Installation Guide

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In This Chapter. . . .

Introduction

This section guides you through the process of installing the DV-1000 in your application. You can use the relevant sections to either make a permanent installation, or just a temporary connection on your desktop for developing your application program. The installation steps in this section are:

- Step 1: Choosing Single or Dual DV-1000s
- Step 2: PLC Selection
- Step 3: Select a Mounting Location
- Step 4: Panel Mounting
- Step 5: Cable Selection
- Step 6: Connecting the DV–1000 to the CPU
- Step 7: Installing the Example Programs
- Step 8: Starting *Direct*SOFT

After the installation, you'll be ready to begin programming and using your DV-1000.

NOTE: . If you have trouble while programming or using your DV-1000, refer to the *Troubleshooting Guide in Appendix A* of this manual.

Step 1: Choosing Single or Dual DV-1000s

DL240, DL250, DL350, DL440 and DL450 CPUs can support two DV-1000 units (DL130, DL230 and DL430 CPUs can support only one DV-1000: DL130 and DL230 CPUs only have one communications port and only the top communications port on a DL430 may be used to connect a DV-1000). Connecting a second DV-1000 to the CPU requires no additional programming beyond what is required for the first one. While most applications only require one DV-1000 per machine, or per PLC, occasionally it is advantageous to add a second one. Refer to the drawing below. For example, some machines have two operator stations that are some distance apart. In other cases, the machine needs only one control panel, but a second DV-1000 placed elsewhere on the machine could make it more convenient for personnel to access data (such as monitoring machine status).

Machine With Two Operator Panels
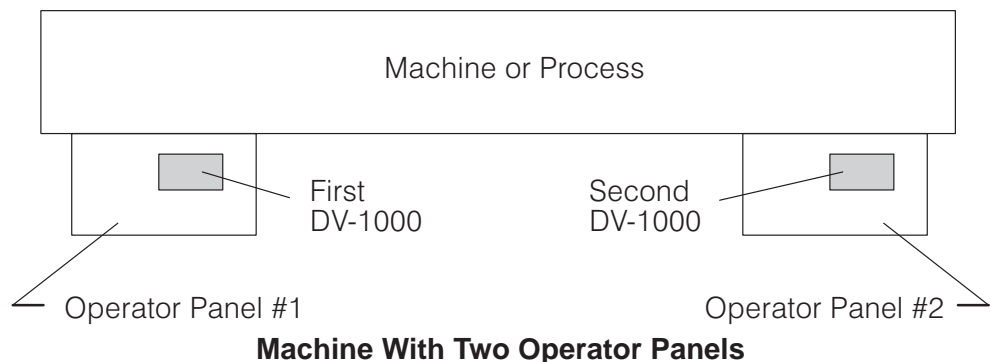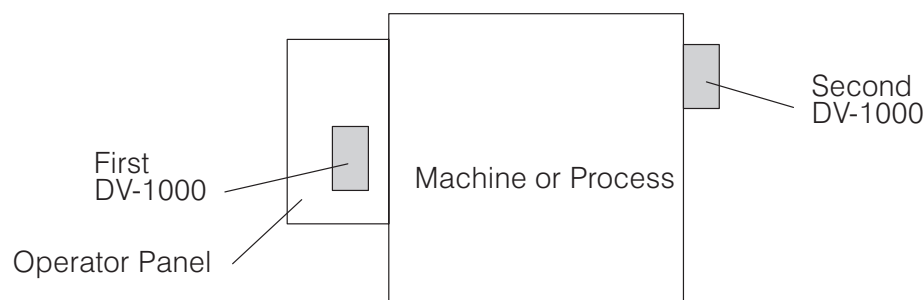
Machine With Operator Panel and Monitoring Station

Dual DV-1000 Operating Characteristics

To help you decide whether dual DV–1000s are right for your application, we list some of the operating characteristics:

- Both DV-1000s share the same setup parameter table in the CPU's V-memory. After powerup, they both read the same parameters, and read the same data blocks elsewhere in V-memory for message data, preset titles, and so on.

- If you select a powerup default mode other than "Previous Mode", both units will power up in the mode you select (via the setup parameter).

- The keypads operate independently, so the DV-1000s can be placed in different modes during operation.

- In all monitoring functions, the units operate independently. One unit can view X input point status while the other views V-memory locations, for example.

- In all control functions, the units operate in a logical OR fashion. Either unit can change a preset, and the result is reflected at the other unit as well. Bit control also works in a logical OR fashion.

Knowing these operating characteristics, you need only one DV-1000 connected to the CPU as you develop the application program. When your programming is finished, just plug in the second DV-1000!

DL240, DL450 Connection

The DL240 and DL450 CPUs are best suited for dual DV-1000 applications, because both DL240 communication ports and the top and middle DL450 ports may connect directly to DV-1000s. Be sure to configure both ports for K-sequence protocol.

DL250, DL350, DL440, Connection

The DL250, DL350 and DL440 CPUs can connect to two DV-1000s, but not as simply as a DL240 or DL450. The various methods are as follows:

- By adding Data Communication Modules (DCM), you can connect additional DV-1000s.

- A second DV–1000 may be connected directly to the CPU, by using the bottom communication port and adding an external +5V supply (since the bottom port does not supply +5V). Use the cable diagrams later in this chapter for connector pin-out information.

- A DL405 Smart Slice product can connect to one DV-1000 (applies to DL405 products only).

Step 2: PLC Selection

The DV-1000 works with all DL105, DL205 and DL405 series CPUs, in addition to DL350 CPUs. At this point you may already know which PLC family and type best fits your application. However, differences in the availability of features exist that you may want to factor into your decision. The table below outlines the feature differences.

DV-1000 FEATURES	DL105 DL230	DL240	DL250, DL350, DL430, DL440, DL450
Selectable Power-up Mode	Yes	Yes	Yes
Text and Numeric Messages	Yes	Yes	Yes
Status Available of V-Memory Data Types:	X, Y, C, SP, T, CT, S, V, P	X, Y, C, SP, T, CT, S, V, P	X, Y, GX, C, SP, T, CT ,S, V, P
Change Preset Locations	16	16	32
Change Preset Password	Yes	Yes	Yes
Titled Timer Preset Values, Number Available	16	99	99
Titled Counter Preset Values, Number Available	16	99	99
Bit Control	Yes	Yes	Yes
Number of DV-1000s Connectable Directly to CPU	1	2	1 (2 for DL450)

Also consider the availability of certain features in each CPU type that supports programming for the DV-1000, given in the following table.

CPU Features That Support DV-1000 Programming	DL130 DL230	DL430	DL240, DL250, DL350, DL440, DL450
ACON Instruction (ASCII Const.)	Yes	No	Yes
MOVMC Instruction	Yes	No	Yes
Can Connect CPU simultaneously to DV-1000 and *Direct*SOFT	No	Yes	Yes

Overall, the **DL240, DL250, DL350, DL440** or **DL450** CPUs are the best choices for DV-1000 applications. The main inconvenience with the DL430 is its lack of ACON and MOVMC instructions that help in Message Display Mode. Use of the DL130 or DL230 requires switching its single communications port between the DV-1000 and *Direct*SOFT programming while you are developing the ladder program.

Step 3: Selecting a Mounting Location

Before actually installing the DV-1000 in your application, we recommend doing a sketch of the control panel or operator interface, or wherever the DV-1000 will be installed. One goal in doing this sketch is to determine the length of cable needed to connect the DV-1000 to the PLC. The sketch needs to show the DV-1000 and the PLC to which it connects. Try to include the following details:

- Operator Panel location on machine or factory floor
- Operator Panel layout, including DV-1000 mounting location(s)
- Control Cabinet layout, including PLC mounting location
- Electrical cable connecting DV-1000 to PLC (showing cable length)
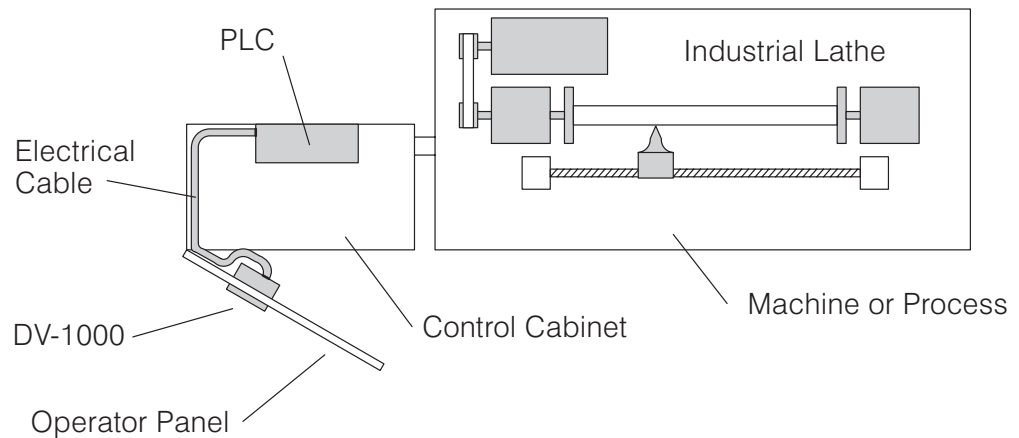
**Example Application Sketch** (Top View)

If your application requires two DV-1000s in the operator interface, include them both in the sketch. If possible, do Step 3 before finalizing your application layout. This planning may eliminate the need to make a custom cable in the event standard cables are too short for your initial layout.

Step 4: Panel Mounting

The DV-1000 is designed to easily snap into a rectangular cutout in a control panel or other surface panel at the machine. On each side of the housing there is a retention clip to keep the unit in place after installation. The drawing below gives the physical dimensions of the DV-1000 housing.

Back

4.92 " (125mm)

2.64 " (67mm)

5.12 " (130mm)

Side

1.34 " (34mm)

1.03 " (26mm)
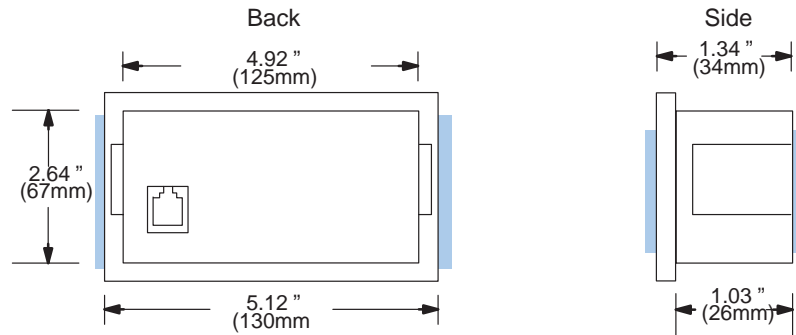
The panel cut-out dimensions are shown to the right. This size rectangle will provide necessary clearance for the body of the unit, but will allow the outer housing bezel to cover the edges of the cut-out for a nice finished appearance. The optimum panel thickness for using the retention clips is 1/16" to 1/8".

4.94 " (125.5 mm

2.65 " (67.3 mm)

Panel Cut-out

Dimensions
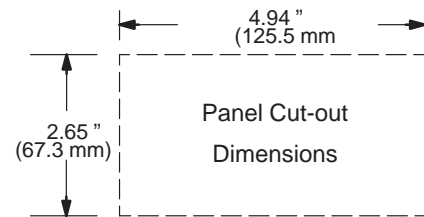
When your panel cut-out is finished, you're ready to mount the DV-1000 in the control panel. Simply push it in from the front, and it will snap into place. If you need to remove the DV-1000, just press the retention clips inward while pushing the unit from the rear toward the panel's front side, and it should just slip out.

NOTE: If possible, avoid mounting other control panel devices directly under the DV-1000. Doing so may interfere with access to the brightness adjustment screw.

Step 5: Cable Selection

In this step we select the appropriate cable to connect the DV-1000 to your CPU. Cables come in two versions, which differ in the connector type at one end. One version is for connection to all DL105, DL205 and DL350 CPUs. The other is for DL430 and DL440 CPUs. DL450 CPUs can use either version.

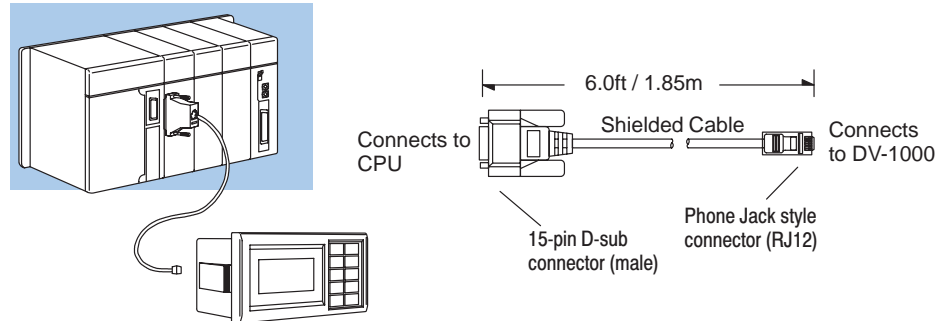**DL105, DL205 DL350, DL450 Phone Jack Style Connection**

The DV-1000 connects to the single phone-jack-style communications port on a DL130 or DL230, the top port on a DL250, DL350, or DL450, or to either port on a DL240. The standard cable and its part number are listed in the following figure.
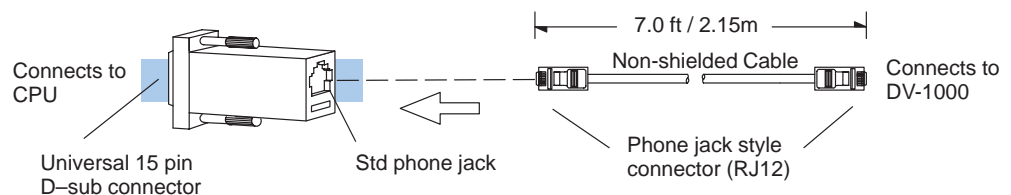
Use Part No. **DV-1000CBL**

6.6ft / 2m

Phone Jack style connector (RJ12), 6-conductor
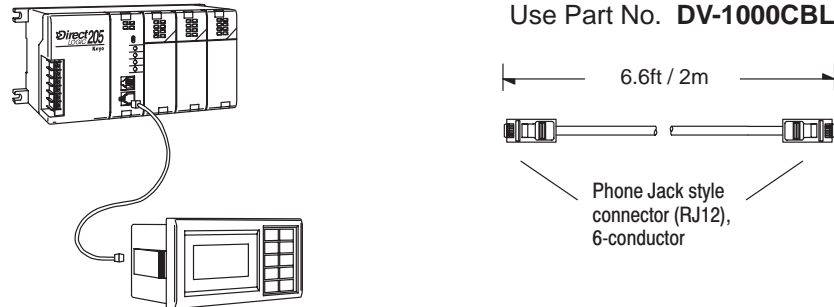
DL430, DL440, DL450 15-Pin Connection

The DV-1000 connects to the 15-pin top port on DL430 and DL440 CPUs and the middle port on DL450 CPUs. The bottom port on these CPUs do not provide the needed +5V. There are two methods for making these connections, shown below.

Method 1 (preferred)**:** Use Part No. **D4-1000CBL**

6.0ft / 1.85m

Connects to CPU

Shielded Cable

Connects to DV-1000

15-pin D-sub connector (male)

Phone Jack style connector (RJ12)

Method 2: Use Part No. **FA-CABKIT**

7.0 ft / 2.15m

Connects to CPU

Non-shielded Cable

Connects to DV-1000

Universal 15 pin D–sub connector

Std phone jack

Phone jack style connector (RJ12)

NOTE: The DV-1000 uses K sequence protocol to communicate to the PLC. Some TI435® CPUs could reliably connect to only one device at a time using K sequence protocol. K sequence protocol is available on all ports on DL105, DL205, DL405 and DL350 CPUs.

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The first method (the preferred method) uses a special shielded cable with a modular phone-jack-style connector on one end and a 15-pin D-shell connector on the other. The connectors plug directly into the DV-1000 and CPU port.

The second method uses a non-shielded cable and an adapter plug from the cable kit. The cable (same as DL105, DL205, DL350, DL450 cable) has a modular phone-jack-style connector at both ends, so either end will connect to the DV-1000. The other end connects to an adapter to go from a 6-conductor modular to a 15-conductor D-shell to connect to the CPU port.

Custom Cables In some applications the length of the standard PLC*Direct* cable may not be quite long enough. You may make your own cable, but observe the following guidelines:

- Use a shielded type cable. Be sure to connect its shield at both ends to the appropriate connector pins.
- Do not exceed 15 feet in length.

NOTE: The standard cables are approximately 6 feet long. If you have determined the need for a cable longer than 6 feet, you may use a slightly longer one (up to 15 feet). The noise immunity of the DV-1000 communications may decrease with cables longer than 15 feet.
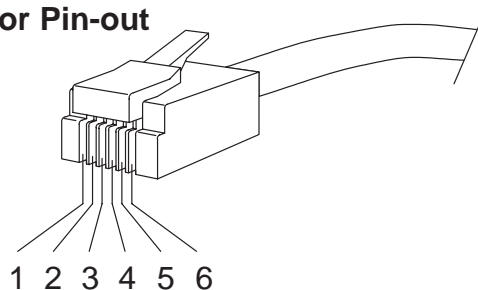
DL105, DL205, DL350, DL450 Connection
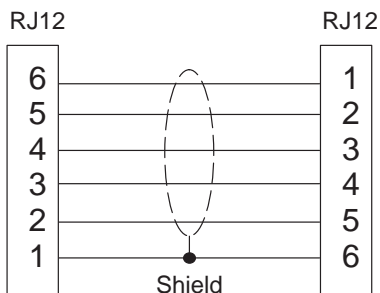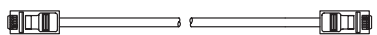
DL430, DL440, DL450 Connection
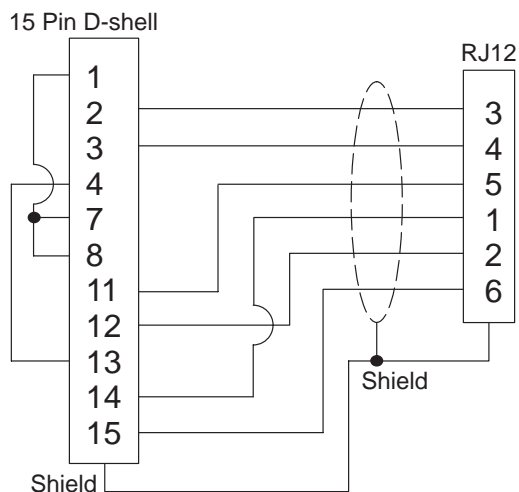
Pin Information	
1	Common
2	+5VDC
3	RX
4	TX
5	+5VDC
6	Common

RJ12 Connector Pin-out

1 2 3 4 5 6

Step 6: Connecting the DV-1000 to the CPU

In the first five steps we have selected the number of DV-1000s, PLC type, decided where to mount the PLC and DV-1000, and selected the proper cable to connect them. Now we're ready to connect the DV-1000 to the CPU. After doing so, turn on the PLC by applying electrical power. If properly connected, the DV-1000 will turn on whenever the PLC is on (the CPU "PWR" LED is illuminated). The back-light is always on whenever the DV-1000 is powered.

After the DV-1000 is powered, you can adjust the display contrast. An adjustment screw is accessible at the bottom of the unit through a small hole. Use a small Philips screwdriver to adjust the contrast for ambient lighting conditions and desired viewing angle.
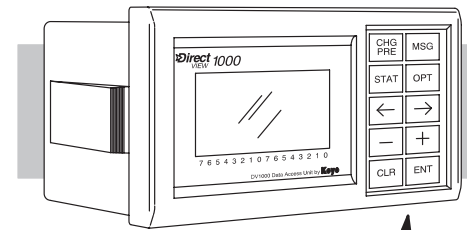

Contrast Adjustment Screw
(on bottom of unit)

In almost all cases, the DV-1000 display will show some message at first powerup. The exact message on the display depends mostly on the current CPU mode, but also the contents of CPU program memory and variable memory.

Step 7: Installing the Example Programs

A diskette of example programs is included with this manual. All of the example programs in the manual are on the diskette. One of the best ways to learn the DV-1000 is to load and run these programs. It is possible to load the examples from the diskette. However, we recommend copying them to the hard drive in your computer, and keep the original diskette in a safe place.
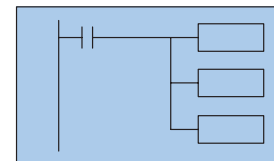
To install the example programs if **using Windows 3.1**, follow these steps:

1. Make a new directory on the hard drive in your computer. For example, if the hard drive is drive C, type:

    MD C:\DV–1000

2. Copy all the files from the example program disk to the new directory. For example, if the diskette is in drive A: and the hard drive is drive C:, type:

    COPY A:*.* C:\DV–1000*.*

To install the example programs if using **WIN 95**, follow these steps:

1. Select the **Explorer** icon and open. If the hard drive is drive C, select the **(C:)** icon.

2. Make a new directory in the hard drive of your computer. For example, Select the **File** menu, then select **New** and then **Folder**. Notice the **New Folder** icon that appears. Select the folder and name it "DV-1000" by selecting the **File** menu and selecting **Rename**. Type in the new name.

3. Copy all the contents of the example program disk. Insert the diskette in drive A, and select and open the **3 1/2 Floppy (A)** icon. Notice the disk contains two directories and one text file: "130_230", "240_450", and "Readme.txt". Select all three by opening the **Edit** menu and selecting **Select All**. Open the **Edit** menu again and select **Copy**.

4. Paste the program disk contents into the new C drive "DV-1000" directory. Open the "DV-1000" directory, open the **Edit** menu and select **Paste**.

After these steps, you're ready to start *Direct*SOFT and run the example programs.

Open the README file in the examples directory for instructions on which set of examples to use with your PLC. Use the examples in the **105** directory if using any DL105 MicroPLC. Use the examples in the **230** directory if using a DL205 with a D2–230 CPU. Use the **240_250** examples if using a DL205 with a D2–240 or D2–250 CPU. Use the **350_405** examples if using a DL305 with a D2–350 CPU or any DL405 CPU.

Step 8: Starting *Direct*SOFT

Initialize the CPU   The DV-1000 relies on the ladder program and setup parameters in V-memory for much of its operation. Before we begin the series of examples and lessons in the following chapters, it is important to get your CPU in a known starting state. Only then will the examples in the following chapters in this manual work or make sense to you. The starting condition of the PLC that we need is with program memory cleared, and V-memory cleared. The following steps will guide you through this process.

1. Connect the communications cable from your personal computer communications port to your PLC's programming port on the CPU.
2. Start *Direct*SOFT on your personal computer.
3. Select a link to go online with the CPU.
4. Save the project file to disk at this time, if you created a program in the PLC that has not been saved to disk.
5. Verify the CPU is in program mode. From the menu bar, select **PLC**, then **PLC Modes**, then **Program**. Then select "OK", or press Return.
6. From the menu bar, select **PLC**, then **Clear PLC memory,** then **All**. Then select "OK", or press Return.
7. From PLC menu, choose Setup, then **Initialize Scratchpad**. This ensures the DV-1000 setup parameters are initialized to zero values.

NOTE: If you are using a DL130 or DL230 CPU, you probably noticed by now that it has only one communications port. Therefore, you will have to swap communications cables in that port in order to alternately use *Direct*SOFT and the DV-1000 with the CPU. Using a DL240 CPU which has two ports will alleviate this inconvenience.

Loading an Example Program   To load an example program from the DV-1000 directory on the hard drive, do the following:

1. Select the **Files** menu, then **Open Project.**
2. A dialog box will appear. Select the disk and directory where the example programs reside (for example, drive C:, directory \DV-1000).
3. Select the file name of the program you wish to load, then OK. When the program has loaded, its ladder rungs will appear on the monitor screen.
4. Select the **PLC** menu, then **Connect**, then select the link to use. All the program examples are saved without PLC link information, so you have to re-connect to your particular CPU. If a message appears which asks you to select the source of program to view, select **Disk.**
5. Ensure the CPU is in Program mode. Then download the program to the CPU. Select the **File** menu, **Write Program**..., then select **To PLC**.
6. When the program has downloaded, put the CPU in Run Mode. Select the **PLC** menu, **PLC Modes**..., then select **Run**.
7. Then follow the directions with the example program from this manual. Usually you will have to use the keypad to get the DV-1000 in a particular mode to see the program operate.