Vision™ PLC+HMI

User Guide
Models V230/280/290

This guide provides basic information for Unitronics' Models V230/280/290 (Non-color Screens).

General Description

Vision PLC+HMIs are programmable logic controllers that comprise an integral operating panel containing a graphic LCD screen and a keyboard. All models offer the same PLC features. Operating panel features differ according to model.

V230
LCD + Keyboard

V280
Touchscreen + Keyboard

V290
Touchscreen only

Communications

- 2 serial ports: RS232 (COM1), RS232/RS485 (COM2)
- 1 CANbus port
- The user can order and install an additional port. Available port types are: RS232/RS485, and Ethernet
- Communication Function Blocks include: SMS, GPRS, MODBUS serial/IP Protocol FB enables PLC to communicate with almost any external device, via serial or Ethernet communications

I/O Options

Vision supports digital, high-speed, analog, weight and temperature measurement I/Os via:

- Snap-in I/O Modules
  Plug into the back of the controller to provide an on-board I/O configuration
- I/O Expansion Modules
  Local or remote I/Os may be added via expansion port or CANbus

Information Mode

This mode enables you to:

- View & Edit operand values, COM port settings, RTC and screen contrast/brightness settings
- Calibrate the touchscreen
- Stop, initialize, and reset the PLC

To enter Information Mode, press the <i> button for several seconds.

Programming Software, & Utilities

- VisiLogic
  Easily configure hardware and write both HMI and Ladder control applications; the Function Block library simplifies complex tasks such as PID. Write your application, and then download it to the controller via the programming cable included in the kit.

  Note that in order to program the V290-19-B20B,you must select the V280/V530 in VisiLogic's Hardware Configuration.
- Utilities
  These include UniOPC server, Remote Access for remote programming and diagnostics, and DataXport for run-time data logging

To learn how to use and program the controller, as well as use utilities such as Remote Access, refer to the VisiLogic Help system.

Operand Types Memory Bits 4096 | Memory Integers, 16-bit, 2048 | Long Integers, 32-bit, 256 | Double Word, 32-bit unsigned, 64 | Memory Floats, 32-bit, 24 | Timers, 32-bit, 192 | Counters, 16-bit, 24

Additional product documentation is in the Technical Library, located at www.unitronicsplc.com. Technical support is available at the site, and from support@unitronics.com.

Kit Contents

- Vision controller
- Mounting brackets (x4)
- 3 pin power supply connector
- 5 pin CANbus connector
- CANbus network termination resistor
- Grounding hardware
- Rubber seal
- Extra set of keyboard slides, according to model

Alert Symbols and General Restrictions

When any of the following symbols appear, read the associated information carefully.

Symbol	Meaning	Description
	Danger	The identified danger causes physical and property damage.
	Warning	The identified danger could cause physical and property damage.
Caution	Caution	Use caution.

- Before using this product, the user must read and understand this document
- All examples and diagrams are intended to aid understanding, and do not guarantee operation Unitronics accepts no responsibility for actual use of this product based on these examples
- Please dispose of this product according to local and national standards and regulations
- Only qualified service personnel should open this device or carry out repairs

Failure to comply with appropriate safety guidelines can cause severe injury or property damage

- Do not attempt to use this device with parameters that exceed permissible levels
- To avoid damaging the system, do not connect/disconnect the device when power is on

Environmental Considerations

- Do not install in areas with: excessive or conductive dust, corrosive or flammable gas, moisture or rain, excessive heat, regular impact shocks or excessive vibration, in accordance with the standards given in the product's technical specification sheet

- Ventilation: 10mm space required between controller's top/bottom edges & enclosure walls
- Do not place in water or let water leak onto the unit
- Do not allow debris to fall inside the unit during installation
- Install at maximum distance from high-voltage cables and power equipment

UL Compliance

The following section is relevant to Unitronics' products that are listed with the UL.

The model: V230-13-B20B, V280-18-B20B, V290-19-B20B are UL listed for Ordinary Location.

The model: V230-13-B20B, V280-18-B20B are UL listed for Hazardous Locations.

○ UL Ordinary Location

In order to meet the UL ordinary location standard, panel-mount this device on the flat surface of Type 1 or 4 X enclosures

UL Ratings, Programmable Controllers for Use in Hazardous Locations, Class I, Division 2, Groups A, B, C and D

These Release Notes relate to all Unitronics products that bear the UL symbols used to mark products that have been approved for use in hazardous locations, Class I, Division 2, Groups A, B, C and D.

Caution

- This equipment is suitable for use in Class I, Division 2, Groups A, B, C and D, or Non-hazardous locations only.
- Input and output wiring must be in accordance with Class I, Division 2 wiring methods and in accordance with the authority having jurisdiction.
- WARNING—Explosion Hazard—substitution of components may impair suitability for Class I, Division 2.
- WARNING – EXPLOSION HAZARD – Do not connect or disconnect equipment unless power has been switched off or the area is known to be non-hazardous.
- WARNING – Exposure to some chemicals may degrade the sealing properties of material used in Relays.
- This equipment must be installed using wiring methods as required for Class I, Division 2 as per the NEC and/or CEC.

Panel-Mounting

For programmable controllers that can be mounted also on panel, in order to meet the UL Haz Loc standard, panel-mount this device on the flat surface of Type 1 or Type 4X enclosures.

Communication and Removable Memory Storage

When products comprise either USB communication port, SD card slot, or both, neither the SD card slot nor the USB port are intended to be permanently connected, while the USB port is intended for programming only.

Removing / Replacing the battery

When a product has been installed with a battery, do not remove or replace the battery unless the power has been switched off, or the area is known to be non-hazardous.

Please note that it is recommended to back up all data retained in RAM, in order to avoid losing data when changing the battery while the power is switched off. Date and time information will also need to be reset after the procedure.

UL des zones ordinaires:

Pour respecter la norme UL des zones ordinaires, monter l'appareil sur une surface plane de type de protection 1 ou 4X

Certification UL des automates programmables, pour une utilisation en environnement à risques, Class I, Division 2, Groups A, B, C et D.

Cette note fait référence à tous les produits Unitronics portant le symbole UL - produits qui ont été certifiés pour une utilisation dans des endroits dangereux, Classe I, Division 2, Groupes A, B, C et D.

Attention

- Cet équipement est adapté pour une utilisation en Classe I, Division 2, Groupes A, B, C et D, ou dans Non-dangereux endroits seulement.
- Le câblage des entrées/sorties doit être en accord avec les méthodes de câblage selon la Classe I, Division 2 et en accord avec l'autorité compétente.
- AVERTISSEMENT: Risque d'Explosion – Le remplacement de certains composants rend caduque la certification du produit selon la Classe I, Division 2.
- AVERTISSEMENT - DANGER D'EXPLOSION - Ne connecter pas ou ne débranche pas l'équipement sans avoir préalablement coupé l'alimentation électrique ou la zone est reconnue pour être non dangereuse.
- AVERTISSEMENT - L'exposition à certains produits chimiques peut dégrader les propriétés des matériaux utilisés pour l'étanchéité dans les relais.
- Cet équipement doit être installé utilisant des méthodes de câblage suivant la norme Class I, Division 2 NEC et /ou CEC.

Montage de l'écran:

Pour les automates programmables qui peuvent aussi être monté sur l'écran, pour pouvoir être au standard UL, l'écran doit être monté dans un coffret avec une surface plane de type 1 ou de type 4X.

Communication et de stockage amovible de mémoire (carte mémoire)

Produits comprend un port USB de communication, soit un port carte SD ou les deux, ni le port SD, ni le port USB ne sont censés être utilisés en permanence, tandis que l'USB est destiné à la programmation uniquement.

Retrait / Remplacement de la batterie

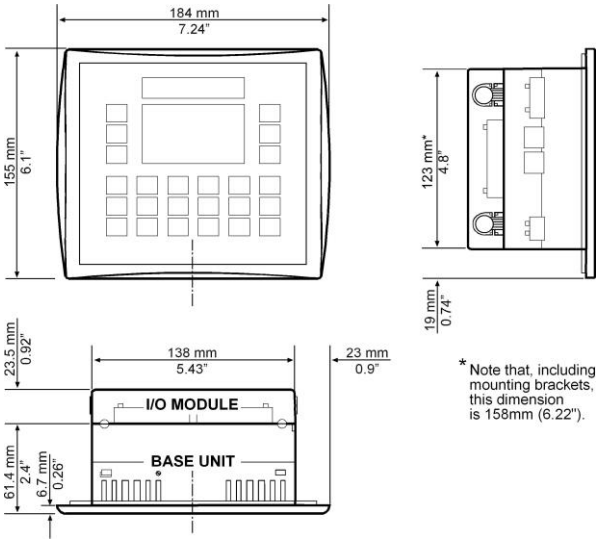
Lorsqu'un produit a été installé avec une batterie, retirez et remplacez la batterie seulement si l'alimentation est éteinte ou si l'environnement n'est pas dangereux.

Veuillez noter qu'il est recommandé de sauvegarder toutes les données conservées dans la RAM, afin d'éviter de perdre des données lors du changement de la batterie lorsque l'alimentation est coupée. Les informations sur la date et l'heure devront également être réinitialisées après la procédure

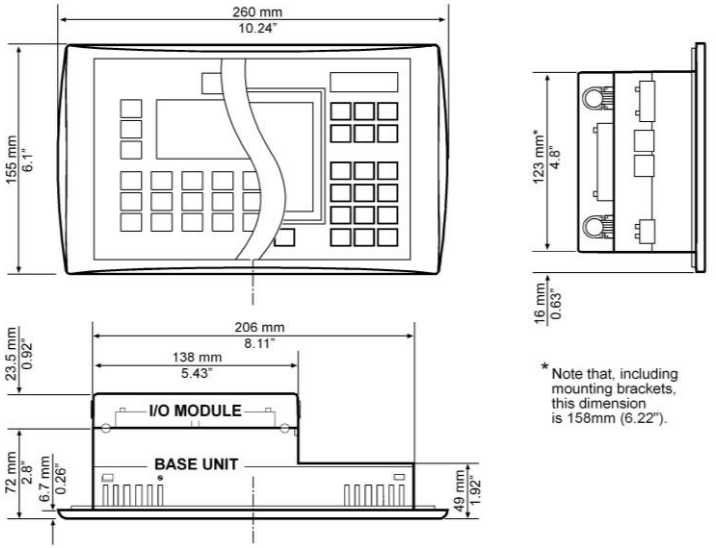
Mounting

Dimensions

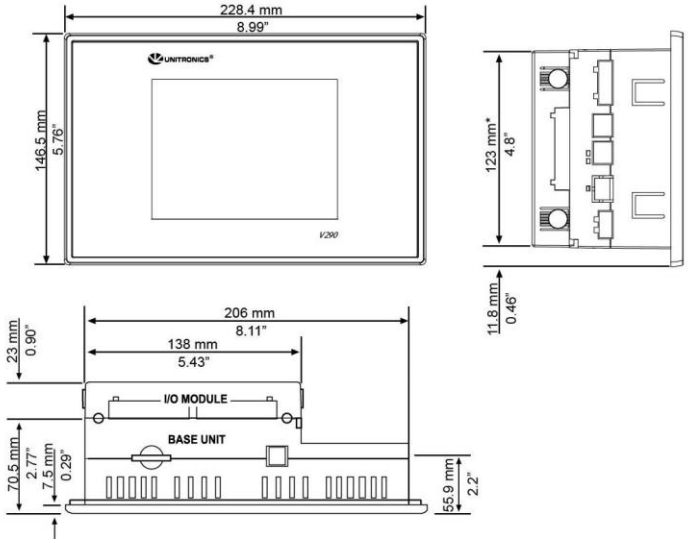
V230



V280



V290



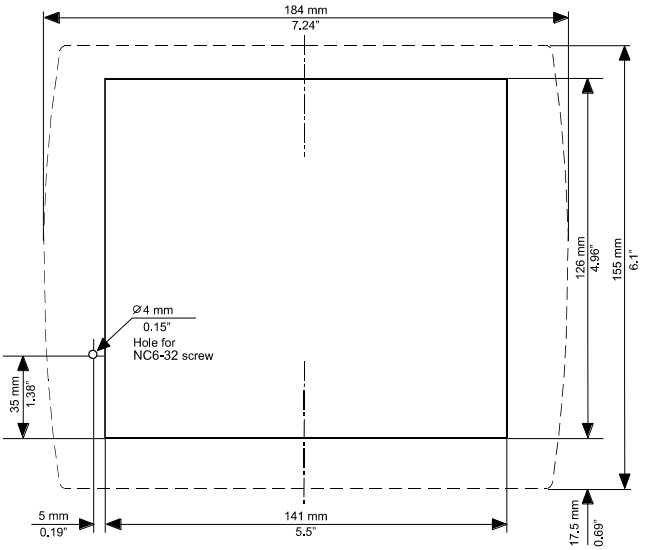
Mounting

Before you begin, note that:

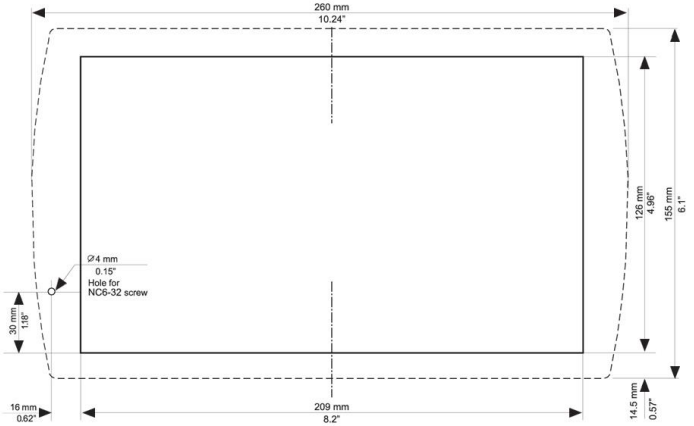
- The mounting panel cannot be more than 5 mm thick
- To minimize electromagnetic interference, mount the controller on a metal panel and earth the power supply according to the details on page 6.

1. Make a panel cut-out that suits your model controller.

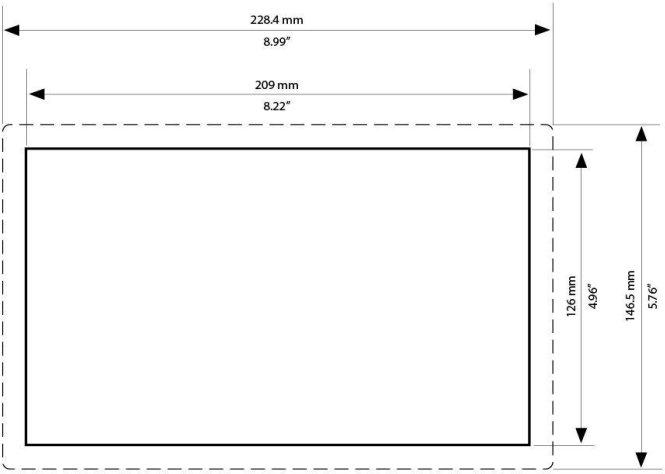
V230 Cut-out Dimensions



V280 Cut-out Dimensions



V290 Cut-out Dimensions

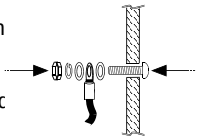


Caution	▪ The necessary torque is 0.45 N·m (4.5 kgf·cm).

2. If you mount the controller on a metal panel, earth the power supply **only in**

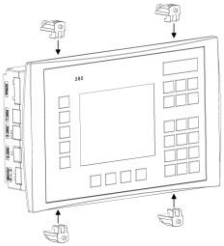
V230:

a. Bore a hole to suit the NC6-32 screw supplied with the kit.
b. Scrape panel paint away from the contact area to ensure a conductive con
c. Drive the screw into the hole.
d. Place the following hardware screw's shank, in the order shown in the accompanying figure: washer, ring cable shoe, second washer, spring, and

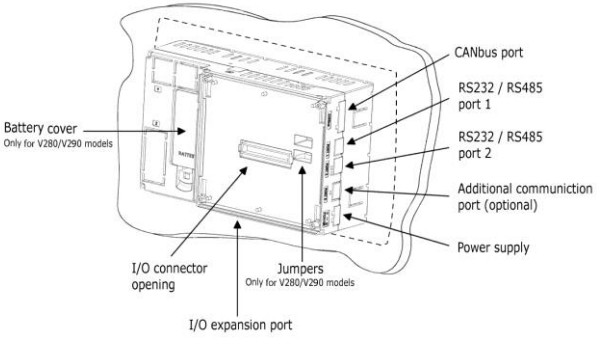


- Pay Attention:
  The wire used to earth the power supply must not exceed 10 cm in length if your conditions do not permit this, do not earth the power supply.
- Make sure that the metal panel is properly earthed.

3. Slide the controller into the cut-out, ensuring that the rubber seal is in place.
4. Push the 4 mounting brackets into their slots on the sides of the controller as shown in the figure to the right.
5. Tighten the bracket screws against the panel. Hold the bracket securely against the unit while tightening the screw.



6. When properly mounted, the controller is squarely situated in the panel cut-out as shown below.



Wiring: General

- This equipment is designed to operate only in SELV/PELV/Class 2/Limited Power environments
- All power supplies in the system must include double insulation. Power supply outputs must be rated as SELV/PELV/Class 2/Limited Power.
- Do not connect either the 'Neutral or 'Line' signal of the 110/220VAC to device's 0V pin.
- Do not touch live wires.

- All wiring activities should be performed while power is OFF.
- Unused pins should not be connected. Ignoring this directive may damage the device

Caution

- To avoid damaging the wire, do not exceed a maximum torque of 0.5 N·m (5 kgf·cm)
- Do not use tin, solder, or any substance on stripped wire that might cause the wire strand to break

Use crimp terminals for wiring; use 26-14 AWG wire (0.13 mm ^{2}–2.08 mm^2).

1. Strip the wire to a length of 7±0.5mm (0.250–0.300”).
2. Unscrew the terminal to its widest position before inserting a wire.
3. Insert the wire completely into the terminal to ensure a proper connection.
4. Tighten enough to keep the wire from pulling free.

Wiring Guidelines

- Use separate wiring ducts for each of the following groups:
- Group 1: Low voltage I/O and supply lines, communication lines.
- Group 2: High voltage Lines, Low voltage noisy lines like motor driver outputs.

  Separate these groups by at least 10cm (4"). If this is not possible, cross the ducts at a 90˚angle.

- For proper system operation, all 0V points in the system should be connected to the system 0V supply rail.

Earthing the Controller

To maximize system performance, avoid electromagnetic interference as follows:

- Use a metal cabinet.
- Connect the 0V terminal to the earth ground of the system at one point, preferably as near to the controller as possible.

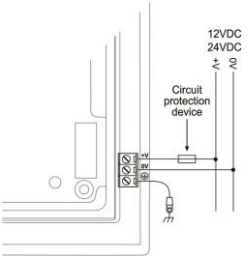
Power Supply

The controller requires an external 12 or 24VDC power supply. The permissible input voltage range is 10.2-28.8VDC, with less than 10% ripple.

⚠

- You must use an external circuit protection device
- Install an external circuit breaker. Guard against short-circuiting in external wiring
- Double-check all wiring before turning on the power supply

In the event of voltage fluctuations or non-conformity to voltage power supply specifications, connect the device to a regulated power supply



Communication Ports

⚠
- Turn off power before making communications connections
- Signals are related to the controller's 0V; this is the same 0V used by the power supply

Caution
- Always use the appropriate port adapters
- The serial ports are not isolated. If the controller is used with a non-isolated external device, avoid potential voltage that exceeds ± 10V

Serial Communications

This series comprises 2 RJ-11-type serial ports and a CANbus port.

COM1 is RS232 only. COM2 may be set to either RS232 or RS485 via jumper as described below. By default, the port is set to RS232.

Use RS232 to download programs from a PC, and to communicate with serial devices and applications, such as SCADA.

Use RS485 to create a multi-drop network containing up to 32 devices.

Caution
- COM1 & 2 are not isolated

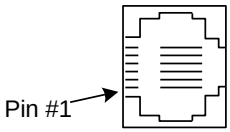
Pinouts

To connect a PC to a port that is set to RS485, remove the RS485 connector, and connect the PC to the PLC via the programming cable. Note that this is possible only if flow control signals are not used (which is the standard case).

RS232	
Pin #	**Description**
1*	DTR signal
2	0V reference
3	TXD signal
4	RXD signal
5	0V reference
6*	DSR signal

RS485**	
Pin #	**Description**
1	A signal (+)
2	(RS232 signal)
3	(RS232 signal)
4	(RS232 signal)
5	(RS232 signal)
6	B signal (-)

Controller Port



*Standard programming cables do not provide connection points for pins 1 and 6.

** When a port is adapted to RS485, Pin 1 (DTR) is used for signal A, and Pin 6 (DSR) signal is used for signal B.

RS232 to RS485: Changing Jumper Settings

The port is set to RS232 by factory default.

To change the settings, first remove the Snap-in I/O Module, if one is installed, and then set the jumpers according to the following table.

Note:
For V230/V280/V290 modules only there is a small window as described on page 6 for jumper setting so there is no need to open the controller.

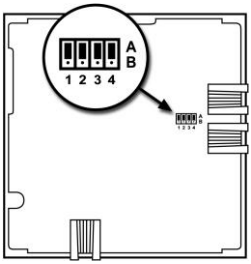
⚠
- Before you begin, touch a grounded object to discharge any electrostatic charge

1. Before removing a Snap-in I/O Module or opening the controller, you must turn off the power

RS232/RS485 Jumper Settings

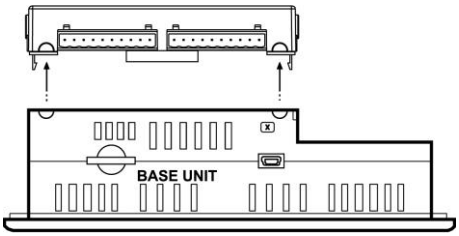
Jumper	1	2	3	4
RS232*	A	A	A	A
RS485	B	B	B	B
RS485 Termination	A	A	B	B

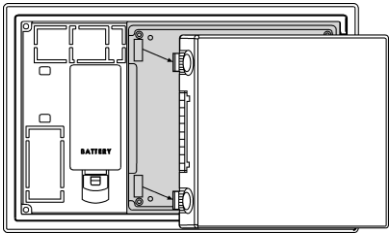
*Default factory setting.



Removing a Snap-in I/O Module

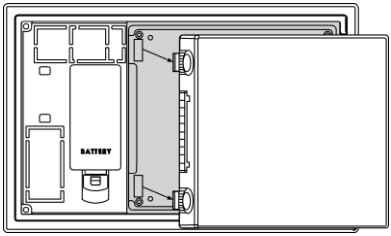
1. Locate the four buttons on the sides of the module, two on either side.
2. Press the buttons and hold them down to open the locking mechanism.
3. Gently rock the module from side to side, easing the module from the controller.

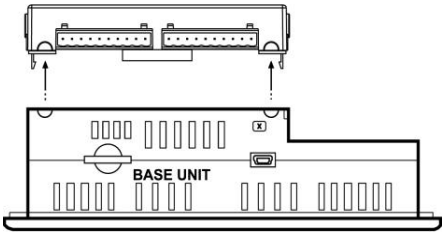




Re-installing a Snap-in I/O Module

1. Line the circular guidelines on the controller up with the guidelines on the Snap-in I/O Module as shown below.
2. Apply even pressure on all 4 corners until you hear a distinct ‘click’. The module is now installed. Check that all sides and corners are correctly aligned.



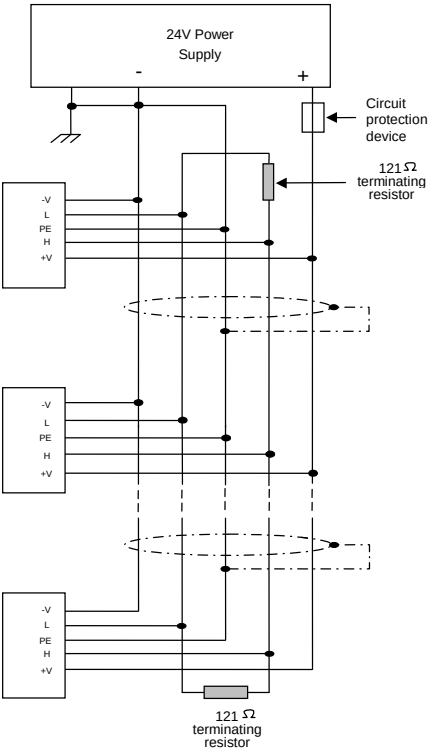


CANbus

These controllers comprise a CANbus port. Use this to create a decentralized control network using one of the following CAN protocols:

- CANopen: 127 controllers or external devices
- Unitronics' proprietary UniCAN: 60 controllers, (512 data bytes per scan)

The CANbus port is galvanically isolated.



CANbus Wiring

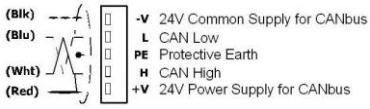
Use twisted-pair cable. DeviceNet® thick shielded twisted pair cable is recommended.

Network terminators: These are supplied with the controller. Place terminators at each end of the CANbus network.
Resistance must be set to 1%, 121Ω, 1/4W.

Connect ground signal to the earth at only one point, near the power supply.

The network power supply need not be at the end of the network.

CANbus Connector



Technical Specifications

This guide provides specifications for Unitronics' models V230-13-B20B,V280-18-B20B, V290-19-B20B.
You can find additional information in the Technical Library at www.unitronics.com.

Technical Specifications

Power Supply

Input voltage	12VDC or 24VDC		
Permissible range	10.2VDC to 28.8VDC with less than 10% ripple		
Max. current consumption			
	V230	**V280**	**V290**
@12VDC	280mA	540mA	470mA
@24VDC	140mA	270mA	230mA
Typical power consumption	2.5W	5.4W	5.1W

Battery

Back-up	7 years typical at 25°C, battery back-up for RTC and system data, including variable data.
Replacement	Yes. Refer to instructions in the document: *Replacing a Battery V230-280-290.pdf*, available from Unitronics' Technical Library.

Graphic Display Screen

	V230	**V280**	**V290**
LCD Type	STN	Graphic B&W FSTN	
Illumination backlight	LED yellow-green	CCFL fluorescent lamp	
Display resolution, pixels	128x64	320x240 (QVGA)	
Viewing area	3.2"	4.7"	5.7"
Touchscreen	None	Resistive, analog	
'Touch' indication	None	Software (SB16)	Software (SB16); Via buzzer
Screen contrast	Manually adjusted. Refer to VisiLogic Help topic: *Setting LCD Contrast/Brightness*	Via software (Store value to SI 7). Refer to VisiLogic Help topic: *Setting LCD Contrast/Brightness*	

Keyboard

	V230	**V280**	**V290**
Number of keys	24 Includes soft keys and alphanumeric keypad	27	none (virtual)
Key type	Metal dome, sealed membrane switch		none
Slides	Picture, alphanumeric keypad, and Function keys		none

Program

Application memory	1MB		
Operand type	Quantity	Symbol	Value
Memory Bits	4096	MB	Bit (coil)
Memory Integers	2048	MI	16-bit signed/unsigned
Long Integers	256	ML	32-bit signed/unsigned
Double Word	64	DW	32-bit unsigned
Memory Floats	24	MF	32-bit signed/unsigned
Timers	192	T	32-bit
Counters	24	C	16-bit
Data Tables	120K (dynamic)/192K (static)		
HMI Displays	Up to 255		
Scan Time	30µsec per 1K of typical application		

Communication

Serial Ports	2. See Note 1	
RS232		
Galvanic isolation	No	
Voltage limits	±20V absolute maximum	
Baud rate range	COM1	COM2
	300 to 57600 bps	300 to 115200 bps
Cable length	Up to 15m (50′)	
RS485		
Galvanic isolation	No	
Voltage limits	−7 to +12V differential maximum	
Baud rates	300 to 115200 bps	
Nodes	Up to 32	
Cable type	Shielded twisted pair, in compliance with EIA RS485	
Cable length	Up to 1200m (4000′)	

CANbus port	1	
Nodes	CANopen	Unitronics' CANbus protocols
	127	60
Power requirements	24VDC (±4%), 40mA max. per unit	
Galvanic isolation	Yes, between CANbus and controller	
Cable length/baud rate	25 m	1 Mbit/s
	100 m	500 Kbit/s
	250 m	250 Kbit/s
	500 m	125 Kbit/s
	500 m	100 Kbit/s
	1000 m*	50 Kbit/s
	1000 m*	20 Kbit/s

* If you require cable lengths over 500 meters, contact technical support.

Optional port	User may install an additional port, available by separate order. Available port types are: RS232/RS485, and Ethernet.

Notes:

1. COM1 supports RS232 only.
   COM2 may be set to either RS232/RS485 according to jumper settings as shown in the product's Installation Guide. Factory setting: RS232.

I/Os	
Via module	Number of I/Os and types vary according to module. Supports up to 256 digital, high-speed, and analog I/Os.
Snap-in I/O modules	Plugs into rear port to create self-contained PLC with up to 43 I/Os.
Expansion modules	Local adapter, via I/O Expansion Port. Integrate up to 8 I/O Expansion Modules comprising up to 128 additional I/Os.
	Remote I/O adapter, via CANbus port. Connect up to 60 adapters; connect up to 8 I/O expansion modules to each adapter.

Dimensions

Size — See Page 5

	V230	V280	V290
Weight	429g (15.1 oz)	860g (30.4 oz)	840g (29.7 oz)

Mounting	
Panel-mounting	Via brackets
Environment	
Inside cabinet	IP20 / NEMA1 (case)
Panel mounted	IP65 / NEMA4X (front panel)
Operational temperature	0 to 50ºC (32 to 122ºF)
Storage temperature	-20 to 60ºC (-4 to 140ºF)
Relative Humidity (RH)	5% to 95% (non-condensing)

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