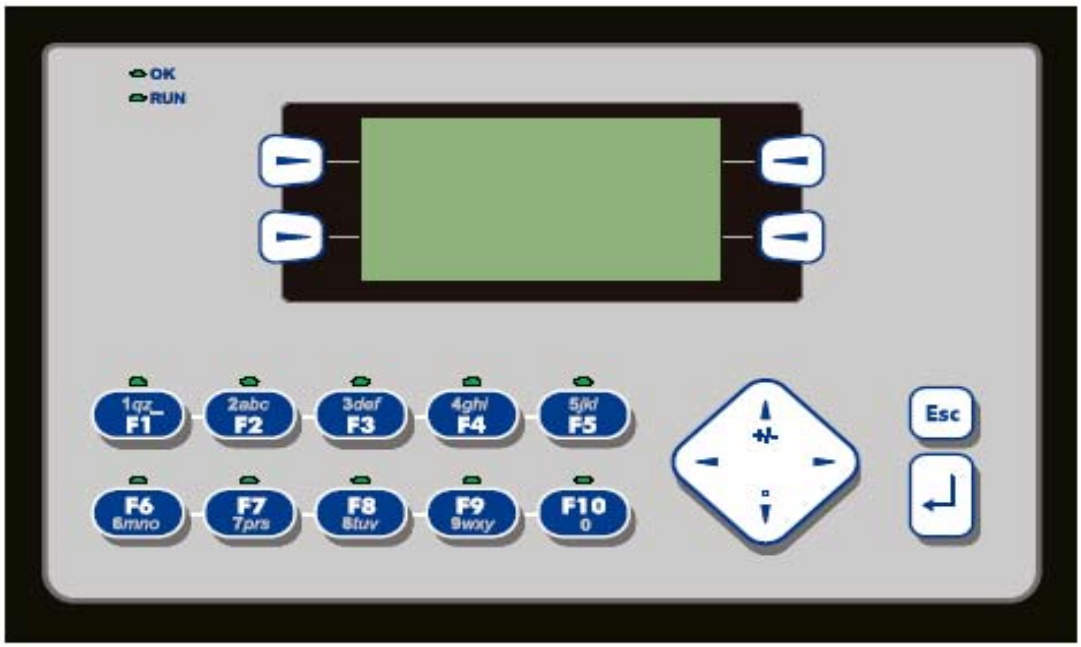


Figure 6.1 – HENX22XTXXX

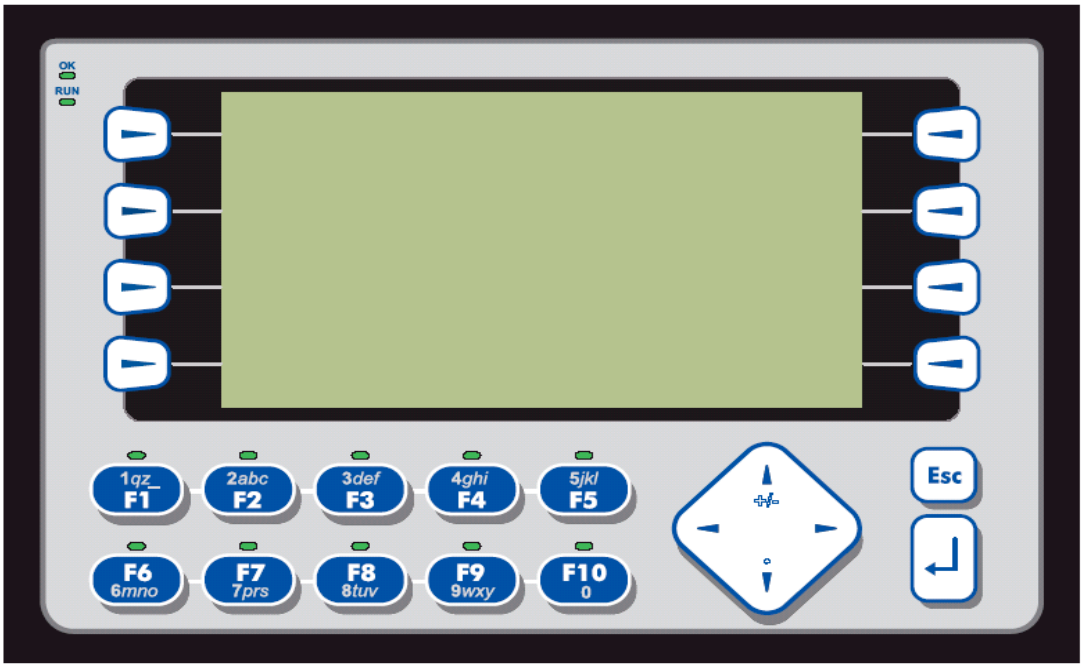


Figure 6.2 – HENX25XTXXX

6.2 Button Selection Actions

a) **LEFT & RIGHT** keys select data for editing OR exits from data editing.
b) **PAUSE & DOWN** keys pressed together, enters sub menu pages.
c) **PAUSE & UP** keys pressed together, exits sub menus to the parent menu pages.
d) **UP** key selects the previous menu page, sub menu page, alarms, and increments data
e) **DOWN** key selects the next menu page, sub menu page, alarms and also decrements data.
f) **ENTER** key sends data to the automation equipment, accepts alarms, and displays accepted alarms.
g) **ALPHANUMERIC KEYPAD** can be used to enter data
h) **PROGRAMMABLE KEYS** can be used to preform some pre-programmed action.
i) **ESC** key is used to return to main menu

6.3 Contrast Adjustment

On menu page 1 (after the start-up screen), hold the **ENTER** key and press the **UP** or **DOWN** key to adjust the contrast. The contrast setting is stored and not lost after removing power.

CONTRAST BAND - allows the user to set the lower and upper limits of contrast. Adjust the lower limit using the UP or DOWN key and press Enter when done. Do the same for the upper limit.
WARNING: - Changes to the lower or upper limits may allow the user to set the contrast to a setting where the display may appear blank. It is recommended that the factory setting are used (Min 8A, Max FE).

6.4 Rear View

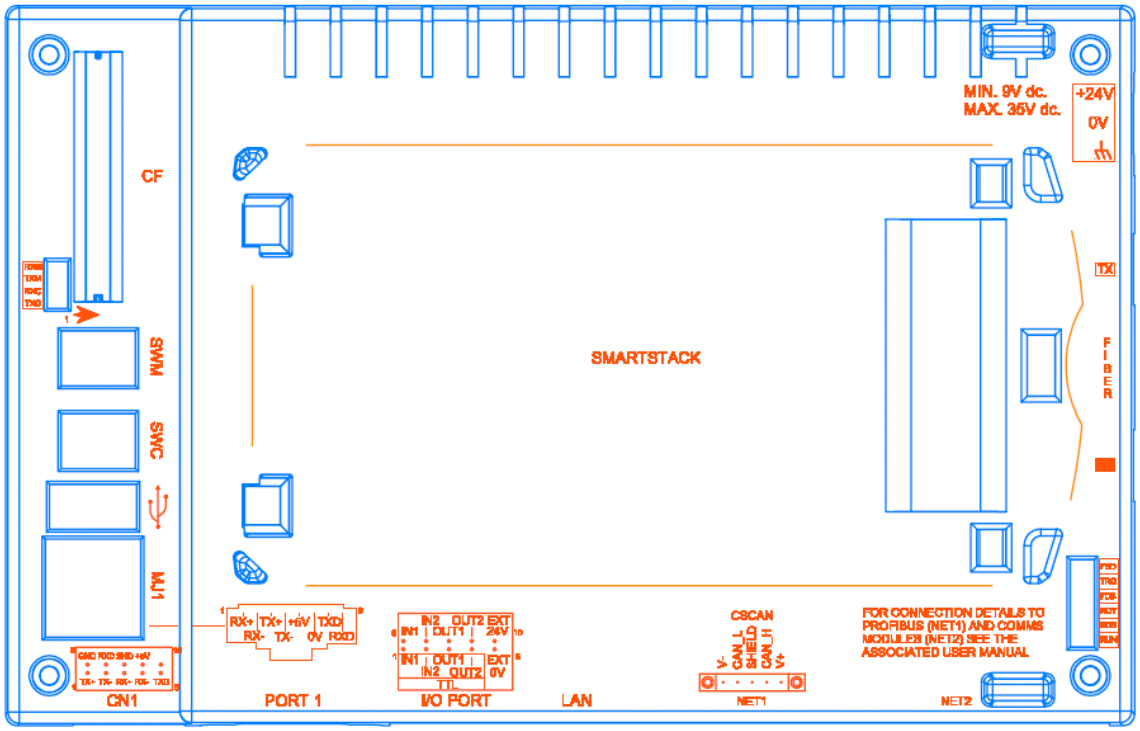


Figure 6.3 – Rear View of HENX2XXTXXX

6.5 Ports

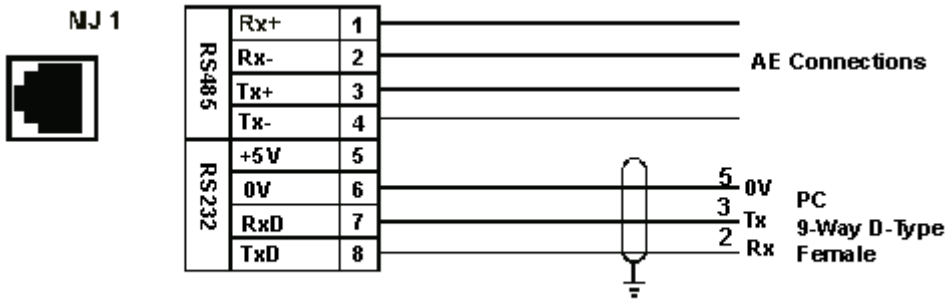
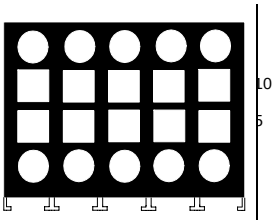
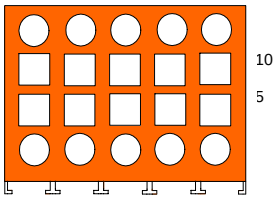


Figure 6.4 Automated Equipment Serial Port (MJ1)



+5V	9
TX 485/422+	1
TX 485/422-	2
RX 485/422+	3
RX 485/422-	4
TX RS232	5
0V (GND)	6
RX RS232	7
Frame Gnd	8

Figure 6.5 - Automated Equipment Serial Port (CN1)



IN1	1
IN2	2
OUT1	3
OUT2	4
EXT 0V	5
IN1	6
IN1	7
OUT1	8
OUT2	9
EXT 24V	10

Figure 6.6 – Pulse I/O Port

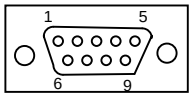


Figure 6.7 – PC Port 9-way D-type Sub (Female)

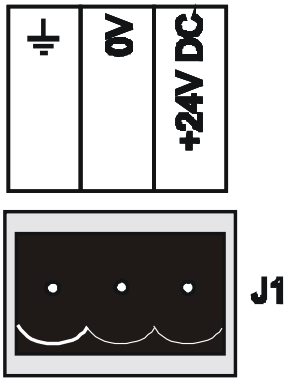


Figure 6.8 – Power Connector
Powered by +24V and Ground (0V)

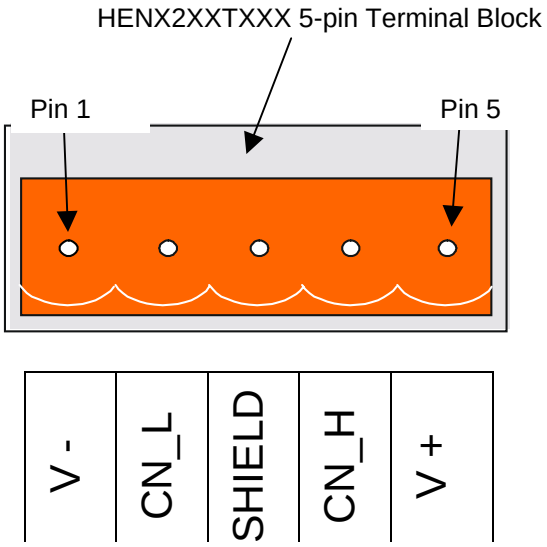


Figure 6.9 – CSCAN Network Port (NET1)

Figure 6.10 – Automation Equipment Port Receive & Transmit LEDs
The LED's flash when the HENX2XXTXXX is communicating.

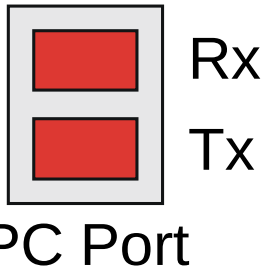


Figure 6.11 – PC Port Receive & Transmit LEDs
The LED's flash when the PC is communicating with the HENX2XXTXXX

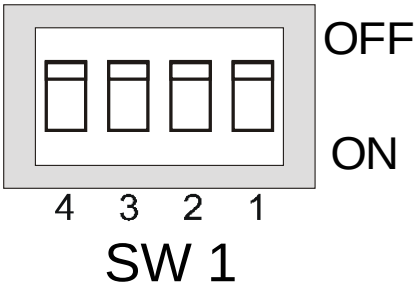


Figure 6.12 – Configuration Bank 1

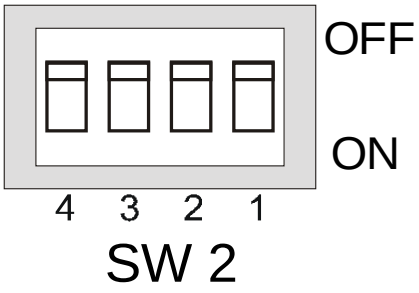


Figure 6.13 – Configuration Bank 2

6.5.1 *HE500TIU20X Configuration of the RS-485 Port*

The configuration banks, for both sets of switches (shown in Figure 6.9 & 6.10), set each of the parameters of both RS-485 ports as described in Table 6.1:

Table 6.1 – Configuration Bank for SW1	
Switch 1	ON: Pull-up (must be used together with switch 3) OFF: no Pull-up
Switch 2	ON: 120Ω termination on the Receive pins OFF: no termination
Switch 3	ON: Pull-down (must be used together with switch 1) OFF: no Pull-down
Switch 4	ON: Shorts Rx+ with Tx+ OFF: No Short
NOTE: Switch 1 and 3 must be used together. Either both pull-up and pull-down are used or neither is used.	

Table 6.2 – Configuration Bank for SW2	
Switch 1	ON: Pull-up (must be used together with switch 3) OFF: no Pull-up
Switch 2	ON: 120Ω termination on the Receive Pins OFF: no termination
Switch 3	ON: Pull-down (must be used together with switch 1) OFF: no Pull-down
Switch 4	ON: Shorts Rx- with Tx- of **Port 1** OFF: No Short
NOTE: Switch 1 and 3 must be used together. Either both pull-up and pull-down are used or neither is used.	

Pull-up and **Pull-down** switches are used to increase the signal level on the RS-485 bus. This is useful if there is a long bus and a significant amount of attenuation is anticipated.

Termination resistance of 120Ω must be placed across each end of the RS-485 bus. With Switch 2 ON, a 120Ω resistance is placed across the bus. This should only be used if the HENX2XXTXX is the last device at either end of the bus.

6.6 Dimensions

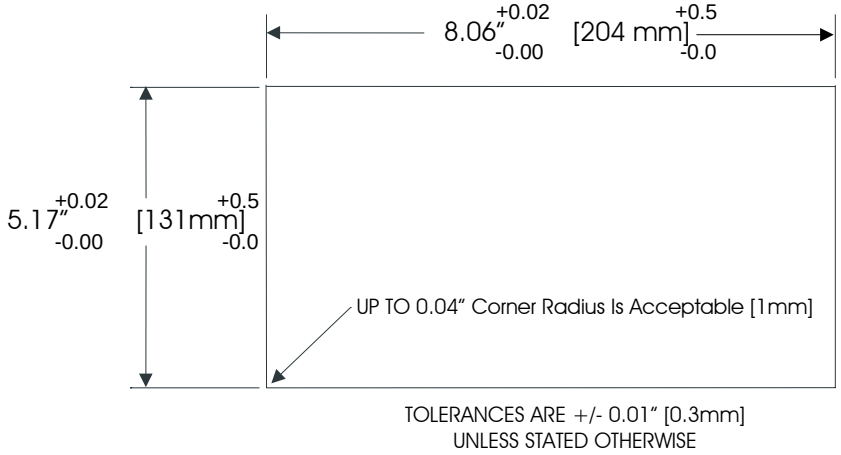


Figure 6.14 – HENX2XXT2XX Cutout

CHAPTER 7: HE500TIU300/301/302/303/310/311/312/313/320/321/322/323

7.1 Scope

The HE500TIU3XX has a 320 x 240 pixel display which allows for full graphic screen. The screen technology is indicated by the part number as follows…
HE500TIU30X 16 Grey scale screen
HE500TIU31X 16 Colour STN screen
HE500TIU32X 16 Colour TFT screen
The hardware description is covered under the following chapter

Figure 7.1 – Front View of HE500TIU3XX

7.2 HE500TIU3XX Touch Key Pad

The Tiu3XX has a touch keypad that can be assigned to perform a variety of key macro operations from within the CBreeze configuration package.

7.3 HE500TIU3XX Contrast Adjustment

On menu page 1 (after the start-up screen), hold the **SYSTEM** key and press the **F1** or **F2** key to adjust the contrast. The contrast setting is stored and not lost after removing power. (Note TIU32X series feature a TFT display which do not require contrast adjustment)

7.4 HE500TIU3XX Rear View

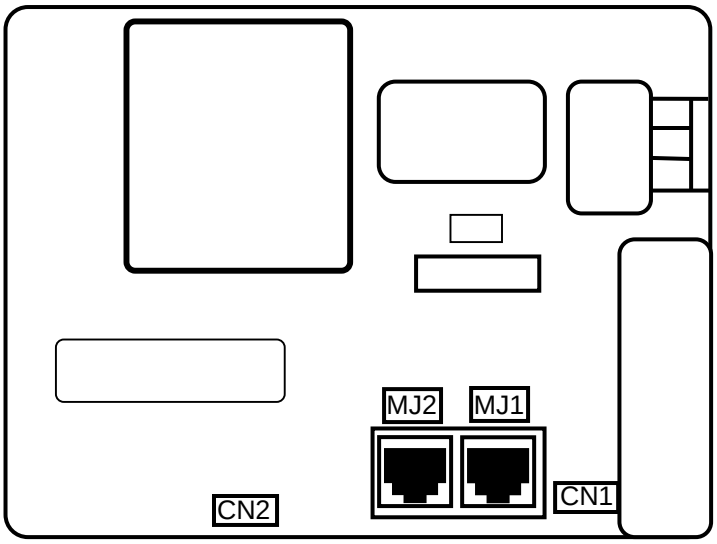


Figure 7.2 HE500TIU3XX Rear View

7.5 HE500TIU3XX Serial Ports

Pin No	Signal	Function
1	FG	Frame Ground
2	TXD	RS-232-C Send Data
3	RXD	RS-232-C Receive Data
4	RTS	RS-232-C Request To Send
5	CTS	RS-232-C Clear To Send
6		Not Connected
7	SG	Signal Ground
8		Not Connected
9	+5V	Internal Use Only Do Not Use!
10	0V	Internal Use Only Do Not Use!
11		Not Connected
12	+SD	RS-422/RS-485 Send Data (+)
13	-SD	RS-422/RS-485 Send Data (-)
14	+RTS	RS-422 Request To Send (+)
15		Not Connected
16		Not Connected
17	-RTS	RS-422 Request To Send (-)
18	-CTS	RS-422 Clear To Send (-)
19	+CTS	RS-422 Clear To Send (+)
20		Not Connected
21		Not Connected
22		Not Connected
23		Not Connected
24	+RD	RS-422/RS-485 Receive Data (+)
25	-RD	RS-422/RS-485 Receive Data (-)

Figure 7.3 Automation Equipment Serial Port

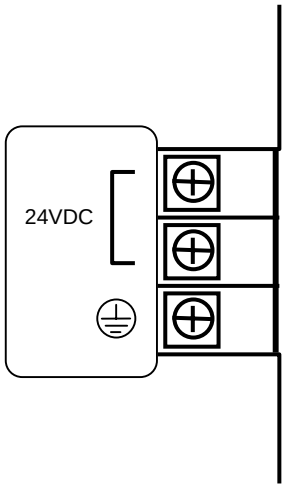


Figure 7.4 – Power Connector
Powered by +24VDC and Ground

7.6 HE500TIU3XX Dimensions

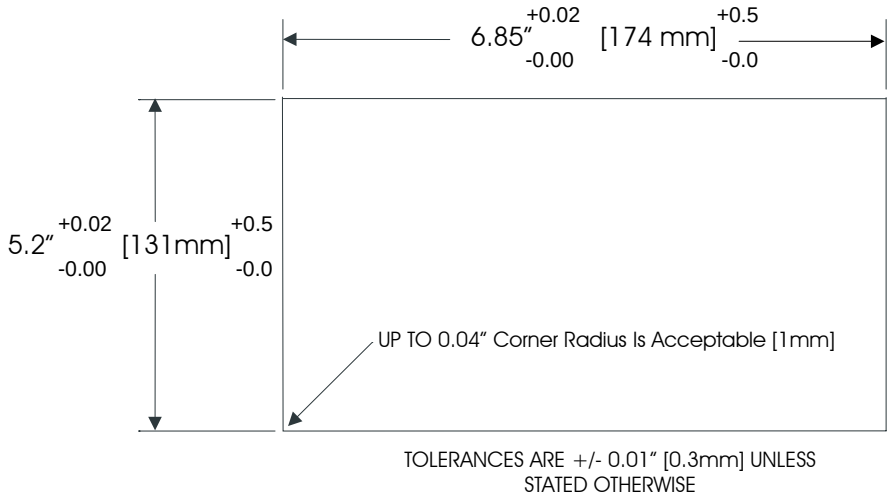


Figure 7.5 – HE500TIU3XX Cutout Details

7.7 SPECIFICATIONS

PARAMETER	Conditions	Min	Typical	Max	Units
Input Voltage (Vi)		21.6	24	26.4	VDC
Typical Power Consumption	Vi = 24VDC			10	WATTS
Inrush Input Current	Vi = 24VDC for 1mS			17	A
Withstand Voltage	DC Terminals to Earth			500	VAC for 1 Min
Operating Temperature		0		50	°C
Storage Temperature		-10		60	°C
Relative Humidity	non-Condensing	5		85	%
Weight			0.8		Kg
Dimensions	W x H x D	182.5 x 138.8 x 57.3			mm
Panel Cut-out	W x H	174 (+0.5) x 131 (+0.5)			mm

NOTES

CHAPTER 8: HE500TIU4XX

8.1 Scope

The HE500TIU4XX has a 800 x 600 pixel TFT technology display which supports 32768 colours. The hardware description is covered under the following chapter

Figure 8.1 – Front View of HE500TIU4XX

8.2 HE500TIU4XX Touch Key Pad

The Tiu4XX has a touch keypad that can be assigned to perform a variety of key macro operations from within the CBreeze configuration package.

8.3 HE500TIU4XX Rear View

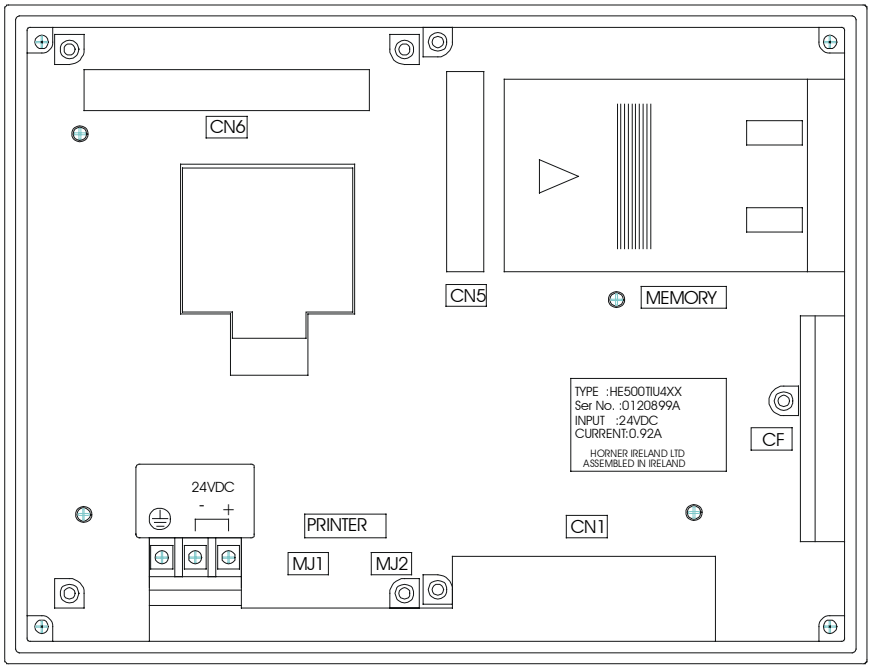


Figure 8.2 HE500TIU4XX Rear View

8.4 HE500TIU4XX Serial Ports

Pin No	Signal	Function
1	FG	Frame Ground
2	TXD	RS-232-C Send Data
3	RXD	RS-232-C Receive Data
4	RTS	RS-232-C Request To Send
5	CTS	RS-232-C Clear To Send
6		Not Connected
7	SG	Signal Ground
8		Not Connected
9	+5V	Internal Use Only Do Not Use!
10	0V	Internal Use Only Do Not Use!
11		Not Connected
12	+SD	RS-422/RS-485 Send Data (+)
13	-SD	RS-422/RS-485 Send Data (-)
14	+RTS	RS-422 Request To Send (+)
15		Not Connected
16		Not Connected
17	-RTS	RS-422 Request To Send (-)
18	-CTS	RS-422 Clear To Send (-)
19	+CTS	RS-422 Clear To Send (+)
20		Not Connected
21		Not Connected
22		Not Connected
23		Not Connected
24	+RD	RS-422/RS-485 Receive Data (+)
25	-RD	RS-422/RS-485 Receive Data (-)

Figure 8.3 Automation Equipment Serial Port

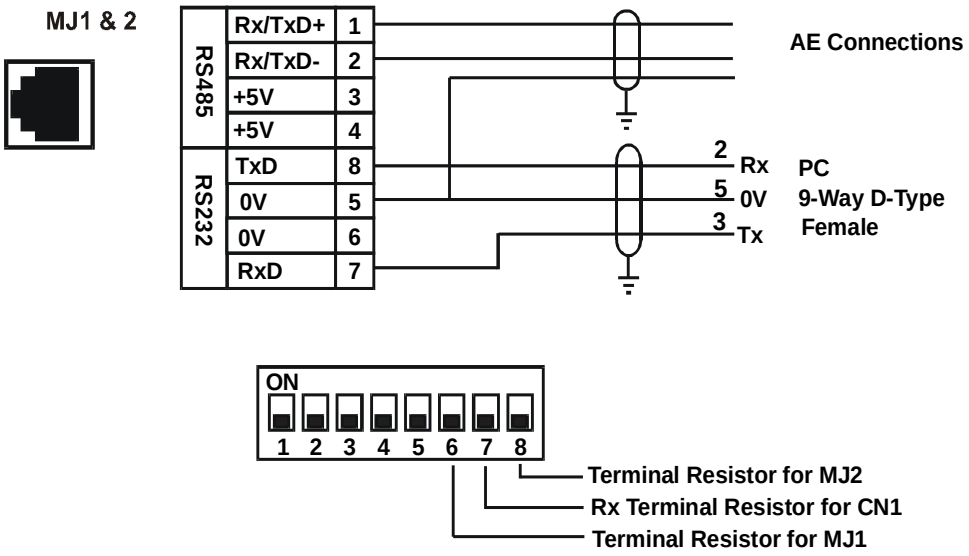


Figure 8.4 Serial Port (MJ1 & 2)

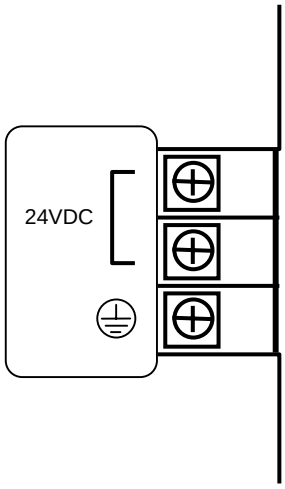


Figure 8.4 – TIU4XX Power Connector

Powered by +24VDC and Ground

8.5 HE500TIU4XX Dimensions

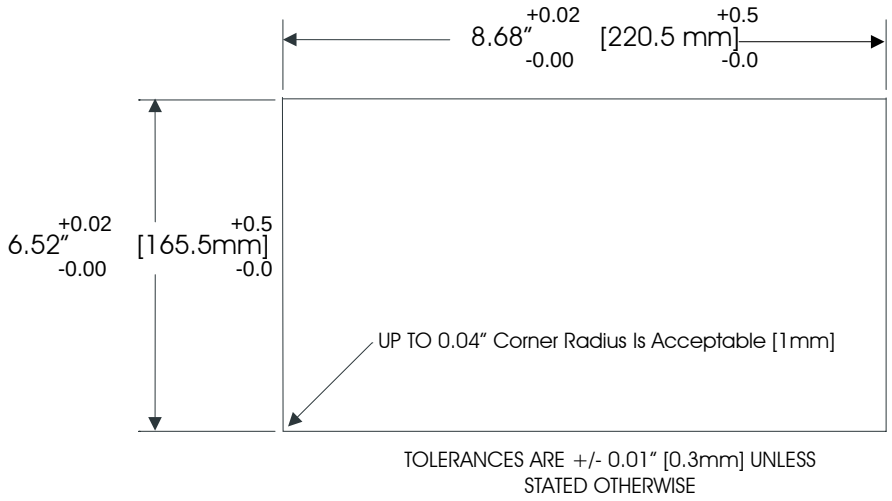


Figure 8.5 – HE500TIU4XX Cutout Details

8.6 SPECIFICATIONS

PARAMETER	CONDITIONS		PARAMETER	UNITS
Display Size	8.4"		Serial Ports RS232 RS422/485	Asynchronous Type Data Length: 7, 8 bits Parity: Even, Odd, None Stop Bits: 1, 2 bits Baud Rate: 4800, 9600, 19200, 38400, 57600, 76800, 115200 bps
Display Type	TFT Colour LCD			
Display Resolution	800 * 600			
Colour	32768 colours + 16 Colours in Blink Mode			
Backlight Average Lifetime	50,000 Hrs		Operating Ambient Temperature	0-50 °C
Backup Memory	64Kbytes SRAM			
Clock	RTC Battery Backed (Sanyo CR2450-CN1 Lithium Coin)		Storage Temperature	-10 - +60 °C
Backup Period	5 years (ambient 25 °C)		Humidity	85%RH, (non-Condensing)
CF Card Interface	Compatible with Compact Flash™		Weight	Approx 1.5 Kg
Printer Interface	Centronics Compatible half pitch 20 pins		Dimensions (W*H*D) mm	233 * 178 * 66.1
Nominal Input Voltage	24VDC		Panel Cut-Out mm	220.5 (+0.5) * 165.5 (+0.5)
Input Voltage Range	24VDC ± 10%		Seal Rating	Front Panel- IP65 (When Waterproof Sheet is used) Rear Cover- IP20
Inrush Current	25A, 0.7mS		Cooling	Natural Convection
Power Requirement	22W or less		Approvals	CE
Permissable Power Failure	Less than 1mS		Touch Panel Method	Analogue Resistive Membrane
Voltage Tolerance (between DC Terminal and Field Ground)	500Vac, 1min		Touch Panel Resolution	1024W*1024H
Insulation Resistance	500VDC 10MΩ or more		Mechanical Lifetime	1 million times, or more

NOTES

CHAPTER 9: HE500TIU5XX

9.1 Scope

The HE500TIU5XX has a 800 x 600 pixel TFT technology display which supports 32768 colours. The hardware description is covered under the following chapter

Figure 9.1 – Front View of HE500TIU5XX

9.2 HE500TIU5XX Touch Key Pad

The Tiu5XX has a touch keypad that can be assigned to perform a variety of key macro operations from within the CBreeze configuration package.

9.3 HE500TIU5XX Rear View

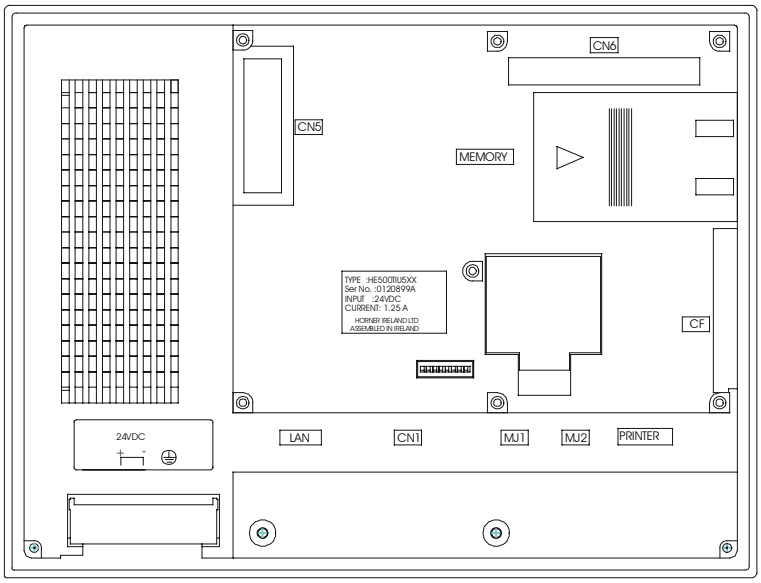


Figure 9.2 HE500TIU5XX Rear View

9.4 HE500TIU5XX Serial Ports

Pin No	Signal	Function
1	FG	Frame Ground
2	TXD	RS-232-C Send Data
3	RXD	RS-232-C Receive Data
4	RTS	RS-232-C Request To Send
5	CTS	RS-232-C Clear To Send
6		Not Connected
7	SG	Signal Ground
8		Not Connected
9	+5V	Internal Use Only Do Not Use!
10	0V	Internal Use Only Do Not Use!
11		Not Connected
12	+SD	RS-422/RS-485 Send Data (+)
13	-SD	RS-422/RS-485 Send Data (-)
14	+RTS	RS-422 Request To Send (+)
15		Not Connected
16		Not Connected
17	-RTS	RS-422 Request To Send (-)
18	-CTS	RS-422 Clear To Send (-)
19	+CTS	RS-422 Clear To Send (+)
20		Not Connected
21		Not Connected
22		Not Connected
23		Not Connected
24	+RD	RS-422/RS-485 Receive Data (+)
25	-RD	RS-422/RS-485 Receive Data (-)

Figure 9.3 Automation Equipment Serial Port

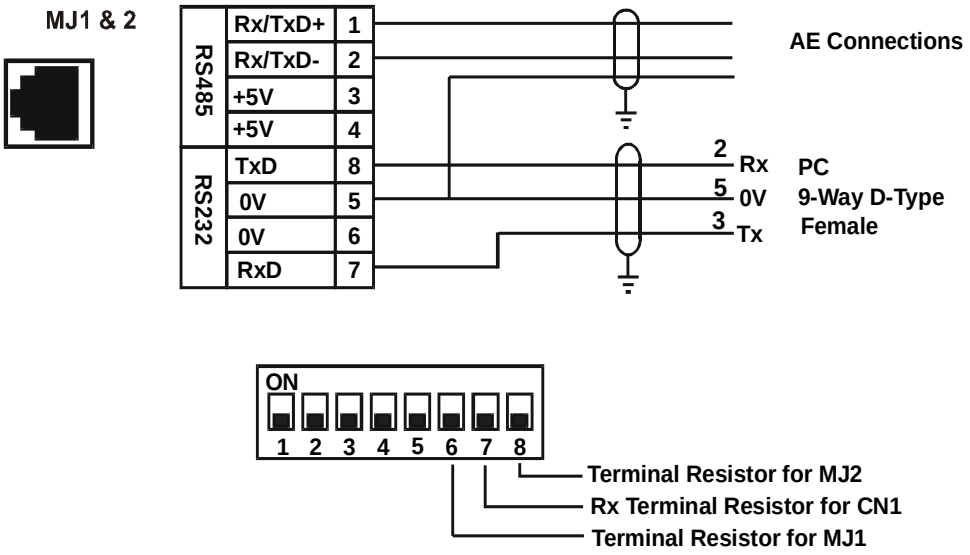


Figure 9.3 Automation Equipment Serial Port

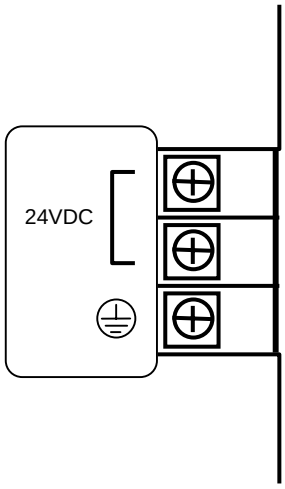


Figure 9.4 – TIU5XX Power Connector

Powered by +24VDC and Ground

9.5 HE500TIU5XX Dimensions

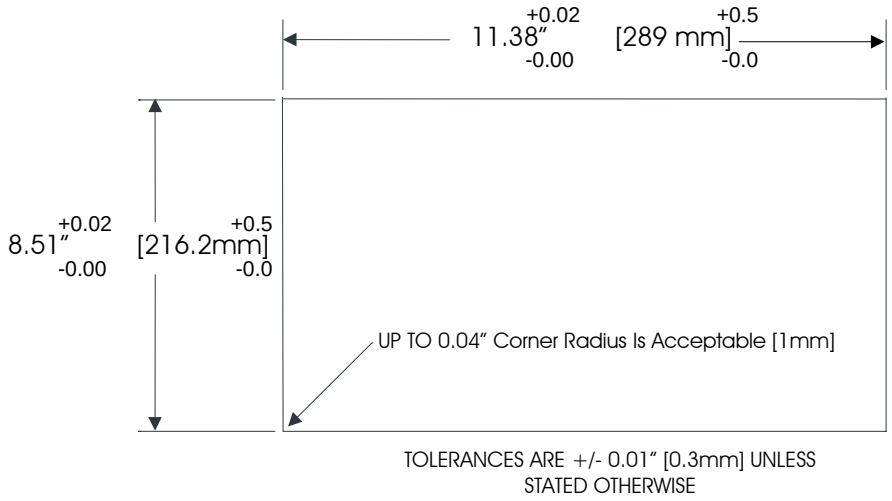


Figure 9.5 – HE500TIU5XX Cutout Details

9.6 SPECIFICATIONS

PARAMETER	CONDITIONS		PARAMETER	UNITS
Display Size	10.41"		Serial Ports RS232 RS422/485	Asynchronous Type Data Length: 7, 8 bits Parity: Even, Odd, None Stop Bits: 1, 2 bits Baud Rate: 4800, 9600, 19200, 38400, 57600, 76800, 115200 bps
Display Type	TFT Colour LCD			
Display Resolution	800 * 600			
Colour	32768 colours + 16 Colours in Blink Mode			
Backlight Average Lifetime	50,000 Hrs		Operating Ambient Temperature	0-50 °C
Backup Memory	64Kbytes SRAM			
Clock	RTC Battery Backed (Sanyo CR2450-CN1 Lithium Coin)		Storage Temperature	-10 - +60 °C
Backup Period	5 years (ambient 25 °C)		Humidity	85%RH, (non-Condensing)
CF Card Interface	Compatible with Compact Flash™		Weight	Approx. 2.4Kg
Printer Interface	Centronics Compatible half pitch 20 pins		Dimensions (W*H*D) mm	303.8 * 231 * 72.0
Nominal Input Voltage	24VDC		Panel Cut-Out mm	289.0 (+0.5) * 216.2 (+0.5)
Input Voltage Range	24VDC ± 10%		Seal Rating	Front Panel- IP65 (When Waterproof Sheet is used) Rear Cover- IP20
Inrush Current	30A, 1mS		Cooling	Natural Convection
Power Requirement	30W or less		Approvals	CE
Permissable Power Failure	Less than 1mS		Touch Panel Method	Analogue Resistive Membrane
Voltage Tolerance (between DC Terminal and Field Ground)	500Vac, 1min		Touch Panel Resolution	1024W*1024H
Insulation Resistance	500VDC 10MΩ or more		Mechanical Lifetime	1 million times, or more

NOTES

CHAPTER 10: HE500TIU6XX

10.1 Scope

The HE500TIU6XX has a 800 x 600 pixel TFT technology display which supports 32768 colours. The hardware description is covered under the following chapter

Figure 10.1 – Front View of HE500TIU6XX

10.2 HE500TIU6XX Touch Key Pad

The Tiu6XX has a touch keypad that can be assigned to perform a variety of key macro operations from within the CBreeze configuration package.

10.3 HE500TIU6XX Rear View

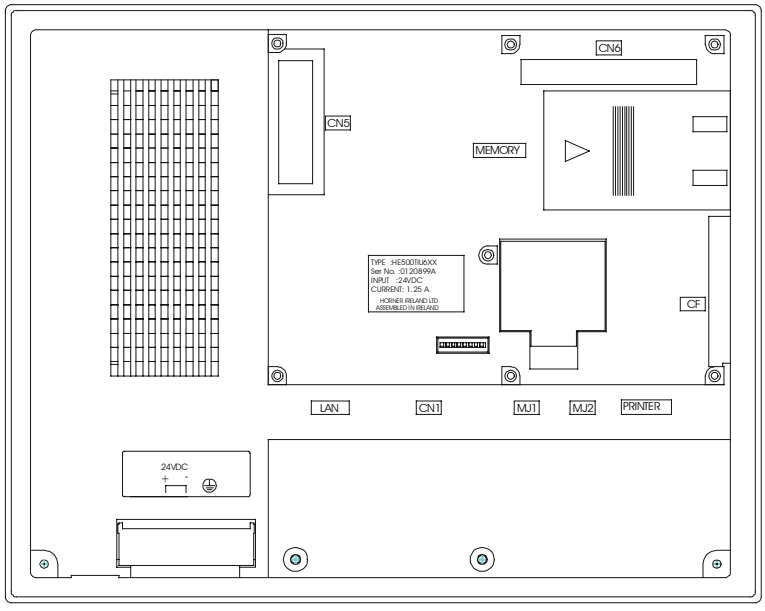


Figure 10.2 HE500TIU6XX Rear View

10.4 HE500TIU6XX Serial Ports

Pin No	Signal	Function
1	FG	Frame Ground
2	TXD	RS-232-C Send Data
3	RXD	RS-232-C Receive Data
4	RTS	RS-232-C Request To Send
5	CTS	RS-232-C Clear To Send
6		Not Connected
7	SG	Signal Ground
8		Not Connected
9	+5V	Internal Use Only Do Not Use!
10	0V	Internal Use Only Do Not Use!
11		Not Connected
12	+SD	RS-422/RS-485 Send Data (+)
13	-SD	RS-422/RS-485 Send Data (-)
14	+RTS	RS-422 Request To Send (+)
15		Not Connected
16		Not Connected
17	-RTS	RS-422 Request To Send (-)
18	-CTS	RS-422 Clear To Send (-)
19	+CTS	RS-422 Clear To Send (+)
20		Not Connected
21		Not Connected
22		Not Connected
23		Not Connected
24	+RD	RS-422/RS-485 Receive Data (+)
25	-RD	RS-422/RS-485 Receive Data (-)

Figure 10.3 Automation Equipment Serial Port (CN1)

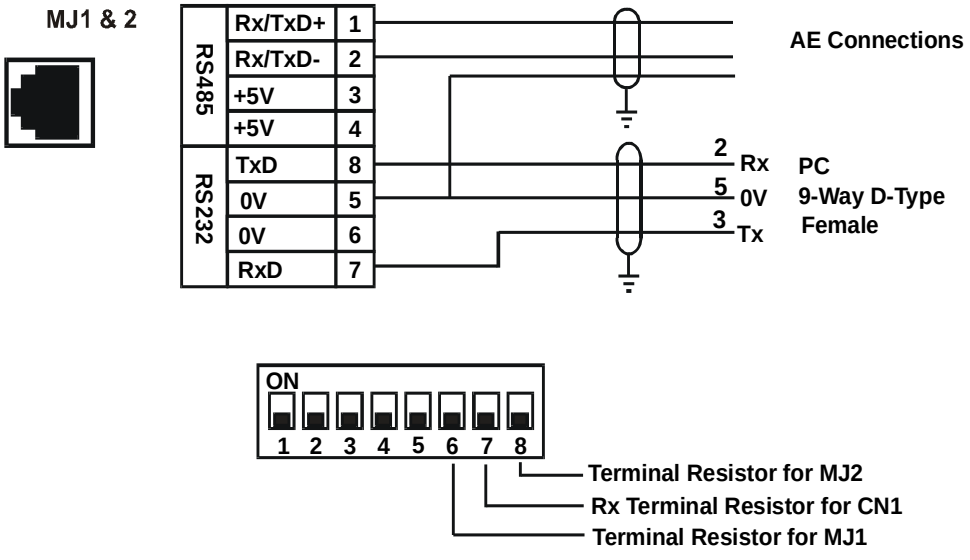


Figure 10.4 Serial Ports (MJ1 & 2)

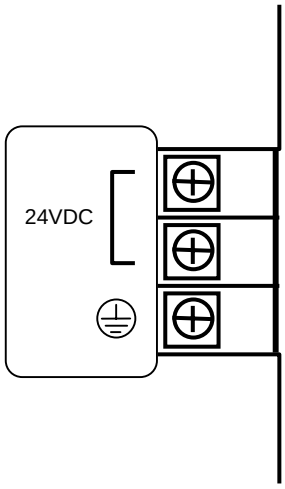


Figure 10.4 – TIU6XX Power Connector

Powered by +24VDC and Ground

10.5 HE500TIU6XX Dimensions

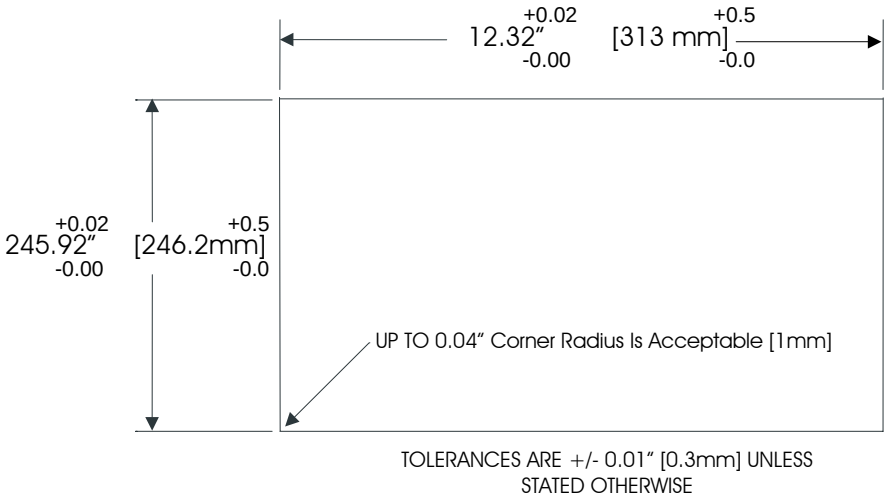


Figure 10.5 – HE500TIU6XX Cutout Details

10.6 Specifications

PARAMETER	CONDITIONS		PARAMETER	UNITS
Display Size	12.1"		Serial Ports RS232 RS422/485	Asynchronous Type Data Length: 7, 8 bits Parity: Even, Odd, None Stop Bits: 1, 2 bits Baud Rate: 4800, 9600, 19200, 38400, 57600, 76800, 115200 bps
Display Type	TFT Colour LCD			
Display Resolution	800 * 600			
Colour	32768 colours + 16 Colours in Blink Mode			
Backlight Average Lifetime	50,000 Hrs		Operating Ambient Temperature	0-50 °C
Backup Memory	64Kbytes SRAM			
Clock	RTC Battery Backed (Sanyo CR2450-CN1 Lithium Coin)		Storage Temperature	-10 - +60 °C
Backup Period	5 years (ambient 25 °C)		Humidity	85%RH, (non-Condensing)
CF Card Interface	Compatible with Compact Flash™		Weight	Approx. 2.75Kg
Printer Interface	Centronics Compatible half pitch 20 pins		Dimensions (W*H*D) mm	326.4 * 259.6 * 72.0
Nominal Input Voltage	24VDC		Panel Cut-Out mm	313 (+0.5) * 246.2 (+0.5)
Input Voltage Range	24VDC ± 10%		Seal Rating	Front Panel- IP65 (When Waterproof Sheet is used) Rear Cover- IP20
Inrush Current	30A, 1mS		Cooling	Natural Convection
Power Requirement	30W or less		Approvals	CE
Permissable Power Failure	Less than 1mS		Touch Panel Method	Analogue Resistive Membrane
Voltage Tolerance (between DC Terminal and Field Ground)	500Vac, 1min		Touch Panel Resolution	1024W*1024H
Insulation Resistance	500VDC 10MΩ or more		Mechanical Lifetime	1 million times, or more

NOTES

CHAPTER 11: COMMUNICATIONS

11.1 PC to Operator Station Communications

The serial pin connections for transmit (Tx), receive (Rx) and ground are displayed below.

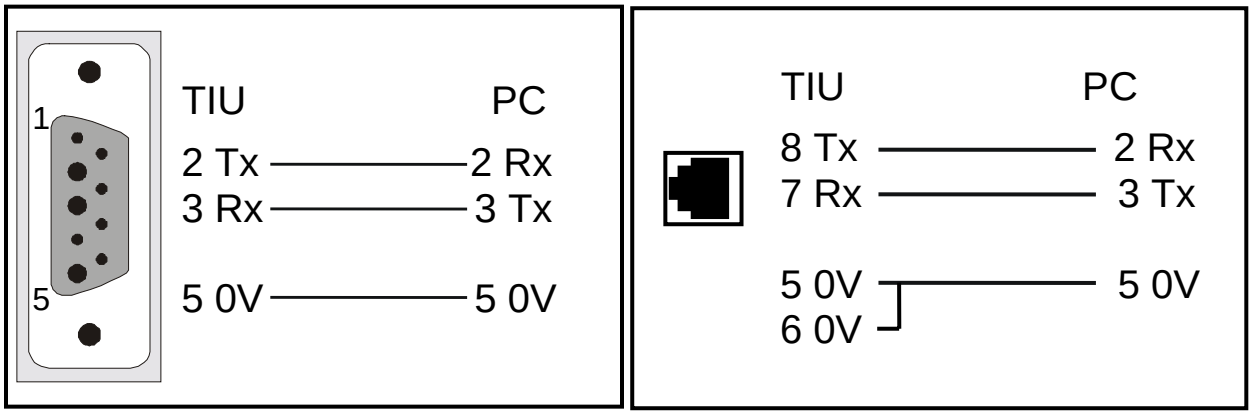


Figure 11.1 Tiu/PC Connection

11.2 Automation Equipment (AE) Communications Connections

10.2.1 *Recommended Automation Equipment Communication Cables*

Horner Electric recommends the following cables for automation equipment communication:

Belden No. 8105, 9807 or 9832 – General Purpose
Belden No. 8165 – Heavy Noise Environment

11.3 RS-232 Connection

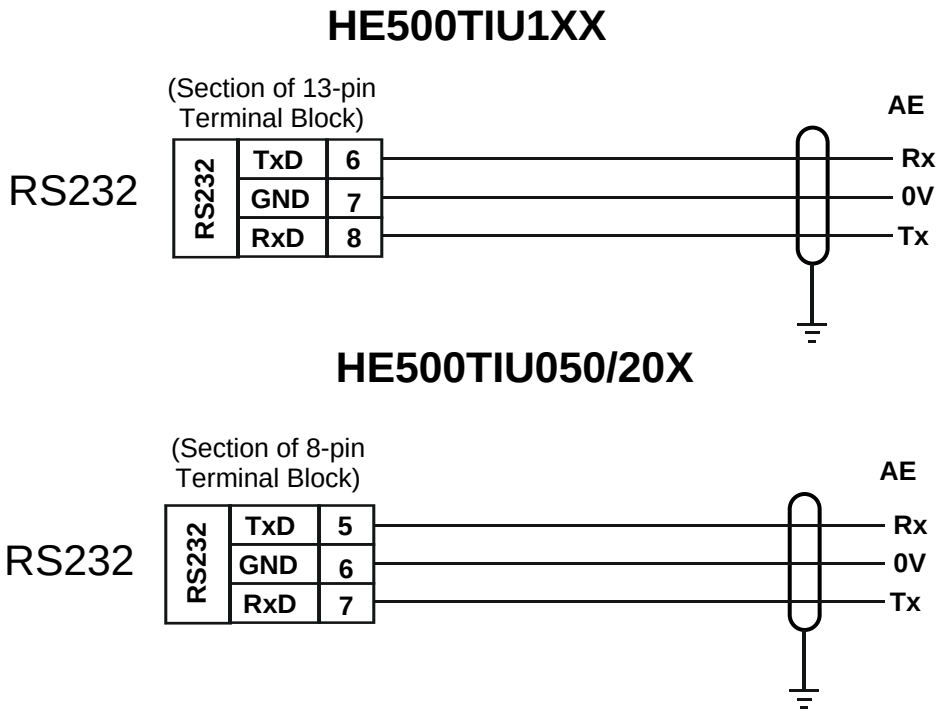
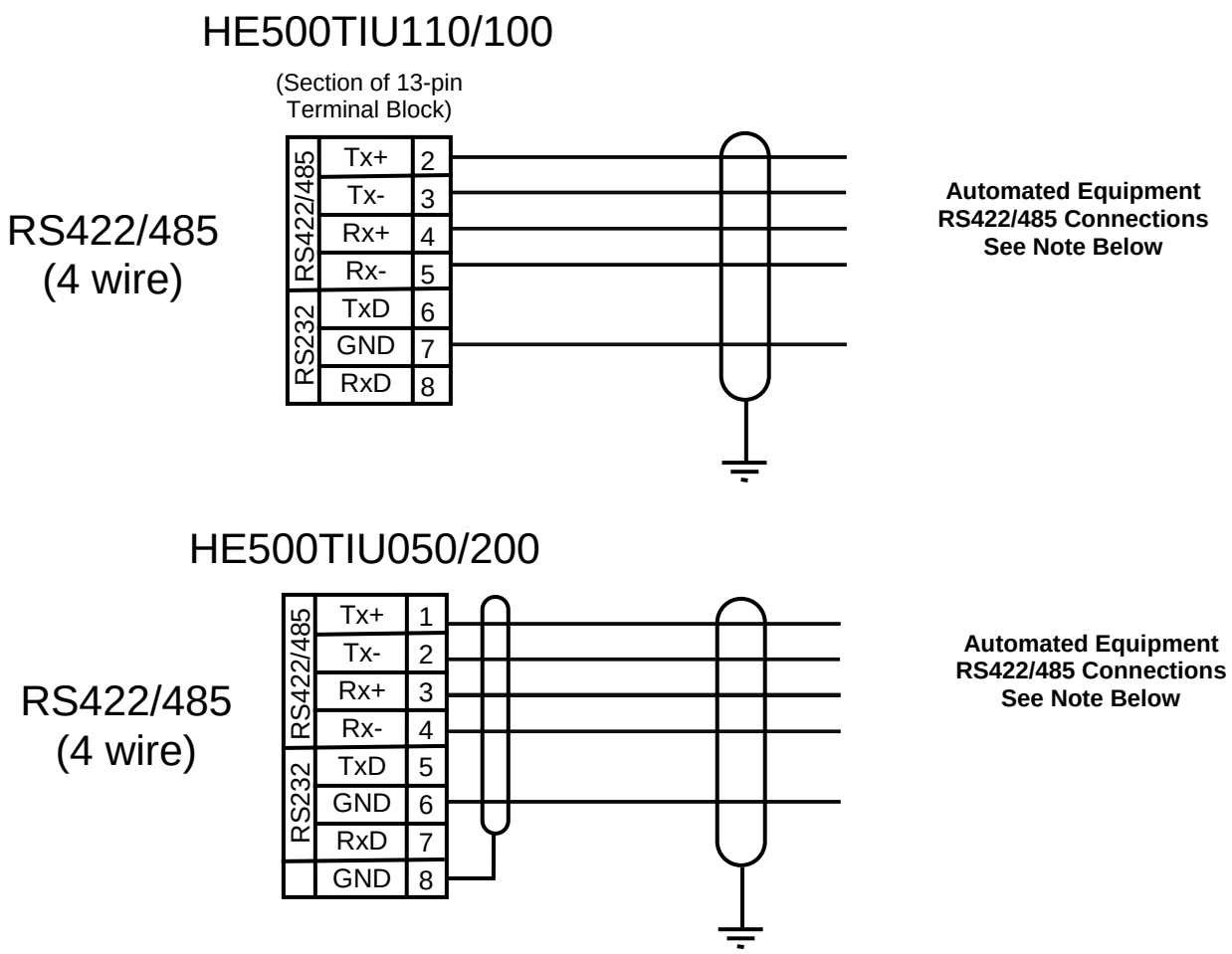


Figure 11.2 RS232 Connections

11.4 RS-422/485 Four-Wire



Note: The descriptions used by different manufacturers for RS-422/485 connections vary. Please refer to the automation equipment manufacturers own manuals for connection details.

Note: Horner produces application notes explaining the connection to each of the different automated equipment manufactures. These application notes are ongoing, see your installation CD for any released documentation.

Figure 11.3 – RS-422/485 Four-Wire

11.5 RS-485 Two-Wire

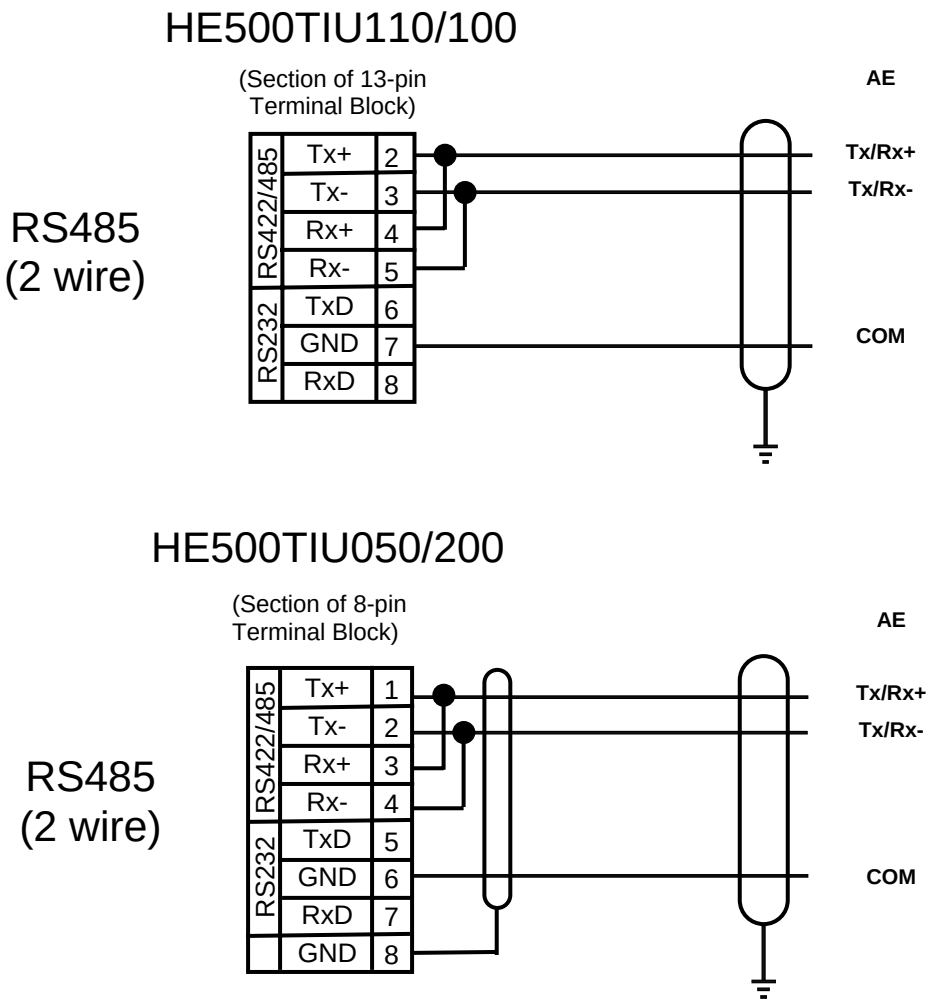


Figure 11.4 – RS-485 Two-Wire

11.6 Current Loop

The following diagram shows the connection to a device with an active 20mA current loop. The current loop on the HE500TIU100/110 is passive. Either the PLC must provide the 20mA source or an external current source must be supplied.

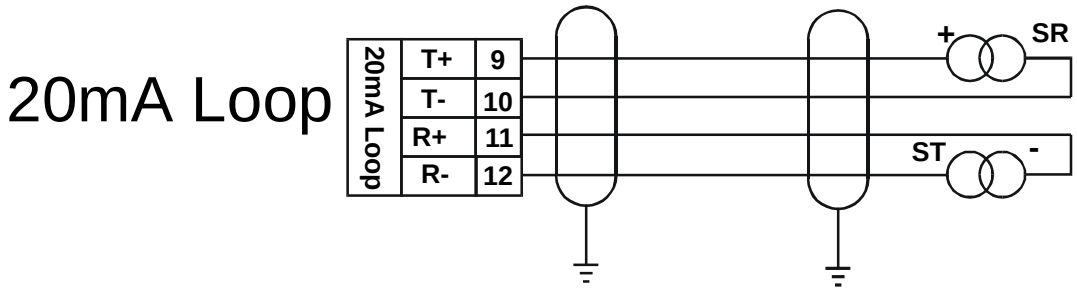


Figure 11.5 – Current Loop

Note: Current Loop is <u>not</u> a standard option on the HE500TIU100/110. Current loop must be ordered specifically or can be re-fit into a standard unit. Contact a Horner Electric dealer for more information.

Note: Current Loop is <u>not</u> an option with the HE500TIU050/101/111/20X/3XX/4XX/5XX/6XX

CHAPTER 12: GETTING STARTED

12.1 Self-Test (TIU050, TIU1xx, TIU2xx)

Power up the unit with the **UP** and **ENTER** keys pressed at the same time. The unit enters a self-test mode. The self-test consists of the following four checks:

12.1.1 Contrast Band

This test allows the user to set the lower and upper limits of contrast. Adjust the lower limit using the **UP** or **DOWN** key and press **Enter** when done. Do the same for the upper limit.

WARNING: - Changes to the lower or upper limits may allow the user to set the contrast to a setting where the display may appear blank. It is recommended that the factory setting are used (Min 8A, Max FE).

12.1.2 Display Test

The display test continuously blinks all pixels on (black) to off. Look for any pixels stuck on or off. Exit this test by pressing and holding any key for approximately two seconds.

12.1.3 Keyboard Test

As each key is pressed, an indication ******* appears above that key. In the case of units with a numeric keypad, press the key and a message appears indicating the key press. Check for keys indicating multiple presses or not reporting presses. Exit this test by pressing and holding any key for approximately two seconds.

12.1.4 RAM Test

Test either segment 0000 or segment 1000 (on the HE500TIU100/110) of the RAM. The segment 1000 test performs a base 3 repeating test. This test detects shorted address lines and damaged memory bits. The segment 0000 test performs a Read-Modify-Write test on each byte of RAM, detecting damaged memory bits. Exit this test by selecting DONE.

12.1.5 Serial Loop-back Tests

Tests the PC port and the Serial Port in each of it's three modes for serial loop-back. Pre-made plugs are required to link the pins of a particular port. This takes the following form:

Table 12.1 Loop-back Test Plugs

Port Tested	Product	Type of Connector	Pins to Short
PC (J2)	HE500TIU100/110	Pin male D link connector	pin 2 to pin 3
RS-232 (J3)	HE500TIU100/110	13-pin phoenix connection	pin 6 to pin 8
RS-422/485 (J3)	HE500TIU100/110	13-pin phoenix connection	pin 2 to pin 4 and pin 3 to pin 5.
Current Loop	HE500TIU100/110	13-pin phoenix connection	pin 1 to 9, pin 10 to 11 and pin 12 to 7
PC	HE500TIU050	Pin male D link connector	pin 2 to pin 3
RS-232	HE500TIU050	8-pin phoenix connection	Pin 5 to pin 7
RS-422/485	HE500TIU050	8-pin phoenix connection	Pin 1 to pin 3, Pin 2 to pin 4
NOTE: current loop in not installed on standard models, as such a standard model will fail the current loop-back test. Current Loop is <u>not</u> an option on the HE500TIU050/20X/3XX.			

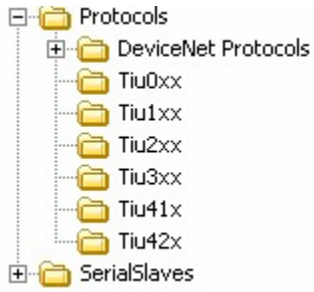
After starting the test, the OK counter begins to count up. Exit this test by selecting **DONE**.

12.2 Self-Test (TIU4xx,TIU5xx, TIU6xx)

Power up the unit with function keys **F1** and **F6** pressed. The unit enters a self-test mode. The self test consists of :
DISPLAY TEST - Continuously flashes the screen in each of 16 colours. Press F1 to exit.
TOUCH SCREEN TEST - Touch the screen at various points, the X, Y co-ordinate shown must change with each position. Press F1 to exit.
KEYBOARD TEST - Press F1 to F7 and the System key, the relevant key appears on the screen. F1 to exit.
SERIAL LOOPBACK - Tests MJ1 and CN1 the programming and PLC ports. Connectors with the following shorts are required for these tests :
MJ1 - Short pins 2-3 at the D-Type end.
CN1 - Short 2 - 3 (RS232), 12 - 24 and 13 - 25 (RS485).

12.3 Updating the Protocol

When the software is installed the user decides where the main CBREEZE folder resides. During installation the following folders are created: -



In the protocol directory 3 folders are created, TIU0xx, TIU1xx and TIU2xx. The protocol files for the different terminal is loaded into these folders. The protocol files for the HE500TIU050 are loaded into Tiu0xx, the protocol files for the HE500TIU10X are loaded into Tiu10x and the protocol files for the HE500TIU20X are loaded into Tiu20x.

The name of the protocol file is broken up into three section, the protocol, the main software revsion and the terminal type that protocol file is for.

Protocol Name	_	**Software Revision**	.	**Terminal Type**

Example
snp_R6.1xx
This is the protocol file for release 6 software for the GE FANUC PLC, for the HE500TIU10X
df1_R4.2xx
This is the protocol file for release 4 software for Allen Bradley PLC, for the HE500TIU20X

To Update Protocol File
1. Set Terminal Type
2. Set the required Automation Equipment in Communications Settings
3. Select **Update TIU Protocol** from the **File** menu.
4. Select the folder of the terminal you have connected to the PC. The correct file will appear for the terminal type selected and the Automation Equipment selected. Select that file and click OK.
5. A status bar appears indicating download progress.
6. After the transfer, the HE500TIU050/10X/11X/20X resets itself. The correct PLC type is displayed on the HE500TIU050/10X/11X/20X.
7. Next, the project loaded runs.

12.4 Updating the Operating System

1. Select **Update Operating System** from the **File** menu.
2. Choose the updated file with the “BIN” extension. Click **OK**.
3. A status bar appears indicating download progress.
4. During the download process, HE500TIU050/10X/11X/20X displays the message “**SYSTEM SHUTDOWN**”.

CHAPTER 13 : NETWORKS

13.1 Scope

This chapter gives a brief introduction into the networking hardware available on the Operator Station range. The part numbers of the various options are available in the Introduction Chapter of this manual. For information on programming the various network options see MAN0023, User Manual for the ***CBREEZE*** Software.

13.2 Controller Area Network (CAN) Overview

The controller area network (or CAN bus) is a serial communications bus that was originally developed in the late 1980's by a German company (Robert Bosch) for use in the automotive industry. CAN is an ISO (**I**nternational **S**tandards **O**rganisation) - defined serial communications bus for real-time applications. Established in 1947, the International Standards Organisation (ISO) is a multinational body dedicated to worldwide agreement on international standards. Specifically, CAN is documented in ISO 11898 (for high-speed applications) and ISO 11519 (for lower-speed applications).

13.2.1 *CAN Features*

CAN-based open automation technology successfully competes on the market of distributed automation systems because of the special features of the CAN protocol. The special features are CAN's producer-consumer-oriented (or peer-to-peer) principle of data transmission and its multi-master capability. The general design of CAN originally specified a high bit rate, high immunity to electrical interference and an ability to detect any errors produced. CAN networks have the following general attributes:

- Automatic error detection
- Easily configurable
- Cost-effective to design and implement
- Capable of operating in harsh environments

13.3 CsCAN Network Overview

The CsCAN Network was first developed in 1993 by Horner Electric. It was developed for use in a project that Horner Electric completed for the United States Post Office. Horner Electric developed its own network, because it needed a network that had a specific set of powerful peer-to-peer and host-to-node capabilities. The CsCAN Network has a "pass-through" feature whereby PC-based programs access other nodes connected to a network by passing the programming command through the serial port to the network port. (For a more detailed description, see below.) Horner Electric found that by developing its own network, it satisfied several important needs. Horner Electric continues CsCAN Network development to satisfy the requirements of today and the requirements of the future.

13.3.1 *CsCAN Network Features*

The CsCAN Network is based on CAN, which has many desirable features such as ruggedness, ease of configuration, etc. With Horner Electric Controllers, data is passed at 125Kbps using a differential pair of wires plus a ground. It is important to note that the data rate is not limited to 125Kbps. The maximum data rate is 1Mbps (limited by the speed of light). The CAN implementation in the CsCAN controller allows up to 64 controllers to be networked with no additional hardware and up to 253 controllers with three CAN repeaters.

For the programmer, little knowledge of networking procedures is needed. However for troubleshooting and optimizing, the following information is helpful. Instead of using master/slave or token passing, the hardware self-arbitrates based on the Network ID. **Controllers with lower Network ID numbers are given a higher priority than controllers with higher Network ID numbers.**

13.3.2 *CsCAN Network Operation*

When a controller needs to send data over the network, it first waits for the network to be idle (currently a maximum of 900uS). If two controllers start broadcasting information on the network at the same time, the

"self-arbitration" causes the controller with the greater Network ID number to cease broadcasting without affecting the message-in-progress of the other controller.

In applications with a large number of networked controllers, better results may be achieved by assigning lower Network IDs to controllers that have more critical network data than other controllers. By assigning higher Network IDs to controllers that provide numerous network updates, the controllers are prevented from monopolising the bus time.

Each controller is capable of broadcasting Global Digital Output bits (%QG) and Global Analog Output bits (%AQG), which are periodically broadcasted to the other controllers on the network. The coil representations %QG and %AQG may be used in ***CBREEZE*** like any other coil or internal register reference.

All digital global outputs are broadcast to the network each time one of them has a state change. In addition, if a controller has not transmitted its global data for specific time period, the controller's programmable network timer may expire, which in turn results in a global data broadcast. Finally, as part of its power-up initialisation sequence, another controller can explicitly request a controller to broadcast its global data.

13.4 DeviceNet Overview

DeviceNet is an open network. The specification and the protocol are open. Vendors are not required to purchase hardware, software or licensing rights to connect devices to a system.

13.4.1 *DeviceNet Features*

DeviceNet is a low-cost communications link to connect industrial devices. It allows the interchangeability of simple devices while making interconnectivity of more complex devices possible. DeviceNet is based on CAN. It is an application layer protocol (ISO layer 7) and is defined in terms of an abstract object model, which represents the available communication services and the external visible behaviour of a DeviceNet node.

The DeviceNet Model is application independent. DeviceNet provides the communication services needed by various types of applications. Many of today's lower level industrial control devices must retain their low cost/low resource characteristics even when directly connected to a network. DeviceNet takes this into consideration by defining a specific instance of the DeviceNet Model for communications typically seen in a Master/Slave application. This is referred to as the Predefined Master/Slave Connection Set. Some of the features and functionality of the DeviceNet network are described Table 8.1.

Table 13.1 - DeviceNet Features and Functionality

Network Size	**Up to 64 Nodes**
Network Length	Selectable end-to end network distance varies with speed Baud Rate — Distance 125 Kbps — 500m (1,640 feet) 250 Kbps — 250m (820 feet) 500 Kbps — 100m (328 feet)
Data Packets	0-8 bytes
Bus Topology	Linear (trunkline/dropline); power and signal on the same network cable
Bus Addressing	Peer-to-Peer with Multi-Cast (one-to-many); Multi-Master and Master/Slave special case; polled or change-of-state (exception-based)
System Features	Removal and replacement of devices from the network under power

13.4.2 *DeviceNet Protocol*

Some of the communication protocol features of DeviceNet consist of the following:

1. A DeviceNet product can behave as a Client, a Server or both.
2. Master/Slave operation.
3. Capable of Peer-to-Peer exchange capability exists in which any DeviceNet product can produce and consume messages.
4. Capable of supporting 64 node addresses
5. Each node can support an unlimited number of I/O.

13.4.3 *DeviceNet Operation*

The following restrictions are placed on operations when using an OS that is configured as a DeviceNet slave.

1. Currently, communication between the PC and the controller is only possible to the device physically connected to the PCs' serial port. Project downloads, uploads, monitoring, and configuration **cannot currently take place** over a DeviceNet network.
2. The HE200CGM40x gateway card can not currently be used with DeviceNet communications. Horner Electric is providing a special Gateway device that is based on the OCS hardware. The Gateway device makes it possible to connect the PC serial port with the DeviceNet network.
3. DeviceNet network nodes are in a range from 0 to 63. The controller is able to observe network responses (polled connections) from any slave to the DeviceNet Master. The first 16-words of these observed responses are made available for mapping on the **Network Input Assignments** page. These correspond to the available nodes 0 to 63 and registers AQG1 to AQG16. Node 64 is used for a special case. When data is sent to a controller from a DeviceNet Master (via the polled connection) this data is mapped to node 64. Relative addressing is limited to -64 to +64.

13.5 CAN Wiring Rules

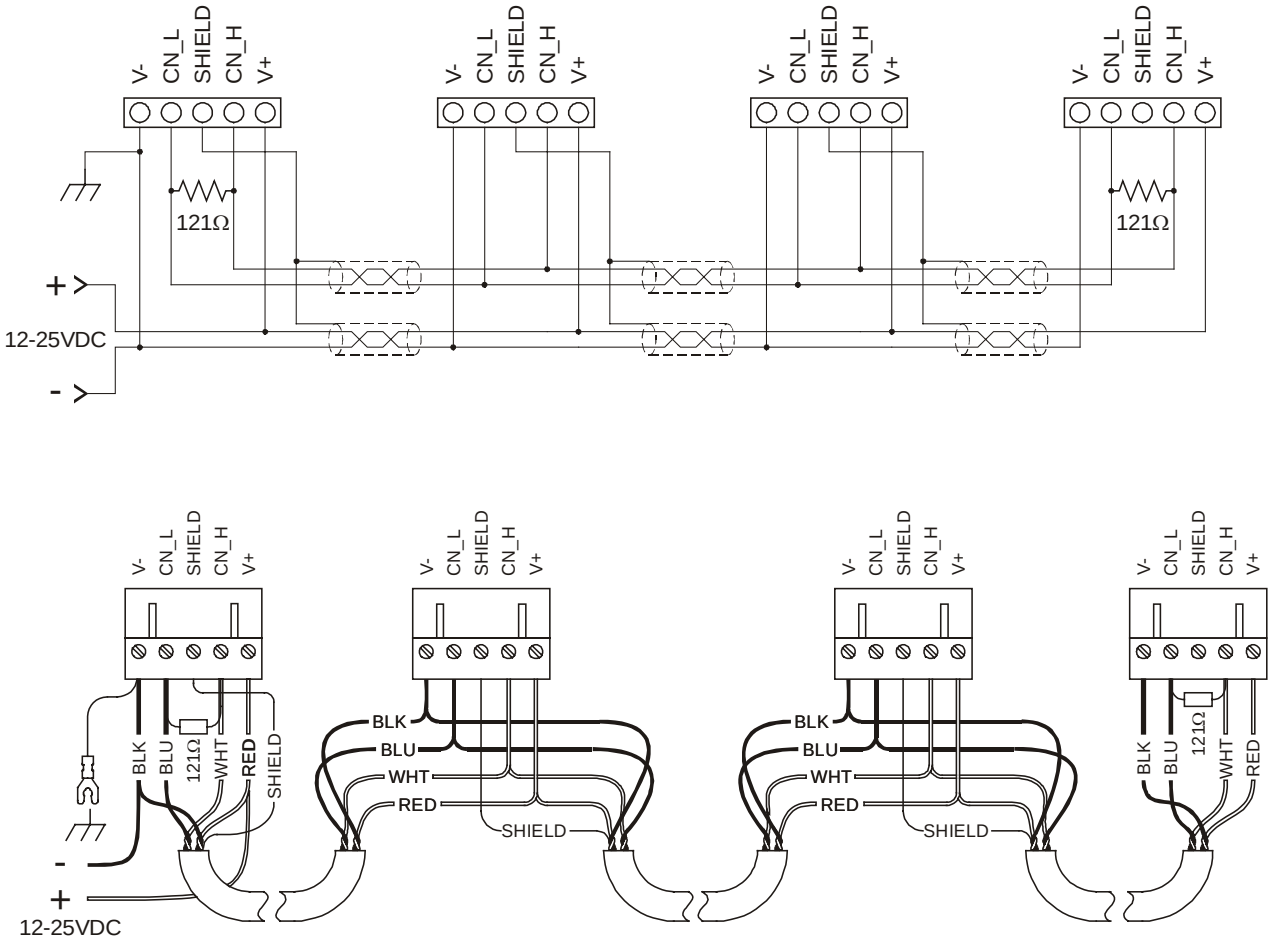


Figure 13.1 – CAN Network Cabling

1. Wire the CAN network in a daisy-chained fashion such that there are exactly two physical end-points on the network.
2. The two nodes at the physical end-points need to have 121 ohm 1% terminating resistors connected across the CN_L and CN_H terminals.
3. Use data conductors (CN_L and CN_H) that are 24 AWG shielded twisted pair for “thin cable” and 22 AWG shielded twisted pair for “thick cable”. They must also have 120-ohm characteristic impedance. In typical industrial environments, use a Belden wire #3084A (“thin”). Use #3082A (“thick”) for environments where noise is a concern.
4. Use power conductors (V- and V+) that are 18 AWG twisted-pair for “thin cable” and 15 AWG twisted-pair for “thick cable”.
5. Connect the V- power conductor to a good earth ground **at one place only** on the network, preferably physical endpoints.
6. For a section of cable between two nodes, the cable shield is connected to the cable shield input at *one end of the cable only.*
7. A CAN network (without repeaters) is limited to 64 nodes (with 63 cable segments) with a maximum cable length of 1500 ft.
8. Up to four CAN network segments, which adhere to the above rules, may be connected together using three CAN repeaters. In this manner, a CAN network may be extended to 253 nodes with a total cable distance of 6000 ft.

13.6 Profibus

Profibus utilises a Master-Slave type of communication with the HE500TIUXX2 functioning as a slave device. Decentralised Peripherals (Slave) Baud rates of up to 12 MBd can be obtained through Profibus.

Up to 32 devices 9master or slaves) can be connected in one segment without using repeaters, or up to 64 devices can be connected using repeaters.

Master devices are used to determine the data communication on the bus. One master can service several slaves. Several Masters can participate on the bus simultaneously, but only one Master can write outputs to a slave.

The slave devices are peripheral devices. Slaves do not have bus access rights and can only acknowledge received messages or send messages to the master when requested to do so. Any master can read data from the slave devices. All connected Slaves have the same priority.

For further information on the Profibus Network, visit their website at www.profibus.com

13.6.1 *Profibus Wiring*

The HE500TIUXX2 uses a 9 pin D-sub plug connector for its Profibus port. The pin assignment of the plug connector and the wiring are show below.

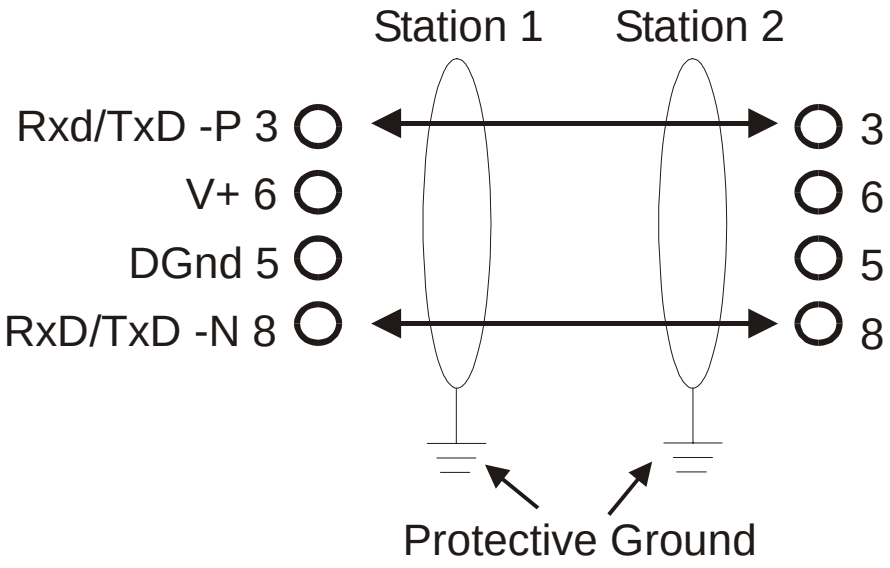


Figure 13.2 Profibus Port Pinout

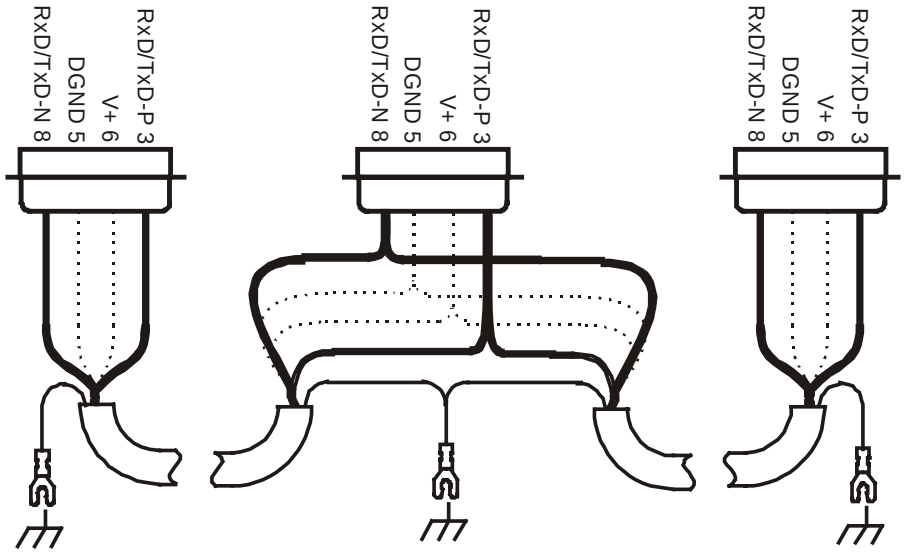


Figure 13.3 – Profibus Network Cabling

It is necessary to terminate both ends of the network. Both terminations must have power to them to insure proper operation of the network. The following diagram illustrates the correct connection for the termination resistors.

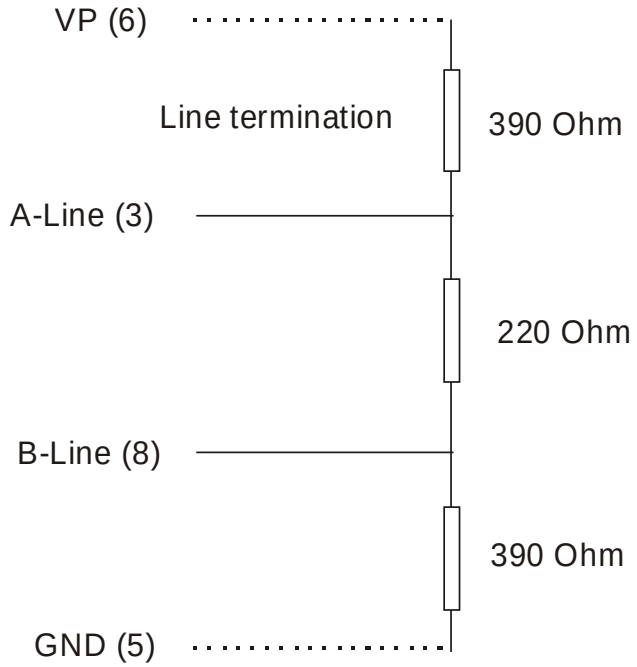


Figure 13.4 – Profibus termination resistors

CHAPTER 14: SMARTSTACK ™

14.1 Scope

Horner has now added the SmartStack™ modules from the OCS Range to the HE500TIU20X range. The SmartStack system is a method of allowing I/O expansion on an HMI. A wide range of modules is available including Digital and Analogue.

14.2 Installing and Removing a SmartStack Module

The following section describes how to install and remove a SmartStack Module.

Caution: To function properly and avoid possible damage, do not install more than four Smart Stack™ Modules per HE500TIU20X.

14.2.1 *Installing SmartStack Modules*

1. Hook the tabs. Each SmartStack Module has two tabs that fit into slots located on the HE500TIU20X. (The slots on the HE500TIU20X are located on the back cover.)
2. Press the SmartStack Module into the “locked” position, making sure to align the SmartStack Module fasteners with the SmartStack receptacles on the HE500TIU20X.

14.2.2 *Removing SmartStack Modules*

1. Using a Flathead screwdriver, pry up the end of the SmartStack Module (opposite of tabs) and swing the module out.
2. Lift out the tabs of the module.

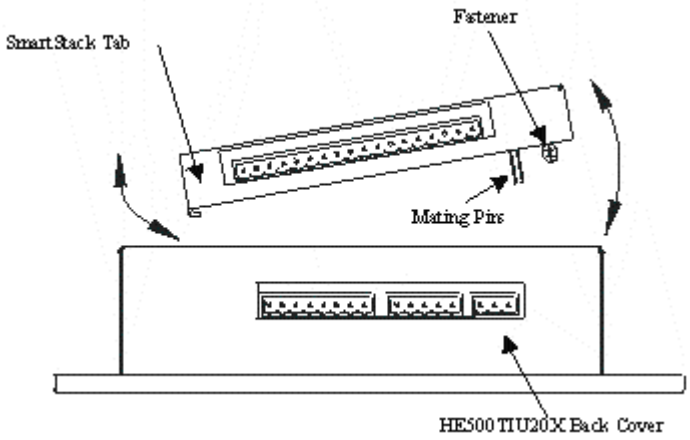


Figure 14.1 – Installing a SmartStack™ Module in a TIU

NOTES