Connecting to a PLC

In This Appendix....

- Connecting to DirectLOGIC PLCs
- Connecting to Allen-Bradley (A-B) PLCs
- Connecting to a WinPLC
- The Programming Cable (DP–PGMCBL)
- DirectTouch Cable pin-outs
- DirectTouch Panel Specifications
- Panel Dimensions and Installation

Connecting to DirectLOGIC PLCs



Warning: Be aware that the *Direct*Touch panel, as with any external device, can write to PLC registers and bits. You must be careful in using the panel to write to any PLC address. It is a good idea to use PLC ladder logic to call screens and to write to PLC outputs based on prescribed conditions.



1. Choose either RS-232 or RS-422 for panel/PLC communication.

If you are using a PLC which has RS–422 (like the D2–250, D3–350 and D4–450), the most efficient way is shown in the figure below. This keeps you from constantly having to swap back and forth between PC and PLC when designing screens and ladder logic.



RS–422 (panel/PLC)

DirectTouch Setup

2. Set up panel/PLC communications (RS–232 or RS–422). Press the upper left and lower right corners of the panel screen to bring up the System Mode Main Menu screen below and press System Setup.

If **RS–422** is used for panel/PLC connection, set the communication settings (baud rate— in bps, parity, stop bit, and data length) the same on the panel as the PLC.

In this case the RS–232 is used for panel/PC connection. The panel RS–232 settings may be ignored since the panel will adjust to the PC settings for downloads and uploads.

Press the upper left and lower right corners of the panel screen to bring up the System Mode Main Menu screen below and press System Setup.

Sys	tem Setup
Syst	em Check
Up/	Download
Us	ser Mode

Connecting to a PLC

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System Setup







NOTE: Initially, the panel is set to Not Used on both RS232C and RS422/485.

RS-232C Setup

Press the RS232C Setup button first, then the Connected Device button and select PLC (and ENT). Press enter (ENT) again for the change to take effect.







NOTE: Initially, the panel is set to Not Used on both RS232C and RS422/485.

RS-422 Setup

Press the RS422/485 Setup button, then the Connected Device button and select PLC (and ENT). Press enter (ENT) again for the change to take effect.



During configuration/programming, we found this setup very helpful for the D2–250:



D2-DSCBL-2 (for RS-422)



D2–DSCBL–2 Wiring Instructions: Connect the colored wires as shown. Tie Blue/White to Green/White and Blue to Green. (This ties RTS to CTS.) Tape all unused wires and tied wires so they cannot touch each other.

RS-232C (panel/PLC)



If RS-232C is used for panel/PLC connection, follow the same steps above, only set RS-232C as the PLC and RS-422 as Not Used.

3. Connect the PLC to the panel through the proper cable below. For cable pinouts, see page A–15.

DirectTouch Cables					
Family	PLC (or other device)	Port	Cable		
<i>Direct</i> LOGIC™ DL05	D0–05xx	Port1 or Port2	DP-2CBL		
<i>Direct</i> LOGIC™ DL105	F1–130	Only one	DP-2CBL		
<i>Direct</i> LOGIC™	D2–230	Only one	DP-2CBL		
DL205	D2-240	Top port	DP-2CBL		
		Bottom port	DP-2CBL		
	D2–250	Top port Bottom port Bottom port (RS–422)	DP-2CBL DP-2CBL-1 D2-DSCBL-2		
	D2-DCM	Only one	DP-3CBL-2		
<i>Direct</i> LOGIC™	D3–340	Top port	DP-3CBL		
DL305		Bottom port	DP-3CBL		
	D3–350	Top port (Phone Jack)	DP-2CBL		
		Bottom port Bottom port (RS–422)	DP-3CBL-2 D2-DSCBL-2		
	D3–DCM or 330/340 DCU	Only one	DP-3CBL-2		
DirectLOGIC™	D4–430	Top port (15-pin)	DP-4CBL		
DL405		Bottom port (25-pin)	DP-3CBL-2		
	D4–440	Top port (15-pin)	DP-4CBL		
		Bottom port (25-pin)	DP-3CBL-2		
	D4–450	Phone Jack	DP-2CBL		
		Top port (15-pin) Top port (RS–422)	DP-4CBL D2-DSCBL-2		
		Bottom port (25-pin)	DP-3CBL-2		
	D4–DCM	Only one	DP-3CBL-2		
Allen-Bradley™ SLC 500	5/03 & 5/04	Bottom port	DP-ABCBL-1		
WinPLC	WinPLC	Top port or Serial I/O Top port (RS–422)	DP–2CBL Belden 9729 (or equal)		
Allen-Bradley™ MicroLogix™	1000 & 1500	Only one	DP-ABCBL-2		

Programming Cable (DP–PGMCBL) See page A–15 for information regarding the *Direct*Touch panel programming cable (DP–PGMCBL).

Connecting to Allen–Bradley (A–B) PLCs



Warning: Be aware that the *Direct*Touch panel, as with any external device, can write to PLC registers and bits. You must be careful in using the panel to write to any PLC address. It is a good idea to use PLC ladder logic to call screens and to write to PLC outputs based on prescribed conditions.

DirectTouch Setup

Press the upper left and lower right corners of the panel screen to bring up the System Mode Main Menu screen below and press System Setup.

ç	System Mode Main Menu
	System Setup
	System Check
	Up/Download
	User Mode
L	

System Setup

RS232C Setup	Pushbutton Setup	Printer Setup
RS422/485 Setup	Display Control	RAM File Setup
Host Command Setup	Display Direction	
Clock Setup	Error Disp Setup	

n	2
11	u

NOTE: Initially, the panel is set to Not Used on both RS232C and RS422/485.

RS-232C Setup

Press the RS232C Setup button first, then the Connected Device button and select PLC (and ENT). Press enter (ENT) again for the change to take effect.



RS–232C (panel/PLC)

Step 1 Channel 0 (RS-232C) Setup Since **RS–232C** must be used for panel/PLC connection on A–B PLCs set RS–232C as the PLC and RS–422 as Not Used.

1. Setup Channel 0 as shown below for panel/PLC communication. The window below is for SLCs.

The Micrologix 1500 has only Chan. 0–System, but is configured the same as below— <u>except Error Detection must be CRC</u>.

The Micrologix 1000 is factory set to Parity: NONE (and cannot be changed). The Baud Rate should be set to 9600.

Channel Configuration	X
General Chan. 1 - System Chan. 0 - System Chan. 0 - User	1
Driver DF1 Full Duplex Source ID Baud 9600	Micrologix 1500 Setup
Parity EVEN	Protocol Control Control Line No Handshaking
	Error Detection CRC
	Embedded Responses Auto Detect
	Duplicate Packet Detect
Protocol Control	eout (x20 ms) 50
Error Detection BCC	NAK Retries 3
Embedded Responses Enabled	ENQ Retries 3
Duplicate Packet Detect	
OK Cancel A	pply Help

2

Chan. 1 (DH 485)

Step 2

Setup



2. Setup Channel 1 as shown below, for PC/PLC communication	on. (Micrologix
PLCs do not have Channel 1.)	

Channel (Configuration		×
General	Chan, 1 - System Chan, 0	-System Chan. 0 - User	
Driver	DH485	Node Address	
Baud	19200 💌		

Suggested Setup for programming the panel for an A–B PLC.

The optional (user provided) data switch can be used to switch between panel/PC and panel/PLC.



Unfortunately, there is no easy way to configure/program the A-B PLCs at the same time as the **Direct**Touch panel.



NOTE: Use two different PC comm ports, for Allen-Bradley, one to the panel and one for programming the PLC. Using a single port for both causes conflicts.



3. For SLCs: Connect the A-B PLC (bottom port) to the DirectTouch panel through the DP-ABCBL-1 cable.

3. For Micrologix: Connect the A-B PLC (only port) to the DirectTouch panel through the DP-ABCBL-2 cable.

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NOTE: For Micrologix PLCs, set the Error Detection to CRC!

Allen–Bradley SLC 5/03 or 5/04: Data Addressing

Bit Addresses Word Addresses

Bit level addressing is available for all file types below.

The only usable 16 bit word addresses are those in the Bit, Integer and Floating Point data files, for example N7:0 or B9:3. These word addresses may be used for Numerical Displays, Text Displays or for any other part requiring a word address. *Status, Integer and Binary files are defined with e for element instead of w, for word. But for these files, e is actually a 16 bit word!*

Allen-Bradley Data Files				
File Type file (f)	File Number	Element Range element (e), word (w)	Element Value Range	Bit Range bit (b)
Status (Sf:e/b)	2	0–255	-32768 to 32767	0–15
Binary (Bf:e/b or Bf/b)	3, 9–255	0–255	-32768 to 32767	0–15
Timer (Tf:e.w/b)	4, 9–255	e: 0–255, w: 0–2 *	-32768 to 32767	0–15 *
Counter (Cf:e.w/b)	5, 9–255	e: 0–255, w: 0–2 *	-32768 to 32767	0–15 *
Control (Rf:e.w/b)	6, 9–255	e: 0–255, w: 0–2 *	-32768 to 32767	0–15 *
Integer (Nf:e/b)	7, 9–255	0–255	-32768 to 32767	0–15
Floating Point (Ff:e/b)	8, 9–255	0–255	1.1754944e-38 to 3.40282347e+38	0–15

* See the Rockwell (or Allen–Bradley) manual for details of elements/words.

Input and Output Bits In order to indicate the status of, or write to, Input/Output bits, a single Bit address must be assigned to each Input/Output bit in a ladder logic rung (by an Output Energize Coil).

Allen–Bradley Micrologix (1000 and 1500): Data Addressing

Bit Addresses Word Addresses Bit level addressing is available for all file types below.

The only usable 16 bit word addresses are those in the Bit and Integer data files, for example N7:0 or B9:3. These word addresses may be used for Numerical Displays, Text Displays or for any other part requiring a word address. *Status, Integer and Binary files are defined with e for element instead of w, for word. But for these files, e is actually a 16 bit word!*

Allen–Bradley Data Files				
File Type file (f)	File Number	Element Range element (e), word (w)	Element Value Range	Bit Range bit (b)
Status (Sf:e/b)	2	0–255	-32768 to 32767	0–15
Binary (Bf:e/b or Bf/b)	3, 9–255	0–255	-32768 to 32767	0–15
Timer (Tf:e.w/b)	4, 9–255	e: 0–255, w: 0–2 *	-32768 to 32767	0–15 *
Counter (Cf:e.w/b)	5, 9–255	e: 0–255, w: 0–2 *	-32768 to 32767	0–15 *
Control (Rf:e.w/b)	6, 9–255	e: 0–255, w: 0–2 *	-32768 to 32767	0–15 *
Integer (Nf:e/b)	7, 9–255	0–255	-32768 to 32767	0–15

* See the Rockwell (or Allen–Bradley) manual for details of elements/words.

Input and Output Bits In order to indicate the status of, or write to, Input/Output bits, a single Bit address must be assigned to each Input/Output bit in a ladder logic rung (by an Output Energize Coil).

Controller

Properties

Allen–Bradley PLCs: Communications

The dialogs below are provided as a starting point for communication troubleshooting. If you are having communication problems between the PC and PLC, check the Controller Properties to make sure the Driver is the same as that which RSLinx (or WINTelligent Linx) is set for. If you are having communication problems between the PLC and the *Direct*Touch panel, double-check the setup steps on the previous pages for both the PLC and the panel.

The Controller Properties for both Micrologix and SLC models is shown below.



Connecting to PLCs running the Modbus protocol

Modbus

The *Direct*Touch panel now supports the Standard Modbus protocol. The Standard Modbus protocol is also known as Modbus RTU. Please refer to your PLC User Manual for details on the Modbus protocol and data ranges.

Connecting to the WinPLC

Requirements

The following products and versions are required to connect a WinPLC to the *Direct*Touch panel:

- WinPLC, Revision Code 4D or later
- Think & Do Software, V5.2 or higher
- ScreenCreator, V1.14 or higher

*Direct*Touch Setup Press the upper left and lower right corners of the panel screen to bring up the System Mode Main Menu screen below and press System Setup.



System Setup

RS232C	Pushbutton	Printer
Setup	Setup	Setup
RS422/485	Display	RAM File
Setup	Control	Setup
Host Command Setup	Display Direction	
Clock Setup	Error Disp Setup	

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Connecting to a PLC



NOTE: Initially, the panel is set to Not Used on both RS232C and RS422/485.

RS-232C Setup

Press the RS232C Setup button first, then the Connected Device button and select PLC (and ENT). Press enter (ENT) again for the change to take effect.

Make sure at this point to set the Communication Rate (Baud rate) and Parity Check the same as that of the WinPLC.



During configuration/programming, we found this setup very helpful for the WinPLC:



|--|

NOTE: You do not have to use the setup shown above. You can program the panel and WinPLC separately and connect them together by RS–232 (Cable DP–2CBL) if you choose.

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Creating a New Create New Project Properties X Select Project > New... to create Project for a Settings Connect to your ScreenCreator project for a Display Device WinPLC WinPLC application. Project Name: Win Application Comment: Type in the Project Name and Panel Model: DP--0 STN 16 colors Normal select the panel model. Shaded Color: 7 🔻 Compress Bitmap when Building Change as Needed Project Folder: C:\SC1.14\Win\ .PAD -> Project Folder Global Screen: Win Library File: BCLIB.PLB -> Library folder Eunction File: USER.FNC -> Library folder <u>T</u>ext File: -> Project Folder Win.STR <u>R</u>egister File: Win.REG -> Project Folder Cancel OK Create New Project Pro Settings Connect to PLC • None Click on the Connect to tab, as None PLC Direct(K-Sequence) PLC Direct(DirectNetD3-330/340) PLC Direct(DirectNetD3-330P) PLC Direct(DirectNetExcept D3-330/330P/34 A-8(SLC 5/03 & 5/04) A-8(SLC 5/03 & 5/04) Printer shown on the right and select Bar Code Reader Magnetic Card Reade Think & Do (MODBUS) as the Tenkey Pad PLC. A-B(MicroLogix 1000) Memory Card A-B(MicroLogix 1500) Think&Do(MODBUS) Standard MODBUS Protocol Host Computer Else Not OK Cancel **Project Properties** Settings Connect to PLC Think&Do(MODBUS • Printer • None Bar Code Reader None • If you already have a Think & Do Magnetic Card Reade -Tenkey Pad Project for the WinPLC, you can Memory Card select the Map File (from your Host Computer None Ŧ Think & Do project) by clicking Else None the Select... button. This will import all of the Think&Do Map File S<u>e</u>lect... Tagnames into the project. OK Cancel

The Think &See the Think & Do Software website (www.thinkanddo.com) for details on Think &Do/WinPLC ProjectDo Software (Version 5.2 or higher), which is required to connect the WinPLC to theDirectDirect

The following is only a quick reference for a WinPLC Think & Do project. Refer to the WinPLC Installation and Operation Manual (H2–WPLC–M) for details.



Launch the Think & Do I/O View and open the project CEHeat, as shown.

Set the Access Type to **Modbus Slave**.

Be sure to set the other Port Settings to match those of the *Direct*Touch panel (Baud Rate, etc.)

Additional information about the WinPLC can be found in the Think & Do Software online Help system.

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Attributes	Value
Serial Port	COM1
Device Name	com port
Serial Port Settings	
Access Type	Modbus Slave 🖓 💌
Baud Rate	9600 💌
Parity	None 💌
Data Bits	8
Stop Bits	1
Flow Control	None 💌
Receive Buffer Size	2048
Transmit Buffer Size	2048

DirectTouch Panel

Regardless of which PLC is used with the panel, the programming cable (DP-PGMCBL) is used to connect the panel to the personal computer.

The Programming Cable (DP-PGMCBL)

Pin-outs

Connect the programming cable (DP-PGMCBL) between the serial port (CH1) of the **Direct**Touch panel and the serial port of the personal computer. The figure below shows programming cable connectors and wiring specifications. Wiring diagrams refer to the communication ports.

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DirectTouch Panel Specifications

Specification	Rating
Display Type	Backlit LCD
Display Colors	16/256 (Color)/Blue & Gray (Mono
Display Size	5.7"diagonal
Resolution	320Hx240W, 16x12 cells
Screen Type	Resistive
Number of screens	1024 (limited by memory)
Screen Data Memory	1 MB
System Memory	512 KB
Alarms/Faults	Yes
Clock/Calendar	Yes, both internal and PLC (external)
Password Protection	Yes
PLCs Supported	DL 105/205/305/405 A–B SLC 5/03 & 5/04
Warranty	12 Months
Storage Temperature	-10°C to 60°C (14°F to 140°F)
Operating Temperature	0° to 50°C (32°F to 122°F)
Humidity	15% to 85% relative humidity (Non-condensing)
Vibration	JIS–C0911 (5 to 55 Hz, 2G)
Shock	JIS-C0912 (10G 12mS or less)
Voltage	20.5 to 28.8 VDC
Power	14W max (Mono), 24W max (Color)
Inrush Current	2.8 A
Humidity	15% to 85% relative humidity (Non–condensing)
Vibration	JIS-C0911 (5 to 55 Hz, 2G)
Communications	1–RS-232C and 1–RS-422 (only on some DirectLOGIC PLCs)
Maximum Distance	50 feet (RS-232C) and 4000 feet (RS-422)
Noise immunity (Power)	1000Vpp, pulse width 100 to 1000 ns in common mode
Noise immunity (Comm)	500Vpp, pulse width 100 to 1000 ns in capacity coupling
Withstand Voltage	1.0kVDC (1 min.) from Power Input to FG
NEMA Rating	IEC IP65F (Compares to NEMA 4)
Agency Approval	Pending UL, CUL and CE
Atmosphere	No corrosive gases

DirectTouch Panel Dimensions and Installation

It is important to understand the installation requirements for our operator interfaces. Sometimes the size alone can dictate your choice of unit. This is especially true with respect to the depth of the unit. *Please make sure you consider the space required for proper access to cables, power wiring, etc.* Also, you may need to consider the environmental requirements, agency approvals, etc. for your particular application.



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NOTE: For monochrome panels (DP–M320 or DP–M321), the System Setup > Display Control > Brightness Setup must be set to the 5th from left (default), or higher, in order to display properly.