UNITRONICS V1040-T20B Vision OPLC Controller User Guide

Contents

UNITRONICS V1040-T20B Vision OPLC Controller

Vision TM OPLCTM V1040-T20B

The V1040 OPLC is a programmable logic controller with a built-in operating panel that includes a 10.4-inch color touchscreen. It offers function keys and a virtual alpha-numeric keyboard that automatically displays when the application requires the operator to enter data.

Communications I/O Options

- 2 isolated RS232/RS485 ports
- USB programming port (Mini-B)
- Isolated CANbus port
- Add-on Ethernet or serial port available upon request

Communication Function Blocks

The communication function blocks include SMS, GPRS, MODBUS serial/IP. The Protocol FB enables the PLC to communicate with almost any external device via serial or Ethernet communications.

I/O Options

The V1040 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 onboard I/O configuration.
- I/O Expansion Modules: Local or remote I/Os may be added via expansion port or CANbus.

Installation Instructions

Installation instructions and other data may be found in the module’s technical specification sheet.

Information Mode

The Information Mode enables the user to calibrate the touchscreen, view & edit operand values, COM port settings, RTC and screen contrast/brightness settings. The user can also stop, initialize, and reset the PLC. To enter Information Mode, press the touchscreen and maintain contact for several seconds.

Programming Software & Utilities

The Unitronics Setup CD contains the VisiLogic software and other utilities. VisiLogic allows users to 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. Utilities 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.

Removable Memory Storage

Data Tables enable users to set recipe parameters and create data logs. The Micro-SD card can store data logs, alarms, trends, data tables, export to Excel, backup Ladder, HMI & OS. Users can also use this data to 'clone' PLCs. For more information, refer to the SD topics in the VisiLogic Help system.

Technical Support

Additional product documentation is available 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 CAN bus connector
- CAN bus network termination resistor
- Battery (not installed)
- Mounting brackets (x8)
- Rubber seal

Danger Symbols

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

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

Product Usage Instructions

1. Read the instruction manual carefully before using theproduct.

2. Install the V1040 OPLC according to the instructions provided in the technical specification sheet.
3. To enter Information Mode, press the touchscreen and maintain contact for several seconds.
4. Use the VisiLogic software to configure hardware and write both HMI and Ladder control applications.
5. Download the application to the controller via the programming cable included in the kit.
6. Use utilities such as UniOPC server, Remote Access, and DataXport for run-time data logging.
7. Refer to the VisiLogic Help system for detailed instructions on how to use and program the controller.
8. Store data logs, alarms, trends, data tables, backup Ladder, HMI & OS on the Micro-SD card for easy access and 'cloning' of PLCs.
9. For technical support, refer to the Technical Library at **www.unitronicsplc.com** or contact **support@unitronics.com**.

General Description

V1040 OPLCs are programmable logic controllers that comprise a built-in operating panel containing a 10.4" Color Touchscreen. The V1040 offers function keys along with a virtual alpha-numeric keyboard which is automatically displayed when the application requires the operator to enter data.

Communications

- 2 isolated RS232/RS485 ports
- USB programming port (Mini-B)
- Isolated CAN bus port
- The user can order and install an additional port. This may be either Ethernet or serial.
- 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 of the product
V1040 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 CAN bus.
  Installation instructions and other data may be found in the module's technical specification sheet.

Information about Mode
This mode enables you to:

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

To enter Information Mode, press the touchscreen and maintain contact for several seconds.

Programming Software, & Utilities
The Unitronics Setup CD contains VisiLogic software and other 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.
- 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.

Removable Memory Storage
Micro-SD card: store datalogs, Alarms, Trends, Data Tables; export to Excel; backup Ladder, HMI & OS and use this data to 'clone' PLCs.
For more data, refer to the SD topics in 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**.

Symbols of danger
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: V1040-T20B is UL listed for Hazardous Locations.
The model: V1040-T20B is 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 B 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.
- EXPLOSION HAZARD – Do not connect or disconnect equipment unless power has been switched off or the area is known to be
  non-hazardous.
- 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.

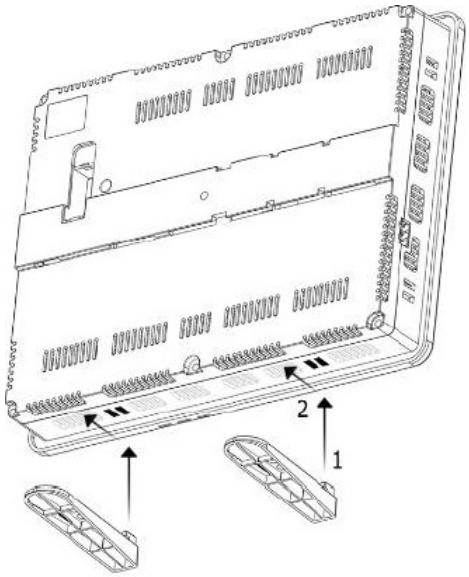
Removing / Replacing the battery
When a product has been installed with a battery, do not remove or replace the battery unless the power has been switched off, or the area is known to be non-hazardous.
Please note that it is recommended to back up all data retained in RAM, in order to avoid losing data when changing the battery while the power is switched off. Date and time information will also need to be reset after the procedure.

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 6. 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.

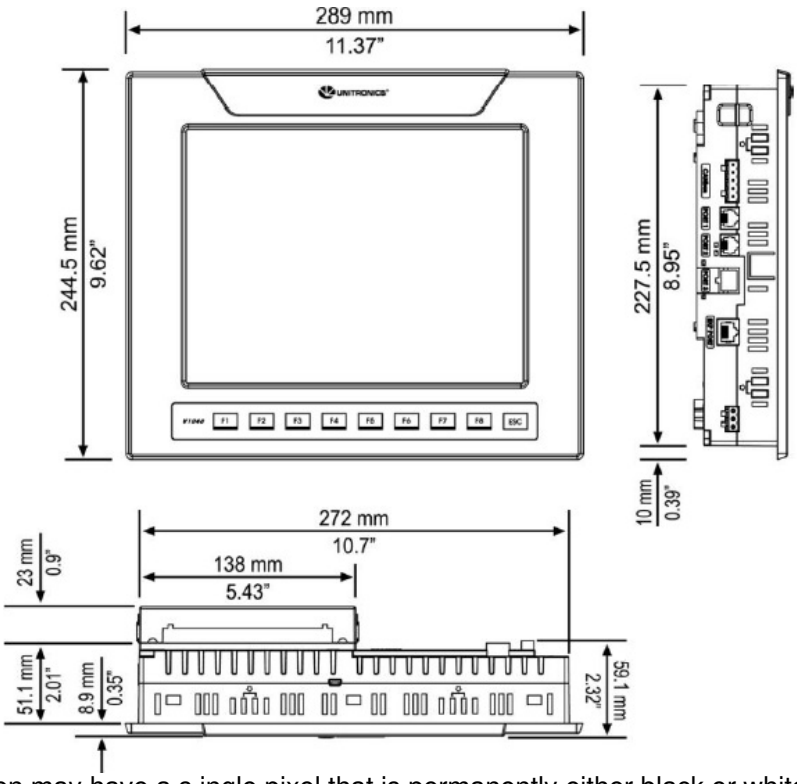
Panel Support Installation

1. Insert the Panel Support tabs into their location.
   Note that the exact location varies according to the panel model.
2. Pull on the Panel Support until it locks (clicks) into it's place.



Mounting

Dimensions

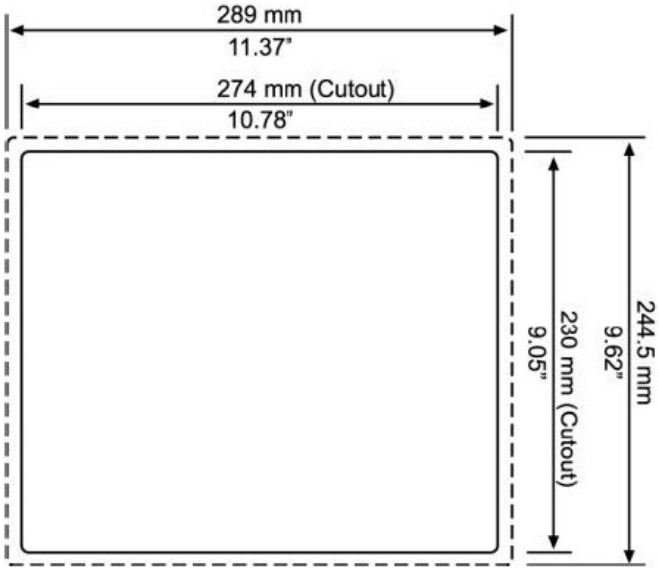


Note that the LCD screen may have a s ingle pixel that is permanently either black or white.

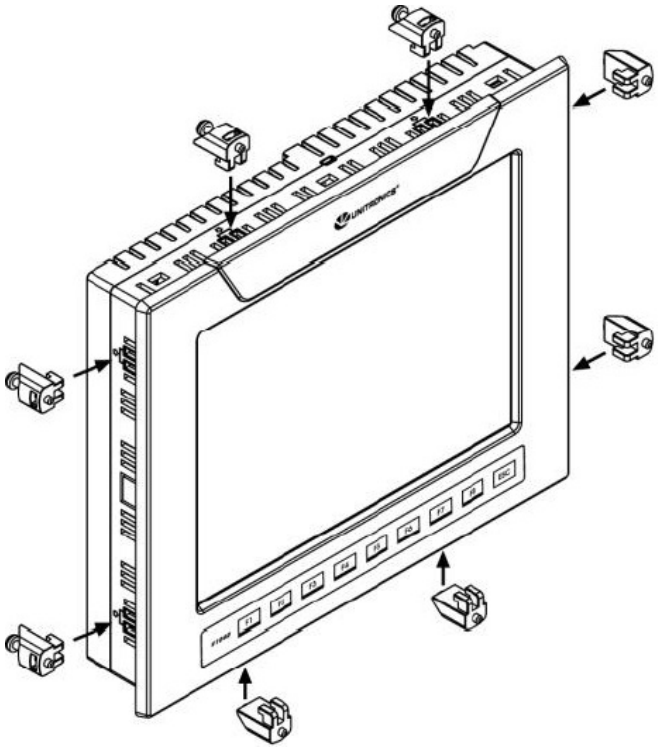
Panel Mounting

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

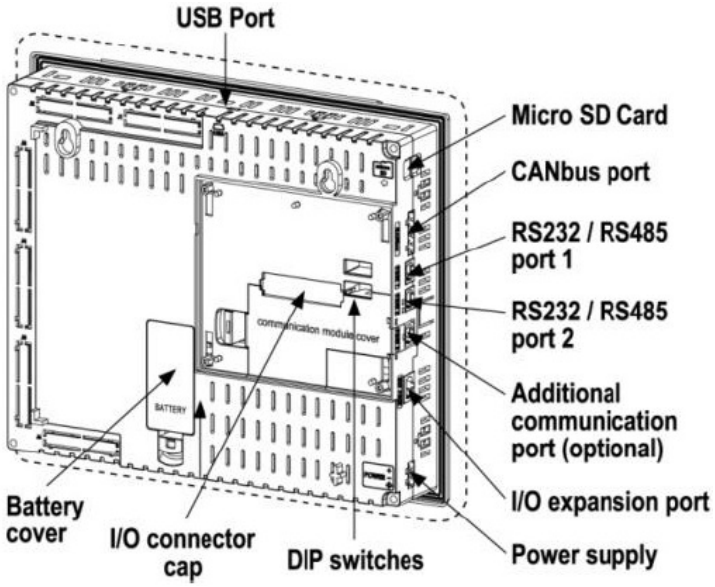
1. Make a panel cut-out according to the dimensions in the figure to the right.



2. Slide the controller into the cut-out, ensuring that the rubber seal is in place.
3. Push the 8 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.

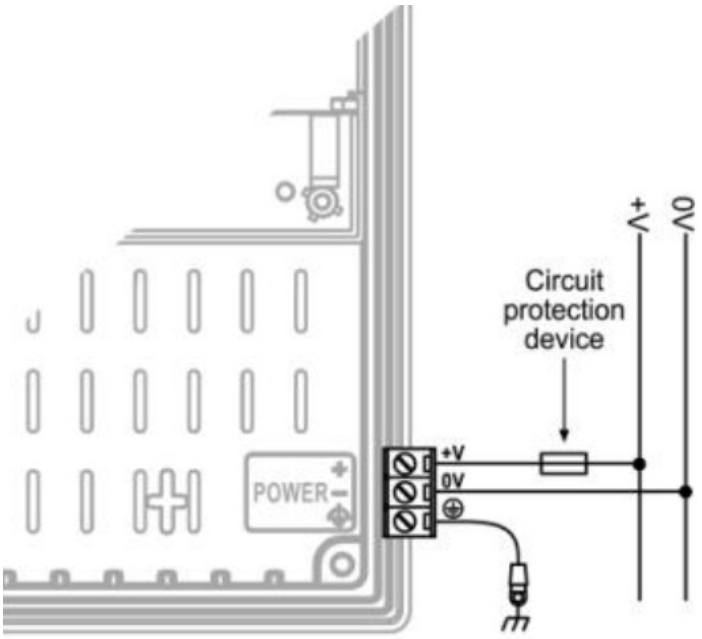
- Install at maximum distance from high-voltage cables and power equipment.

Wiring Procedure
Use crimp terminals for wiring; use 26-12 AWG wire (0.13 mm 2–3.31 mm2).

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.

Power Supply
The controller V1040-T20B requires either an external 12 or 24VDC power supply. Permissible input voltage range: 10.2-28.8VDC, with less than 10% ripple.

- The power supply must include double insulation. 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.
- 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.



Earthing the OPLC
To maximize system performance, avoid electromagnetic interference by:

- Mounting the controller on a metal panel.
- Connect the functional earth terminal of the OPLC, and the common and ground lines of I/Os, directly to the earth ground of your system.
- For ground wiring, use the shortest and thickest possible wire.

Communication Ports

This series comprises a USB port, 2 RS232/RS485 serial ports and a CANbus port. An additional port may be ordered separately and installed. This port may be either Ethernet, or serial (COM 3). For the most updated information regarding ports and their installation, please refer to the Technical Library at **www.unitronics.com**.

- Turn off power before making communications connections.

Caution

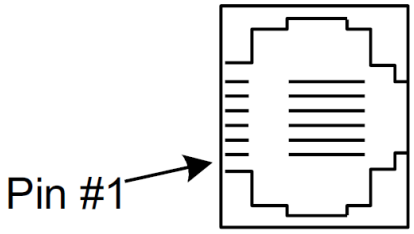
- Always use the appropriate port adapters.

The USB port may be used for programming, OS download, and PC access.
Note that COM port 1 function is suspended when this port is physically connected to a PC.
The serial ports are type RJ-11 and may be set to either RS232 or RS485 via DIP switches, in accordance with the table shown below. 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 PLC port signals. 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**		**Controller Port**
Pin #	**Description**	
1	A signal (+)	
2	(RS232 signal)	
3	(RS232 signal)	
4	(RS232 signal)	
5	(RS232 signal)	
6	B signal (-)	

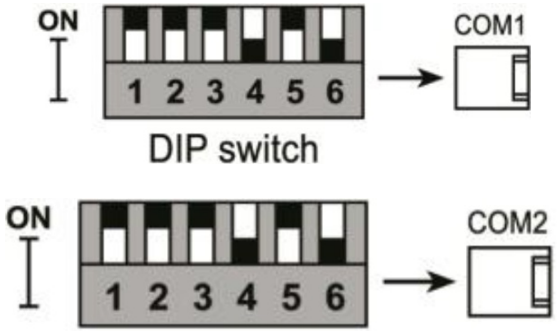


- Standard programming cables do not provide connection points for pins 1 and 6.
- When a port is adapted to RS485, Pin 1 (DTR) is used for signal A, and Pin 6 (DSR) signal is used for signal B.

RS232 to RS485: Changing DIP Switch Settings
The ports are 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 switches according to the following table.

RS232/RS485: DIP Switch Settings
The settings below are for each COM port.

	Switch Settings					
	1	2	3	4	5	6
RS232*	ON	ON	ON	OFF	ON	OFF
RS485	OFF	OFF	OFF	ON	OFF	ON
RS485 with termination**	ON	ON	OFF	ON	OFF	ON

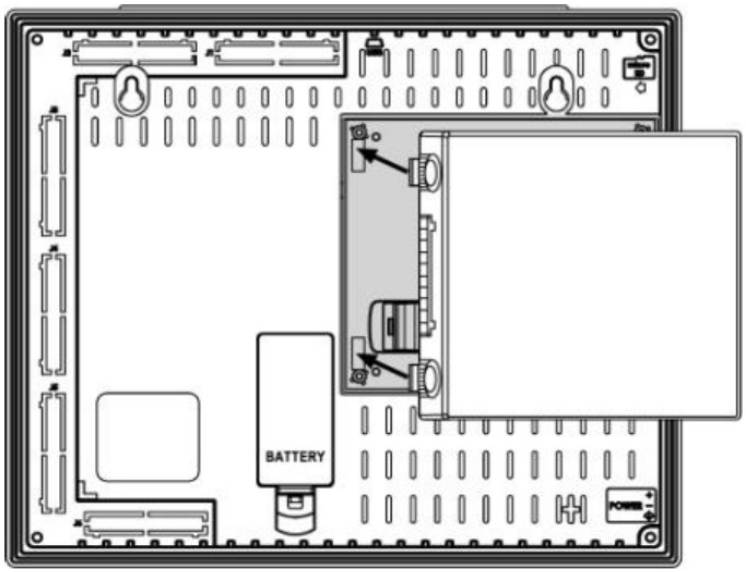


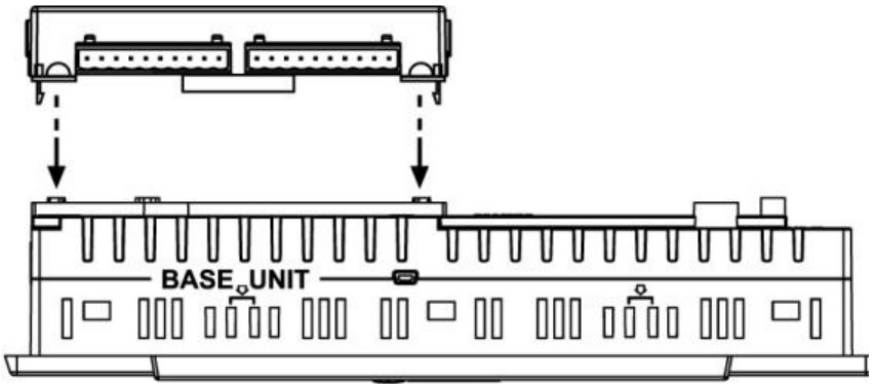
- Default factory setting
- Causes the unit to function as an end unit in an RS485 network

Installing a Snap-in I/O Module

- Before installing a Snap-In Module, ensure that the Communication Module Cover is closed.

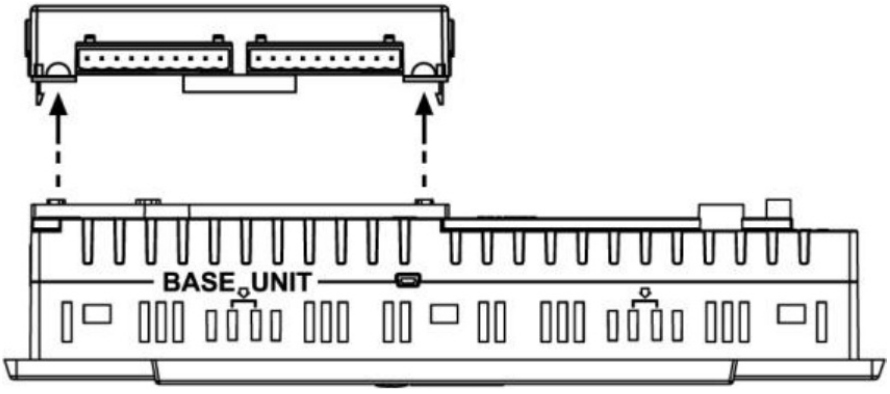
1. Remove the I/O connector cap shown on Page 6.
2. Line the circular guidelines on the Snap-in I/O Module with the slots on the controller as shown below.
3. Apply even pressure on all 4 corners until you hear a distinct ‘click’. The module is now installed. Check that all sides and corners are correctly aligned.

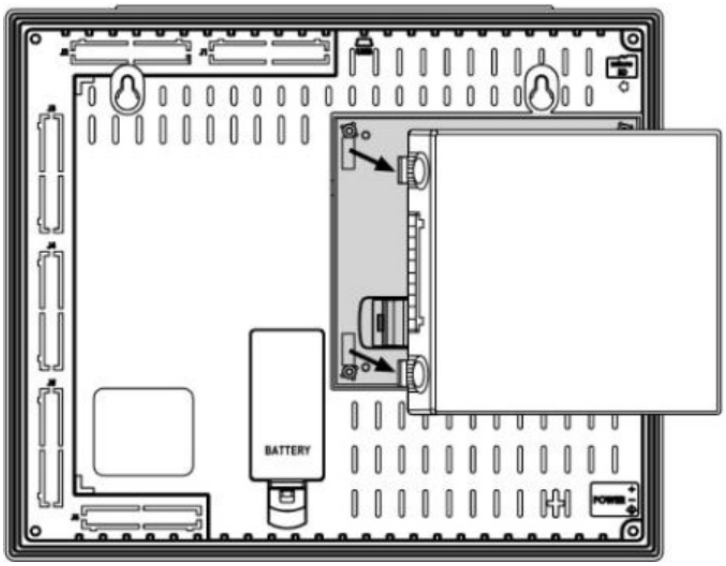




Removing a Snap-in I/O Module

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.



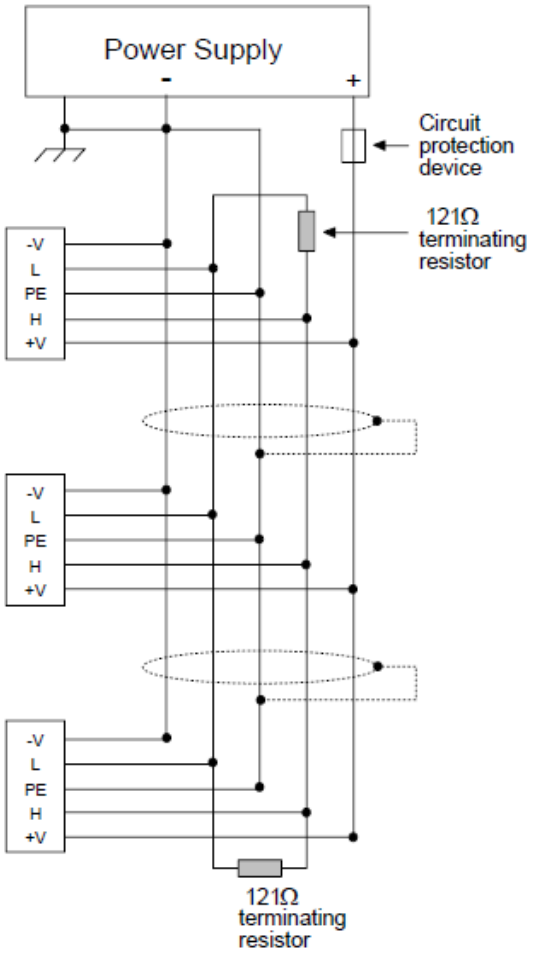


CANbus
These controllers comprise a CAN bus port. Use this to create a decentralized control network using one of the following CAN protocols:

- CAN open: 127 controllers or external devices
- CAN Layer 2, J1939
- Unitronics' proprietary Uni CAN: 60 controllers, (512 data bytes per scan)

The CAN bus port is galvanically isolated.

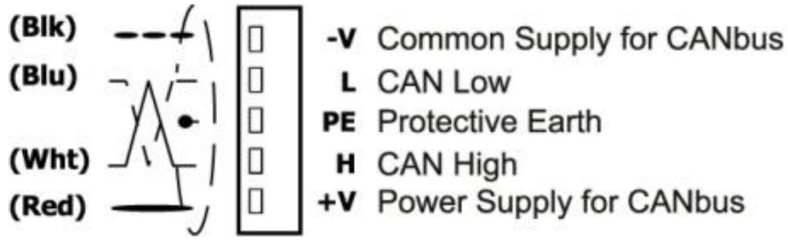
CAN bus Wiring



Use twisted-pair cable. Device Net® 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

CAN bus Connector



Technical Specifications

Power Supply	
Input voltage	12 or 24VDC
Permissible range	10.2-28.8VDC
Max. current consumption	840mA@12V 420mA@24V
Battery	
Back-up	7 years typical at 25°C, battery back-up for RTC and system data, including va riable data.
Replaceable	Yes, without opening the controller.
Graphic Display Screen	See Note 1
LCD Type	TFT
Illumination backlight	White LED
Display resolution, pixels	800×600 (SVGA)
Viewing area	10.4″
Colors	65,536 (16-bit)
Touchscreen	Resistive, analog
‘Touch’ indication	Via buzzer
Screen brightness	Via software (Store value to SI 9).
Keypad	Displays virtual keyboard when the application requires data entry.

Notes:

- Note that the LCD screen may have a single pixel that is permanently either black or white.

Keypad

- Number of keys 9 programmable function keys

- Key type Metal dome, sealed membrane switch

Program

- Memory size Application Logic – 2MB, Images – 80MB, Fonts – 1MB

Operand type	Quantit y	Symbol	Value
Memory Bits	8192	MB	Bit (coil)
Memory Integers	4096	MI	16-bit
Long Integers	512	ML	32-bit
Double Word	256	DW	32-bit unsigned
Memory Floats	64	MF	32-bit
Timers	384	T	32-bit
Counters	32	C	16-bit

- Data Tables 120K dynamic RAM data (recipe parameters, datalogs, etc.)
  Up tp 256K Flash data
- HMI displays Up to 1024
- Program scan time 9 µsec per 1K of typical application

Removable Memory

- Micro-SD card Compatible with fast micro-SD cards; store data logs, Alarms, Trends, Data Tables, backup Ladder, HMI, and OS. See Note 2

Notes:

- User must format via Unitronics SD tools utility.

Communication

- Serial ports 2. See Note 3

RS232

- Galvanic isolation Yes
- Voltage limits +20VDC absolute maximum
- Baud rate range 300 to 115200 bps
- Cable length Up to 15m (50’)

RS485

- Galvanic isolation Yes
- Voltage limits –7 to +12VDC differential maximum
- Baud rate range 300 to 115200 bps
- Nodes Up to 32
- Cable type Shielded twisted pair, in compliance with EIA RS485
- Cable length 1200m maximum (4000’)

USB See Note 4

- Port type Mini-B
- Galvanic isolation No
- Specification USB 2.0 compliant; full speed
- Baud rate range 300 to 115200 bps
- Cable USB 2.0 compliant; up to 3m

CAN bus port 1

Nodes	CAN open	Unitronics’ CAN bus protocols	
	127	60	

Power requirements	24VDC (±4%), 40mA max. per unit. See Note 5		
Galvanic isolation	Yes, between CAN bus and controller		
Cable length/baud rate See Note 5	25 m 100 m 250 m 500 m 500 m 1000 m* 1000 m*	1 Mbit/s 500Kbit/s 250 Kbit/s 125 Kbit/s 100 Kbit/s 50 Kbit/s 20 Kbit/s	
			* If you require cable lengths over 500 meters, contact technical support.
Optional port	User may install a single Ethernet port, or an RS232/RS485 port. Available by separate order.		

Notes:

- The standard for each port is set to either RS232/RS485 according to DIP switch settings. Refer to the Installation Guide.
- The USB port may be used for programming, OS download, and PC access. Note that COM port 1 function is suspended when this port is physically connected to a PC.
- Supports both 12 and 24VDC CAN bus power supply, (±4%), 40mA maximum per unit. Note that if 12 VDC is used, the maximum cable length is 150 meters.

I/Os	
	Number of I/Os and types vary according to module. Supports up to 1024 digital , high-speed, and analog I/Os.
Snap-in I/O modules	Plugs into rear port to create self-contained PLC with up to 62 I/Os.
Expansion modules	Local adapter (P.N. EX-A1), via I/O Expansion Port. Integrate up to 8 I/O Expansion Modules comprising up to 128 additional I/Os. Remote adapter (P.N. EX-RC1), via CANbus port. Connect up to 60 adapters; co nnect up to 8 I/O expansion modules to each adapter.
Exp. port isolation	Galvanic
Dimensions	
Size	**289X244.5X59.1mm)11.37″X9.62″X2.32″). See Note 6**
Weight	1.5kg (52.9 oz)

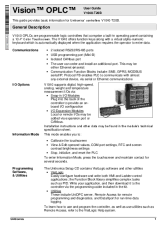
Notes:

- For exact dimensions, refer to the product's Installation Guide.

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)

Documents / Resources

	**UNITRONICS V1040-T20B Vision OPLC Controller** [pdf] User Guide V1040-T20B, V1040-T20B Vision OPLC Controller, Vision OPLC Controller, V1040-T20B Controller, Controller

References

- Home - Unitronics
- Unitronics- Programmable Logic Controller + Built-in HMI
- Unitronics- Programmable Logic Controller + Built-in HMI