Vision OPLC™

Graphic Operator Panel & Programmable Logic Controller

User Guide

Vision 230™
Vision 260™
Vision 280™

unitronics
Industrial Automation Systems

Preface

This guide contains essential information for Vision OPLC™ users. Note that illustrations showing the Vision230 (V230) also refer to the models Vision260 (V260) and Vision280 (V280), except where specified.

Warnings and Safety Guidelines

Read this section carefully before installing and operating the device.

Chapter 1: Overview

Contains a general description of the device's features and functions.

Chapter 2: Mounting

Describes mounting considerations and procedures.

Chapter 3: Power Supply

Explains wiring procedures and considerations.

Chapter 4: I/Os

Presents I/O options; shows how to attach a Snap-in I/O Module.

Chapter 5: Communications

Contains program download instructions as well as information on RS232 communications and CANbus networking, including wiring.

Chapter 6: Information Mode

Describes how to use Information Mode to view runtime values, set timer values, reset and initialize the controller and check I/O module status.

Chapter 7: Operating Panel Options

Explains how to adjust the LCD contrast, and how to use slides to label keys.

Appendix A: System Data Types

Contains tables showing internal system elements.

Appendix B: Technical Specifications

Provides detailed technical specifications.

Appendix C: New PLC Users

Provides information for new PLC users.

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Warnings and Safety Guidelines

Guidelines for user safety and equipment protection

This manual is intended to aid trained and competent personnel in the installation of this equipment as defined by the European directives for machinery, low voltage, and EMC. Only a technician or engineer trained in the local and national electrical standards should perform tasks associated with the electrical wiring of this device.

Symbols are used to highlight information relating to the user's personal safety and protection of the equipment throughout this manual.

When any of the following symbols appear, the associated information must be read carefully and understood fully.

Danger Symbols

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.

Warnings

- Under no circumstances will Unitronics be liable or responsible for any consequential damage that may arise as a result of installation or use of this equipment.

- All examples and diagrams shown in the manual are intended to aid understanding. They do not guarantee operation.

- Unitronics accepts no responsibility for actual use of this product based on these examples.

- Due to the great variety of possible applications for this equipment, the user must assess the suitability of this product for specific applications.

- Make sure to have safety procedures in place to stop any connected equipment in a safe manner if the controller should malfunction or become damaged for any reason.

- Do not replace electrical parts or try to repair this product in any way.

- Only qualified service personnel should open the device's housing or carry out repairs.

- The manufacturer is not responsible for problems resulting from improper or irresponsible use of this device.

- Please dispose of this product in accordance with local and national standards and regulations.

Chapter 1: Overview

Introducing the Vision OPLC™[1]

Vision OPLCs are programmable logic controllers that comprise an integral operating panel. Compactly designed, these controllers are compatible with different types of Unitronics' I/O modules. This allows you to build Vision-controlled systems capable of automating a broad range of analog and digital applications. All Vision OPLCs offer RS232 communications, CANbus networking options, and a real-time clock (RTC).

Vision OPLC operating panels contain a graphic LCD screen and a keyboard. Certain models offer graphic touchscreens. The LCD screen displays operator instructions, alarms, and real-time variable system information via text and graphic images. The operator uses the programmable keyboard to enter or modify data within the Vision-controlled system. This communication interface between the controller and operator is referred to as the **HMI**, or Human Machine Interface, throughout this manual.
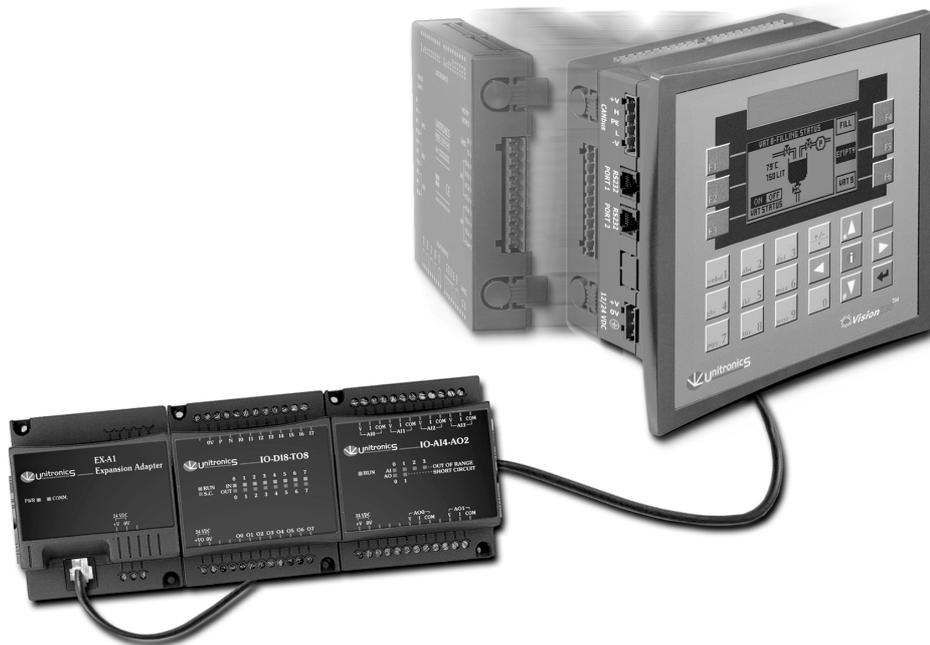
Figure 1.   The Vision System

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[1] Acronym for Operating panel + Programmable Logic Controller

Two types of I/O modules are compatible with Vision OPLCs. I/O modules are available in a variety of models. **Snap-in I/O Modules** plug directly into the back of a Vision OPLC, creating a self-contained PLC unit with a local I/O configuration. **I/O Expansion Modules** can also be easily integrated to greatly extend the system's control capacity.

These features combine to offer a cost-effective solution for medium-sized industrial applications that require both an operator's interface and the ability to control small-to-medium processes according to time and ambient conditions.

Technical Description

The Vision OPLC

- Dimensions: V230: 184 x 155 x 61.4 mm; V260/V280: 260 x 155 x 72 mm
- Mounting: Panel-mounted via brackets
- Power supply: 12 or 24VDC
- Real-time clock (RTC): Enables time and date controlled functions
- Battery back-up: Protects real-time clock (RTC) and system data

Operating Panel

Operating panels comprise either a graphic screen or graphic touchscreen, and a keyboard:

- The LCD screen displays both user-defined text; according to fonts selected in the HMI program; and user-designed graphic images. Models offering a graphic touchscreen enable the user to assign 'tap' properties to text and graphic objects.
- All models comprise an alphanumeric keypad. V230/260 models offer 6 softkeys, V260 models offer an additional 9 function keys. V280 comprises 9 softkeys. To label keys, insert keyboard slides as described in: "Chapter 7: Operating Panel Options", page 29.

I/Os

The controller can support up to 158 I/Os. I/Os are integrated into the system via Snap-in I/O Modules and I/O Expansion Modules.

Snap-in I/O Modules

These I/O modules easily plug into the back of the controller, providing an on-board I/0 configuration that can include analog and digital I/Os.

I/O Expansion Modules

The controller's I/O expansion port enables up to 8 I/O Expansion Modules to be connected to a single Vision controller.

Note that all I/O technical specifications are provided in a separate document.

Communications

RS232

The controller comprises 2 COM ports. These may be used to download programs from a PC, or to establish communications with devices using the RS232 protocol.

CANbus

The controller comprises 1 port for CANbus networking purposes.

Additional communication port

Optional communication channel; note that certain models comprise a RS485 port.
Information regarding other communication options can be obtained from your distributor.

Programming

Vision OPLC programs comprise both the PLC and HMI applications. The programmer writes both applications on a PC using VisiLogic software.

PLC Application

The PLC application is the program that enables the controller to perform its automation task. VisiLogic enables the programmer to:

- Build the PLC application using click-and-drop Ladder elements and functions.

- Create a modular program, comprised of separate subroutines that can be called into the PLC application at any time.

HMI Application

The HMI application customizes the operator interface. Use it to:

- Assign functions to the keyboard keys, touchscreen objects (V280 only) and enable the operator to enter data via the controller keyboard.

- Create and display text, graphic images, and variable system data on the controller's screen in response to run-time conditions.

A HMI application can typically comprise up to 255 Displays. Each Display can include text, graphic images, and variables.

Variables allow you to display system data on the controller's LCD screen: bit, integer, and timer values, times and dates, I/O status and values, and text from the variable text display list. Variables can also use a graphic image or a bar graph to represent a value or range of values. Typically, 12 fonts in a variety of languages may be installed and used in text messages.

When the VisiLogic program is complete, the programmer downloads it into the controller.

The data types in the tables below can be used in your applications.

Data Type	Symbol
Memory Bits (coils): 1024	**MB**
Memory Integers (registers): 1024, 16 bit	**MI**
Memory Long Integers: 256, 32 bit	**ML**
Double Word (unsigned): 64, 32 bit	**DW**

Data Type	Symbol
Timers: 128, 32 bit	**T**
Inputs: 544	**I**
Outputs: 544	**O**

System data types, listed below, are linked to certain values or controller functions and are reserved for use by the system. Some of them are available for use in your program. See "Appendix A: System Data Types," page 31.

Data Type	Symbol
System Bits: 512	**SB**
System Integers: 512, 16 bit	**SI**

Data Type	Symbol
System Long Integers: 64, 32 bit	**SL**
System Double Word: 64, 32 bit	**SDW**

Safety Guidelines

- Failure to comply with appropriate safety guidelines can result in severe personal injury or property damage. Always exercise proper caution when working with electrical equipment.
- Check the user program before running it.
- Do not attempt to use the controller with voltage exceeding permissible levels. Permissible voltage levels are listed in the technical specifications provided in Appendix B.
- Install an external circuit breaker and take all appropriate safety measures against short-circuiting in external wiring.

Caution
- Ascertain that terminal blocks are properly secured in place.

Chapter 2: Mounting

This chapter gives detailed panel mounting instructions.

Before You Begin

Before you begin installation procedures, check the contents of the controller kit. Standard kits contain the controller, a 3-pin power supply connector, a 5-pin CANbus connector, and 4 mounting brackets, each with a screw inserted. These elements are illustrated in Figure 2 below. Other items in the kit include an envelope containing a wire that is ended by a ring cable shoe and other hardware that may be used to earth the controller's power supply. The kit also includes a rubber seal already seated in back of the operating panel, a CANbus network termination resistor; a CD-ROM containing VisiLogic software for programming the controller, a communication cable, this manual, and two sets of keyboard slides which you can use to label the keyboard keys. Note that one set of slides is already installed in the operating panel.

Some kits may also include installed Snap-in I/O modules and documentation.
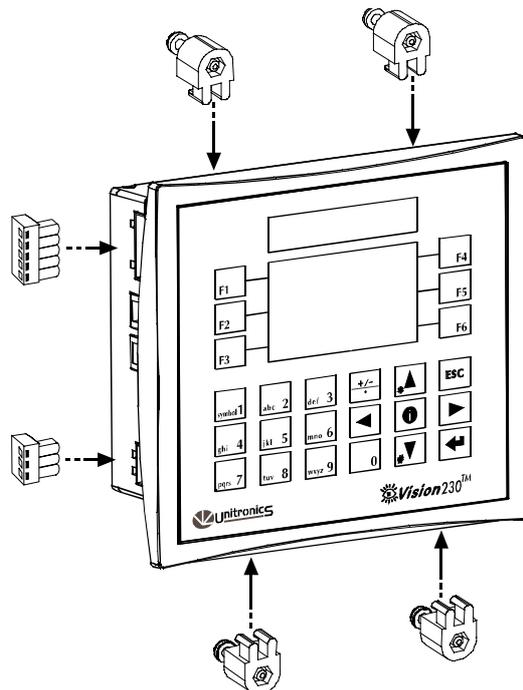
Figure 2.   *Vision Connectors and Mounting Brackets*

Safety and Environmental Guidelines

- 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.

- Do not place in water or let water leak onto the controller.

- Do not allow debris to fall inside the unit during installation.

- **Double-check** all the wiring before turning on the power supply.

- Do not touch live wires.

- Stay as far as possible from high-voltage cables and power equipment.

- Leave a minimum of 10mm space for ventilation between the top and bottom edges of the controller and the enclosure walls.

Mounting

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

To maximize system performance, avoid electromagnetic interference by mounting the controller on a metal panel and earthing the power supply according to the details in Figure 7, page 16

1. Make a panel cut-out that is appropriate for your model controller.
   V230 cut-out dimensions are shown in Figure 3, page 12.
   V260/V280 cut-out dimensions are shown in Figure 4, page 13.

2. If you are mounting the controller on a metal panel, earth the power supply:

   a. Bore a hole, as shown below, that suits the NC6-32 screw supplied with the controller kit.

   b. Scrape the panel paint away from the contact area to ensure a conductive connection.

   c. Drive the screw into the hole.

   d. On the screw's shank, place the following hardware in this order: washer, ring cable shoe, second washer, spring, and nut; as shown in Figure 5, page 13.

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 Figure 2, page 9.

5. Tighten the bracket screws against the panel.

184 mm
7.24"

126 mm
4.96"

155 mm
6.1"

Ø4 mm
0.15"
Hole for
NC6-32 screw

35 mm
1.38"

5 mm
0.19"

141 mm
5.5"

17.5 mm
0.69"
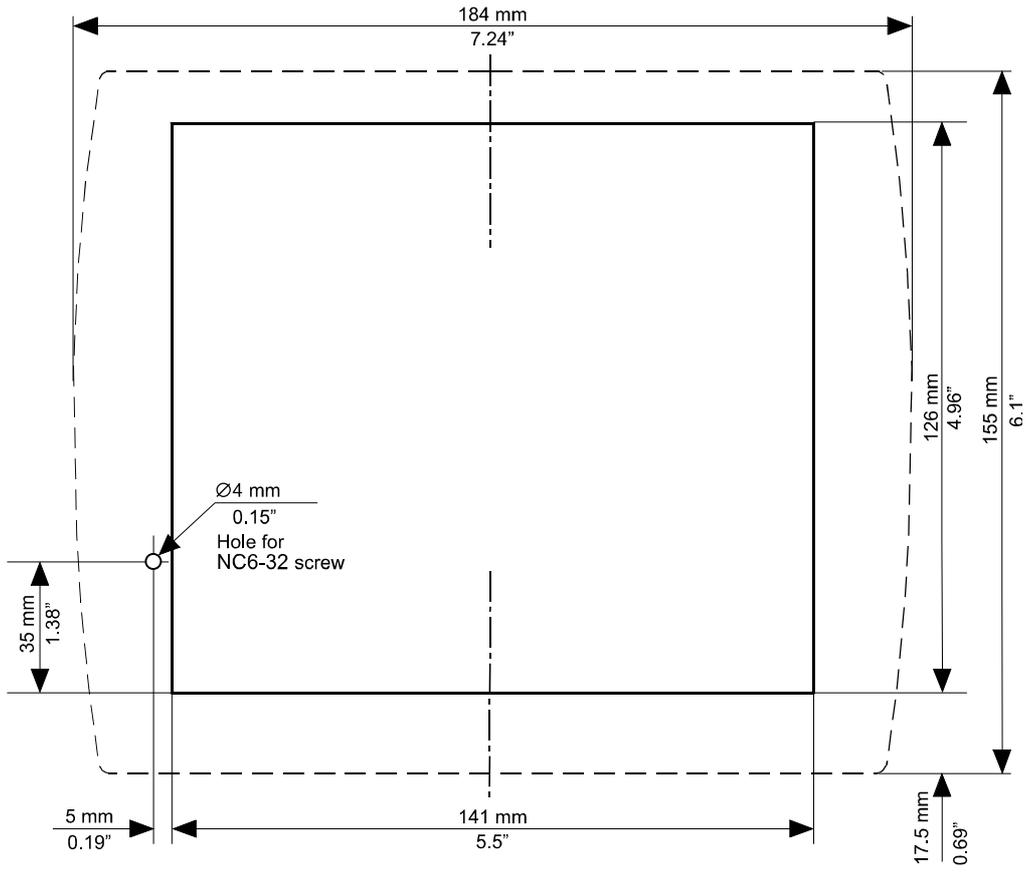
Figure 3.   V230 Panel Cut-out—Front View
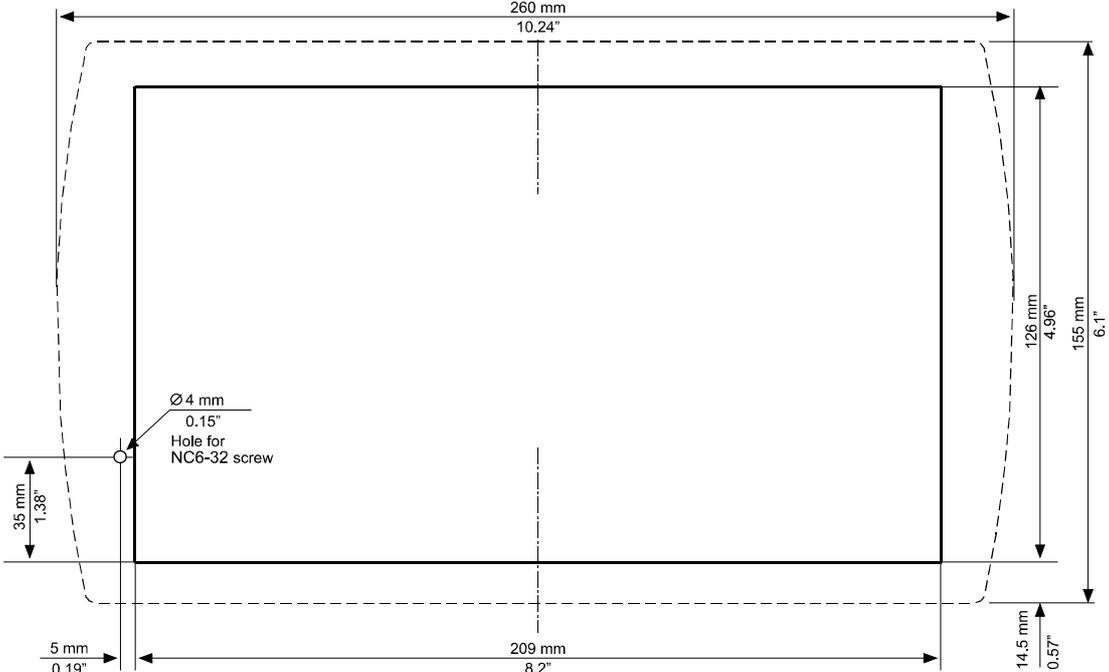
Figure 4.   V260/V280 Panel Cut-out—Front View
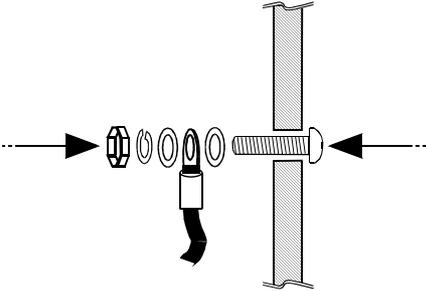
Figure 5.   Earth Assembly

When properly mounted, the controller is squarely situated in the panel cut-out as shown below.
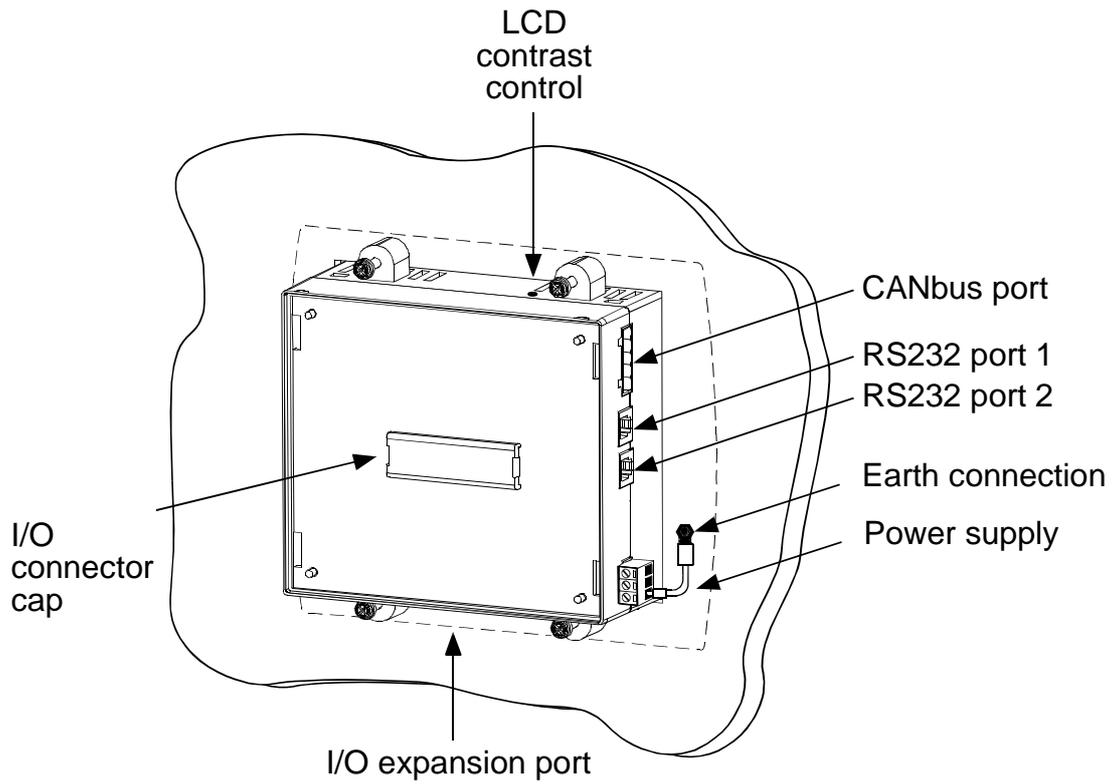
Figure 6.   *Panel Mounted—Rear View*

Chapter 3: Power Supply

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 as shown in Figure 7, page 16.

Safety Considerations

- Do not touch live wires.

- A non-isolated power supply can be used provided that a 0V signal is connected to the chassis.

- Standard safety considerations require that metal cabinet panels be earthed to avoid electrocution.

- Do not connect either the 'Neutral or 'Line' signal of the 110/220VAC to the 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.

- The wiring of this device is specifically designed to be safe and easy. A technician or engineer trained in the local and national electrical standards should perform all tasks associated with the electrical wiring of the device.

- Double-check all wiring before turning on the power supply.

Wiring the Power Supply

- Do not use tin, solder, or any other substance on the stripped wire that might cause the wire strand to break.

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

- To avoid damaging the wire, do not exceed a maximum torque of 0.5 N·m (5 kgf·m).

We recommend that you use crimp terminals for wiring; use 26-14 AWG wire for all wiring purposes.

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

7. Unscrew the terminal to its widest position before inserting a wire.

8. Insert the wire completely into the terminal to ensure a proper connection according to the figure below.

9. Tighten enough to keep the wire from pulling free.
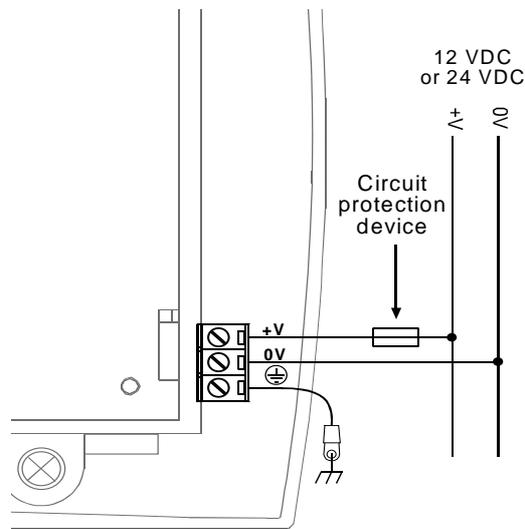
Figure 7.   Power Supply Wiring

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 by connecting the chassis signal to the panel as shown in Figure 6, page 14, and connecting the tapered end to the power supply as shown in Figure 7 above.

Note: The wire used to earth the power supply must not exceed 8 cm in length. If your conditions do not permit this, do not earth the power supply.

Chapter 4: I/Os

You can create an I/O configuration for Vision OPLCs using both **Snap-in I/O Modules** and **I/O Expansion Modules**.

- **Snap-in I/O Modules**
  This provides a Vision OPLC with an on-board I/O configuration. These modules snap directly onto the back of the controller.

- **I/O Expansion Modules**
  Via an adapter, you can connect a broad variety of I/O modules to a Vision OPLC's I/O expansion port.

⚠ • Turn off the power before installing I/O modules.

Installing a Snap-in I/O Module

You can install a Snap-in I/O Module both before and after mounting the unit.

Note the protective cap covering the I/O connector on the back of the controller. This cap must cover the connector whenever a Snap-in I/O Module is **not** attached to the controller. You must remove this cap before installing a module.

1. Pry the cap, shown in Figure 6, page 14, off using the blade of a screwdriver.

2. Line the circular guidelines on the controller up with the guidelines on the Snap-in I/O Module 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.
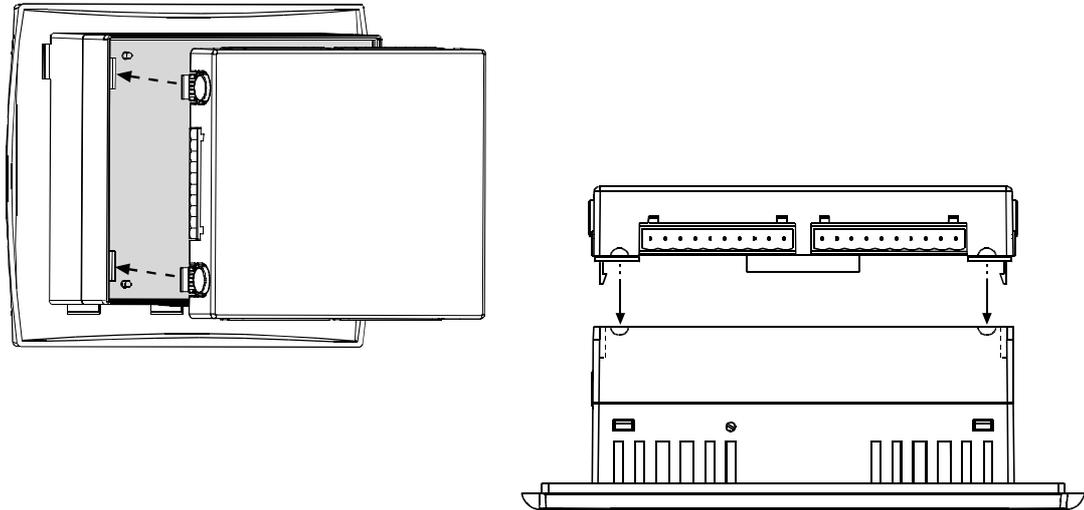
Figure 8.   Installing a Snap-in I/O Module

Removing a Snap-in I/O Module

1.   Press the buttons on the sides of the module and hold them down to open the locking mechanism.

2.   Gently rock the module from side to side, easing the module from the controller.

3.   Replace the protective cap on the connector.

Installing I/O Expansion Modules

An adapter enables you to integrate I/O Expansion Modules into the system. You plug an I/O expansion cable into the appropriate port located on the bottom of the controller, connect the cable to the adapter, and then plug I/O Expansion Modules into the adapter. Exact instructions are provided with the adapter and I/O Expansion Modules. The location of the I/O Expansion port is shown in Figure 6, page 14.

Chapter 5: Communications

This chapter contains guidelines for communications connections. All Vision controllers comprise 2 RS232 ports and a CANbus port. Certain models offer other communication options such as RS485.

RS232

Via the RS232 serial ports, you can:

- Download programs from a PC.

- Communicate with RS232 devices.
  You can, for example, use your PC to access a networked controller via its RS232 port. You can then view, read, and write data into any unit. RS232 also allows you to view the network via a SCADA program.

The RS232 interface is via RJ-11 type serial ports located on the side of the controller, shown in Figure 6, page 14.

⚠	• Turn off power before making communications connections.
	• Do not connect the controller directly to a telephone or telephone line.

Table 1: RS232 Port Pinout

Diagram	Pin Number	Function
	1	DTR signal*
	2	0V reference
	3	TxD signal
Pin #1 →	4	RxD signal
	5	0V reference
	6	DSR signal*
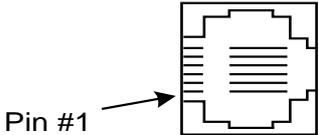
*Standard programming cables do not provide connection points for pins 1 and 6

Caution	• Signals are related to the controller's 0V; this is the same 0V used by the power supply.
	• The RJ-11 type serial port located on the side of the controller must always be used with an appropriate adapter.
	• The RS232 serial port is not isolated.

Downloading Your Program

You can download programs via a direct cable connection between your PC and the controller. The cable should not exceed 3 meters in length.

Connecting the Controller to the PC

• Connect the controller to your PC using the communication cable as shown below.
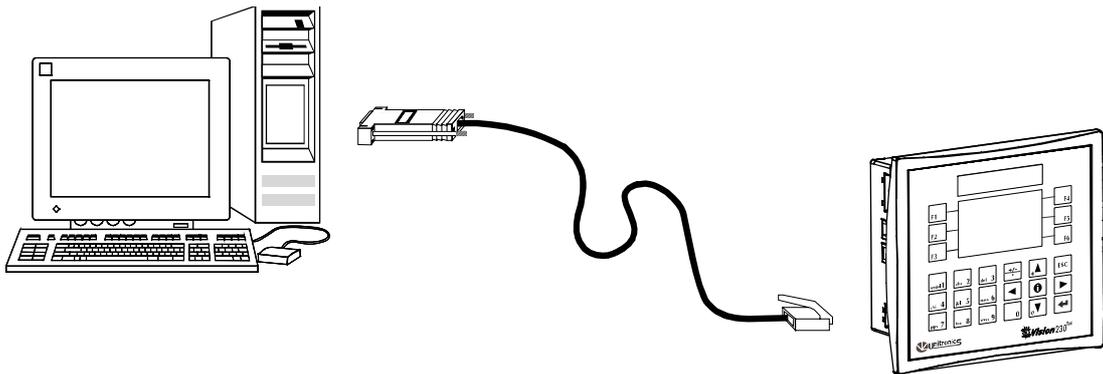
Figure 9.   Connecting the PC to the Controller

CANbus

The CANbus port is located on the side of the controller, as shown in Figure 6, page 14. Via this port, you can create a decentralized control network of up to 63 controllers. This is sometimes called a multi-master network. In such a network, CANbus enables inter-PLC data exchange.

Unitronics' CANbus control network is run by a separate isolated power supply that is not part of the network power supply.

CANbus Wiring Specifications.

Table 2:   *CANbus Specifications*

Power Requirements: 24VDC (±4%) 40mA max.

Galvanic Isolation between CANbus and controller: Yes

Max. Network Cable Length:

1 Mbit/s -	25 m
500 Kbit/s -	100 m
250 Kbit/s -	250 m
125 Kbit/s -	500 m
100 Kbit/s -	500 m
50 Kbit/s -	1000 m
20 Kbit/s	1000 m

Note: Cable lengths over 500 meters require an additional power supply.

Table 3:   *Wiring Considerations*

- 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 the 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

- Maximum number of controllers in a network: 63
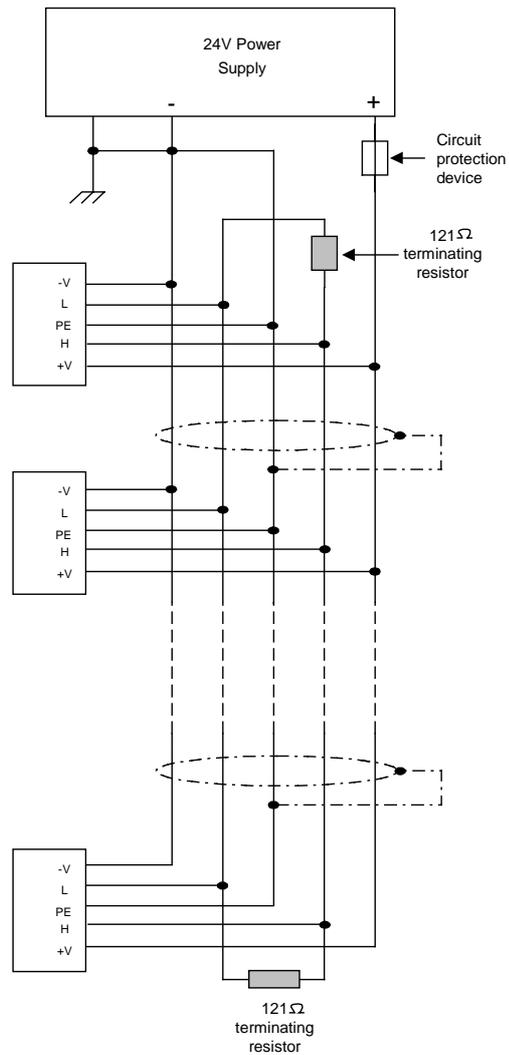
Figure 10.   CANbus Wiring Diagram

-V   24V common supply for CANbus

L   CAN low

PE   Protective Earth

H   CAN high

+V   24V power supply for CANbus
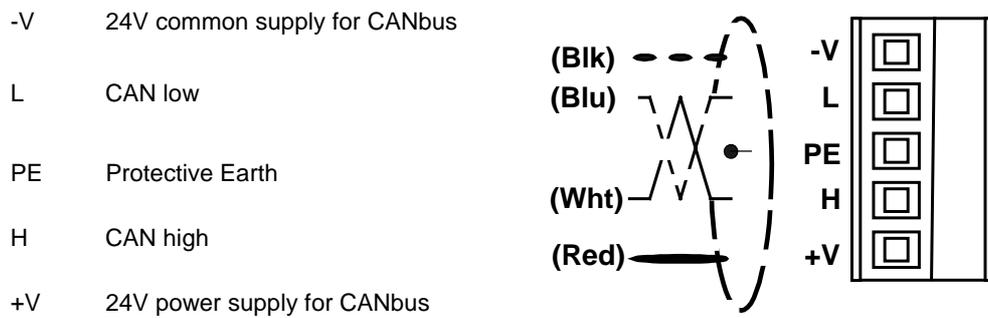
Figure 11.   CANbus Connector

Chapter 6: Information Mode

Information Mode is a utility that is embedded in the operating system of the controller. Via Information Mode, you can view data on the LCD screen, use the controller's keyboard to directly edit data, and perform certain actions such as resetting the controller. You can enter Information Mode at any time without regard to what is currently displayed on the LCD screen

Viewing data does not affect the controller's program. Performing actions, such as initializing the controller, can influence the program.

Note that when you use Information Mode, the keyboard is dedicated to that purpose. The keys return to normal application functions when you exit Information Mode.

Using Information Mode

1. To enter Information mode, press the <i>button on the Vision's keyboard down for several seconds.

2. Enter your password. The default password is 1111. This password remains in effect **until** you change it via the Information Mode screen described in the table below.

3. The controller enters Information Mode, showing the first category, Data Types.

Caution	• The controller will block entry into Information mode until the correct password has been entered. This is why you must record any password you set for your controller.

The data in Information Mode is arranged in Categories. Each Category contains several Subjects. You navigate Information Mode by using the keyboard buttons as shown below.

To exit Information mode, press the <ESC>button on the Vision's keyboard. Each press returns one level up. Press the number of times necessary to exit.

Note that when you reenter Information Mode, the controller will return to the last Category viewed.

Figure 12.   Navigating Information Mode

Table 4 shows the categories of information that can be accessed in this mode.

Table 4:   *Information Mode*

Category	Subject	Possible Actions
Data Types	Inputs	• View input status. • Force input status to 1 (FR1) or 0 (FR0). Forced values stay in effect until Normal mode (NRM) is selected, or until the controller is initialized or reset. Note that forced values do influence your program. This can be useful in testing the effect of an input condition on an output status.
	Outputs	• View output status. • Force output status to 1 (FR1) or 0 (FR0). Note that forced output values do not affect your program. • Set/Reset output status.
	Memory Bits System Bits	• View bit status. • Change bit status (Set/Reset).
	Timers	• Enter a Preset Timer value. • View the current timer value and status by selecting the R.T. option.
	Memory Integers System Integers Memory Longs System Longs Memory Double Words System Double Words	• View integer/long integer/double word values. • Change values. • Toggle Base: view the value in decimal or hexadecimal form.

Category	*Subject*	*Possible Actions*
System	Model & O/S Ver	• Check the controller's model number and operating system version. • Check whether the controller is in Run or Stop mode.
	Working Mode	• Check whether the controller is in Run or Stop mode. • Reset the controller. This restarts your program; restoring power-up values to all data types **except** for those protected by the battery memory backup. • Initialize the controller. This restarts your program and initializes all values, restoring 0 values to all data types.
	Time & Date	• View the Real Time Clock (RTC) settings. Note that the RTC settings control all time-based functions. • Change the RTC settings via the controller's keyboard.
	Unit ID	The Unit ID number identifies a networked controller. You can: • Change the ID number. The new ID number will remain in effect until the controller is reset. • Burn the ID number into the controller's FLASH memory. This is a permanent change.
	Serial Port 1 Serial Port 2	• View and edit communication settings. • Select to Change or Burn the new settings.
	CANbus Baud Rate	• Change the CANbus baud rate.
	Touchscreen Adjustment	• Follow the on-screen instructions

Category	*Subject*	*Possible Actions*
Function Block	FBs in use	• Shows a list of all function blocks that have been downloaded into the controller. Both the FB name and its version are displayed.
Password	New	• Set a New Password
Hardware Configuration		• Check if I/O Expansion Modules are installed. Note that I/O Expansion Modules are represented by letters. Identical module types are represented by identical letters as shown below. • Shows if an I/O module is short-circuited.
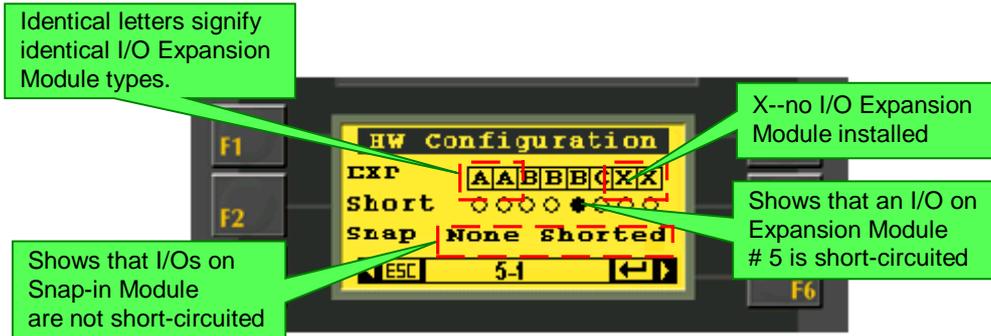
Figure 13.   Information Mode: Hardware Configuration

Chapter 7: Operating Panel Options

You can customize the operating panel by:

- Adjusting the contrast of the LCD screen.
- Labeling the keyboard keys.

Adjusting the LCD screen contrast

To adjust the screen contrast, locate the contrast control on the top of the controller, shown in Figure 6, page 14. Using a flat-bladed screwdriver, turn the control in either direction; the screen contrast changes.

To adjust the contrast of the V280 graphic touchscreen, store values into SI 7, LCD Contrast Control. Note that 0=Minimal Contrast, 50=Medium Contrast, 100=Maximal Contrast.

Labeling keys

You can label most of the controller's keys by inserting **keyboard slides** into slots under the cover of the operating panel. Keyboard slides are strips of plastic that are designed and cut to fit under specific groups of keys. To label keys, you write or print text onto a slide; then insert it in the appropriate slot. The text will be visible through the operating panel covering.

There is a special slide that allows you to display a picture, such as company logo or a system symbol. Note that slides cannot be inserted under the following keys: the directional arrows, **ESC**, ↵, and **<i >** key.

The controller is shipped with two sets of slides appropriate for your model controller. One set of slides is already inserted into the operating panel; the other set is packaged separately. This set does not include a picture slide.

Note: Slides must be inserted before the controller is mounted.

Printing Customized Slides Using Templates

You can also create slides by using Visio and Word stencils that are designed for your model controller. The resulting slides can be printed on film, and then cut to size. For more information, refer to the on-line help system.

The first step in labeling keys is removing a slide from its slot in the operating panel.

Labeling Slides

You can label slides using a fine-tip permanent marker, or by using a professional labeling tool to obtain a more professional in appearance.

Removing and Inserting Your Slides

In order to reach the slides, you must move the rubber seal which is seated in back of the operating panel.

Caution	• Slides fit very tightly into the operating panel slots. This keeps the correct label over the correct key. When you remove or insert slides, work carefully, as excessive force may damage the slide.

Removing a Slide

Slides have tabs to allow the slide to be pulled out more easily.

1. Grasp the tab, with your fingers or using flat-bladed long-nose pliers.

2. Pull gently and steadily; the slide slowly slips out.

Inserting a Slide

• Gently and steadily, slip the slide into the slot.

Appendix A: System Data Types

The Vision OPLC operating system – user program interface includes System Bits (SB), System Integers (SI), System Long Integers (SL), and System Double Words (SDW) listed in the tables below. Specific data types are linked to fixed parameters and are read-only by the user program, such as **SB 2 Power-up bit**.

You may write into certain data types. These are marked with an asterisk (*), such as **SI 8 Unit ID**. All SBs, SIs, SLs, and SDWs not listed are reserved for use by the system.

Table 5:   System Bit Functions

System Bits (SB)	Function
0	Always 0
1	Always 1
2	Power-up bit
3	1 second pulse
4	Divide by zero
5	Output(s) short circuit
6	Keyboard is active
7	100 mS pulse
8	Battery low
30	HMI keypad entries completed
31*	Refresh current LCD screen display
32	HMI keypad entry in progress
40-63	Keypad keys (see the following table)
200*-215*	Network operands
236	Network communication error
237*	Network disable
250	Keypad entry within limits
251	Keypad entry exceeds limits

Table 6:   Keypad System Bit Functions

System Bit (SB)	Keypad Key	System Bit (SB)	Keypad Key
SB 40	0	SB 51	◄
SB 41	symbol 1	SB 52	►
SB 42	abc 2	SB 53	↵
SB 43	def 3	SB 55	*▲
SB 44	ghi 4	SB 56	#▼
SB 45	jkl 5	SB 57	ESC
SB 46	mno 6	SB 58	F1
SB 47	pqrs 7	SB 59	F2
SB 48	tuv 8	SB 60	F3
SB 49	wxyz 9	SB 61	F4
SB 50	+/− .	SB 62	F5
		SB 63	F6

The System Bits below relate to the additional function keys found on the V260/V280 keypad.

System Bit (SB)	Keypad Key	System Bit (SB)	Keypad Key
SB 64	F7	SB 68	F11
SB 65	F8	SB 69	F12
SB 66	F9	SB 70	F13
SB 67	F10	SB 71	F14
		SB 72	F15

Table 7:   *System Integer Functions*

System Integer	Function
0	Scan Time (mSec)
6	Current key pressed
7*	LCD Contrast (V280 only)
8*	Unit ID
9*	LCD Backlight intensity
30*	Current second—according to RTC
31*	Current time—according to RTC
32	Current date—according to RTC
33	Current year— according to RTC
34	Current day— according to RTC
80	Modem Status: COM 1
81	Modem Error Code: COM 1
82	Modem Status: COM 2
83	Modem Error Code: COM 2
200*-201*	Network operands
236	Network communication error code
237	Network: failed unit ID

Table 8:   *System Long Integer Functions*

System Long Integer	Function
4	Divide Remainder (signed divide function)

Table 9:   *System Double Word Functions*

System Double Word	Function
0	10mS counter
4	Divide Remainder (unsigned divide function)
5	Output(s) short circuit bitmap

Appendix B: Technical Specifications

Power Supply

	V230	V260	V280
Input voltage	12VDC or 24VDC		
Permissible range	10.2VDC to 28.8VDC with less than 10% ripple		
Maximum current consumption	280mA @ 12VDC 140mA @ 24VDC	460mA@12VDC 220mA@24VDC	540mA@12VDC 270mA@24VDC
Typical power consumption	2.5W	4.2W	5.4W

Battery Back-up

7 year typical battery back-up for real-time clock (RTC) and system data

Graphic Display Screen

	V230	V260	V280
Type	STN LCD	Negative blue STN LCD	Graphic B&W FSTN LCD
Illumination backlight	LED, yellow-green	CCFL (fluorescent lamp)	CCFL (fluorescent lamp)
Display resolution	128x64 pixels	240x64 pixels	320x240 pixels (QVGA)
Touchscreen	None	None	Resistive, analog

Keyboard

	V230	V260	V280
Number of Keys	24	33	27
	Includes soft keys and alphanumeric keypad		
Key type	Metal dome, sealed membrane		
Slides	Provided for picture, alphanumeric keypad, and Function keys		

Program

Ladder code memory	192K
Memory Bits (coils) Operand symbol	1024 **MB**
Memory Integers (Registers) Operand symbol	1024 **MI**
Long Integers (32 bit) Operand symbol	256 **ML**
Double Word (signed) Operand Symbol	64 **DW**
Timers Operand symbol	128 **T**
HMI displays	Up to 255
Execution time for bit operation	0.5msec per 1K word

Communication

RS232	2 ports
Isolation	No
Voltage limits	± 20V
RS485	1 port, model-dependent
Isolation	No
Nodes	Up to 32
CANbus	1 port
Galvanic Isolation	Yes
Nodes	Up to 63
Baud rate range	20Kbits—1Mbit
Cable length	25m—1000m

I/O Expansion

Expansion port	Via adapter, integrates up to 8 I/O Expansion Modules

Dimensions

	V230	V260	V280
Size: See mechanical drawings	Page 37	Page 38	Page 38
Weight	429g (15.1 oz)	695g (24.5 oz)	854g (30.1 oz)

Mounting

	V230	V260/280
Panel-mounting cut-out diagrams	Page 12	Page 13

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)

Accessories

Programming cable

3 pin power supply connector

5 pin CANbus connector plug

Mounting brackets (x4)

VisiLogic Software CD

Spare set of slides
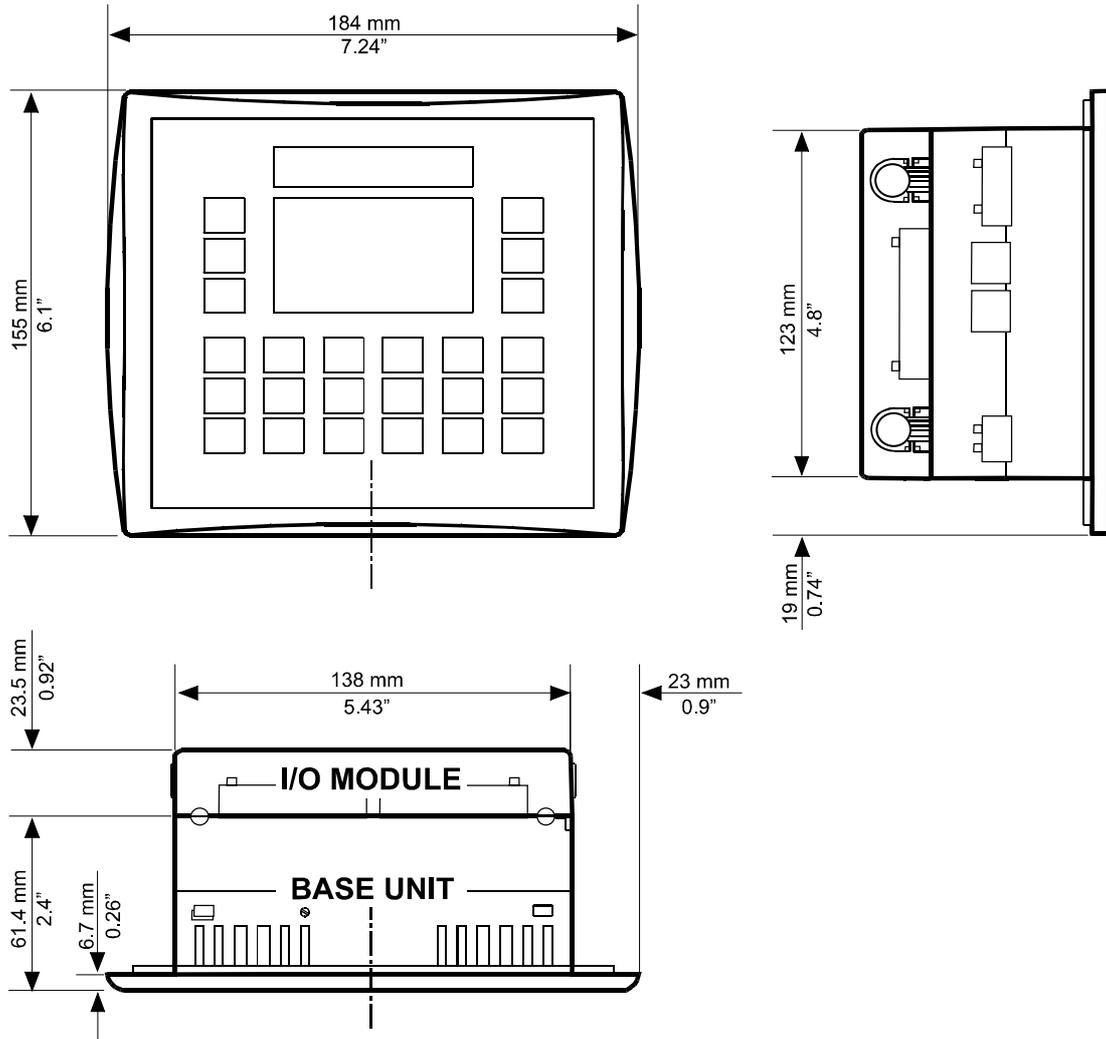
Figure 14.   V230 Dimensions
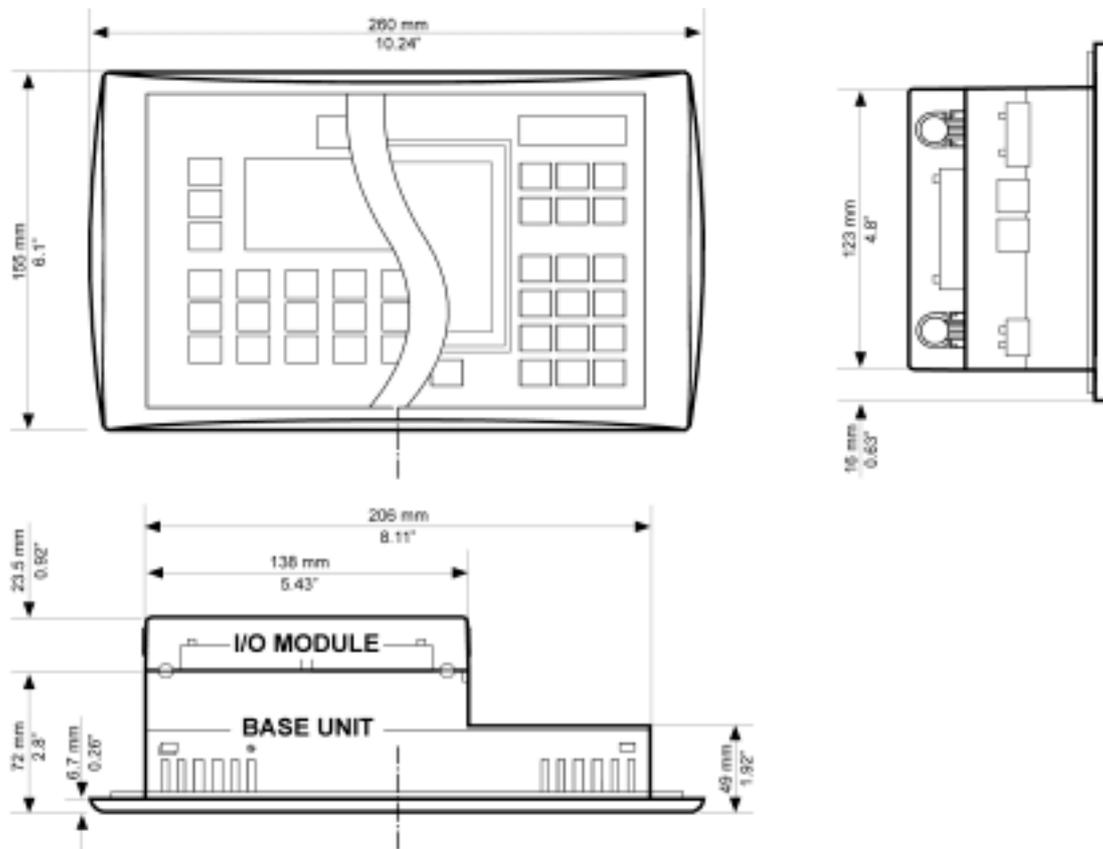
Figure 15.   V260/V280 Dimensions

Appendix C: New PLC Users

PLCs, or programmable logic controllers, are electronic control systems based on microprocessors. A PLC performs control functions in accordance with its software program of external automated equipment.

Parts of a PLC

Operating Panel

The operating panel provides what is called the HMI, or Human Machine Interface, between you and the PLC. The panel is composed of an LCD screen and a customizable keypad. The LCD screen displays messages to the operator. You assign functions to the keys when you write your software program.

Inputs

Inputs receive signals from external devices such as switches, push buttons and variable voltage signals from analog devices. The inputs convert the voltage to signals that the PLC can process.

Outputs

Outputs send signals from the PLC to external devices such as lights or contactor coils. Outputs convert the PLC program results into signals that these external devices can process.

CPU

The Central Processing Unit is the brain of the PLC. It executes the control program.

How PLCs Work

The figure below shows the PLC cycle. This cycle is called a scan. The scan cycle is performed continuously.
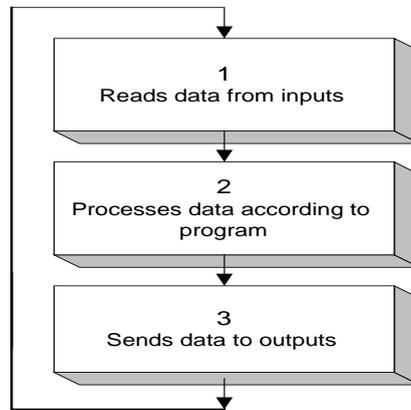
Figure 16.   PLC Scan

First, the input data is read at the beginning of each scan. The data has two sources: the PLC's physical inputs, and data that are entered via the PLC's keypad.

Next, the program is executed. The user creates the PLC control program. The program is composed of instructions that are written in the Ladder language, and is written using the PLC's proprietary software. All program instructions are executed in each scan cycle.

Last, the outputs are updated with the new data.

The sample program below causes an alarm, connected to output #1, to actuate whenever a gate, connected to input #1, opens.

The command ⊣⊢ means that the status of the gate is checked at the beginning of each scan. When the gate is open, the value in the operand is 1 or on. When the gate is closed, the value in the operand is 0 or off.

The command ⟨⟩ controls the alarm. When the value in ⊣⊢ contact 1 is found to be 1, the alarm is switched on. When the value is 0, the alarm is off.

Table of Figures

Notes