# UNITRONICS V1040-T20B Vision OPLC Programmable Logic Controllers Installation Guide



Contents



UNITRONICS

## UNITRONICS V1040-T20B Vision OPLC Programmable Logic Controllers


## General Description

This guide provides basic information for Unitronics' controllers V1040-T20B. 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 CANbus 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

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 CANbus.

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


**Information 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**

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 | Mounting brackets (x8) |
| 3 pin power supply connector | Rubber seal |
| 5 pin CANbus connector | |
| CANbus network termination resistor | |
| Battery (not installed) | |

**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.<br>§ 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<br>with the standards given in the product's technical specification sheet. |
| | § Ventilation: 10mm space required between controller's top/bottom edges & enclosure walls.<br>§ Do not place in water or let water leak onto the unit.<br>§ Do not allow debris to fall inside the unit during installation.<br>§ 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.
  T
- he 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 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- hazard ous locations only. | |
| | § Input and output wiring must be in accordance with Class I, Division 2 wiring methods and in a ccordance with the authority having jurisdiction. | |
| | § WARNING—Explosion Hazard—substitution of components may impair suitability for Class I, Division 2.<br>§ WARNING – EXPLOSION HAZARD – Do not connect or disconnect equipment unless power has been switched off or the area is known to be non-hazardous.<br>§ WARNING – Exposure to some chemicals may degrade the sealing properties of material use d in Relays.<br>§ This equipment must be installed using wiring methods as required for Class I, Division 2 as p er the NEC and/or CEC. | |

**Panel-Mounting**
For programmable controllers that can be mounted also on panels, 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 a 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.

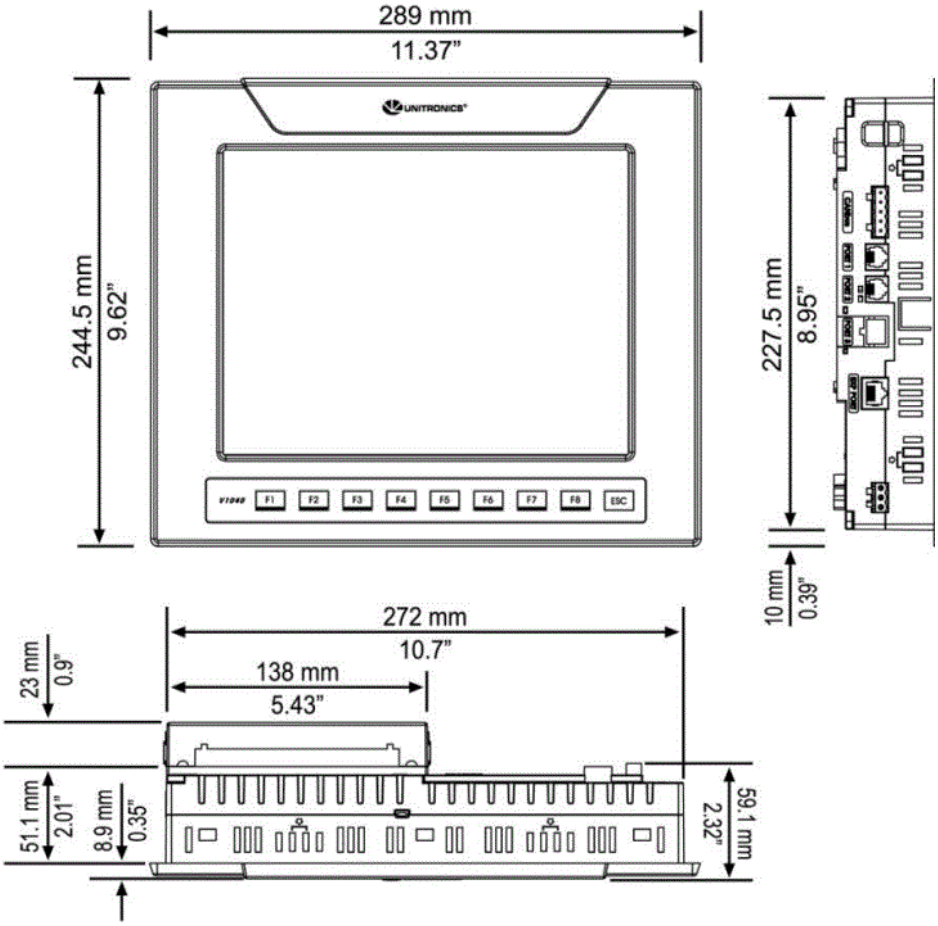
## Inserting the Battery

In order to preserve data in case of a power-off, you must insert the battery. The battery is supplied and 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.

## Mounting

#### Dimensions

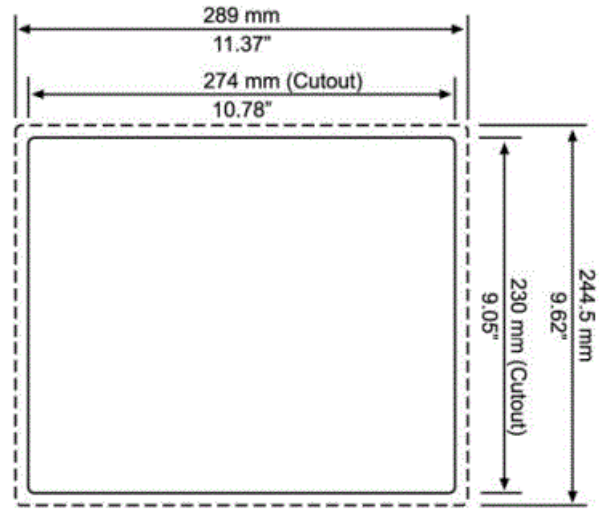


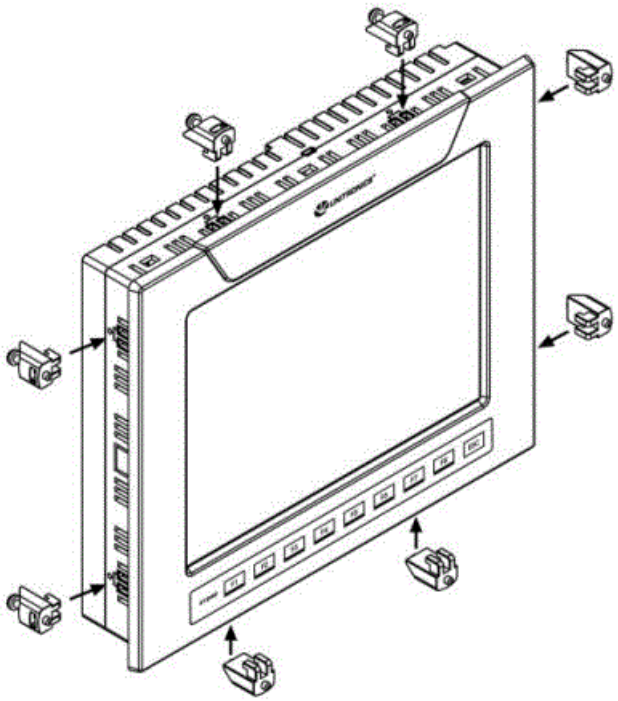

Note that the LCD screen may have a single pixel that is permanently either black or white.

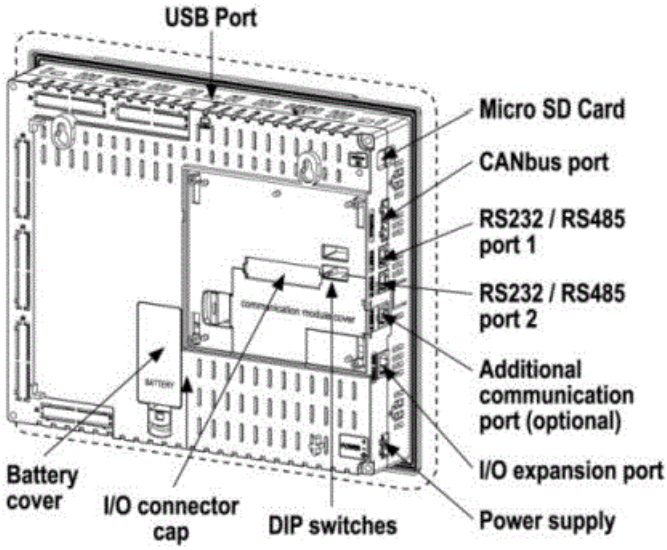
#### Panel Mounting

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.






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

## Wiring

### Danger

- Do not touch live wires.

### Warning

- 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

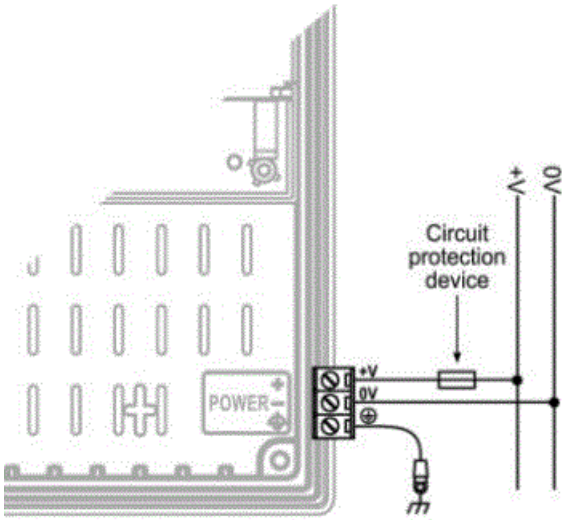
range: 10.2-28.8VDC, with less than 10% ripple.

**Danger**

- 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.

**Warning**

- 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**.

**Danger**

- **Turn** off power before making communications connections.

**Caution**

- Always use the appropriate port adapters.

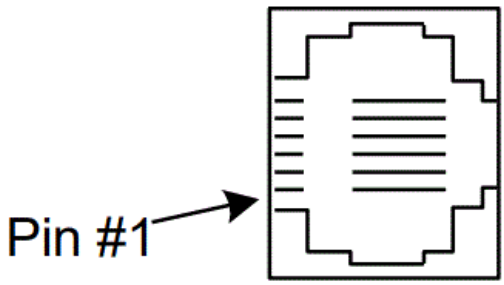
The USB port may be used for programming, OS download, and PC access. Note that COM port 1 function is suspended when this port is physically connected to a PC. The serial ports are type RJ-11 and may be set to either RS232 or RS485 via DIP switches, in accordance with the table shown below. Use RS232 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 |

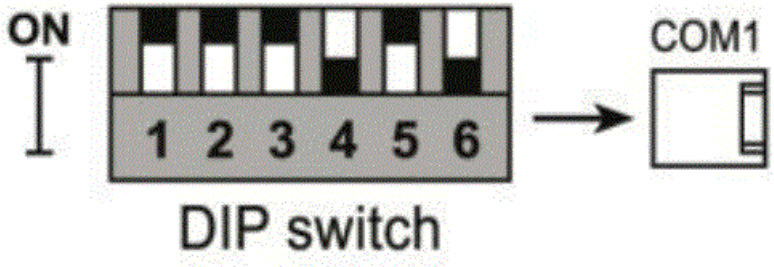
| RS485** | | Controller Port |
|---|---|---|
| **Pin #** | **Description** | |
| 1 | A signal (+) | |
| 2 | (RS232 signal) | |
| 3 | (RS232 signal) | |
| 4 | (RS232 signal) | |
| 5 | (RS232 signal) | |
| 6 | B signal (-) | |

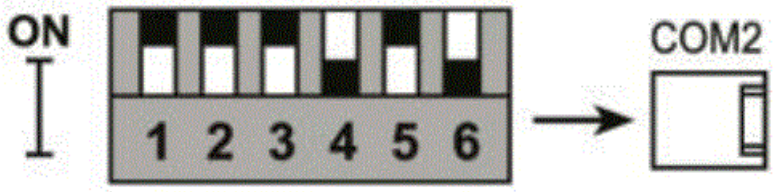



*Standard programming cables do not provide connection points for pins 1 and 6.
**When a port is adapted to RS485, Pin 1 (DTR) is used for signal A, and Pin 6 (DSR) signal is used for signal B.

**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** |



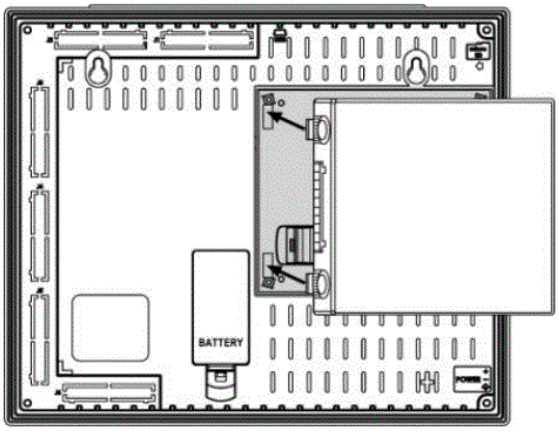

*Default factory setting
**Causes the unit to function as an end unit in an RS485 network.

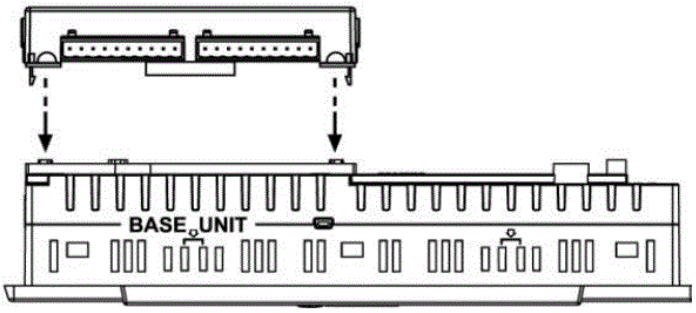
## Installing a Snap-in I/O Module

### Warning

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

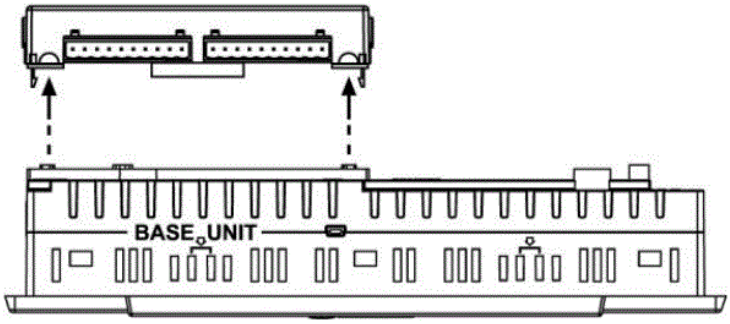
1. Remove the I/O connector cap shown on Page 6.
2. Line the circular guidelines on the Snap-in I/O Module with the slots on the controller as shown below.
3. Apply even pressure on all 4 corners until you hear a distinct ‘click’. The module is now installed. Check that all sides and corners are correctly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

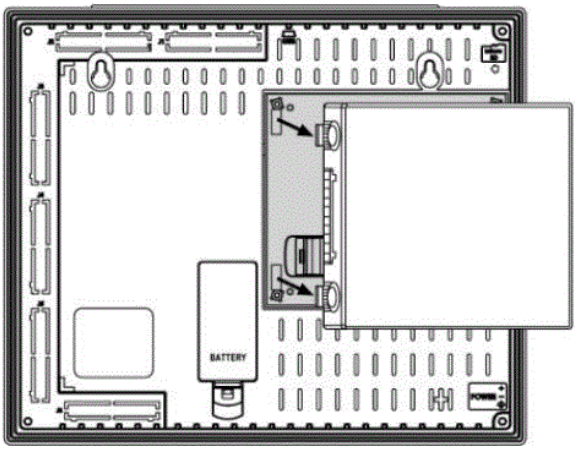



### Removing a Snap-in I/O Module

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

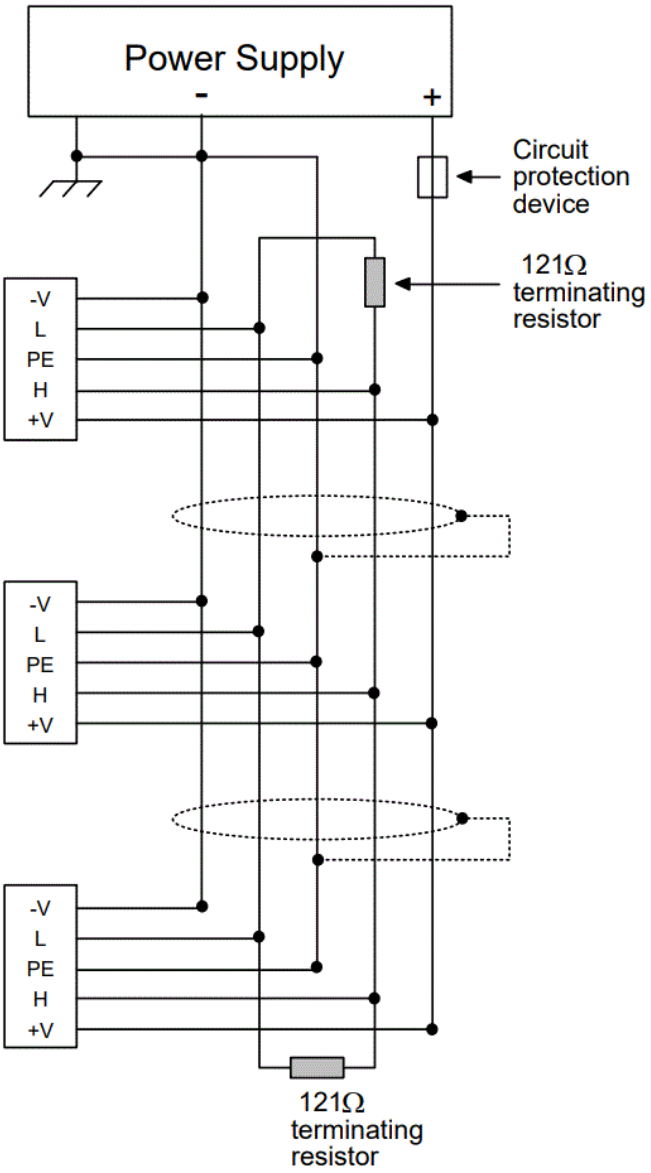
- CANopen: 127 controllers or external devices
- CANLayer 2, J1939
- Unitronics' proprietary UniCAN: 60 controllers, (512 data bytes per scan)

The CANbus port is galvanically isolated.

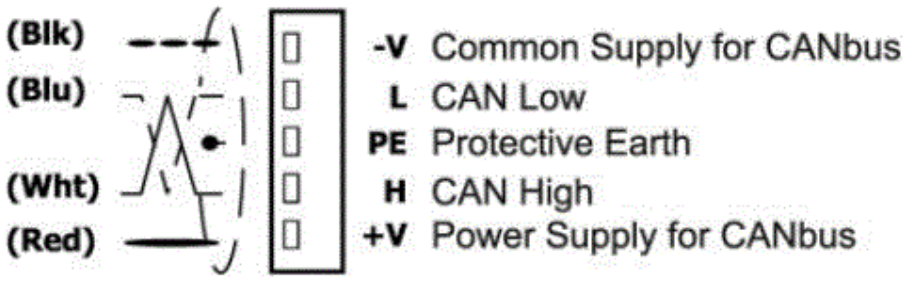
**CANbus Wiring**

Use a 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**

| | |
|---|---|
| **Power Supply** | |
| Input voltage | 12 or 24VDC |
| Permissible range | 10.2-28.8VDC |
| Max. current consumption | 840mA@12V<br>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:** | |
| 1. 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 | Quantity | 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 datalogs, Alarms, Trends, Data Tables, backup Ladder, HMI, and OS. See Note 2 | |
| **Notes:** | | |
| 2. 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 | | |
| CANbus port | 1 | | |
| Nodes | CANopen | Unitronics' CANbus protocols | |
| | 127 | 60 | |
| Power requirements | 24VDC (±4%), 40mA max. per unit. See Note 5 | | |
| Galvanic isolation | Yes, between CANbus and controller | | |
| Cable length/baud rate See Note 5 | 25 m<br>100 m<br>250 m<br>500 m<br>500 m<br>1000 m*<br>1000 m* | 1 Mbit/s<br>500 Kbit/s<br>250 Kbit/s<br>125 Kbit/s<br>100 Kbit/s<br>50 Kbit/s<br>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:** | | | |

3. The standard for each port is set to either RS232/RS485 according to DIP switch settings. Refer to the Installation Guide.

4. 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.

5. Supports both 12 and 24VDC CANbus 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.<br><br>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:** | |
| 6. 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 Programmable Logic Controllers [pdf] Installation Guide<br>V1040-T20B, Vision OPLC Programmable Logic Controllers, Vision OPLC, Programmable Logi c Controllers, V1040-T20B Vision OPLC Programmable Logic Controllers |

## References

- Home - Unitronics

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