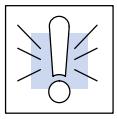
# Connecting to a PLC

A

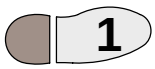
In This Appendix. . . .

— Connecting to *D**irect***LOGIC** PLCs
— Connecting to Allen–Bradley (A–B) PLCs
— Connecting to a WinPLC
— The Programming Cable (DP–PGMCBL)
— *Direct*Touch Cable pin-outs
— *Direct*Touch Panel Specifications
— Panel Dimensions and Installation

# Connecting to *Direct*LOGIC PLCs



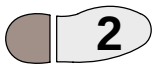
**Warning:** Be aware that the ***Direct***Touch panel, as with any external device, can write to PLC registers and bits. You must be careful in using the panel to write to any PLC address. **It is a good idea to use PLC ladder logic to call screens and to write to PLC outputs based on prescribed conditions.**



**Step 1**

**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.



**Step 2**

**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.**

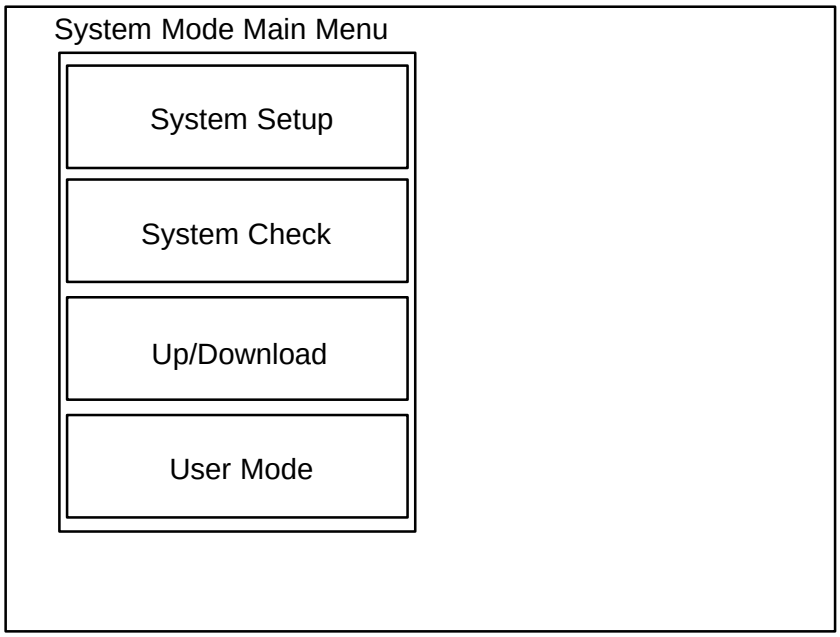
**RS–422 (panel/PLC)**

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.

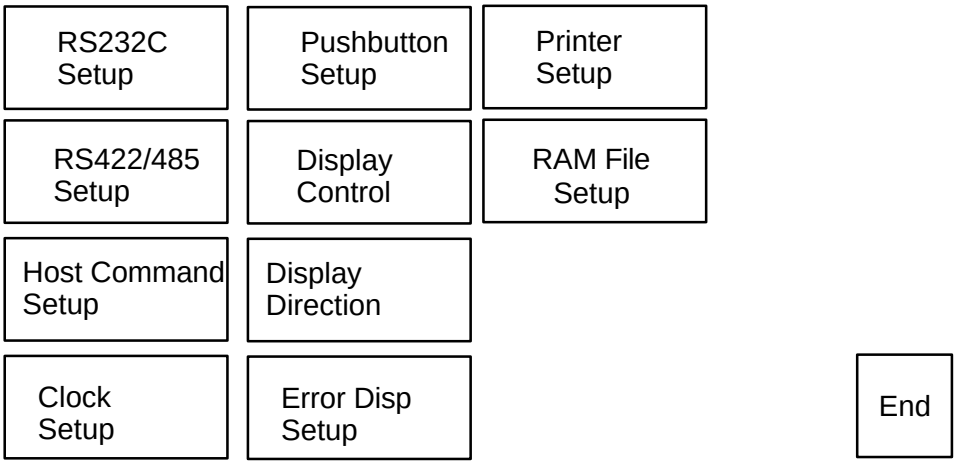
In this case the RS–232 is used for panel/PC connection. The panel RS–232 settings may be ignored since the panel will adjust to the PC settings for downloads and uploads.

***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.**



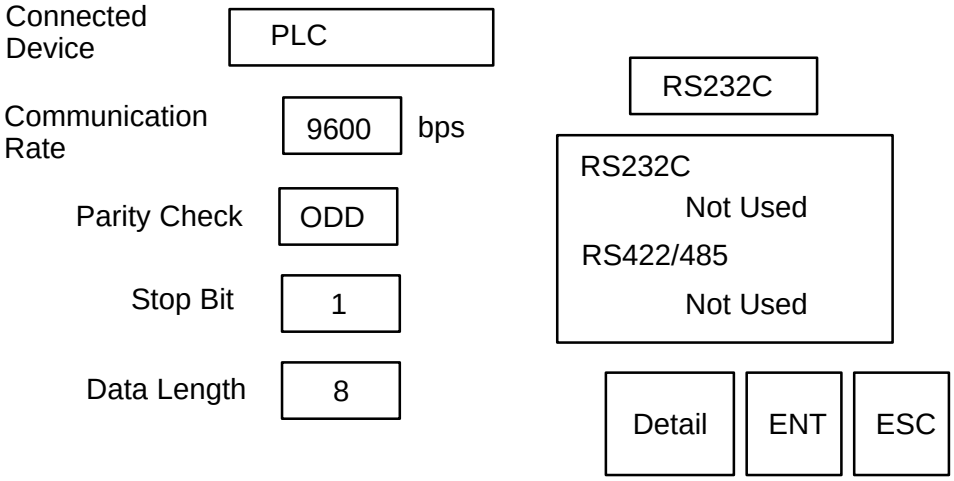
System Setup




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

**RS–232C Setup**

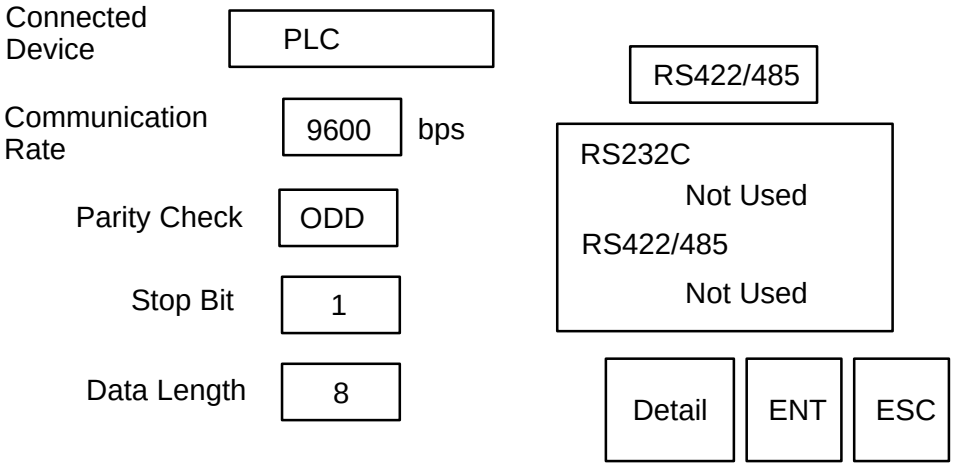
**Press the RS232C Setup button first, then the Connected Device button and select PLC (and ENT). Press enter (ENT) again for the change to take effect.**



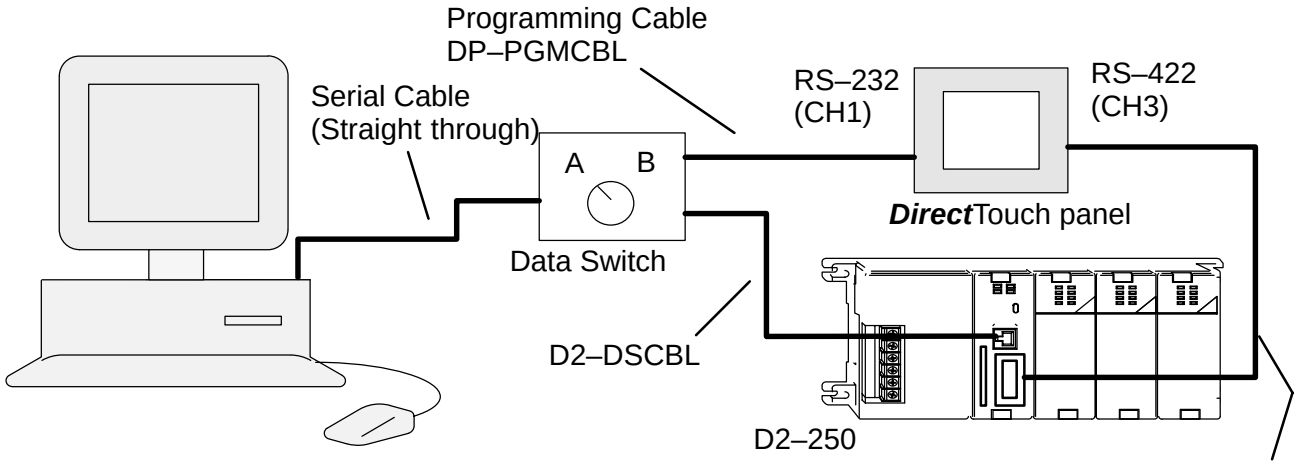
**NOTE:** Initially, the panel is set to Not Used on both RS232C and RS422/485.

**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:**




If using RS–422, the PLC and panel can remain connected while both may be configured/programmed by the PC using a switch.

Pig-tail Cable
D2–DSCBL–2
(for RS–422)

RS–422
(CH3)

| | |
|---|---|
| FG | |
| SG | Black/White |
| RD– | Yellow/White |
| RD+ | Yellow |
| SD– | Orange |
| SD+ | Orange/White |

**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.

**Step 3**

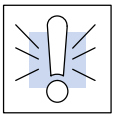
**3. Connect the PLC to the panel through the proper cable below. For cable pinouts, see page A–15.**

| ***Direct*Touch Cables** | | | |
|---|---|---|---|
| **Family** | **PLC (or other device)** | **Port** | **Cable** |
| ***Direct*LOGIC™ DL05 | D0–05xx | Port1 or Port2 | DP–2CBL |
| ***Direct*LOGIC™ DL105 | F1–130 | Only one | DP–2CBL |
| ***Direct*LOGIC™ DL205 | D2–230 | Only one | DP–2CBL |
| | D2–240 | Top port | DP–2CBL |
| | | Bottom port | DP–2CBL |
| | D2–250 | Top port<br>Bottom port<br>Bottom port (RS–422) | DP–2CBL<br>DP–2CBL–1<br>D2–DSCBL–2 |
| | D2–DCM | Only one | DP–3CBL–2 |
| ***Direct*LOGIC™ DL305 | D3–340 | Top port | DP–3CBL |
| | | Bottom port | DP–3CBL |
| | D3–350 | Top port (Phone Jack) | DP–2CBL |
| | | Bottom port<br>Bottom port (RS–422) | DP–3CBL–2<br>D2–DSCBL–2 |
| | D3–DCM or 330/340 DCU | Only one | DP–3CBL–2 |
| ***Direct*LOGIC™ DL405 | D4–430 | Top port (15-pin) | DP–4CBL |
| | | 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)<br>Top port (RS–422) | DP–4CBL<br>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<br>Top port (RS–422) | DP–2CBL<br>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).

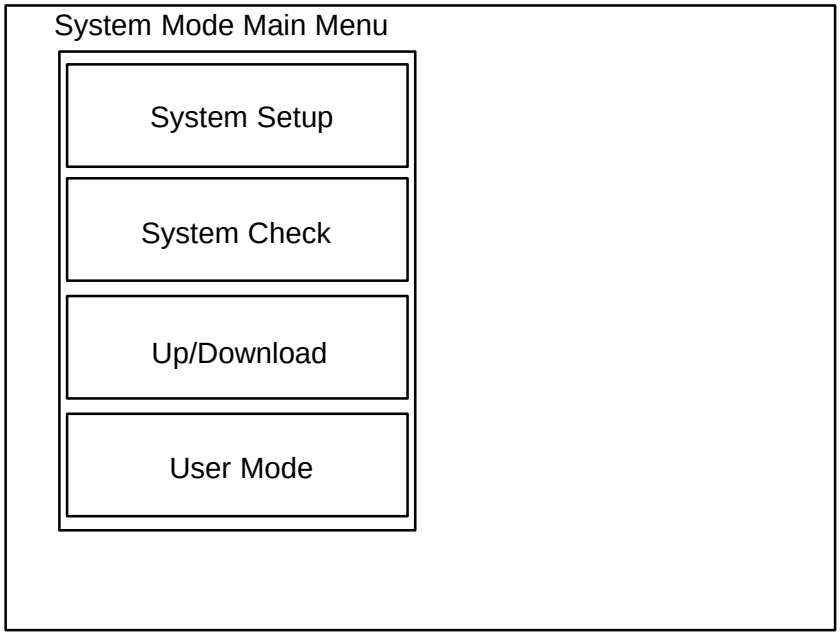
# Connecting to Allen–Bradley (A–B) PLCs



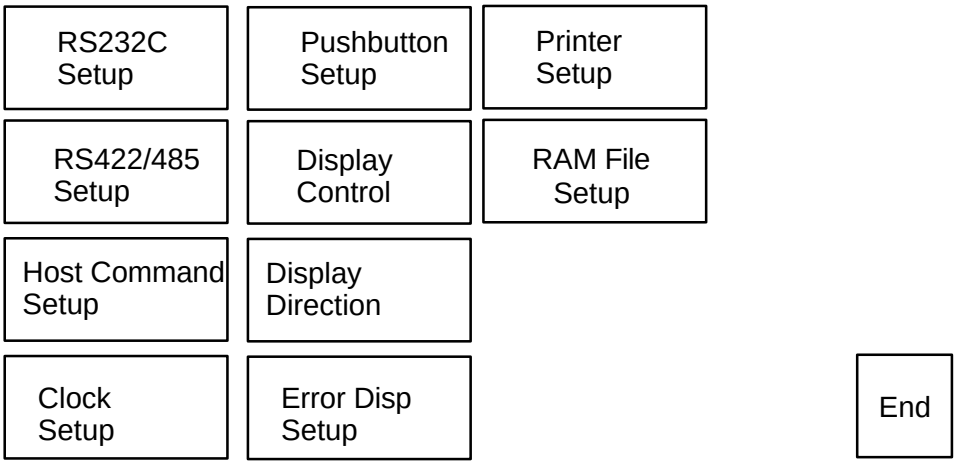
**Warning:** Be aware that the ***Direct***Touch panel, as with any external device, can write to PLC registers and bits. You must be careful in using the panel to write to any PLC address. **It is a good idea to use PLC ladder logic to call screens and to write to PLC outputs based on prescribed conditions.**

***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.**



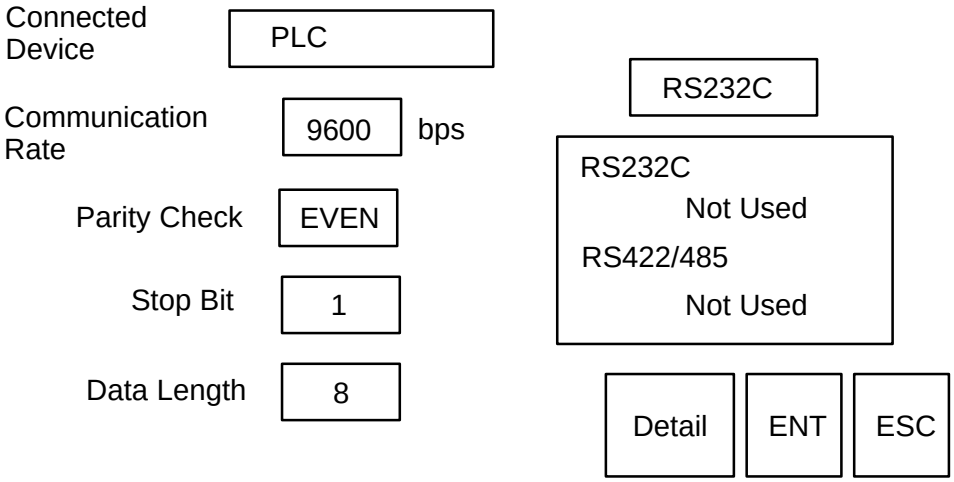

System Setup



**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.**

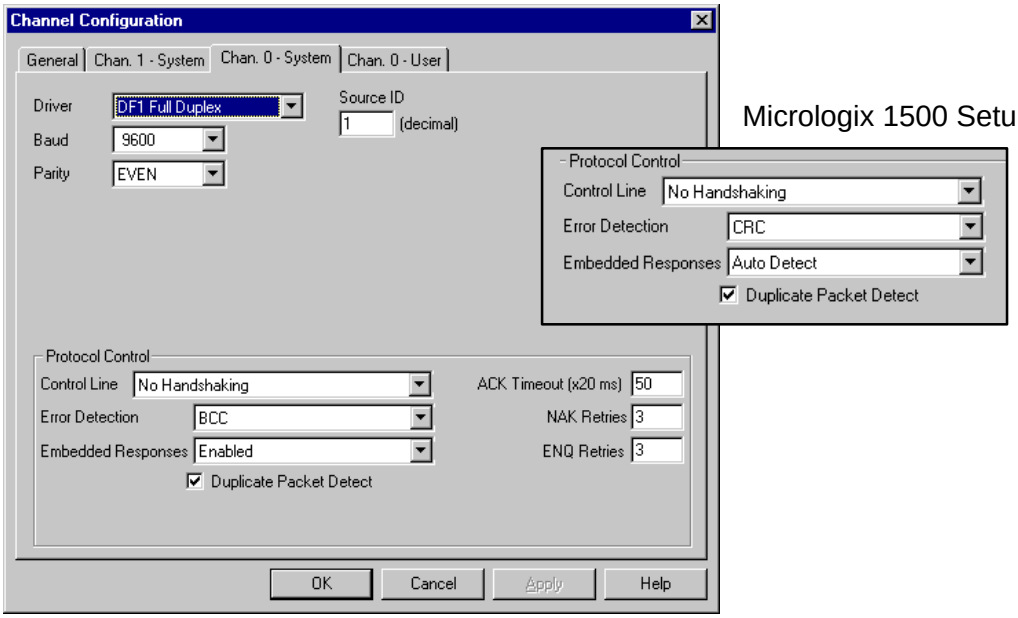



**RS–232C (panel/PLC)**

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.

**Step 1**
**Channel 0 (RS–232C) Setup**

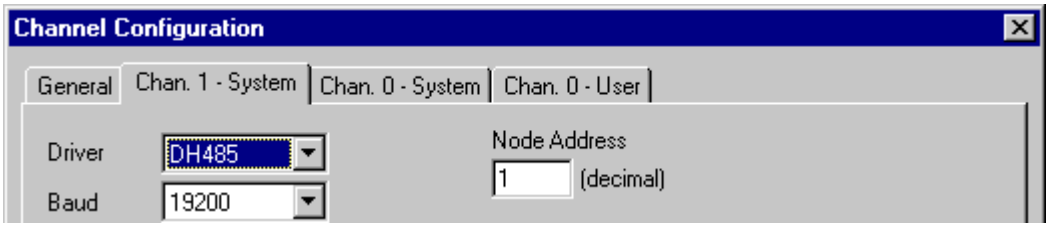
**1. Setup Channel 0 as shown below for panel/PLC communication. The window below is for SLCs.**
**The Micrologix 1500** has only Chan. 0–System, but is configured the same as below— ***except Error Detection must be CRC*.**
**The Micrologix 1000** is factory set to Parity: NONE (and cannot be changed). The Baud Rate should be set to 9600.




Micrologix 1500 Setup

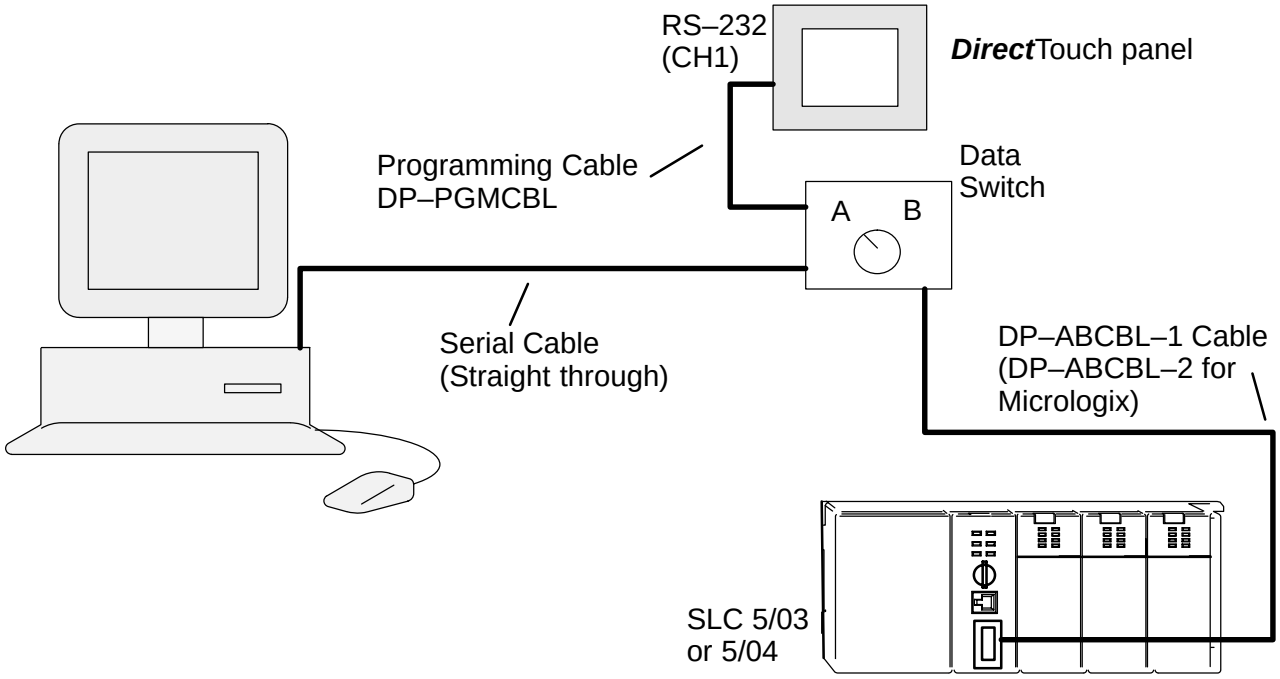
Step 2
Chan. 1 (DH 485) Setup

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




## 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.*

Step 3

**3. For SLCs:** Connect the A–B PLC (bottom port) to the *Direct*Touch panel through the DP–ABCBL–1 cable.

**3. For Micrologix:** Connect the A–B PLC (only port) to the *Direct*Touch panel through the DP–ABCBL–2 cable.

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

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

**Bit Addresses**

Bit level addressing is available for all file types below.

**Word Addresses**

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**

Bit level addressing is available for all file types below.

**Word Addresses**

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**

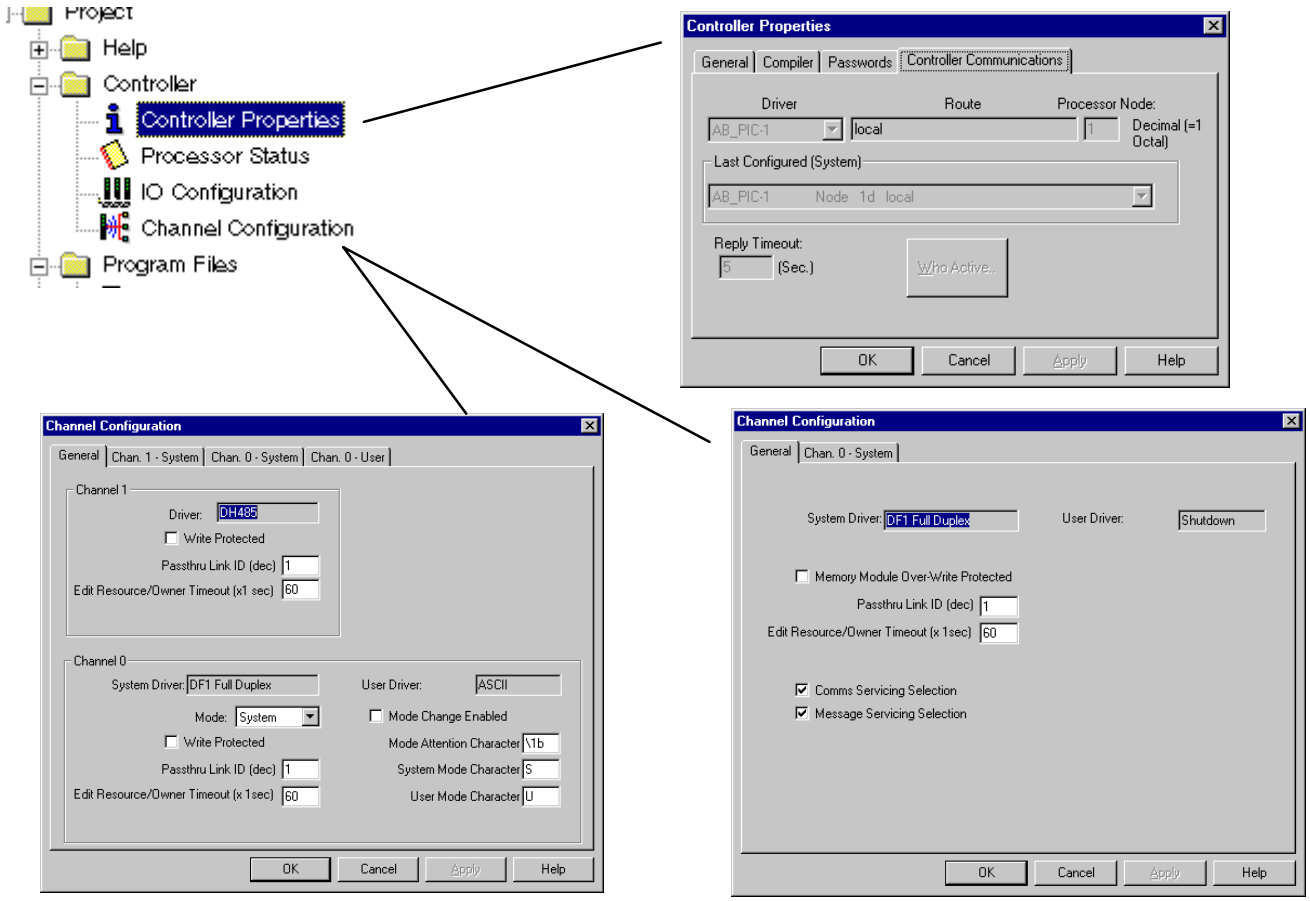
In order to indicate the status of, or write to, Input/Output bits, a single Bit address must be assigned to each Input/Output bit in a ladder logic rung (by an Output Energize Coil).

# 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.

**Controller Properties**

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

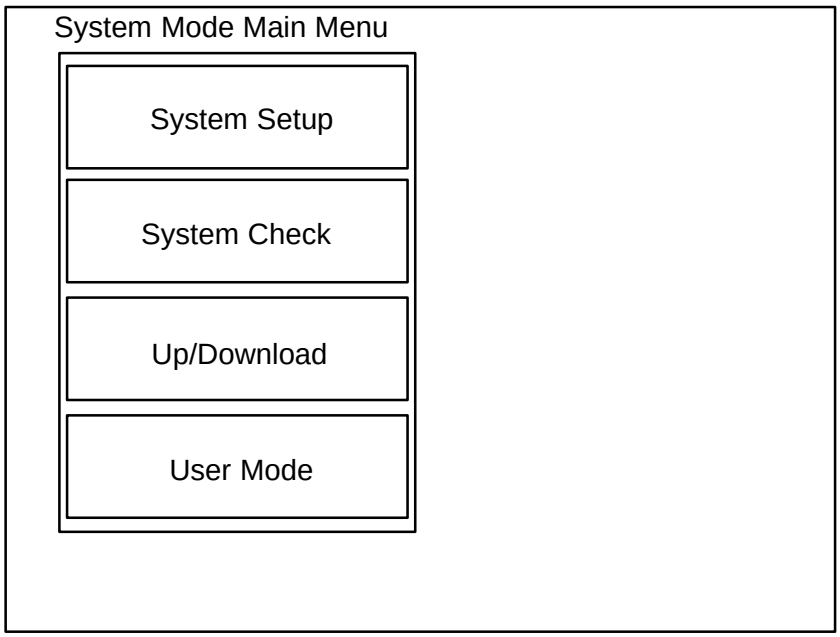
**Requirements**

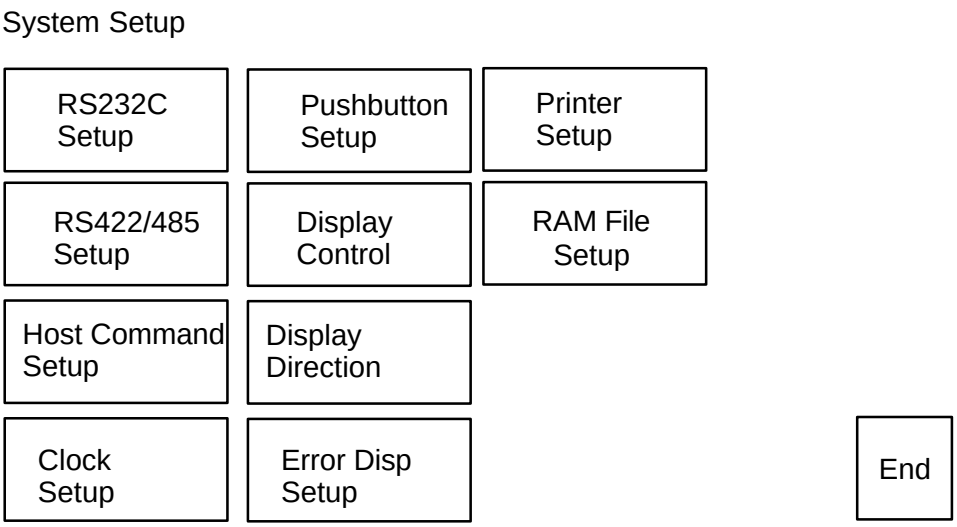
The following products and versions are required to connect a WinPLC to the ***Direct***Touch panel:

- 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.**

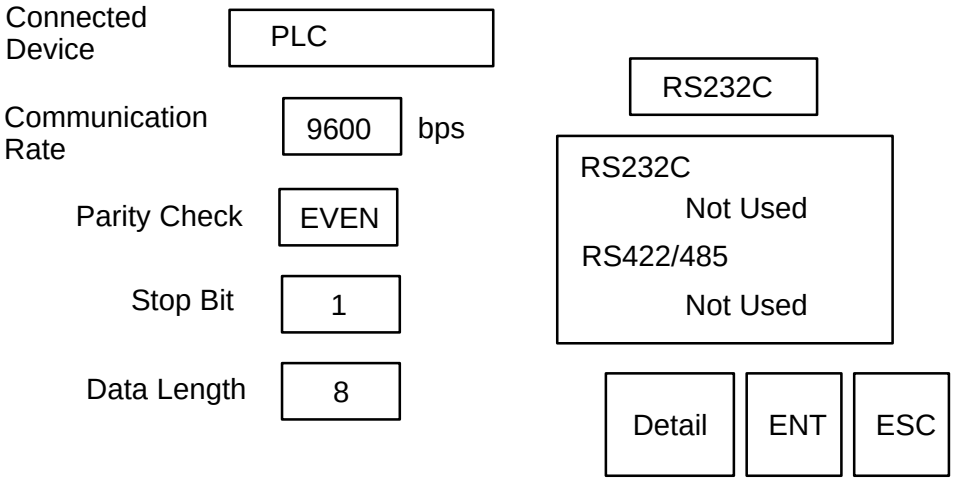


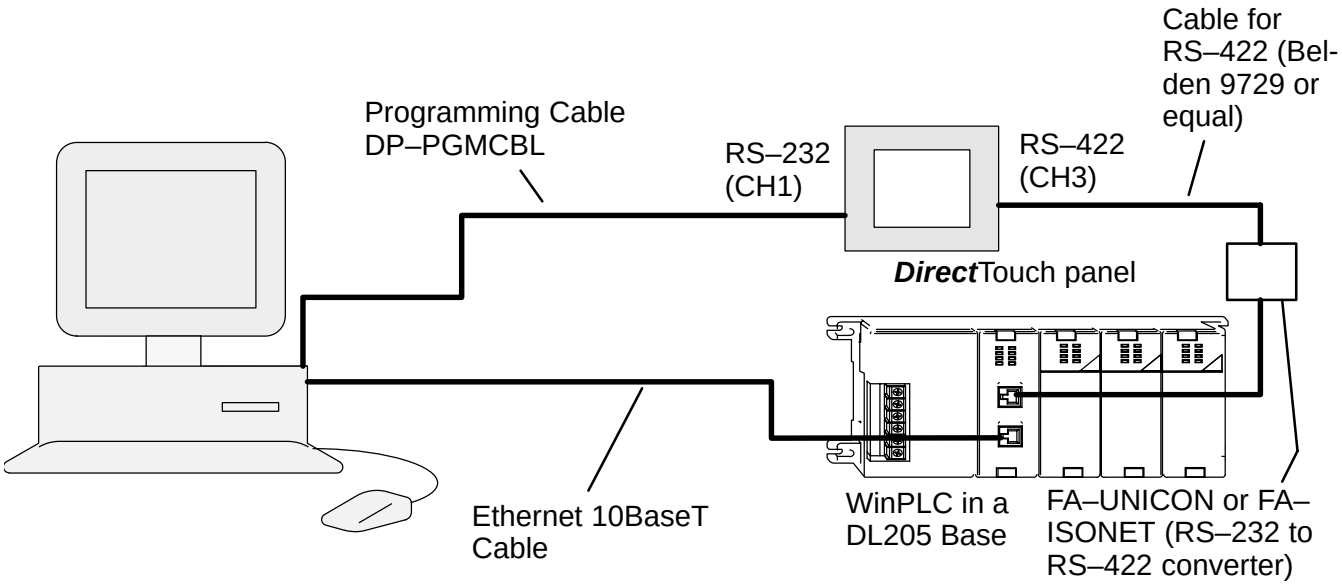
**NOTE:** Initially, the panel is set to Not Used on both RS232C and RS422/485.

**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:**

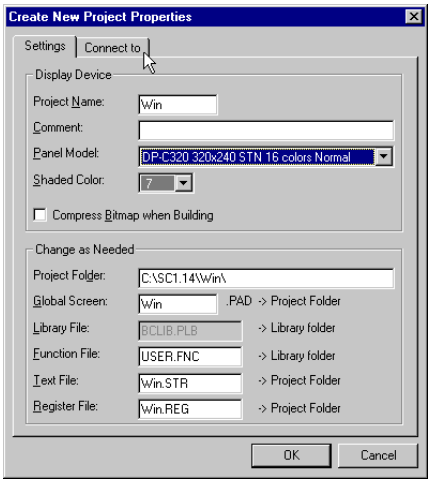



**NOTE:** You do not have to use the setup shown above. You can program the panel and WinPLC separately and connect them together by RS–232 (Cable DP–2CBL) if you choose.

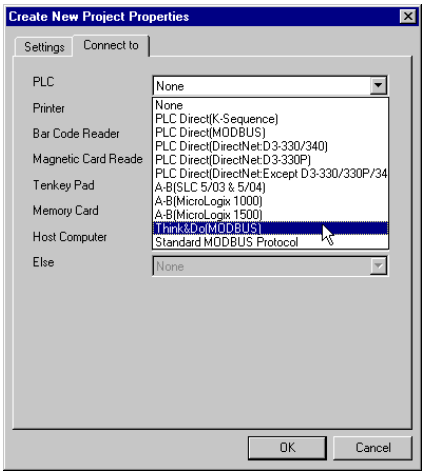
## Creating a New Project for a WinPLC Application

Select Project > New... to create your ScreenCreator project for a WinPLC application.

Type in the Project Name and select the panel model.

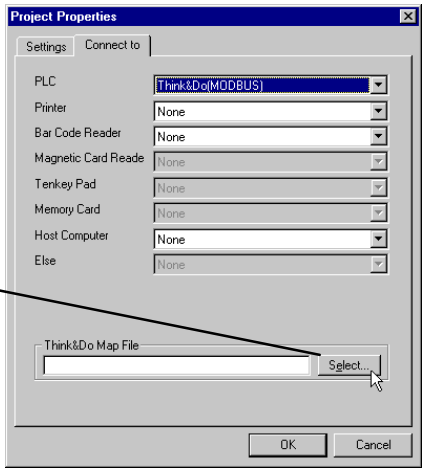



Click on the *Connect to* tab, as shown on the right and select Think & Do (MODBUS) as the PLC.




If you already have a Think & Do Project for the WinPLC, you can select the Map File (from your Think & Do project) by clicking the Select... button.

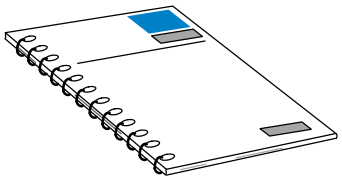
This will import all of the Tagnames into the project.



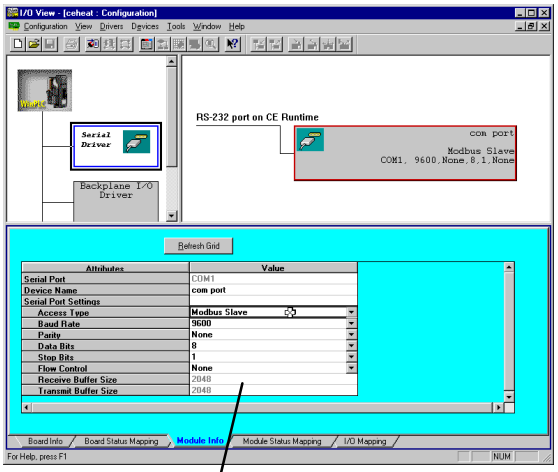
**The Think & Do/WinPLC Project**

See the Think & Do Software website (www.thinkanddo.com) for details on Think & Do Software (Version 5.2 or higher), which is required to connect the WinPLC to the ***Direct***Touch panel.

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.

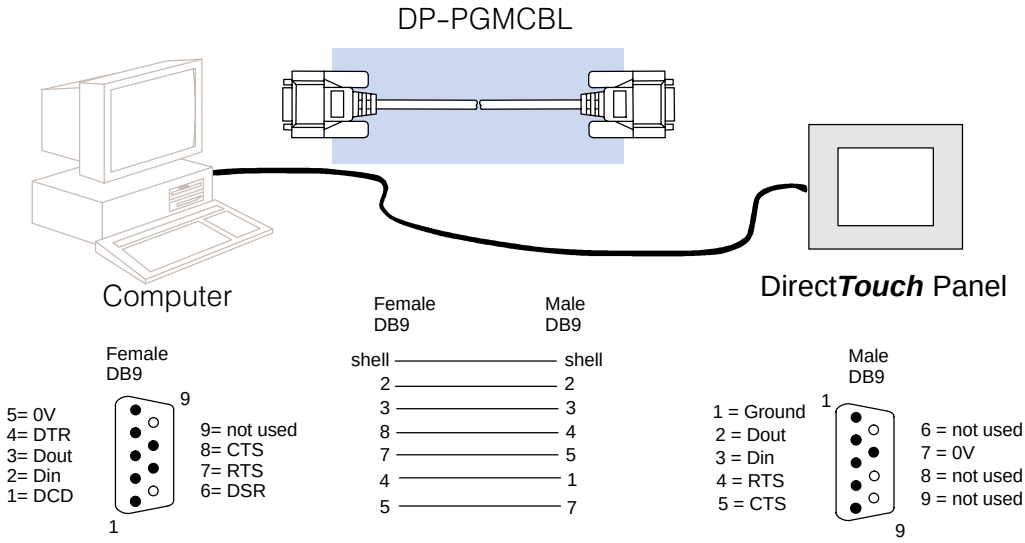
| Attributes | Value |
|---|---|
| Serial Port | COM1 |
| Device Name | com port |
| Serial Port Settings | |
| Access Type | Modbus Slave |
| Baud Rate | 9600 |
| Parity | None |
| Data Bits | 8 |
| Stop Bits | 1 |
| Flow Control | None |
| Receive Buffer Size | 2048 |
| Transmit Buffer Size | 2048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

# *Direct*Touch Panel

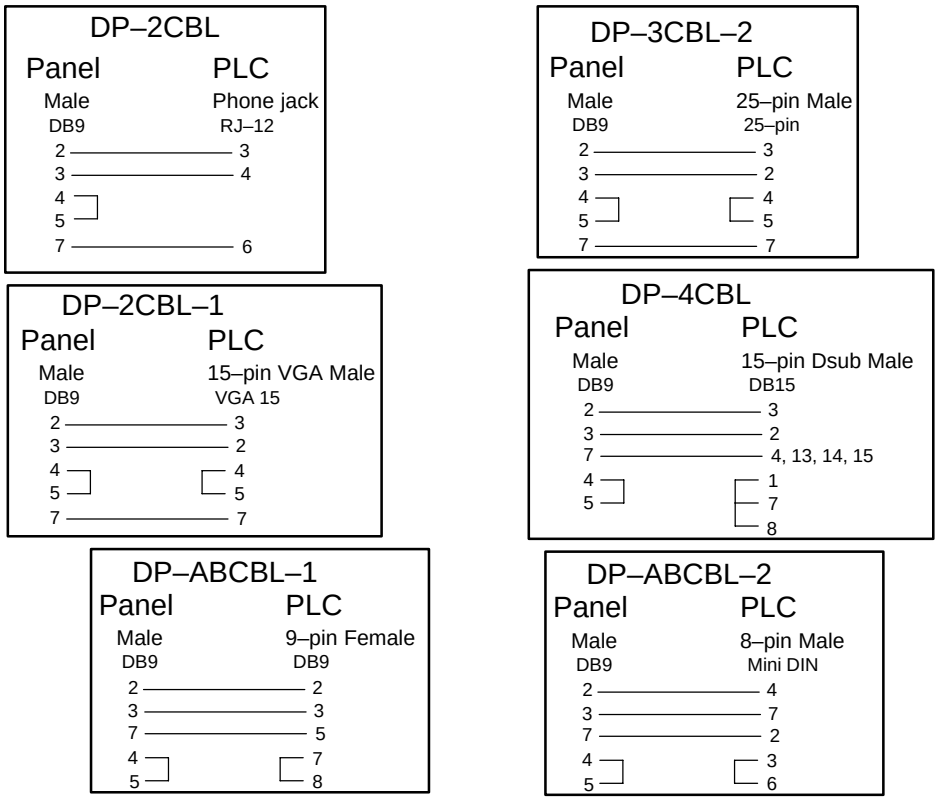
Regardless of which PLC is used with the panel, *the programming cable (DP–PGMCBL) is used to connect the panel to the personal computer*.

**The Programming Cable (DP–PGMCBL)**

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.*




**DirectTouch Cable Pin-outs**

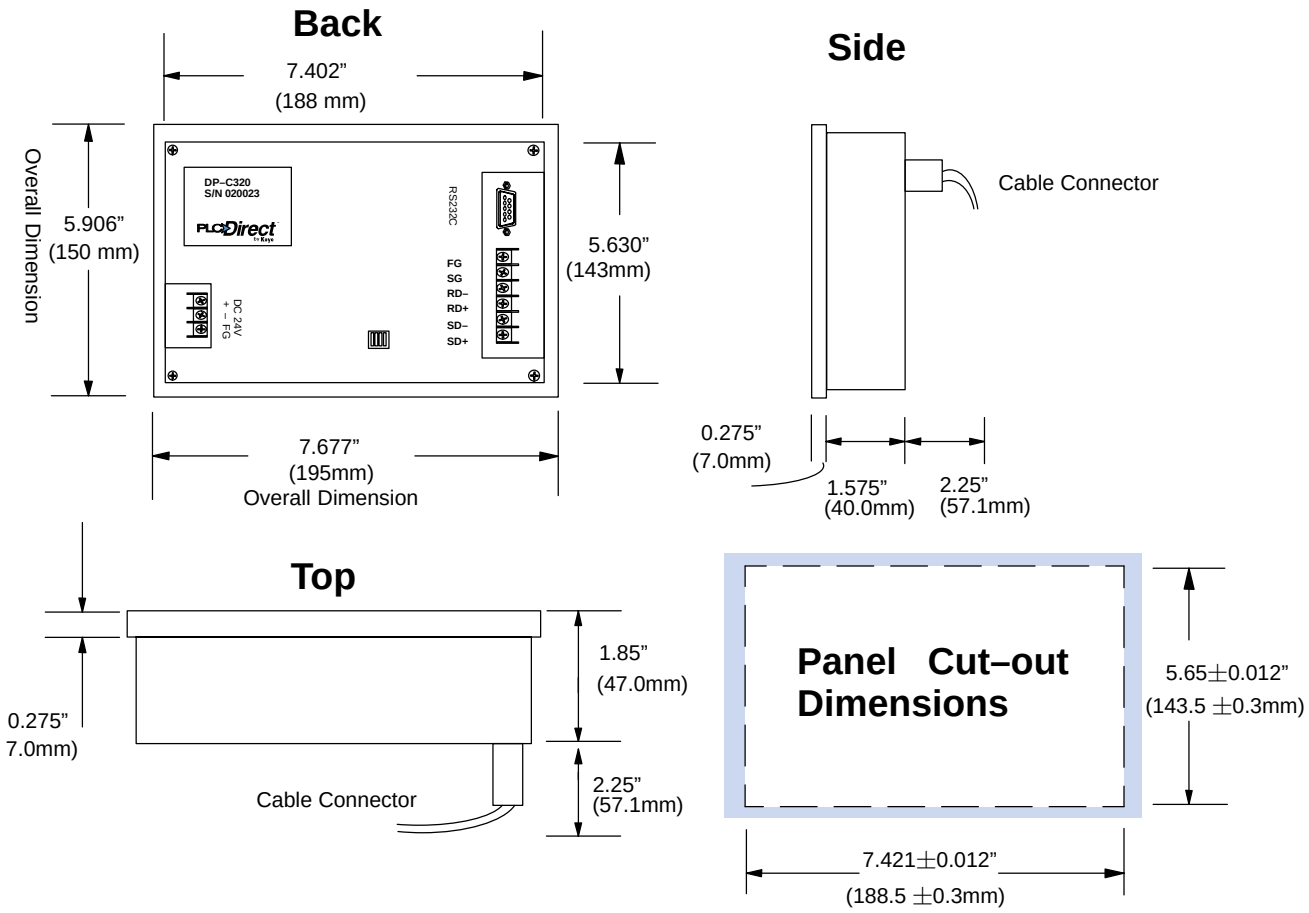


# *Direct*Touch Panel Specifications

| 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<br>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 |

# *Direct*Touch 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.




**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.