Vision™ OPLC™

User Guide
V530-53-B20B

This guide provides basic information for Unitronics' controller V530-53-B20B.

General Description

V530 OPLCs are programmable logic controllers that comprise a built-in operating panel containing a monochrome touchscreen, which displays a virtual keyboard when the application requires the operator to enter data.

Communications	▪ 2 serial ports: RS232 (COM 1), RS232/485 (COM 2) ▪ 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	V530 supports digital, high-speed, analog, weight and temperature measurement I/Os via: ▪ <u>Snap-in I/O Modules</u> Plug into the back of the controller to provide an on-board I/O configuration ▪ <u>I/O Expansion Modules</u> Local or remote I/Os may be added via expansion port or CANbus Installation instructions and other data may be found in the module's technical specification sheet.
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	The Unitronics Setup CD contains VisiLogic software and other utilities ▪ <u>VisiLogic</u> 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. ▪ <u>Utilities</u> Includes 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.
Data Tables	Data tables enable you to set recipe parameters and create datalogs.

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.

Standard Kit Contents

Vision controller

3 pin power supply connector

5 pin CANbus connector

CANbus network termination resistor

Battery (not installed)

Mounting brackets (x4)

Rubber seal

Danger Symbols

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 following models: V530-53-B20B, V530-53-B20B-J are UL listed for Ordinary Location.

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

Inserting the Battery

In order to preserve data in case of power-off, you must insert the battery.

The battery is supplied taped to the battery cover on the rear of the controller.

1. Remove the battery cover shown on page 4. The polarity (+) is marked on the battery holder and on the battery.
2. Insert the battery, ensuring that the polarity symbol on the battery is:
   - facing up
   - aligned with the symbol on the holder
3. Replace the battery cover.

Mounting

Dimensions

* Note that, including mounting brackets, this dimension is 151 mm (5.94").
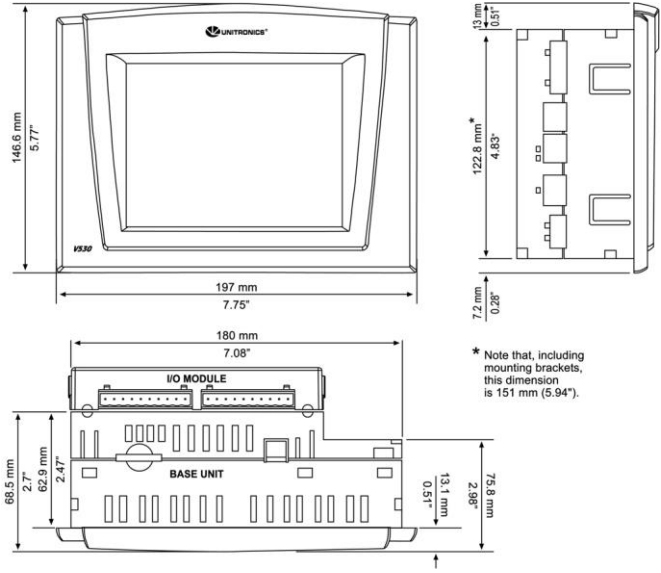
Panel Mounting

Before you begin, note that the mounting panel cannot be more than 5 mm thick.

1. Make a panel cut-out according to the dimensions in the figure to the right.

2. Slide the controller into the cut-out, ensuring that the rubber seal is in place.

3. Push the 4 mounting brackets into their slots on the sides of the controller as shown in the figure to the right.

4. Tighten the bracket screws against the panel. Hold the bracket securely against the unit while tightening the screw.

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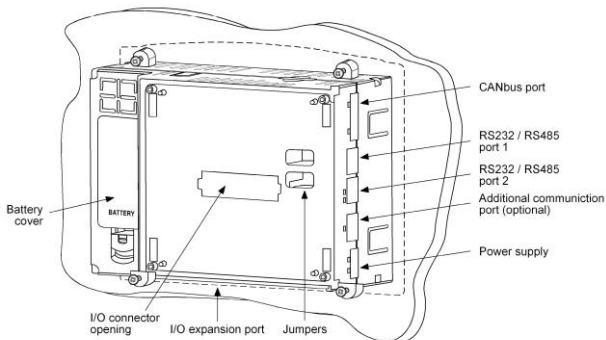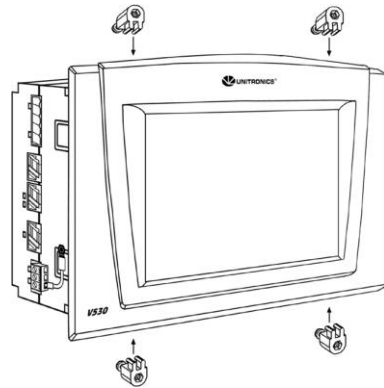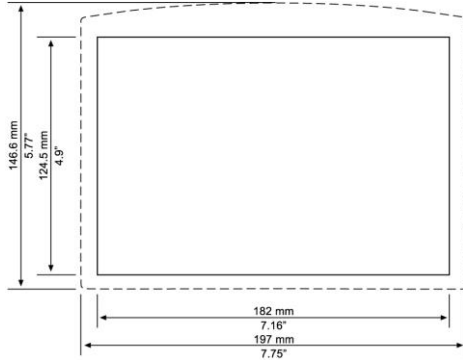
Wiring

⚡	▪	Do not touch live wires.
⚠	▪ Install an external circuit breaker. Guard against short-circuiting in external wiring. ▪ Use appropriate circuit protection devices. ▪ Unused pins should not be connected. Ignoring this directive may damage the device. ▪ Double-check all wiring before turning on the power supply.	
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. ▪ Install at maximum distance from high-voltage cables and power equipment.	

Wiring Procedure

Use crimp terminals for wiring; use 26-12 AWG wire (0.13 mm^2–3.31 mm^2).

1. Strip the wire to a length of 7±0.5mm (0.250–0.300 inches).
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.

▪ Input or output cables should not be run through the same multi-core cable or share the same wire.
▪ Allow for voltage drop and noise interference with input lines used over an extended distance. Use wire that is properly sized for the load.

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.

⚡	▪	A non-isolated power supply can be used if a 0V signal is connected to the chassis.

⚠ ▪ Install an external circuit breaker. Guard against short-circuiting in external wiring. ▪ Double-check all wiring before turning on the power supply. ▪ Do not connect either the 'Neutral or 'Line' signal of the 110/220VAC to device's 0V pin. ▪ In the event of voltage fluctuations or non-conformity to voltage power supply specifications, connect the device to a regulated power supply.	
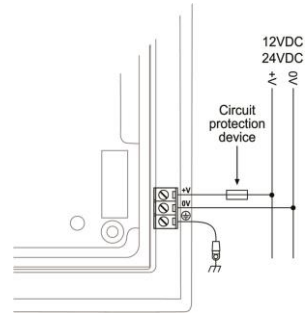
Earthing the Power Supply

To maximize system performance, avoid electromagnetic interference by:
▪ Mounting the controller on a metal panel.
▪ Earthing the controller's power supply: connect one end of a 14 AWG wire to the chassis signal; connect the other end to the panel.

Note: If possible, the wire used to earth the power supply should not exceed 10 cm in length. However, it is recommended to earth the controller in all cases.

Communication Ports

⚡ ▪ Turn off power before changing communication settings or connections.

Caution
▪ Signals are related to the controller's 0V; the same 0V is used by the power supply.
▪ 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.

COM 1 is RS232 only. COM 2 may be set to either RS232 or RS485 via jumper as described on page 9. 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.

Pinouts

The pinouts below show the signals sent from the controller to the PC.

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		RS485**		Controller Port
Pin #	**Description**	**Pin #**	**Description**	
1*	DTR signal	1	A signal (+)	
2	0V reference	2	(RS232 signal)	
3	TXD signal	3	(RS232 signal)	Pin #1
4	RXD signal	4	(RS232 signal)	
5	0V reference	5	(RS232 signal)	
6*	DSR signal	6	B signal (-)	

*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.

⚠
- Before you begin, touch a grounded object to discharge any electrostatic charge.
- Before removing a Snap-in I/O Module or opening the controller, you must turn off the power.
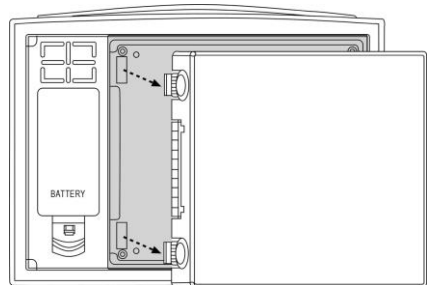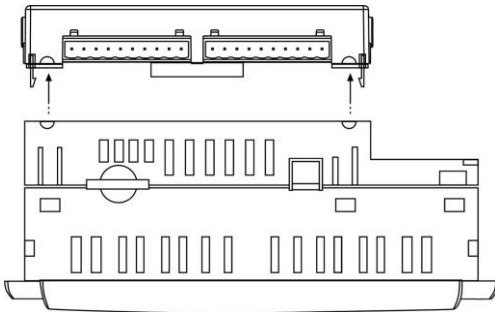
RS232/RS485 Jumper Settings

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

*Default factory setting.
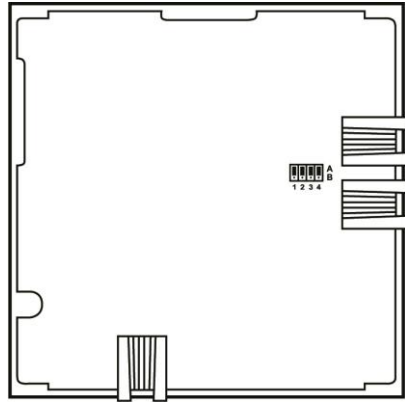
Removing a Snap-in I/O Module

1. Locate the four buttons on the sides of the controller, 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.
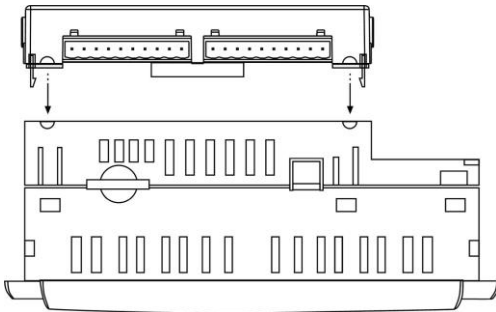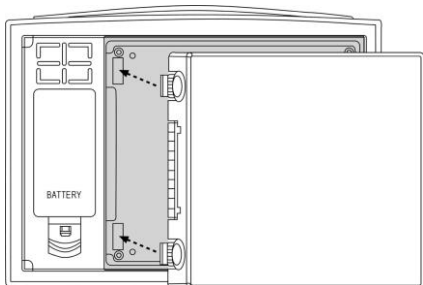
CANbus

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
- CANLayer 2
- Unitronics' proprietary UniCAN: 60 controllers, (512 data bytes per scan)

The CANbus port is galvanically isolated.

CANbus Wiring

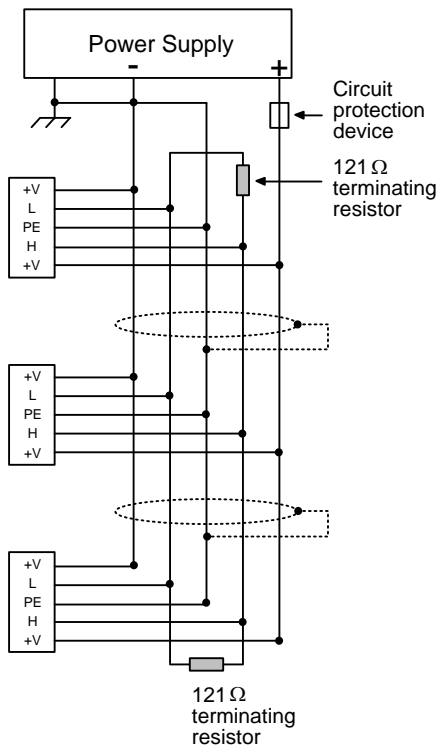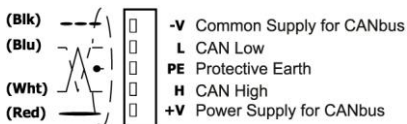Use twisted-pair cable. DeviceNet® thick shielded twisted pair cable is recommended.

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

(Blk) -V Common Supply for CANbus
(Blu) L   CAN Low
       PE Protective Earth
(Wht) H   CAN High
(Red) +V Power Supply for CANbus

Technical Specifications

Power Supply

Input voltage	12VDC or 24VDC
Permissible range	10.2VDC to 28.8VDC with less than 10% ripple
Max. current consumption	
12VDC	470mA
24VDC	230mA
Typical power consumption	5.1W

Battery

Back-up	7 years typical at 25°C, battery back-up for RTC and system data, including variable data
Replacement	Yes, without opening the controller.

Graphic Display Screen

LCD Type	Graphic, monochrome black and white, FSTN
Display resolution, pixels	320x240 (QVGA)
Viewing area	5.7"
Touchscreen	Resistive, analog
Screen contrast	Via software (Store value to SI 7) Refer to VisiLogic Help topic Setting LCD Contrast.

Program

Application memory	1000K		
Operand type	Quantity	Symbol	Value
Memory Bits	4096	MB	Bit (coil)
Memory Integers	2048	MI	16-bit
Long Integers	256	ML	32-bit
Double Word	64	DW	32-bit unsigned
Memory Floats	24	MF	32-bit
Timers	192	T	32-bit
Counters	24	C	16-bit

Data Tables	120K (dynamic)/ 192K (static)
HMI displays	Up to 255
Program scan time	30µsec per 1K of typical application

Communication

Serial Ports	2. See Note	
RS232		
Galvanic isolation	No	
Voltage limits	±20V	
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
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:

COM 1 supports RS232 only.
COM 2 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 171 digital, high-speed, and analog I/Os.
Snap-in I/O modules	Plugs into rear port; provides an on-board I/O configuration.
Expansion modules	Via adapter, use up to 8 I/O Expansion Modules comprising up to 128 additional I/Os. Number of I/Os and types vary according to module.

Dimensions

Size	197X146.6X68.5mm (7.75" X 5.77" X2.7")
Weight	750g (26.5 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)

UG_V530.pdf   07/22