EZPanel Enhanced
EZText Enhanced
EZTouchPLC
EZTextPLC
EZMarquee
EZPLC & EZI/O
EZ Touchscreen CE Computer
EZCE Touchpanel
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EZText Set Point Display Panel User's Manual

Model: EZ-SP

Manual Part Number EZ-TEXT-SP-M-E

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WARNING!

Programmable control devices such as EZText Enhanced Panels are not fail-safe devices and as such must not be used for stand-alone protection in any application. Unless proper safeguards are used, unwanted start-ups could result in equipment damage or personal injury. The operator must be made aware of this hazard and appropriate precautions must be taken.

In addition, consideration must be given to the use of an emergency stop function that is in dependent of the programmable controller.

The diagrams and examples in this user manual are included for illustrative purposes only. The manufacturer cannot assume responsibility or liability for actual use based on the diagrams and examples.

CAUTION

Do not press the EZText Enhanced Panel pushbuttons with any sharp objects. This practice may damage the unit beyond repair.

Trademarks

This publication may contain references to products produced and/or offered by other companies. The product and company names may be trademarked and are the sole property of their respective owners. EZAutomation disclaims any proprietary interest in the marks and names of others.

Manual P/N EZ-TEXT-SP-M-E

MANUFACTURED by AVG AUTOMATION
4140 Utica Ridge Rd. • Bettendorf, IA 52722-1327

MARKETED by EZAUTOMATION
4140 Utica Ridge Rd. • Bettendorf, IA 52722-1327

EU Information

The EZText Enhanced Panel is manufactured in compliance with European Union (EU) Directives and carries the CE mark. The EZText Enhanced Panel has been tested under CE Test Standard #EN55011, and is listed under UL File #E209355. The following information is provided to comply with EU documentation requirements.

Please NOTE: Products with CE marks perform their required functions safely and adhere to relevant standards as specified by EU Directives provided they are used according to their intended purpose and that the instructions in this manual are adhered to. The protection provided by the equipment may be impaired if this equipment is not used in accordance with this manual. Only replacement parts supplied by EZAutomation or its agents should be used.

Technical Support

Consult EZText Enhnaced Programming Software Help or you may find answers to your questions in the operator interface section of our web site @ www.EZAutomation.net. If you still need assistance, please call our technical support at 1-877-774-EASY or FAX us at 1-877-775-EASY.

SELV Circuits

All electrical circuits connected to the communications port receptacle are rated as Safety Extra Low Voltage (SELV).

Environmental Specifications

Operating Temperature.....0 to 45 °C

Storage Temperature..... –20 to +60 °C

Operating Humidity.....10–95% R.H., noncondensing

Air Composition .....No corrosive gases permitted

Preventative Maintenance and Cleaning

No preventative maintenance is required. The EZText Enhanced Panel overlay should be cleaned as needed with warm, soapy water. See Chapter 6, Maintenance, for a list of compatible/incompatible chemicals and compounds.

1

Introduction

In this Chapter....

- Manual Organization
- Introduction to the EZText Enhanced Set Point Display
- What you need to get started
- Need HELP?
- Models
- PLCs Supported by EZText Enhanced Panel
- Accessories and Optional Equipment
- PLC and Programming Cable Part Numbers
- Front Panel Features
- Specifications

Manual Organization

This manual is all you'll need to get the EZText Enhanced Panel installed and configured. This manual covers models EZ-SP.

In this manual we will take you through the steps necessary to get your EZText Enhanced Panel up and running in the shortest possible time. Although your familiarity with programmable operator interface devices will determine how quickly you move through the steps — it's as easy as 1 — 2 — 3. This manual is arranged in chapters. A description of key information contained in each chapter is provided below.

Chapter	Description
1	**Introduction** Provides Manual Organization, and lists what you need to get started, hardware and software. Discusses how to get help with questions or problems you might encounter through Onscreen Help and Technical Support. Provides you with a table listing the various models, their part numbers and special features. Lists the important features of all EZText Enhanced Panels. Lists the PLCs supported by the panels, by brand, model and protocol. Lists the part numbers for PLC cables and the programming cable. Tells how to install programming software.
2	**Hardware Installation** Provides instructions on how to install the EMI Noise Filter. Discusses two mounting techniques — stud mounting and DIN clip mounting. Provides Outline Dimensions and Mounting Template. Provides you with instructions on connecting the unit to power, a programming PC and a PLC.
3	**Learning the Features** Provides an Overview of the panel features. Front Panel Features, including; LCD Display, LED Display, PLC Message LED and Control Pushbuttons are discussed. Rear Panel Features are shown. A functional description of controls and indicators is provided. Types of Messages and Data Sets are described.
4	**Tutorial** Provides instructions to create an example (or "demo") project. Discusses how to configure a PLC ladder logic program to use with the demo project. Takes you through the steps necessary to create an EZText Enhanced Panel project using the programming software and application worksheets. Shows you how to transfer a project to the panel.

Chapter	Description
5	**Configuration** Step-by-step instructions for configuring the EZ-SP Panel using the EZText Enhanced Programming Software are provided.
6	**Maintenance and Troubleshooting** Instructions for maintaining the EZ-SP panel are provided, including; Fuse Reset, Precautions, Chemical Compatibility, Cleaning, and Gasket Replacement. Troubleshooting section aids in diagnosing problems you might encounter when installing or operating the panel. Provides steps to take to isolate and correct problems.
A	**Appendix A** Application Worksheets are provided to help you plan and implement your system configuration.
B	**Appendix B** Wiring diagrams for several PLC cables are provided.
C	**Appendix C** Error Message for PLC Drivers, EZText Enhanced Panel, and EZText Enhanced Programming Software.

Introduction to the EZText Enhanced Set Point Display Panel

The EZText Enhanced Set Point Display Panel provides a man-machine interface to your PLC automation system. The panel provides features such as a numeric display, control pushbuttons, and messages. The panel communicates with a PLC using either RS-232C or RS-422A serial communication. A tutorial is provided in Chapter 4 of this manual. Configuration software and programming the panel are covered in Chapter 5 of this manual.

The Set Point Panel allows you to configure up to 256 numeric setpoints or displays with text messages. The numeric values use an 8-digit LED display, while the messages use a 16-character LCD display. In addition to the two displays, there are five control pushbuttons labeled **esc**, t, **sel**, s, and **enter**.

The messages are displayed by either scrolling with the arrow buttons or when triggered from the PLC. A PLC Message LED illuminates when a message is triggered from the PLC.

The messages and numeric setup are configured using EZText Enhanced Programming Software.

The EZText Enhanced Set Point Display Panel has two basic modes— Setup and Run. While in Run Mode the panel has all of its features (listed in the table on page 5) available, except Contrast Adjust. The Contrast Adjust feature is available only when in Setup Mode.

The Set Point Panel is equipped with one dual-purpose serial port. The serial port allows the user to communicate with either a computer or a PLC. A computer can be used to program the Set Point Panel via the serial port, or a PLC can interact with the Set Point Panel via the serial port.

Finally, the rear of the unit has two LEDs, hardware controlled, that inform you of serial port communications.

The EZText Enhanced Panel is available in a variety of models to suit your application. Key features of the EZText Enhanced Panel Model EZ-SP are provided on the next page. The EZText Enhanced Panel also supports a variety of PLCs. A list of the PLCs currently supported is provided on page 8.

Features

FEATURE	DESCRIPTION
Set Point Panel	Stores up to 256 16-character messages. One data set per message.
LCD display	One line sixteen character display. Adjustable contrast.
8-Digit Display	Displays one variable data set on an eight digit (7 segment LED per digit) display. Displays values in either decimal or BCD number. Range 0 - 99999999. Displays a fixed decimal, that can be repositioned at the request of the user. Blinks a digit to represent edit mode.
PLC Message LED	"On" to signal the currently displayed message was triggered by a PLC.The LED will remain on for at least three seconds. After the three seconds, the user can edit data or exit the PLC Message by pressing the escape button.
TXD LED	Toggles "on" and "off" to signal activity on the transmission line.
RXD LED	Toggles "on" and "off" to signal activity on the receive line.
♦ pushbutton	The up arrow allows the user to scroll through messages or alter data. If pressed in edit mode, the digit will increment(by 1, 10, 100,..., 10000000). If pressed in non-edit mode, the previous message will be retrieved. If pressed in Setup Mode, the LCD contrast will be adjusted.
♦ pushbutton	The down arrow allows the user to scroll through messages or alter data. If pressed in edit mode, the digit will decrement (by 1, 10, 100,..., 10000000). If pressed in non-edit mode, the next message will be retrieved. If pressed in setup mode, the LCD contrast will be adjusted.
♦ ♦ pushbutton	When both the up and down arrows are pressed simultaneously the panel will enter setup mode.
sel pushbutton	When pressed, the panel will enter edit mode, unless there is no data set associated with the messsage. An indication that the panel is in edit mode is a blinking digit on one of the seven segment displays. On each successive press the blinking cursor will move from LSD to MSD. If "sel" is pressed when the MSD is blinking then LSD will blink.
esc pushbutton	If pressed in edit mode, the panel will exit edit mode, abort writing the data set to the PLC, and the original data set will be displayed. If pressed in PLC mode, the panel will exit PLC mode, abort editing, abort writing the data set to the PLC, and display the previously displayed message. If pressed in setup mode, the panel will exit setup mode.
enter pushbutton	If pressed in edit mode, the current displayed data will be sent to the PLC and the panel will exit edit mode.

What you need to get started:

Hardware

- EZText Enhanced Set Point Display Panel, Models EZ-SP
- RS-232C Programming Cable (P/N EZTEXT-PGMCBL)
- 24 Volt DC Power Supply (FA-24 PS recommended)
- Programmable Logic Controller (PLC)
- PLC Cable (see page 8 for part numbers of cables)
- PC requirements:
  - — IBM or compatible PC (486 or better) with a mouse and separate serial port
  - — VGA display
  - — Standard Windows 95/98 (Second Edition)/NT.0/2000® requirements
  - — CD ROM Drive

Software

- EZText Enhanced Programming Software (P/N EZ-TEXTEDIT-E)

Need HELP?

PLEASE NOTE: Section 6, Maintenance and Troubleshooting, should be able to help you with most problems you might encounter.

Onscreen HELP

One of the most important features of the EZText Enhanced Programming Software is the availability of context sensitive onscreen help. To access the Help windows, simply press the F1 function key while on the topic where you need help or click on HELP in the main menu bar. For example, if you need help while working with panel configuration, hit the F1 function key when that dialog box is open and a pop-up HELP window will be displayed.

PLC HELP

If you need help with the PLC to EZText Enhanced Panel Interface, consult the EZText Enhanced Programming Software Help. Each PLC Driver has a Help Topic that lists the error messages and provides an explanation for each. Also provided are PLC to EZText Enhanced Panel wiring diagrams.

Technical Support

Although most questions can be answered with EZText Enhanced HELP or the manuals, if you are still having difficulty with a particular aspect of installation or system design, technical support is available at **1-877-774-EASY, Monday through Friday, 6 a.m. to Midnight CST, or FAX us at 1-877-775-EASY. Visit our website at *www.EZAutomation.net.***

Models

Part Number
EZ-SP • Set Point Display with Numeric LED 8 Digits, 7 Segments • 1 line by 16 character LCD display • Character height of 0.317 inches (8.06 mm) • Stores up to 256 16-character messages • 5 Control Pushbuttons • EMI filtered power supply to reduce communication problems 

PLCs Supported by EZText Enhanced Panels

PLC Brand	Model		Protocols Supported
Allen Bradley	MicroLogix 1000/1200/1500, SLC500, 5/01, /02, /03, /04, /05 and PLC5		DF1 Half Duplex; DF1 Full Duplex
	PLC 5		DF1
Aromat	Aromat		Mewtocol COM
Control Techniques	Unidrive 4-wire		Binary
Control Technology Corporation (CTC)	CTC 2600, 2700, and 5100		CTC Binary
EZAutomation	EZPLC		EZ Protocol
General Electric	90/30 and 90/70 Versamax		SNPX
Idec	Idec		Computer Link
Mitsubishi	FX Series (all)		FX, Direct
Modicon	984 CPU, Quantum 113 CPU, AEG Modicon Micro Series 110, CPU: 311-xx, 411-xx, 512-xx, 612-xx		Modbus RTU
Omron	C200, C500, CQM1, CPM1		Host Link
Direct Logic	DL05, DL06		K-Sequence; DirectNet; Modbus (Koyo addressing)
	DL105		K-Sequence
	DL205	D2-230	K-Sequence
		D2-240	K-Sequence; DirectNet
		D2-250/D2-250 - 1/260	K-Sequence; DirectNet; Modbus (Koyo addressing)
		D2-240/250/260 w/DCM	DirectNet
	DL305	D3-330/330P	DirectNet
		D3-340	DirectNet
		D3-350	K-Sequence; DirectNet; Modbus (Koyo addressing)
		D3-350 w/DCM	DirectNet
	DL405	D4-430	K-Sequence; DirectNet
		D4-440	K-Sequence; DirectNet
		D4-450	K-Sequence; DirectNet; Modbus (Koyo addressing)
		All with DCM	DirectNet
		Entivity (Think-n-Do)	Modbus RTU
Siemens	Siemens S7300/400 PLCs MPI Adaptor		3964R
Texas Instruments	TI5x5 series,TI505, TI545-1102, TI545-1104		TBP (Transparent Byte Protocol) or NITP (Non-Intelligent Terminal Protocol)

PLC Cables and Programming Cable Part Numbers

Part Number	Cable Description
EZP-2CBL	Direct Logic PLC RJ12 port, DL05, DL105, DL205, DL350 & DL450 (RS-232C)
EZP-2CBL-1	Direct Logic (VGA Style) 15-pin port, DL250 (RS-232C)
EZP-3CBL	Direct Logic PLC RJ11 port, DL340 (RS-232C)
EZP-4CBL-1	Direct Logic PLC 15-pin Dsub port, DL405 (RS-232C)
EZP-4CBL-2	Direct Logic PLC 25-pin Dsub port, DL405, DL350, DL305 DCU, and all DCM's (RS-232C)
EZP-90-30-CBL	GE 90/30 and 90/70 15-pin Dsub port (RS-422A)
EZP-SLC-232-CBL	AB SLC 5/03/04/05 DF1 port (RS-232C)
EZP-PLC5-232-CBL	AB PLC5 DF1 port (RS-232C)
EZP-MLOGIX-CBL	AB Micrologix 1000, 1200 & 1500 (RS-232C)
EZP-MITSU-CBL	Mitsubishi FX Series 25-pin port (RS-422A)
EZP-MITSU-CBL-1	Mitsubishi FX Series 8-pin (RS-422A)
EZP-OMRON-CBL	Omron C200, C500 (RS-232C)
EZP-S7MPI-CBL	Siemens 7 MPI Adaptor (RS-232C)
EZTEXT-PGMCBL	EZText Programming Cable
EZP-CTRLUNI-CBL	Control Techniques Uni-drive 4-wire 9-in D-shell female connector (RS-422)
EZP-ARCOL-CBL	Aromat PLC, 5-pin Mini DIN male port (RS-232C)
EZP-CTCBI-CBL	CTC PLC, RJ-12 port (RS-232C)
EZP-MODRTU-CBL	Modicon PLC, 9-pin D-shell male port (RS-232C)
EZP-TX505-CBL	Texas Instruments 505 series PLC, 9-pin D-shell female port (RS-232C)
EZP-IDECS-CBL	Idec MicroSmart PLC 8-pin Mini DIN male port (RS-232C)
EZP-TX545-CBL	TI545-1102 series PLC, 9-pin D-shell male port (RS-232C)
EZP-TX545-CBL1	TI 545-1104 series PLC 9-pin D-shell female port (RS-232C)
EZP-CBL	EZPLC 9-pin D-sub male (RS-232)

Accessories and Optional Equipment

Part Number	Description
EZ-TEXTEDIT-E	EZText Enhnaced Programming Software
EZ-TEXT-S-GSK	Standard Replacement Gasket (small)
EZ-TEXT-L-GSK	Standard Replacement Gasket (large)
EZ-BRK-2	DIN Clips (package of 4)
EZ-TEXT-STUDS	Mounting Studs (package of 4)
EZ-MULTIDROP	Serial Multiplexer
EZ-MULTIDROP-M	Serial Multiplexer Manual
EZTEXT-PGMCBL	EZText Enhanced Panel Programming Cable
EZ-TEXT-M-E	EZText Enhanced User's Manual
EZ-COMCON3	15-pin male D-sub connectors witth terminal blocks for connecting RS422 network cable from EZText Enhanced
EZ-COMCON4	9-pin female D-sub connectors with terminal blocks
EZ-TEXT-CORE	EZText replacement ferrite cores (qty 2/ pkg)
EZ-TEXT-PWRTERM	EZText Enhanced replacement power terminal strip

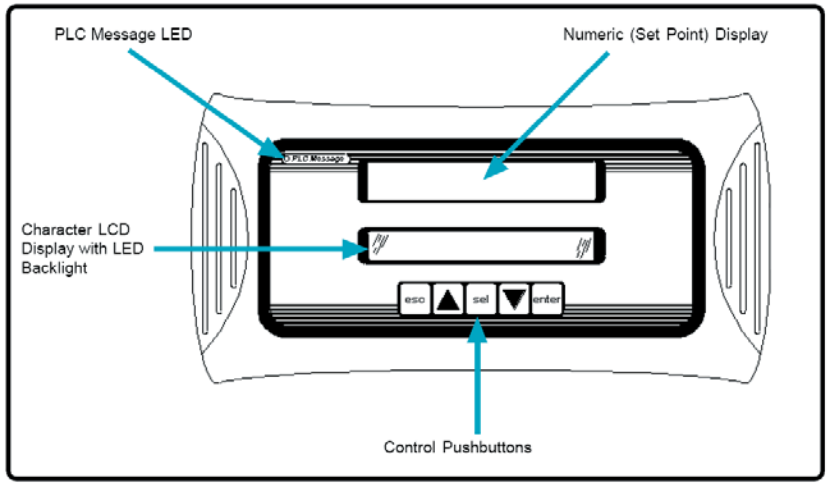
Front Panel Features

In this section, we will describe the front panel features of the EZText Enhanced Set Point Panel. Descriptions of the PLC Message LED, Control Pushbuttons, Numeric Display, and LCD Message Display are provided. To understand more about the features, and how to program the panel, please refer to the Chapter 3, *Learning the Features* and Chapter 5, *Configuration.*

Operator Controls and Indicators

Each EZText Enhanced Set Point Display Panel provides sealed membrane Pushbuttons for operator interface with a PLC. The Control Pushbuttons may be used to change setpoints in the PLC or scroll through messages. EZText Enhanced Panel Control Pushbuttons are located on the front panel. Also on the front panel are an LCD Text Display and LED Numeric Display.

PLC Message LED
This LED will illuminate to indicate that the PLC has triggered a message that will be displayed in the LCD window. The message is locked into the display for three seconds to ensure that the operator reads the message. The LED will turn OFF when the operator presses the **Escape (esc)** pushbutton, thereby acknowledging message received, and returns to the previous message that was being viewed.



Control Pushbuttons

There are 5 Control Pushbuttons. These buttons consist of an **esc** (escape), ⍰ (UP Arrow), ⍰ (DOWN Arrow), **sel** (select,) and **enter** pushbutton. When configured with the EZText Enhanced Programming Software, an Interactive Message can be set up as a setpoint for adjustment using the **UP/DOWN Arrow** pushbuttons. The operator can then press the **UP/DOWN Arrow** buttons and the numeric value will increment or decrement, respectively. As it is adjusted, the value WILL NOT BE UPDATED in the PLC data register until the **enter** pushbutton is pressed. When completed, the operator will press the **enter** pushbutton and the value will be written to the PLC. Press **esc** to abort or cancel the adjustment without writing the value to the PLC.

Numeric LED

The EZText Enhanced Set Point Display Panel has a 8-digit (7 segments each) Numeric LED display. It will display a word (16-bit) or a long value (32-bit). It can display a value from 0–99999999 in Decimal or BCD. (The most significant digits will be blanked if not used.) To edit a value, press the select button to make the first digit in the display blink. This means that the digit is ready to be edited. You can move to each subsequent digit by pressing the select button until the digit you wish to update is blinking. Then, simply use the **UP / DOWN Arrow** pushbuttons to increment or decrement the value. When a value is incremented past "9", the next most significant digit is incremented and so on until an upper limit has been reached or you are at the most significant digit.

For example, if the display reads 9376.2 and you are incrementing the "7" digit and increment past nine, the digit you are editing becomes a "0" and the "3" to the left will increment to "4", and so on→

9376.2→ 9386.2→ 9396.2 9406.2

When finished editing the value, the **enter** pushbutton is pressed to write the new value to the PLC and take you out of edit mode.

Character LCD with LED Backlight

The EZ-SP model provides one message line that can display up to 16 characters. The LCD Display serves as a message screen for data displayed in the Numeric LED Display. Instead of creating labels to describe the data fields, simply use EZText Enhanced Programming Software to program the message or label to be display with the data.

To learn more about the features and controls, see Chapter 3.

Specifications

Description:	1x16 LCD Display, 8 digit LED display, five control pushbuttons
Display Type:	Character LCD, 1 line by 16 characters w/8 digit .52" LED numeric display
Character Height:	8.06mm (0.316")
Viewing Angle:	± 15 degrees horizontal
Keypad Overlay:	Five control pushbuttons
Service Power:	24VDC (20-30VDC operating range)
Power Consumption:	6.5 Watts @ 24VDC
Enclosure:	NEMA 4, 4x (indoor)
Agency Approval:	UL, CUL, CE
Operating Temperature:	0 to 45 °C (32 to 113 °F)
Storage Temperature:	–20 to +60 °C (–4 to +140 °F)
Humidity:	10–95% R.H. (noncondensing)
Electrical Noise:	NEMA ICS 2-230 showering arc, ANSI C37.90a-1974 SWC Level C Chattering Relay Test
Withstand Voltage:	1000VDC (1 minute), between power supply input terminal and protective ground (FG)
Vibration:	5 to 55 Hz 2G for 2 hours in the X, Y, and Z axes
Shock:	10G for under 12 ms in the X, Y, and Z axes
Burn-in:	Temperature cucled 96 hours and then fully functional tested
LED/LCD Life:	100,000 hours
Serial Communications:	Download/Program/PLC Port — RS-232C, RS-422A, RS-485 15-pin D-sub (female)
External Dimensions:	10.018" x 5.00" (254.458mm x 126.998mm)
Weight:	.85 lbs

2

Hardware Installation

In this Chapter....

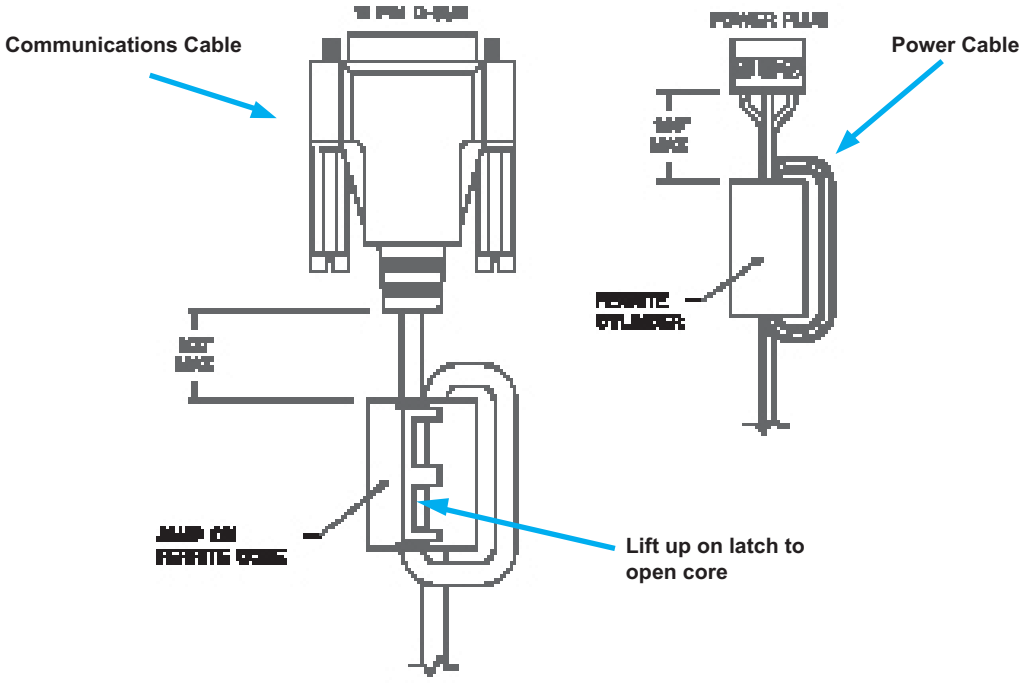
- — EMI Noise Filter Installation
- — Mounting
- — DIN Clip Mounting
- — Connections and Wiring

EMI Noise Filter Installation

EZText Enhanced Panels are supplied with two ferrite cores that should be attached to the cables prior to installation of the EZText Enhanced Panel. These cores are *required to suppress EMI emissions* that are conducted through the Power Cable and the Communications Cable. The figure, below, shows the ferrite cores properly installed. Attach the cores within one inch of the EZText Enhanced connector. The cable should be snugly wrapped once around the core, providing two passes through the core.

The **Power Cable Core** is a solid ferrite cylinder. The Power Cable should pass once through the core, be looped around and pass through a second time. Pull the excess cable so that it rests snugly against the outside of the core.

The **Communications Cable Core** is a snap-together, split, ferrite core. This core can be installed on a finished cable. Lift the latch to open the core. Wrap the wire through the core center, snugly around the outside, and again through the center. Close the core until the latch snaps. Ensure that the cable jacket is not pinched between the two halves of the core. The finished cable should look similar to the drawing shown below.

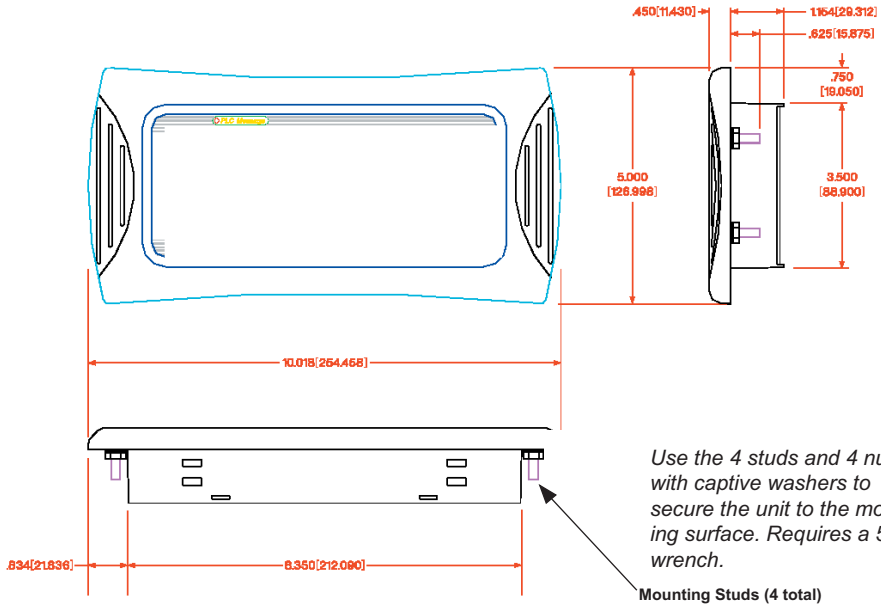


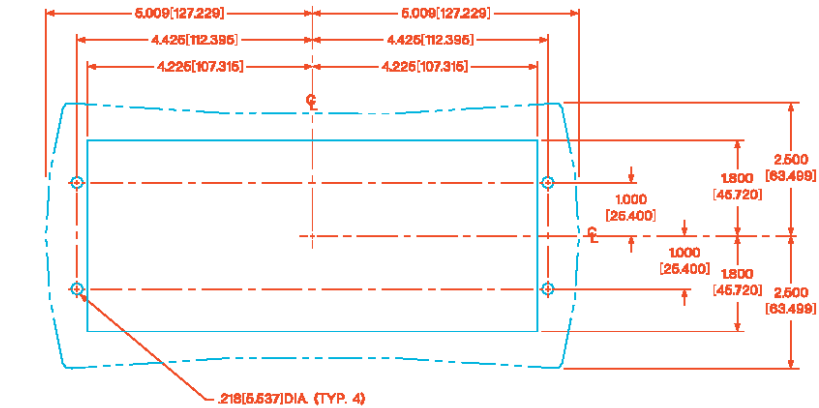
Mounting

EZText Enhanced Panels can be mounted in two different ways: 1) Stud Mounting, and 2) DIN Clip Mounting. The panel comes with all the necessary mounting hardware required for stud mounting. DIN Clips (P/N EZ-BRK-2) must be ordered separately.

STUD Mounting:

Model EZ-SP Outline
Dimensions and Mounting Template

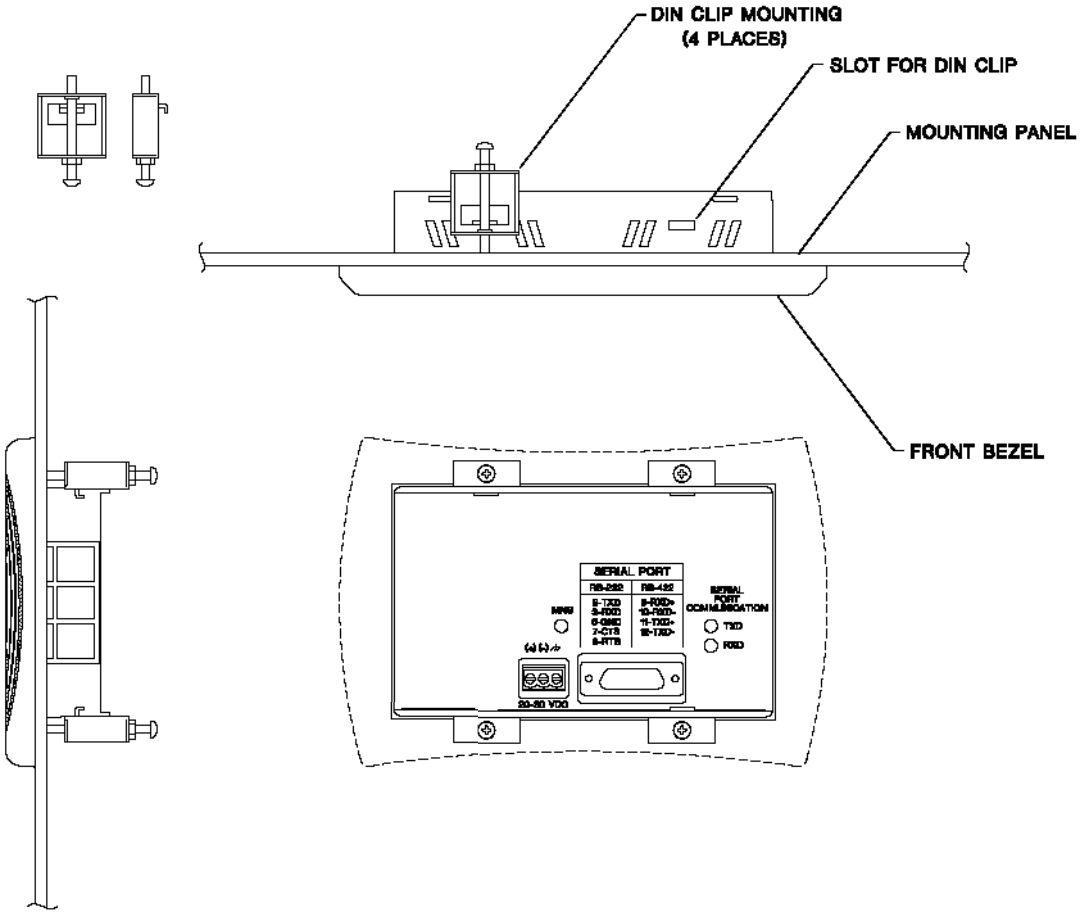




MOUNTING TEMPLATE

DIN CLIP Mounting:

DIN Clips (P/N EZ-BRK-2) are metal brackets that attach to the panel housing and secure the front bezel to a mounting surface with a screw. They provide an alternative to bolting the panel into the mounting surface. There are 4 square holes in the chassis (two on the top and two on the bottom). Insert the clip flange into the holes and secure the EZText Enhanced Panel by tightening the DIN CLIP screw until the front bezel is firmly pressed to the mounting surface.

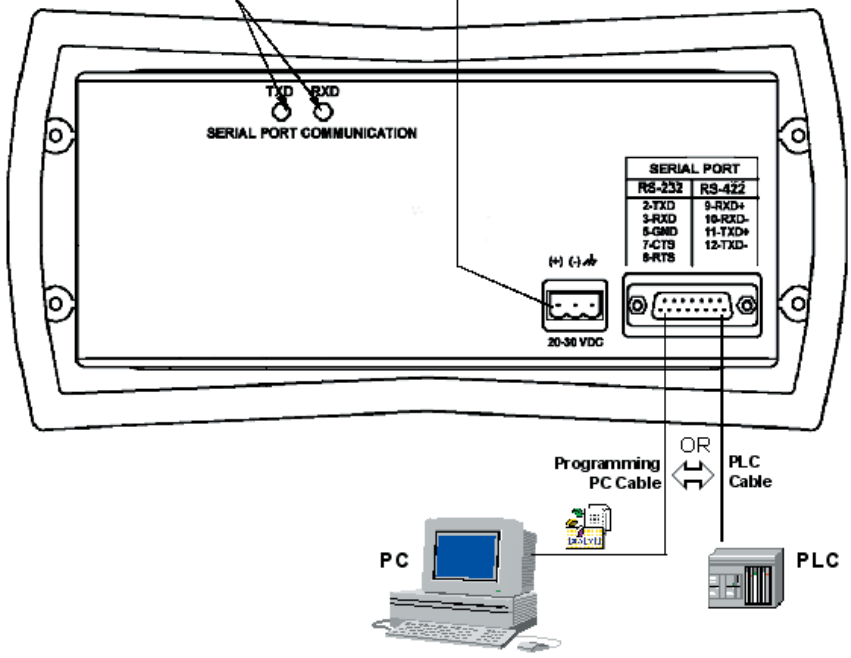


EZ-SP Rear View

Serial Port Communication LEDs
These LEDs illuminate to show whether the unit is sending or receiving data.

24 VDC Power Source

Power Connector
Block style connector is used to connect an external 24 VDC power supply. See Power Connector Pinout on page 18.



Serial Port
This port may be used to connect the programming computer or a PLC (see page 18). Use Programming Cable P/N EZTEXT-PGMCBL to connect the PC. See PLC Cable Part Number table, page 19, for the appropriate PLC cable type used by your application.

Power Connector

This block style connector is used to connect an external 24 VDC power supply. The connector with screw terminals is provided with your EZText Enhanced Panel and allows you to plug into the power receptacle. A pinout is shown below. An external power supply is adapted to supply operating voltage to the EZText Enhanced Panel. The power supply must deliver a range of 20 to 30 VDC.

In multi-panel applications, if separate power supplies are used, please ensure the electrical ground common does not have a great potential difference. In a multi-panel application, the power supply must maintain the specified voltage and current consumption under all conditions (this includes powerup) for each of the individual units. Please refer to the specifications on page 12 for the individual units.

Pin #	Connection	
1	+V	24VDC (20–30 VDC)
2	–V	
3	Chassis Ground	

Connect (+) on the unit to the (+) lead of your power source; (-) on the unit is connected to the (-) lead; and chassis GND (on the unit) is connected to the chassis ground of the cabinet. It is recommended you use a regulated power source isolated from relays, valves, etc.

Serial Port

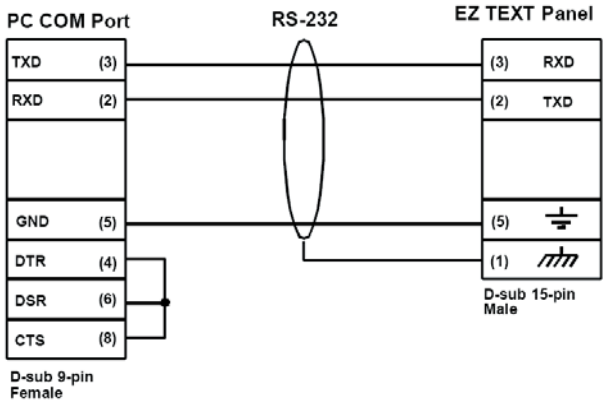
The Serial Port may be used to connect your panel to a programming computer (PC) or a Programmable Logic Controller (PLC). You will only need to connect to a PC when you initially configure and program the EZText Enhanced Panel. The Serial Port is then available for connection to the PLC. When you power up the EZText Enhanced Panel, it will come up in RUN Mode. While in RUN Mode the Serial Port will only communicate with a PLC. To program the panel and have the Serial Port communicate with a PC, you will have to enter the SETUP Mode (see following paragraph).

Connect a Programming PC

To program the EZText Enhanced Panel, you must put the panel into SETUP Mode. When the panel is powered up, it will be operating in the RUN Mode. To enter the SETUP Mode, you must press and hold the UP Arrow button while simultaneously pressing the DOWN Arrow button. While in the SETUP Mode you may also adjust the screen contrast.

The EZText Enhanced Panel is configured using a PC running the EZText Enhanced Programming Software. When you are ready to download the program, connect the programming cable (EZTEXT-PGMCBL) to the serial port of the panel and the serial port of the PC. A wiring diagram follows.

P/N EZTEXT-PGMCBL



Connect a PLC

Connect your PLC to the EZText Enhanced Panel with one of the cables listed below.

Part Number	Cable Description
EZP-2CBL	Direct Logic PLC RJ12 port, DL05, DL105, DL205, DL350 & DL450 (RS-232C)
EZP-2CBL-1	Direct Logic (VGA Style) 15-pin port, DL250 (RS-232C)
EZP-3CBL	Direct Logic PLC RJ11 port, DL340 (RS-232C)
EZP-4CBL-1	Direct Logic PLC 15-pin Dsub port, DL405 (RS-232C)
EZP-4CBL-2	Direct Logic PLC 25-pin Dsub port, DL405, DL350, DL305 DCU, and all DCM's (RS-232C)
EZP-90-30-CBL	GE 90/30 and 90/70 15-pin Dsub port (RS-422A)
EZP-SLC-232-CBL	AB SLC 5/03/04/05 DF1 port (RS-232C)
EZP-PLC5-232-CBL	AB PLC5 DF1 port (RS-232C)
EZP-MLOGIX-CBL	AB Micrologix 1000, 1200 & 1500 (RS-232C)
EZP-MITSU-CBL	Mitsubishi FX Series 25-pin port (RS-422A)
EZP-MITSU-CBL-1	Mitsubishi FX Series 8-pin (RS-422A)
EZP-OMRON-CBL	Omron C200, C500 (RS-232C)
EZP-S7MPI-CBL	Siemens 7 MPI Adaptor (RS-232C)
EZTEXT-PGMCBL	EZText Programming Cable
EZP-CTRLUNI-CBL	Control Techniques Uni-drive 4-wire 9-in D-shell female connector (RS-422)
EZP-ARCOL-CBL	Aromat PLC, 5-pin Mini DIN male port (RS-232C)
EZP-CTCBI-CBL	CTC PLC, RJ-12 port (RS-232C)
EZP-MODRTU-CBL	Modicon PLC, 9-pin D-shell male port (RS-232C)
EZP-TX505-CBL	Texas Instruments 505 series PLC, 9-pin D-shell female port (RS-232C)
EZP-IDECS-CBL	Idec MicroSmart PLC 8-pin Mini DIN male port (RS-232C)
EZP-TX545-CBL	TI545-1102 series PLC, 9-pin D-shell male port (RS-232C)
EZP-TX545-CBL1	TI 545-1104 series PLC 9-pin D-shell female port (RS-232C)
EZP-CBL	EZPLC 9-pin D-sub male (RS-232)

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3

Learning the Features

In this Chapter....

Learning the Features

In this section, we will help you to learn and understand the Features of the EZText Enhanced Set Point Panel. We recommend that you read this chapter well before you attempt to configure and use the EZText Enhanced Set Point Panel features and controls. As you proceed through this section, relate the topics discussed with how you will implement your panel.

Overview

The EZText Enhanced Set Point Display Panel is a human-machine interface. It has two modes of operation —Setup Mode and Run Mode. While in Run Mode, the panel has all of its features (described below) available except Contrast Adjust. Contrast Adjust is only available while in Setup Mode.

The Set Point Panel has two separate physical displays. It has an LCD Message Display and an eight-digit LED Display. The LCD Display will allow the operator to view text messages that are associated with the LED Display.

While in Run Mode, there are two operational modes available— Edit Mode and PLC Mode. PLC Mode is when the PLC is communicating with the Panel, sending data and messages to the Set Point Panel. Edit Mode is when the operator is changing data values to send to the PLC. The Control Pushbuttons will function differently, depending upon the mode (see CONTROL PUSHBUTTONS section).

In addition to the two displays, the Set Point Panel is equipped with five Control Pushbuttons. These pushbuttons allow the operator to control operation of the unit. The front panel has one LED that notifies the operator that the PLC has triggered the message/data currently being displayed. The Set Point Panel is equipped with one dual-purpose serial port. The serial port allows the panel to communicate with either a computer or a PLC. A programming computer is only used when configuring the Set Point Panel. In a system application, the serial port is connected to a PLC. Finally, the rear of the unit has two LEDs, hardware controlled, that inform the operator about serial port communications.

Front Panel Features

LCD DISPLAY
The LCD window, located below the LED display, is where the messages are displayed. A message may be up to sixteen characters in length. A modifiable data set may be associated with each message. The LCD window displays messages triggered by the PLC and by the operator. If a message is triggered by the PLC, the PLC Message LED will illuminate.

LED DISPLAY
The Set Point Panel has eight, 7-segment LEDs at the top of the panel. It can display a value ranging from 0–99999999 in Decimal or BCD format. A data set overflow will be represented by ºXXXXXXX.

The display can represent a number with a decimal point. It is capable of displaying 0.0.0.0.0.0.0.0 – 9.9.9.9.9.9.9.9 Only one decimal point will be displayed at any given time. If Variable is selected for the Decimal Point position (selected in the programming software) the decimal point is PLC controlled. Then, if a PLC controlled decimal point position is set in the ladder logic that is greater than 7, this will result in *all* decimal points being turned on. The least significant segment (LSS) is *not* capable of having its decimal turned on. For a value with no decimal point specified, all leading zeros will be blanked. If the value has a decimal point specified, all leading zeros will be blanked, the only exception is the digit containing the decimal point. The value on the display can be edited if set up as READ/WRITE. The LED digit being edited will blink.

PLC MESSAGE LED
When a PLC message is received, the panel will enter the PLC Mode and illuminate the PLC Message LED. The message is locked into the display for three seconds before the operator can edit or acknowledge the message. This is to ensure that the operator reads the message. To exit the PLC Message and return to the previous message, press **esc**.

CONTROL PUSHBUTTONS
There are five pushbuttons that allow the operator to control the panel. The operation of each pushbutton is described below.

enter — ENTER Pushbutton
Pressing the **enter** pushbutton will write the currently set register value to the PLC. The panel must be in Edit Mode for this to take place. If the panel is not in Edit Mode the pushbutton will be ignored. If there is no Data Set in the message, the **enter** pushbutton will be ignored.

esc— ESCAPE Pushbutton
The **esc** pushbutton will terminate the data entry. If pressed in Edit Mode, the panel will exit Edit Mode, abort writing the data value to the PLC, and the original data value will be displayed. If pressed in PLC Mode, the

panel will exit PLC Mode, abort editing, abort writing the data set to the PLC, and display the previously displayed message. (Also, if pressed in the operational Setup Mode, the panel will exit Setup Mode.)

sel — SELECTION Pushbutton

The **sel** pushbutton will activate the Edit Mode for the currently viewed data register. When pressed, the panel will enter Edit Mode, unless there is no data set associated with the message. Edit Mode is indicated by a blinking digit on one of the 8 seven-segment displays. Upon entry into Edit Mode, the first digit to blink will be the LSD (Least Significant Digit). On each successive press, the blinking cursor will move from LSD to MSD (Most Significant Digit). If the operator attempts to select a leading digit that is blanked, that digit will show a blinking zero. If **sel** is pressed when the MSD is blinking, then the LSD will blink.

⍰⍰ — SCROLL Pushbuttons

The ⍰ ⍰ (UP/DOWN Arrows or Scroll Pushbuttons) will be used in four different ways.

1) The Scroll pushbuttons can be used to retrieve the next or previous message. If the UP arrow is pressed in Non-Edit Mode, the previous message will be retrieved. If the DOWN arrow is pressed in Non-Edit Mode, the next message will be retrieved.

2) The Scroll pushbuttons are used to increment or decrement the register values in Edit Mode. If pressed in Edit Mode, the digit will increment or decrement by 1, 10, 100, … 10000000. Specifically, the operator can increment (0 to 9) or decrement (9 to 0) the selected (blinking) digit. When the operator increments a value past 9 the next most significant digit is incremented. If the operator decrements the leading digit to zero, the blinking indicator will shift towards the LSD until it reaches the first nonzero number. The register values can be configured to have a range with upper and lower limits.

3) Simultaneously pressing the UP and DOWN arrows will place the panel in Setup Mode. You must be in Setup Mode to write the program to the panel and to change the firmware.

4) If the UP or DOWN arrow is pressed in Setup Mode, the LCD Contrast will be adjusted.

Rear Panel Indicators

TXD LED

This LED will toggle "on" and "off" to signal activity on the transmission line.

RXD LED

This LED will toggle "on" and "off" to signal activity on the receive line.

Functional Description

On power-up, the EZText Enhanced Set Point Display Panel will enter the Run Mode and alpha-characters "ABCDEFGH IJKLMNOP" will be written to the LCD display and "8.8.8.8.8.8.8.8" will be written to the 8-digit LED Display for approximately three seconds. This information will be removed when the first message is retrieved. The messages/data will be displayed in two ways, either triggered by the PLC or triggered from the front panel.

Scrolling through Message List

If a message triggered from the PLC is not being displayed or edited, the user can scroll through a list of messages. (These messages are programmed using the EZText Enhanced Programming Software.) To scroll through the messages, press the "⍓" (UP Arrow) or "⍗" (DOWN Arrow) button. Pressing "⍓" button will retrieve the previous message. Pressing "⍗" button will retrieve the next message. When a message is displayed that has a Data Value , you can press the "**sel**" (Select) button to edit the Data Value.

Editing a Data Set

While editing, the operator can either edit the data or escape out of the Edit Mode. When the operator presses the **sel** button, the LSD (Least Significant Digit) in the display will blink. This is an indication that the panel is ready to edit. If the data has READ Only access, you will not be able to edit the value. If the data set is READ Only, a warning message will be displayed in the LCD window for a few seconds. The operator will not be allowed to edit this data set.

While in the edit mode, the blinking digit is the digit selected to be edited. To select another digit, press the **sel** button again. Each successive press of the **sel** button will move the blinking cursor progressively toward the MSD (Most Significant Digit). If the **sel** button is pressed while the MSD is blinking, the LSD will begin to blink. While any of the eight digits is blinking, the operator may edit the currently displayed data set or escape out of the edit mode.

If the operator presses the **esc** button, the panel will exit the edit mode. When escaping from the edit mode, the currently displayed data set will not be written to the PLC, the selected digit will stop blinking, and the original data set will be displayed.

If the operator presses the "⊠" or "⊠" button instead of escaping, the selected digit will increment or decrement, respectively. The data set will increase or decrease by 1, 10, 100, 1000, 10000, 100000, 1000000, or 10000000 depending on the digit selected. If the attempt to increment or decrement results in an illegal value, the attempt will be ignored.

The data set may have a predefined range to limit the range of the data set. This can by defined while programming the messages. If the operator presses the **esc** button at this point, the panel will exit the edit mode. When escaping from the edit mode the currently displayed data set **will not** be written to the PLC, the selected digit will stop blinking, and the original data set will be displayed. To send the changes to the PLC, the operator must press the **enter** button and the currently displayed data will be written to the PLC. The status (press/release) of the **enter** pushbutton will be sent to the PLC, and the panel will exit the edit mode.

Editing PLC Triggered Data/Message

If a message that was triggered by a PLC is being displayed, the operator can edit or acknowledge the message. The PLC LED will illuminate when a message has been triggered by the PLC. This LED will remain on for at least three seconds. After the three seconds have expired, the operator can just acknowledge the message or alter its data. To acknowledge a PLC triggered message, just press the **esc** button. This will cause the previously displayed message to be displayed. If the operator presses the **sel** button, the panel goes into edit mode, and the data set may be edited as described above.

Entering the Setup Mode

The EZText Enhanced Set Point Panel can be placed in Setup Mode by simultaneously pressing the "⊠⊠" buttons.

Adjusting the Contrast while in Setup Mode

When in the Setup Mode, the LCD contrast can be adjusted using either of the "s" or t" buttons. Pressing the **esc** button will return the panel to Run Mode.

Messages

Message Operation

The Set Point Panel will allow the panel programmer to define up to 256 messages. The messages can have a maximum of 16 ASCII characters. Each message may have one variable data value associated with it. The range of this value may be limited if the range option is selected during configuration. The range option allows the panel programmer to select an upper and lower limit for the data value. When editing, the operator will then only be able to enter a value within the range limits.

The *Upper Limit* is to test for the upper limit for the data value and *Lower Limit* is to test for the lower limit for the data value. This will let the user update the value between the ranges. Data values can be scrolled. Data values can also be incremented or decremented with the **UP/DOWN Arrow** Buttons.

Message Types

There are three primary categories: Static, Dynamic, and Interactive messages identify the different message types.

Static Messages

Static Messages are text displays that have NO data value associated with it. Static Message may be displayed when an event or condition becomes true. You will enter the messages using the EZText Enhanced Programming Software.

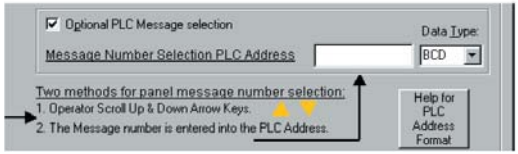
Dynamic Messages

Dynamic messages (READ only register) are text messages that are associated with and/or describe a data value. These messages are used to present the operator with important PLC data. A value will display on the LED and a message will display in the LCD window. This data is information that helps the operator closely monitor and/or control the machine or process.

Data Values in messages can be of two types — Decimal and BCD. These two types can be in two different formats— with variable decimal point or without. Decimal point values can be in either variable or fixed position.

Interactive Messages
An Interactive Message is used by the operator for data entry. This type of message is used for changing values that are stored in the PLC registers. These values are items such as; Set Point, Upper and Lower Limits, etc. Changes to data values are made using the **UP/DOWN Arrow** buttons.

Displaying Messages



Static Message Operation
To display a configured message on the LCD Display, you simply put the message number (1–256) in the **Message Number Selection PLC Address.** Your ladder logic program must sequence the message being displayed by placing an integer value (1–256) in the PLC message register.

Dynamic Message Operation
Dynamic Messages are text messages that are associated with a Read Only Data Value. These messages present the operator with important PLC data. The LCD Display serves as a message screen for the data displayed in the 8-digit LED Numerical Display. Instead of creating labels to describe the data fields, simply use EZText Enhanced Programming Software to program the message or label to be displayed with the data. The PLC Message LED illuminates when the PLC displays a register value and its associated text message. You may program message numbers 1–256 as dynamic messages.

Interactive Message Operation
Interactive Messages allow the operator to edit Read/Write Data Values using the Control Pushbuttons. Use these messages to enter or change values that are stored in PLC registers. Check the proper PLC product user manual to verify which data formats are supported. Depending on the PLC, the data format will be either Binary or BCD (Binary Coded Decimal). You may program message numbers 1–256 as Interactive Messages.

4

Tutorial

In this Chapter....

EZText Enhanced Panel Setup

SETUP Mode

In order to download the program to the EZText Enhanced Panel using the EZText Enhanced Programming Software, you must be in the Setup Mode. Setup Mode is also where you will **adjust the display contrast** of the EZText Enhanced Panel.

The EZText Enhanced Panel will start up in the RUN Mode. To access the SETUP Mode, follow these steps:

1. Press the **UP Arrow** Pushbutton and hold while simultaneously pressing the **DOWN Arrow** Pushbutton to enter the SETUP Mode.

2. At any time you may press the Escape (**esc**) button to go back to RUN Mode. You will be taken back to the start of the Local Message menu (cursor is placed at root level when you return from setup).

Adjust Display Contrast

You may only adjust the Display Contrast when in Setup Mode. To adjust the display contrast use the UP and DOWN arrows to increase or decrease the contrast.

Internal Software and Hardware Revisions

While in **SETUP** Mode the Panel Hardware Revision, Driver Revision, Boot Revision, and Exec (Firmware) Revision numbers will display on the panel.

Preparing for Configuration

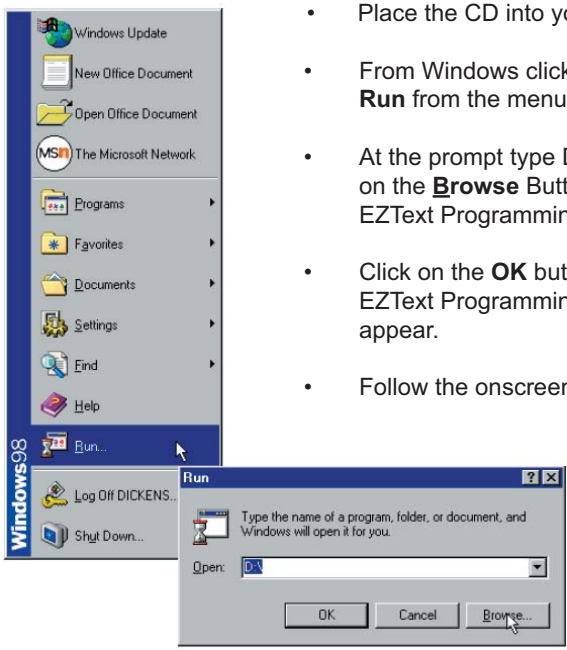
If you prepare and plan ahead of time, your use of the EZText Enhanced Programming software will be successful. Below are a few important steps to take to prepare to program your application.

- Prepare your personal computer and ensure proper installation of the EZText Enhanced Programming Software
- Know your operator interface requirements. Determine the type of EZText Enhanced Panel and the number of EZText Enhanced Panels required by your application
- Know your PLC type and available resources, such as, programming tools, CPU capabilities, user memory, etc.
- Verify type of communications port, as well as protocol used. Determine the CPU link(s) available for connecting an EZText Enhanced Panel (RS-232/RS-422, baud rate, parity, stop bits.)

- Determine how the Set Point and Display Messages will be configured in your panels with respect to your machine or process.
- To prepare your application, use the application worksheets provided in appendix A of this manual. The example worksheets will help you understand how the EZText Enhanced program is configured. Blank worksheets can be used in planning, implementing, and using your EZText Enhanced Panels.

Installing EZText Programming Software

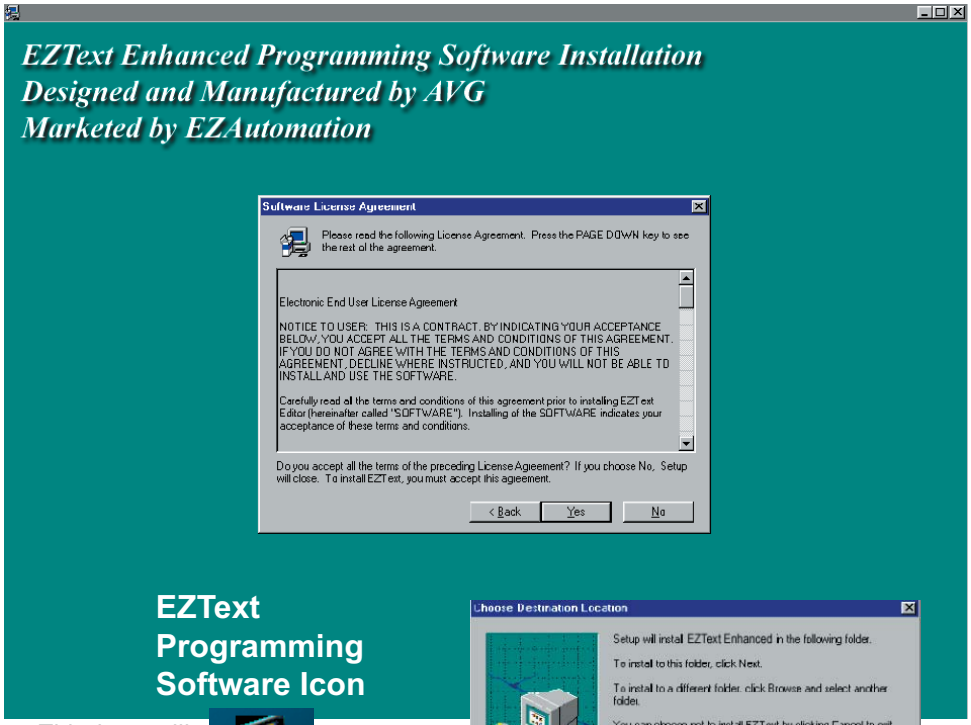
EZText Enhanced Panels are configured with software running on an IBM or compatible personal computer. This software is available through EZAutomation, (P/N EZ-TEXTEDIT-E). The software is used to download your configuration before connecting the panel and communicating with a PLC. Help Topics are provided to help you configure your panel. You design and configure your EZText Enhanced program off-line and save it to disk. The program may then be transferred to the EZText Enhanced Panel. To install EZText Programming Software, perform the following steps:



- Place the CD into your **CD ROM Drive.**

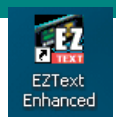
- From Windows click on the **Start** Button, and then click on **Run** from the menu. The **Run** dialog box will pop up.
- At the prompt type D:\ (or your CD Drive)\setup.exe or click on the **Browse** Button and find the **Setup.exe** file for EZText Programming Software.
- Click on the **OK** button to begin the installation. The EZText Programming Software Installation Screen will appear.
- Follow the onscreen prompts to load the software.

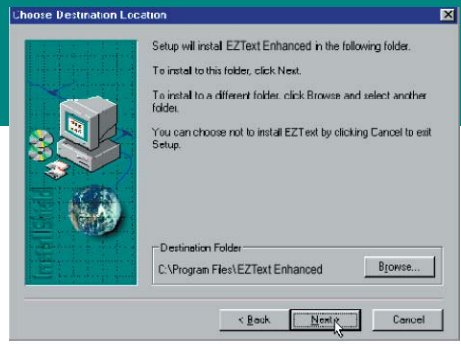
Installation Screens



EZText Programming Software Icon

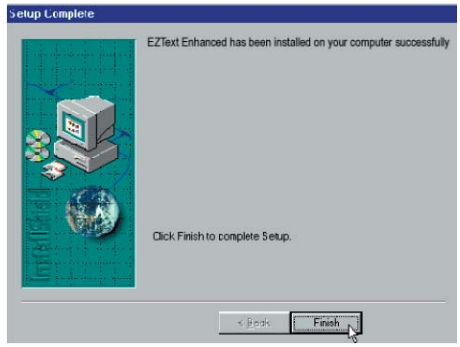
This icon will appear on your desktop after installation.





This is the final installation screen. Here you select the destination folder where your software program will be installed. The default destination location is C:\ Program Files\EZText. If you wish to select another destination, click on the Browse button.

To complete the installation, click on Next> button. That's all there is to it! The EZText Enhanced Icon shown above will appear on your desktop. Simply click on it to open the Programming Software!



Tutorial — Plan the Project using Application Worksheets

The following is a project tutorial. It will take you through the process of creating a new project, creating messages, and transferring a project to the EZText Enhanced Panel. This should help familiarize you with the EZText Enhanced Programming Software.

Let's start by filling out the application worksheet found in Appendix A. For tutorial purposes, we have already filled in the information. For your project, make copies of the forms in Appendix A. Follow steps 1 through 8 as shown below to fill out the application worksheet for the EZText Demo Project.

EZTEXT ENHANCED APPLICATION WORKSHEET

1 Fill in the Project and PLC information.

PROJECT NAME: EZText Demo Project PANEL TYPE: EZ-SP

PLC CONFIGURATION:

PLC MANUFACTURER: DirectLogic
PLC Model: 250
PLC Protocol: K-Sequence
PLC Address: 1
PLC Timeout: 40 secs.

Baud Rate: 9600
Parity: Odd
Data Bits: —
Stop Bits: —
Checksum: —

2 Select if using PLC generated messages. Assign a PLC Address.

☑ **Optional PLC Message Selection:**

PLC Address: V3000 ☑ BCD ☐ Binary

3 Add Message No. 1. This is a display (Read Only).

Message No. 1: MIXER TANK LEVEL (16 characters)

Set Point PLC Address: V2000

Display Method: ☑ Read Only ☐ Read/Write

Data Type: ☑ BCD/Int 16 ☐ BCD/Int 32 ☐ Binary/Int 16 ☐ Binary/Int 32

Set Point Range: Min. _____ Max. _____

Decimal Point: ☐ None ☑ Fixed (1–7) 2 ☐ Variable*

* Variable Decimal Point PLC Address: _____

4 Add Message No. 2. This is a Setpoint.

Message No. 2: SET HIGH LVL ALM (16 characters)

Set Point PLC Address: V2001

Display Method: ☐ Read Only ☑ Read/Write

Data Type: ☑ BCD/Int 16 ☐ BCD/Int 32 ☐ Binary/Int 16 ☐ Binary/Int 32

Set Point Range: Min. 20.00" Max. 22.00"

Decimal Point: ☐ None ☑ Fixed (1–7) 2 ☐ Variable*

* Variable Decimal Point PLC Address: _____

— continued, next page

EZTEXT ENHANCED APPLICATION WORKSHEET

5 Add Message No. 3. This is also a Set Point.

5

Message No. 3 — S E T _ L O W _ L V L _ A L M _ (16 characters)

Set Point
PLC Address: V2002

Display Method:
- ☐ Read Only
- ☑ Read/Write

Data Type:
- ☑ BCD/Int 16
- ☐ BCD/Int 32
- ☐ Binary/Int 16
- ☐ Binary/Int 32

Set Point Range:
Min. 1.00"
Max. 3.00"

Decimal Point:
- ☐ None
- ☑ Fixed (1–7) 2
- ☐ Variable*

* Variable Decimal Point PLC Address: _____

6 Add Message No. 4. This is a PLC Message with no data.

6

Message No. 4 — M I X E R _ C Y C L E _ M O D E (16 characters)

Set Point
PLC Address: none

Display Method:
- ☑ Read Only
- ☐ Read/Write

Data Type:
- ☐ BCD/Int 16
- ☐ BCD/Int 32
- ☐ Binary/Int 16
- ☐ Binary/Int 32

Set Point Range:
Min. _____
Max. _____

Decimal Point:
- ☐ None
- ☐ Fixed (1–7) _____
- ☐ Variable*

* Variable Decimal Point PLC Address: _____

7 Add Message No. 5, PLC Message.

7

Message No. 5 — H I _ T A N K _ L V L _ A L M _ (16 characters)

Set Point
PLC Address: none

Display Method:
- ☑ Read Only
- ☐ Read/Write

Data Type:
- ☐ BCD/Int 16
- ☐ BCD/Int 32
- ☐ Binary/Int 16
- ☐ Binary/Int 32

Set Point Range:
Min. _____
Max. _____

Decimal Point:
- ☐ None
- ☐ Fixed (1–7) _____
- ☐ Variable*

* Variable Decimal Point PLC Address: _____

8 Add Message No. 6, PLC Message.

8

Message No. 6 — L O _ T A N K _ L V L _ A L M _ (16 characters)

Set Point
PLC Address: none

Display Method:
- ☑ Read Only
- ☐ Read/Write

Data Type:
- ☐ BCD/Int 16
- ☐ BCD/Int 32
- ☐ Binary/Int 16
- ☐ Binary/Int 32

Set Point Range:
Min. _____
Max. _____

Decimal Point:
- ☐ None
- ☐ Fixed (1–7) _____
- ☐ Variable*

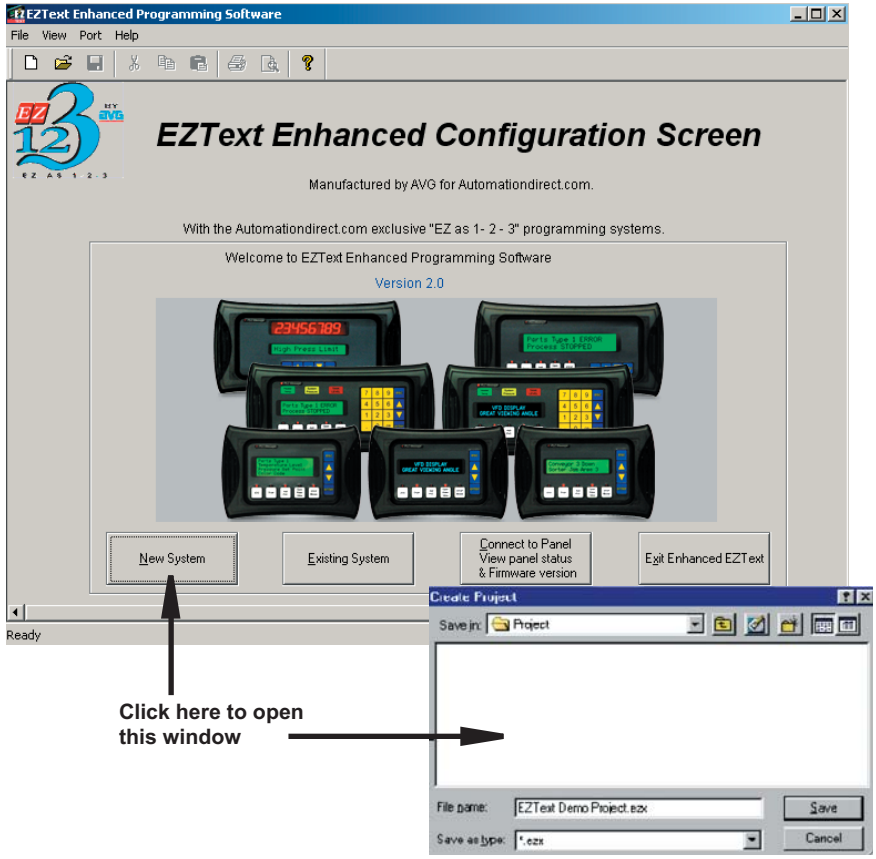
* Variable Decimal Point PLC Address: _____

Tutorial — Create the Project using EZText Programming Software

Let's assume you have the programming software installed on your PC (if you don't, go back to page 31 and install now). Connect the EZText Enhanced Panel to your PC using the P/N EZTEXT-PGMCBL cable. Apply 24 VDC to the panel power connector.

1. From the **Welcome** screen, click on the **New System** button.

2. The **Create Project** window will appear. Type in "EZText Demo Project" in the **File name** field. Click on **Save**. (If you don't want your project saved to the default "Project" folder, navigate to the directory and/or folder where you want it to reside.)

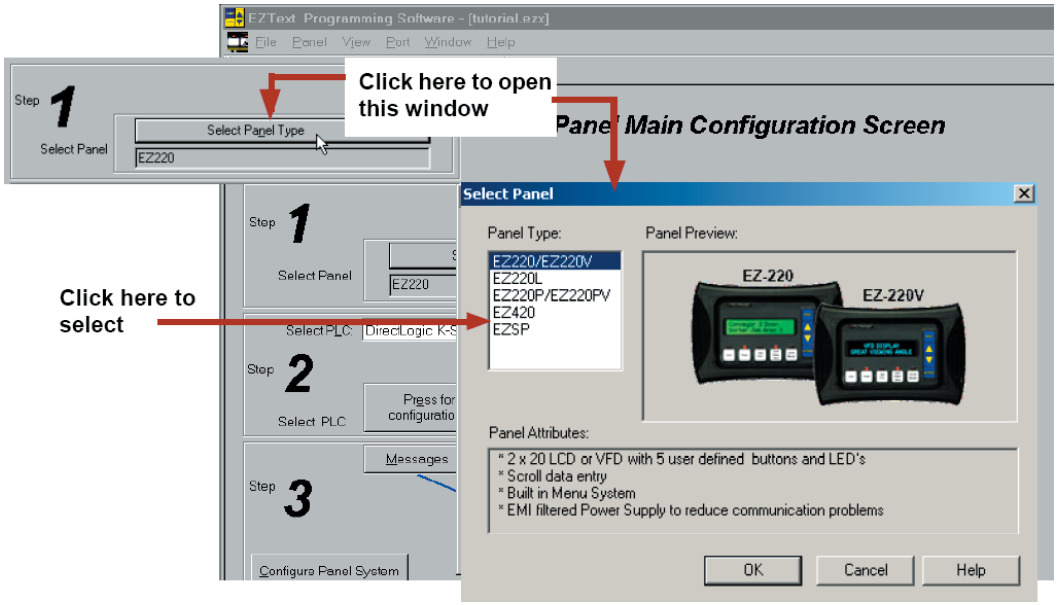


3. In **Step 1, Select Panel**, you will start your project by selecting the panel type you are using.

   a. From the **Main Configuration** Screen, click on the **Select Panel Type** button.

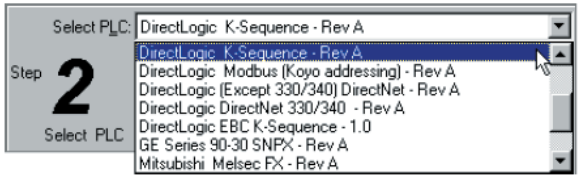
   b. The **Select Panel** dialog box will open. Under **Panel Type**, click on the panel type you are using to highlight it. A picture of the panel will appear under **Panel Preview**, and key features of the panel are displayed under **Panel Attributes**.

   c. Click on the **OK** button to select and close the dialog box.

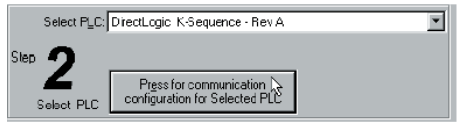


4. In **Step 2, Select PLC,** you will choose the type PLC you are using.

   a. Click on the DOWN arrow next to the **Select PLC** field to view the drop down menu of available PLCs. Click on the PLC Type to select.

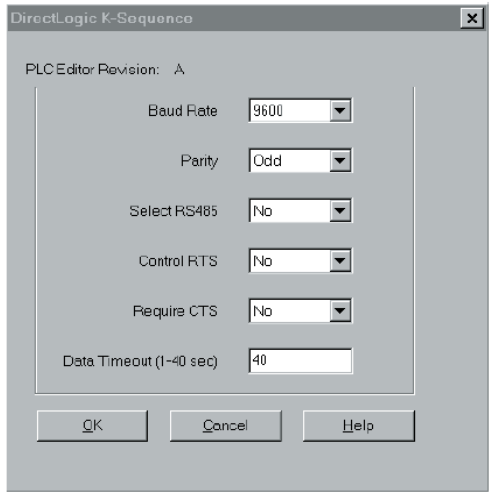


b. Click on the **Press for communication configuration for Selected PLC** button.



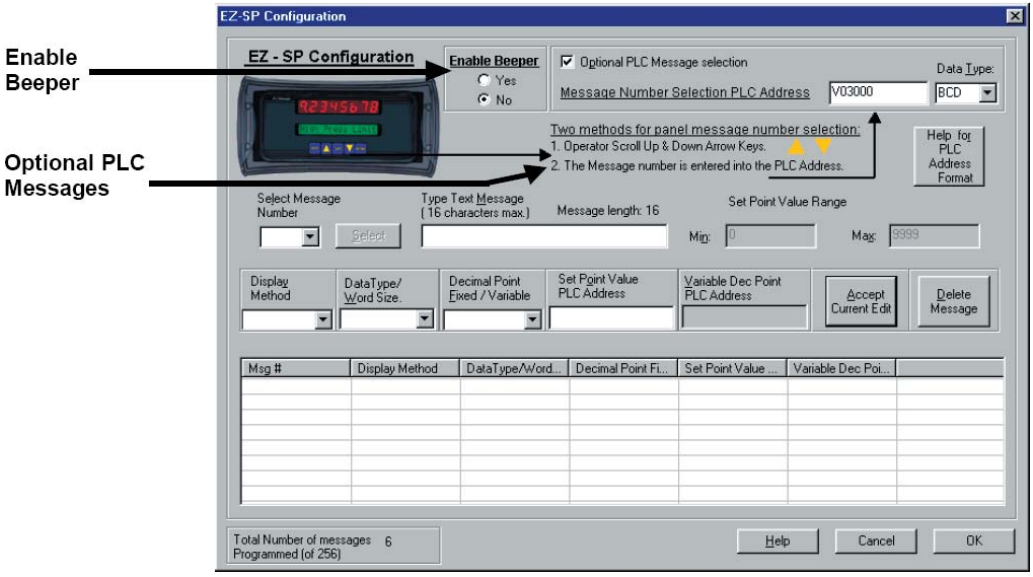
c. The **PLC Communications Attributes** window will appear for the PLC you have selected. (In this case, DirectLogic K-Sequence.) Set the attributes to match those in the screen capture, below. Click on the **OK** button.

Please Note:
The PLC communication attributes must match the COM port settings for your selected PLC.



5. In **Step 3** you will configure the **Messages.**

6. Click on the **Messages** button. The following screen will appear.

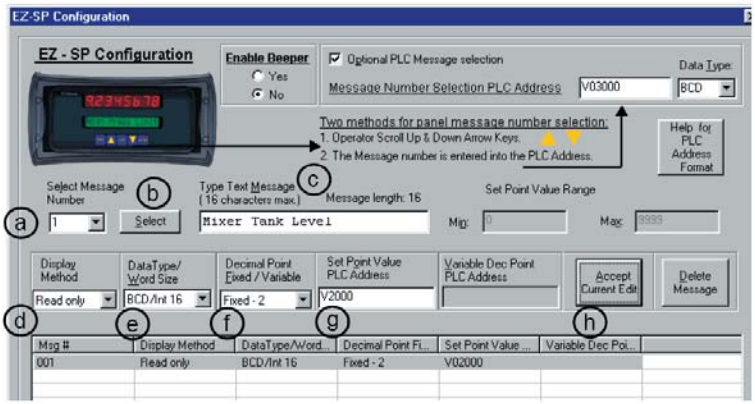


7. Use your Application Worksheets to configure the Messages.

8. To **Enable Beeper**, select **Yes** or **No**.

9. For "Optional PLC Messages," click on the box in front of **Optional PLC Message selection** to select, and enter "**V3000**" for PLC Address and select a **Data Type** of "**BCD**."

10. Add **Message No. 1** as shown below. Refer to letter callouts (a through h) on the graphic below, that match the following steps:



a. Type a **"1"** under **Select Message Number**.

b. Click on the **Select** button. Some of the fields will fill in with selectable data. The cursor will go to the **Message Text** field.

c. Enter **"Mixer Tank Level"**.

d. Select **Read Only** for **Display Method**.

e. Select **BCD/Int 16** for **Data Type/Word Size**.

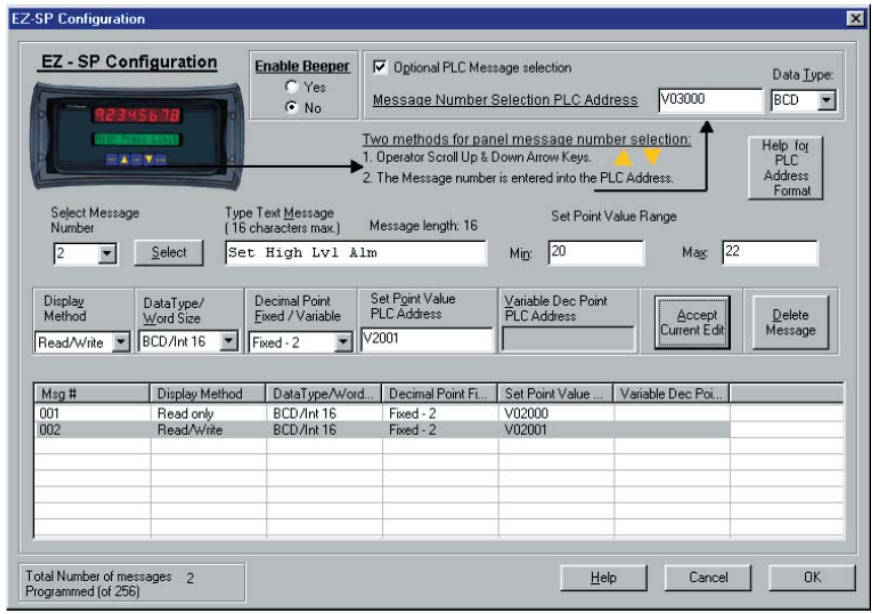
f. Select **Fixed-2** for **Decimal Point Fixed/Variable**.

g. Enter **"V2000"** for **Set Point Value PLC Address**.

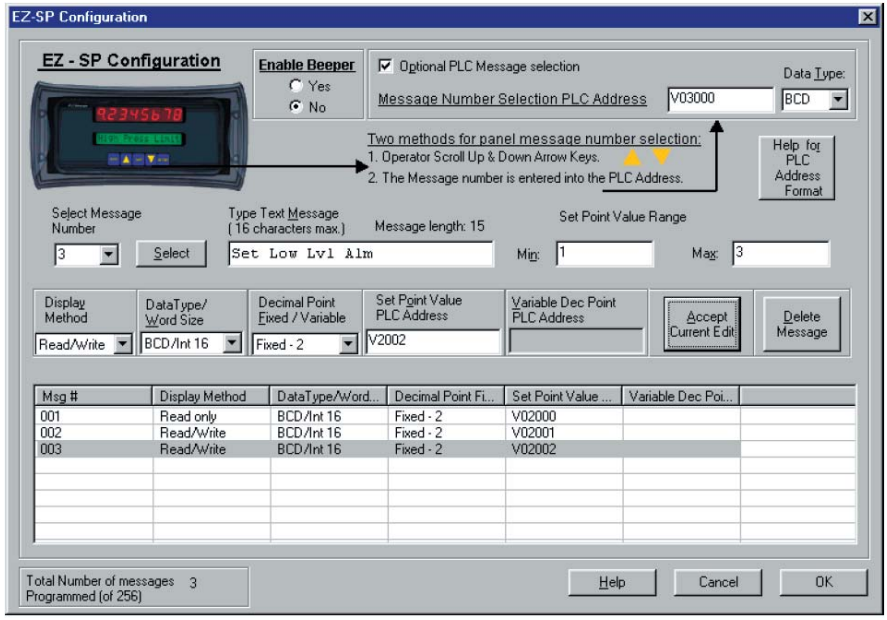
h. Click on the **Accept Current Edit** button.

11. Configure Messages 2, 3, 4, 5, and 6 as shown in the following graphics:

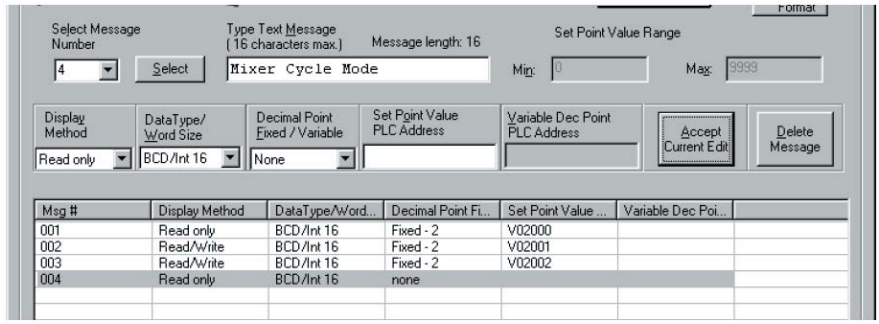
Message No. 2



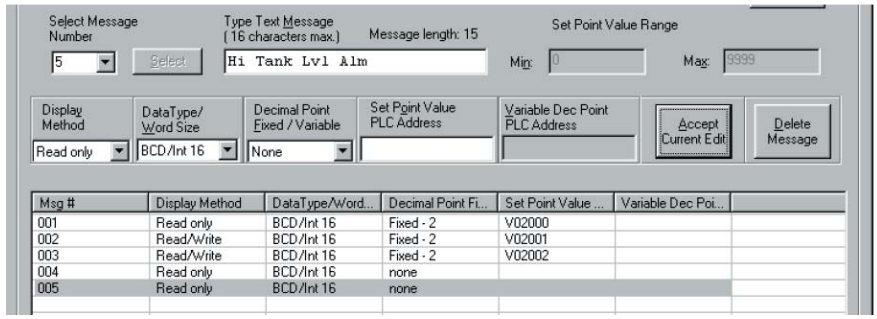
Message No. 3

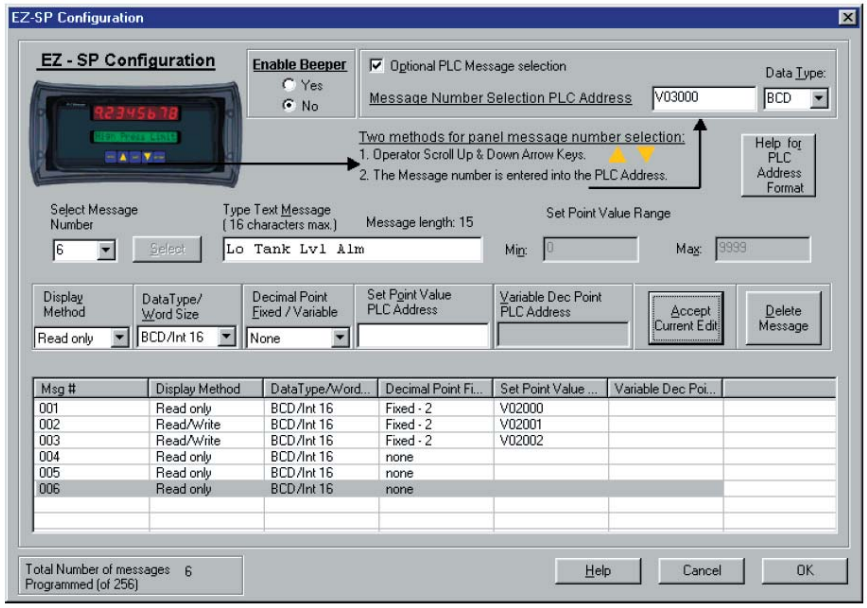


Message No. 4



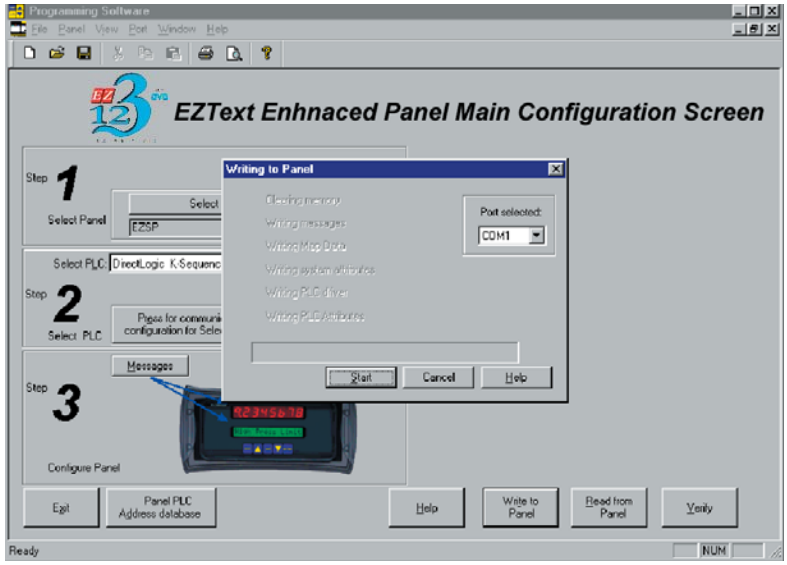
Message No. 5





12. You are now ready to write the project to the EZText Enhanced Panel.

13. Click on the **Write to Panel** button on the **Main Configuration Screen**.

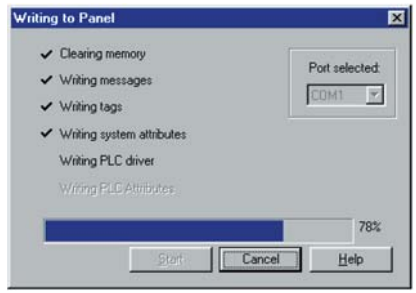


14. The **Writing to Panel** screen will appear. Click on the down arrow under **Port selected** and select the COM port on your PC that is connected to the EZText Enhanced Panel (COM1, COM2, COM3 or COM4).

15. Before preceding, ensure that the panel you are about to write to is in the **Setup Mode**. To enter the **Setup Mode**, press the UP and DOWN arrows on the EZText Enhanced Panel simultaneously. The panel display will read **SETUP MODE** on the first line.

16. Click on the **Start** button on the **Writing to Panel** screen, as shown above.

17. The progress of the **Write to Panel** process will be shown by a check mark placed in front of the items as the project is written to the panel. The status bar along the bottom portion of the screen will also show the progress.



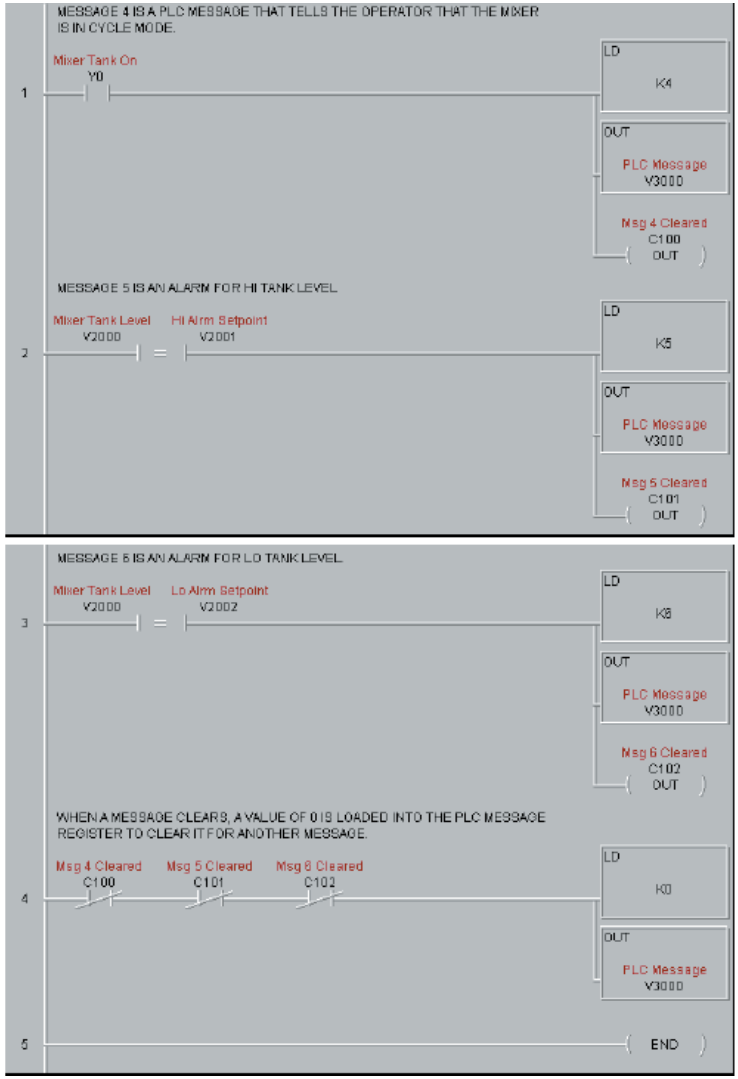
18. Now that the panel is configured, let's connect our PLC programming software to the PLC and write the ladder program.

Tutorial — Configure a PLC

For the purposes of this tutorial, we will be using a DirectLogic® DL05 PLC. To configure the PLC we are using DirectSOFT® Programming Software. The purpose of this part of the tutorial is to show you how to configure your PLC to communicate with an EZText Enhanced Panel.

1. Connect to the PLC with DirectSOFT.

2. Enter the following ladder logic.



3. Save the Program to the PLC and to disk (EZTextDemoProject).

4. Place the PLC in Run Mode.

5. Go to **Debug**, **Dataview**, **New** and enter **V2000**, **V2001**, and **V2003** under elements.

6. Go to Edit Mode and write a value of **1500** in **V2000**, **2100** in **V2001**, and **200** in **V2002** to the PLC.

The PLC is now configured and running. Now, to test our project, connect the Panel to PLC communications cable (P/N EZP-2CBL), to the panel port and the PLC port.

1. Press the **esc** (escape) button on the EZText Enhanced Panel. The first Message, "**Mixer Tank Level**", will be displayed and a value of **15.00** will be displayed.

2. Press the ⊠ (down arrow) once to enter the **High Level Alarm** setpoint. To change the value, press the **sel** (select) button. The cursor will land on the LSD (Least Significant Digit). Press **sel** two more times. While selecting the "1", press the ⊠ (up arrow) once to change the "1" to a "2". Press **ent**. The new value is written to the PLC.

3. Now scroll down ⊠ to set the **Low Level Alarm**. Press **sel** three times. Change the "2" to a "3" by pressing the ⊠ button once. Press **ent**.

4. Scroll back up ⊠ to display the **Mixer Tank Level**.

5. Using DirectSoft, go back to the **Dataview** window and change **V2000** to a value of **2200**.

6. The **PLC Message LED** will illuminate and the message "**Hi Tank Lvl Alm**" will be displayed.

7. Press **esc** and the PLC message will clear and the previous message will be displayed.

8. Now do the same for the **Low Level Alarm** by changing **V2000** to a value of **200**.

CONGRATULATIONS! You have now successfully configured an EZText Enhanced Panel!

5

Configuration

In this chapter....

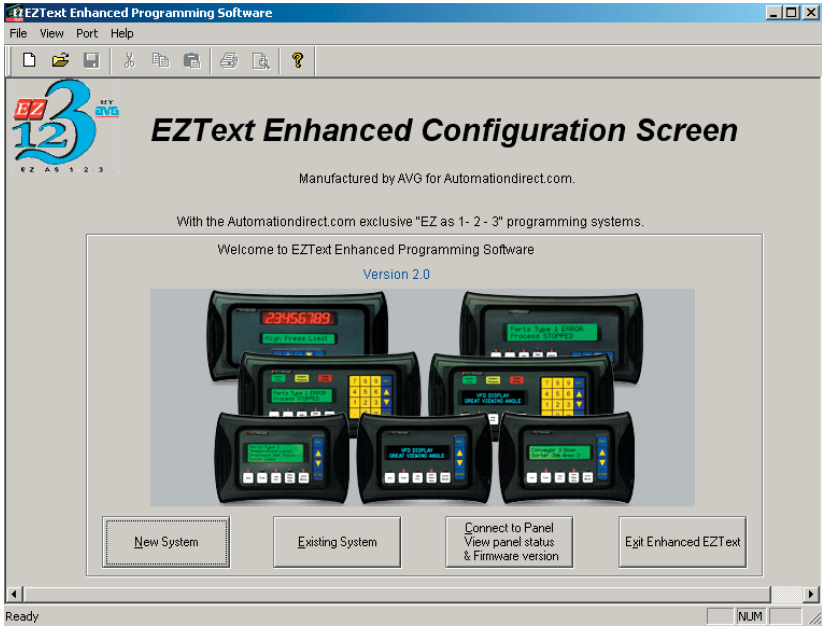
This section will take you through the steps necessary to configure a new system, edit an existing system, view panel status, and upgrade the EZText Enhanced Panel firmware.

We recommend that you go through the tutorial in Chapter 4, page 29, before configuring your EZText Enhanced Panel.

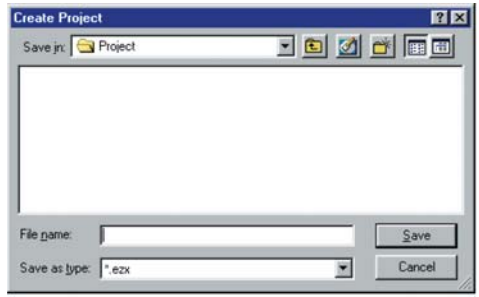
If you don't already have the EZText Enhanced Programming Software installed, go to Chapter 4, Tutorial, page 31.

Configure New System

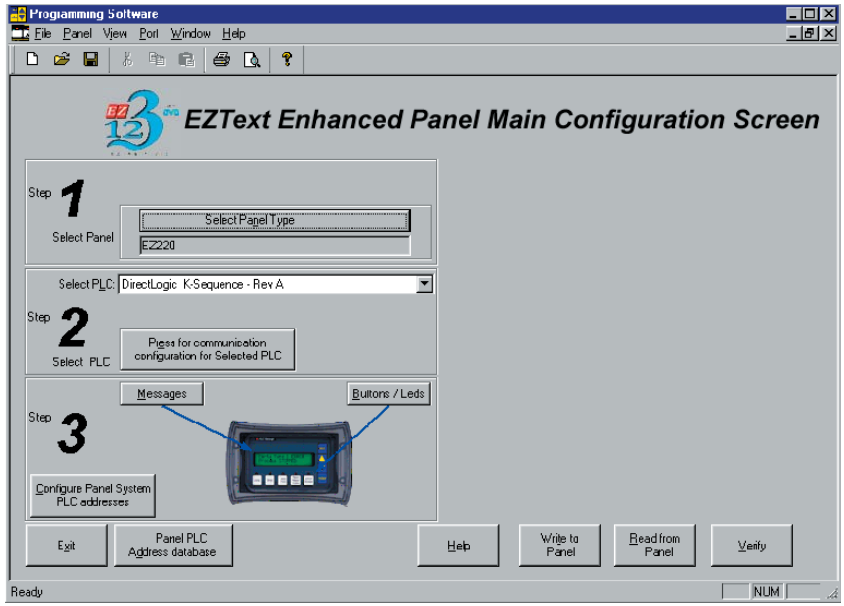
1. Click on the EZText Enhanced Icon to open the EZText Enhanced Programming Software. The following screen will appear.



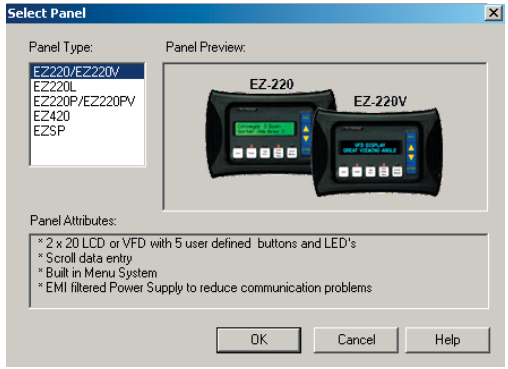
2. Click on the **New System** button to configure the EZText Enhanced program. The following screen will appear.



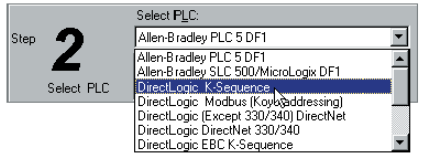
3. Enter a name for the project in the **File name** field. Navigate to the directory and folder where you want to keep the file (or except default location), and click on the **Save** button to save. The following screen will appear.



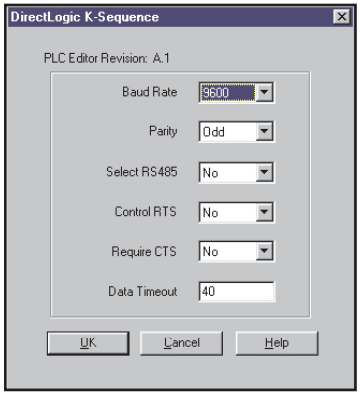
4. For **Step 1**, click on the **Select Panel Type** button. The following screen will appear. Under **Panel Type**, click on the model you are using. A **Panel Preview** and **Panel Attributes** specific to the type of panel you have chosen will appear in this dialog box. Click on **OK** to enter your selection.



5. For **Step 2**, click on the Down Arrow next to the **Select PLC** field. Choose the PLC and Protocol type you are using.



6. Click on **Press for Communication Configuration for Selected PLC** button.



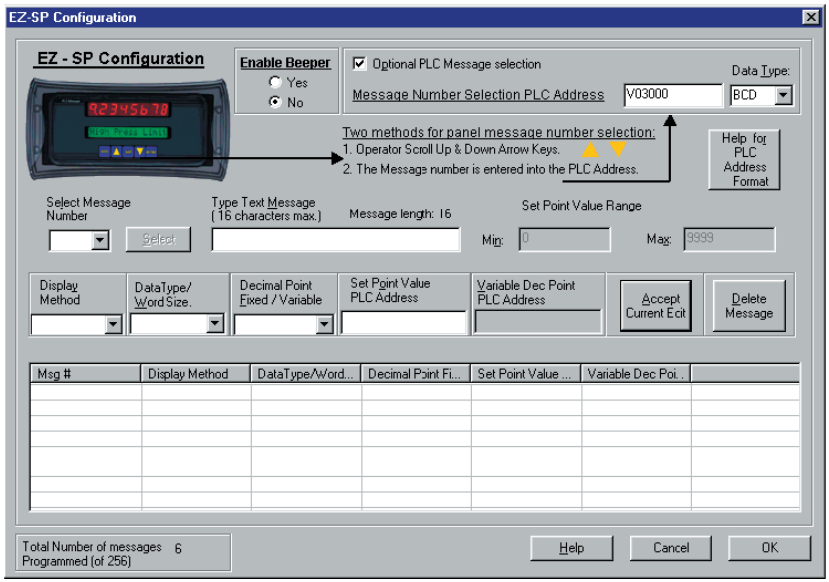
A PLC Attributes dialog box specific to your type PLC will appear. Complete the communications information. After selecting the PLC type, you must define the remaining protocol items, such as baud rate, parity, etc. The following table provides the necessary information for most DirectLogic controllers. When using another type PLC, consult that product's user manual to determine the port communications capabilities.

Table for DirectLogic PLC Attributes

PLC Model		Port/Baud Rates	Parity	Stop Bit
DL105/230/240	Top	9600	Odd	1
	Bottom	(DL240 only) 9600/19.2k	Odd/None	
DL250	Top	9600	Odd/None	1
	Bottom	9600/19.2k		
DL330	DCU only	4800/9600/19.2k	Odd/None	1
DL340	Bottom & Top	4800/9600/19.2k	Odd/None	1
DL350	Top	9600	Odd	1
	Bottom	4800/9600/19.2k	Odd/None	
DL430/440	Top	9600	Odd	1
	Bottom	9600/19.2k	Odd/None	
DL450	DB15	9600	Odd	1
	DB25	9600/19.2k	Odd/None	
	RJ12	9600/19.2k	Odd/None	

During configuration, ensure that your address and communications parameters match the PLC port settings. There will be a selection for PLC timeout. When the panel sends a message to the PLC and does not receive a response or does not understand the response, it will wait the timeout period before sending the message again.

7. For Step 3, click on the **Messages** button. The **EZ-SP Configuration** window will appear (shown below).



8. Choose whether or not you want the **Optional PLC Message selection.** Click in the box to select. If selected, enter a PLC address next to **Message Number Selection PLC Address** and then select the **Data Type** (BCD or Binary).

9. To configure the first message, enter a number between 001 and 256 in the **Select Message Number** field. (To edit already configured messages, click on the down arrow to view list and click on message number to highlight, then click on the **Select** button.)

10. Click on the **Select** button, then type in the message text (up to 16 characters) in the **Type Text Message** field.

11. Choose the **Display Method** for the Set Point Value associated with the message you are currently configuring. You may select **Read Only** or **Read/Write**. **Read/Write** will allow the operator to edit the value. **Read Only** does not allow editing (see step 16, next page).

NOTE:
When entering a NEW message, you must click on the **Select** button. If it is not clicked on, the **Accept Current Edit** button will not be selectable.

12. Select the **Data Type/Word Size**. This will depend upon the PLC Type and Protocol you have selected previously. (For help with PLC address format, click on the **Help for PLC Address Format** button. Mapping information particular to the type PLC you have selected will appear.) Your choices are **BCD/Int 16**, **BCD/Int 32**, **Binary/Int 16**, or **Binary/Int 32**.

13. Select Decimal Point placement for the Set Point Value. Click on the down arrow under **Decimal Point Fixed/Variable** to view the options. You may choose **None**, **Fixed-1**, **Fixed-2**, **Fixed-3**, **Fixed-4**, **Fixed-5**, **Fixed-6**, **Fixed-7**, or **Variable**.

14. Enter the **Set Point Value PLC Address**. This is the location in the PLC where the panel will read and/or write the value.

15. If you chose **Variable** for the Decimal Point type, the PLC will control Decimal Point placement in the Set Point value. The **Variable Dec Point PLC Address** field will become available. Enter the PLC Address for decimal point control.

16. Next, if available, you will choose whether or not to enter a range for the Set Point Value. (If the **Display Method** is Read/Write, you must select the range. If the **Display Method** is Read Only, the minimum and maximum range is determined by the Data Type and length and is fixed.) If the method is Read/Write, an optional minimum and maximum may be entered (defaults depend on Data Type and length). Under **Set Point Value Range**, enter a value in the **Min.** (minimum) and **Max.** (maximum) fields within the range displayed below the fields.

17. Click on the **Accept Current Edit** button, to save the message. Click on the **Delete Message** button to delete.

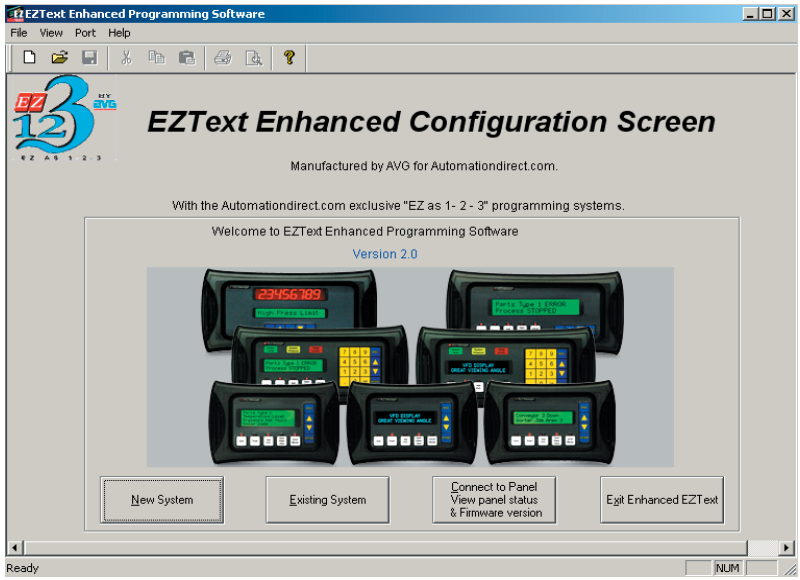
18. Configured Messages will display in the list at the bottom of the screen. If you want to edit a message, click on it , the field above will display the settings you have chosen. You may then edit and then click on the **Accept Current Edit** button to save the changes.

19. If you want to delete a message from this list, click on the message to highlight it and then click on the **Delete Message** button. A message (shown to the right) will appear asking you to confirm the deletion. Click on **Yes** to accept.

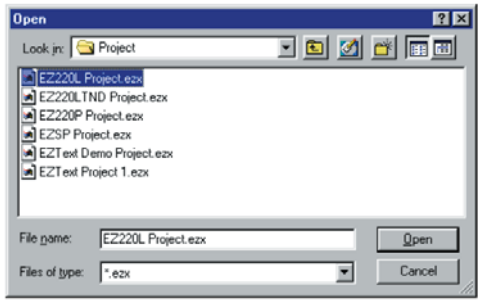
20. When you are done configuring the messages, click on **OK** to exit the screen and save the messages. Click on **Cancel** to exit without saving.

Configure Existing System

1. Click on the EZText Enhanced Icon to open the EZText Enhanced Programming Software. The following screen will appear.



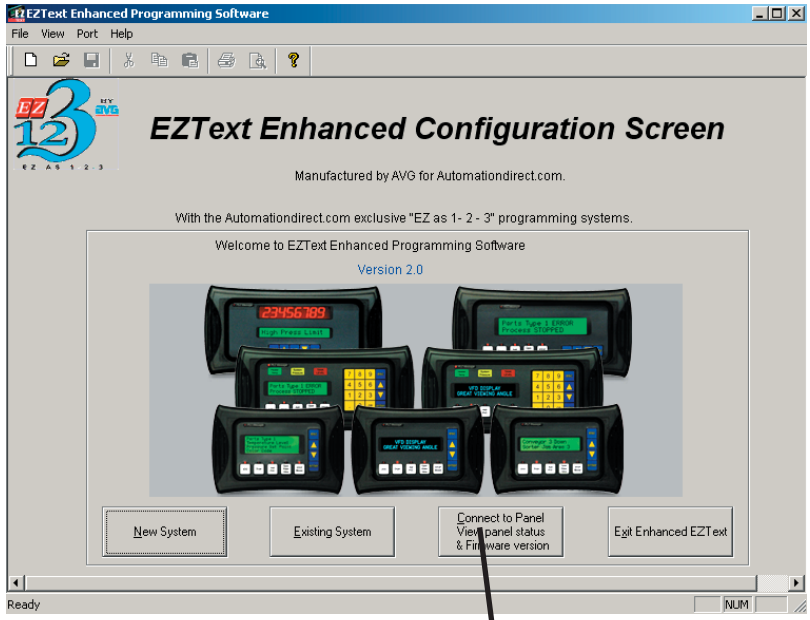
2. Click on the **Existing System** button to edit an EZText Enhanced program. The following screen will appear.



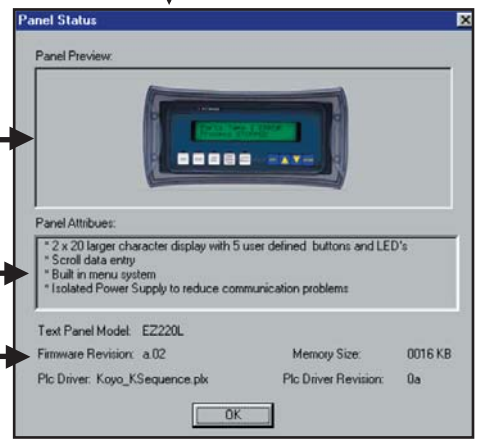
3. Select the project you want to edit from the default program directory or navigate to where the project resides. Click on it to highlight, and then click on the **Open** button and the project you have selected will open to the Main Configuration Screen.

4. Begin editing your project.

Connect to Panel, View Panel Status and Firmware Version



Click on the Connect to Panel, View Panel Status & Firmware Version button to view the panel status. The **Panel Status** window will open. An example is shown below.



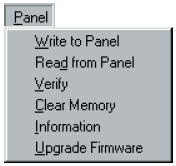
Picture of the panel type you are connected to

Key features of the current panel

Panel and PLC information is displayed, including panel model, Firmware Revision, Memory Size, PLC Driver, and PLC Driver Revision number

Upgrade Firmware

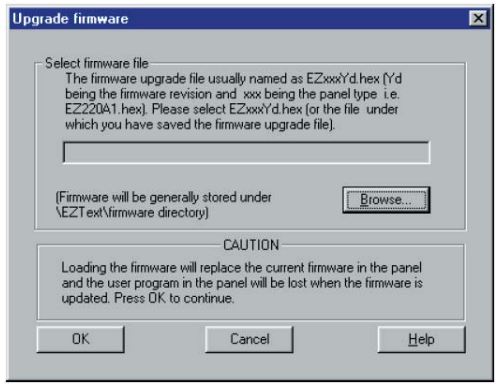
There may be occasional upgrades to the EZText Enhanced Panel internal software, also referred to as the Exec or Firmware. Check the EZ Automation website periodically for information about software and firmware upgrades.



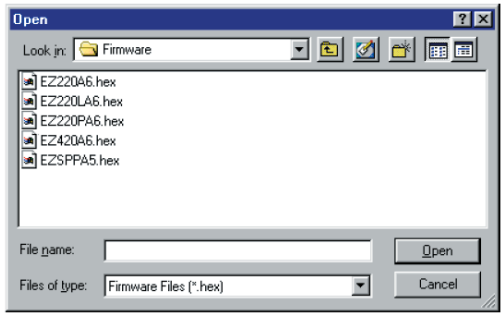
To **Upgrade Firmware**:

1. Place the panel in **Setup Mode** by pressing the UP/DOWN arrows on the EZText Enhanced Panel simultaneously.

2. Under the **Panel Menu**, click on **Upgrade Firmware.** The following screen will appear.

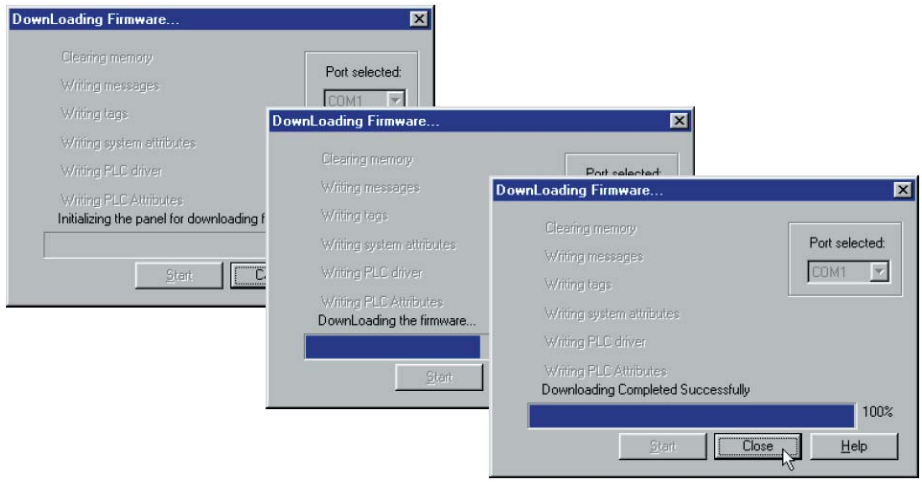


4. Click on the **Browse** button. The window, shown to the right, will open to the default folder, **Firmware** (located in the EZText Enhanced Program directory). If the firmware file has been downloaded from the EZ Automation website to another location, navigate to the new firmware file (.hex file).



There are five types of firmware files (.hex) for the different types of EZText Enhanced Panels: **EZ220xy** — for the EZ-220 & EZ-220V panels; **EZ220Lxy** — for the EZ-220L panel; **EZ420xy** — for the EZ-420 panel; **EZ220Pxy** — for EZ-220P and EZ-220PV panel; and **EZSPPxy** —for the **EZ-SP Set Point Display Panel**. The "x" represents the major revision of the firmware (e.g., A). "y" represents the minor revision (e.g., 1). **Make sure that you select the correct firmware.hex file** for your type panel, and send the upgrade to the panel.

4. Select the appropriate **COM** port under **Port Selected** (if necessary) and click on the **Start** button to begin downloading the firmware to the EZText Enhanced Panel. A status bar will let you know when the upgrade is complete. Click on **Close** when complete.



When you initialize the **Upgrade Firmware** process, the EZText Enhanced Panel Message display will read **SELF TESTING**. When the download begins, the display will read **LOADING EXEC**. When the download is complete, the panel will enter the Run Mode.

If the message **INCOMPATIBLE EXEC** is displayed on the panel while the Upgrade is in process, it means that the wrong firmware file has been sent to the panel. You will also receive an error message from the EZText Enhanced

Programming Software, as shown below. If this happens, do the following:

1. Click on the **OK** button on the Error Message.
2. Click on the **Cancel** button on the **Downloading Firmware** window.
3. Click on **Upgrade Firmware** to start the process over, being careful to select the correct firmware.hex file.

Upgrade Firmware, when you press the Start button, the panel will display SELF TESTING while the upgrade is initializing.

When the download begins, the panel will display LOADING EXEC.

If you get the message, INCOMPATIBLE EXEC*, you have sent the wrong firmware file. Exit all windows and start the Upgrade Firmware process again, being careful to select the correct file.

* Because the EZText Enhanced Set Point Display Panel LCD window display is limited to 16 characters, the message INCOMPATIBLE EXEC will display as INCOMPATIBLE EXE. (The "C" in EXEC exceeds the 16-character limit and will not display.)

6

Maintenance & Troubleshooting

In this Chapter....

Maintenance

Fuse Reset

The EZText Enhanced Panel features an AUTO-RESET fuse (0.65 Amp polyfuse). It is reset by removing power for 5 minutes and then reapplying power to the unit.

Precautions

To ensure the longevity and effectiveness of the EZText Enhanced Panel, please take note of the following precautions:

- Do not press sharp objects against the pushbuttons or screen overlay.
- Do not strike the panel with hard objects.
- Do not press the pushbuttons or screen overlay with excessive force.
- Once the panel is mounted and has power applied, do not place any objects over the ventilation slots. This will result in heat buildup and may damage the unit.

Screen Overlay/Chemical Compatibility

The screen overlay has a polycarbonate surface. The following list is provided to make you aware of the general compatibility between chemicals that may be present in your work environment and the polyester surface of the overlay. Use the chart to determine those chemicals that are safe to use around your EZText Enhanced Panel and those that may harm the overlay. The list rates these chemicals as **E—Excellent**, **G—Good**, **F—Fair**, and **N—Not Recommended.** Because the ratings are for conditions at 134 °F (57°C), consider all factors when evaluating your application.

Screen Overlay Cleaning

CHEMICAL	RATING
Acetaldehyde	N
Acetamide	N
Acetic Acid @ 5%	G
Acetic Acid @ 50%	G
Acetone	N
Acetonitrile	N
Acrylonitrile	N
Adipic Acid	E
Alanine	N
Allyl Alcohol	F
Alum. Hydroxide	N
Aluminum Salts	G
Amino Acids	E
Ammonia	N
Ammonium Acetate	E
Ammonium Gloclate	F

CHEMICAL	RATING
Ammonium Hydroxide @ 5%	N
Ammonium Hydroxide @ 30%	N
Ammonium Oxalate	E
Ammonium Salts	G
n-Amyl Acetate	N
Amyl Chloride	N
Aniline	N
Benzaldehyde	N
Benzene	N
Benzoic Acid	G
Benzyl Acetate	G
Benzyl Alcohol	G
Bromine	F
Bromobenzene	N
Bromoform	N
Butadiene	N

CHEMICAL	RATING
n-Butyl Acetate	N
n-Butyl Alcohol	F
sec-Butyl Alcohol	F
tert-Butyl Alcohol	F
Butyric Acid	N
Calcium Hydroxide	N
Calcium Hypochlorite	N
Carbazole	N
Carbon Disulfide	N
Carbon Tetrachloride	N
Cedarwood Oil	F
Cellosolve Acetate	N
Chlorine @ 10% in air	G
Chlorine @ 10% moist	F
Chloroacetic Acid	N
p-Chloroacetophenone	N
Chloroform	N
Chromic Acid @ 10%	N
Chromic Acid @ 50%	N
Cinnamon Oil	F
Citric Acid @ 10%	G
Cresol	N
Cyclohexane	G
Decalin	N
o-Dichlorobenzene	N
p-Dichlorobenzene	N
Diethyl Benzene	N
Diethyl ether	N
Diethyl Ketone	N
Diethyl Malonate	N
Diethylene Glycol	F
Diethylene Glycol Ethyl Ether	N
Dimethylformamide	N
Dimethyl Sulfoxide	N
1, 4-Dioxane	F
Dipropylene Glycol	F
Ether	N
Ethyl Acetate	N
Ethyl Alcohol	G
Ethyl Alcohol @ 40%	G
Ethyl Benzene	N
Ethyl Benzoate	N
Ethyl Butyrate	N
Ethyl Chloride Liquid	N
Ethyl Cyanoacetate	N
Ethyl Lactate	N
Ethylene Chloride	N
Ethylene Glycol	F
Ethylene Glycol Methyl Ether	N

CHEMICAL	RATING
Ethylene Oxide	N
Fluorides	E
Fluorine	F
Formaldehyde	
Formaldehyde @ 40%	G
Formic Acid @ 3%	G
Formic Acid @ 50%	G
Formic Acid @ 99%	F
Fuel Oil	G
Gasoline	F
Glacial Acetic Acid	N
Glycerin	E
n-Heptane	G
Hexane	N
Hydrochloric Acid @ 5%	E
Hydrochloric Acid @ 20%	F
Hydrochloric Acid @ 35%	N
Hydrofluoric Acid @ 5%	F
Hydrofluoric Acid @ 48%	N
Hydrogen Peroxide @ 5%	E
Hydrogen Peroxide @ 30%	E
Hydrogen Peroxide @ 90%	E
Isobutyl Alcohol	G
Isopropyl Acetate	N
Isopropyl Alcohol	E
Isopropyl Benzene	N
Kerosene	E
Lactic Acid @ 3%	G
Lactic Acid @ 85%	G
Methoxyethyl Oleate	N
Methyl Alcohol	F
Methyl Ethyl Ketone	N
Methyl Isobutyl Ketone	N
Methyl Propyl Ketone	N
Methylene Chloride	N
Mineral Oil	G
Nitric Acid @ 10%	G
Nitric Acid @ 50%	F
Nitric Acid @ 70%	N
Nitrobenzene	N
n-Octane	F
Orange Oil	F
Ozone	G
Perchloric Acid	N
Perchloroethylene	N
Phenol Crystals	N
Phosphoric Acid @ 5%	E
Phosphoric Acid @ 85%	G
Pine Oil	E

CHEMICAL	RATING
Potassium Hydroxide @ 1%	N
Potassium Hydroxide conc.	N
Propane Gas	N
Propylene Glycol	F
Propylene Oxide	F
Resorcinol sat.	F
Resorcinol @ 5%	F
Salicylaldehyde	F
Salicylic Acid Powder	G
Salicylic Acid sat.	G
Salt Solutions Metallic	E
Silver Acetate	G
Silver Nitrate	E
Sodium Acetate sat.	G
Sodium Hydroxide @ 1%	N
Sodium Hydroxide @ 50%+	N
Sodium Hypochlorite @ 15%	F
Stearic Acid Crystals	G
Sulfuric Acid @ 6%	E
Sulfuric Acid @ 20%	G
Sulfuric Acid @ 60%	F

CHEMICAL	RATING
Sulfuric Acid @ 98%	N
Sulfur Dioxide Liquid	G
Sulfur Dioxide dry	G
Sulfur Salts	N
Tartaric Acid	G
Tetrahydrofuran	N
Thionyl Chloride	N
Toluene	N
Tributyl Citrate	N
Trichloroethane	N
Trichloroethylene	N
Triethylene Glycol	G
Tripropylene Glycol	G
Turpentine	N
Undecyl Alcohol	F
Urea	N
Vinylidene Chloride	N
Xylene	N
Zinc Stearate	E

The EZText Enhanced Panel screen should be cleaned as needed with warm, soapy water.

Gasket Replacement

The gasket may need to be replaced if it becomes damaged or worn. To replace the gasket, use P/N EZ-TEXT-L-GSK for the large model (EZ-SP). To replace the gasket perform the following steps:

1. The gasket is removed and replaced from the back of the unit. Ensure that all pieces of old gasket have been removed from the panel enclosure surface where the gasket is affixed.

2. Remove the new replacement gasket from its plastic bag.

3. Remove the temporary protective covering from the adhesive side of the gasket.

4. Position gasket (adhesive side down) over the panel gasket surface and press firmly.

Troubleshooting

In this section we will explain how to isolate potential problems. If you cannot isolate and remedy the problem using the procedures we have outlined below, call technical support. For a list of EZText Enhanced Panel, EZText Enhanced Programming Software, and PLC Driver Error Messages, see Appendix C.

Panel Configuration Problems

EZText Enhanced Programming Software is used to create panel applications and to download/upload panel programs. If you are online with the EZText Enhanced Panel and communication fails, the following error message is displayed:

If you receive this EZText Enhanced Programming Software error message, check the following:

1. On the rear panel of the unit, observe Serial Port Communication TXD/RXD LEDs while attempting to Upload/Download a program. Both LEDs should be slowly and alternately flashing to indicate that the programming PC and the panel are connected. If the TXD (transmitter) LED is the only one flashing, or if the TXD/RXD LEDs are NOT alternating between flashes, check to ensure that the EZText Enhanced Panel is set to the Setup (programming) Mode. (To enter the Setup Mode, press and hold the UP Arrow Button while simultaneously pressing the DOWN Arrow button.)

2. Check to ensure that the programming cable (part number EZTEXT-PGMCBL) is properly connected at both ends.

3. Check that the correct communications port is selected with the EZText Enhanced Programming Software (i.e., COM1, COM2).

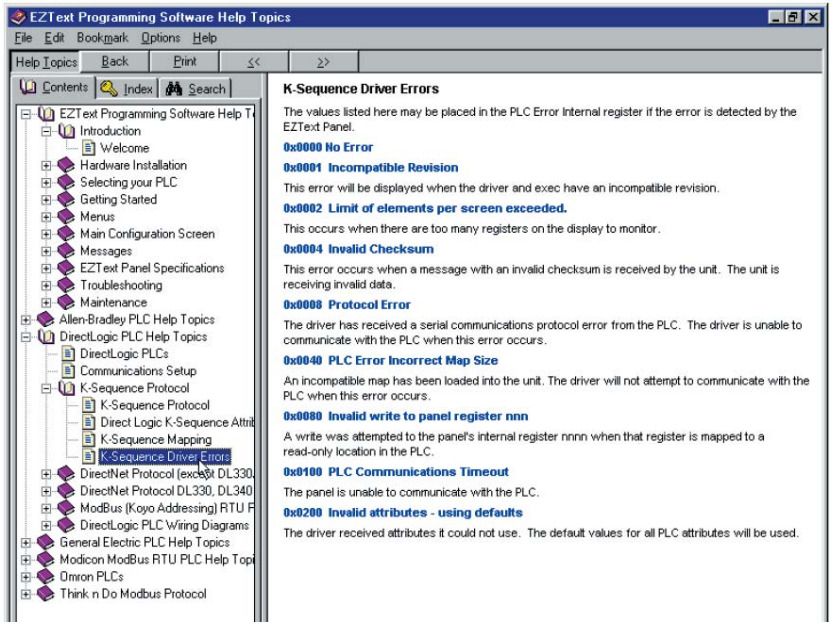
4. Check the 24 VDC power source and its connections.

5. After completing steps 1 through 4, above, repeat the procedure to Upload/Download a program.

PLC Errors

If you experience communication problems between the EZText Enhanced Panel and your PLC, you will receive an error message that is unique to that particular PLC. Look in the **Appendix C** of this manual, or the EZText Enhanced Programming Software Help for error messages for your type PLC. Each PLC Help topic lists the error messages and provides an explanation for each PLC driver. To access the PLC Help topics, perform the following steps.

a. Run EZText Enhanced Programming Software.
b. From the Main Menu, click on **Help > Help Topics**.
c. Under the **Contents** tab, find the type PLC you are using (next to a closed book icon) and click on it to view help topics.



d. Click on Driver Errors Topic.

You may also notice that the **Pushbuttons**, **Pushbutton LEDs**, and/or **Messages** are not working, Check the following:

1. Observe the TXD and RXD LEDs on the rear of the panel. If both LEDs are not steadily flashing or illuminated (depending upon the baud rate) check to ensure the proper communications cable is connected securely at both ends.

2. Check the PLC Communication information for the PLC type, protocol, baud rate, parity, stop bits, and address number. Use the PLC manual to determine the proper settings.

3. If you have configured your own cable, verify cable pinout using the PLC Wiring diagrams provided in Appendix B.

4. Check the 24 VDC power source.

5. If connected to a multiplexer, connect the panel directly to the PLC port.

6. Verify that the EZText Enhanced Panel registers are mapped correctly. Does the EZText Enhanced Panel register exist in the PLC? Is the register Read Only? Is the register Write Only?

Still need Help?

You have two additional sources for more information other than this manual.

Visit our website at www.EZAutomation.net
Our web site contains all of this information, any new feature releases, technical support, plus much more ...

Call our **Technical Support Group,** Monday–Friday at **1-877-774-EASY** or FAX us at **1-877-775-EASY.**

If you have any questions that you can't find an answer to, give us a call from 6 a.m. to Midnight CST at the number above and we will be glad to assist you.

Warranty Repairs

If your EZText Enhanced Panel is under warranty, **contact EZAutomation @ 1-877-774-EASY.**

Out of Warranty Repairs

If your EZText Enhanced Panel is out of warranty, **contact EZAutomation's Service Department for an evaluation of repair costs @ 1-877-774-EASY**. You can then decide whether it is more economical to proceed with factory repairs or purchase a new panel.

Frequently Asked Questions (FAQs)

1. **How do I format an address string when connecting to multiple PLCs?**
   Add the PLC station number to the beginning of the address string. Ex: PLC station is 3 and the address is v2000 the string would look like this, 3-V2000.

2. **Can I convert a project from one Panel type to another?**
   Yes, to do this, simply change the panel type from one to another. This will keep all address and message information intact. The only exception is switching from any of the panels to the Set Point panel. This will cause all messages and addressing to be deleted. Note: Switching panel types does not create a new project. If you wish to create a new project select NEW from the FILE menu.

3. **Can I connect multiple panels to a single PLC?**
   Yes, there are two methods of doing this. The first would be to use the multiplexer (P/N EZ-MULTIDROP). You can connect up to five panels per multiplexer, and one multiplexer per serial port. The second method is to connect one panel per serial port.

4. **What is the maximum number of messages I can have in a project?**
   The maximum amount of messages per project is 256.

5. **How many characters can I have per message?**
   The maximum number of characters per message is 16.

6. **How do I get my panel into Setup Mode?**
   To get the panel into Setup Mode press and hold the up arrow key while simultaneously pressing the down arrow key. To exit Setup Mode, press the **esc** key.

7. **Does the EZ-SP panel support discrete addresses?**
   No, the EZ-SP panel does not support discrete addressing. All addressing for the EZ-SP panel must be in Word format.

8. **Can you copy and paste messages?**
   Yes, you can copy and paste messages. Currently; however, you can copy or paste only one message at a time. This will possibly be changed to multiple messages in the future.

9. **It is hard to read the display on my panel, it is too bright, is there a way to adjust the contrast?**
   Yes, to adjust the contrast on the display, simply place the panel into Setup Mode. While in Setup Mode you can use the up and down arrow keys to adjust the contrast.

10. **What is a PLC message?**
    A PLC Message is a text message that can be triggered by the PLC to provide the operator with important instructions, information, or warnings. PLC Messages will be displayed for 3 seconds before they can be cleared in order to make sure the operator has a chance to read the message. The operator can also view the last PLC Message displayed by pressing the **esc** key.

11. **How do I get my panel to display PLC Messages?**
    To display a PLC message, using your ladder logic, place the number of the PLC Message you wish to display into the Message Number Selection PLC Address (located in the top right corner of the EZ-SP programming screen). When a value is placed in this register the panel will display the message corresponding with that number.

    Example: I want to display PLC Message One on my EZ-SP panel display. Using my ladder logic I write a value of 1 to register V2000, which is set as the Message Selection Number PLC Address. The panel then displays PLC Message One. The message will remain on the display until the **esc** key is pressed.

12. **Is there a way to disable the beeper on my EZ-SP panel?**
    Yes, you can disable the beeper in the EZ-SP Configuration screen by selecting NO under the ENABLE BEEPER option.

13. **When I enter a value to the EZ-SP I sometimes see three horizontal lines to the far left of the 7 segment display, why is that?**
    The three horizontal lines to the far left of the 7 Segment display are an indicator that the EZ-SP has encountered a value that is to large to be correctly displayed on the panel.

14. **I keep getting an error message that reads, "VAR DP TO LARGE". What does this mean?**
    This error message is associated with the variable decimal point option in the EZ-SP panel. The reason this message is displayed is because the value given for the number of decimal places is 8 or greater. To clear this message, edit the value in the variable decimal register to a value of 7 or below.

15. **I downloaded my EZ-SP project to the panel, but when I did the panel displayed a value of zero to the far right of the 7 Segment display, followed by 3 horizontal lines extending to the left of the display. What is the reason for this?**
    This error is caused when there are no messages programmed in the EZ-SP project.

Appendix A

In this Appendix....

— *Application Worksheets*

EZTEXT ENHANCED PANEL APPLICATION WORKSHEET

PROJECT NAME:_____ **PANEL TYPE:** _____

_____

PLC CONFIGURATION:

PLC MANUFACTURER: _____ Baud Rate: _____
PLC Model: _____ Parity: _____
PLC Protocol: _____ Data Bits:_____
PLC Address: _____ Stop Bits:_____
PLC Timeout: _____ Checksum: _____

☐ **Optional PLC Message Selection:**

PLC Address: _____ ☐ BCD ☐ Binary

_____

Message No._____

16 characters

Set Point PLC Address: _____

Display Method:
☐ Read Only
☐ Read/Write

☐ BCD/Int 16
☐ BCD/Int 32
☐ Binary/Int 16
☐ Binary/Int 32

Set Point Range:
Min._____
Max. _____

_____

☐ None
☐ Fixed (1–7) _____
☐ Variable*

*** Variable Decimal Point PLC Address**:_____

Message No._____

16 characters

Set Point PLC Address: _____

Display Method:
☐ Read Only
☐ Read/Write

☐ BCD/Int 16
☐ BCD/Int 32
☐ Binary/Int 16
☐ Binary/Int 32

Set Point Range:
Min._____
Max. _____

_____

☐ None
☐ Fixed (1–7) _____
☐ Variable*

*** Variable Decimal Point PLC Address**:_____

EZTEXT ENHANCED PANEL APPLICATION WORKSHEET

Message No.__________

16 characters

Set Point PLC Address: ____________

Display Method:
- ☐ Read Only
- ☐ Read/Write

- ☐ BCD/Int 16
- ☐ BCD/Int 32
- ☐ Binary/Int 16
- ☐ Binary/Int 32

Set Point Range:
Min.____________________
Max. ____________________

- ☐ None
- ☐ Fixed (1–7) _________
- ☐ Variable*

*** Variable Decimal Point PLC Address:** __________

____

Message No.__________

16 characters

Set Point PLC Address: ____________

Display Method:
- ☐ Read Only
- ☐ Read/Write

- ☐ BCD/Int 16
- ☐ BCD/Int 32
- ☐ Binary/Int 16
- ☐ Binary/Int 32

Set Point Range:
Min.____________________
Max. ____________________

- ☐ None
- ☐ Fixed (1–7) _________
- ☐ Variable*

*** Variable Decimal Point PLC Address:** __________

____

Message No.__________

16 characters

Set Point PLC Address: ____________

Display Method:
- ☐ Read Only
- ☐ Read/Write

- ☐ BCD/Int 16
- ☐ BCD/Int 32
- ☐ Binary/Int 16
- ☐ Binary/Int 32

Set Point Range:
Min.____________________
Max. ____________________

- ☐ None
- ☐ Fixed (1–7) _________
- ☐ Variable*

*** Variable Decimal Point PLC Address:** __________

____

Message No.__________

16 characters

Set Point PLC Address: ____________

Display Method:
- ☐ Read Only
- ☐ Read/Write

- ☐ BCD/Int 16
- ☐ BCD/Int 32
- ☐ Binary/Int 16
- ☐ Binary/Int 32

Set Point Range:
Min.____________________
Max. ____________________

- ☐ None
- ☐ Fixed (1–7) _________
- ☐ Variable*

*** Variable Decimal Point PLC Address:** __________

____

EZTEXT ENHANCED PANEL APPLICATION WORKSHEET

Message No.__________ | | | | | | | | | | | | | | | | (16 characters)

Set Point PLC Address: ____________

Display Method:
- ☐ Read Only
- ☐ Read/Write

- ☐ BCD/Int 16
- ☐ BCD/Int 32
- ☐ Binary/Int 16
- ☐ Binary/Int 32

Set Point Range:
Min.____________________
Max. ____________________

- ☐ None
- ☐ Fixed (1–7) ________
- ☐ Variable*

* Variable Decimal Point PLC Address:__________

Message No.__________ | | | | | | | | | | | | | | | | (16 characters)

Set Point PLC Address: ____________

Display Method:
- ☐ Read Only
- ☐ Read/Write

- ☐ BCD/Int 16
- ☐ BCD/Int 32
- ☐ Binary/Int 16
- ☐ Binary/Int 32

Set Point Range:
Min.____________________
Max. ____________________

- ☐ None
- ☐ Fixed (1–7) ________
- ☐ Variable*

* Variable Decimal Point PLC Address:__________

Message No.__________ | | | | | | | | | | | | | | | | (16 characters)

Set Point PLC Address: ____________

Display Method:
- ☐ Read Only
- ☐ Read/Write

- ☐ BCD/Int 16
- ☐ BCD/Int 32
- ☐ Binary/Int 16
- ☐ Binary/Int 32

Set Point Range:
Min.____________________
Max. ____________________

- ☐ None
- ☐ Fixed (1–7) ________
- ☐ Variable*

* Variable Decimal Point PLC Address:__________

Message No.__________ | | | | | | | | | | | | | | | | (16 characters)

Set Point PLC Address: ____________

Display Method:
- ☐ Read Only
- ☐ Read/Write

- ☐ BCD/Int 16
- ☐ BCD/Int 32
- ☐ Binary/Int 16
- ☐ Binary/Int 32

Set Point Range:
Min.____________________
Max. ____________________

- ☐ None
- ☐ Fixed (1–7) ________
- ☐ Variable*

* Variable Decimal Point PLC Address:__________

EZTEXT ENHANCED PANEL APPLICATION WORKSHEET

Message No.__________

16 characters

Set Point PLC Address: ____________

Display Method:
- ☐ Read Only
- ☐ Read/Write

- ☐ BCD/Int 16
- ☐ BCD/Int 32
- ☐ Binary/Int 16
- ☐ Binary/Int 32

Set Point Range:
Min.____________________
Max. ____________________

- ☐ None
- ☐ Fixed (1–7) ________
- ☐ Variable*

*** Variable Decimal Point PLC Address:** __________

Message No.__________

16 characters

Set Point PLC Address: ____________

Display Method:
- ☐ Read Only
- ☐ Read/Write

- ☐ BCD/Int 16
- ☐ BCD/Int 32
- ☐ Binary/Int 16
- ☐ Binary/Int 32

Set Point Range:
Min.____________________
Max. ____________________

- ☐ None
- ☐ Fixed (1–7) ________
- ☐ Variable*

*** Variable Decimal Point PLC Address:** __________

Message No.__________

16 characters

Set Point PLC Address: ____________

Display Method:
- ☐ Read Only
- ☐ Read/Write

- ☐ BCD/Int 16
- ☐ BCD/Int 32
- ☐ Binary/Int 16
- ☐ Binary/Int 32

Set Point Range:
Min.____________________
Max. ____________________

- ☐ None
- ☐ Fixed (1–7) ________
- ☐ Variable*

*** Variable Decimal Point PLC Address:** __________

Message No.__________

16 characters

Set Point PLC Address: ____________

Display Method:
- ☐ Read Only
- ☐ Read/Write

- ☐ BCD/Int 16
- ☐ BCD/Int 32
- ☐ Binary/Int 16
- ☐ Binary/Int 32

Set Point Range:
Min.____________________
Max. ____________________

- ☐ None
- ☐ Fixed (1–7) ________
- ☐ Variable*

*** Variable Decimal Point PLC Address:** __________

EZTEXT ENHANCED PANEL APPLICATION WORKSHEET

Message No.__________

16 characters

Set Point PLC Address: ____________

Display Method:
- ☐ Read Only
- ☐ Read/Write

- ☐ BCD/Int 16
- ☐ BCD/Int 32
- ☐ Binary/Int 16
- ☐ Binary/Int 32

Set Point Range:
Min.____________________
Max. ____________________

- ☐ None
- ☐ Fixed (1–7) _________
- ☐ Variable*

* Variable Decimal Point PLC Address:__________

____

Message No.__________

16 characters

Set Point PLC Address: ____________

Display Method:
- ☐ Read Only
- ☐ Read/Write

- ☐ BCD/Int 16
- ☐ BCD/Int 32
- ☐ Binary/Int 16
- ☐ Binary/Int 32

Set Point Range:
Min.____________________
Max. ____________________

- ☐ None
- ☐ Fixed (1–7) _________
- ☐ Variable*

* Variable Decimal Point PLC Address:__________

____

Message No.__________

16 characters

Set Point PLC Address: ____________

Display Method:
- ☐ Read Only
- ☐ Read/Write

- ☐ BCD/Int 16
- ☐ BCD/Int 32
- ☐ Binary/Int 16
- ☐ Binary/Int 32

Set Point Range:
Min.____________________
Max. ____________________

- ☐ None
- ☐ Fixed (1–7) _________
- ☐ Variable*

* Variable Decimal Point PLC Address:__________

____

Message No.__________

16 characters

Set Point PLC Address: ____________

Display Method:
- ☐ Read Only
- ☐ Read/Write

- ☐ BCD/Int 16
- ☐ BCD/Int 32
- ☐ Binary/Int 16
- ☐ Binary/Int 32

Set Point Range:
Min.____________________
Max. ____________________

- ☐ None
- ☐ Fixed (1–7) _________
- ☐ Variable*

* Variable Decimal Point PLC Address:__________

____

Appendix B

B

In this appendix....

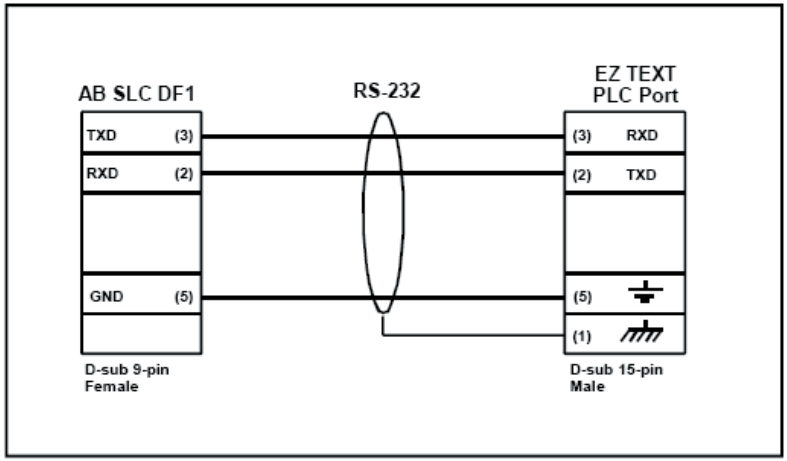
—*Cable Wiring Diagrams for the following PLCs*

Allen Bradley
Direct Logic
General Electric
Mitsubishi FX Series
Modicon Modbus
Omron
Siemens
Control Techniques
Control Technology Corporation (CTC)
Texas Instruments
Idec
Aromat

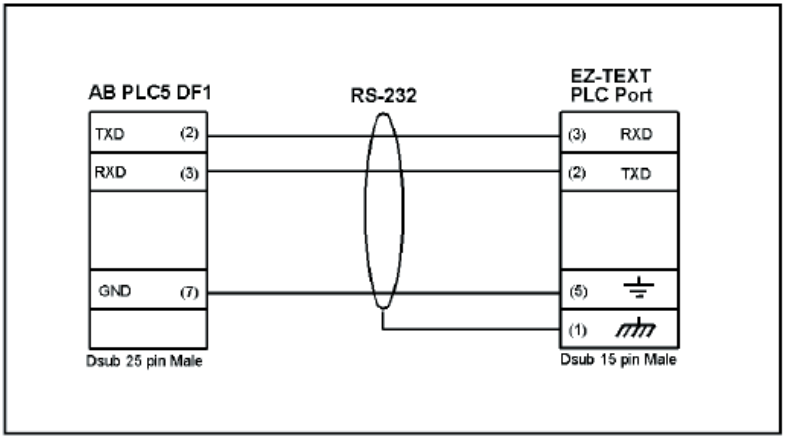
Wiring Diagrams

The following diagrams depict the wiring pinouts for the EZText Enhanced Panel to PLC Cables. If EZAutomation provides the cable, the part number is included with the description. Wiring diagrams for some PLCs are provided so that you may construct your own cable.

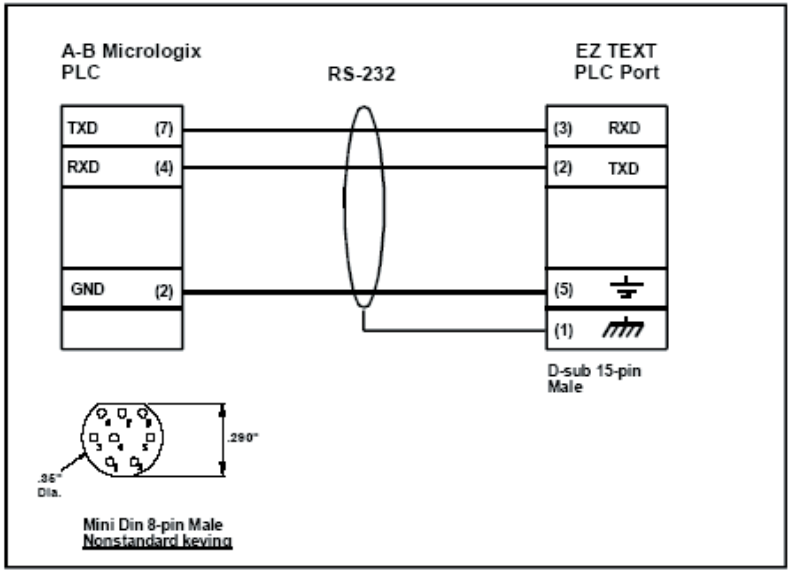
Allen-Bradley SLC DF1 RS-232 (P/N EZP-SLC-232-CBL)



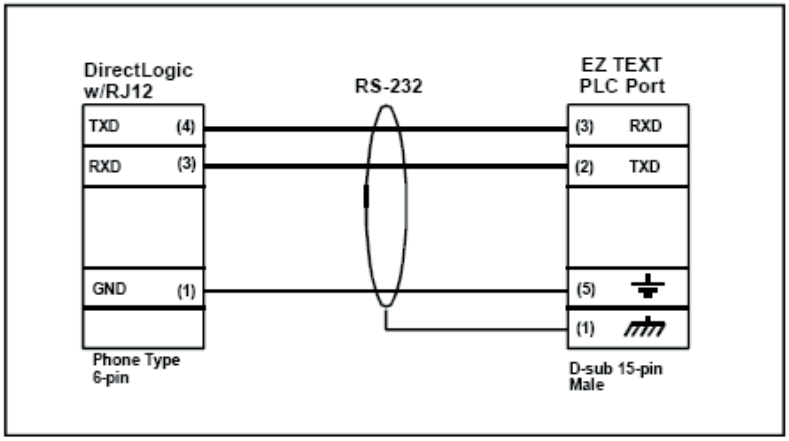
Allen-Bradley PLC5 DF1 RS-232 (P/N EZP-PLC5-232-CBL)



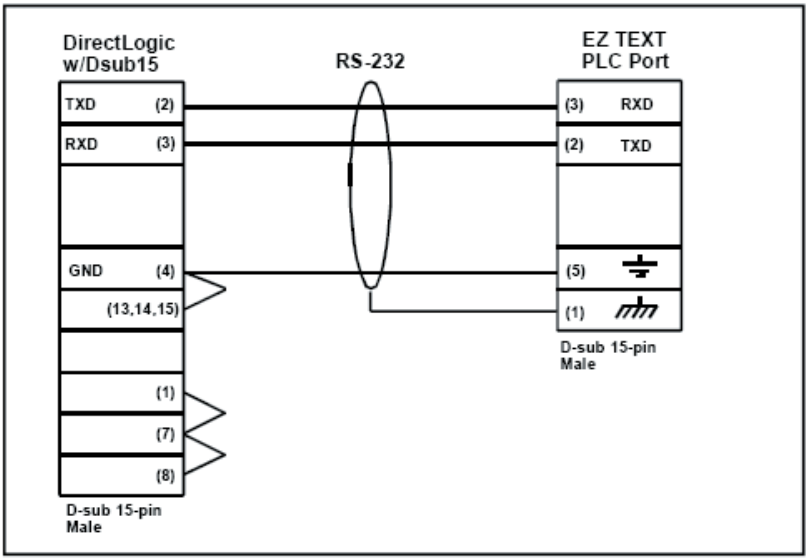
Allen-Bradley Micrologix 1000/1200/1500 RS-232 (P/N EZP-MLOGIX-CBL)



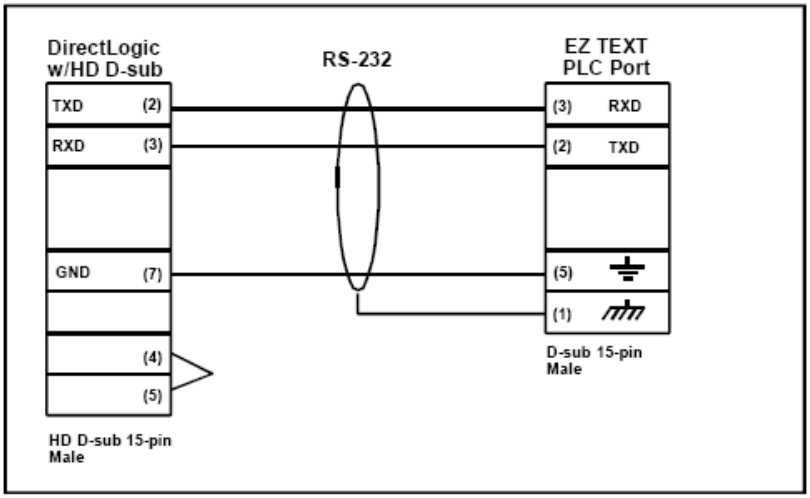
DirectLogic PLC RJ-12, D05, DL105, DL205, DL350, and DL450, RS-232 (P/N EZP-2CBL)



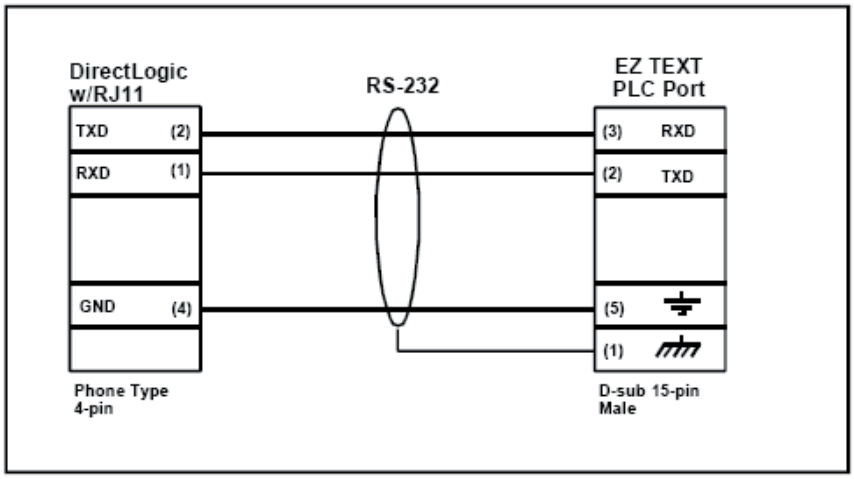
DirectLogic PLC 15-pin D-SUB, DL405 RS-232 (P/N EZP-4CBL-1)



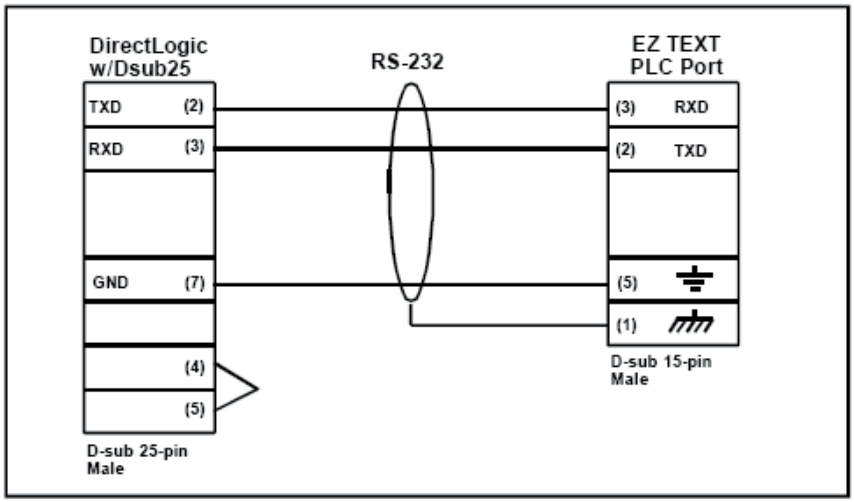
DirectLogic PLC VGA 15-pin , 250, RS-232 (P/N EZP-2CBL-1)



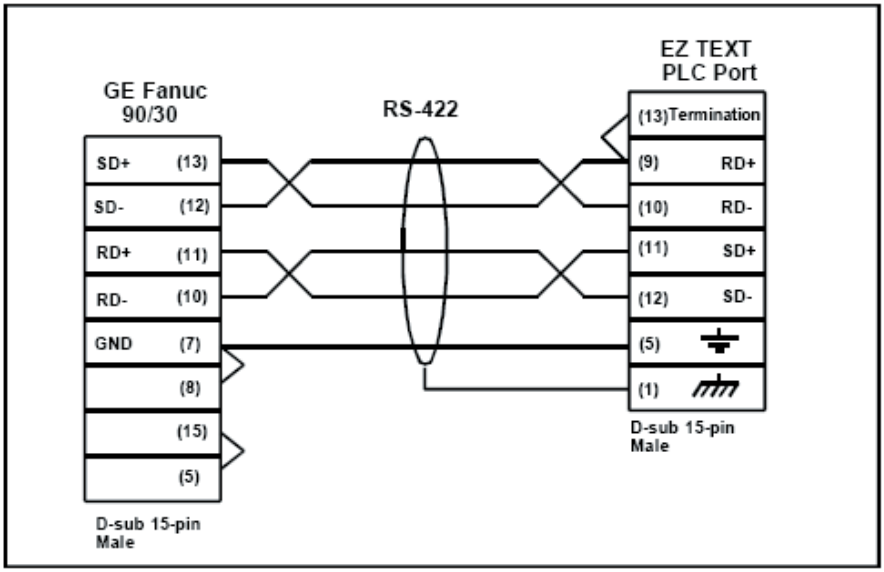
DirectLogic PLC RJ-11 , 340, RS-232 (P/N EZP-3CBL)



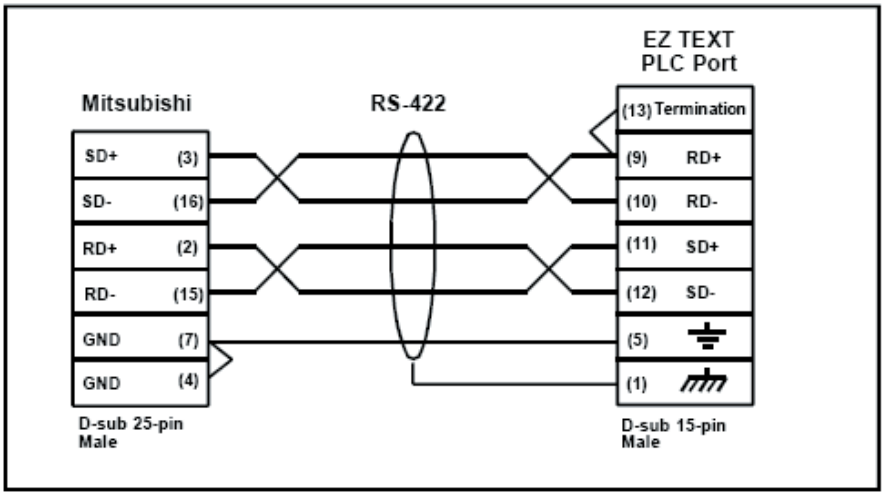
DirectLogic PLC 25-pin D-SUB, DL405, 350, 305 DCU, and all DCMs RS-232 (P/N EZP-4CBL-2)



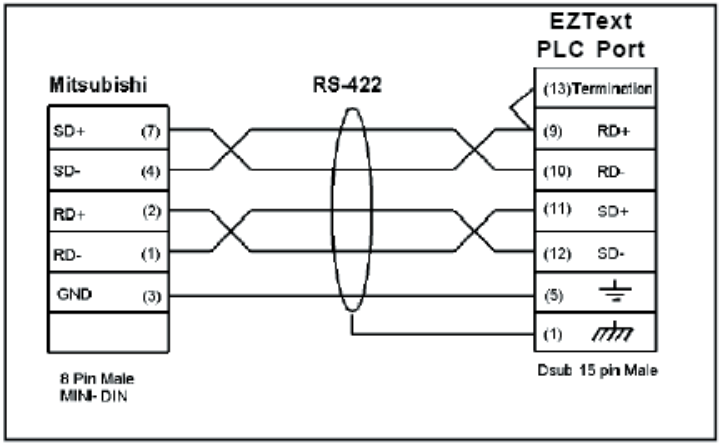
General Electric 90/30 and 90/70 15-pin D-SUB RS-422 (P/N EZP-90-30-CBL)



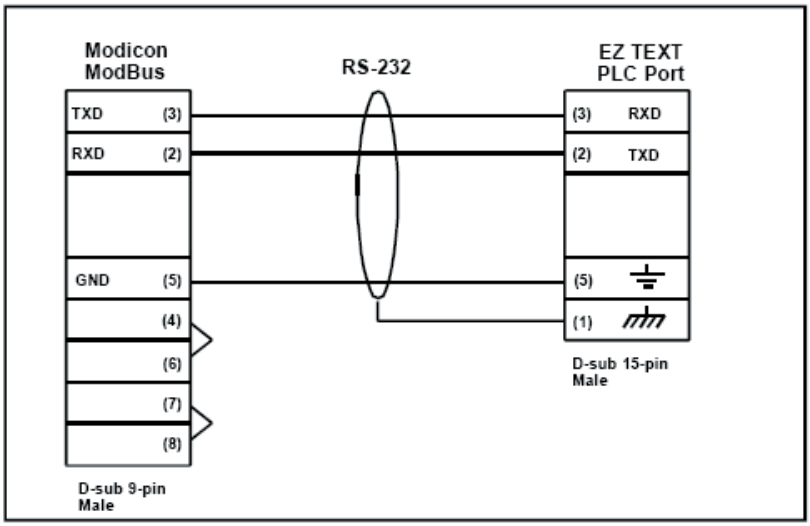
Mitsubishi FX Series 25-pin RS-422 (P/N EZP-MITSU-CBL)



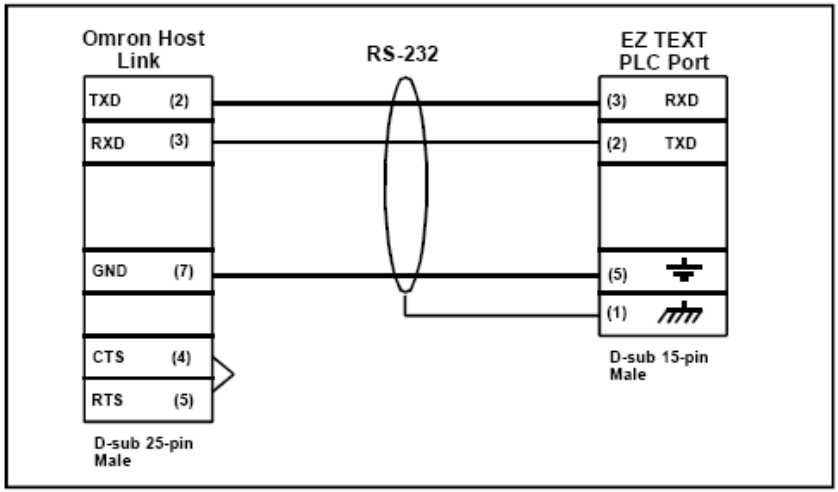
Mitsubishi FX Series 8-pin MINI-DIN RS-422 (P/N EZP-MITSU-CBL-1)



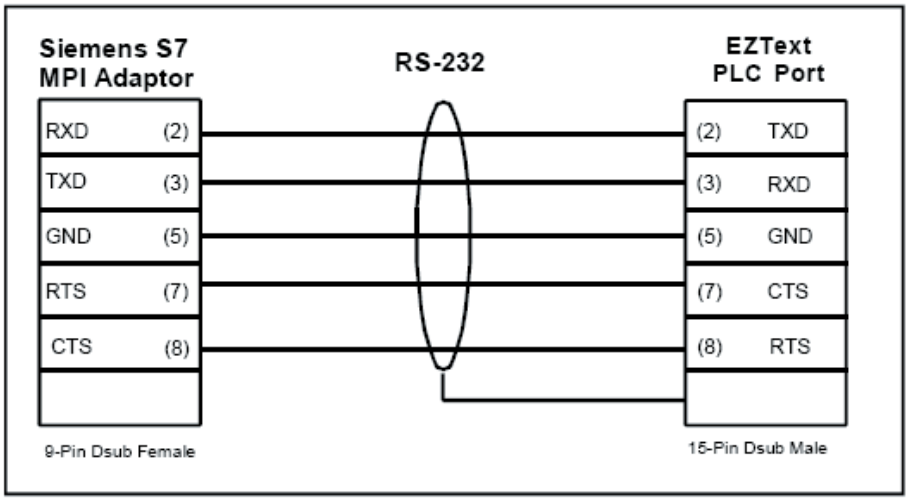
Modicon ModBus 9-Pin D-SUB RS-232 (P/N EZP-MODRTU-CBL)



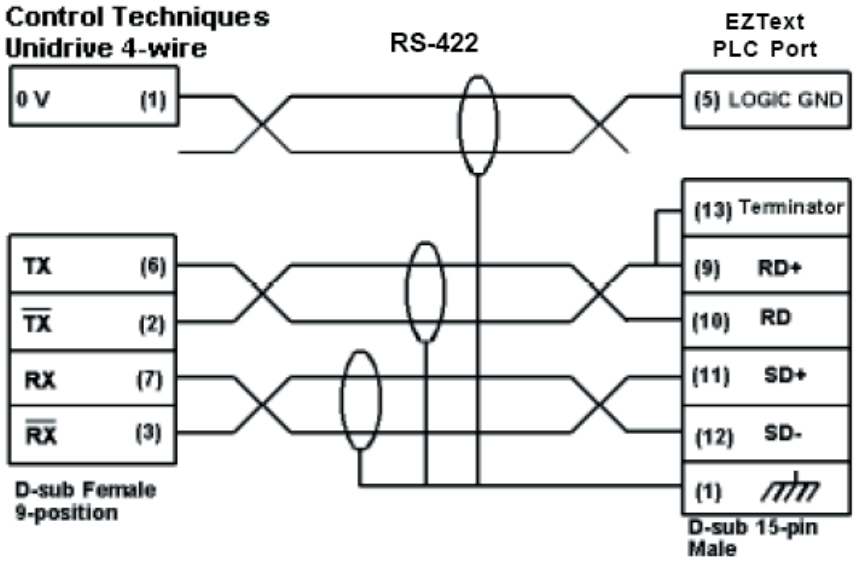
Omron C200, C500 RS-232 (P/N EZP-OMRON-CBL)



Siemens S7 MPI Adaptor (P/N EZP-S7MPI-CBL)

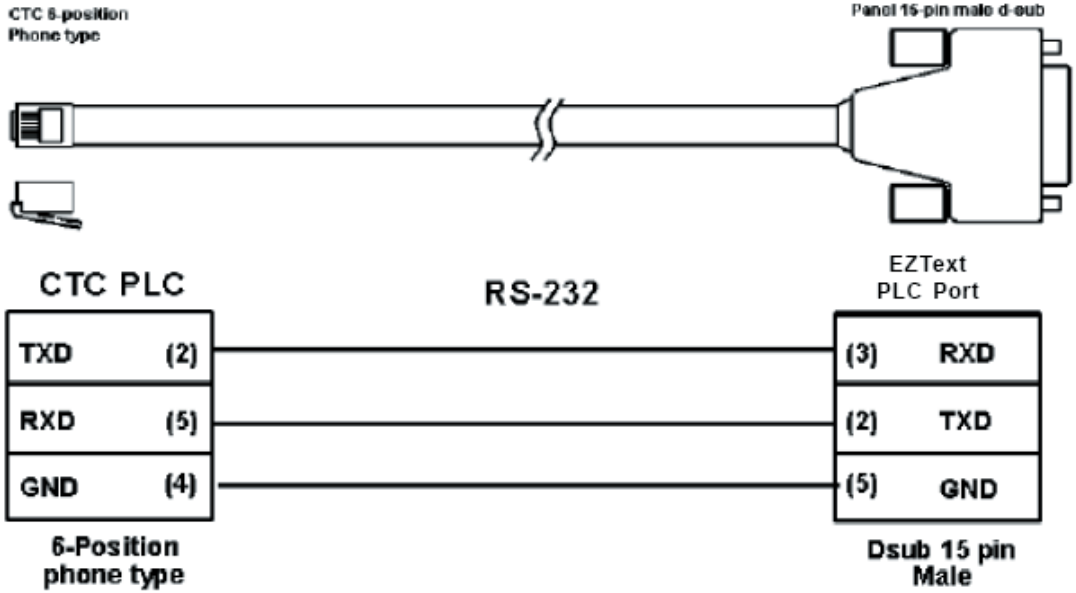


Control Techniques Unidrive 4-wire, RS-422, D-Sub Female 9 position (P/N EZP-CTRLUNI-CBL)



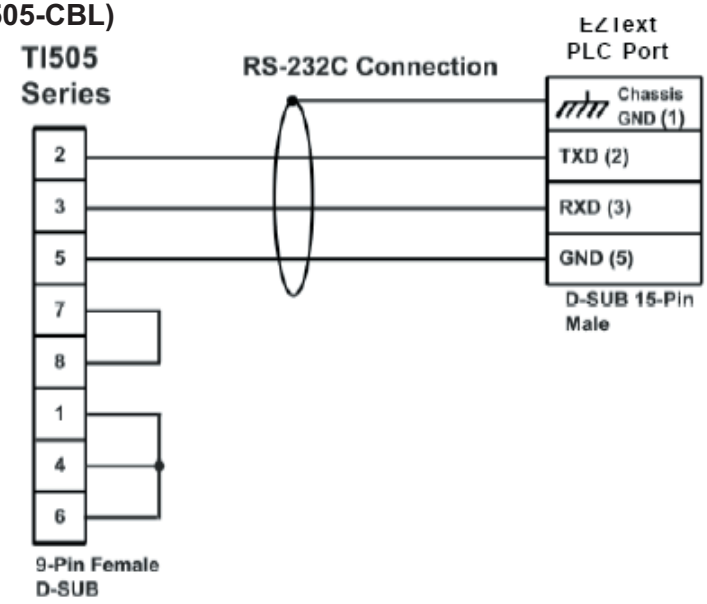
The hardware connection for the Control Techniques Unidrive PLCs is RS-422 (4-wire).

Control Technology Corporation (CTC) PLC, RS232, RJ-12 Port (P/N EZP-CTCBI-CBL)

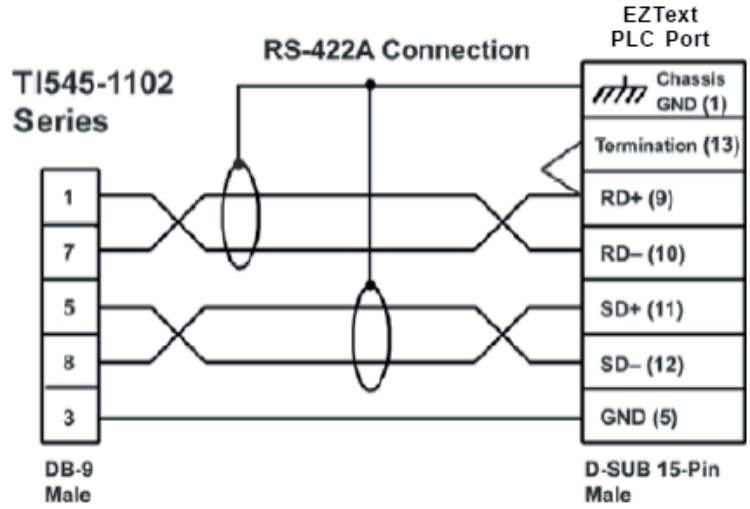


The hardware connection for the CTC2600 and CTC2700 is RS-232C.

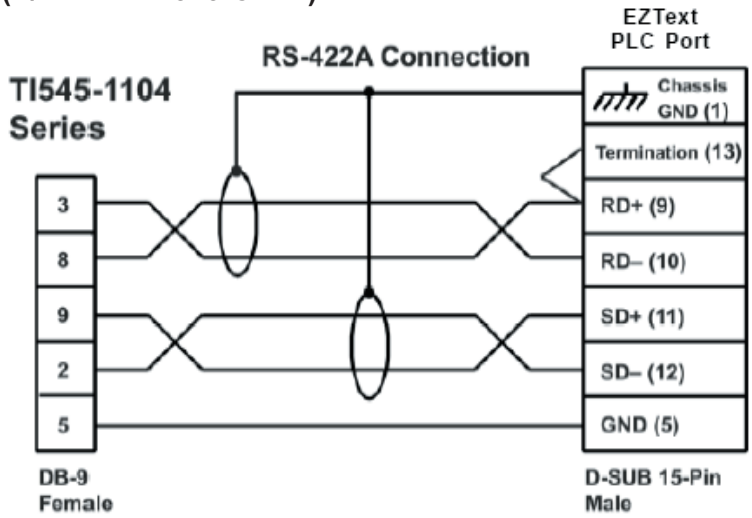
Texas Instruments 505 Series PLC, RS-232C, D-Sub Female 9 pin (P/N EZP-TX505-CBL)



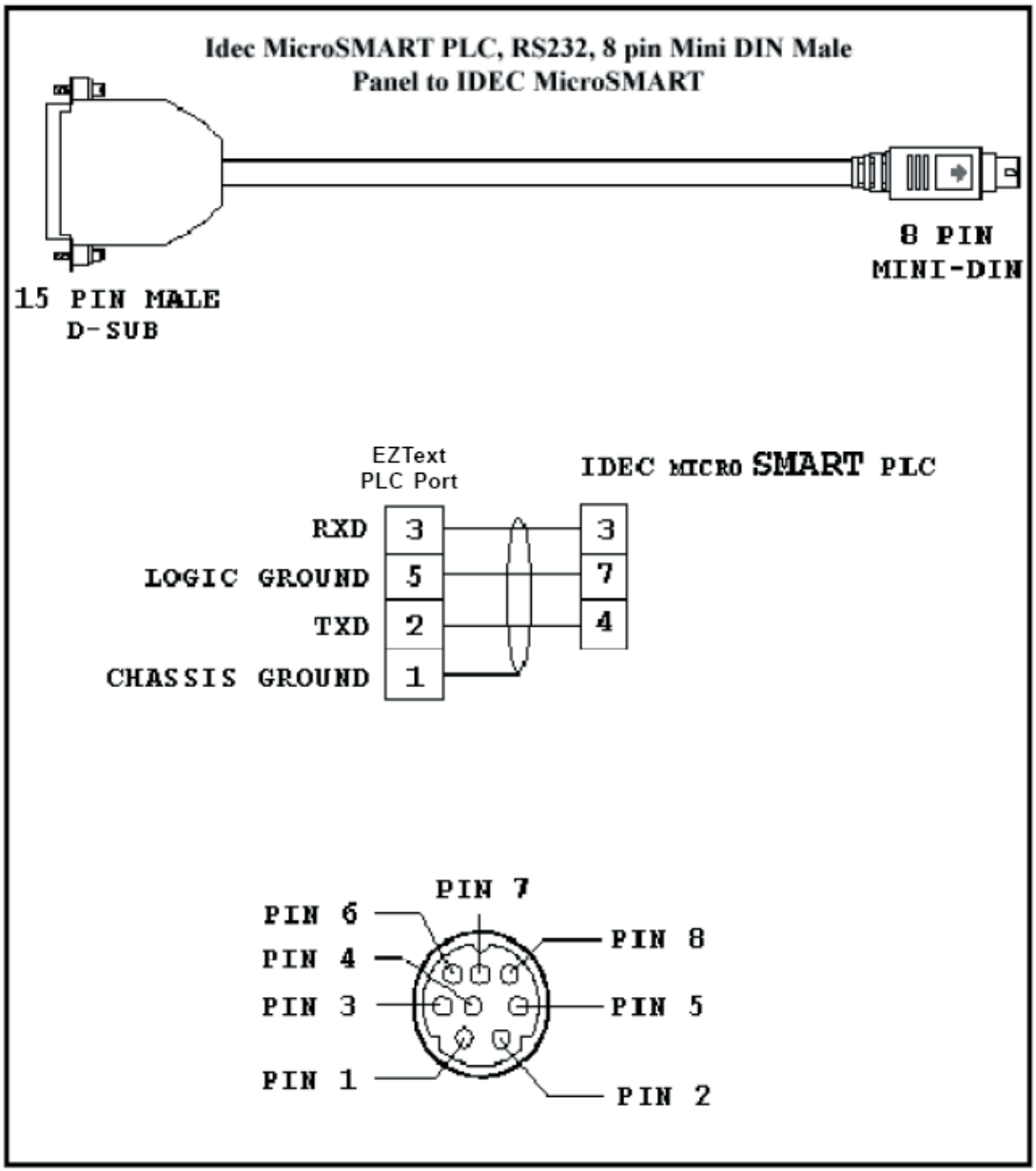
Texas Instruments 545-1102 Series PLC, RS-422A, D-Sub Male 9 pin (P/N EZP-TX545-CBL)



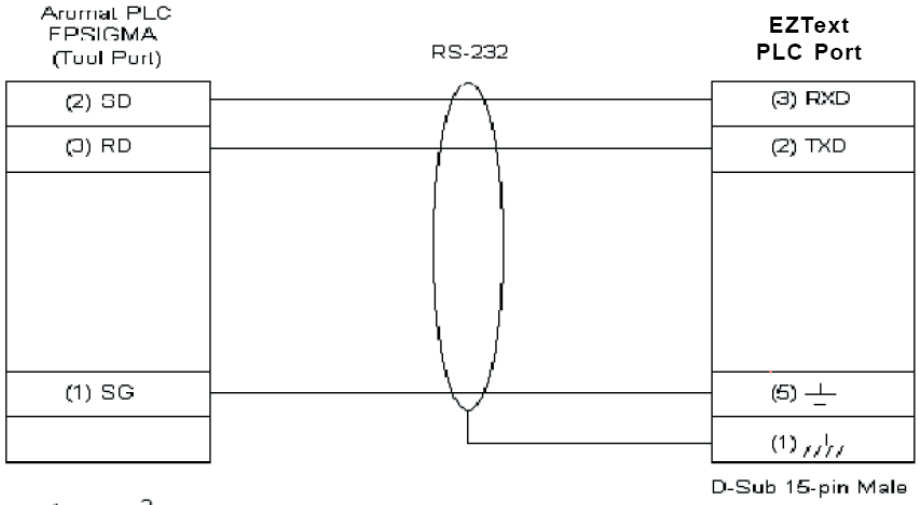
Texas Instruments 545-1104 Series PLC, RS-422A, D-Sub Female 9 pin (P/N EZP-TX545-CBL1)

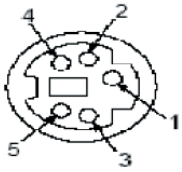


Idec MicroSMART PLC, RS232, 8 pin Mini DIN Male (P/N EZP-IDECS-CBL)



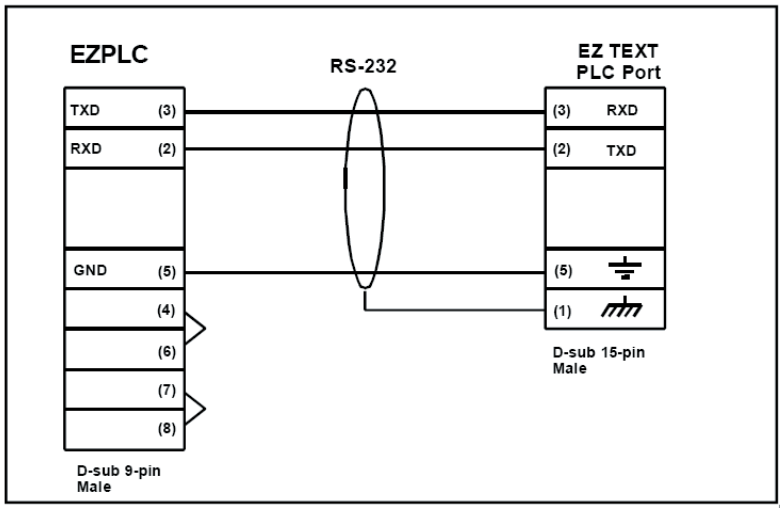
Aromat PLC, RS232, Mini DIN 5-pin Male Connector (P/N EZP-ARCOL-CBL)





Mini Din 5-pin Male
Non-standard Connector

EZAutomation EZPLC 9-Pin D-SUB RS-232 (P/N EZP-CBL)



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Appendix C

In this appendix....

PLC Driver Error Messages

ALLEN-BRADLEY PLCs

Driver Errors for Micrologix/SLC 500 with DF1 Half Duplex Protocol

0x0000 No error

0x0001 Incompatible Revision
This error will be displayed when the driver and exec have incompatible revision.

0x0002 PLC error incorrect map size
This error occurs when an incompatible map is loaded into the unit. The driver will not attempt to communicate with the PLC when this occurs.

0x0004 Limit of elements per screen exceeded
This occurs when there are too many registers on the display that can be monitored.

0x0008 PLC MSG time-out CMD=X
This error occurs when the unit does not receive a reply to its command. The unit will retry a command and wait for the specific time-out period before reporting this command. The command ID causing this error is reported. CMD 0xAA=READ CMD 0XA2=WRITE.

0x0010 Invalid PLC attributes - using defaults
This will occur if the PLC driver receives an invalid set of attributes. The default attributes will be used when this occurs.

0x0020 PLC bad checksum CMD=X
This occurs when a reply with an invalid checksum is received by the unit. The command ID of the command that incurred the error is reported as part of the message. CMD 0XAA=Read CMD 0XA2=Write.

0x0040 PLC Error STS=XX EXTSTS=XX CMD=ZZ
This is reported when a controller responds to a command with an error. The error code is shown and can be looked up in the Allen-Bradley documentation. The command ID of the command causing the error is reported. CMD 0XAA=Read, CMD 0XA2=Write.

0x0080 PLC Nack Error
This error is reported when a controller responds to a command with a negative acknowledgment.

0x0100 PLC element read-only
This is reported when an attempt is made to write to an element with a read-only map entry. Read-only map entries are: input file, output file, and all discrete entries. The driver can only read discrete entries, it cannot write to a single bit within a word.

0x0200 PLC TX buffer full
The error is reported if the transmit buffer becomes full in the PLC driver.

0x0400 PLC error no reply

This occurs when the DF1 modules indicate the PLC has no reply to the last message. It is usually displayed when the unit reestablishes communications after a PLC message time-out error. This can also occur when the panel message time-out is too short. If the PLC message time-out does not give the PLC enough time to respond to the message this error will be displayed.

0x0800 Error code xx

This is reported when the PLC driver encounters an unknown error. This should never occur.

Driver Errors for PLC5 with DF1 Protocol

0x0000 No error

0x0001 Incompatible Revision

This error will be displayed when the driver and exec have an incompatible revision.

0x0002 PLC error incorrect map size

This error occurs when an incompatible map is loaded into the unit. The driver will not attempt to communicate with the PLC when this occurs.

0x0004 Limit of elements per screen exceeded

This occurs when there are too many registers on the display to be monitored. The number of registers on the display must be reduced.

0x0008 PLC MSG Time-out CMD=X

This occurs when the unit does not receive a reply to its command. The unit will retry a command and wait for the specified time-out period before reporting this command. The command ID causing the error is reported.

0x0010 Invalid PLC attributes - using defaults

This error is reported when the PLC driver receives an invalid set of PLC attributes. The default attributes will be used when this error occurs.

0x0020 PLC Bad checksum CMD=X

This error occurs when a reply with an invalid checksum is received by the unit. The command ID of the command that incurred the error is reported as part of the message.

0x0040 PLC Error STS=xx EXTSTS=yy CMD=zz

This error is reported if a controller responds to a command with an error. The error code is shown and can be looked up in the Allen-Bradley documentation. The command ID of the command causing the error is reported.

0x0080 PLC Nack Error

This error is reported if a controller responds to a command with a negative acknowledgment error.

0x0100 PLC Element Read Only

This error is reported if an attempt is made to write to an element with a read only map entry. Read only map entries are: INPUT file, OUTPUT file, and the control word of TIMERS, COUNTERS, and CONTROL structures.

0x0200 PLC Transmit Buffer Full

The error is reported if the transmit buffer becomes full in the PLC driver.

0x8000 Error Code XX

This error is reported when the PLC driver encounters an unknown error. This should never occur.

Time-outs

This specifies the amount of time the EZText Enhanced Panel will wait for a reply to a message before triggering an error. Each message sent to the PLC must be acknowledged by the PLC. The acknowledgment must be received within the time-out period. After the message has been sent twice with no response, the time-out message will be displayed.

Driver Errors for Micrologix/SLC 500 with DF1 Full Duplex Protocol

0x0000 No error

0x0001 Incompatible Revision

This error will be displayed when the driver and exec have incompatible revision.

0x0002 PLC error incorrect map size

This error occurs when an incompatible map is loaded into the unit. The driver will not attempt to communicate with the PLC when this occurs.

0x0004 Limit of elements per screen exceeded

This occurs when there are too many register on the display that can be monitored.

0x0008 PLC MSG time-out CMD=X

This error occurs when the unit does not receive a reply to its command. The unit will retry a command and wait for the specific time-out period before reporting this command. The command ID causing this error is reported. CMD 0xAA=READ CMD 0XA2=WRITE.

0x0010 Invalid PLC attributes - using defaults

This will occur if the PLC driver receives an invalid set of attributes. The default attributes will be used when this occurs.

0x0020 PLC bad checksum CMD=X

This occurs when a reply with an invalid checksum is received by the unit. The command ID of the command that incurred the error is reported as part of the message. CMD 0XAA=Read CMD 0XA2=Write.

0x0040 PLC Error STS=XX EXTSTS=XX CMD=ZZ

This is reported when a controller responds to a command with an error. The error code is shown and can be looked up in the Allen-Bradley documentation. The command ID of the command causing the error is reported. CMD 0XAA=Read, CMD 0XA2=Write.

0x0080 PLC Nack Error

This error is reported when a controller responds to a command with a negative acknowledgment.

0x0100 PLC element read-only

This is reported when an attempt is made to write to an element with a read-only map entry. Read-only map entries are: input file, output file, and all discrete entries. The driver can only read discrete entries, it cannot write to a single bit within a word.

0x0200 PLC TX buffer full

The error is reported if the transmit buffer becomes full in the PLC driver.

0x0400 PLC error no reply

This occurs when the DF1 modules indicate the PLC has no reply to the last message. It is usually displayed when the unit reestablishes communications after a PLC message time-out error. This can also occur when the panel message time-out is too short. If the PLC message time-out does not give the PLC enough time to respond to the message this error will be displayed.

0x0800 Error code xx

This is reported when the PLC driver encounters an unknown error. This should never occur.

DIRECTLOGIC PLCS

K-Sequence Protocol/Direct Logic PLC Models: DL05, DL105, D2-230, D2-240, D2-250, D3-350, D4-430, D4-440, D4-450

0x0000 No Error

0x0001 Incompatible Revision

This error will be displayed when the driver and exec have an incompatible revision.

0x0002 Limit of elements per screen exceeded.

This occurs when there are too many registers on the display to monitor.

0x0004 Invalid Checksum

This error occurs when a message with an invalid checksum is received by the unit. The unit is receiving invalid data.

0x0008 Protocol Error

The driver has received a serial communications protocol error from the PLC. The driver is unable to communicate with the PLC when this error occurs.

0x0040 PLC Error Incorrect Map Size

An incompatible map has been loaded into the unit. The driver will not attempt to communicate with the PLC when this error occurs.

0x0080 Invalid write to panel register nnn

A write was attempted to the panel's internal register nnnn when that register is mapped to a read-only location in the PLC.

0x0100 PLC Communications Timeout

The panel is unable to communicate with the PLC.

0x0200 Invalid attributes - using defaults

The driver received attributes it could not use. The default values for all PLC attributes will be used.

DirectNet Protocol (except DL330/340)/ Direct Logic PLC Models: DL05, D2-240, D2-250, D2-240/250 DCM, D3-350, D3-350 DCM, D4-430, D4-440, D4-450, DL405 Series all with DCM

0x0000 No Error

0x0001 Incompatible Revision

This error will be displayed when the driver and exec have an incompatible revision.

0x0002 Limit of elements per screen exceeded.

This occurs when there are too many registers on the display to monitor.

0x0004 Invalid Checksum

This error occurs when a message with an invalid checksum is received by the unit. The unit is receiving invalid data.

0x0008 Protocol Error

The driver has received a serial communications protocol error from the PLC. The driver is unable to communicate with the PLC when this error occurs.

0x0040 PLC Error Incorrect Map Size

An incompatible map has been loaded into the unit. The driver will not attempt to communicate with the PLC when this error occurs.

0x0080 Invalid write to panel register nnn

A write was attempted to the panel's internal register nnnn when that register is mapped to a read-only location in the PLC.

0x0100 PLC Communications Timeout

The panel is unable to communicate with the PLC.

0x0200 Invalid attributes - using defaults

The driver received attributes it could not use. The default values for all PLC attributes will be used.

ModBus (Koyo Addressing) RTU Protocol/Direct Logic PLC Models: DL05, D2-250, D3-350, D4-450

0x0000 No error

0x0001 Incompatible Revision

This error will be displayed when the driver and exec have an incompatible revision.

0x0002 Limit of elements per screen exceeded

This occurs when there are too many registers on the display to monitor.

0x0004 Reply received from invalid slave nnn

If the driver received a message from a PLC with address nnn when one was not expected.

0x0008 Invalid Checksum Received

This error occurs when a message with an invalid checksum is received by the unit.

0x0010 Incorrect Reply

The driver received an incorrect or unexpected reply from the PLC with address nnn.

0x0020 Error - PLC nnn - <error>

The driver received a ModBus message exception code from the PLC. The <error> strings are:

Illegal Function

The PLC received an invalid function code.

Illegal Data Address

The address requested is not allowable for the PLC. This may appear instead of a time-out when a PLC is in bridge mode to a ModBus Plus network. The PLC that the Panel is communicating with will return this error if the message could not be passed on to the addressed PLC.

Illegal Data Value

The value in the data field is not allowed for the PLC.

Slave Device Failure

An unrecoverable error occurred in the PLC.

Acknowledge

The PLC requires more time to process the message.

Slave Device Busy

The PLC is processing a long command and is not ready for a new one.

Negative Acknowledgment

The PLC cannot perform the function requested.

Memory Parity Error

An error was detected in the PLC memory.

0x0040 Broadcast not allowed in read command

If a broadcast message to read was attempted.

0x0080 PLC time-out - PLC nnn

The EZText Enhanced Panel is unable to communicate with the PLC with address nnn. This may be corrected by increasing the time-out time or increasing the baud rate. An alternative may be to lower the number of registers or coils per message. This causes the panel to use smaller messages, that the PLC should be able to respond to at a faster rate.

0x0100 PLC reply length exceeded - PLC nnn

The driver received, or is receiving a message with a length exceeding the maximum allowed by ModBus protocol from the PLC with address nnn.

0x0200 Invalid write to panel register nnn

A write was attempted to the panel's internal register nnnn when that register is mapped to a read-only location in the PLC.

0x0400 Invalid attributes - using defaults

The driver received attributes it could not use. The default values for all PLC attributes will be used.

DirectNet Protocol DL330, DL340/Direct Logic PLC Models: D3-330/330P, D3-340

0x0000 No Error

0x0001 Incompatible Revision

This error will be displayed when the driver and exec have an incompatible revision.

0x0002 Limit of elements per screen exceeded.

This occurs when there are too many registers on the display to monitor.

0x0004 Invalid Checksum

This error occurs when a message with an invalid checksum is received by the unit. The unit is receiving invalid data.

0x0008 Protocol Error

The driver has received a serial communications protocol error from the PLC. The driver is unable to communicate with the PLC when this error occurs.

0x0040 PLC Error Incorrect Map Size

An incompatible map has been loaded into the unit. The driver will not attempt to communicate with the PLC when this error occurs.

0x0080 Invalid write to panel register nnn

A write was attempted to the panel's internal register nnnn when that register is mapped to a read-only location in the PLC.

0x0100 PLC Communications Timeout

The panel is unable to communicate with the PLC.

0x0200 Invalid attributes - using defaults

The driver received attributes it could not use. The default values for all PLC attributes will be used.

GENERAL ELECTRIC PLCS

0x0000 No error

0x0001 Incompatible Revision

This error will be displayed when the driver and exec have an incompatible revision.

0x0002 Limit of elements per screen exceeded

This occurs when there are too many registers on the display to monitor.

0x0004 PLC Time-out - X = YYYYY

This error results from a loss of communication with a PLC. The X shown stands for the PLC that timed out. This will be a number one through 16 or default. The YYYYY stands for the actual SNP-X ID string entered for the PLC that timed out. If the SNP-X ID string is a null string, the space after the equal sign will be the last character in the error string.

0x0008 Invalid PLC Attributes - using default

The attributes passed from the program loader, or the existing attributes in memory do not match those expected by the driver. The default attributes will be used and normal operations will commence.

0x0010 Invalid Write to panel register xxx

There was an attempted write to panel internal register number xxx which is mapped to an address which has read-access only.

0x0020 PLC Message Error

A communications error occurred which resulted in an invalid message. It could also indicate that an address was requested which is out of the range limits of the PLC.

0x0040 Incorrect Map Size

This error occurs when a map is stored that is not the size the PLC expects.

MITSUBISHI PLCs

0x0001 Incompatible Revision

This error will be displayed when the driver and exec have incompatible revision.

0x0002 Limit of elements per screen exceeded

This occurs when there are too many elements on the display to monitor.

0x0004 Communications Error

This error occurs when there is an error involving communications between the panel and PLC. A communications error results from one of the following: no or bad physical connection between panel and PLC, bad checksum in reply from the PLC, bad checksum in command from the panel, bad command from the panel, bad format of command from the panel, or unexpected reply from the PLC.

0x0010 Invalid Write - Panel register : xxxx

This error will occur when an attempt to write to a read only MFX element. The panel register xxxx contains the address of the MFX element that is read-only.

0x0020 PLC Message Time-out

This message occurs when the unit does not receive a reply to its command. The unit will retry a command and wait for the specified time-out period before reporting this command.

0x0040 Invalid PLC attributes - using defaults

This error is reported when the PLC driver receives an invalid set of PLC attributes. The default attributes will be used when this error occurs.

Timeouts

The timeout time specifies the amount of time the panel will wait for a reply to a message before triggering an error. Each message sent to the PLC must be acknowledged by the PLC. The acknowledgment must be received within the time-out period. If the acknowledgment is not received the driver will retry the command. After the message has been sent twice with no response, the time-out error message will be posted.

MODICON PLC WITH MODBUS RTU PROTOCOL

0x0000 No error

0x0001 Incompatible Revision

This error will be displayed when the driver and exec have an incompatible revision.

0x0002 Limit of elements per screen exceeded

This occurs when there are too many registers on the display to be monitored. The number of registers on the display must be reduced.

0x0004 Reply received from invalid slave nnn

If the driver received a message from a PLC with address nnn when one was not expected.

0x0008 Invalid Checksum Received

This error occurs when a message with an invalid checksum is received by the unit.

0x0010 Incorrect Reply

The driver received an incorrect or unexpected reply from the PLC with address nnn.

0x0020 Error - PLC nnn - <error>

The driver received a Modbus message exception code from the PLC. The <error> strings are:

Illegal Function
The PLC received an invalid function code.

Illegal Data Address
The address requested is not allowable for the PLC. This may appear instead of a time-out when a PLC is in bridge mode to a Modbus Plus network. The PLC that the EZText Enhanced Panel is communicating with will return this error if the message could not be passed on to the addressed PLC.

Illegal Data Value
The value in the data field is not allowed for the PLC.

Slave Device Failure
An unrecoverable error occurred in the PLC.

Acknowledge
The PLC requires more time to process the message.

Slave Device Busy
The PLC is processing a long command and is not ready for a new one.

Negative Acknowledgment
The PLC cannot perform the function requested.

Memory Parity Error
An error was detected in the PLC memory.

0x0040 Broadcast not allowed in read command
If a broadcast message to read was attempted.

0x0080 PLC time-out - PLC nnn
The EZText Enhanced Panel is unable to communicate with the PLC with address nnn. This may be corrected by increasing the time-out time or increasing the baud rate. An alternative may be to lower the number of registers or coils per message. This cause the EZText Enhanced Panel to use smaller messages, which the PLC should be able to respond to at a faster rate.

0x0100 PLC reply length exceeded - PLC nnn
The driver received, or is receiving a message with a length exceeding the maximum allowed by Modbus protocol from the PLC with address nnn.

0x0200 Invalid write to Panel register nnn
A write was attempted to the EZText Enhanced Panel's internal register nnnn when that register is mapped to a read-only location in the PLC.

0x0400 Invalid attributes - using defaults
The driver received attributes it could not use. The default values for all PLC attributes will be used.

OMRON HOST LINK PLCs

0x0000 No error

0x0001 Incompatible Revision
This error will be displayed when the driver and exec have an incompatible revision.

0x0002 Limit of elements per screen exceeded

This occurs when there are too many registers on the display to monitor.

0x0004 Incorrect Unit Response

This will occur when there are too many registers on the display to be monitored. The number of registers on the display must be reduced.

0x0008 PLC Invalid Checksum received

An invalid checksum was received in a message from the PLC.

0x0010 Incorrect reply received

The driver received an incorrect reply from a PLC.

0x0020 Response to an undefined command

The driver received the undefined command response.

0x0040 Command cc Error Response Code xx

This error occurs when a response code xx is returned to a PLC message command of cc.

0x0080 Incorrect Map Size

This error occurs when an incorrect map is stored that is not the correct map entry size the driver expects.

0x0100 Invalid Write to EZText Enhanced Panel register r

This error occurs when an attempt is made to write to a register r when r is mapped to read-only element.

0x0400 PLC Message Time-out

This error occurs when a no reply or error is seen within the time-out time in the EZText Enhanced Panel PLC attributes. If the EZText Enhanced Panel is displaying time-out errors, the timeout may need to be increased.

0x2000 Invalid PLC attributes - using defaults

The driver received attributes it could not use. The default values for all PLC attributes will be used.

Siemens 7 MPI Adapter PLCs

Please Note: If the panel is disconnected from the HMI adapter, and then reconnected, it may take up to 70 seconds for the panel to regain communications and become synchronized with the adapter.

0x0000 No Error

0x0001 Incompatible Revision

This error will be displayed when the driver and exec have an incompatible revision.

0x0002 Limit of elements per screen exceeded

This occurs when there are too many registers on the display to monitor.

0x0008 Protocol Error

The driver has received a serial communications protocol error from the PLC. The driver is unable to communicate with the PLC when this error occurs.

0x0040 PLC Error Incorrect Map Size

An incompatible map has been loaded into the unit. The driver will attempt to communicate with the PLC when this error occurs.

0x0080 Invalid Write to Panel register nnnn

A write was attempted to an internal Panel register number nnnn that has been mapped as a read-only location.

0x0100 PLC Communication Timeout

The Panel is unable to or has lost communication with the PLC.

0x0200 Invalid PLC Attributes - Using Defaults

The panel has received invalid attributes. The default attributes for all PLC attributes will be used.

0x1000 COMMAN_TRANS_ERROR

This error occurs when the PLC detects an error condition. Consult the PLC Communication Error Responses List.

EZText Enhanced Panel Error Messages

READ ONLY VALUE

This message indicates that the operator has tried to edit to a read only data item.

INVALID

This message indicates that the operator has entered an illegal password.

NO DATA SET

This message indicates that the operator has tried to enter a data item in a message that contains no data items.

OUT OF RANGE

This message indicates that the operator has entered a value in a data item that is out of range.

EZText Enhanced Programming Software Error Messages

Error Codes are divided into categories and are numbered with prefixes and 3 digits as follows:

PLC DLL Errors	Pxxx
Communications Errors	Cxxx
Tag Errors	Txxx
Message Errors	Mxxx
Miscellaneous Errors	Zxxx

PLC DLL Error Messages:

Error P001: Load dll Procedure failed. Unable to validate PLC address. Possible reason: Unable to locate correct PLC DLL.

Reason: A PLC .dll file has been moved or deleted from the program directory.
Solution: Reinstall the software.

Error P002: Unable to load library : PlcUtils.dll

Error P003: Unable to load PLC dll.

Error P004: Unable to unload PLC dll.

Error P005: PLC DLL load failed.

Reason: Unable to load selected PLC dl.
Solution: (1) Try closing all other applications and retry; (2) reboot the system; (3) reinstall the software.

Error P006: PLC1 is not compatible with PLC2. Do you want to change the PLC anyway?

Error P007: Unable to rebuild the address for new PLC.

Reason: When changing PLCs, check theaddressing in the PLC manuals to see if they are compatible (same addressing type is followed in both PLCs). If they are not compatible, then the database is no longer valid and the addresses will have to be reentered.

Communication Error Messages:

Error C001: The panel connected to the PC is different from the configured one

Reason: When writing to the panel, if the panel type selected does not match the panel that the computer is physically connected to, the program loader will not upload the project.
Solution: Select appropriate panel type for the connected panel.

Error C002: Cannot Locate the Driver File

Reason: Driver file (*.plx) has been moved or deleted from the program directory.
Solution: Reinstall the software.

Error C003: Error opening port

Reason: Either you have not selected a valid COM port available on your computer or some other program is using this port.

Solution: Select another available COM port or close the program that is using this COM port. If this does not work, reboot your system and try again.

Error C004: Error in setting communication attributes

Reason:Unable to set the attributes for the Panel to PC communciation.
Solution: Reboot the system.

Error C005: Unable to write to Panel. Possible cause: No local messages configured.

Reason: No local messages are configured. At least one local message should be configured before downloading the program to the panel.
Solution: Configure local messages.

Error C006: Error in reading the project from the panel. Project in the panel is corrupted.

Solution: Please upload the project from the computer to the panel. You cannot read the project from the panel.

Error C007: Invalid Length in Reply

Reason: Length of the panel reply buffer is less than the maximum replay length (70)
Solution: If you receive this error message consistently, please report it to technical support.

Standard reply error messages:

PLC Address Error Messages:

Error T001: PLC Address count exceeds maximum limit.

ErrorCode	Error Message
1	Error C008: Checksum error
2	Error C009: Time out Error. Make sure Panel is in Setup Mode. To enter Setup Mode, press the up and down arrow keys simultaneously
3	Error C010: Invalid Message Code
4	Error C011: Start Load Not Requested
5	Error C012: Start Dump Not Requested
6	Error C013: Insufficient space in Text Panel
7	Error C014: Invalid Message Number
8	Error C015: Invalid Message Length
9	Error C016: The firmware being loaded into the panel does not match the panel type
10	Error C017: E2 Memory failed to program correctly
11	Error C018: Invalid Load Format
12	Error C019: Invalid LED control
13	Error C020: Option Not Included
14	Error C021: Memory is Read Only
21	Error C022: Invalid with Random PLC loaded
22	Error C023: Invalid with Random & standard format
24	Error C024: Invalid Byte in the data fields of Command

Solution: You cannot assign another PLC address. Only 300 PLC addresses can be defined. If you want to assign a new address, delete one or more addresses and try again.

Error T002: Invalid Access Type

Reason: Access type of the specified address is invald (e.g., entering a READ only address where a READ/WRITE address type is expected.

Solution: Supply the correct address.

Error T02_1: Invalid Unit Number.
Error T02_2: Invalid Address Type.
Error T02_3: Invalid Address.
Error T02_4: Invalid Bit Number.
Error T02_5: Address in not Word Aligned (Even address is required).
Error T02_6: Address is not Word Aligned (Odd address is required).

Reason: Address entered for the PLC Address is not correct.
Solution: Specify a valid PLC address.

Error T003: The value entered is invalid.

Reason: The value entered for Minimum or Maximum field is out of range.
Solution: Supply values in the range 0…9999 for BCD and 0…65535 for Binary

Error T004: Unable to open tag map file : <filename> Please choose the map file
Error T005: Unable to open map file <map file>

Reason: Think N Do map (.map) file not found.
Solution: Locate the correct map file.

Error T006: Error in reading PLC Addresses

Reason: Unable to generate PLC address while reading from the panel.
Solution: Project in the Panel is corrupted. Reload the project to the panel.

Error T007: Unknown access type specified for PLC Address.

Reason: Invalid access type found while reading a project from disk.
Solution: Project in the Panel is corrupted. Reload the project to the panel.

Message Error Messages:

Error M001: Unable to add a new Message/Folder. Possible cause: All the available 256 messages have been programmed

Solution: Delete one or more messages or folders and try adding your message again.

Error M002: Invalid message number or this message number has already been configured.

Solution: Please change the message number to a valid message number and ensure that this message number was not programmed earlier.

Error M003: Cannot add a message with message number greater than 256.

Solution: Message numbers have to be numbered with the range of 1 to 256. Please enter a valid message number within this range.

Error M004: Invalid Message Number.

Solution: Valid range for message number is 1 to 256. Please enter a valid message number.

Error M005: Message number is out of range.

Solution: Message number is out of range. Valid range is 1-256

Miscellaneous Error Messages:

Error Z001: Error in printing page.

Solution: (1) Check whether you have printer attached to the PC and set to Ready; (2) if still receiving this error, reboot the system and check printer to PC connection.

Error Z002: You are trying to read from an invalid file.

Reason: Either project file is corrupted or you are trying to open an non-EZText Enhanced file.
Solution: If the project file is corrupted, then, recreate the project.

Error Z003: The file may be corrupted.

Reason: The Exec file is corrupted.
Solution: If you receive this error message consistently, please report this to technical support.

Error Z004: Unable to open the PLC driver file.

Reason: Invalid PLC driver file.
Solution: If you receive this error message consistently, please report this to technical support.

Error Z005: The Maximum message length has exceeded.

Reason: Maximum message length exceeded.
Solution: Reduce length of message.

Error Z006: Unknown value type encountered while loading project. Known values are 0 (BCD) and 1 (Binary)

Reason: Invalid value type found while reading project from disk.
Solution: Project file in the panel is corrupted. Reload the project to the panel.

Error Z007: Discrete addresses are not allowed here.

Reason: Discrete addresses are not allowed in the EZText Enhanced Panel.
Solution: Use the correct address type.

Error Z008: Invalid Device Type

Reason: The connected equipment may not be an EZText Enhanced Panel.
Solution: Ensure that you are connected to an EZText Enhanced Panel.

Error Z009: Error in project file Line : <line number> Column : <column number> <filename>

Reason: The project file (XML version) is invalid.
Solution: Use a valid project file.

AROMAT PLC WITH MEWTOCOL COM PROTOCOL

Error 0: NO_ERROR

Screen Message: **N/A**
Condition: NEVER WILL OCCUR

Error 1: INVALID_ATTRIBUTES

Screen Message: **INVALID PLC ATTRIBUTES - USING DEFAULTS**
Condition: If attributes do not exist or there are less than the original number of attributes.

Error 2: MSG_ERR

Screen Message: **INVALID PLC RESPONCE: Txxxxx[,xxx][/BB]**
Condition: The Driver did not receive the reply from the PLC that it expected.

Error 3: PLC_TIMEOUT

Screen Message: **PLC TIMEOUT**
Condition: The Driver did not receive a reply to a message in the allowed time.

Error 4: BCC_ERR

Screen Message: **CHECKSUM ERROR**
Condition: Command string was not sent from the Panel to the PLC correctly, or the checksum in the message was incorrect.

Error 5: FMT_ERR

Screen Message: **FORMAT ERROR**
Condition: Command string was missing characters or some were incorrect.

Error 6: NOT_ERR

Screen Message: **NOT SUPPORT ERROR**
Condition: Command from Panel does not exist on the PLC.

Error 7: PRO_ERR

Screen Message: **PROCEDURE ERROR**
Condition: Command was sent to the PLC while it was still processing an existing command.

Error 8: WRONG_STN_ERR

Screen Message: **WRONG STATION REPLIED TO MSG**
Condition: The received message contained a different station number from the message the driver sent.

Error 9: CSUM_ERR

Screen Message: **INCORRECT CSUM FROM PLC**
Condition: The received message from the PLC had a bad checksum.

Error 10: INVALID_DRIVER_STATE

Screen Message: **INVALID DRIVER STATE**
Condition: NEVER SHOULD OCCUR.

Error 11: GENERAL_ERROR

Screen Message: **ERROR CODE xxx**
Condition: NEVER SHOULD OCCUR.

Error 12: LAST_ERROR

Screen Message: **N/A**
Condition: NEVER WOULD OCCUR

CTC PLC WITH BINARY PROTOCOL

Error 0: NO_ERROR

Screen Message: **N/A**
Condition: Never will occur

Error 1: INVALID_ATTRIBUTES

Screen Message: **INVALID PLC ATTRIBUTES - USING DEFAULTS**
Condition: The error will be displayed if attributes do not exist or there are less than the original number of attributes.

Error 2: RECEIVED_BAD_CHECKSUM

Screen Message: **INVALID CHECKSUM RECEIVED: (Txxxxx [,xxx] [/BB]**
Condition: This error will be displayed if a message received from the PLC has a bad checksum.

Error 3: SENT_BAD_CHECKSUM

Screen Message: **INVALID CHECKSUM SENT: (Txxxxx [,xxx] [/BB]**
Condition: This error will be displayed if the driver sent the PLC a message with a bad checksum.

Error 4: ILLEGAL_REG_READ

Screen Message: I**NVALID REGISTER READ: (Txxxxx [,xxx] [/BB]**
Condition: This error will be displayed if the PLC indicated that the driver attempted to read a register with an invalid address.

Error 5: ILLEGAL_REG_WRITE

Screen Message: **INVALID REGISTER WRITE: (Txxxxx [,xxx] [/BB]**
Condition: This error will be displayed if the PLC indicated that the driver attempted to write to a register with an invalid address.

Error 6: VAL_OUT_RANGE

Screen Message: **VALUE OUT OF RANGE: (Txxxxx [,xxx] [/BB]**
Condition: This error will be displayed if the driver attempted to write to a value than was out of range.

Error 7: MSG_ERR

Screen Message: **INVALID PLC RESPONSE: (Txxxxx [,xxx] [/BB]**
Condition: This error will be displayed if the driver did not receive the reply from the PLC that it expected.

Error 8: **DT_ELEM_NOT_FOUND**

Screen Message: **DATA TABLE VALUE NOT FOUND: (Txxxxx [,xxx] [/BB]**

Condition: This error will be displayed if the driver found a tag that does not exist on the data table. For example, the Row or Column number was out of the range of the PLC's data table limits.

Error 9: **PLC_TIMEOUT**

Screen Message: **PLC TIMEOUT**

Condition: This error will display if the driver did not receive a reply to a message in the allowed time.

Error 10: **DT_STRING_OUT_BOUNDS**

Screen Message: **MESSAGE STRING OUT OF BOUNDS: (Txxxxx [,xxx] [/BB]**

Condition: This error will display if the driver found a tag that does not exist on the data table. For example, the message string included a column number that was out of the range of the PLC's data table limits.

Error 14: **INVALID_DRIVER_STATE**

Screen Message: **INVALID DRIVER STATE**

Condition: Never should occur.

Error 15: **GENERAL_ERROR**

Screen Message: **ERROR CODE xxx**

Condition: Never should occur.

Error 16: **LAST_ERROR**

Screen Message: **N/A**

Condition: Never should occur.

IDEC PLC WITH COMPUTER LINK PROTOCOL

Error 1: INVALID PLC ATTRIBUTES - USING DEFAULTS

This error is reported when the PLC driver receives an invalid set of PLC attributes. The default attributes will be used when this error occurs.

Error 2: PLC TIMEOUT

The Driver did not receive a reply to a message in the allowed time. Check the communication between panel and PLC.

Error 3: DATA RANGE ERROR

This error occurs when response from PLC to read or write had a data range error.

Error 4: T/C PRESET CHANGE

This error occurs when response from plc for an invalid, present value is written to timer or counter.

Error 5: CALENDAR/CLOCK DATA

This error occurs when invalid data is sent to calendar or clock. Command was sent to the PLC while it was still processing an existing command.

Error 6: WRONG STATION REPLIED TO MSG

The received message contains a different station number from the message that the driver sent from panel.

Error 7: INCORRECT CSUM FROM PLC

Error 8: BCC ERROR

The calculated Check sum from the panel did not match with the value that PLC received in a message.

Error 9: FRAME ERROR

Number of bits received by the PLC differs from the preset value (stop bit is 0 for example).

Error 10: DATA SEND/RECEIVE ERROR

Parity error or overrun error occurred on PLC.

Error 11: COMMAND ERROR

Unsupported request message is received

Error 12: PROCEDURE/DATA QUANTITY ERROR

Received request message for the panel does not match the expected data (including quantity of data).

TEXAS INSTRUMENTS PLC WITH SERIES 5x5 PROTOCOL

0x0000 No error

0x0002 Limit of elements per screen exceeded

This occurs when there are too many registers on the display to monitor.

0x0004 Invalid checksum received

An invalid checksum was received in a message from the PLC.

0x0008 PLC Error - Check PLC Status

The PLC has sent an error code to the Panel stating there was a problem with the program in the PLC or with the setup of the Panel.

0x0010 Communications time-out

This error will appear if there is a loss of communications. This error is based on time-out time entered in the PLC attributes.

0x0020 Panel Register xxxx is read only

This error will occur if there is an attempt to write to a read-only variable within the PLC.

0x0040 Register xxxx Address out of range

This error will occur if an attempt to read or write to a variable within the PLC that is out of range of the PLC memory.

0x0080 Register xxxx Data not found

This will occur if the data requested cannot be found within the PLC. This is an error sent by the PLC.

0x0100 Invalid PLC attributes - using defaults

The driver received attributes that it could not use. The default values for all PLC attributes will be used.

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