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Manual Number: C0-USER-M

Notes

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Notes

CLICK PLC USER MANUAL

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Please include the Manual Number and the Manual Issue, both shown below, when communicating with Technical Support regarding this publication.

Manual Number: C0-USER-M

Issue: 2nd Edition, Rev. A

Issue Date: 8/09

Publication History		
Issue	**Date**	**Description of Changes**
1st Edition	5/08	Original
1st Edition, Rev. A	10/08	Updated specifications and drawings throughout manual.
2nd Edition	5/09	Added Port 3 and C0-02DD1-D, C0-02DD2-D, C0-02DR-D analog CPU units.
2nd Edition, Rev. A	8/09	Updated wiring diagram for C0-02DR-D CPU module.

NOTES

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Chapter 1

Getting Started

In This Chapter...

Introduction

1

Purpose of this Manual

Thank you for purchasing the AutomationDirect CLICK PLC family of products. This hardware user manual provides information that will help you install, set up, program, troubleshoot, and maintain your CLICK PLC system. The manual includes information that is critical to the safety of the personnel who will install and use the PLC, and to the machinery, processes, and equipment controlled by the PLC.

The manual also includes important information about power and signal wiring, mounting of the PLC, and configuring the PLC system.

About Getting Started

If you are familiar with PLCs in general, then following the simple steps in this first chapter may be all you require to start being productive using a CLICK PLC system. After you have completed the steps, your CLICK PLC will be running the ladder logic project that you programmed. If you are new to the world of PLCs, be sure to read through all of the chapters in this hardware user manual.

Supplemental Manuals and Other Help

The CLICK Programming Software, C0-PGMSW, can be downloaded free from the AutomationDirect web site (link shown below under Technical Support). Both this Hardware User Manual, C0-USER-M, and the Software Installation Guide are free as a download. The CLICK Programming Software includes searchable online help topics covering all aspects of the software and instruction set.

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Conventions Used

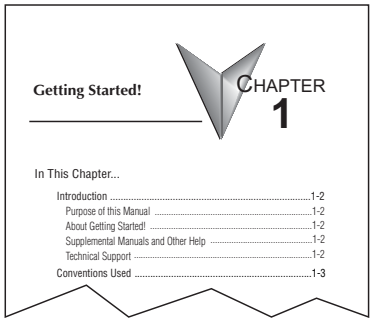
When you see the exclamation point icon in the left-hand margin, the paragraph to its immediate right will be a warning. This information could prevent injury, loss of property, or even death in extreme cases. Any warning in this manual should be regarded as critical information that should be read in its entirety. The word Warning in boldface will mark the beginning of the text.

When you see the notepad icon in the left-hand margin, the paragraph to its immediate right will be a special note. Notes represent information that may make your work quicker or more efficient. The word NOTE: in boldface will mark the beginning of the text.

Whenever the "lightbulb" is shown in the left-hand margin, the paragraph to its immediate right will provide a special tip. The word TIP: in boldface will mark the beginning of the text.

Key Topics for Each Chapter

The beginning of each chapter will list the key topics that can be found in that chapter.


Getting Started!

CHAPTER 1

In This Chapter...

1

Before you begin...

It is recommended that the following items be available to make this short step-by-step introduction to the CLICK PLC go smoothly.

CLICK CPU Module

CLICK 24 VDC Power Supply
C0-00AC or C0-01AC

or

Other 24 VDC Power Supply
Example: PSP24-60S

PC Running
Windows XP or Vista

Not available from ADC.

CLICK
Programming Software
C0-PGMSW

Free download @
www.automationdirect.com

PC with USB port to
Panel Programming
Cable Assembly
EA-MG-PGM-CBL

or

PC Programming Cable
D2-DSCBL

PC requires RS-232 port.

Screwdriver
DN-SS1

Wire Strippers
DN-WS

Hookup Wire

AC Power Cord

Not available from ADC.

Step 1: Install Programming Software

1.) Insert the CLICK Programming Software, C0-PGMSW, CD into the PC's CD drive. The CLICK PLC Programming Software splash screen should appear after a short time.

2.) Click on the splash screen's Install button and follow the dialog boxes.

3.) If the CD does not auto-run, or if using the free downloaded version of the software, click your PC's Start menu (bottom left corner of screen), and select Run.

4.) Type in the Open: prompt text box, D: install.exe, where D: is the drive letter of CD drive being used, or browse to the location of the install.exe file that was downloaded and select this file.

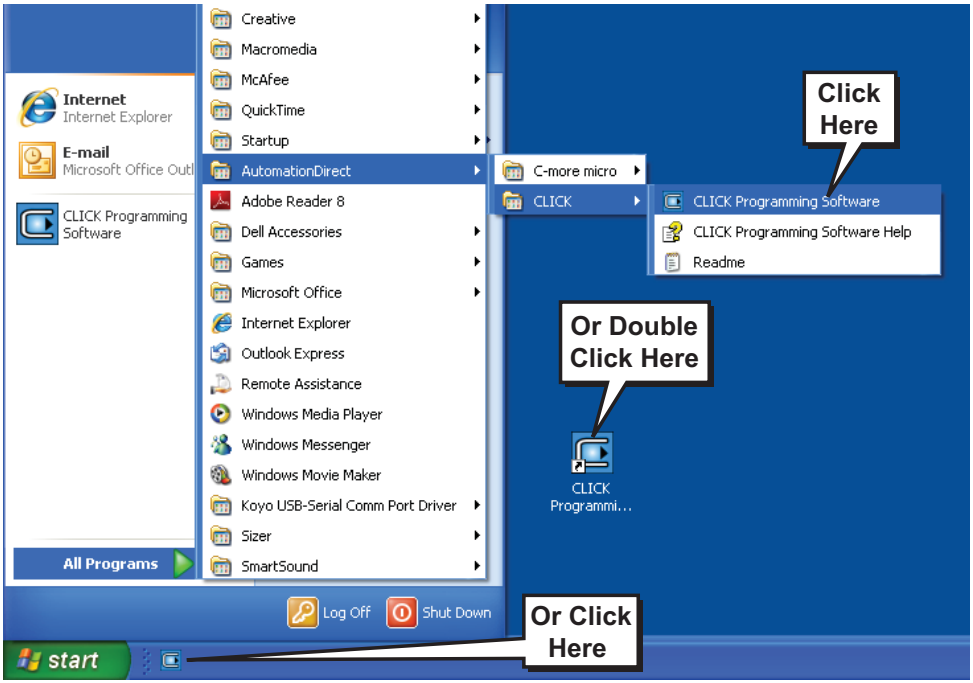
5.) Select OK and follow the dialog boxes.

NOTE: See the CLICK Software Installation Guide, C0-PGMSW-SIG, for additional details, if needed.

1

Step 2: Launch Programming Software

After installing the CLICK Programming Software, C0-PGMSW, choose one of three methods to launch the software. Double click the desktop CLICK icon; or, from the PC's Start menu, slide the mouse pointer through the menus (Start > All Programs > AutomationDirect > CLICK > CLICK Programming Software) and click the CLICK Programming Software selection; or, simply click the icon on the Quick Launch bar. See examples below.

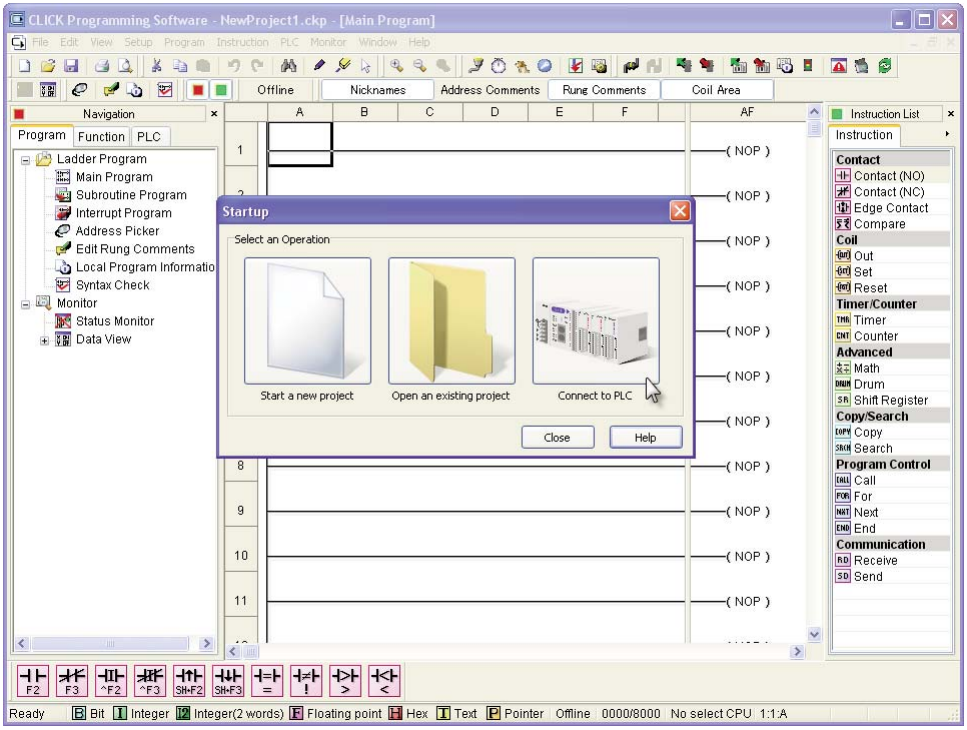


The CLICK Programming Software will start up and display the Main Window as shown on the next page.

NOTE: The recommended minimum screen size for the CLICK Programming Software is 1024 X 786 pixels. Please also note that the ladder logic area of the development screen is split into two areas. There is an Input Area that can include 31 instructions across. The columns for the 31 instructions are labeled 'A' through 'AE'. There is also a separate Coil Area that is used for output coil and box type instructions. This column is labeled 'AF'. The Coil Area can be toggled to display on or off in the split screen mode. The rungs are labeled numerically in sequence starting with '1'.

Step 2: Launch Programming Software (cont'd)

The Main Window is divided into Menus, Toolbars, and Windows that work together to make project development as simple as possible. See the software's online help for additional details.

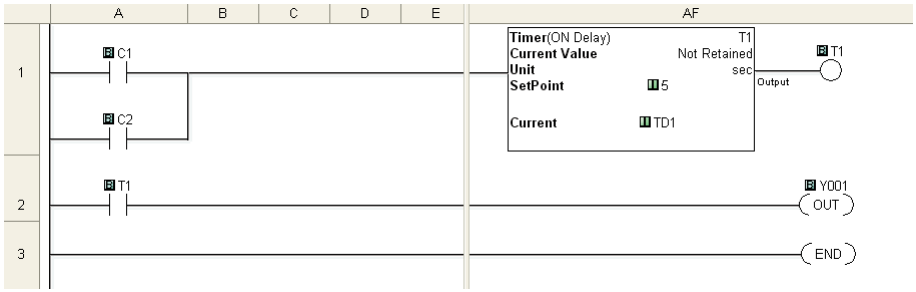


Click on the Start a new project in the Startup dialog box to begin entering the ladder logic program example that follows.

1

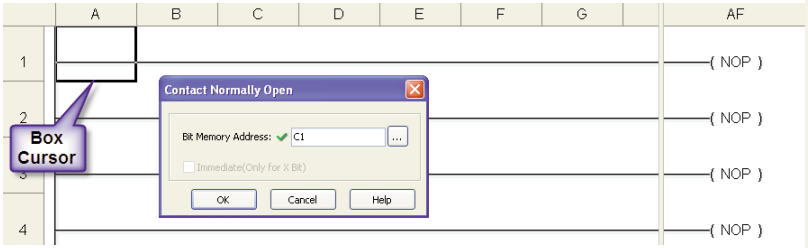
Step 3: Create a Project

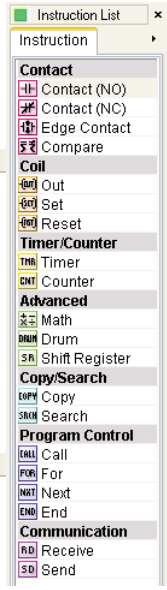
In this step, the project shown below is created by entering the ladder logic program in the order that follows.



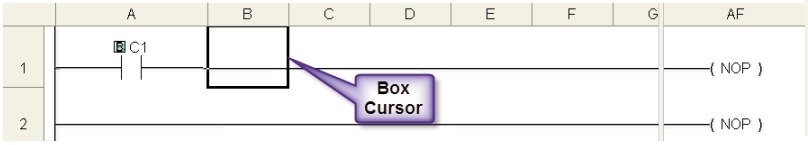
Rung #1

Place the Box Cursor on the first position on Rung #1, as shown below. From the Instruction List, click & drag a Contact (NO) into this box. Enter C1 into the Bit Memory Address text box of the Contact Normally Open dialog box that pops up and click OK. A normally open contact labeled C1 will be placed in the beginning of Rung #1.





The Box Cursor will move to the next available location.

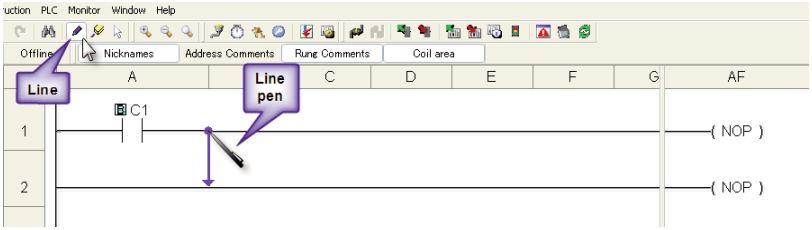


Proceed to the next page to continue construction of Rung #1.

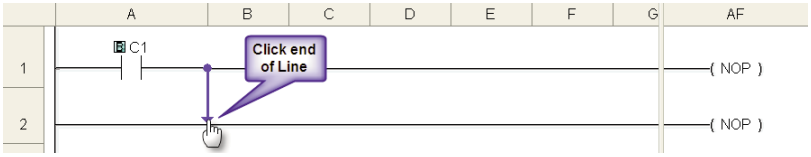
Step 3: Create a Project (cont'd)

Rung #1 (cont'd)

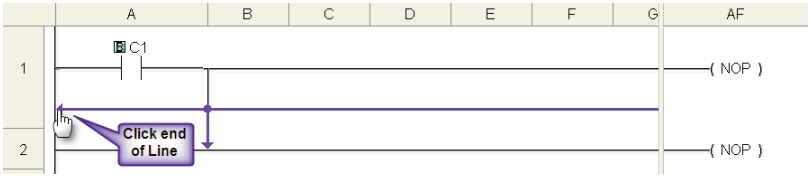
The Line creation tool is used to add an additional normally open contact in parallel with the C1 contact. Click on the Line creation tool icon located on the Edit toolbar. A blue line will appear, showing the direction of the new line. The Line pen is used to redirect the new line.



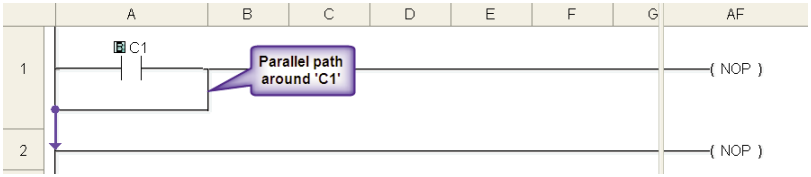
Move the mouse pointer to the end of the new line (arrow) until the mouse pointer becomes a hand with a pointing index finger. Click on the line's arrow.



Additional new lines are shown in blue. Move the mouse pointer to the end of the new line that extends to the left and click.



There is now a parallel path around the C1 contact that was first entered as shown here.

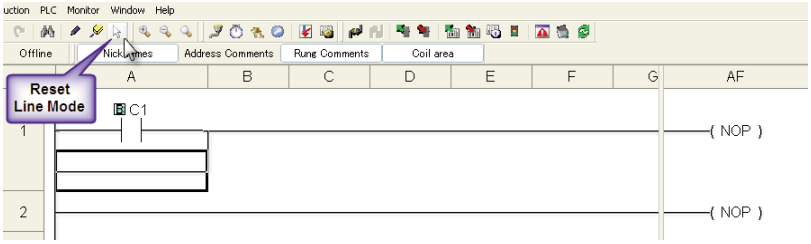


Proceed to the next page to continue construction of Rung #1.

Step 3: Create a Project (cont'd)

Rung #1 (cont'd)

Next, click on the Reset Line Mode icon located on the Edit toolbar (Esc key has the same function as the Reset Line Mode). The Box Cursor will move to the newly created path. If not, position the Box Cursor over the new path to get ready for the next instruction.



NOTE: There is also a Line Erase tool icon next to the Line tool icon on the Edit toolbar that is used to erase any of the lines that were created using the Line tool. Also, to exit the Line or Line Erase function, click on the Reset Line Mode icon on the Edit toolbar. All of the Line type tools are also available under the Edit drop down menu.

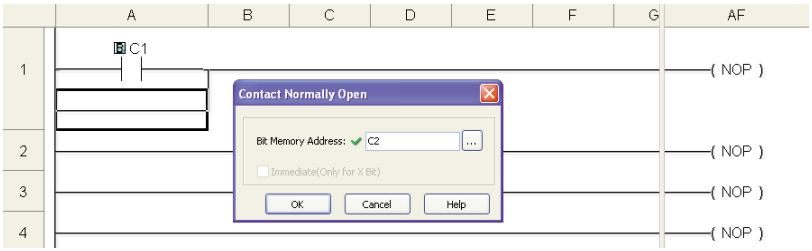
NOTE: Lines to form parallel paths in the ladder logic can also be created with the use of the cursor keys in conjunction with the CTRL key on the PC's keyboard.

Proceed to the next page to continue construction of Rung #1.

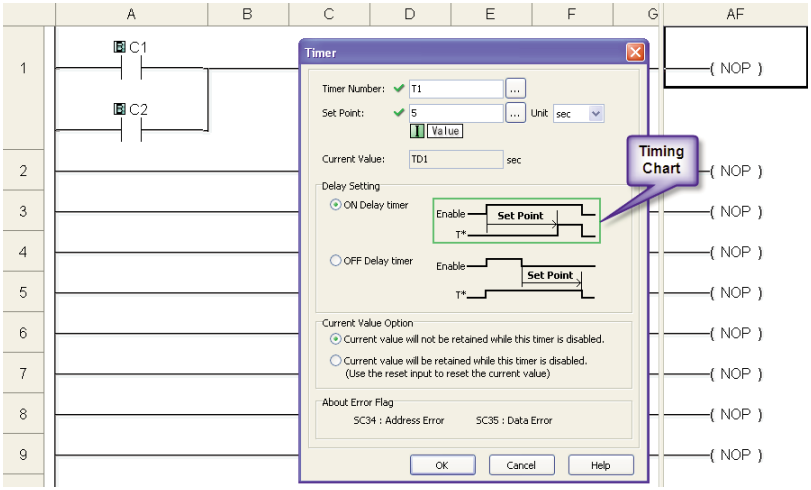
Step 3: Create a Project (cont'd)

Rung #1 (cont'd)

From the Instruction List, click & drag a Contact (NO) into th Box Cursor. Enter C2 into the Bit Memory Address text box of the Contact Normally Open dialog box that pops up and click OK. A normally open contact labeled C2 will be placed in parallel with the C1 contact.



Next, place the Box Cursor on the NOP coil at the far right of Rung #1. NOP stands for No Operation and is a place holder in the ladder logic Coil Area. Click & drag a Timer from the Instruction List into this location. Within the Timer dialog box, enter T1 into the Timer Number text box, the value 5 into the Set Point, and select sec for the timing Unit. The Timer dialog box shows a Timing Chart that graphically represents the function of the ON Delay Timer, and also shows a selection for an alternative OFF Delay Timer mode of operation.



Leave the Delay Setting at ON Delay Timer and the Current Value Option set for the first selection. Click OK. A timer labeled T1 will be placed at the end of Rung #1.

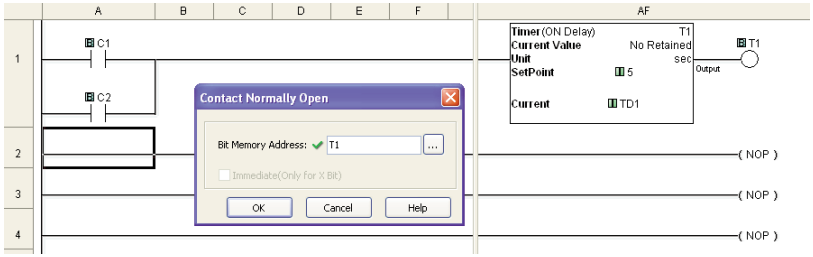
Proceed to the next page to enter Rung #2.

1

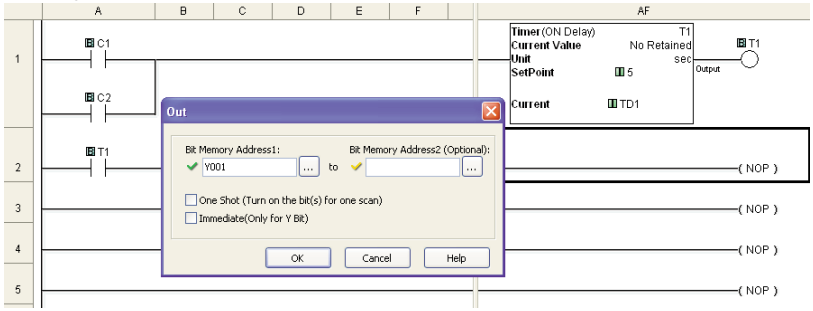
Step 3: Create a Project (cont'd)

Rung #2

Place the Box Cursor at the beginning of Rung #2. From the Instruction List, click and drag a Contact (NO) into this box. Enter T1 into the Bit Memory Address text box of the Contact Normally Open dialog box that pops up. Click OK. A normally open contact labeled T1 will be placed in the beginning of Rung #2.

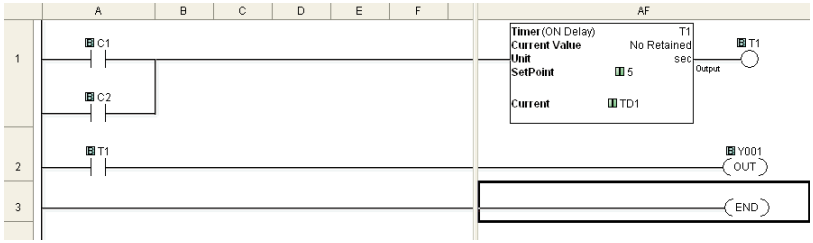


Next, place the Box Cursor on the NOP coil at the far right of Rung #2. Click and drag an OUT from the Instruction List into this location. Within the Out dialog box, enter Y001 into the Bit Memory Address: text box. Click OK. An out coil labeled Y001 will be placed at the end of Rung #2.



Rung #3

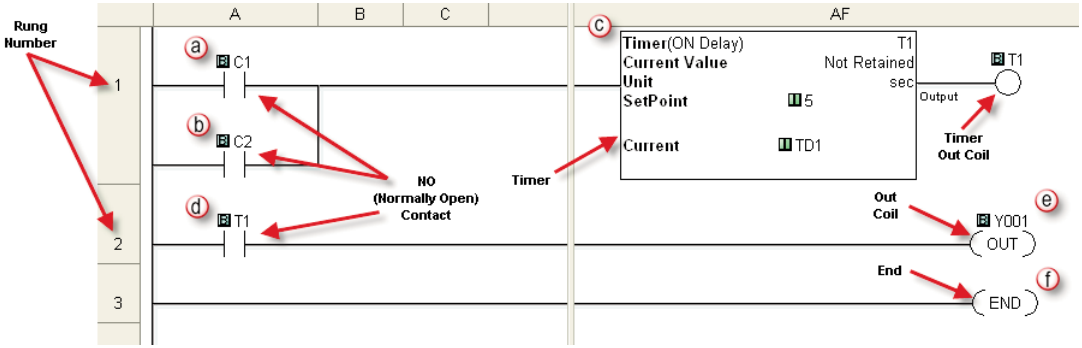
Finally, place the Box Cursor on the NOP coil at the far right of Rung #3. Click and drag an END from the Instruction List into this location. An END instruction indicates the last part of the main ladder logic program. You have created your first project!



Step 3: Create a Project (cont'd)

Program Execution

The following is an explanation of how the CLICK CPU executes the ladder logic program that was just entered.



The CLICK CPU executes the ladder logic program instructions, starting with Rung #1, from left to right, and then proceeds to execute the next rung in the same fashion, carrying on through all of the rungs in sequential order. The 6 instructions (a, b, c, d, e and f) in the above ladder logic program are executed in the following order.

Explanation of the Program Execution

a b NO (Normally Open) Contact: Address C1 and C2 are assigned to a NO Contact. C1 and C2 are internal control bits. The internal control bits are 1 bit memory and hold the status of ON or OFF. The contacts are enabled when the status of C1 or C2 is ON.

c Timer: This instruction is used to delay an action once it is enabled. The CLICK CPU module can use up to 500 timers (T1 to T500) in a project. In this ladder logic program, timer T1 is assigned. The Timer instruction is set up as an ON Delay Timer with a 5 second set point. That is, the timer status bit T1 output coil turns on 5 seconds after the enable input of the Timer instruction turns on.

d This is a NO Contact addressed as T1 and whose status is controlled by Timer T1. The contact is enabled when Timer T1 output coil becomes true after the 5 second delay.

e OUT: This is an output coil addressed as real world output Y001, which happens to be the first output on the CLICK CPU module. It becomes active when the T1 NO Contact in this rung becomes enabled.

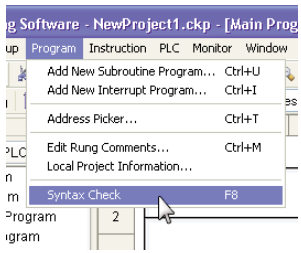
f END: This is the END of the ladder logic scan, and causes the scan to start at the beginning.

1

Step 4: Compile and Save Project

Syntax Check (Compile)

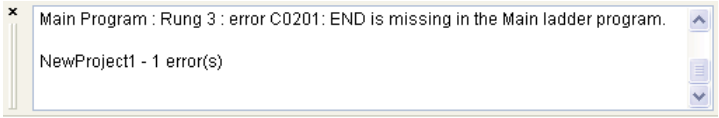
Next, we need to compile the ladder logic program. Compiling the program is done with the Syntax Check function. The program is checked for problems and other conditions that may prevent the program from executing correctly. The results of the Syntax Check are displayed in the Output Window at the bottom of the Main Window as shown below.



From the Program drop down menu, select Syntax Check as shown below, or press the F8 function key on your keyboard, or click on the Syntax Check icon located on the Program Toolbar.

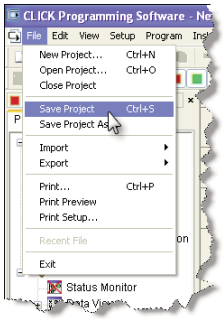
If everything in the program checks out correctly, then the Output Window will indicate 0 error(s) as shown in the following example.

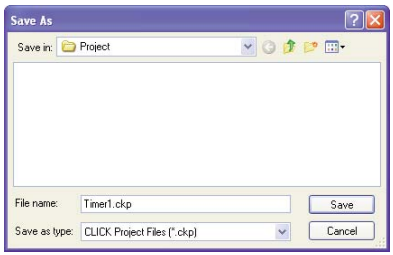
If there are any errors, they will be indicated in the Output Window. For quicker troubleshooting, the user can double click on any particular error in the Output Window and be taken directly to the rung and instruction that may be causing the error. The following is an example of an error.



Save Project

It is always a good practice to save your project at this point. From the File drop down menu, select Save Project as shown below, or click on the Save Project icon located on the File Toolbar. Enter the File Name for your project in the Save As dialog box. You can also browse to the folder that you want the project saved under. Click Save.



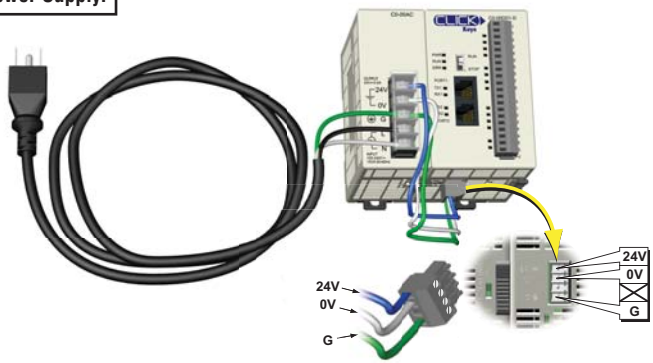


Step 5: Apply Power

The CLICK PLC system works with 24 VDC power. There is a small terminal block on the bottom of the CLICK CPU module. Wire the 24 VDC output from a CLICK power supply, or a properly sized and rated 24 VDC power supply such as AutomationDirect's RHINO series, to the bottom terminal block. (See Chapter 2: Specifications for power supply specifications.)

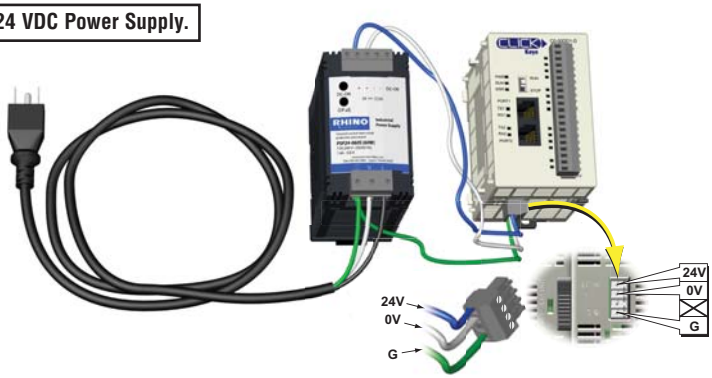
EITHER

Using a CLICK 24 VDC Power Supply.



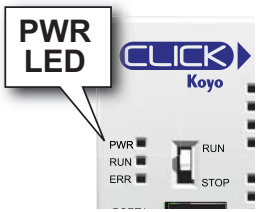
OR

Using an alternate 24 VDC Power Supply.



Once you wire and power up the power supply, confirm the PWR indicator (Green LED) on the CLICK CPU module is on.

If the PWR indicator is not on, check the voltage on the terminal block with a voltage meter. If you measure 24 VDC on the terminal block, the CLICK CPU module may be defective. Please try another one or contact us for a replacement.



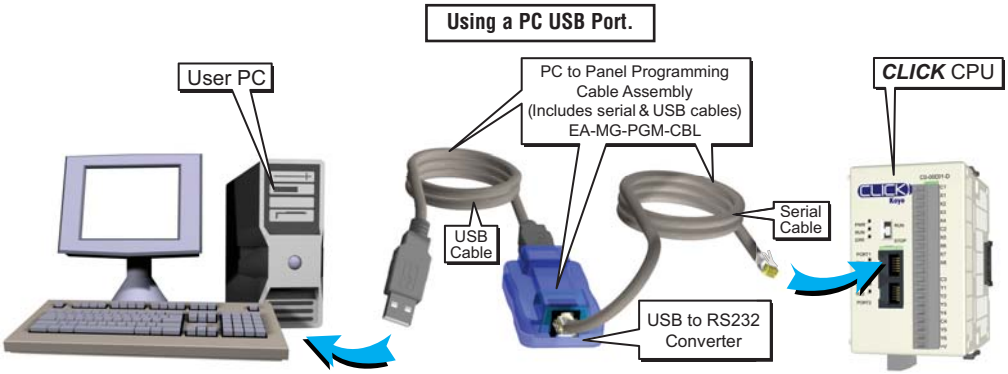
1

Step 6: Establish PC to PLC communications

Next connect a personal computer (PC) to PORT1 on the CLICK CPU module. A PC serial or USB port with the proper serial cable or USB to RS-232 converter can be used to connect from the PC to the CPU's PORT1.

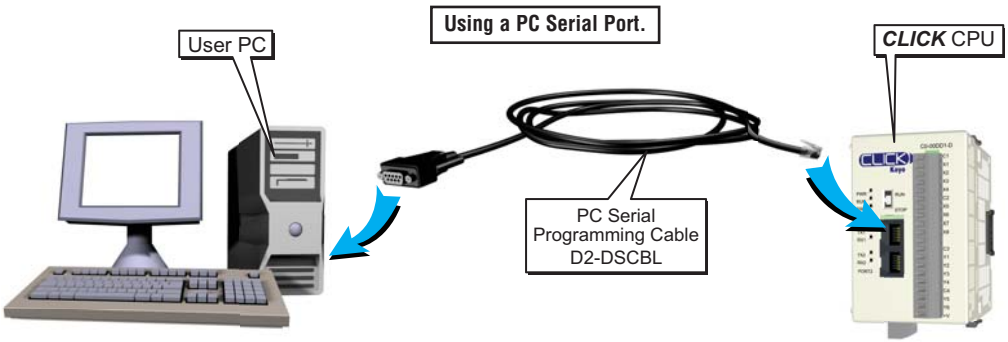
EITHER

If a USB port is available on the PC, then use an AutomationDirect USB to RS232 PC to Panel Programming Cable Assembly, EA-MG-PGM-CBL, to connect between the USB port on the PC and the RJ12 connector on the CPU's PORT1.



OR

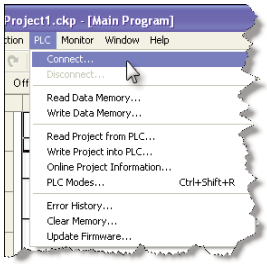
If a 9-pin RS-232 serial communications port is available on the PC, then use an AutomationDirect PC Serial Programming Cable, D2-DSCBL, to connect between the 9-pin port on the PC and the RJ12 connector on the CPU's PORT1.

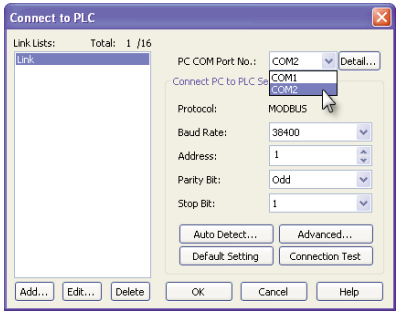


NOTE: PORT1 on the CLICK CPU module is designed as the primary programming port. The port has fixed communication parameters, so you can always connect the programming software to the CLICK CPU module through the port without any configuration changes.

Step 6: Establish PC to PLC communications (cont'd)

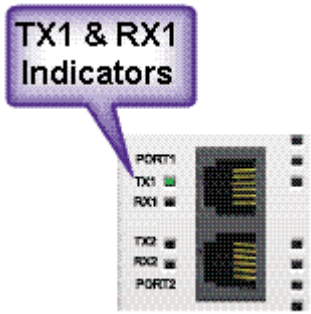
Once we have a communications cable connected between a port on the PC and PORT1 on the CLICK CPU module, we need to select the PC COM port that is connected to the CLICK CPU. From the PLC drop down menu, select Connect as shown to the right, or click on the Connect icon located on the PLC Toolbar.





The Connect to PLC dialog box will be displayed. Under the PC COM Port No.: drop down list, select the communications port that is connected to the CLICK PLC Port1.

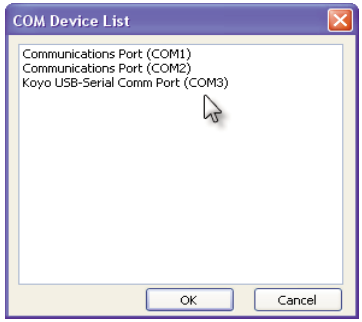
If you are connecting the programming cable to PORT1 on the CLICK CPU module, you do not need to change any of the parameters, just click the OK button. The software should start to immediately connect to the CLICK CPU module.



If you cannot connect the software to the CLICK CPU module, try the above procedure one more time and keep watching the TX1 and RX1 indicators on the CLICK CPU module.

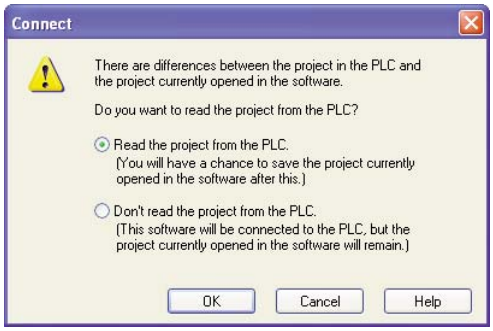
If the RX1 is not blinking, it means the CLICK CPU module is not receiving any data from the programming software. Check to make sure you selected the correct PC COM Port, and also check the cable connections.

NOTE: If using the USB to RS232 converter, and you aren't sure which PC COM Port the USB port is assigned, click the Detail... button next to the COM Port drop down list to identify it. Below shows the Koyo USB-Serial Com Port device assigned to COM3. Select it and click OK.



Step 6: Establish PC to PLC communications (cont'd)

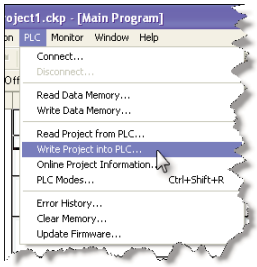
The following Connect dialog box will appear once communication has been established with the CLICK CPU. It is typical that the project that is opened in the programming software will not match the project that resides in the PLC. The dialog box gives you a choice to either Read the PLC's project for viewing purposes, but at the same time allowing the project opened in the software to still be saved, or not read the project in the PLC.



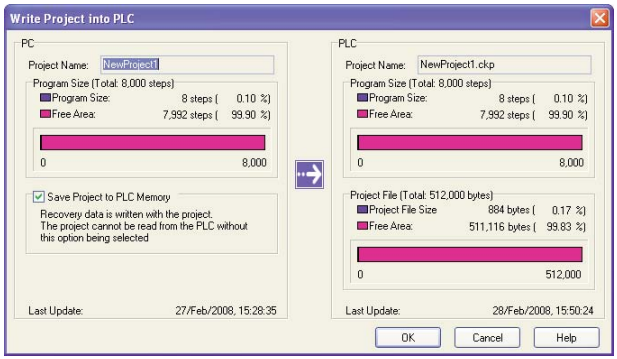
For the Getting Started! exercise, click the radio button for the Don't read the project from the PLC and click OK. Proceed to the next step which will allow the created project to be written into the CPU's memory.

Step 7: Write Project into PLC

The next step is used to transfer the project that was created into the CLICK CPU module. From the PLC drop down menu, select Write Project into PLC as shown to the right, or click on the Write Project into PLC icon located on the PLC Toolbar.



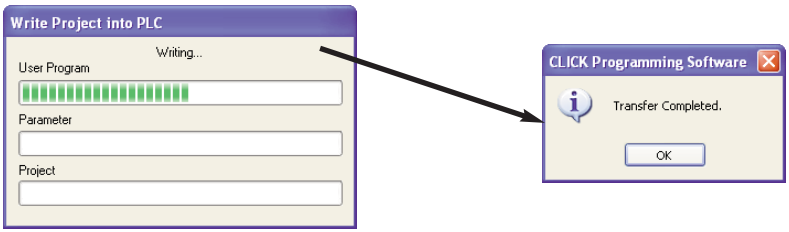
The following dialog box is displayed.



The dialog box displays the information for the Project that is currently opened in the programming software (PC) on the left side. The dialog box also displays the information for any Project that may be stored in the CLICK CPU module (PLC) on the right side.

Click **OK** to write the project data from the **PC** to the **CLICK** CPU module.

The Writing... progress window will open to allow verification that the Project is being written to the CPU. When finished, a Transfer Completed message will be displayed. Click OK to continue.



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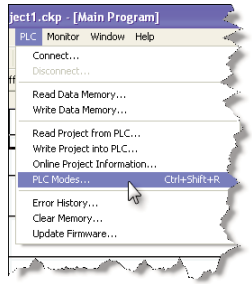
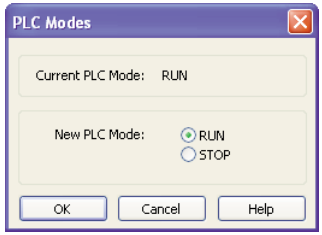
Step 8: Place PLC in RUN Mode

The next step is to place the CLICK CPU module into its Run mode so that the ladder logic program will execute. Next, from the PLC drop down menu, select PLC Modes.. as shown below, or click on the PLC Modes... icon located on the PLC Toolbar.

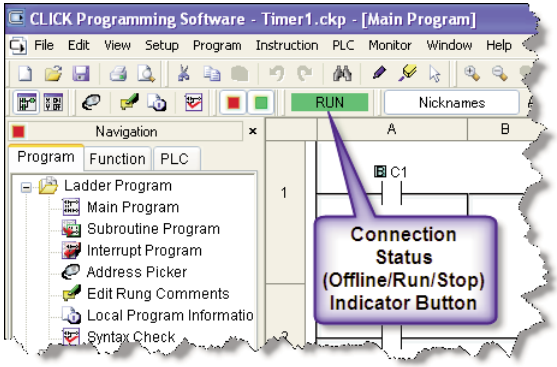


The PLC Modes dialog box is displayed.



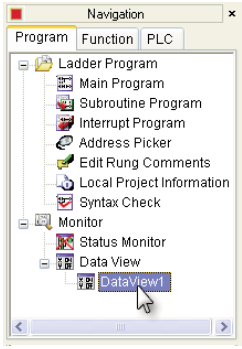
Click the radio button for RUN and then click the OK button. The CLICK CPU module is now in Run mode and executing your ladder logic program.

NOTE: The PLC Modes dialog box can also be accessed by clicking on the Connection status (Offline/Run/Stop) indicator button that is located on the toolbar.

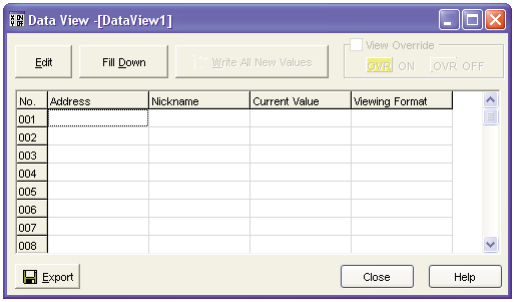


Step 9: Test Project using Data View Monitor

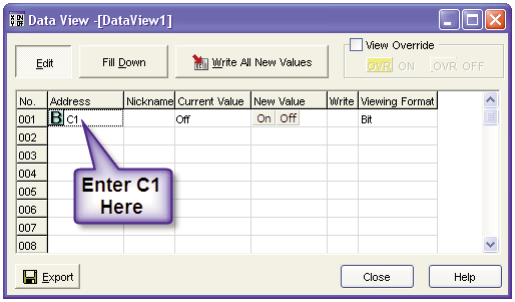
In this next step, use the Data View Monitor to test the ladder logic program by manually overriding the status of the internal C1 bit that was programmed. The purpose of this will be to have the C1 bit enable Timer T1. From the Navigation window on the left side of the development screen, select the Program tab, open the Data View folder under Monitor and double click on DataView1.



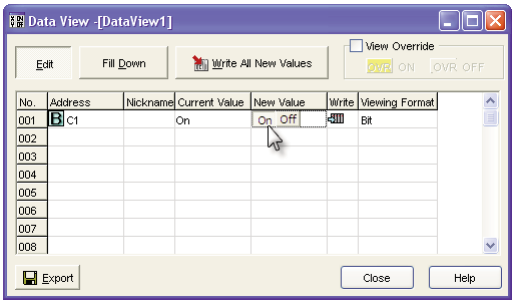
The Data View window is displayed.



Click the Edit button and type in C1 as the Address as shown below.



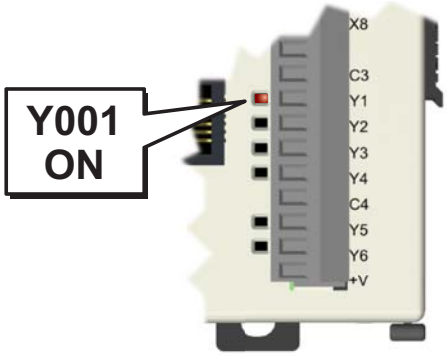
Double click the ON button in the New Value column. The Current Value of the C1 bit changes from OFF to ON. Go to Step 10: Y001 Output On?



Step 10: Y001 Output On?

1

CLICK CPU output Y001 (labeled Y1 on the CPU module) will turn on 5 seconds after you write the ON state to the C1 bit using Data View in the Edit mode.



If you missed viewing the transition of the Y001 status LED from OFF to ON, write an OFF state to the C1 bit and then an ON state in the Data View Monitor to do it again.

NOTE: Also, try overriding the status of the internal C2 bit. The results should be the same because the C2 bit is in parallel with the C1 bit. The ladder logic reads: "Enable timer T1, if either C1 or 'C2 is true."

Congratulations!

You have now learned how to create, compile and transfer a ladder logic project to a CLICK CPU, and then run and test the project. There are additional instructions available for the CLICK PLC. Please refer to the programming software online help topics for details on these instructions.

Again, thank you very much for using the CLICK PLC system.

SPECIFICATIONS

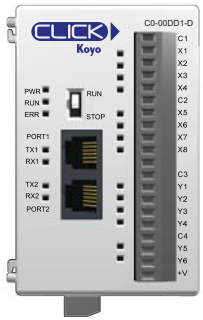
In This Chapter...

Overview

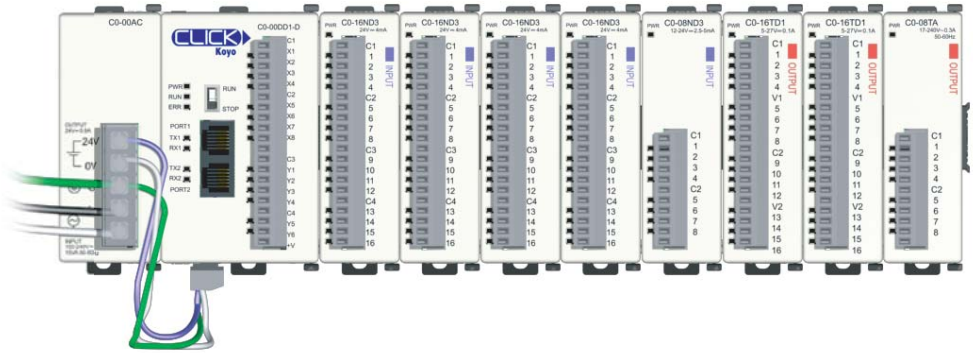
PLC System

The CLICK PLC family of components is designed to offer practical PLC features in a compact and expandable design, and at the same time offer a simple-to-use philosophy. A powered CLICK CPU module by itself can be used as a complete PLC system with built-in I/O points, or the system can be expanded with the addition of up to eight I/O modules. The CLICK PLC system does not require a mounting base. The CLICK CPU and I/O modules are connected together via an expansion port on the sides of the modules. A variety of I/O modules are available for flexible and optimal system configuration. The CLICK PLC supports a very simple but useful instruction set. There are 21 easy-to-use instructions that cover most applications that are suitable for this class of PLC.

Use a CLICK CPU module as a stand-alone controller...



or, expand the system by installing up to eight additional I/O modules.



NOTE: It is not necessary to use the CLICK PLC with a CLICK power supply. An alternately regulated, properly-sized 24 VDC power source can be used to power the CPU and can also provide 24 VDC to any optional I/O modules used in the CLICK PLC hardware configuration. Please refer to the Power Budgeting section later in this chapter for details on choosing the correct size power supply.

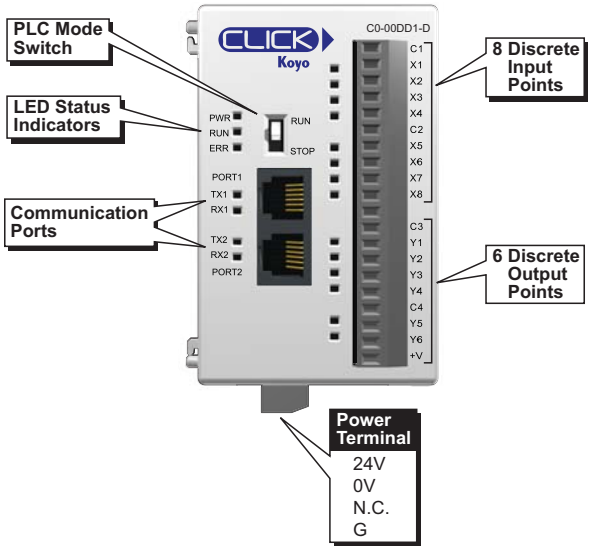
CPU Modules

Two types of CPU modules are available:

- Basic CPUs with discrete-only inputs and outputs.
- Analog CPUs with both discrete and analog inputs and outputs.

Basic CPU Modules

The Basic CLICK CPU modules are available with different combinations of built-in I/O types (i.e. DC input/DC output, DC input/relay output, and AC input/relay output). The CLICK CPU modules listed below all offer the same performance, use the same instruction set, and support all optional I/O modules. With the 14 built-in I/O points (8 inputs/6 outputs), the CPU can be used as a ready-to-go PLC control system without any additional I/O modules. The CPU module just needs 24 VDC, but it can be expanded in the future if the need arises.



Built-in I/O (Basic CPUs)

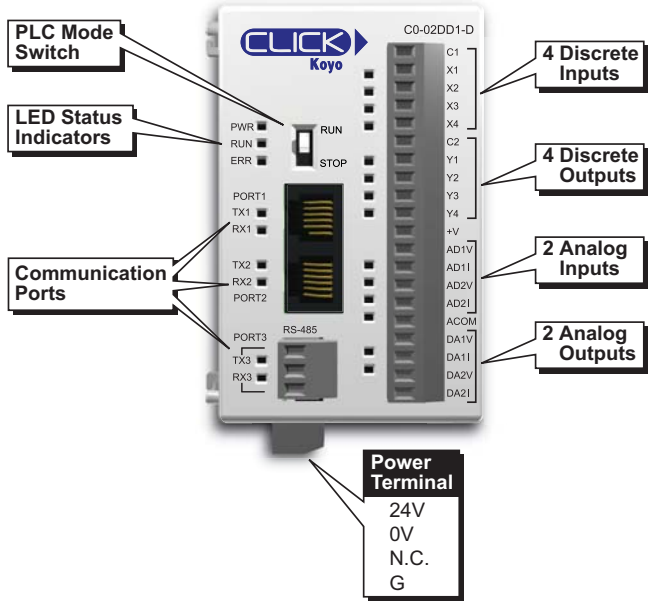
There are four different configurations of I/O types available for the discrete CLICK CPU modules. The table below lists the part numbers showing the various I/O types.

Basic CLICK CPUs			
Part Number	**Discrete Input Type**	**Discrete Output Type**	**External Power**
C0-00DD1-D	8 DC (sink/source)	6 DC (sink)	24VDC (required for all CPUs)
C0-00DD2-D		6 DC (source)	
C0-00DR-D		6 Relay	
C0-00AR-D	8 AC		

Analog CPU Modules

The Analog CLICK CPU modules are available with different combinations of DC in, DC sinking, sourcing or relay out, and analog in and out.

They also have an RS-485 port for Modbus and ASCII communications, and the battery backup feature which will retain the data in SRAM for 5 years.



Built-in I/O (Analog CPUs)

There are three different configurations of I/O types available for the Analog CLICK CPU modules. The table below lists the part numbers showing the various I/O types.

Analog CLICK CPUs					
Part Number	**Discrete Input Types**	**Discrete Output Types**	**Analog Input Types**	**Analog Output Types**	**External Power**
C0-02DD1-D	4 DC in	4 DC sinking	2 channel; voltage (0-5 VDC) / current (4-20 mA); selectable separately per channel	2 channel; voltage (0-5 VDC) / current (4-20 mA); selectable separately per channel	24 VDC (required for all CPUs)
C0-02DD2-D		4 DC sourcing			
C0-02DR-D		4 relay out			

There is a dedicated terminal for each voltage or current type, but you must also select the voltage or current type in the CLICK programming software. See the Analog I/O Configuration section in Chapter 3.

Communication Ports (Basic and Analag CPUs)

Basic CLICK CPU modules have two built-in serial communications ports, and Analog CPU modules have three ports. See Chapter 4: Communications for details on the proper use of these ports.

Memory (Basic and Analag CPUs)

The CLICK CPU modules have a non-volatile FLASH ROM to store the downloaded ladder program and project file. The FLASH ROM has a total of 136K words. These are broken down into 8K words for the ladder program and 128K words dedicated for the project file. The FLASH ROM will retain the ladder program even with power removed from the CPU module.

The CLICK CPU modules make use of data registers to store values and conditions that are used during program execution. This data is stored in the SRAM memory. It is volatile memory, but is backed up by a super capacitor. The super capacitor is a special type of capacitor that is designed to provide power to volatile memory like the SRAM when the power to the CPU is off. However, it will not back up the memory for an extended time. In the case of the CLICK PLC, the super capacitor will back up the SRAM for a few days after the power is shut off. Once the super capacitor is discharged, all data in the SRAM are cleared when the CLICK CPU is powered up the next time.

Battery Backup (Analog CPUs Only)

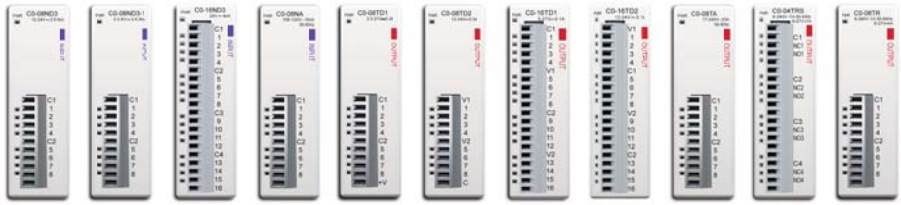
Analog CPU modules also have the battery backup feature that will retain data in the SRAM for five years. Use part number D2-BAT-1 as the replacement battery.

See the CPU Module Specifications section later in this chapter for more CPU information.

2

I/O Modules

A variety of I/O modules are available for the CLICK PLC System. Up to 8 I/O modules can be connected to a CLICK CPU module to expand the system I/O count and meet the needs of a specific application. Complete I/O module specifications and wiring diagrams can be found later in this chapter. The table below lists the discrete option modules that are supported by the CLICK at this time.

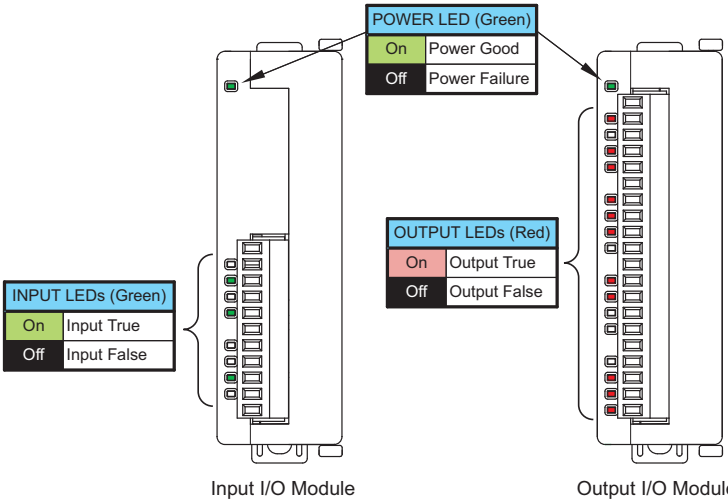


Discrete I/O Modules						
Part Number	Inputs			Outputs		
	I/O Type/ Number/ Commons	Sink or Source	Voltage Ratings	I/O Type/ Number/ Commons	Sink or Source	Voltage/Current Ratings
C0-08ND3	DC/8/2	Sink or Source	12-24 VDC			
C0-08ND3-1	DC/8/2	Sink or Source	3.3-5 VDC			
C0-16ND3	DC/16/4	Sink or Source	24 VDC			
C0-08NA	AC/8/2	N/A	100-120 VAC			
C0-08TD1				DC/8/2	Sink	3.3-27 VDC, 0.3 A
C0-08TD2				DC/8/1	Source	12-24 VDC, 0.3 A
C0-16TD1				DC/16/2	Sink	5-27 VDC, 0.1 A
C0-16TD2				DC/16/2	Source	12-24 VDC, 0.1 A
C0-08TA				AC/8/2	N/A	17-240 VAC, 0.3 A
C0-04TRS				Relay/4/4	N/A	6-27 VDC, 7 A 6-240 VAC, 7 A
C0-08TR				Relay/8/2	N/A	6-27 VDC, 1 A 6-240 VAC, 1 A

LED Indicators

All CLICK I/O modules have an LED Power Indicator, PWR. When this LED is on, the I/O module is receiving 24 VDC through the backplane connector correctly. The input modules have green LEDs and the output modules have red LEDs respectively as the status indicator. When the LED is on, the I/O point is on.

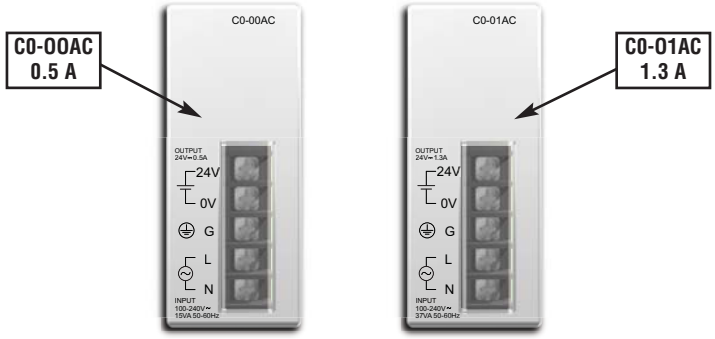
I/O Module LED Status Indicators



Please refer to the I/O Module Specifications section later in this chapter for additional specifications.

Power Supply

Two types of 24 VDC power supplies are available for the CLICK PLC family. They are designed to attach to the left side of the CLICK CPU, which allows a compact footprint. They are identical except for the output current rating. The 24 VDC power is wired from the DC output terminals of the power supply to a removable power terminal block located on the bottom of the CLICK CPU.



C0-00AC

The C0-00AC is a low-cost solution for applications requiring only minimal I/O and power consumption. This power supply will not support a fully-populated CLICK PLC system with all possible I/O module combinations.

C0-01AC

The C0-01AC is designed to support a fully-populated CLICK PLC system with all possible I/O module combinations with no concerns of exceeding the power budget.

CLICK 24 VDC Power Supply Ratings	
Part Number	**Output Current**
C0-00AC	0.5 A
C0-01AC	1.3 A

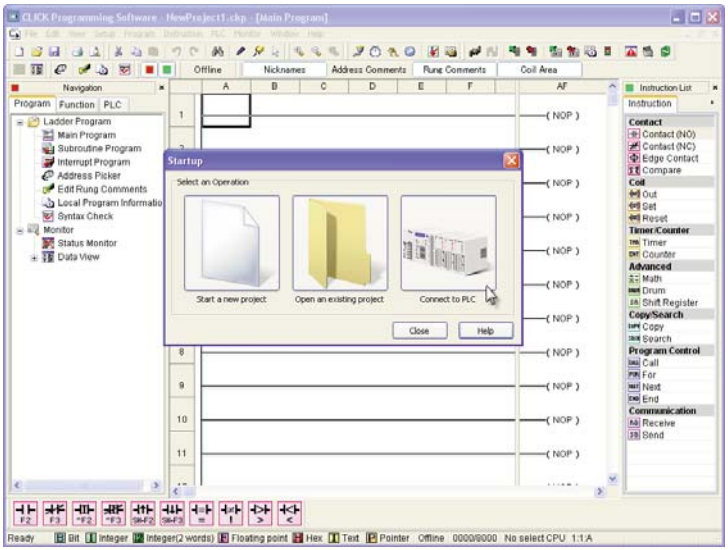
Please refer to the Power Supply Specifications section later in this chapter for detailed specifications.

NOTE: It is not mandatory to use one of the above CLICK power supplies for the CLICK PLC system. A properly-sized and rated, 24 VDC power supply, such as some of those offered by Automationdirect.com, can also be used to power a CLICK PLC system.

To select a power supply to use with your CLICK PLC system, you need to consider the total PLC system's power budget. Please refer to the Power Budget section of this chapter for details.

Programming Software

The CLICK Programming Software, C0-PGMSW, which can be downloaded free from the Automationdirect.com web site, is designed to provide simple and fast application development of ladder logic programming.



These are some of the features that help make this happen:

- The Navigation window allows organization of the ladder logic programs used in your project and access to the functions, settings and configurations used to work with your project.
- The Instruction List window displays all available CLICK PLC instructions, allows you to drag and drop the instruction into your ladder logic program, and then enter any values and/or parameters required for the particular instruction.
- You can add Subroutine and Interrupt programs separately from the main ladder logic program. This allows you to manage your ladder logic programs in a simple, structured environment and, at the same time, aid in trouble-shooting your program.
- The Data View Monitor window configurations are saved with your project. This allows quick access to the same set of memory addresses that may have been set up for viewing during testing of your program.
- The graphical represented System Configuration dialog box allows checking the PLC system I/O configuration. A Power Budget calculation feature is included. Refer to the Power Budgeting section later in this chapter for additional details.
- The Address Picker window allows quick selection of any memory address to be placed in the ladder logic program. Refer to the programming software online help for additional details.
- The CPU module Firmware can be updated from the programming software within 2 minutes.

PLC Numbering System

The following section explains how the CLICK PLC handles the available numbering systems, memory addressing, and I/O numbering.

Data Types

The CLICK PLC supports the following data types. On the CLICK PLC programming software, each data type is indicated with a small icon.

Data Type	S/W Icon	Data Ranges
Bit	B	0, 1
Integer (Single Word)	I	-32,768 to 32,767
Integer2 (Double Word)	I2	-2,147,483,648 to 2,147,483,647
Floating Point	F	-3.4028235E+38 to 3.4028235E+38
HEX (Hexadecimal)	H	0000h to FFFFh (The HEX data type requires the 'h' after the value.)
Text (Single Character)	T	ASCII character 00h to FFh
ASCII Code	A	ASCII code $00 to $FF

NOTE: The CLICK CPU does not support Octal or BCD numbering systems (data types).

Memory Types

The following is the list of the memory types that the CLICK PLC system supports. See the memory map later in this chapter.

Memory Type	Symbol	Data Type	S/W Icon	Definition
Input Point	X	Bit	B	The Discrete Input points are represented by the "X" symbol.
Output Point	Y	Bit	B	The Discrete Output points are represented by the "Y" symbol.
Control Relay	C	Bit	B	The Control Relay bits are represented by the "C" symbol. These internal bits are typically used for ladder program control. They do not represent any real world inputs or outputs.
Timer	T	Bit	B	The Timers are represented by the "T" symbol. The Timer status bit is used to indicate when the Current Value of the timer equals its Preset Value.
Counter	CT	Bit	B	The Counters are represented by the "CT" symbol. The Counter status bit is used to indicate when the Current Value of the counter equals its Preset Value.
System Control Relay	SC	Bit	B	The internal System Control Relays, represented by the "SC" symbol, are pre-defined bits which represent the status of specific system functions.
Data Register	DS	Integer	I	Single word integer data registers are represented by the "DS" symbol.
Data Register	DD	Integer2	I2	Double word integer data registers are represented by the "DD" symbol.
Data Register	DH	HEX	H	Single word Hex data registers are represented by the "DH" symbol.
Data Register	DF	Floating Point	F	Data Floating Point registers are IEEE format Real number values represented by the "DF" symbol as 32 bit words.
Input Register	XD	HEX	H	The Input Registers, represented by the "XD" symbol, contain groups of Discrete Input points in a 16 bit word format.
Output Register	YD	HEX	H	The Output Registers, represented by the "YD" symbol, contain groups of Discrete Output points in a 16 bit word format.
Timer Register	TD	Integer	I	The Timer Registers, represented by the "TD" symbol, contain the corresponding Timer's accumulative value in a 16 bit data register.
Counter Register	CTD	Integer2	I2	The Counter Registers, represented by the "CTD" symbol, contain the corresponding Counter's accumulative value in a 32 bit data register.
System Data Register	SD	Integer	I	The internal System Data Registers, represented by the "SD" symbol, are pre-defined words which represent the status of specific system functions.
Text	TXT	Text	T	The Text data registers, represented by the "TXT" symbol, are used to store and manipulate ASCII text data.

Memory Types (cont'd)

Pointer Addressing

The CLICK PLC allows the use of Pointer Addressing for flexibility in programming. The Copy instruction supports Pointer Addressing in the single copy mode. The Pointer is always assigned as a DS memory type and is designated as a Pointer by placing the DS memory type in square brackets, such as [DS1]. Pointer Addressing uses the Pointer's data value to point to a memory location within the range of one of the eligible memory types. Pointer Addressing can be used with the DS, DD, DF, DH, XD, YD, TD, CTD and TXT data register memory types.

Pointer Addressing is also sometimes referred to as Indirect Addressing. One of the many uses for Pointer Addressing would be to perform lookup in tables. An application example might be determining the number of gallons in a horizontal tank when the liquid level is known. The gallons could be determined by a rather complex math formula, but a simpler approach would be to pre-calculate the number of gallons at several uniform levels, and place these values into a table of data registers that can be accessed using Pointer Addressing.

Pointer Addressing Example

DS1 = 100; data register DS1 is assigned the value of 100.

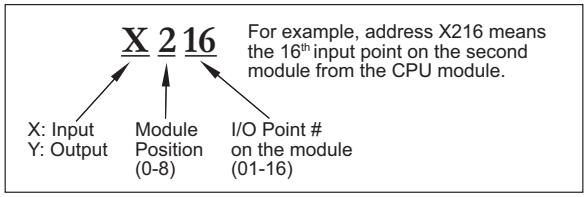
Then the use of DD[DS1] would be the same as showing DD100.

As the value in DS1 is changed, the result would then point to a different DD data register.

In the example, data register DS1 is called a Pointer. Only a DS memory type can be used as a pointer. As mentioned before, the use of the [square brackets] around DS1 in the data register reference DD[DS1] is how the Pointer Addressing is designated.

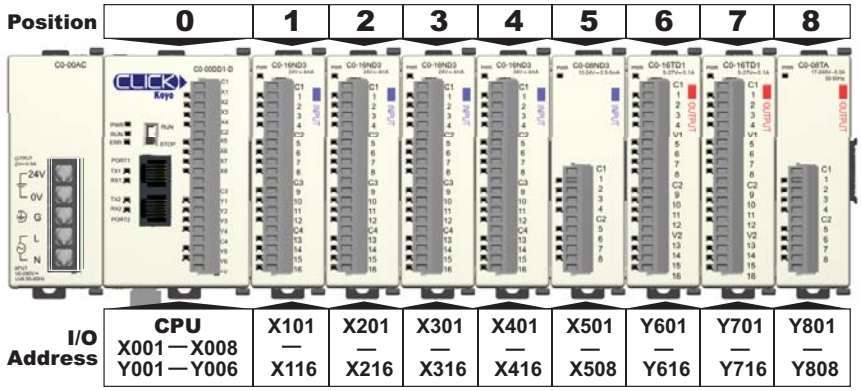
I/O Numbering System

The CLICK PLC uses decimal numbers for the input (X) and output (Y) addressing.

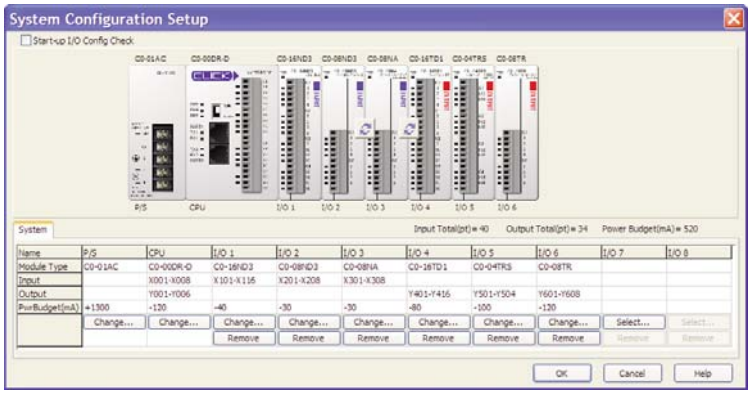


Module Location

Please refer to the following diagram to understand the module position and I/O numbering.



The I/O Addressing can be checked by using the System Configuration window from within the CLICK programming software. From the Setup pulldown menu, select System Configuration; otherwise, from the Navigation window select the Function tab, and under CPU configuration, double click on System Configuration.



CPU Operation

Introduction

Achieving proper control of your equipment or process requires a thorough understanding of how the CLICK CPU controls all aspects of system operation. There are three main areas to understand before you create your application program:

- CPU Operating System – the CPU manages all aspects of system control. A quick overview of all the steps are provided in the next section.
- CPU Operating Modes – The two primary modes of operation are Stop mode and Run mode.
- CPU Memory Map – CLICK CPUs offer a wide variety of resources, such as timers, counters, inputs, etc. The Memory Map section shows the organization and availability of these data types.

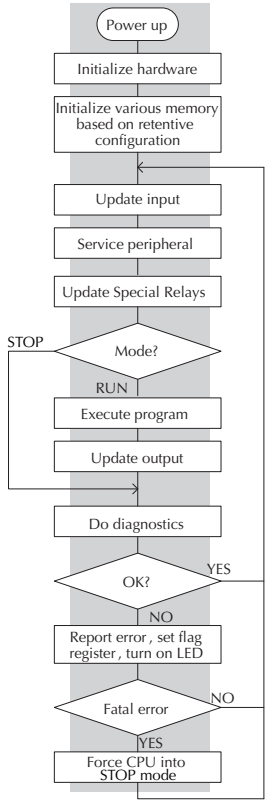
CPU Operating System

At powerup, the CLICK CPU initializes the internal electronic hardware. Memory initialization starts with examining the retentive memory settings. In general, the contents of retentive memory are preserved, and non-retentive memory is initialized to zero (unless otherwise specified).

After the one-time powerup tasks, the CPU begins the cyclical scan activity. The flowchart to the right shows how the tasks differ, based on the CPU mode and the existence of any errors. The "scan time" is defined as the average time around the task loop. Note that the CPU is always reading the inputs, even during Stop mode. This allows programming tools to monitor input status at any time.

The outputs are only updated in Run mode. In Stop mode, they are in the off state.

Error detection has two levels. Non-fatal errors are reported, but the CPU remains in its current mode. If a fatal error occurs, the CPU is forced into Stop mode and the outputs turn off.

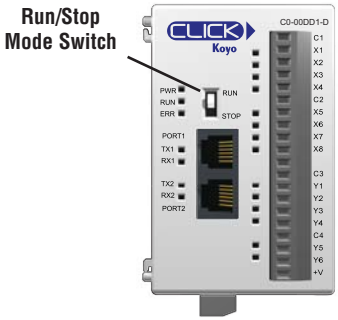


CPU Operating Modes

Stop Mode

In Stop mode, the CLICK CPU does NOT execute the ladder logic program or update the output points. The primary use for Stop Mode is to enter or change a ladder logic program. You also use Stop mode to set up the CPU parameters, such as retentive memory areas, etc.

You can use CLICK Programming Software, or the CLICK CPU mode switch to place the CPU in Stop mode; however, the CLICK CPU mode switch will override the software mode condition. If the CPU mode switch is in the Stop position, the software is blocked from changing the CPU mode. When the CPU mode switch is in the Run position, the software may toggle the mode switch from Run to Stop at will.



Run Mode

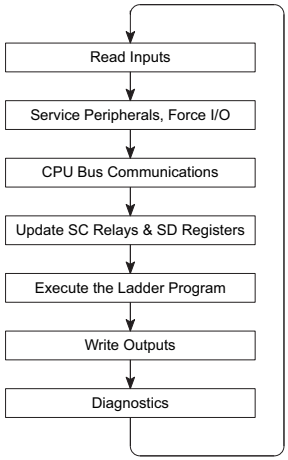
In Run mode, the CPU executes the application program and updates the I/O system. You can perform many operations during Run mode. Some of these include:

- Monitor and change I/O point status
- Change timer/counter preset values
- Change variable memory locations

The Run Mode can be divided into several key areas. For the vast majority of applications, some of these execution segments are more important than others. For example, you need to understand how the CPU updates the I/O points, handles forcing operations, and solves the application program. The remaining segments are not that important for most applications.

You can use CLICK Programming Software, or the CLICK CPU mode switch to place the CPU in Run mode.

Normal Run Mode Scan



Warning: Only authorized personnel fully familiar with all aspects of the application should make changes to the ladder logic program. Make sure you thoroughly consider the impact of any changes to minimize the risk of personal injury or damage to equipment.

Read Inputs

The CLICK CPU reads the status of all inputs, then stores it in the image register. Input image register locations are designated with an X followed by a memory location. Image register data is used by the CPU when it solves the application program.

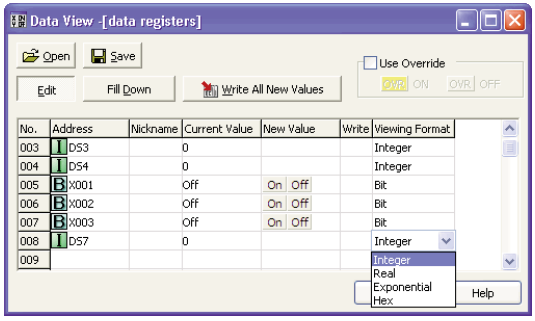
Of course, an input may change after the CPU has just read the inputs. Generally, the CPU scan time is measured in milliseconds. If you have an application that cannot wait until the next I/O update, you can use Immediate Instructions. These do not use the status of the input image register to solve the application program. The Immediate instructions immediately read the input status directly from the I/O modules. However, this lengthens the program scan since the CPU has to read the I/O point status again.

Service Peripherals and Force I/O

After the CLICK CPU reads the inputs from the input modules, it reads any attached peripheral devices. This is primarily a communications service for any attached devices. For example, it would read a programming device to see if any input, output, or other memory type status needs to be modified. There are two basic types of forcing available with the CLICK CPUs:

- Forcing from a peripheral – not a permanent force, good only for one scan
- Bit Override – holds the I/O point (or other bit) in the current state. Valid bits are X, Y, C, T nd CT. (These memory types are discussed in more detail earlier in this chapter).

Forcing and Bit Override are done through the Data View Monitor.



Regular Forcing: This type of forcing can temporarily change the status of a discrete bit. For example, you may want to force an input on, even though it is really off. This allows you to change the point status that was stored in the image register. This value will be valid until the image register location is written to during the next scan. This is primarily useful during testing situations when you need to force a bit on to trigger another event.

Bit override: This is a more forceful type of bit manipulation. When bit override is enabled, you can actually override the current status of a bit in the image register. This change will remain intact until you remove the override.

Warning: Only authorized personnel fully familiar with all aspects of the application should make changes to the program. Make sure you thoroughly consider the impact of any changes to minimize the risk of personal injury or damage to equipment.

Update System Control (SC) Relays and System Data (SD) Registers

The CLICK CPUs have system memory locations hold this information. This portion of the execution cycle makes sure these locations get updated on every scan. Also, there are several different system control relays, such as diagnostic relays, etc., that are also updated during this segment.

Solve Application Program

The CLICK CPU evaluates each instruction in the application program during this segment of the scan cycle. The instructions define the relationship between the input conditions and the desired output response. The CLICK CPU uses the output image register area to store the status of the desired action for the outputs. Output image register locations are designated with a Y followed by a memory location. The actual outputs are updated during the write outputs segment of the scan cycle.

The internal control relays (C) and the data registers (DS, DD, DF and DH) are also updated in this segment.

You may recall that you can force various types of points in the system, discussed earlier in this chapter. If any I/O points or memory data have been forced, the output image register also contains this information.

Write Outputs

Once the application program has solved the instruction logic and constructed the output image register, the CLICK CPU writes the contents of the output image register to the corresponding output points. Remember, the CPU also made sure that any forcing operation changes were stored in the output image register, so the forced points get updated with the status specified earlier.

Diagnostics

During this part of the scan, the CPU performs all system diagnostics and other tasks such as calculating the scan time and resetting the watchdog timer. There are many different error conditions that are automatically detected and reported by the CLICK PLCs. Chapter 6: Troubleshooting contains a listing of the various error codes with a description of the possible causes.

Probably one of the more important things that occurs during this segment is the scan time calculation and watchdog timer control. The CLICK CPU has a watchdog timer that stores the maximum time allowed for the CPU to complete the solve application part of the scan cycle. If this time is exceeded, the CPU will enter the Stop mode and turn off all outputs. An error is automatically reported. The default value of the watchdog timer is 200 ms and can be adjusted between 5-10,000 ms. Refer to the online help available from the CLICK Programming Software, C0-PGMSW, for additional information in regards to the Watchdog Timer.

Power Budgeting

What is Power Budgeting?

There are two areas that need to be considered when determining the power required to operate a CLICK PLC system. The first area is the power required by the CLICK CPU, along with the internal logic side power that the CPU provides to its own I/O and any connected I/O modules that are powered through the CPU's expansion port, plus any device, such as a C-more Micro-Graphic panel, that is powered through one of the CPU's communication ports.

The second area is the power required by all externally connected I/O devices. This should be viewed as the field side power required. The field side power is dependent on the voltage used for a particular input or output device as it relates to the wired I/O point, and the calculated load rating of the connected device

It is strongly recommended that the power source for the logic side be separate from the power source for the field side to help eliminate possible electrical noise.

Be aware that the CLICK sinking DC output points require a sustained voltage to work with their output drivers. This includes the C0-00DD1-D CPU, and the C0-08TD1 & C0-16TD1 output modules. It is recommended that this voltage be provided from the field side power source.

The CLICK CPU operates from a 24 VDC power source. The 24 VDC power source can be provided by an optional CLICK power supply (C0-00AC or C0-01AC), or a standard industrial 24 VDC power supply as offered by AutomationDirect.

CLICK 24 VDC Power Supply
C0-00AC or C0-01AC

Other 24 VDC Power Supply
Example: PSP24-60S

Visit www.automationdirect.com for the complete line-up.

The power source for the connected I/O devices is dependent on the voltage rating of the devices and the type of CLICK I/O module that is being used.

Power Budgeting requires the calculation of the total current that the 24 VDC power source needs to provide to CLICK's logic side, and also a separate calculation of the total current required from all devices operating from the field side of the PLC system.

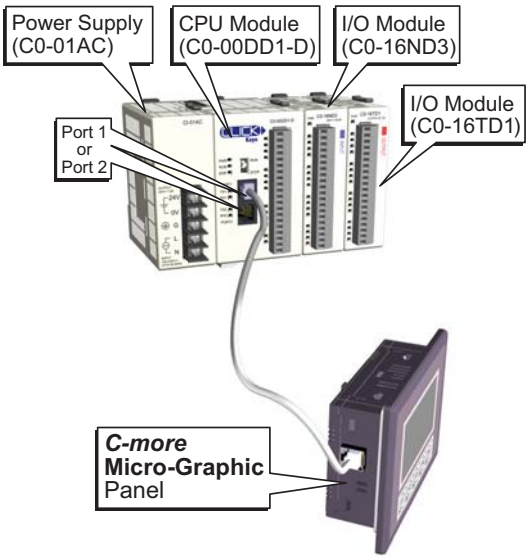
See the Power Budgeting example shown on the next page which includes tables listing the CLICK CPU and I/O module current requirements..

Power Budget Calculation

The following table shows the current consumption required for both the logic side and field side of the CLICK modules.

Current Consumption (mA)		
Part Number	**Power Budget 24 VDC (logic side)**	**External 24 VDC (field side)**
Basic CPU Modules		
C0-00DD1-D	120	60
C0-00DD2-D	120	0
C0-00DR-D	120	0
C0-00AR-D	120	0
Analog CPU Modules		
C0-02DD1-D	120	60
C0-02DD2-D	120	0
C0-02DR-D	120	0
Input Modules		
C0-08ND3	30	0
C0-08ND3-1	30	0
C0-16ND3	40	0
C0-08NA	30	0

Current Consumption (mA)		
Part Number	**Power Budget 24 VDC (logic side)**	**External 24 VDC (field side)**
Output Modules		
C0-08TD1	50	15
C0-08TD2	50	0
C0-16TD1	80	100
C0-16TD2	80	0
C0-08TA	80	0
C0-04TRS	100	0
C0-08TR	100	0
***C-more* Micro-Graphic Panel**		
All p/n	90	0



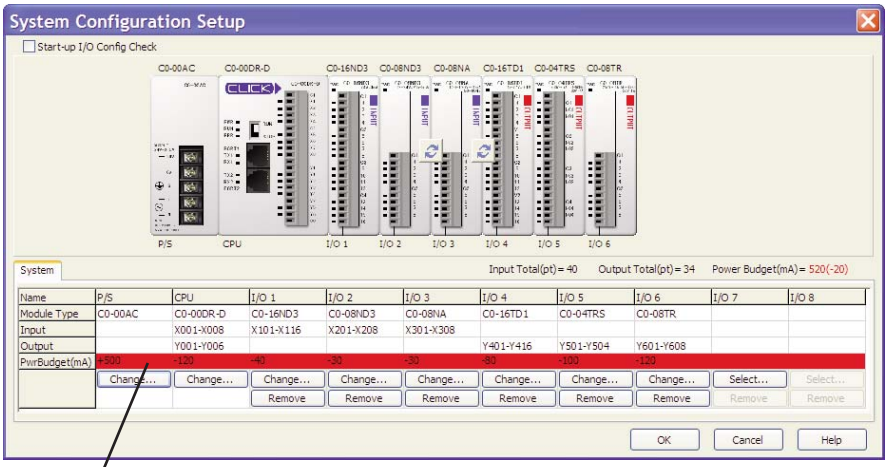
Example

Add the current consumption for each module in the system. The following is an example.

Current Consumption (mA)		
Part Number	**Power Budget 24 VDC (logic side)**	**External 24 VDC (field side)**
C0-00DD1-D	120	60
C0-16ND3	40	0
C0-16TD1	80	100
***C-more* Micro**	90	0
Total:	**330**	**160 ***
* Plus calculated load of connected I/O devices.		

Power Budgeting using the CLICK Programming Software

The following example shows the logic side current consumption as calculated in the System Configuration Setup section of the CLICK Programming Software. Based on the amperage rating of the power supply selected in the first column, your power budget is calculated by subtracting each consecutive module's power consumption from the total available power budget. If you exceed the maximum allowable power consumption, the power budget row fills in red. (The row will be red if the PC is not connected to the CLICK CPU.)



Power budget row turns red if maximum allowable power consumption is exceeded for the power supply selected.

General Specifications

General Specifications (all CLICK PLC products)

The following general specifications apply to all CLICK CPUs, optional I/O modules, and optional power supply products. Please refer to the appropriate I/O temperature derating charts under both the CPU and I/O module specifications to determine best operating conditions based on the ambient temperature of your particular application.

General Specifications	
Power Input Voltage Range	20-28 VDC
Maximum Power Consumption	5W (No 5V use from communication port)
Maximum Inrush Current	30A (less than 1ms)
Acceptable External Power Drop	Max 10ms
Operating Temperature	32°F to 131°F (0°C to 55°C) IEC 60068-2-14 (Test Nb, Thermal Shock)
Storage Temperature	–4°F to 158°F (–20°C to 70°C) IEC 60068-2-1 (Test Ab, Cold) IEC 60068-2-2 (Test Bb, Dry Heat) IEC 60068-2-14 (Test Na, Thermal Shock)
Ambient Humidity	30% to 95% relative humidity (non–condensing)
Environmental Air	No corrosive gases The level for the environmental pollution is 2 (UL840)
Vibration	MIL STD 810C, Method 514.2 IEC60068-2-6 JIS C60068-2-6 (Sine wave vibration test)
Shock	MIL STD 810C, Method 516.2 IEC60068-2-27 JIS C60068-2-27
Noise Immunity	Comply with NEMA ICS3-304 Impulse noise 1µs, 1000V EN61000-4-2 (ESD) EN61000-4-3 (RFI) EN61000-4-4 (FTB) EN61000-4-5 (Surge) EN61000-4-6 (Conducted) EN61000-4-8 (Power frequency magnetic field immunity) RFI: No interference measured at 150, 450MHz (5w/15cm)
Emissions	EN55011:1998 Class A
Agency Approvals	UL508 (File No. E157382, E316037); CE (EN61131-2)
Other	RoHS instruction conformity

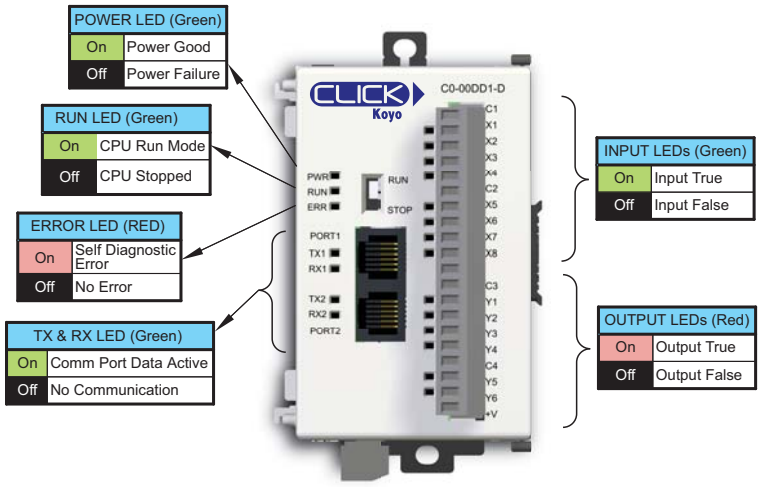
CPU Module Specifications

Common Specifications

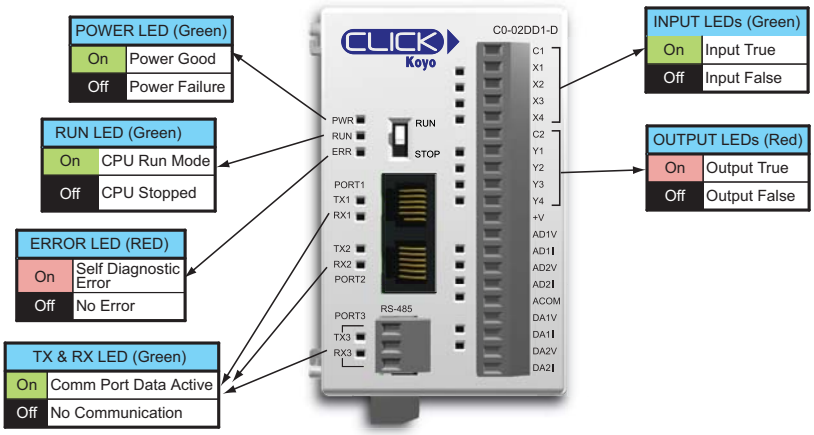
CPU Module Specifications		
	Basic CPU	**Analog CPU**
Control Method	Stored Program/Cyclic execution method	Stored Program/Cyclic execution method
I/O Numbering System	Fixed in Decimal	Fixed in Decimal
Ladder Memory (steps)	8000	8000
Total Data Memory (words)	8000	8000
Contact Execution (boolean)	< 0.6us	< 0.6us
Typical Scan (1k boolean)	1-2 ms	1-2 ms
RLL Ladder Style Programming	Yes	Yes
Run Time Edits	No	No
Scan	Variable / fixed	Variable / fixed
CLICK Programming Software for Windows	Yes	Yes
Built-in Communication Ports	Yes (two RS-232 ports)	Yes (two RS-232 ports and one RS-485 port)
FLASH Memory	Standard on CPU	Standard on CPU
Built-in Discrete I/O points	8 inputs, 6 outputs	4 inputs, 4 outputs
Built-in Analog I/O Channels	No	2 inputs, 2 outputs
Number of Instructions Available	21	21
Control Relays	2000	2000
System Control Relays	1000	1000
Timers	500	500
Counters	250	250
Interrupt	Yes (external: 8 / timed: 4)	Yes (external: 4 / timed: 4)
Subroutines	Yes	Yes
For/Next Loops	Yes	Yes
Math (Integer and Hex)	Yes	Yes
Drum Sequencer Instruction	Yes	Yes
Internal Diagnostics	Yes	Yes
Password Security	Yes	Yes
System Error Log	Yes	Yes
User Error Log	No	No
Memory Backup	Super Capacitor	Super Capacitor + Battery
Battery Backup	No	Yes (battery part no. D2-BAT-1)
Calendar/Clock	No	Yes
I/O Terminal Block Replacement	ADC p/n C0-16TB	ADC p/n C0-16TB
Communication Port & Terminal Block Replacement	N/A	ADC p/n C0-03TB
24 VDC Power Terminal Block Replacement	ADC p/n C0-4TB	ADC p/n C0-4TB

CPU LED Status Indicators

Basic CPU



Analog CPU



Memory Map

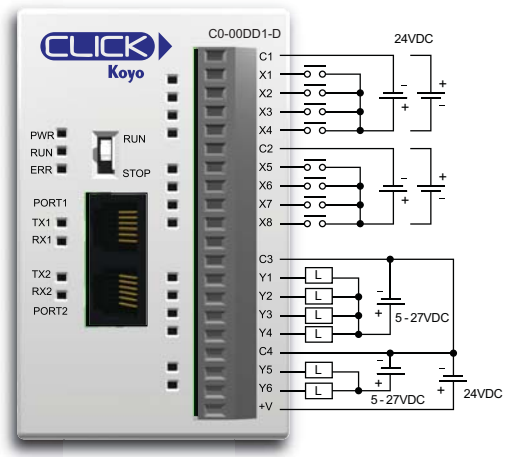
The CLICK PLC uses decimal numbers for the memory addressing. See pages 2-10 and 2-11 for the definitions of each memory type and data type.

Memory Type	Symbol	Data Type	S/W Icon	Range
Input Point	X	Bit	B	X001 – X816
Output Point	Y	Bit	B	Y001 – Y816
Control Relay	C	Bit	B	C1 – C2000
Timer	T	Bit	B	T1 – T500
Counter	CT	Bit	B	CT1 – CT250
System Control Bit	SC	Bit	B	SC1 – SC1000
Data Register	DS	Integer	I	DS1 – DS4500
Data Register	DD	Integer2	I2	DD1 – DD1000
Data Register	DH	HEX	H	DH1 – DH500
Data Register	DF	Floating Point	F	DF1 – DF500
Input Register	XD	HEX	H	XD0 – XD8
Output Register	YD	HEX	H	YD0 – YD8
Timer Register	TD	Integer	I	TD1 – TD500
Counter Register	CTD	Integer2	I2	CTD1 – CTD250
System Data Register	SD	Integer	I	SD1 – SD1000
Text	TXT	Text	T	TXT1 – TXT1000

Basic CPU Module Specifications

C0-00DD1-D – 8 DC Input/6 Sinking DC Output Micro PLC

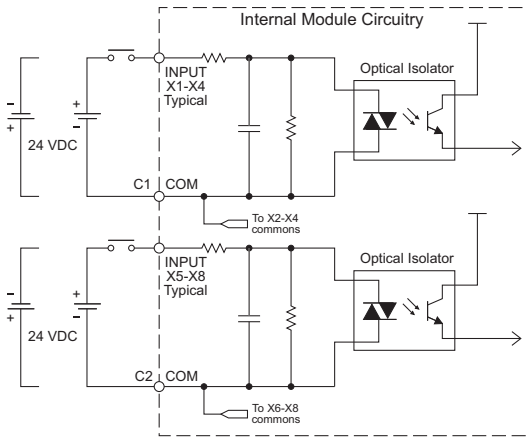
Wiring Diagram



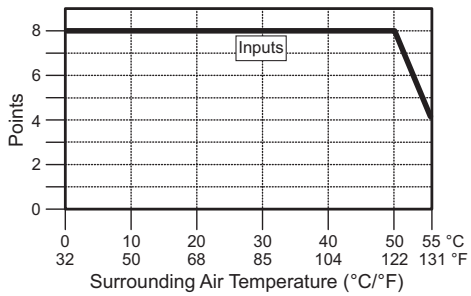
C0-00DD1-D Built-in I/O Specifications - Inputs	
Inputs per Module	8 (Sink/Source)
Operating Voltage Range	24 VDC
Input Voltage Range	21.6 - 26.4 VDC
Input Current	X1-2: Typ 5 mA @ 24 VDC X3-8: Typ 4 mA @ 24 VDC
Maximum Input Current	X1-2: 6.0 mA @ 26.4 VDC X3-8: 5.0 mA @ 26.4 VDC
Input Impedance	X1-2: 4.7 kΩ @ 24 VDC X3-8: 6.8 kΩ @ 24 VDC
ON Voltage Level	X1-2: > 19 VDC X3-8: > 19 VDC
OFF Voltage Level	X1-2: < 4 VDC X3-8: < 7 VDC
Minimum ON Current	X1-2: 4.5 mA X3-8: 3.5 mA
Maximum OFF Current	X1-2: 0.1 mA X3-8: 0.5 mA
OFF to ON Response	X1-2: Typ 5 µs Max 20 µs X3-8: Typ 2 ms Max 10 ms
ON to OFF Response	X1-2: Typ 5 µs Max 20 µs X3-8: Typ 3 ms Max 10 ms
Status Indicators	Logic Side (8 points, green LED)
Commons	2 (4 points/common) Isolated

General Specifications	
Current Consumption at 24VDC	120 mA
Terminal Block Replacement Part No.	C0-16TB
Weight	5.0 oz (140 g)

Equivalent Input Circuit



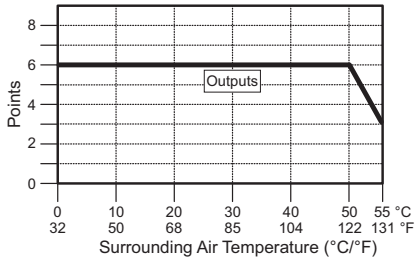
C0-00DD1-D Temperature Derating Chart



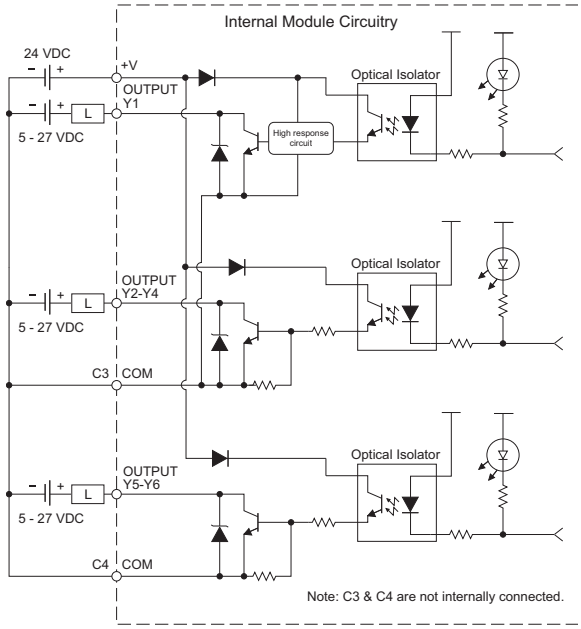
C0-00DD1-D – 8 DC Input/6 Sinking DC Output Micro PLC (cont'd)

C0-00DD1-D Built-in I/O Specifications - Outputs	
Outputs per Module	6 (Sink)
Operating Voltage Range	5-27 VDC
Output Voltage Range	4-30 VDC
Maximum Output Current	0.1 A/point; C3: 0.4 A/common, C4: 0.2 A/common
Minimum Output Current	0.2 mA
Maximum Leakage Current	0.1 mA @ 30.0 VDC
On Voltage Drop	0.5 VDC @ 0.1 A
Maximum Inrush Current	150 mA for 10 ms
OFF to ON Response	Y1: typ 5 µs; max 20 µs Y2-6: < 0.5 ms
ON to OFF Response	Y1: typ 5 µs; max 20 µs Y2-6: < 0.5 ms
Status Indicators	Logic Side (6 points, red LED)
Commons	2 (4 points/com & 2 points/com)
External DC Power Required	20-28 VDC Maximum @ 60 mA (All Points On)

C0-00DD1-D Temperature Derating Chart



Equivalent Output Circuit



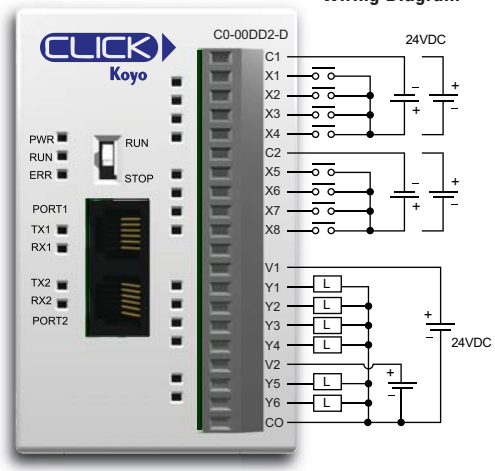
ZipLink Pre-Wired PLC Connection Cables and Modules for CLICK PLC

20-pin connector cable
ZL-C0-CBL20 (0.5 m length)
ZL-C0-CBL20-1 (1.0 m length)
ZL-C0-CBL20-2 (2.0 m length)

ZL-RTB20
20-pin feed-through connector module

C0-00DD2-D – 8 DC Input/6 Sourcing DC Output Micro PLC

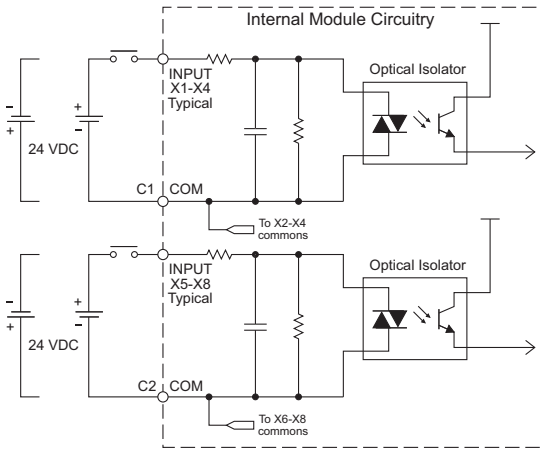
Wiring Diagram



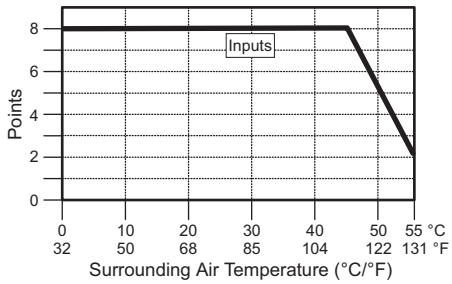
C0-00DD2-D Built-in I/O Specifications - Inputs	
Inputs per Module	8 (Sink/Source)
Operating Voltage Range	24 VDC
Input Voltage Range	21.6 - 26.4 VDC
Input Current	X1-2: Typ 5 mA @ 24 VDC X3-8: Typ 4 mA @ 24 VDC
Maximum Input Current	X1-2: 6.0 mA @ 26.4 VDC X3-8: 5.0 mA @ 26.4 VDC
Input Impedance	X1-2: 4.7 kΩ @ 24 VDC X3-8: 6.8 kΩ @ 24 VDC
ON Voltage Level	X1-2: > 19 VDC X3-8: > 19 VDC
OFF Voltage Level	X1-2: < 4 VDC X3-8: < 7 VDC
Minimum ON Current	X1-2: 4.5 mA X3-8: 3.5 mA
Maximum OFF Current	X1-2: 0.1 mA X3-8: 0.5 mA
OFF to ON Response	X1-2: Typ 5 µs Max 20 µs X3-8: Typ 2 ms Max 10 ms
ON to OFF Response	X1-2: Typ 5 µs Max 20 µs X3-8: Typ 3 ms Max 10 ms
Status Indicators	Logic Side (8 points, green LED)
Commons	2 (4 points/common) Isolated

General Specifications	
Current Consumption at 24VDC	120 mA
Terminal Block Replacement Part No.	C0-16TB
Weight	5.0 oz (140 g)

Equivalent Input Circuit



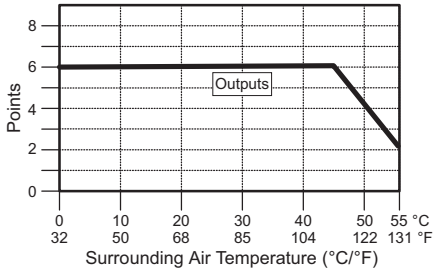
C0-00DD2-D Temperature Derating Chart



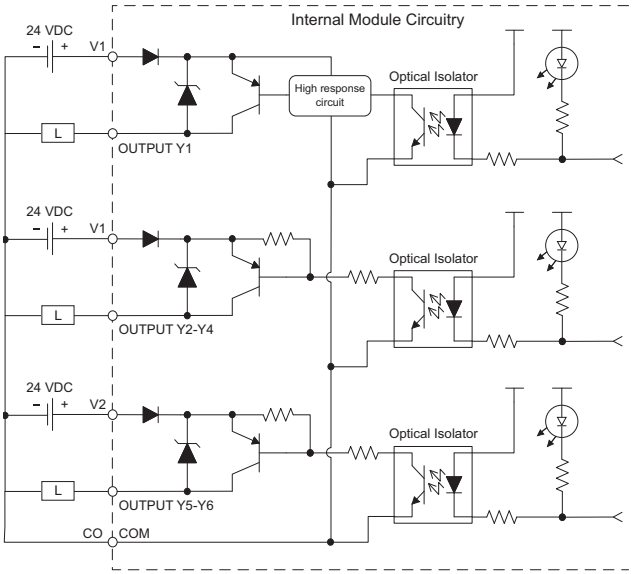
C0-00DD2-D – 8 DC Input/6 Sourcing DC Output Micro PLC (cont'd)

C0-00DD2-D Built-in I/O Specifications - Outputs	
Outputs per Module	6 (Source)
Operating Voltage Range	24 VDC
Output Voltage Range	19.2-30 VDC
Maximum Output Current	0.1 A/point , 0.6 A/common
Minimum Output Current	0.2 mA
Maximum Leakage Current	0.1 mA @ 30 VDC
On Voltage Drop	Y1: 1.0 VDC @ 0.1 A Y2-6: 0.5 VDC @ 0.1 A
Maximum Inrush Current	150 mA for 10 ms
OFF to ON Response	Y1: typ 5 µs; max 20 µs Y2-6: < 0.5 ms
ON to OFF Response	Y1: typ 5 µs; max 20 µs Y2-6: < 0.5 ms
Status Indicators	Logic Side (6 points, red LED)
Commons	2 (4 points/com & 2 points/com)

C0-00DD2-D Temperature Derating Chart



Equivalent Output Circuit

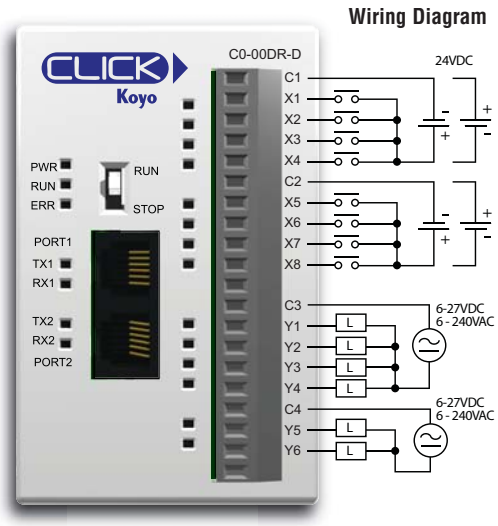


ZipLink Pre-Wired PLC Connection Cables and Modules for CLICK PLC

20-pin connector cable
ZL-C0-CBL20 (0.5 m length)
ZL-C0-CBL20-1 (1.0 m length)
ZL-C0-CBL20-2 (2.0 m length)

ZL-RTB20
20-pin feed-through connector module

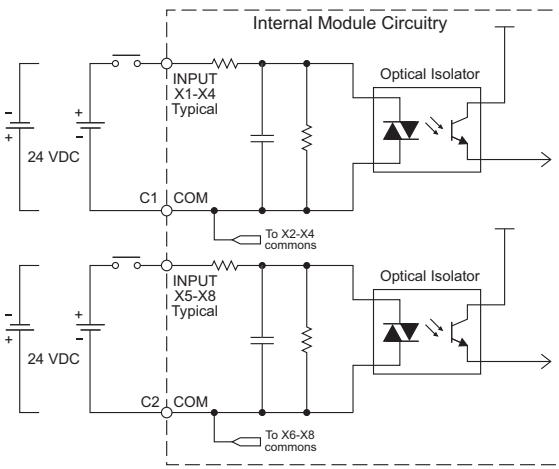
C0-00DR-D – 8 DC Input/6 Relay Output Micro PLC

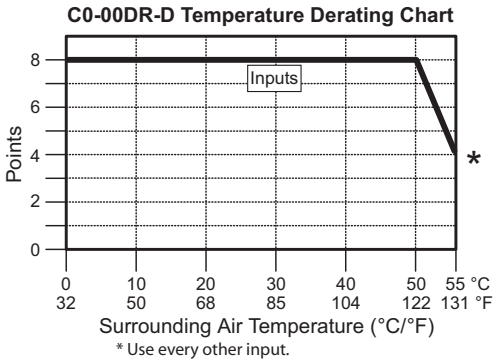


C0-00DR-D Built-in I/O Specifications - Inputs	
Inputs per Module	8 (Sink/Source)
Operating Voltage Range	24 VDC
Input Voltage Range	21.6-26.4 VDC
Input Current	X1-2: Typ 5 mA @ 24 VDC X3-8: Typ 4 mA @ 24 VDC
Maximum Input Current	X1-2: 6.0 mA @ 26.4 VDC X3-8: 5.0 mA @ 26.4 VDC
Input Impedance	X1-2: 4.7 kΩ @ 24 VDC X3-8: 6.8 kΩ @ 24 VDC
ON Voltage Level	X1-2: > 19 VDC X3-8: > 19 VDC
OFF Voltage Level	X1-2: < 4 VDC X3-8: < 7 VDC
Minimum ON Current	X1-2: 4.5 mA X3-8: 3.5 mA
Maximum OFF Current	X1-2: 0.1 mA X3-8: 0.5 mA
OFF to ON Response	X1-2: Typ 5 µs Max 20 µs X3-8: Typ 2 ms Max 10 ms
ON to OFF Response	X1-2: Typ 5 µs Max 20 µs X3-8: Typ 3 ms Max 10 ms
Status Indicators	Logic Side (8 points, green LED)
Commons	2 (4 points/common) Isolated

General Specifications	
Current Consumption at 24VDC	120 mA
Terminal Block Replacement Part No.	C0-16TB
Weight	5.6 oz (160 g)

Equivalent Input Circuit



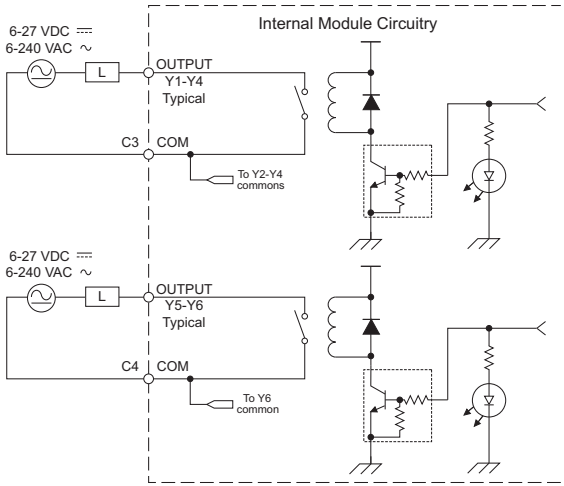


C0-00DR-D – 8 DC Input/6 Relay Output Micro PLC (cont'd)

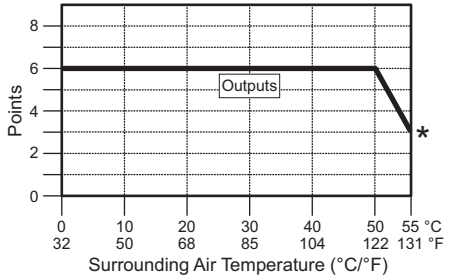
2

C0-00DR-D Built-in I/O Specifications - Outputs	
Outputs per Module	6
Operating Voltage Range	6-240 VAC (47-63 Hz), 6-27 VDC
Output Voltage Range	5-264 VAC (47-63 Hz), 5-30 VDC
Output Type	Relay, form A (SPST)
Maximum Current	1 A/point; C3: 4 A/common, C4: 2 A/common
Minimum Load Current	5 mA @ 5 VDC
Maximum Inrush Current	3 A for 10 ms
OFF to ON Response	< 15 ms
ON to OFF Response	< 15 ms
Status Indicators	Logic Side (6 points, red LED)
Commons	2 (4 points/com & 2 points/com) Isolated

Equivalent Output Circuit



C0-00DR-D Temperature Derating Chart



* Use every other output.

Typical Relay Life (Operations) at Room Temperature	
Voltage & Load Type	Load Current: 1 A
30 VDC Resistive	300,000 cycles
30 VDC Solenoid	50,000 cycles
250 VAC Resistive	500,000 cycles
250 VAC Solenoid	200,000 cycles
ON to OFF = 1 cycle	

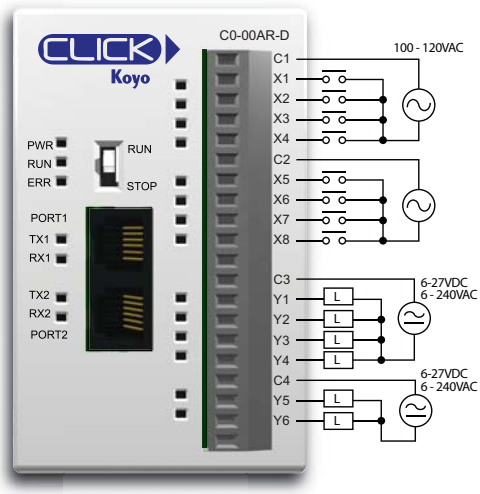
ZipLink Pre-Wired PLC Connection Cables and Modules for CLICK PLC

20-pin connector cable
ZL-C0-CBL20 (0.5 m length)
ZL-C0-CBL20-1 (1.0 m length)
ZL-C0-CBL20-2 (2.0 m length)

ZL-RTB20
20-pin feed-through connector module

C0-00AR-D – 8 AC Input/6 Relay Output Micro PLC

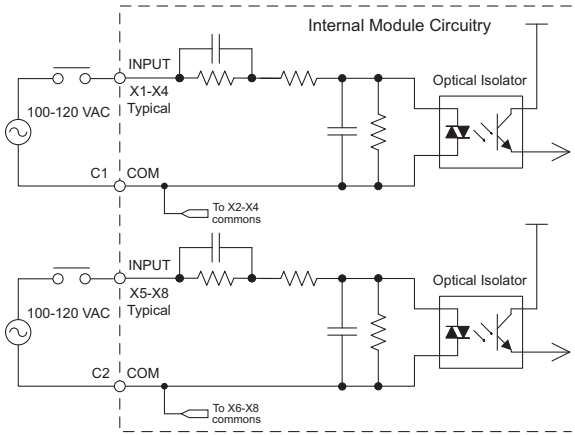
Wiring Diagram



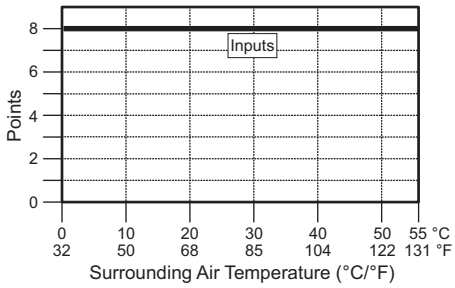
C0-00AR-D Built-in I/O Specifications - Inputs	
Inputs per Module	8
Operating Voltage Range	100-120 VAC
Input Voltage Range	80-144 VAC
AC Frequency	47-63 Hz
Input Current	8.5 mA @ 100 VAC at 50 Hz 10 mA @ 100 VAC at 60 Hz
Maximum Input Current	16 mA @ 144 VAC at 55°C or 131°C
Input Impedance	15 kΩ @ 50 Hz 12 kΩ @ 60 Hz
ON Voltage Level	> 60 VAC
OFF Voltage Level	< 20 VAC
Minimum ON Current	5 mA
Maximum OFF Current	2 mA
OFF to ON Response	< 40 ms
ON to OFF Response	< 40 ms
Status Indicators	Logic Side (8 points, green LED)
Commons	2 (4 points/common) Isolated

General Specifications	
Current Consumption at 24VDC	120 mA
Terminal Block Replacement Part No.	C0-16TB
Weight	5.6 oz (160 g)

Equivalent Input Circuit



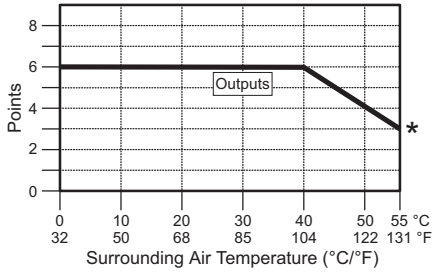
C0-00AR-D Temperature Derating Chart



C0-00AR-D – 8 AC Input/6 Relay Output Micro PLC (cont'd)

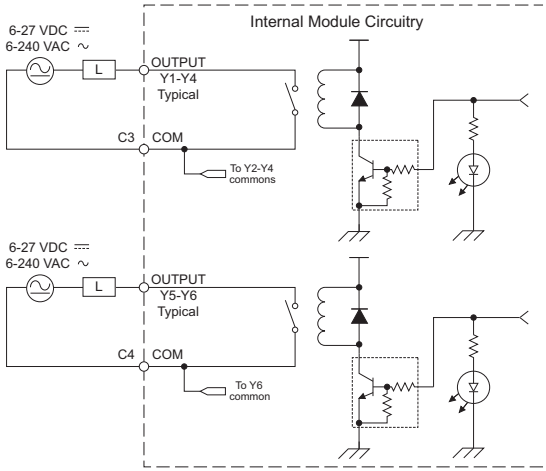
C0-00AR-D Built-in I/O Specifications - Outputs	
Outputs per Module	6
Operating Voltage Range	6-240 VAC (47-63 Hz), 6-27 VDC
Output Voltage Range	5-264 VAC (47-63 Hz), 5-30 VDC
Output Type	Relay, form A (SPST)
Maximum Current - Resistive	1 A/point; C3: 4A/common, C4: 3A/common
Minimum Load Current	5 mA @ 5 VDC
Maximum Inrush Current	3 A for 10 ms
OFF to ON Response	< 15 ms
ON to OFF Response	< 15 ms
Status Indicators	Logic Side (6 points, red LED)
Commons	2 (4 points/com & 2 points/com) Isolated

C0-00AR-D Temperature Derating Chart



* Use every other output.

Equivalent Output Circuit



Typical Relay Life (Operations) at Room Temperature	
Voltage & Load Type	Load Current: 1 A
30 VDC Resistive	300,000 cycles
30 VDC Solenoid	50,000 cycles
250 VAC Resistive	500,000 cycles
250 VAC Solenoid	200,000 cycles
ON to OFF = 1 cycle	

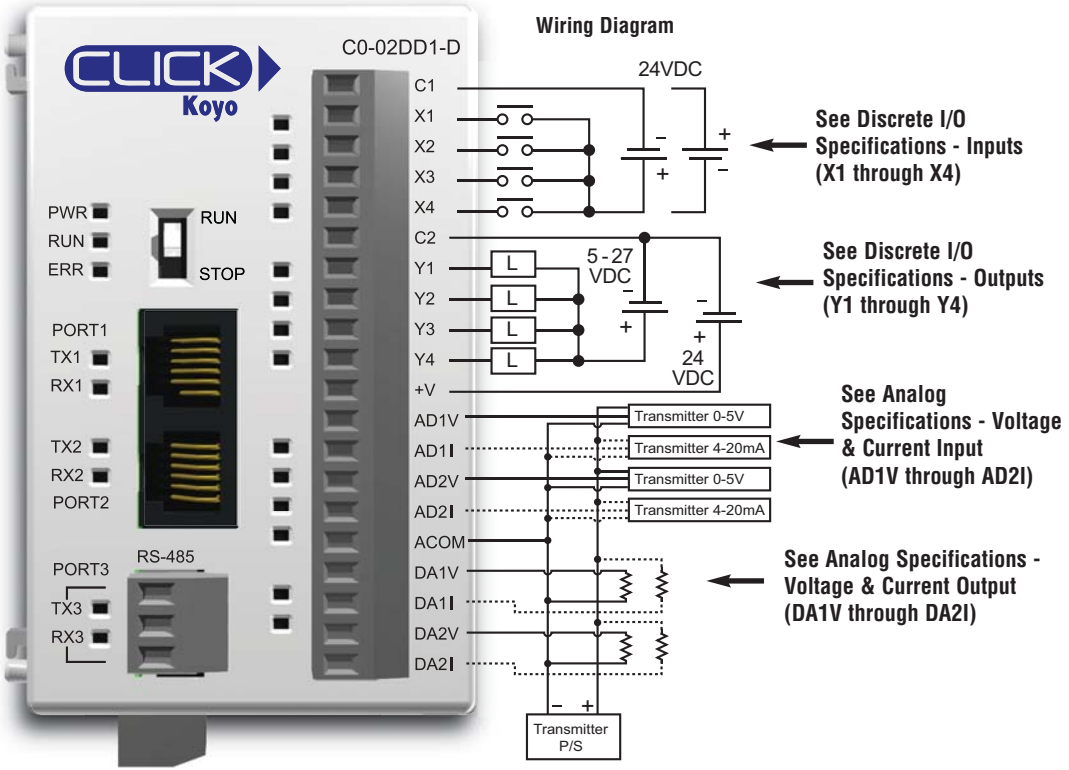
ZipLink Pre-Wired PLC Connection Cables and Modules for CLICK PLC

20-pin connector cable
ZL-C0-CBL20 (0.5 m length)
ZL-C0-CBL20-1 (1.0 m length)
ZL-C0-CBL20-2 (2.0 m length)

ZL-RTB20
20-pin feed-through connector module

Analog CPU Module Specifications

C0-02DD1-D – 4 DC Input/4 Sinking DC Output; 2 Analog In/2 Analog Out Micro PLC



General Specifications	
Current Consumption at 24VDC	120 mA
Terminal Block Replacement Part No.	C0-16TB
Weight	5.3 oz (150 g)

NOTE: Please refer to the Analog I/O Configuration section in Chapter 3 for information on using these analog I/O.

NOTE: When using Analog CPUs, you must also use CLICK programming software version V1.10 or later.

NOTE: There are no ZipLink pre-wired PLC connection cables and modules for the Analog CPUs (cannot mix discrete I/O and analog I/O signals in a ZIPLink cable.)

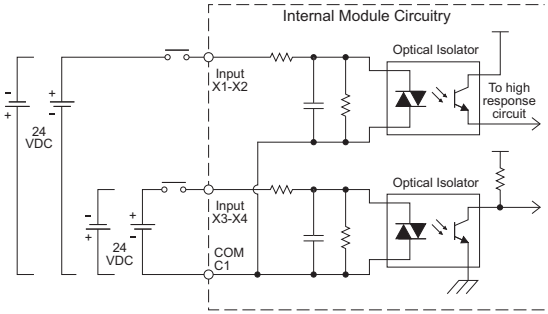
C0-02DD1-D (cont'd)

X1 - X4

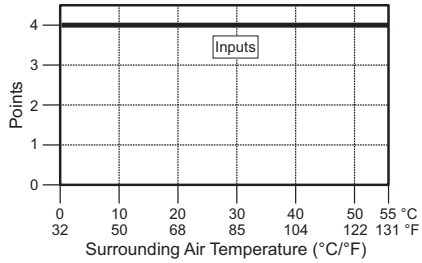
C0-02DD1-D Discrete I/O Specifications - Inputs	
Inputs per Module	4 (Sink/Source)
Operating Voltage Range	24 VDC
Input Voltage Range	21.6 - 26.4 VDC
Input Current	X1-2: Typ 5 mA @ 24 VDC X3-4: Typ 4 mA @ 24 VDC
Maximum Input Current	X1-2: 6.0 mA @ 26.4 VDC X3-4: 5.0 mA @ 26.4 VDC
Input Impedance	X1-2: 4.7 kΩ @ 24 VDC X3-4: 6.8 kΩ @ 24 VDC
ON Voltage Level	X1-2: > 19 VDC X3-4: > 19 VDC
OFF Voltage Level	X1-2: < 4 VDC X3-4: < 7 VDC
Minimum ON Current	X1-2: 4.5 mA X3-4: 3.5 mA
Maximum OFF Current	X1-2: 0.1 mA X3-4: 0.5 mA
OFF to ON Response	X1-2: Typ 5 µs Max 20 µs* X3-4: Typ 2 ms Max 10 ms
ON to OFF Response	X1-2: Typ 5 µs Max 20 µs* X3-4: Typ 3 ms Max 10 ms
Status Indicators	Logic Side (4 points, green LED)
Commons	1 (4 points/common)

*** Threshold level is 70% amplitude.**

Equivalent Discrete Input Circuit



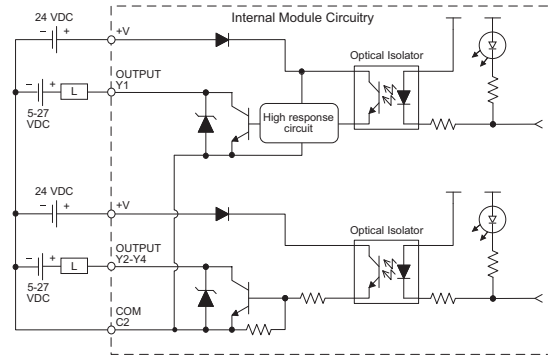
C0-02DD1-D Temperature Derating Chart



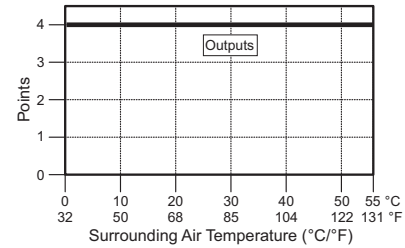
Y1 - Y4

C0-02DD1-D Discrete I/O Specifications - Outputs	
Outputs per Module	4 (Sink)
Operating Voltage Range	5-27 VDC
Output Voltage Range	4-30 VDC
Maximum Output Current	0.1 A/point; 0.4 A/common
Minimum Output Current	0.2 mA
Maximum Leakage Current	0.1 mA @ 30.0 VDC
On Voltage Drop	0.5 VDC @ 0.1 A
Maximum Inrush Current	150 mA for 10 ms
OFF to ON Response	Y1: typ 5 µs; max 20 µs Y2-4: < 0.5 ms
ON to OFF Response	Y1: typ 5 µs; max 20 µs Y2-4: < 0.5 ms
Status Indicators	Logic Side (4 points, red LED)
Commons	1 (4 points/common)
External DC Power Required	20-28 VDC Maximum @ 60 mA (all points on)

Equivalent Discrete Output Circuit



C0-02DD1-D Temperature Derating Chart



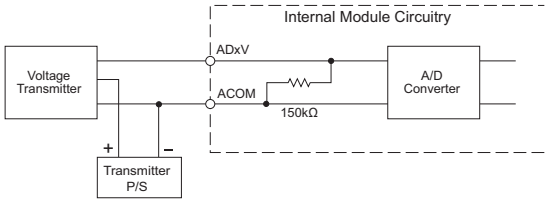
C0-02DD1-D (cont'd)

AD1V - AD2I

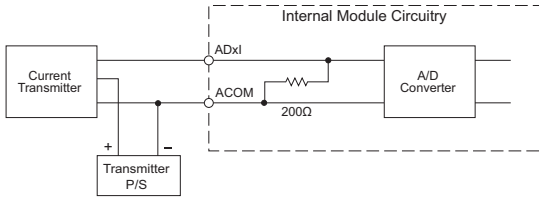
C0-02DD1-D Analog Specifications - Voltage Input	
Number of Channels	2 (voltage/current selectable)
Input Range	0 - 5 VDC
Resolution	12 bit
Conversion Time	50 ms
Input Impedance	150 kΩ
Input Stability	±2 LSB maximum
Full-Scale Calibration Error	±1.2% maximum
Offset Calibration Error	±5 mV maximum
Accuracy vs. Temperature Error	±100 ppm / °C maximum

C0-02DD1-D Analog Specifications - Current Input	
Inputs per Module	2 (voltage/current selectable)
Input Range	4 - 20 mA
Resolution	12 bit
Conversion Time	50 ms
Input Impedance	200Ω
Input Stability	±2 LSB
Full-Scale Calibration Error	±1% maximum
Offset Calibration Error	±0.1 mA maximum
Accuracy vs. Temperature Error	±100 ppm / °C maximum

Analog Voltage Input



Analog Current Input Circuit

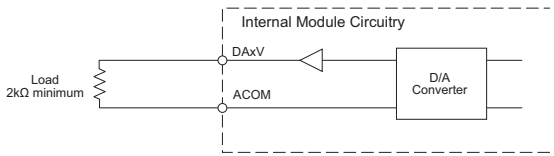


DA1V - DA2I

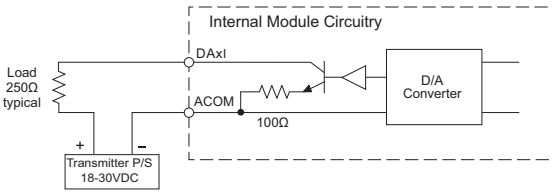
C0-02DD1-D Analog Specifications - Voltage Output	
Outputs per Module	2 (voltage/current selectable)
Output Range	0 - 5 VDC
Resolution	12 bit
Conversion Time	1 ms
Load Impedance	2 kΩ minimum (output current 2.5 mA maximum)
Full-Scale Calibration Error	±0.8% maximum
Offset Calibration Error	±5 mV maximum
Accuracy vs. Temperature Error	±100 ppm / °C maximum

C0-02DD1-D Analog Specifications - Current Output	
Outputs per Module	2 (voltage/current selectable)
Output Range	4 - 20 mA
Resolution	12 bit
Conversion Time	1 ms
Loop Supply Voltage	DC 18 - 30 V
Load Impedance	250Ω Load Power Supply: DC 18V: 600Ω maximum DC 24V: 900Ω maximum DC 30V: 1200Ω maximum
Full-Scale Calibration Error	±1% maximum
Offset Calibration Error	±0.1 mA maximum
Accuracy vs. Temperature Error	±100 ppm / °C maximum

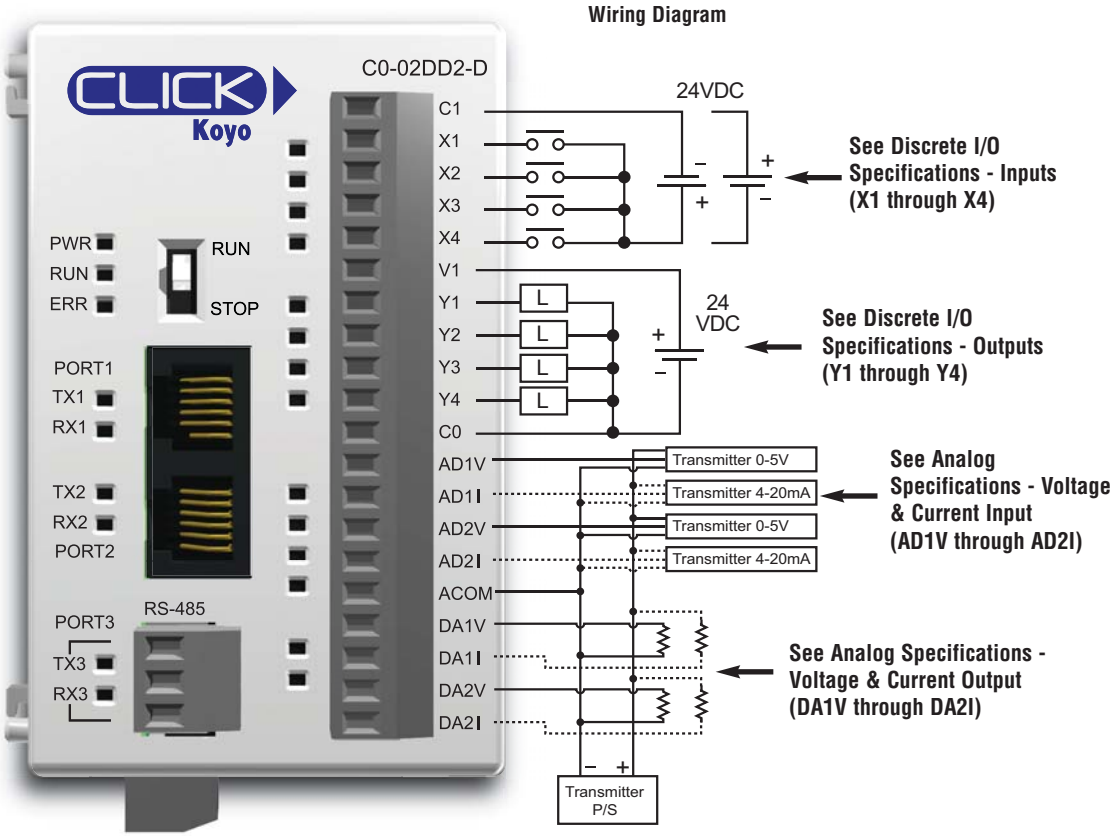
Analog Voltage Output Circuit



Analog Current Output Circuit



C0-02DD2-D – 4 DC Input/4 Sourcing DC Output; 2 Analog In/2 Analog Out Micro PLC



General Specifications	
Current Consumption at 24VDC	120 mA
Terminal Block Replacement Part No.	C0-16TB
Weight	5.3 oz (150 g)

NOTE: Please refer to the Analog I/O Configuration section in Chapter 3 for information on using these analog I/O.

NOTE: When using Analog CPUs, you must also use CLICK programming software version V1.10 or later.

NOTE: There are no ZipLink pre-wired PLC connection cables and modules for the Analog CPUs (cannot mix discrete I/O and analog I/O signals in a ZIPLink cable.)

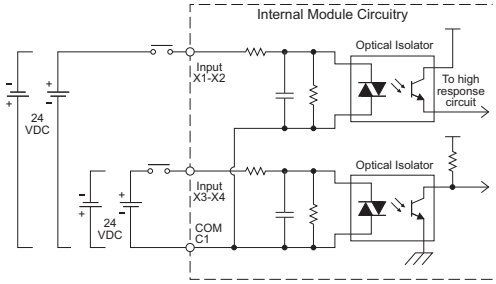
C0-02DD2-D (cont'd)

X1 - X4

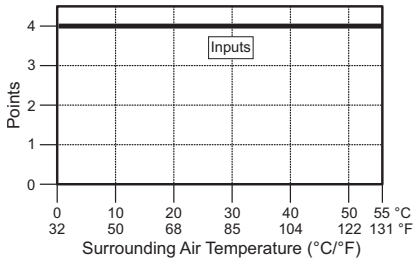
C0-02DD2-D Discrete I/O Specifications - Inputs	
Inputs per Module	4 (Sink/Source)
Operating Voltage Range	24 VDC
Input Voltage Range	21.6 - 26.4 VDC
Input Current	X1-2: Typ 5 mA @ 24 VDC X3-4: Typ 4 mA @ 24 VDC
Maximum Input Current	X1-2: 6.0 mA @ 26.4 VDC X3-4: 5.0 mA @ 26.4 VDC
Input Impedance	X1-2: 4.7 kΩ @ 24 VDC X3-4: 6.8 kΩ @ 24 VDC
ON Voltage Level	X1-2: > 19 VDC X3-4: > 19 VDC
OFF Voltage Level	X1-2: < 4 VDC X3-4: < 7 VDC
Minimum ON Current	X1-2: 4.5 mA X3-4: 3.5 mA
Maximum OFF Current	X1-2: 0.1 mA X3-4: 0.5 mA
OFF to ON Response	X1-2: Typ 5 µs Max 20 µs* X3-4: Typ 2 ms Max 10 ms
ON to OFF Response	X1-2: Typ 5 µs Max 20 µs* X3-4: Typ 3 ms Max 10 ms
Status Indicators	Logic Side (4 points, green LED)
Commons	1 (4 points/common)

*** Threshold level is 70% amplitude.**

Equivalent Discrete Input Circuit



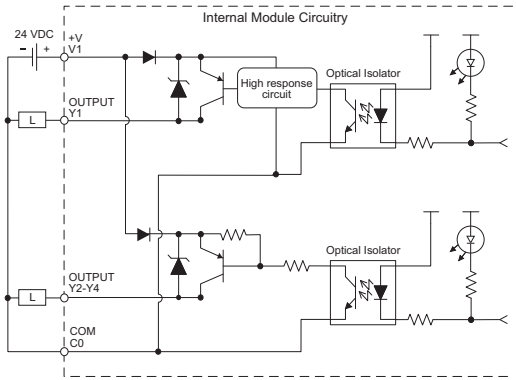
C0-02DD2-D Temperature Derating Chart



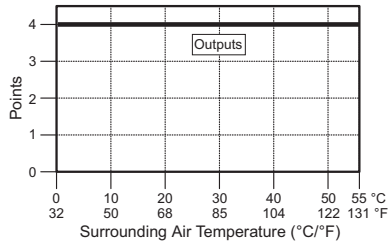
Y1 - Y4

C0-02DD2-D Discrete I/O Specifications - Outputs	
Outputs per Module	4 (Source)
Operating Voltage Range	24 VDC
Output Voltage Range	19.2-30 VDC
Maximum Output Current	0.1 A/point , 0.4 A/common
Minimum Output Current	0.2 mA
Maximum Leakage Current	Y1 : 0.1mA @ 30VDC Y2-4 : 0.1mA @ 30VDC
On Voltage Drop	Y1: 1 VDC @ 0.1A Y2-4 : 0.5VDC@ 0.1mA
Maximum Inrush Current	150 mA for 10 ms
OFF to ON Response	Y1: typ 5 µs; max 20 µs Y2-4: < 0.5 ms
ON to OFF Response	Y1: typ 5 µs; max 20 µs Y2-4: < 0.5 ms
Status Indicators	Logic Side (4 points, red LED)
Commons	1 (4 points/common)

Equivalent Output Circuit



C0-02DD2-D Temperature Derating Chart



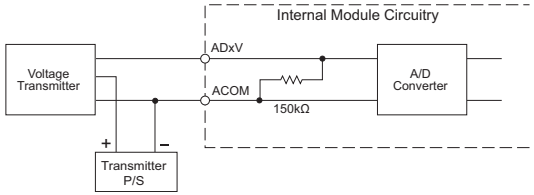
C0-02DD2-D (cont'd)

AD1V - AD2I

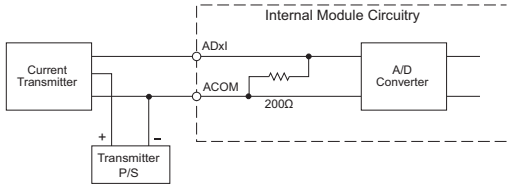
C0-02DD2-D Analog Specifications - Voltage Input	
Number of Channels	2 (voltage/current selectable)
Input Range	0 - 5 VDC
Resolution	12 bit
Conversion Time	50 ms
Input Impedance	150 kΩ
Input Stability	±2 LSB maximum
Full-Scale Calibration Error	±1.2% maximum
Offset Calibration Error	±5 mV maximum
Accuracy vs. Temperature Error	±100 ppm / °C maximum

C0-02DD2-D Analog Specifications - Current Input	
Inputs per Module	2 (voltage/current selectable)
Input Range	4 - 20 mA
Resolution	12 bit
Conversion Time	50 ms
Input Impedance	200 Ω
Input Stability	±2 LSB
Full-Scale Calibration Error	±1% maximum
Offset Calibration Error	±0.1 mA maximum
Accuracy vs. Temperature Error	±100 ppm / °C maximum

Analog Voltage Input Circuit



Analog Current Input Circuit

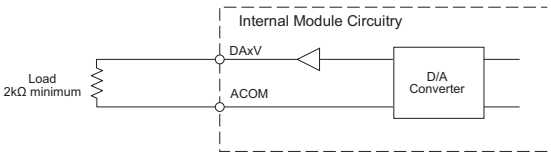


DA1V - DA2I

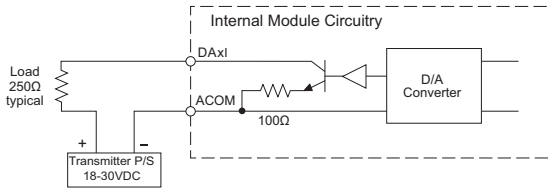
C0-02DD2-D Analog Specifications - Voltage Output	
Outputs per Module	2 (voltage/current selectable)
Output Range	0 - 5 VDC
Resolution	12 bit
Conversion Time	1 ms
Load Impedance	2 kΩ minimum (output current 2.5 mA maximum)
Full-Scale Calibration Error	±0.8% maximum
Offset Calibration Error	±5 mV maximum
Accuracy vs. Temperature Error	±100 ppm / °C maximum

C0-02DD2-D Analog Specifications - Current Output	
Outputs per Module	2 (voltage/current selectable)
Output Range	4 - 20 mA
Resolution	12 bit
Conversion Time	1 ms
Loop Supply Voltage	DC 18 - 30 V
Load Impedance	250Ω Load Power Supply: DC 18V: 600Ω maximum DC 24V: 900Ω maximum DC 30V: 1200Ω maximum
Full-Scale Calibration Error	±1% maximum
Offset Calibration Error	±0.1 mA maximum
Accuracy vs. Temperature Error	±100 ppm / °C maximum

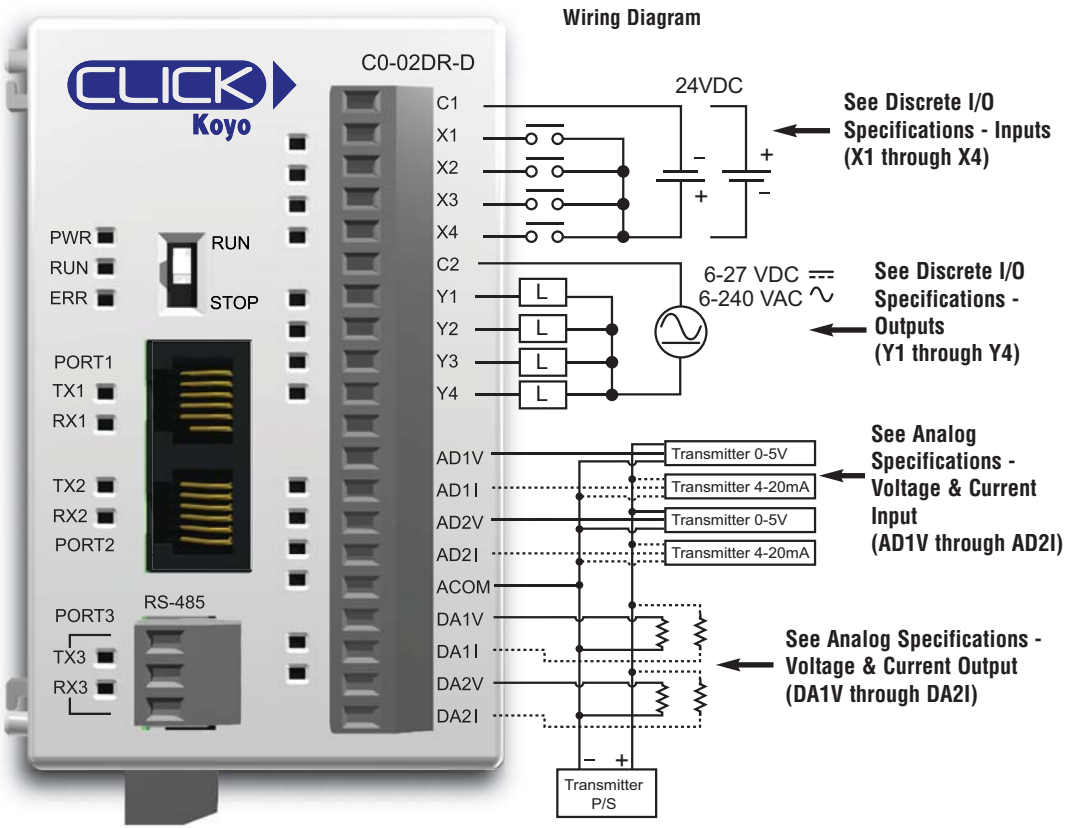
Analog Voltage Output Circuit



Analog Current Output Circuit



C0-02DR-D – 4 DC Input/4 Relay Output; 2 Analog In/2 Analog Out Micro PLC



General Specifications	
Current Consumption at 24VDC	120 mA
Terminal Block Replacement Part No.	C0-16TB
Weight	5.6 oz (160 g)

Typical Relay Life (Operations) at Room Temperature	
Voltage & Load Type	**Load Current: 1 A**
30 VDC Resistive	300,000 cycles
30 VDC Solenoid	50,000 cycles
120 VAC Resistive	500,000 cycles
120 VAC Solenoid	200,000 cycles
ON to OFF = 1 cycle	

NOTE: Please refer to the Analog I/O Configuration section in Chapter 3 for information on using these analog I/O.

NOTE: When using Analog CPUs, you must also use CLICK programming software version V1.10 or later.

NOTE: There are no ZipLink pre-wired PLC connection cables and modules for the Analog CPUs (cannot mix discrete I/O and analog I/O signals in a ZIPLink cable.)

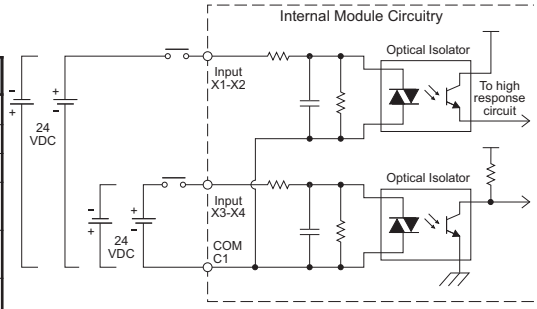
C0-02DR-D (cont'd)

X1 - X4

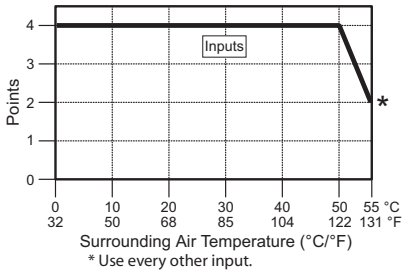
C0-02DR-D Discrete I/O Specifications - Inputs	
Inputs per Module	4 (Source/Sink)
Operating Voltage Range	24 VDC
Input Voltage Range	21.6 - 26.4 VDC
Input Current	X1-2: Typ 5 mA @ 24 VDC X3-4: Typ 4 mA @ 24 VDC
Input Impedance	X1-2: 4.7 kΩ @ 24 VDC X3-4: 6.8 kΩ @ 24 VDC
ON Voltage Level	X1-2: > 19 VDC X3-4: > 19 VDC
OFF Voltage Level	X1-2: < 4 VDC X3-4: < 7 VDC
Minimum ON Current	X1-2: 4.5 mA X3-4: 3.5 mA
Maximum OFF Current	X1-2: 0.1 mA X3-4: 0.5 mA
OFF to ON Response	X1-2: Typ 5 µs Max 20 µs* X3-4: Typ 2 ms Max 10 ms
ON to OFF Response	X1-2: Typ 5 µs Max 20 µs* X3-4: Typ 3 ms Max 10 ms
Status Indicators	Logic Side (4 points, green LED)
Commons	1 (4 points/common)

*** Threshold level is 70% amplitude.**

Equivalent Discrete Input Circuit



C0-02DR-D Temperature Derating Chart

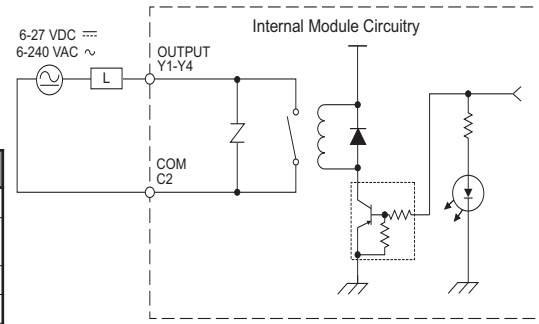


* Use every other input.

Y1 - Y4

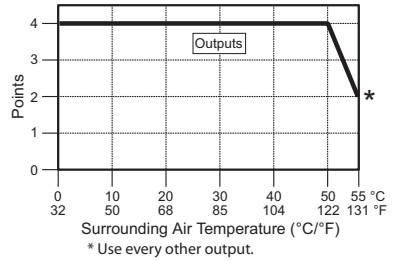
C0-02DR-D Discrete I/O Specifications - Outputs	
Outputs per Module	4
Operating Voltage Range	6-27 VDC6 (-15%/+10%)/ 6-240 VAC (-10%/+10%)
Output Type	Relay, form A (SPST)
AC Frequency	47-63 Hz
Maximum Current	1 A/point (resistive)
Minimum Load Current	5 mA @ 5 VDC
Maximum Inrush Current	3 A for 10 ms
OFF to ON Response	< 15 ms
ON to OFF Response	< 15 ms
Status Indicators	Logic Side (4 points, red LED)
Commons per Module	1 (4 points/common)
Fuse	None

Equivalent Output Circuit



This circuit does not contain built-in protection.
Install protection elements such as a fuse outside the module if necessary.

C0-02DR-D Temperature Derating Chart



* Use every other output.

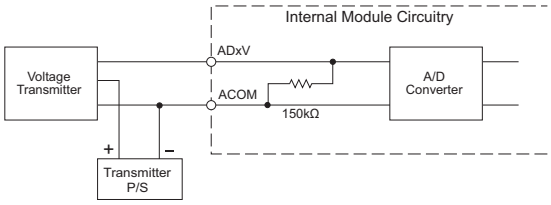
C0-02DR-D (cont'd)

AD1V - AD2I

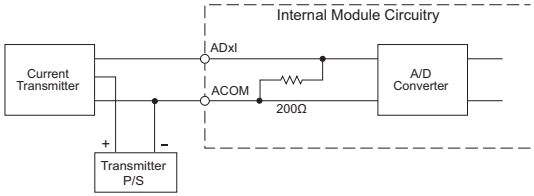
C0-02DR-D Analog Specifications - Voltage Input	
Number of Channels	2 (voltage/current selectable)
Input Range	0 - 5 VDC
Resolution	12 bit
Conversion Time	50 ms
Input Impedance	150 kΩ
Input Stability	±2 LSB maximum
Full-Scale Calibration Error	±1.2% maximum
Offset Calibration Error	±5 mV maximum
Accuracy vs. Temperature Error	±100 ppm / °C maximum

C0-02DR-D Analog Specifications - Current Input	
Inputs per Module	2 (voltage/current selectable)
Input Range	4 - 20 mA
Resolution	12 bit
Conversion Time	50 ms
Input Impedance	200 Ω
Input Stability	±2 LSB
Full-Scale Calibration Error	±1% maximum
Offset Calibration Error	±0.1 mA maximum
Accuracy vs. Temperature Error	±100 ppm / °C maximum

Analog Voltage Input Circuit



Analog Current Input Circuit

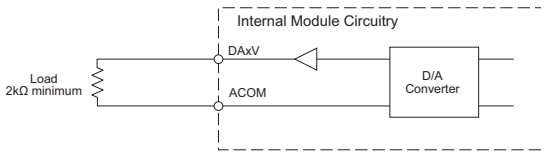


DA1V - DA2I

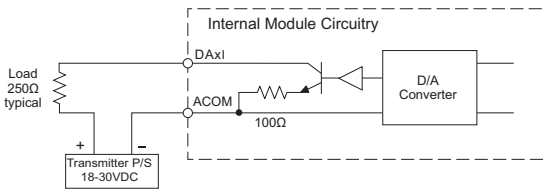
C0-02DR-D Analog Specifications - Voltage Output	
Outputs per Module	2 (voltage/current selectable)
Output Range	0 - 5 VDC
Resolution	12 bit
Conversion Time	1 ms
Load Impedance	2 kΩ minimum (output current 2.5 mA maximum)
Full-Scale Calibration Error	±0.8% maximum
Offset Calibration Error	±5 mV maximum
Accuracy vs. Temperature Error	±100 ppm / °C maximum

C0-02DR-D Analog Specifications - Current Output	
Outputs per Module	2 (voltage/current selectable)
Output Range	4 - 20 mA
Resolution	12 bit
Conversion Time	1 ms
Loop Supply Voltage	DC 18 - 30 V
Load Impedance	250Ω Load Power Supply: DC 18V: 600Ω maximum DC 24V: 900Ω maximum DC 30V: 1200Ω maximum
Full-Scale Calibration Error	±1% maximum
Offset Calibration Error	±0.1 mA maximum
Accuracy vs. Temperature Error	±100 ppm / °C maximum

Analog Voltage Output Circuit

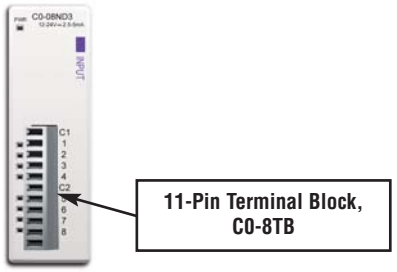


Analog Current Output Circuit

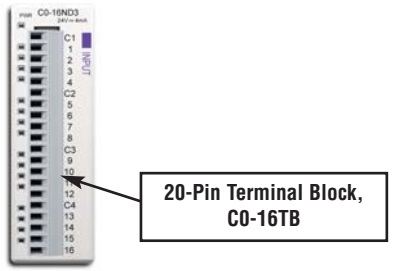


I/O Module Specifications

I/O Terminal Block Specifications for CPUs and I/O Modules



11-pin Terminal Block Specifications	
Connector Type	Pluggable Terminal Block
Number of Pins	11 pt
Pitch	3.50 mm
Wire Range	28-16 AWG
Wire Strip Length	7 mm
Screw Size	M2.0
Screw Torque	2.0 to 2.2 lb-inch
ADC Part Number	C0-8TB

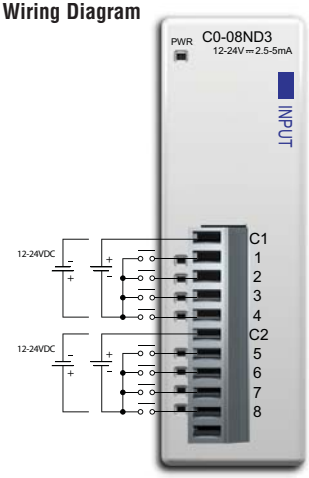


Connector Type	Pluggable Terminal Block
Number of Pins	20 pt
Pitch	3.50 mm
Wire Range	28-16 AWG
Wire Strip Length	7 mm
Screw Size	M2.0
Screw Torque	2.0 to 2.2 lb-inch
ADC Part Number	C0-16TB

C0-08ND3 – 8-Point Sink/Source DC Input Module

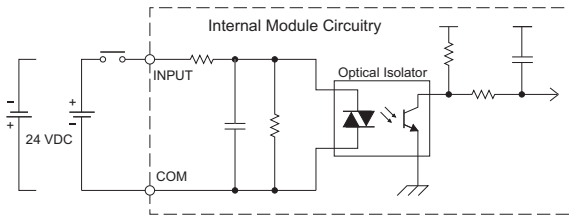
8-pt 12-24 VDC current sinking or sourcing input module, 2 commons, isolated, removable terminal block included.

Wiring Diagram

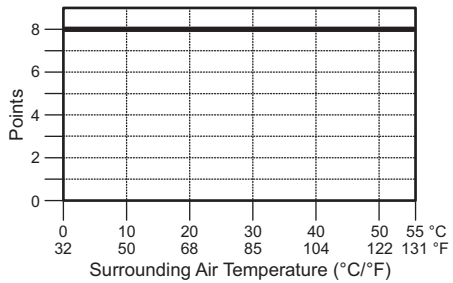


C0-08ND3 Input Specifications	
Inputs per Module	8 (Sink/Source)
Operating Voltage Range	12-24 VDC
Input Voltage Range	10.8-26.4 VDC
Input Current	Typ 5 mA @ 24 VDC
Maximum Input Current	7 mA @ 26.4 VDC
Input Impedance	4.7 kΩ @ 24 VDC
ON Voltage Level	> 8.0 VDC
OFF Voltage Level	< 3.0 VDC
Minimum ON Current	1.4 mA
Maximum OFF Current	0.5 mA
OFF to ON Response	Max 3.5 ms, Typ 2 ms
ON to OFF Response	Max 4 ms, Typ 2.5 ms
Status Indicators	Logic Side (8 points, green LED) Power Indicator (green LED)
Commons	2 (4 points/common) Isolated
Bus Power Required (24 VDC)	Max. 30 mA (All Inputs On)
Terminal Block Replacement	ADC p/n C0-8TB
Weight	2.8 oz (80 g)

Equivalent Input Circuit



Input Module Temperature Derating Chart



ZipLink Pre-Wired PLC Connection Cables and Modules for CLICK PLC

11-pin connector cable
ZL-C0-CBL11 (0.5 m length)
ZL-C0-CBL11-1 (1.0 m length)
ZL-C0-CBL11-2 (2.0 m length)

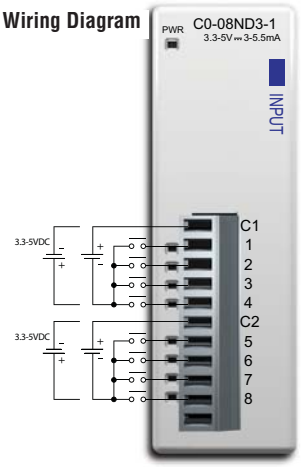
ZL-RTB20
20-pin feed-through connector module

C0-08ND3-1 – 8-Point Sink/Source DC Input Module

8-pt 3.3-5 VDC current sinking or sourcing input module, 2 commons, isolated, removable terminal block included.

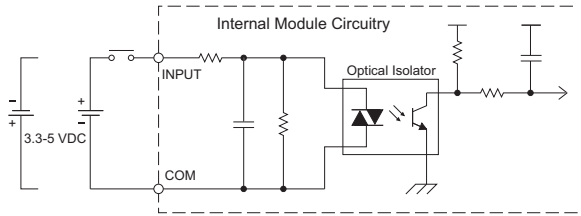
2

Wiring Diagram

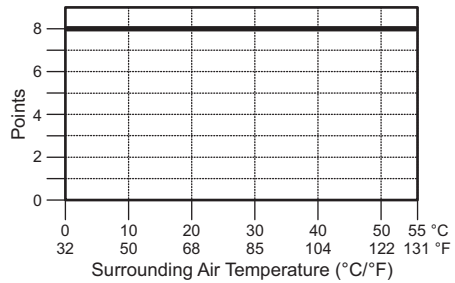


C0-08ND3-1 Input Specifications	
Inputs per Module	8 (Sink/Source)
Operating Voltage Range	3.3-5 VDC
Input Voltage Range	2.8-5.5 VDC
Input Current	Typ 5.5 mA @ 5 VDC
Maximum Input Current	7.5 mA @ 5.5 VDC
Input Impedance	680 Ω
ON Voltage Level	> 2.2 VDC
OFF Voltage Level	< 0.8 VDC
Minimum ON Current	1.4 mA
Maximum OFF Current	0.2 mA
OFF to ON Response	Max. 3 ms Typ. 1.6 ms
ON to OFF Response	Max. 4 ms Typ. 2.3 ms
Status Indicators	Logic Side (8 points, green LED) Power Indicator (green LED)
Commons	2 (4 points/common) Isolated
Bus Power Required (24 VDC)	Max. 30 mA (All Inputs On)
Terminal Block Replacement	ADC p/n C0-8TB
Weight	2.8 oz (80 g)

Equivalent Input Circuit



Input Module Temperature Derating Chart



ZipLink Pre-Wired PLC Connection Cables and Modules for CLICK PLC

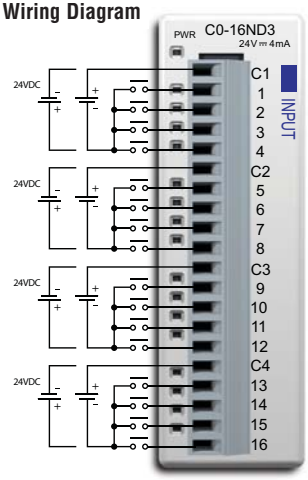
11-pin connector cable
ZL-C0-CBL11 (0.5 m length)
ZL-C0-CBL11-1 (1.0 m length)
ZL-C0-CBL11-2 (2.0 m length)

ZL-RTB20
20-pin feed-through connector module

C0-16ND3 – 16-Point Sink/Source DC Input Module

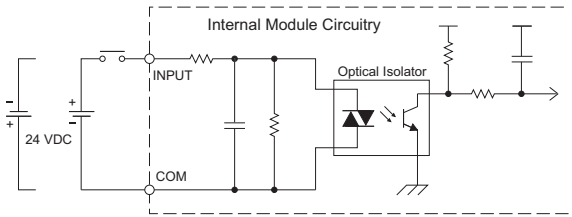
16-pt 24 VDC current sinking or sourcing input module, 4 commons, isolated, removable terminal block included.

Wiring Diagram

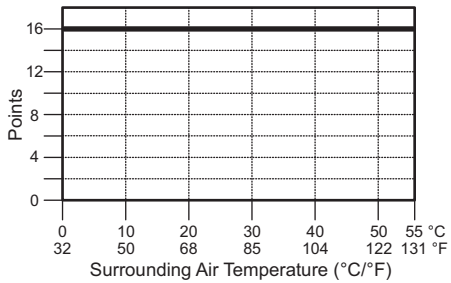


C0-16ND3 Input Specifications	
Inputs per Module	16 (Sink/Source)
Operating Voltage Range	24 VDC
Input Voltage Range	21.6-26.4 VDC
Input Current	Typ 4.0 mA @ 24 VDC
Maximum Input Current	5.0 mA @ 26.4 VDC
Input Impedance	6.8 kΩ @ 24 VDC
ON Voltage Level	> 19 VDC
OFF Voltage Level	< 7 VDC
Minimum ON Current	3.5 mA
Maximum OFF Current	0.5 mA
OFF to ON Response	Max. 10 mS Typ. 2 mS
ON to OFF Response	Max. 10 mS Typ. 3 mS
Status Indicators	Logic Side (16 points, green LED) Power Indicator (green LED)
Commons	4 (4 points/common) Isolated
Bus Power Required (24 VDC)	Max. 40 mA (All Inputs On)
Terminal Block Replacement	ADC p/n C0-16TB
Weight	3.2 oz (90 g)

Equivalent Input Circuit



Input Module Temperature Derating Chart



ZipLink Pre-Wired PLC Connection Cables and Modules for CLICK PLC

20-pin connector cable
ZL-C0-CBL20 (0.5 m length)
ZL-C0-CBL20-1 (1.0 m length)
ZL-C0-CBL20-2 (2.0 m length)

ZL-RTB20 20-pin feed-through connector module

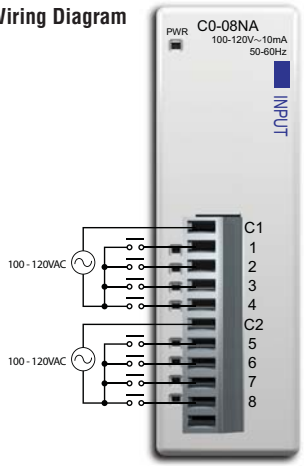
ZL-LTB16-24 sensor input module

C0-08NA – 8-Point AC Input Module

8-pt 100-120 VAC input module, 2 commons, isolated, removable terminal block included.

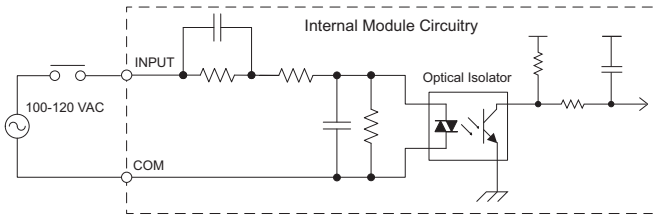
2

Wiring Diagram

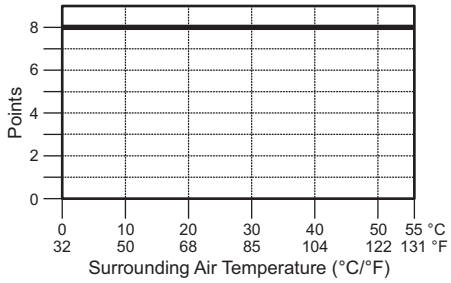


C0-08NA Input Specifications	
Inputs per Module	8
Operating Voltage Range	100-120 VAC
Input Voltage Range	80-144 VAC
AC Frequency	47-63 Hz
Input Current	Typ 8.5 mA @ 100 VAC (50Hz) Typ 10 mA @ 100 VAC (60Hz)
Maximum Input Current	16 mA @ 144 VAC
Input Impedance	15kΩ (50 Hz), 12kΩ (60 Hz)
ON Voltage Level	> 70 VAC
OFF Voltage Level	< 20 VAC
Minimum ON Current	5 mA
Maximum OFF Current	2 mA
OFF to ON Response	< 40 mS
ON to OFF Response	< 40 mS
Status Indicators	Logic Side (8 points, green LED) Power Indicator (green LED)
Commons	2 (4 points/common) Isolated
Bus Power Required (24 VDC)	Max. 30mA (All Inputs On)
Terminal Block Replacement	ADC p/n C0-8TB
Weight	2.8 oz (80 g)

Equivalent Input Circuit



Input Module Temperature Derating Chart



ZipLink Pre-Wired PLC Connection Cables and Modules for CLICK PLC

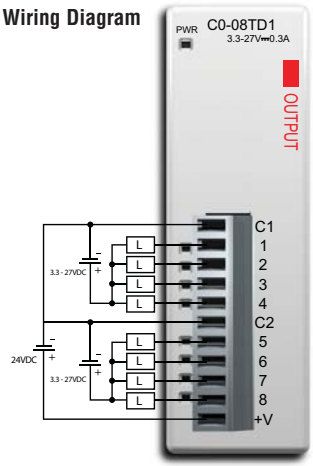
11-pin connector cable
ZL-C0-CBL11 (0.5 m length)
ZL-C0-CBL11-1 (1.0 m length)
ZL-C0-CBL11-2 (2.0 m length)

ZL-RTB20
20-pin feed-through connector module

C0-08TD1 – 8-Point Sinking DC Output Module

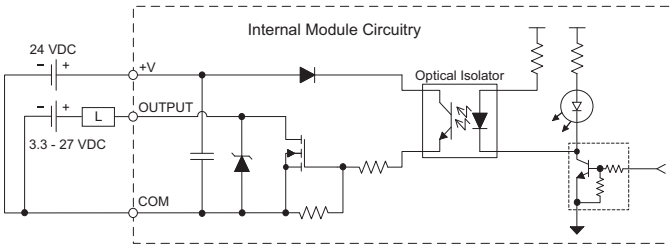
8-pt 3.3-27 VDC current sinking output module, 2 commons, 0.3 A/pt, removable terminal block included.

Wiring Diagram

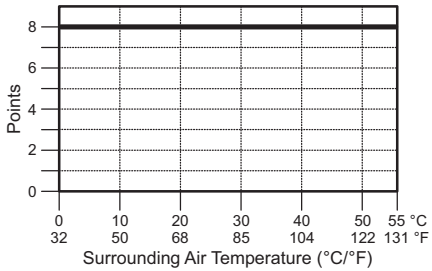


C0-08TD1 Output Specifications	
Outputs per Module	8 (Sink)
Operating Voltage Range	3.3-27 VDC
Output Voltage Range	2.8-30 VDC
Maximum Output Current	0.3 A/point , 1.2 A/common
Minimum Output Current	0.5 mA
Maximum Leakage Current	0.1 mA @ 30.0 VDC
On Voltage Drop	1.5 VDC @ 0.3 A
Maximum Inrush Current	1 A for 10 ms
OFF to ON Response	< 0.5 ms
ON to OFF Response	< 0.5 ms
Status Indicators	Logic Side (8 points, red LED) Power Indicator (green LED)
Commons	2 (4 points/common)
External DC Power Required	21.6-26.4 VDC Max 15 mA (All Outputs On)
Bus Power Required (24 VDC)	Max. 50 mA (All Outputs On)
Terminal Block Replacement	ADC p/n C0-8TB
Weight	2.8 oz (80 g)

Equivalent Output Circuit



Output Module Temperature Derating Chart



ZipLink Pre-Wired PLC Connection Cables and Modules for CLICK PLC

11-pin connector cable
ZL-C0-CBL11 (0.5 m length)
ZL-C0-CBL11-1 (1.0 m length)
ZL-C0-CBL11-2 (2.0 m length)

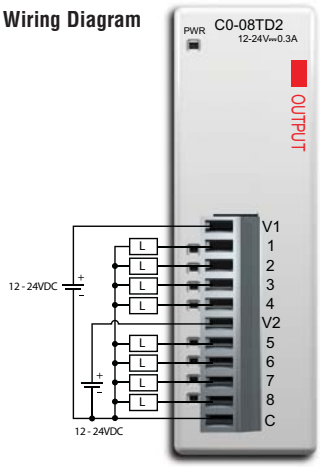
ZL-RTB20
20-pin feed-through connector module

C0-08TD2 – 8-Point Sourcing DC Output Module

8-pt 12-24 VDC current sourcing output module, 1 common, 0.3 A/pt, removable terminal block included.

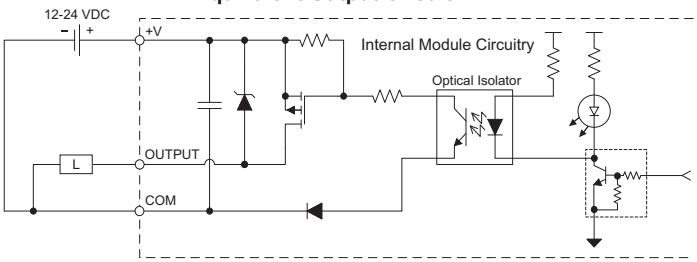
2

Wiring Diagram

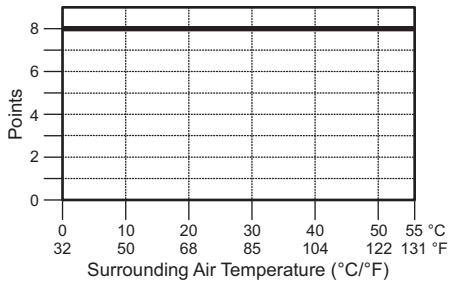


C0-08TD2 Output Specifications	
Outputs per Module	8 (Source)
Operating Voltage Range	12-24 VDC
Output Voltage Range	9.6-30 VDC
Maximum Output Current	0.3 A/point , 1.2 A/common
Minimum Output Current	0.5 mA
Maximum Leakage Current	0.1 mA @ 30.0 VDC
On Voltage Drop	1.5 VDC @ 0.3 A
Maximum Inrush Current	1 A for 10 ms
OFF to ON Response	< 1 ms
ON to OFF Response	< 1 ms
Status Indicators	Logic Side (8 points, red LED) Power Indicator (green LED)
Commons	1 (8 points/common)
Bus Power Required (24 VDC)	Max. 50 mA (All Outputs On)
Terminal Block Replacement	ADC p/n C0-8TB
Weight	2.8 oz (80 g)

Equivalent Output Circuit



Output Module Temperature Derating Chart



ZipLink Pre-Wired PLC Connection Cables and Modules for CLICK PLC

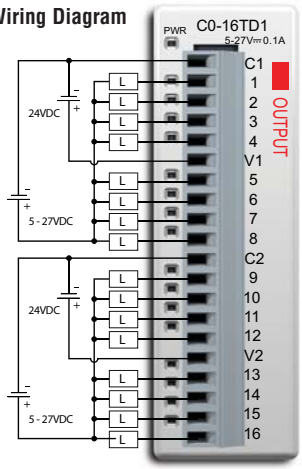
11-pin connector cable
ZL-C0-CBL11 (0.5 m length)
ZL-C0-CBL11-1 (1.0 m length)
ZL-C0-CBL11-2 (2.0 m length)

ZL-RTB20
20-pin feed-through connector module

C0-16TD1 – 16-Point Sinking DC Output Module

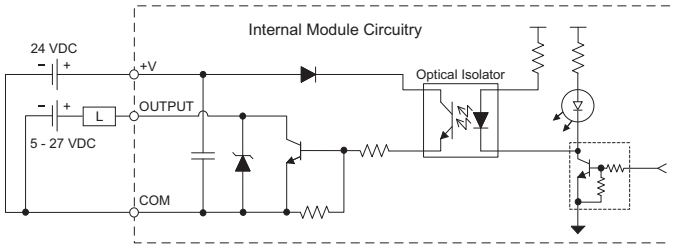
16-pt 5-27 VDC current sinking output module, 2 commons, isolated, 0.1 A/pt, removable terminal block included.

Wiring Diagram



C0-16TD1 Output Specifications	
Outputs per Module	16 (Sink)
Operating Voltage Range	5-27 VDC
Output Voltage Range	4-30 VDC
Maximum Output Current	0.1 A/point , 0.8 A/common
Minimum Output Current	0.2 mA
Maximum Leakage Current	0.1 mA @ 30.0 VDC
On Voltage Drop	0.5 VDC @ 0.1 A
Maximum Inrush Current	150 mA for 10 ms
OFF to ON Response	< 0.5 ms
ON to OFF Response	< 0.5 ms
Status Indicators	Logic Side (16 points, red LED) Power Indicator (green LED)
Commons	2 (8 Points/common) Isolated
External DC Power Required	21.6-26.4 VDC Max 100 mA (All Outputs On)
Bus Power Required (24 VDC)	Max. 80 mA (All Outputs On)
Terminal Block Replacement	ADC p/n C0-16TB
Weight	3.2 oz (90 g)

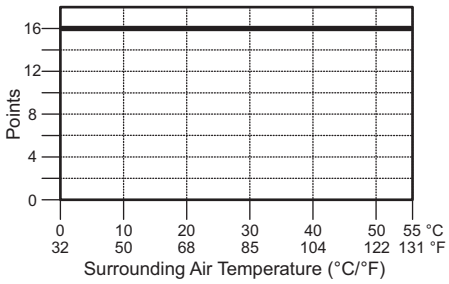
Equivalent Output Circuit



ZipLink Pre-Wired PLC Connection Cables and Modules for CLICK PLC

20-pin connector cable
ZL-C0-CBL20 (0.5 m length)
ZL-C0-CBL20-1 (1.0 m length)
ZL-C0-CBL20-2 (2.0 m length)

Output Module Temperature Derating Chart



ZL-RTB20 20-pin feed-through connector module

ZL-RFU20 fuse module

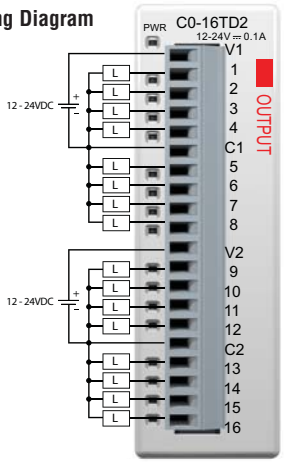
ZL-RRL16-24 sensor input modue

C0-16TD2 – 16-Point Sourcing Output Module

16-pt 12-24 VDC current sourcing output module, 2 commons, isolated, 0.1 A/pt, removable terminal block included.

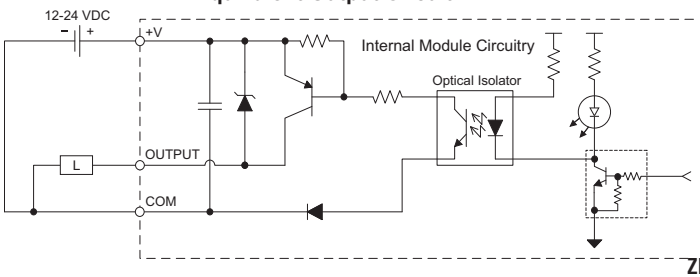
2

Wiring Diagram



C0-16TD2 Output Specifications	
Outputs per Module	16 (Source)
Operating Voltage Range	12-24 VDC
Output Voltage Range	9.6-30.0 VDC
Maximum Output Current	0.1 A/point , 0.8 A/common
Minimum Output Current	0.2 mA
Maximum Leakage Current	0.1 mA @ 30.0 VDC
On Voltage Drop	0.6 VDC @ 0.1 A
Maximum Inrush Current	150 mA for 10 ms
OFF to ON Response	< 0.5 ms
ON to OFF Response	< 0.5 ms
Status Indicators	Logic Side (16 points, red LED) Power Indicator (green LED)
Commons	2 (8 points/common) Isolated
Bus Power Required (24 VDC)	Max. 80 mA (All Outputs On)
Terminal Block Replacement	ADC p/n C0-16TB
Weight	3.2 oz (90 g)

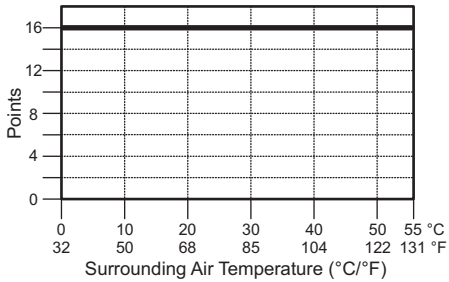
Equivalent Output Circuit



ZipLink Pre-Wired PLC Connection Cables and Modules for CLICK PLC

20-pin connector cable
ZL-C0-CBL20 (0.5 m length)
ZL-C0-CBL20-1 (1.0 m length)
ZL-C0-CBL20-2 (2.0 m length)

Output Module Temperature Derating Chart



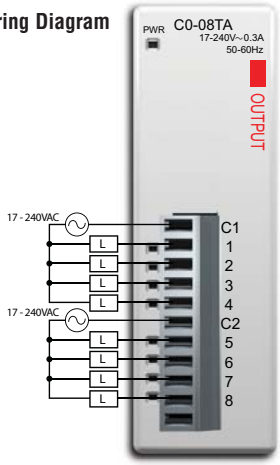
ZL-RTB20 20-pin feed-through connector module

ZL-RFU20 fuse module

C0-08TA – 8-Point AC Output Module

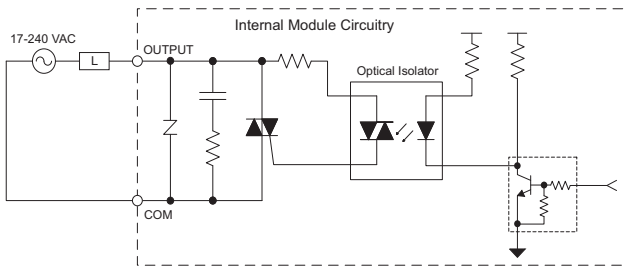
8-pt 17-240 VAC triac output module, 2 commons, isolated, 0.3 A/pt, removable terminal block included.

Wiring Diagram

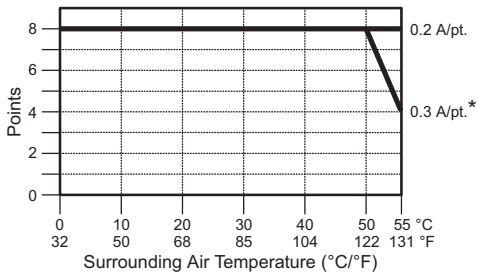


C0-08TA Output Specifications	
Outputs per Module	8
Operating Voltage Range	17-240 VAC
Output Voltage Range	13.5-288 VAC
AC Frequency	47-63 Hz
Maximum Output Current	0.3 A/point, 1.2 A/common
Minimum Load	10 mA
Maximum Leakage Current	4 mA @ 288 VAC
On Voltage Drop	1.5 VAC @ > 0.1 A 3.0 VAC @ < 0.1 A
Maximum Inrush Current	10 A for 10 ms
OFF to ON Response	1 ms
ON to OFF Response	1 ms + 1/2 cycle
Status Indicators	Logic Side (8 points, red LED) Power Indicator (green LED)
Commons	2 (4 points/common) Isolated
Bus Power Required (24 VDC)	Max. 80 mA (All Outputs On)
Protection Circuit	Not built into the module - Install protection elements such as external fuse.
Terminal Block Replacement	ADC p/n C0-8TB
Weight	3.5 oz (100 g)

Equivalent Output Circuit



Output Module Temperature Derating Chart



* Use every other output.

ZipLink Pre-Wired PLC Connection Cables and Modules for CLICK PLC

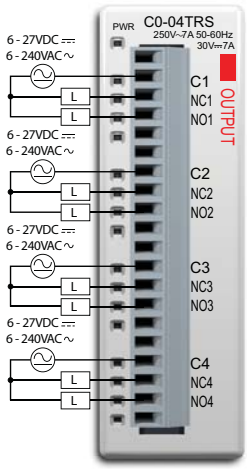
11-pin connector cable
ZL-C0-CBL11 (0.5 m length)
ZL-C0-CBL11-1 (1.0 m length)
ZL-C0-CBL11-2 (2.0 m length)

ZL-RTB20
20-pin feed-through connector module

C0-04TRS – 4-Point Relay Output Module

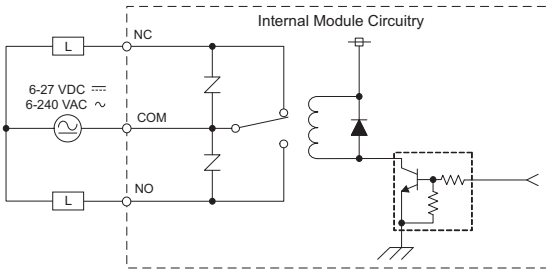
4-pt 6-240 VAC/6-27 VDC Isolated relay output module, 4 Form C (SPDT) relays, 4 isolated commons, 7 A/point, removable terminal block included.

Wiring Diagram



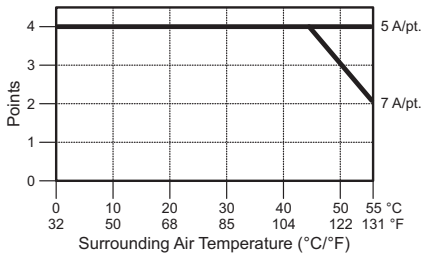
C0-04TRS Output Specifications	
Outputs per Module	4
Operating Voltage Range	6-27 VDC / 6-240 VAC
Output Voltage Range	5-30 VDC / 5-264 VAC
Output Type	Relay, form C (SPDT)
AC Frequency	47-63 Hz
Maximum Current	7 A/point, 7 A/common
Minimum Load Current	100 mA @ 5 VDC
Maximum Leakage Current	0.1 mA @ 264 VAC
Maximum Inrush Current	12 A
OFF to ON Response	< 15 ms
ON to OFF Response	< 15 ms
Status Indicators	Logic Side (4 points, red LED) Power Indicator (green LED)
Commons	4 (1 point/common) Isolated
Bus Power Required (24 VDC)	Max. 100 mA (All Outputs On)
Protection Circuit	Not built into the module - Install protection elements such as external fuse.
Terminal Block Replacement	ADC p/n C0-16TB
Weight	4.4 oz (125 g)

Equivalent Output Circuit



Typical Relay Life (Operations) at Room Temperature	
Voltage & Load Type	**Relay Life**
30 VDC, 7 A Resistive	100,000 cycles
250 VAC, 7 A Resistive	100,000 cycles
250 VAC, 4.9 A Solenoid	90,000 cycles
250 VAC, 2.9 A Solenoid	100,000 cycles
ON to OFF = 1 cycle	

Output Module Temperature Derating Chart



NOTE: *The CO-04TRS relay output module is derated to 2A per point maximum when used with the ZipLink wiring system.*

ZipLink Pre-Wired PLC Connection Cables and Modules for CLICK PLC

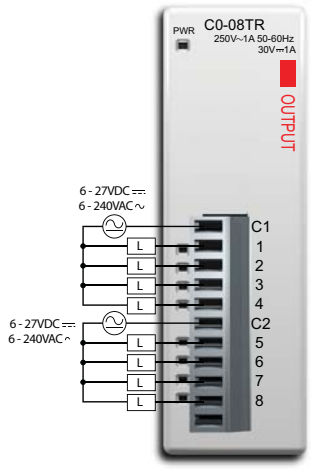
20-pin connector cable
ZL-C0-CBL20 (0.5 m length)
ZL-C0-CBL20-1 (1.0 m length)
ZL-C0-CBL20-2 (2.0 m length)

ZL-RTB20
20-pin feed-through connector module

C0-08TR – 8-point Relay Output Module

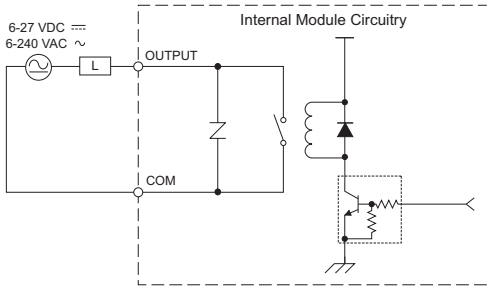
8-pt 6-240 VAC/6-27 VDC relay output module, 8 Form A (SPST) relays, 2 commons, isolated, 4 A/common, removable terminal block included.

Wiring Diagram

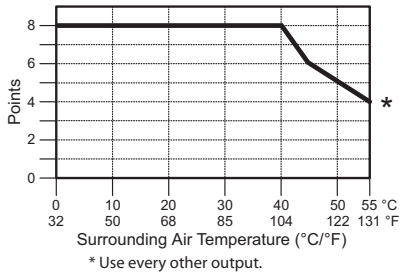


C0-08TR Output Specifications	
Outputs per Module	8
Operating Voltage Range	6-27 VDC / 6-240 VAC
Output Voltage Range	5-30 VDC / 5-264 VAC
Output type	Relay, form A (SPST)
AC Frequency	47-63 Hz
Maximum Current (resistive)	1 A/point, 4 A/common
Minimum Load Current	5 mA @ 5 VDC
Maximum Leakage Current	0.1 mA @ 264 VAC
Maximum Inrush Current	3 A for 10 mS
OFF to ON Response	< 15 mS
ON to OFF Response	< 15 mS
Status Indicators	Logic Side (8 points, red LED) Power Indicator (green LED)
Commons	2 (4 points/common) Isolated
Bus Power Required (24 VDC)	Max. 100 mA (All Outputs On)
Protection Circuit	Not built into the module - Install protection elements such as external f`use.
Terminal Block Replacement	ADC p/n C0-8TB
Weight	3.9 oz (110 g)

Equivalent Output Circuit



Output Module Temperature Derating Chart



* Use every other output.

Typical Relay Life (Operations) at Room Temperature	
Voltage & Load Type	Load Current: 1 A
30 VDC Resistive	300,000 cycles
30 VDC Solenoid	50,000 cycles
250 VAC Resistive	500,000 cycles
250 VAC Solenoid	200,000 cycles
ON to OFF = 1 cycle	

ZipLink Pre-Wired PLC Connection Cables and Modules for CLICK PLC

11-pin connector cable
ZL-C0-CBL11 (0.5 m length)
ZL-C0-CBL11-1 (1.0 m length)
ZL-C0-CBL11-2 (2.0 m length)

ZL-RTB20
20-pin feed-through connector module

Power Supply Specifications

C0-00AC Power Supply

Limited auxiliary AC power supply allows you to power the CLICK PLC with 100-240 VAC supply power. The 0.5 A DC power supply is capable of controlling the CPU plus a limited configuration based on the power budget of each I/O module. The C0-00AC is a low-cost solution for applications requiring only minimal I/O and power consumption. This power supply will not support a fully-populated CLICK PLC system with all possible I/O module combinations.

C0-00AC Power Supply Specification	
Input Voltage Range	85-264 VAC
Input Frequency	47-63 Hz.
Input Current (typical)	0.3 A @ 100 VAC, 0.2 A @ 200 VAC
Inrush Current	30 A
Output Voltage Range	23-25 VDC
Output Current	0.5 A
Over Current Protection	@ 0.65 A (automatic recovery)
Weight	5.3 oz (150 g)

C0-01AC Power Supply

No-limit auxiliary AC power supply allows you to power the CLICK PLC with 100-240 VAC supply power. The 1.3 A DC power supply is capable of supporting a fully-populated CLICK PLC system with all possible I/O module combinations with no concerns of exceeding the power budget.

C0-01AC Power Supply Specification	
Input Voltage Range	85-264 VAC
Input Frequency	47-63 Hz.
Input Current (typical)	0.9 A @ 100 VAC, 0.6 A @ 200 VAC
Inrush Current	30 A
Output Voltage Range	23-25 VDC
Output Current	1.3 A
Over Current Protection	@ 1.6 A (automatic recovery)
Weight	6.0 oz (170g)

Accessories

C0-PGMSW – CLICK PLC Programming Software

CLICK PLC Windows PC programming software Ladder Logic Editor for the CLICK C0 series CPUs. Free download available from the web includes the manual on pdf. Cable sold separately. Windows 2000/XP(Home/Pro)/Vista required.

C0-USER-M – CLICK PLC Hardware Users Manual

Manual covers all CLICK CPU & I/O Module installation & wiring, specifications, error codes & trouble shooting guide. Sold separately from hardware.

NOTE: The CLICK PLC Hardware User Manual can be downloaded free at the AutomatioDirect web site or purchased from the AutomationDirect online web store. www.automationdirect.com

EA-MG-PGM-CBL – PC to Panel Programming Cable Assembly for C-more Micro-Graphic Panels and/or PC to CLICK PLCs.

6-ft. cable assembly to connect personal computer to any C-more Micro-Graphic panel or CLICK PLC for setup and programming. (Note: This cable assembly uses the PC's USB port and converts the signals to serial transmissions. The USB port supplies 5 VDC to the Micro-Graphic panel for configuration operations). Assembly includes standard USB A-type connector to B-type connector cable, custom converter, and an RS232C cable with RJ12 modular connector on each end.

D2-DSCBL – PC Programming Cable for CLICK and DirectLOGIC PLCs

12 ft. (3.66m) RS232 shielded PC programming cable for CLICK, DL05, DL06, DL105, DL205, D3-350, and D4-450 CPUs. 9-pin D-shell female connector to an RJ12 6P6C connector.

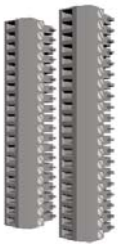
NOTE: If your PC has a USB port but does not have a serial port, you must use programming cable EA-MG-PGM-CBL.

Accessories (cont'd)

C0-8TB – Spare 8 Point I/O Terminal Block

Replacement terminal block for the 8 point I/O modules. Sold in packs of 2.

C0-16TB – Spare 16 Point I/O Terminal Block



Replacement terminal block for the 16 point I/O modules & CPU built-in I/O. Sold in packs of 2.

C0-3TB - Spare 3-Pole Terminal Block

Replacement 3-pole terminal block for the 3-wire, RS485 communications port on the CLICK Analog CPUs. Sold in packs of 2.

C0-4TB – Spare 24 VDC Power Terminal Block

Replacement terminal block for the 24VDC supply power to the CPU. Sold in packs of 2.

D2-BAT-1 – Battery

Replacement battery for Analog CPU modules.

ZIPLink Wiring Systems

C-more and C-more Micro-Graphic Operator Interfaces

DN-WS – Wire Stripper

DN-SS1 – Insulated Slotted Screwdriver 0.4 x 2.5 x 75 mm

DN-EB35MN – DINnectors End Bracket

Installation and Wiring

In This Chapter...

Safety Guidelines

NOTE: Products with CE marks perform their required functions safely and adhere to relevant standards as specified by CE directives, provided they are used according to their intended purpose and that the instructions in this manual are followed. The protection provided by the equipment may be impaired if this equipment is used in a manner not specified in this manual. A listing of our international affiliates is available on our Web site at http://www.automationdirect.com.

Warning: Providing a safe operating environment for personnel and equipment is your responsibility and should be your primary goal during system planning and installation. Automation systems can fail and may result in situations that can cause serious injury to personnel or damage to equipment. Do not rely on the automation system alone to provide a safe operating environment. You should use external electromechanical devices, such as relays or limit switches, that are independent of the PLC application to provide protection for any part of the system that may cause personal injury or damage. Every automation application is different, so there may be special requirements for your particular application. Make sure you follow all national, state, and local government requirements for the proper installation and use of your equipment.

Plan for Safety

The best way to provide a safe operating environment is to make personnel and equipment safety part of the planning process. You should examine every aspect of the system to determine which areas are critical to operator or machine safety. If you are not familiar with PLC system installation practices, or your company does not have established installation guidelines, you should obtain additional information from the following sources.

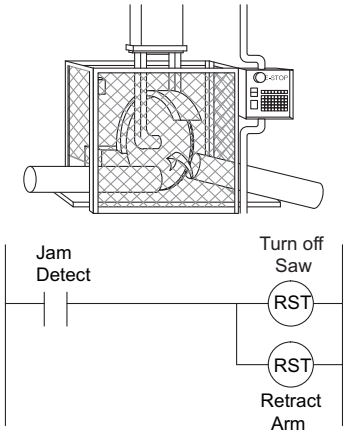
- NEMA — The National Electrical Manufacturers Association, located in Washington, D.C., publishes many different documents that discuss standards for industrial control systems. You can order these publications directly from NEMA. Some of these include:
  ICS 1, General Standards for Industrial Control and Systems
  ICS 3, Industrial Systems
  ICS 6, Enclosures for Industrial Control Systems
- NEC — The National Electrical Code provides regulations concerning the installation and use of various types of electrical equipment. Copies of the NEC Handbook can often be obtained from your local electrical equipment distributor or your local library.
- Local and State Agencies — many local governments and state governments have additional requirements above and beyond those described in the NEC Handbook. Check with your local Electrical Inspector or Fire Marshall office for information.

Three Levels of Protection

Warning: The control program must not be the only form of protection for any problems that may result in a risk of personal injury or equipment damage.

The publications mentioned provide many ideas and requirements for system safety. At a minimum, you should follow these regulations. Also, you should use the following techniques, which provide three levels of system control.

1. Orderly system shutdown sequence in the PLC control program
2. Mechanical disconnect for output module power
3. Emergency stop switch for disconnecting system power



Orderly System Shutdown

The first level of fault detection is ideally the PLC control program, which can identify machine problems. Certain shutdown sequences should be performed. These types of problems are usually things such as jammed parts, etc., that do not pose a risk of personal injury or equipment damage.

System Power Disconnect

You should also use electromechanical devices, such as master control relays and/or limit switches, to prevent accidental equipment startup at an unexpected time. These devices should be installed in a manner that will prevent any machine operations from occurring.

For example, if the machine in the illustration has a jammed part, the PLC control program can turn off the saw blade and retract the arbor. If the operator must open the guard to remove the part, you should also include a bypass switch that disconnects all system power any time the guard is opened.

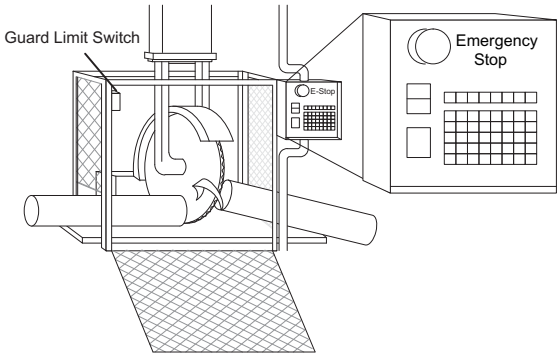
Emergency Stop Circuits

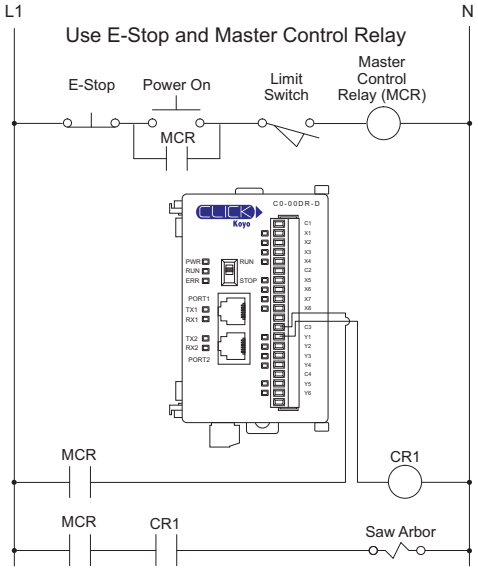
Emergency stop (E-Stop) circuits are a critical part of automation safety. For each machine controlled by a PLC, provide an emergency stop device that is wired outside the PLC and easily accessed by the machine operator.

E-stop devices are commonly wired through a master control relay (MCR) or a safety control relay (SCR) that will remove power from the PLC I/O system in an emergency.

MCRs and SCRs provide a convenient means for removing power from the I/O system during an emergency situation. By de-energizing an MCR (or SCR) coil, power to the input (optional) and output devices is removed. This event occurs when any emergency stop switch opens. However, the PLC continues to receive power and operate even though all its inputs and outputs are disabled.

The MCR circuit could be extended by placing a PLC fault relay (closed during normal PLC operation) in series with any other emergency stop conditions. This would cause the MCR circuit to drop the PLC I/O power in case of a PLC failure (memory error, I/O communications error, etc.).





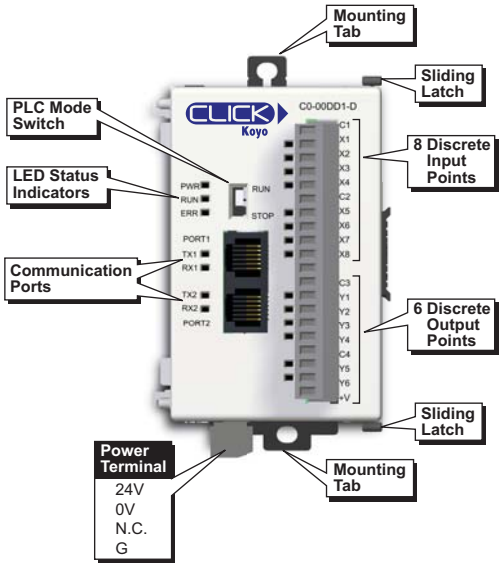
Warning: For some applications, field device power may still be present on the terminal block even though the PLC is turned off. To minimize the risk of electrical shock, remove all field device power before you expose or remove PLC wiring. The connector is designed for easy removal by hand.

Introduction to the CLICK PLC Mechanical Design

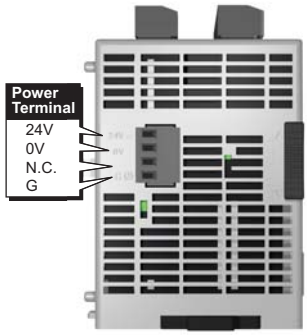
CLICK CPU PLC Modules

All CLICK CPUs are similar in appearance and performance. Please see the diagrams below to familiarize yourself with the CPU features. The main components located on the front of the CPU are a removable 20-pin I/O connector, Run/Stop switch, communications ports and LED status indicators. A removable 4-pin 24VDC input power connector is located on the bottom of the CPU. The I/O module extension port is located on the side of the CPU. See Mounting Guidelines in this chapter for module dimensions and Chapter 2 for CLICK PLC specifications.

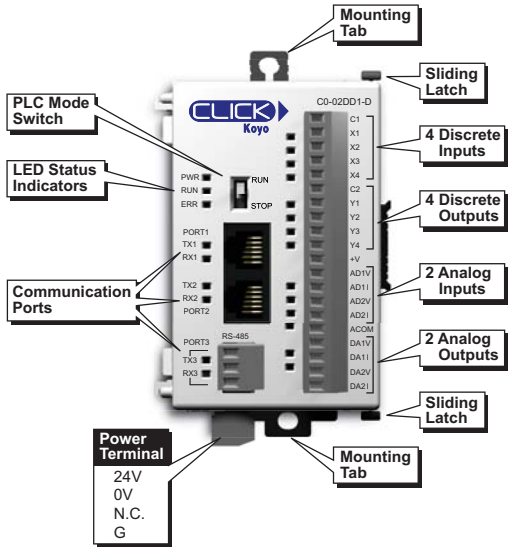
Component Locations on Basic CPU Modules



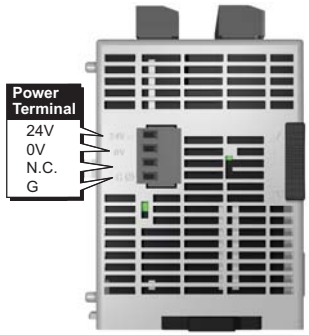
Bottom of CPU



Component Locations on Analog CPU Modules



Bottom of CPU

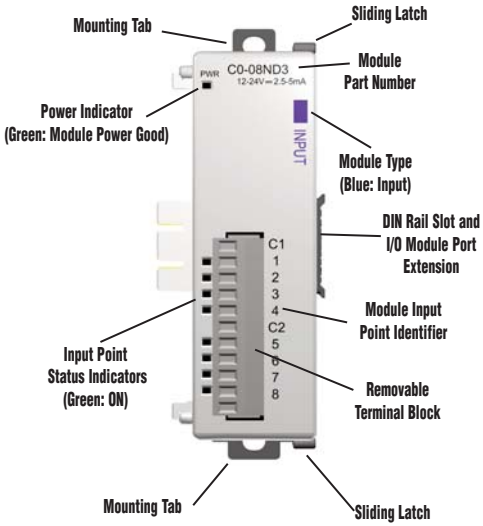


CLICK I/O Modules

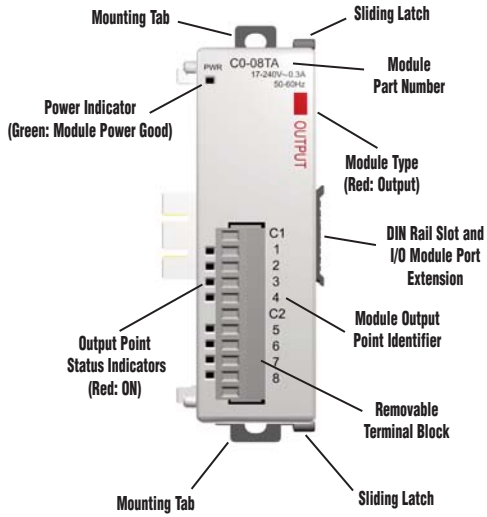
Several different types of discrete input and output modules are available for the CLICK PLC system. Please see the diagrams below to familiarize yourself with the I/O module features.

Each I/O module is identified as an Input or Output module on its front panel using the color coding scheme listed below. Up to eight I/O option modules can be connected to a CLICK PLC. See Mounting Guidelines in this chapter for module dimensions and Chapter 2 for CLICK I/O module specifications.

Input Modules



Output Modules



CLICK Power Supplies

All CLICK CPUs require 24VDC input power from either a CLICK power supply or other suitable external power supply. Two models of CLICK power supplies are available to supply power to the CPU and I/O modules.

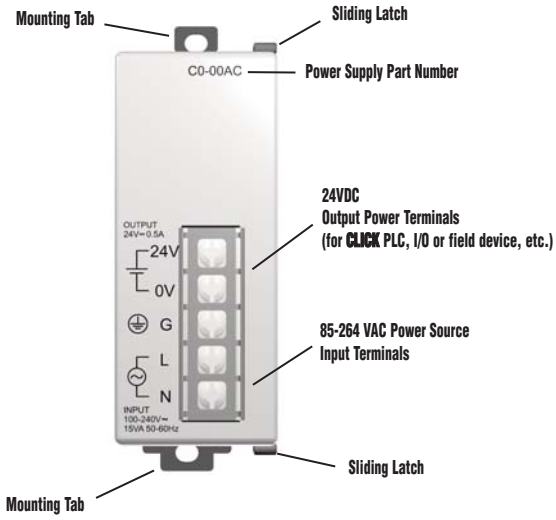
- C0-00AC - 0.5A @ 24VDC output
- C0-01AC - 1.3A @ 24VDC output

Select a power supply based on the power requirements of your system components. See Mounting Guidelines in this chapter for module dimensions and Chapter 2 for CLICK power supply specifications.

Power wires must be connected from the output terminals on the front of the power supply to the input power connector on the bottom of the CLICK CPU. (There is no internal 24VDC power bus to the CPU.) See Mounting Guidelines for additional wiring information.

Only a single CLICK power supply can be attached directly to a CLICK PLC system. If multiple CLICK power supplies are used, or other type of power supply, mount separately from the PLC.

Power Supplies



Battery Backup (Analog CPU Modules Only)

In all CLICK PLC analog CPU modules, an optional lithium battery is available to maintain the data in SRAM when the system is without external power.

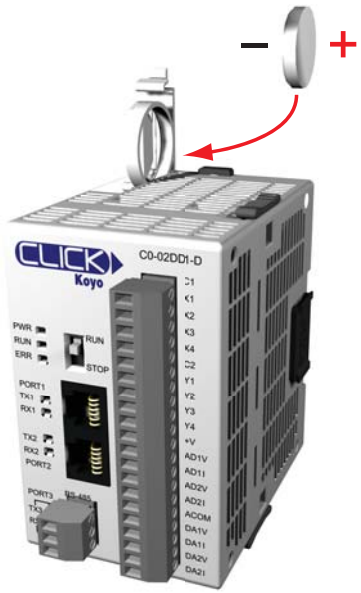
Use battery part number D2-BAT-1 (not included with the CPU module; order battery separately). Typical battery life is 5 years, which includes PLC runtime and normal shutdown periods.

Note: We recommend that you install and/or change the battery while the CPU is powered up.

To install or replace the D2-BAT-1 battery:

1. Press the retaining clip on the battery door and swing the battery door open.
2. Install the battery into the coin-type slot with the +, or larger, side out.
3. Close the battery door so that it locks securely.
4. Make a note of the date the battery was installed.

The battery backup is now available.



WARNING: Do not attempt to recharge the battery or dispose of it by fire. The battery may explode or release hazardous materials.

Mounting Guidelines

Environmental Specifications

The CLICK family of PLC products should be stored, installed, and used within their range of environmental specifications, such as storage temperature, operating temperature, humidity, environmental air, vibration, shock, and noise immunity. Certain output module circuit types may have derating curves depending on the ambient temperature and the number of outputs ON. Please refer to the I/O module specifications in Chapter 2: Specifications for CLICK PLC environmental specifications and I/O module derating curves.

Agency Approvals

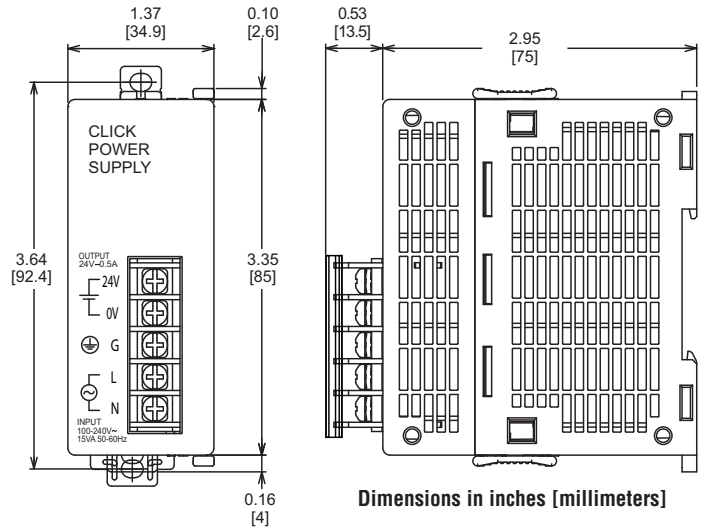
In addition to the panel layout guidelines, other specifications can affect the definition and installation of a PLC system. Always consider the following:

- Environmental Specifications
- Power Requirements
- Agency Approvals
- Enclosure Selection and Component Dimensions

CLICK Unit Dimensions

The diagrams below show the outside dimensions of the CLICK power supply, CPU, and I/O modules. The CLICK PLC system is designed to be mounted on standard 35mm DIN rail, or it can be surface mounted. See the following pages for installation and mounting information.

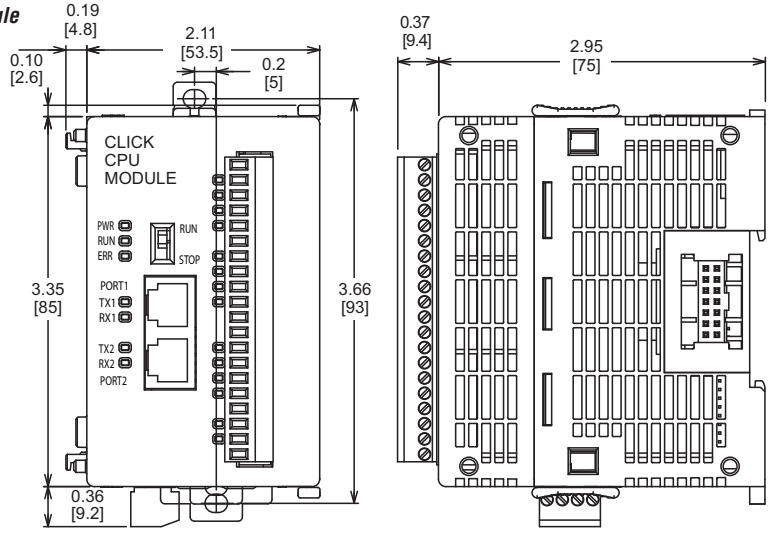
Power Supply



Dimensions in inches [millimeters]

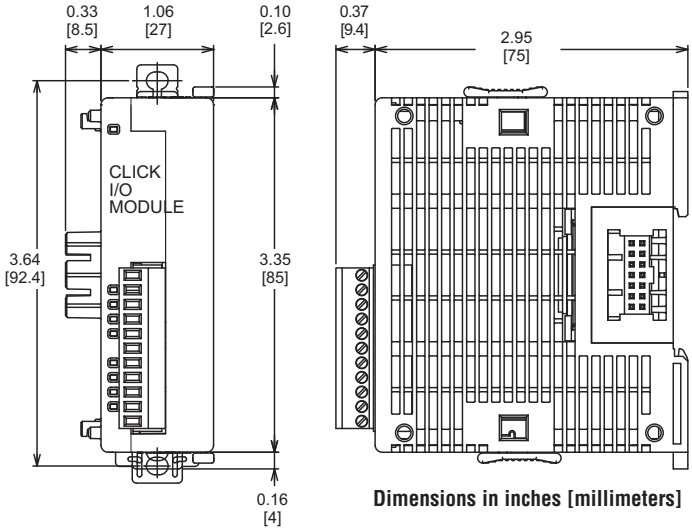
NOTE: *The dimensions for the C0-00AC and C0-01AC power supplies are the same.*

CPU Module



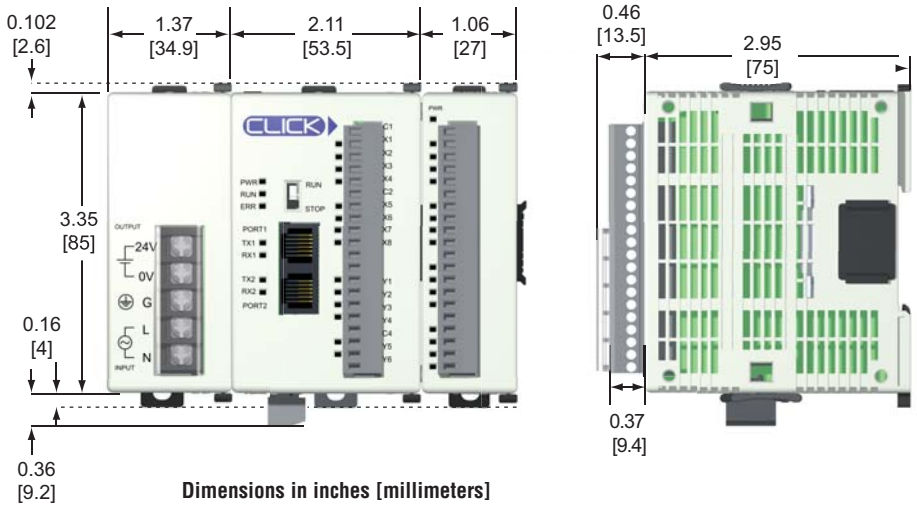
Dimensions in inches [millimeters]

I/O Module



Dimensions in inches [millimeters]

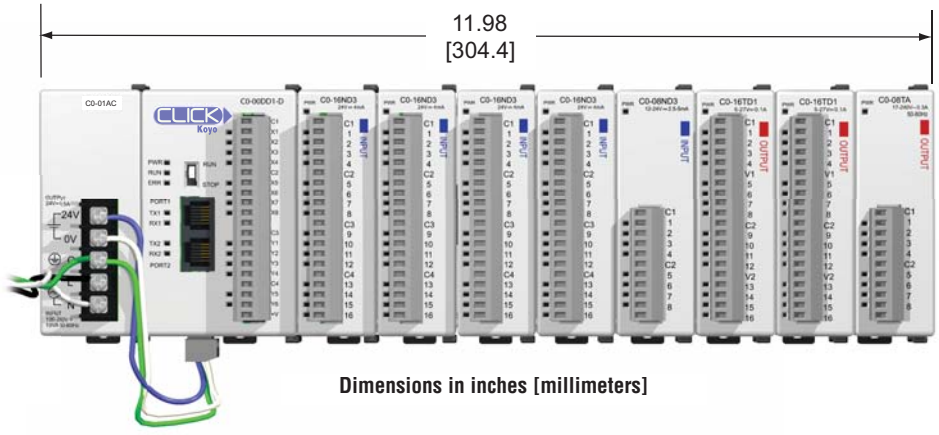
PLC System



Dimensions in inches [millimeters]

Maximum system: Power Supply + CPU + eight I/O modules.

Follow the installation guidelines to allow for proper spacing from other components within an enclosure.



Dimensions in inches [millimeters]

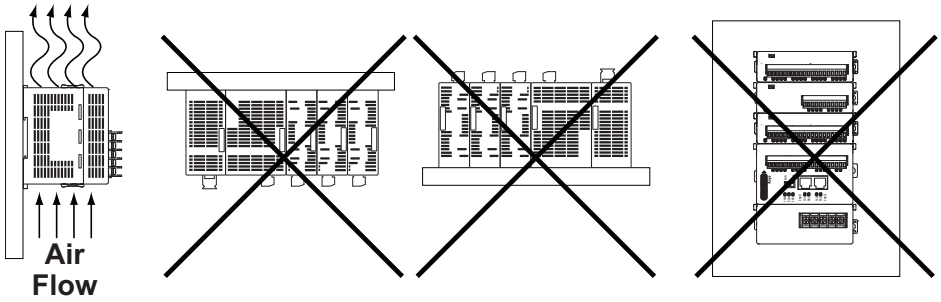
Enclosures

Your selection of a proper enclosure is important to ensure safe and proper operation of your CLICK PLC system. Control applications vary and yours may require additional considerations. At a minimum your enclosure should include:

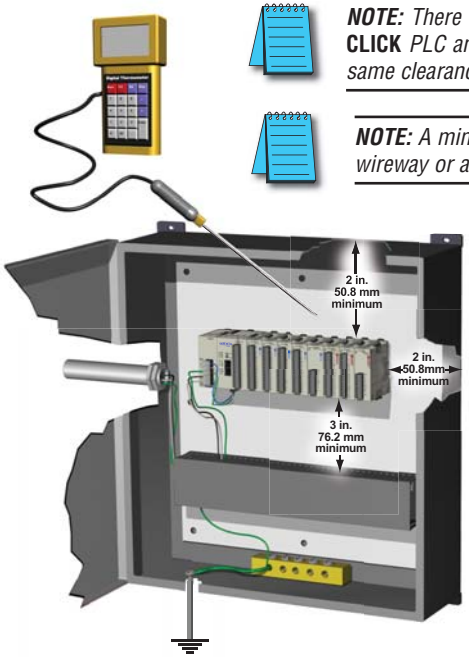
- Conformance to electrical standards
- Protection from the elements in an industrial environment
- Common ground reference
- Maintenance of specified ambient temperature
- Access to equipment
- Security or restricted access
- Sufficient space for proper installation and maintenance of equipment

Panel Layout and Clearances

1. Mount the PLC horizontally as shown below to provide proper ventilation. Do not mount the CLICK PLC units vertically, upside down, or on a flat horizontal surface. If you place more than one unit in a cabinet, there must be a minimum of 7.2" (183mm) between the units.

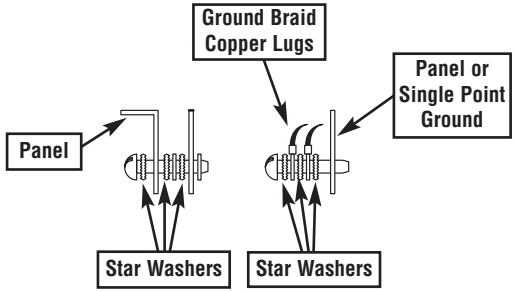


2. Provide a minimum clearance of 2" (50mm) between the unit and all sides of the cabinet. *Note*: Remember to allow for any operator panels or other items mounted in the door.
3. There should also be at least 3" (78mm) of clearance between the unit and any wiring ducts that run parallel to the terminals.
4. The ground terminal on the CLICK PLC CPU must be connected to a single point ground. Use copper stranded wire to achieve a low impedance. Copper eye lugs should be crimped and soldered to the ends of the stranded wire to ensure good surface contact.
5. There must be a single point ground (i.e. copper bus bar) for all devices in the panel requiring an earth ground return. The single point of ground must be connected to the panel ground termination. The panel ground termination must be connected to ground. Minimum wire sizes, color coding, and general safety practices should comply with appropriate electrical codes and standards for your area.



NOTE: *There is a minimum clearance requirement of 2" (51 mm) between the* **CLICK** *PLC and the panel door or any devices mounted in the panel door. The same clearance is required between the PLC and any side of the enclosure.*

NOTE: *A minimum clearance of 3" (76 mm) is required between the PLC and a wireway or any heat producing device.*



6. A good common ground reference (Earth ground) is essential for proper operation of the CLICK PLC. One side of all control and power circuits and the ground lead on flexible shielded cable must be properly connected to Earth ground. There are several methods of providing an adequate common ground reference, including:
   a) Installing a ground rod as close to the panel as possible
   b) Connection to incoming power system ground
7. Evaluate any installations where the ambient temperature may approach the lower or upper limits of the specifications. If you suspect the ambient temperature will not be within the operating specification for the CLICK PLC system, measures such as installing a cooling/heating source must be taken to get the ambient temperature within the range of specifications.
8. CLICK PLC systems are modular and can be powered by any suitable 24 VDC power supply. The optional CLICK power supply is designed to attach to the side of the CLICK CPU. The CLICK power supplies accept 85-264 VAC and produce nominal 24 VDC to power the CLICK PLC and I/O modules. Powerline filters are recommended for protecting the CLICK PLC from power surges and EMI/RFI noise. The AutomationDirect Powerline Filter, for use with 120 VAC and 240 VAC, 1–5 Amps, is an excellent choice (locate at www.automationdirect.com), however, you can use a filter of your choice. These units install easily between the AC power source and the PLC.

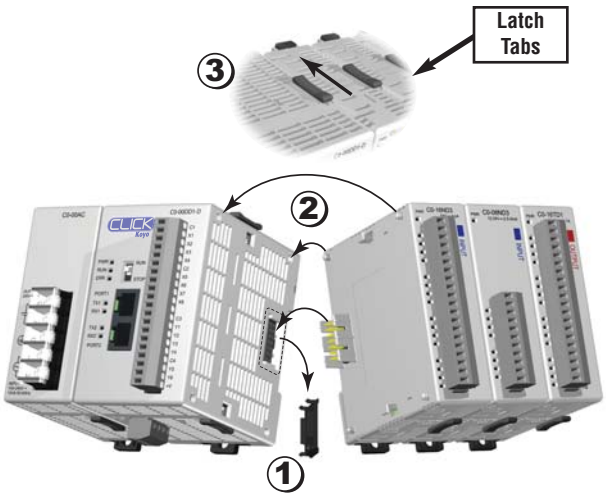
Installing the CLICK PLC

Connecting the Modules Together

CLICK CPUs and I/O modules connect together using the Extension Ports that are located on the side panels of the modules. The modules secure together by sliding LOCK/UNLOCK latch tabs located on the top and bottom panels of the modules. A PLC backplane or base is not required.

When connecting an I/O module to the PLC, first remove the Extension Port covers, slide the latches forward (unlock), align the module pins, and press the I/O module onto the CPU's right side. Slide the latches backward to lock the modules together.

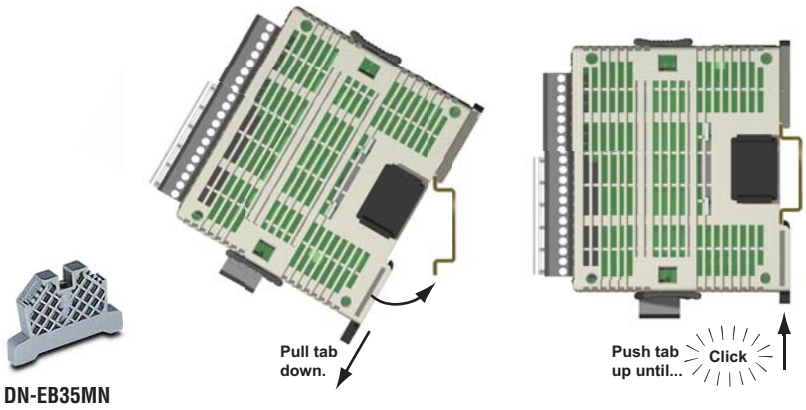
NOTE: *If you are using other components in your system, make sure you refer to the appropriate manual to determine how those units can affect mounting dimensions.*



1) Remove extension port covers and slide latch tabs forward.
2) Align the module pins and connection plug, and press the I/O module onto the right side of the CPU.
3) Slide the latch tabs backward to lock the modules together.

Mounting CLICK PLC System on DIN Rail

CLICK PLCs can be secured to a panel by using mounting rails. We recommend rails that conform to DIN EN standard 50 022. They are approximately 35mm high, with a depth of 7mm. If you mount the CLICK PLC on a rail, consider using end brackets on each side of the PLC. The end bracket helps keep the PLC from sliding horizontally along the rail, reducing the possibility of accidentally pulling the wiring loose. On the bottom of the PLC is a small retaining clip. To secure the PLC to a DIN rail, place it onto the rail and gently push up on the clip to lock it onto the rail. To remove the PLC, pull down on the retaining clip, lift up on the PLC slightly, then pull it away from the rail.



NOTE: *When mounting on DIN rail, using DINnectors end brackets at both ends is recommended (part number DN-EB35MN).*

Optional Mounting Method

The CLICK PLC system can be secured to the equipment panel or desired location using the mounting tabs located on the back panel of the PLC, I/O modules and power supplies. Extend the upper and lower retaining clips to the full out position. Mount using M4 screws in the center hole of the tabs.

Wiring Guidelines

Power Input Wiring to CLICK Power Supply

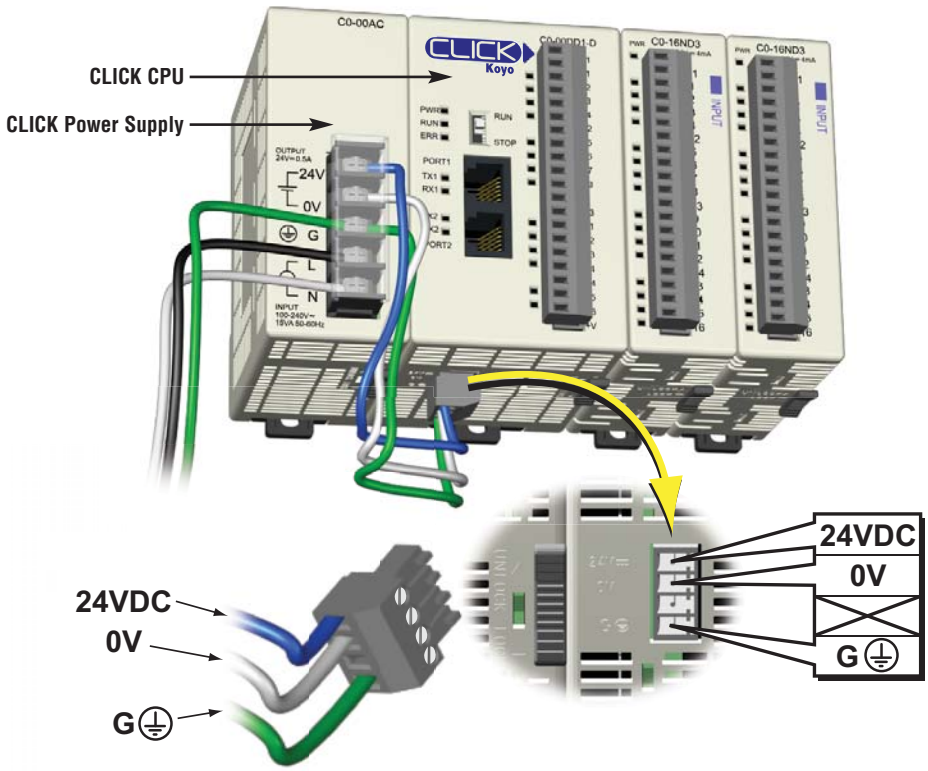
Connect the AC power source input wiring to the Click power supply (the Click power supply voltage and current requirements are listed in chapter 2). If you are not using a CLICK power supply, be sure to meet that supply's requirements.

Do not apply power at this time. Observe all precautions stated earlier in this manual.

Warning: Once the power wiring is connected, secure the terminal block cover in the closed position. When the cover is open there is a risk of electrical shock if you accidentally touch the connection terminals or power wiring.

Power Input Wiring to Click CPU

Connect the 24 VDC power source input wiring to the 4-pin 24 VDC input connector located on the bottom panel of the Click PLC. Do not apply power at this time. Observe all precautions stated earlier in this manual.



Fuse Protection

Fuse Protection for PLC Input Power

External circuit protection is needed to ensure the safety of service personnel and the safe operation of the equipment itself. To meet UL/CUL specifications, the input power must be fused. Fuse the AC side of the power supply that provides the 24 VDC power to the CLICK CPU.

When operating the power supply from a 110/120 VAC system with a grounded neutral, it is only necessary to fuse the line (L) lead; it is not necessary to fuse the grounded neutral (N) lead. Select the fuse size based on the input current draw of the power supply. Refer to Chapter 2 of this manual for specifications of CLICK power supplies.

Fuse Protection for I/O Module Circuits

Input and Output circuits on CLICK PLCs do not have internal fuses. In order to protect your PLC, we suggest you add external fuses to your I/O wiring. A fast-blow fuse, with a lower current rating than the I/O bank's common current rating can be wired to each common. Or, a fuse with a rating of slightly less than the maximum current per output point can be added to each output. Refer to the I/O module specifications in Chapter 2 to find the maximum current per output point or per output common. Adding the external fuse does not guarantee the prevention of PLC damage, but it will provide added protection.

Planning the I/O Wiring Routes

The following guidelines provide general information on how to wire the I/O connections to CLICK PLCs. For additional information about wiring a particular I/O type refer to the corresponding information in this chapter.

1. Each terminal connection of the CLICK PLC can accept one 16 AWG wire or two 18 AWG size wires. Do not exceed this recommended capacity. Refer to Chapter 2 for more detailed specifications of the terminal blocks.
2. Always use a continuous length of wire. Do not splice wires to attain a needed length.
3. Use the shortest possible wire length.
4. Use wire trays for routing where possible.
5. Avoid running lower voltage wires near higher voltage wiring.
6. Avoid running input wiring close to output wiring where possible.
7. To minimize voltage drops when wires must run a long distance, consider using multiple wires for the return line.
8. Avoid running DC wiring in close proximity to AC wiring where possible.
9. Avoid creating sharp bends in the wires.
10. Install the recommended powerline filter to reduce power surges and EMI/RFI noise.

I/O Point Numbering

All CLICK PLC units have fixed I/O points and can also have optional I/O modules attached. The CLICK PLCs use a decimal-based I/O numbering system with a letter prefix of X for inputs, and a Y prefix for outputs. The I/O on the CPU module starts with the number X001 (inputs) or Y001 (outputs). The first I/O module attached to the CPU starts with either X101 or Y101, depending upon whether it is an input or output module. The next I/O module starts with X201 or Y201, and so on. Refer to Chapter 2, Specifications, for more information about the CLICK I/O numbering system.

Wiring I/O Modules

There are two sizes of I/O module terminal blocks used for field wiring connections (11pt. & 20pt.), and they can be removed from the module for wiring convenience. There are no clips or screws retaining the terminal block. Firmly grip the block and pull it away from the PLC or I/O module. Make sure the terminal blocks are properly seated against the module when replacing them.

The connector terminal points have recessed screws to help minimize the risk of someone accidentally touching active wiring.

We also have DINnectors, DIN-rail mounted, and terminal blocks. Refer to our catalog for a complete listing of all available products. We strongly recommend using our ZIPLinks connections systems. ZIPLinks come with special pre–assembled cables, with the I/O connectors installed and wired. See the following page.

ZIPLinks Connection Systems

ZIPLinks Cables with Connectors

ZIPLinks Module

WARNING: For some modules, field device power may still be present on the terminal block even though the PLC system is turned off. To minimize the risk of electrical shock and equipment damage, check all field device power before you remove the connector.

ZIPLink Connection Systems for CLICK PLCs

Use the following tables to select your ZIPLink components. See our website for more specifications and information on ZIPLinks.

Note: ZIPLinks are only available for basic CPU modules; they are not available for analog CPU modules.

Step 1	Locate the CLICK CPU module or I/O module part number.
Step 2	Locate compatible connector module type.
Step 3	Select the cable length by replacing the # symbol with: Blank = 0.5m, -1 = 1.0m, -2 = 2.0m

	ZIPLink Wiring System Compatibility Matrix for CLICK PLCs					
	Step 2: Connector Module Type		***Feedthrough Module***	***Fuse Module***	***Relay Modules***	***Sensor Input Module***
	Step 1: I/O unit	***Number of Terminals***	ZL-RTB20	ZL-RFU20	ZL-RRL16-24	ZL-LTB16-24
			Step 3: Cables			
CPU Module	***C0-00DD1-D***	20	ZL-C0-CBL20#			
	C0-00DD2-D	20	ZL-C0-CBL20#			
	C0-00DR-D	20	ZL-C0-CBL20#			
	C0-00AR-D	20	ZL-C0-CBL20#			
I/O Module	**Inputs**					
	C0-08ND3	11	ZL-C0-CBL11#			
	C0-08ND3-1	11	ZL-C0-CBL11#			
	C0-08NA	11	ZL-C0-CBL11#			
	C0-16ND3	20	ZL-C0-CBL20#			ZL-C0-CBL20#
	Outputs					
	C0-08TD1	11	ZL-C0-CBL11#			
	C0-08TD2	11	ZL-C0-CBL11#			
	C0-08TR	11	ZL-C0-CBL11#			
	C0-08TA	11	ZL-C0-CBL11#			
	C0-16TD1	20	ZL-C0-CBL20#	ZL-C0-CBL20#	ZL-C0-CBL20#	
	C0-16TD2	20	ZL-C0-CBL20#	ZL-C0-CBL20#		
	C0-04TRS*	20	ZL-C0-CBL20#			

***Note: The C0-04TRS relay output is derated not to exceed 2A per point maximum when used with the ZIPLink wiring system**

See our website for ZIPLink connection systems specifications.

I/O Wiring Checklist

Use the following guidelines when wiring the I/O modules in your system.

1. There is a limit to the size of wire the modules can accept. The table below lists the suggested AWG. When making terminal connections, follow the suggested torque values.

Terminal Block AWG and Torque	
Connector Type (all)	Removeable Terminal Block
Wire Range	16-24 AWG
Wire strip length	6.5 mm
Screw Size	M2.0
Screw Torque	2.5 lb•inch

NOTE: *Recommended wire is 16 AWG Type TFFN or Type MTW. Other types of 16 AWG may be acceptable, depending on the thickness and stiffness of the wire insulation. If the insulation is too thick or stiff, and a majority of the module's I/O points are used, then the plastic terminal cover may not close properly or the connector may pull away from the module. This applies especially for high temperature thermoplastics such as THHN.*

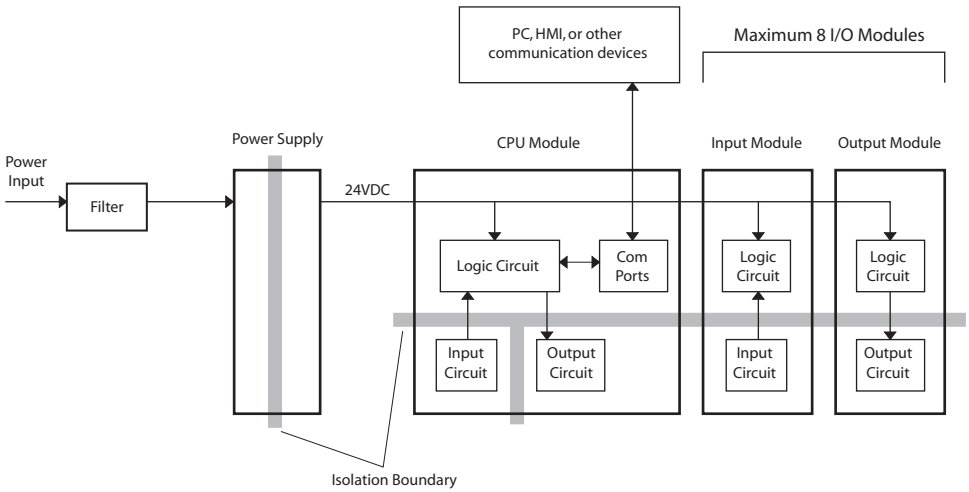
2. Always use a continuous length of wire, do not combine wires to attain a needed length.
3. Use the shortest possible wire length.
4. Use wire trays for routing where possible.
5. Avoid running wires near high energy wiring. Also, avoid running input wiring close to output wiring where possible.
6. To minimize voltage drops when wires must run a long distance, consider using multiple wires for the return line.
7. Avoid running DC wiring in close proximity to AC wiring where possible.
8. Avoid creating sharp bends in the wires.
9. To reduce the risk of having a module damaged, we suggest you add external fuses to your I/O wiring. A fast blow fuse, with a lower current rating than the I/O module fuse, can be added to each common, or a fuse with a rating of slightly less than the maximum current per output point can be added to each output. Refer to our catalog for a complete line of DINnectors, DIN-rail mounted fuse blocks.
10. If using relay outputs with inductive loads, consider using surge suppressors (see section on surge suppression later in this chapter).

System Wiring Strategies

The CLICK PLC system is very flexible and will work in many different wiring configurations. By studying this section before actual installation, you can find the best wiring strategy for your application. This will help to lower system cost and wiring errors, and avoid safety problems.

PLC Isolation Boundaries

PLC circuitry is divided into three main regions separated by isolation boundaries, shown in the drawing below. Electrical isolation provides safety, so that a fault in one area does not damage another. A powerline filter will provide isolation between the power source and the power supply. The transformer in the power supply provides magnetic isolation between the primary and secondary sides. Optical isolators provide optical isolation in Input and Output circuits. This isolates logic circuitry from the field side, where factory machinery connects. The discrete inputs are isolated from the discrete outputs, because each is isolated from the logic side. Isolation boundaries protect the devices such PC, HMI that are connected to the communication ports from power input faults or field wiring faults. When wiring a PLC, it is extremely important to avoid making external connections that connect logic side circuits to any other.

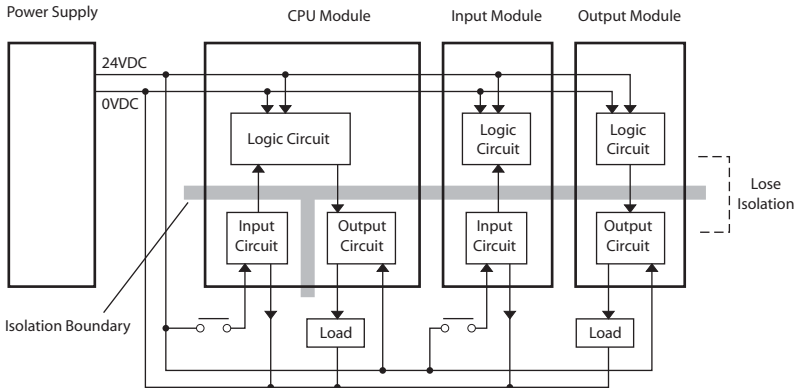


NOTE: If you do not use one of the CLICK PLC power supplies C0-00AC and C0-01AC to provide 24VDC to the CPU module (and I/O modules), be sure the power supply you use has isolation with a transformer.

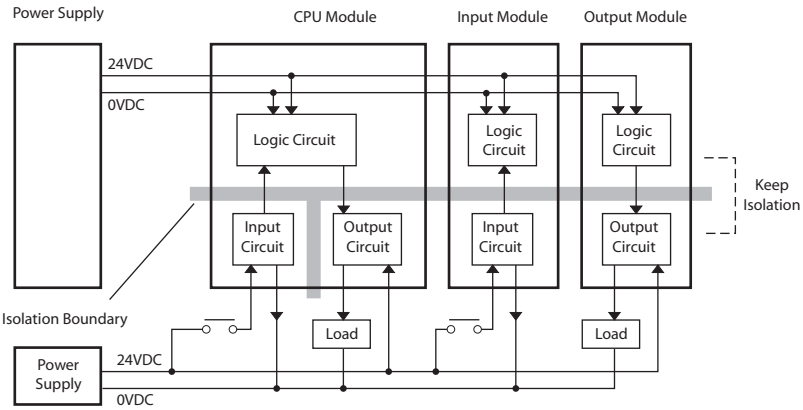
Powering I/O Circuits

In most applications, it will be necessary to power the input devices from one power source, and to power output loads from another source. Loads often require high-energy AC power, while input sensors use low-energy DC. If a machine operator is likely to come in close contact with input wiring, then safety reasons also require isolation from high-energy output circuits.

For the DC input/output circuits, you can use the same power source as the CPU module (and I/O modules). However, you lose the isolation between the logic circuits and the input/output circuits. (For AC input/output circuits, you don't need to worry about sharing the 24VDC.)



To keep the isolation between the logic circuits and the input/output circuits, we recommend using another power supply for the DC input and output circuits.



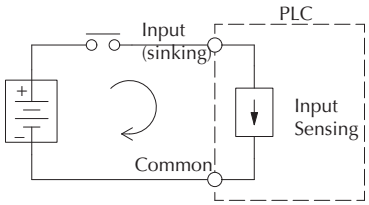
Sinking/Sourcing Concepts

Before wiring field devices to the PLC I/O, it's necessary to have a basic understanding of sinking and sourcing concepts. Use of these terms occurs frequently in input or output circuit discussions. The purpose of this section is to explain the terms. The short definitions are as follows:

Sinking = Path to supply ground (–) or switching ground

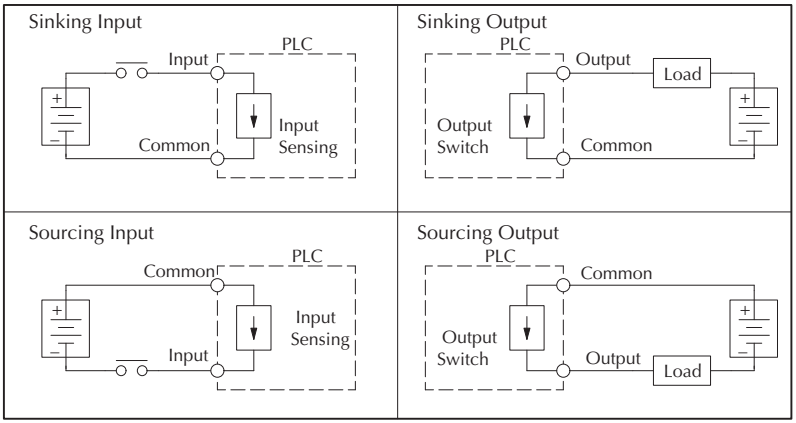
Sourcing = Path to supply source (+) or switching +V

These terms only apply to DC circuits, not AC circuits. Input and output points that are either sinking or sourcing can conduct current in only one direction. This means it is possible to wire the external supply and field device to the I/O point with current trying to flow in the wrong direction, in which case the circuit will not operate.



The diagram on the left shows a sinking PLC input. To properly connect the external supply, connect it so the input provides a path to ground (–). Start at the PLC input terminal, follow through the input sensing circuit, exit at the common terminal, and connect the supply (–) to the common terminal.

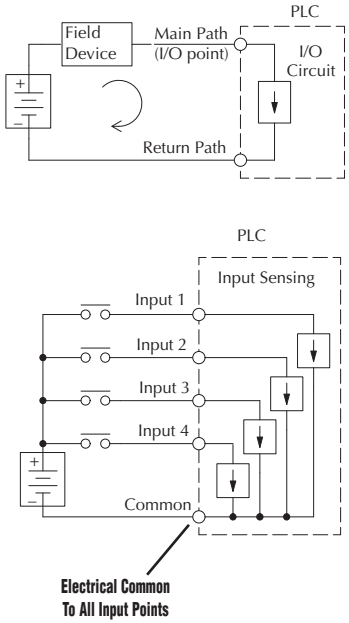
The switch between the supply (+) and the input completes the circuit. Current flows in the direction of the arrow when the switch is closed. By applying the circuit principle above to the four possible combinations of input/output sinking/sourcing types, we have the four circuits as shown below.



I/O "Common Terminal" Concepts

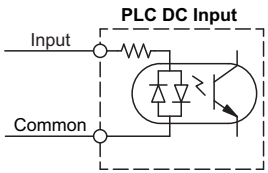
In order for a PLC I/O circuit to operate, current must enter at one terminal and exit at another. This means at least two terminals are associated with every I/O point. In the figure to the right, the input or output terminal is the main path for the current. One additional terminal must provide the return path to the power supply.

If there was unlimited module space, then every I/O point could have two dedicated terminals as the figure above shows. Providing this level of flexibility is not practical or necessary for most applications. So, most I/O point groups share the return path (common) among two or more I/O points. The figure to the right shows a group (or bank) of 4 input points which share a common return path. In this way, the four inputs require only five terminals instead of eight.



NOTE: In the circuit above, the current in the common path is equal to the sum of the energized channels. This is especially important in output circuits, where larger gauge wire is sometimes needed for the commons.

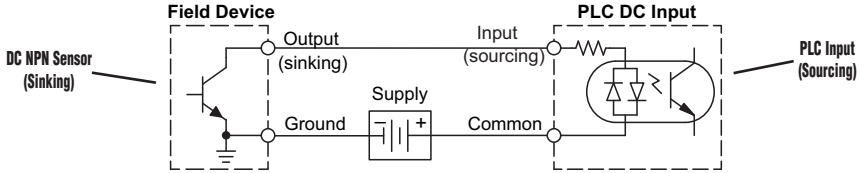
DC Input Wiring Methods



CLICK PLCs and I/O modules with DC inputs can be wired as either sinking or sourcing inputs. The dual diodes (shown in this diagram) allow current to flow in either direction. Inputs grouped by a common point must be either all sinking or all sourcing. DC inputs typically operate in the range of +12-24 VDC.

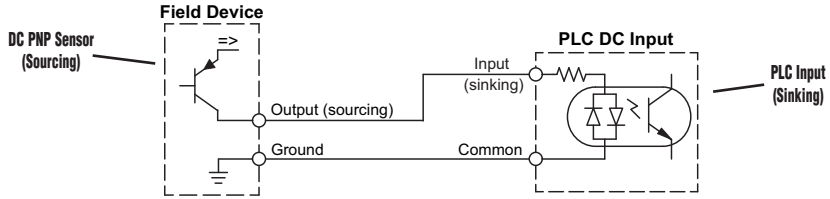
Sinking Input Sensor (NPN Type) to PLC Sourcing Input

In the following example, a field device has an open-collector NPN transistor output. When energized, it sinks current to ground from the DC input point. The PLC input current is sourced from the common terminal connected to power supply (+).



Sourcing Input Sensor (PNP Type) to PLC Sinking Input

In the following example, a field device has an open-emitter PNP transistor output. When energized, it sources current to the PLC input point, which sinks the current to ground. Since the field device loop is sourcing current, no additional power supply is required for the module.



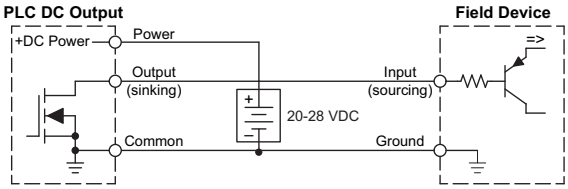
DC Output Wiring Methods

CLICK PLCs and I/O modules with DC output circuits are wired as all current sinking only or current sourcing only depending on which PLC or output module part number is used. DC outputs typically operate in the range of +5-24 VDC.

PLC Sinking Output to Sourcing Load Device

Many applications require connecting a PLC output point to a DC input on a field device load. This type of connection is made to carry a low-level DC signals.

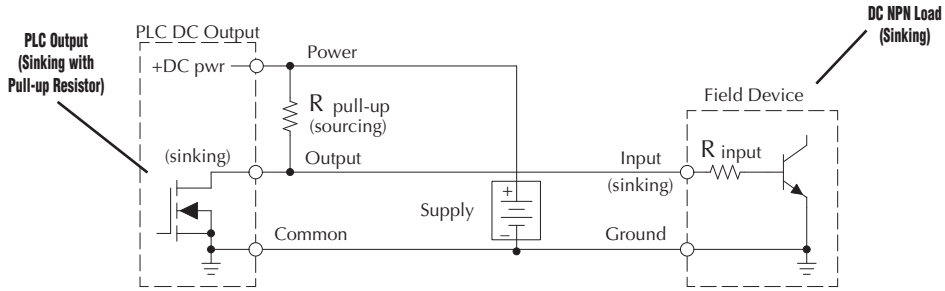
In the following example, the PLC output point sinks current to ground (common) when energized. The output is connected to a field device load with a sourcing input.



DC Output Wiring Methods, cont'd

PLC DC Sinking Output to Sinking Load Device

In the example below, a PLC sinking output point is connected to the sinking input of a field device load. In this case, both the PLC output and field device input are sinking type. Since the circuit must have one sourcing and one sinking device, we add sourcing capability to the PLC output by using a pull-up resistor. In the circuit below, we connect Rpull-up from the output to the DC output circuit power input.



NOTE 1: DO NOT attempt to drive a heavy load (>25 mA) with this pull-up method.

NOTE 2: Using the pull-up resistor to implement a sourcing output has the effect of inverting the output point logic. In other words, the field device input is energized when the PLC output is OFF, from a ladder logic point-of-view. Your ladder program must comprehend this and generate an inverted output. Or, you may choose to cancel the effect of the inversion elsewhere, such as in the field device.

It is important to choose the correct value of $R_{pull\text{-}up}$. In order to do so, we need to know the nominal input current to the field device (I_{input}) when the input is energized. If this value is not known, it can be calculated as shown (a typical value is 15 mA). Then use I_{input} and the voltage of the external supply to compute $R_{pull\text{-}up}$. Then calculate the power $P_{pull\text{-}up}$ (in watts), in order to size $R_{pull\text{-}up}$ properly.

$$I_{input} = \frac{V_{input\ (turn\text{–}on)}}{R_{input}}$$

$$R_{pull\text{-}up} = \frac{V_{supply} - 0.7}{I_{input}} - R_{input}$$

$$P_{pull\text{-}up} = \frac{V_{supply}^2}{R_{pull\text{-}up}}$$

Relay Outputs - Wiring Methods

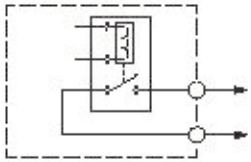
Relay outputs are available for the CLICK PLCs. Relays are best for the following applications:

- Loads that require higher currents than the solid-state outputs can deliver
- Cost-sensitive applications
- Some output channels need isolation from other outputs (such as when some loads require different voltages than other loads)

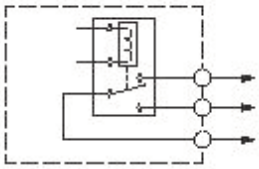
Some applications in which NOT to use relays:

- Loads that require currents under 10 mA
- Loads which must be switched at high speed or heavy duty cycle

Relay with Form A contacts



Relay with Form C contacts



Relay outputs in the CLICK PLCs and modules are available in two contact arrangements. Form A type, or SPST (single pole, single throw) type. They are normally open and are the simplest to use. The Form C, or SPDT (single pole, double throw) type has a center contact which moves and a stationary contact on either side. This provides a normally closed contact and a normally open contact.

Some relay output module's relays share common terminals, which connect to the wiper contact in each relay of the bank. Other relay modules have relays which are completely isolated from each other. In all cases, the module drives the relay coil when the corresponding output point is on.

Relay Outputs - Surge Suppression For Inductive Loads

Inductive load devices (devices with a coil) generate transient voltages when de-energized with a relay contact. When a relay contact is closed it "bounces", which energizes and de-energizes the coil until the "bouncing" stops. The transient voltages generated are much larger in amplitude than the supply voltage, especially with a DC supply voltage.

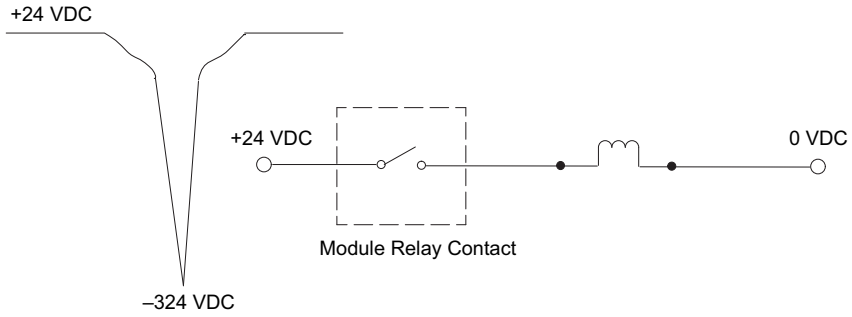
When switching a DC-supplied inductive load, the full supply voltage is always present when the relay contact opens (or bounces). When switching an AC-supplied inductive load, there is one chance in 60 (60 Hz) or 50 (50 Hz) that the relay contact will open (or bounce) when the AC sine wave is zero crossing. If the voltage is not zero when the relay contact opens, there is energy stored in the inductor that is released when the voltage to the inductor is suddenly removed. This release of energy is the cause of the transient voltages.

When inductive load devices (motors, motor starters, interposing relays, solenoids, valves, etc.) are controlled with relay contacts, it is recommended that a surge suppression device be connected directly across the coil of the field device. If the inductive device has plug-type connectors, the suppression device can be installed on the terminal block of the relay output.

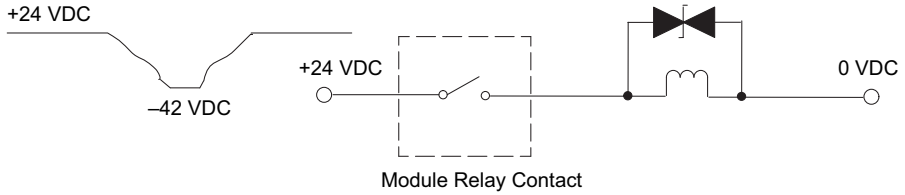
Transient Voltage Suppressors (TVS or transorb) provide the best surge and transient suppression of AC and DC powered coils, providing the fastest response with the smallest overshoot.

Metal Oxide Varistors (MOV) provide the next best surge and transient suppression of AC and DC powered coils.

For example, the waveform in the figure below shows the energy released when opening a contact switching a 24 VDC solenoid. Notice the large voltage spike.



This figure shows the same circuit with a transorb (TVS) across the coil. Notice that the voltage spike is significantly reduced.



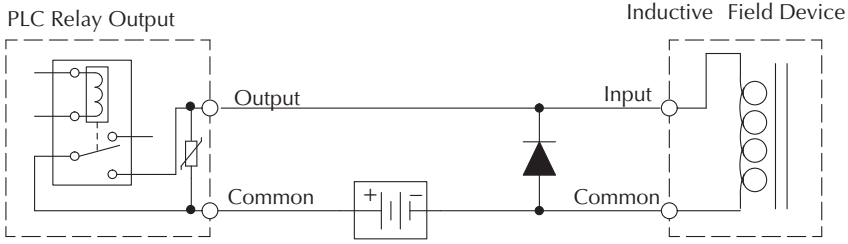
Relay Outputs - Relay Contact Life Extension

Use the following table to help select a TVS or MOV suppressor for your application based on the inductive load voltage.

Surge Suppressors			
Vendor / Catalog	**Type**	**Inductive Load Voltage**	**Part Number**
AutomationDirect Transient Voltage Suppressors, LiteOn Diodes; from Digi-Key Catalog: Phone: 1-800-344-4539	TVS TVS TVS TVS Diode	110/120 VAC 24 VDC 220/240 VAC 12/24 VDC 12/24 VDC	ZL-TD8-120 ZL-TD8-24 P6KE350CA Contact Digi-Key Corp.
Digi-key www.digikey.com	MOV MOV	110/120 VAC 220/240 VAC	Contact Digi-Key Corp.

Relay contacts wear according to the amount of relay switching, amount of spark created at the time of open or closure, and presence of airborne contaminants. There are some steps you can take to help prolong the life of relay contacts, such as switching the relay on or off only when it is necessary, and if possible, switching the load on or off at a time when it will draw the least current. Also, take measures to suppress inductive voltage spikes from inductive DC loads such as contactors and solenoids.

For inductive loads in DC circuits, we recommend using a suppression diode as shown in the following diagram (DO NOT use this circuit with an AC power supply). When the load is energized, the diode is reverse-biased (high impedance). When the load is turned off, energy stored in its coil is released in the form of a negative-going voltage spike. At this moment, the diode is forward-biased (low impedance) and shunts the energy to ground. This protects the relay contacts from the high voltage arc that would occur just as the contacts are opening.

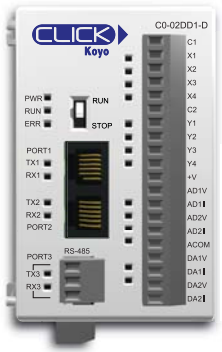


Place the diode as close to the inductive field device as possible. Use a diode with a peak inverse voltage rating (PIV) at least 100 PIV, 3A forward current, or larger. Use a fast-recovery type (such as Schottky type). DO NOT use a small-signal diode such as 1N914, 1N941, etc. Be sure the diode is installed in the circuit correctly before operation. If installed backwards, it short-circuits the supply when the relay energizes.

Analog I/O Configuration

Terminal Block Wiring

The Analog CPU modules have 2 built-in analog inputs and 2 built-in analog outputs. You can select analog voltage or analog current for each analog I/O separately. As shown below, you must use the proper terminal on the terminal block when using analog voltage or analog current.



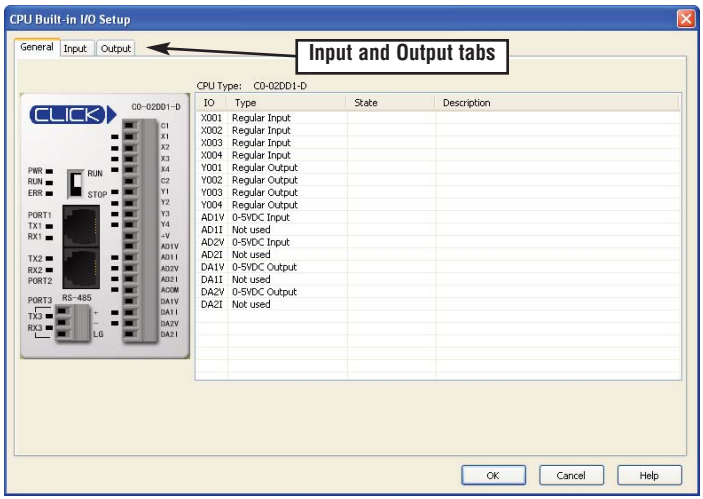
Analog Terminals	
Terminal Name	**Terminal Description**
AD1V	Analog voltage input
AD1I	Analog current input
AD2V	Analog voltage input
AD2I	Analog current input
ACOM	Common for all analog inputs and outputs
DA1V	Analog voltage output
DA1I	Analog current output
DA2V	Analog voltage output
DA2I	Analog current output

Configuration in the CLICK Programming Software

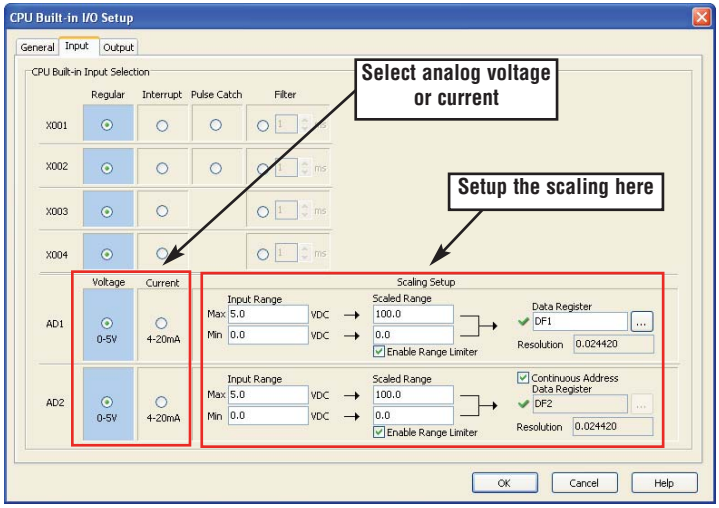
The Analog CPU modules cannot detect which terminal is used between the analog voltage and analog current, so you must configure which analog type is used for each analog I/O in the CLICK programming software.

Connect the CLICK programming software to the analog CPU module, then open the CPU Built-in I/O Setup window as shown below.

(Pull-down menu: Setup > CPU Built-in I/O Setup)



Click the Input tab to configure the analog inputs and/or click the Output tab to configure the analog outputs. The Input tab is shown below, but the Output tab looks very similar.

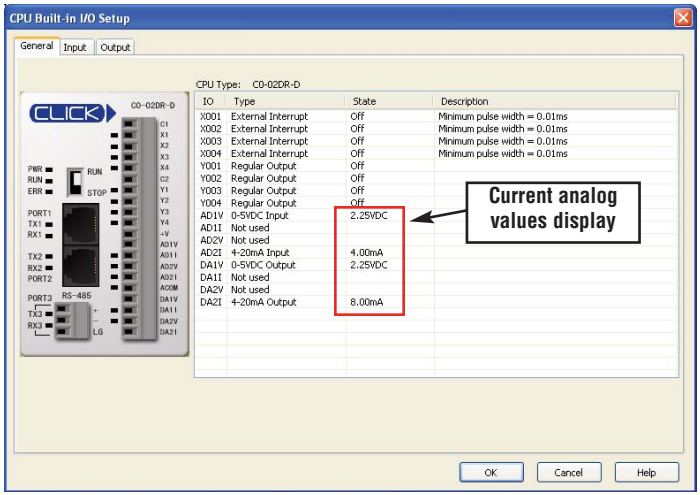


You can select the analog voltage or analog current with the radio buttons. Also use this screen to set the scaling for each analog I/O. Click the Help button on the right bottom to learn about the scaling feature.

After you configure the analog I/O, download the project into the analog CPU module.

Analog I/O Monitoring

Analog I/O monitoring is an additional feature in the CPU Built-in I/O Setup window that is useful for troubleshooting. The current analog values are displayed in their physical units.



Notes

PLC COMMUNICATIONS

In This Chapter...

Introduction

This chapter explains the communications ability of the CLICK PLC system for exchanging data between the CPU and other connected serial devices. It covers:

- the electrical connections used for communications
- the networking routing between the CPU and other devices,
- setting the port communication parameters,
- selecting the protocols and the available data addressing types to use,
- the ladder logic program instructions that make it all work together.

The CLICK CPUs have two built-in RS-232 ports. Both ports are physically 6-pin RJ12 phone type jacks. Port 1's communication parameters are fixed and it is used primarily as the programming port. Port 1 can also be used as a Modbus RTU protocol slave device. Port 2 is a general purpose port with its communication parameters being user configurable from the CLICK Programming Software, C0-PGMSW. Port 2 can be used as a Modbus RTU master or slave protocol device, or handle ASCII data In or Out.

Some CPU versions also have a 3-pin RS-485 port, Port 3. Like Port 2, Port 3 is a general purpose port with its communication parameters being user configurable from the programming software. Port 3 can be used as a Modbus RTU master or slave protocol device, or handle ASCII data In or Out.

For details on the Modbus protocol, visit www.modbus.org.

ASCII stands for American Standard Code for Information Interchange and defines a character encoding method for text that is used in computers and other communication devices. Details can be found by doing a search for ASCII on the internet.

The CLICK PLC can be networked to other CLICK PLCs, data input devices (barcode readers, weight scales, etc.), and/or data output devices (serial printers, serial text displays, etc.). It is also possible to network the CLICK PLC to other 3rd party PLCs and devices that have the ability to communicate using the Modbus RTU protocol.

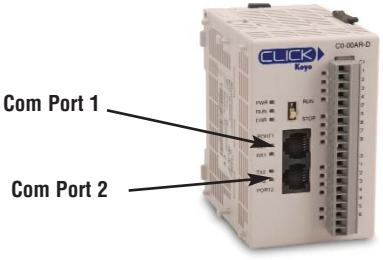
The final part of the PLC Communications chapter contains explanations and examples of the various ways the Send and Receive programming instructions can be used to perform Modbus RTU protocol and ASCII data communications between devices.

There are three different data addressing types that can be selected when using the Modbus RTU protocol from the Send and Receive instructions. They are, CLICK addressing, Modbus 984 addressing, or Modbus HEX addressing. The CLICK addressing makes it convenient to exchange data between CLICK PLCs. The other addressing choices are selected based on the Modbus protocol addressing the networked devices are using.

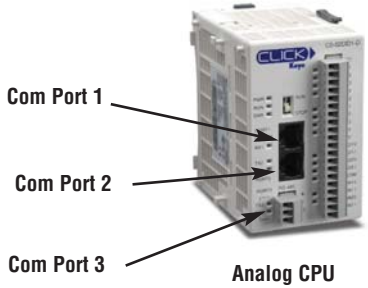
NOTE: The Modbus RTU Master is identified as the device that controls the exchange of data between itself and any connected slave device. There can only be one master on the network. When the CLICK CPU is the master, it is easily identified. It will be the PLC in the network with the Send and/or Receive instructions using the Modbus protocol in its ladder logic program.

CPU Communication Ports Specifications

The CLICK CPU modules have two or three built-in communications ports.



Basic CPU

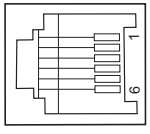


Analog CPU

Com Port 1 Specifications
Use: Programming Port
Physical: 6 pin, RJ12, RS-232
Communication speed (baud): 38400 (fixed)
Parity: Odd
Station Address: 1
Data length: 8 bits
Stop bit: 1
Protocol: Modbus RTU (slave only)

Port 1

6 pin RJ12 Phone Type Jack – Port 1

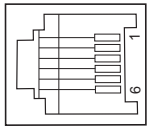


Port 1 Pin Descriptions		
1	0V	Power (-) connection (GND)
2	5V	Power (+) connection
3	RXD	Receive data (RS-232)
4	TXD	Transmit data (RS-232)
5	NC	No connection
6	0V	Power (-) connection (GND)

Com Port 2 Specifications
Use: Serial Communication
Physical: 6 pin, RJ12, RS-232
Communication speed (baud): 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200
Parity: odd, even, none
Station Address: 1 to 247
Data length: 8 bits (Modbus RTU) or 7, 8 bits (ASCII)
Stop bit: 1,2
Protocol: Modbus RTU (master/slave) or ASCII in/out

Port 2

6 pin RJ12 Phone Type Jack – Port 2

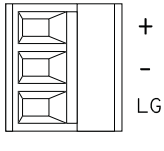


Port 2 Pin Descriptions		
1	0V	Power (-) connection (GND)
2	5V	Power (+) connection
3	RXD	Receive data (RS-232)
4	TXD	Transmit data (RS-232)
5	RTS	Request to send
6	0V	Power (-) connection (GND)

Com Port 3 Specifications
Use: Serial Communication
Physical: 3 pin, RS-485
Communication speed (baud): 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200
Parity: odd, even, none
Station Address: 1 to 247
Data length: 8 bits (Modbus RTU) or 7, 8 bits (ASCII)
Stop bit: 1,2
Protocol: Modbus RTU (master/slave) or ASCII in/out

Port 3

RS-485

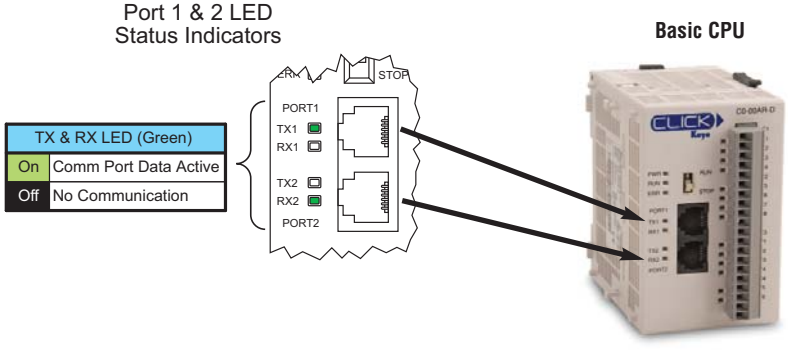


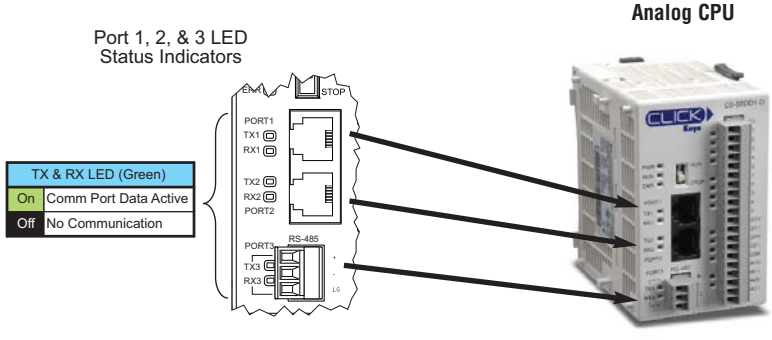
Port 3 Pin Descriptions		
1	+ (plus)	Signal A (RS-485)
2	- (minus)	Signal B (RS-485)
3	LG	Logic Ground(0 V)

LED Status Indicators

LED Status Indicators

There are LED status indicators located to the left of each communication port to indicate port activity or communications.





DirectLogic Devices That Do Not Work With CLICK PLCs

The CLICK PLC does not support K-sequence protocol, so the following DirectLogic devices do not work with the CLICK PLC:

D2-HPP

D4-HPP-1

DV-1000

3 Steps to Using the CLICK PLC Communications

We offer an easy 3-steps method to use the communications features of the CLICK PLC.

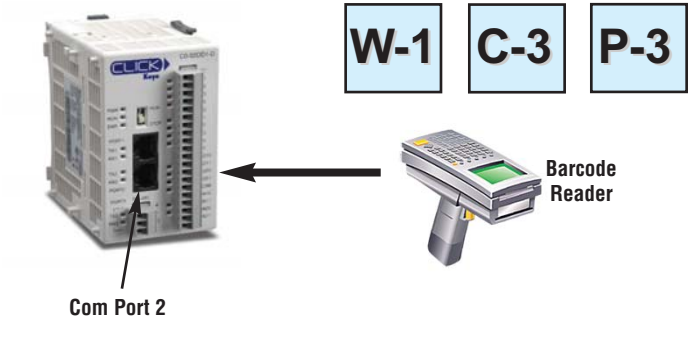
The following pages show what devices you can connect to the CLICK CPU Com ports. Use the table below to help find information on communications for your particular application. As you can see in the table, each step has subcategories. For each step, find the subcategory description that best describes your application. Use the subcategory references (W-2, C-2, etc.) to find more information on these topics in this chapter. See the example below.

CLICK PLC Communications			
Step	**Subcategory Reference**	**Subcategory Description**	**Page**
1	W-1	Com port 1 & 2 wiring	4-9
	W-2	Com port 3 wiring	4-12
2	C-1	Com port 1 setup	4-13
	C-2	Com port 2 setup (Modbus)	4-14
	C-3	Com port 2 setup (ASCII)	4-15
	C-4	Com port 3 setup (Modbus)	4-16
	C-5	Com port 3 setup (ASCII)	4-17
3	P-1	Modbus Slave programming	4-18
	P-2	Modbus Master programming	4-21
	P-3	ASCII Receive programming	4-24
	P-4	ASCII Send programming	4-27

Example:

Let's say you want to connect a barcode reader, which sends ASCII data, to Com Port 2.

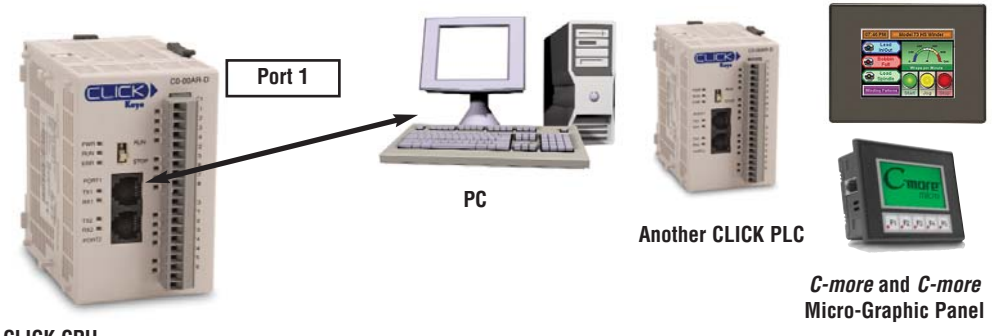
To set up the communications properly for this example, refer to these three references on the following pages.



Typical Serial Communication Applications

The diagrams on these three pages illustrate the typical uses for the CLICK CPU's communication ports. Typical serial communication applications are continued on the next two pages.

Port 1 (RS-232) – Modbus RTU Slave Mode (only)

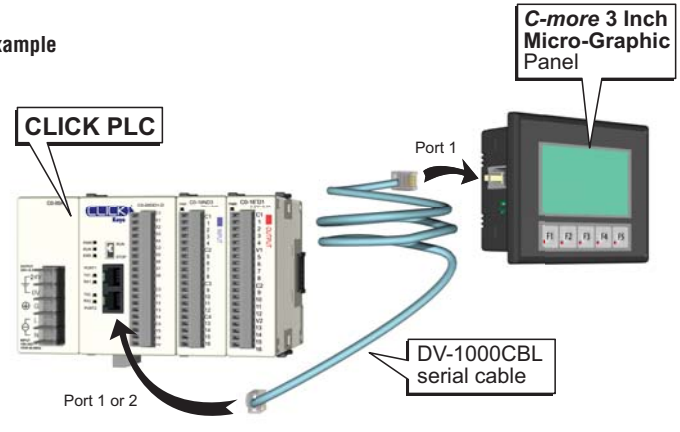


To set up the Port 1 communications properly, refer to these three references on the following pages.

Other Devices Supporting Modbus RTU Master Mode

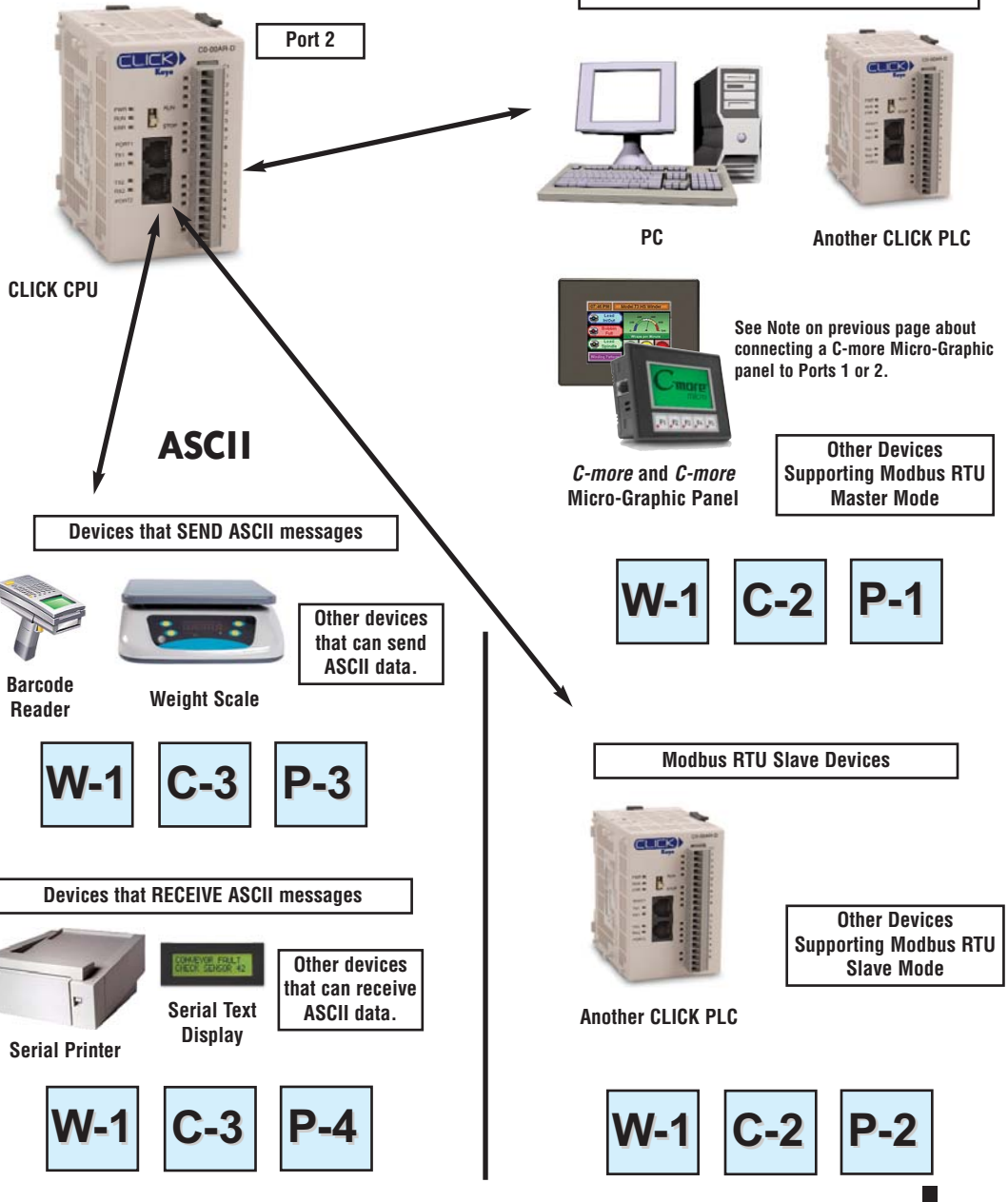
W-1 C-1 P-1

Example

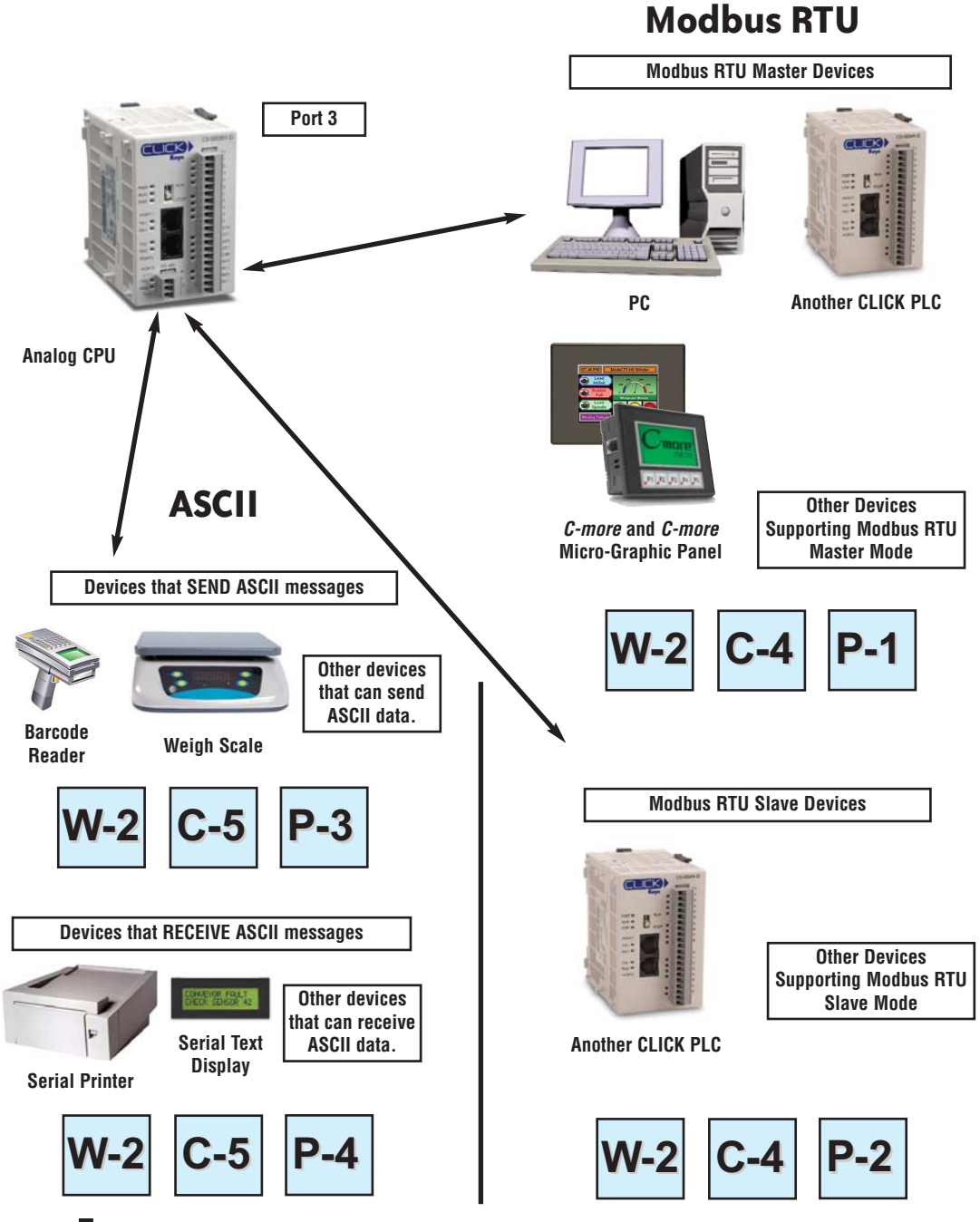


NOTE: A C-more Micro-Graphic panel can be connected to CLICK's Port 1 and/or Port 2. Either port can provide 5 VDC to power the panel, but not at the same time. If a C-more Micro-Graphic panel is connected to both ports, then at least one of the panels must be powered by a C-more DC power adapter, EA-MG-P1 or EA-MG-SP1, or another 24 VDC power source.

Port 2 (RS-232) – Modbus RTU or ASCII



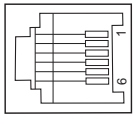
Port 3 (RS-485; Analog CPUs Only) – Modbus RTU or ASCII



W-1: Com Port 1 & 2 Wiring

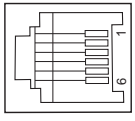
Com Port 1 and Com Port 2 have very similar pin layouts; the only difference is that Port 2 has a RTS signal output, which Port 1 does not have.

6 pin RJ12 Phone Type Jack – Port 1



Port 1 Pin Descriptions		
1	0V	Power (-) connection (GND)
2	5V	Power (+) connection
3	RXD	Receive data (RS-232)
4	TXD	Transmit data (RS-232)
5	NC	No connection
6	0V	Power (-) connection (GND)

6 pin RJ12 Phone Type Jack – Port 2



Port 2 Pin Descriptions		
1	0V	Power (-) connection (GND)
2	5V	Power (+) connection
3	RXD	Receive data (RS-232)
4	TXD	Transmit data (RS-232)
5	RTS	Request to send
6	0V	Power (-) connection (GND)

Note: Both Com ports can provide 5 VDC; however, the 5 VDC power can be used only for the C-more Micro-Graphic panel. AutomationDirect does not guarantee that the CLICK PLC will work correctly when any other device uses 5 VDC from these Com ports. Please also remember these Com ports can provide enough power only for one C-more Micro-Graphic panel. If you are going to connect a C-more Micro-Graphic panel to each Com port (2 panels in total), you must obtain power from another 24 VDC power source for the second C-more Micro-Graphic panel.

Wiring Strategy

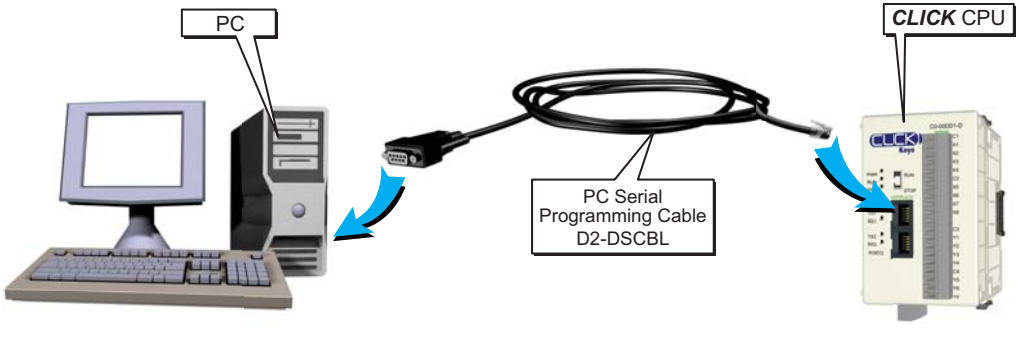
The following section covers these five case scenarios for connecting com ports 1 or 2 to:

- Case 1: PC
- Case 2: Another CLICK PLC
- Case 3: C-more or C-more Micro-Graphic panel
- Case 4: RS-232 port on another device
- Case 5: RS-422 or RS485 port on another device(s).

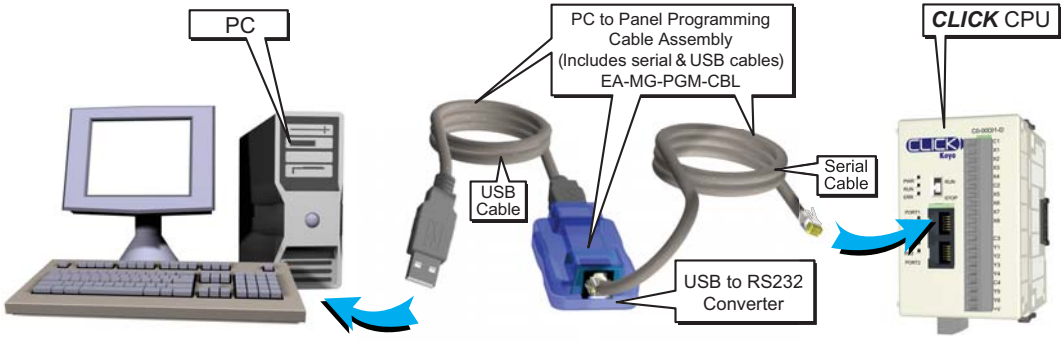
Case 1: Connect Com Port 1 or 2 to a PC

You can connect Com Port 1 or 2 to a serial com port or USB port on the PC.

1. Connect to a serial port

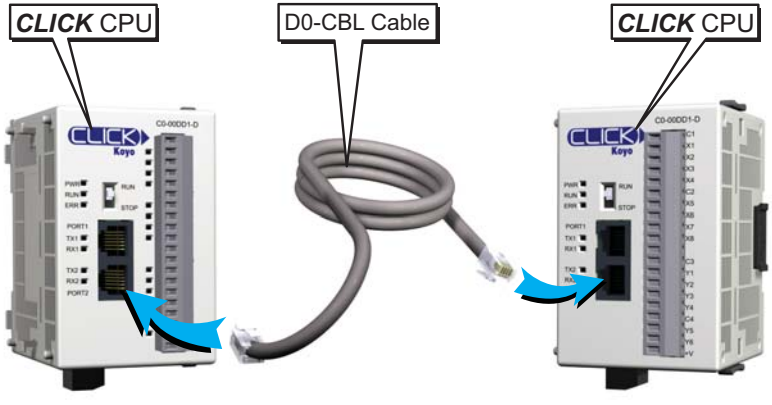


2. Connect to a USB port



Case 2: Connect Com Port 1 or 2 to another CLICK PLC

You can use the cable D0-CBL.



In this configuration, one of the CLICK CPU module needs to be the network master and the other is the network slave. Connect the D0-CBL on Com Port 2 on the master CPU module side.

Note: The ZL-RJ12-CBL-2 cable cannot be used for this purpose.

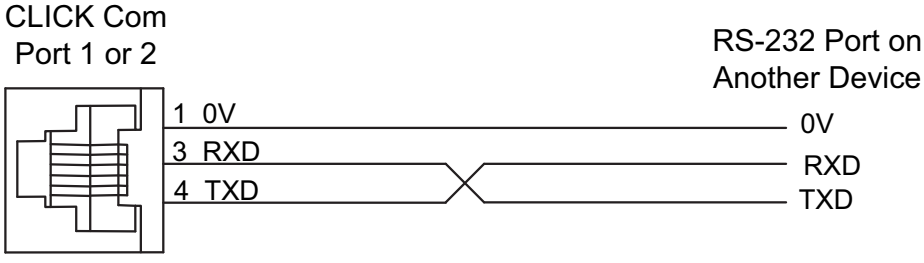
Case 3: Connect Com Port 1 or 2 to a C-more or C-more Micro-Graphic panel

Please use the following cables to make your connections.

C-more / C-more Micro-Graphic Panel	Cable Part Number
C-more Touch panels	EA-2CBL-1 (3m) or OP-2CBL-1 (2m)
C-more Micro-Graphic Panels	DV-1000CBL if the panel receives 5 VDC power from the CLICK PLC com port.
	EA-2CBL-1 (3m) or OP-2CBL-1 (2m) if the panel receives 24 VDC power from other source.

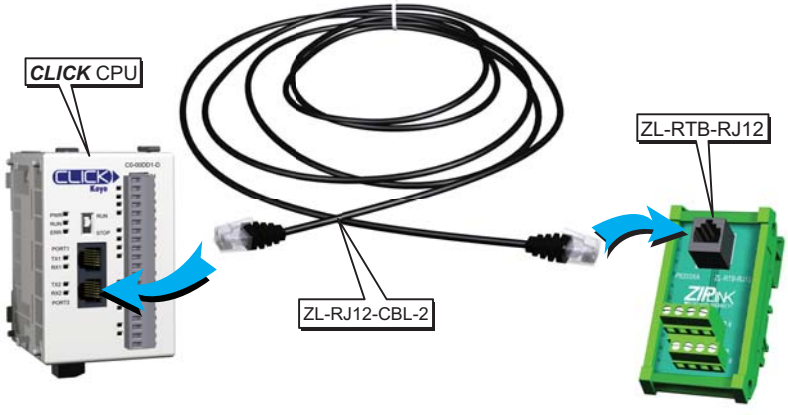
Case 4: Connect Com Port 1 or 2 to an RS-232 port on another device.

You need to cross the RTD and TXD signal lines and connect 0V on both com ports.

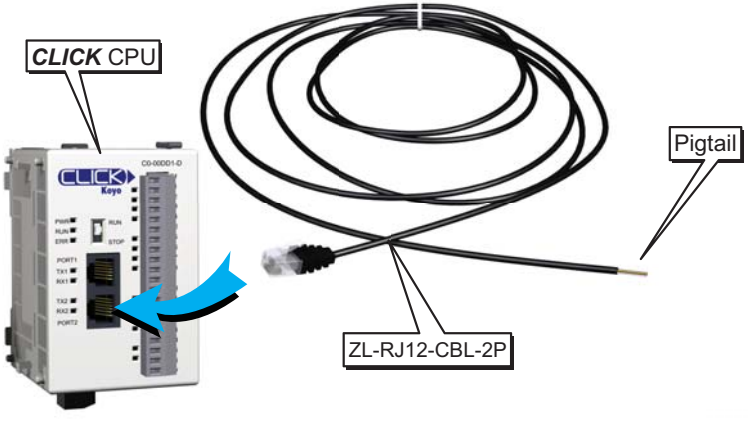


You can make your own cable. We offer two products that make your wiring much easier:

1. ZIPLink feed-through module and cable

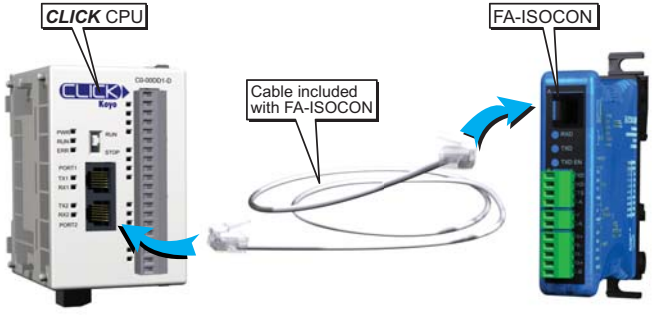


2. ZIPLink pig-tail cable



Case 5: Connect Com Port 1 or 2 to an RS-422 or RS485 port on another device(s).

You need a RS-232 to RS-422/485 converter in this case. We recommend our FA-ISOCON as the converter.

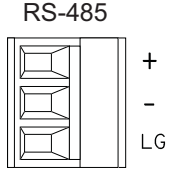


The recommended cables to connect the FA-ISOCON to other devices:

- Belden 8103 for the RS-422
- Belden 9842 for 2-wire RS-485
- Belden 9843 for 4-wire RS-485

W-2: Com Port 3 Wiring

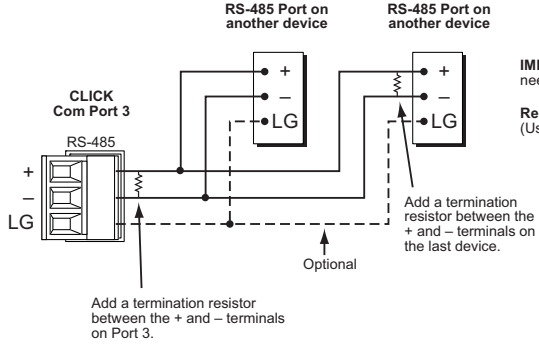
Com Port 3 supports 2-wire RS-485.



Port 3 Pin Descriptions		
1	+ (plus)	Signal A (RS-485)
2	- (minus)	Signal B (RS-485)
3	LG	Logic Ground (0 V)

Wiring Strategy

You need to connect all + signal terminals in the network together. You also need to connect all – signal terminals together. It is optional to connect the logic ground.

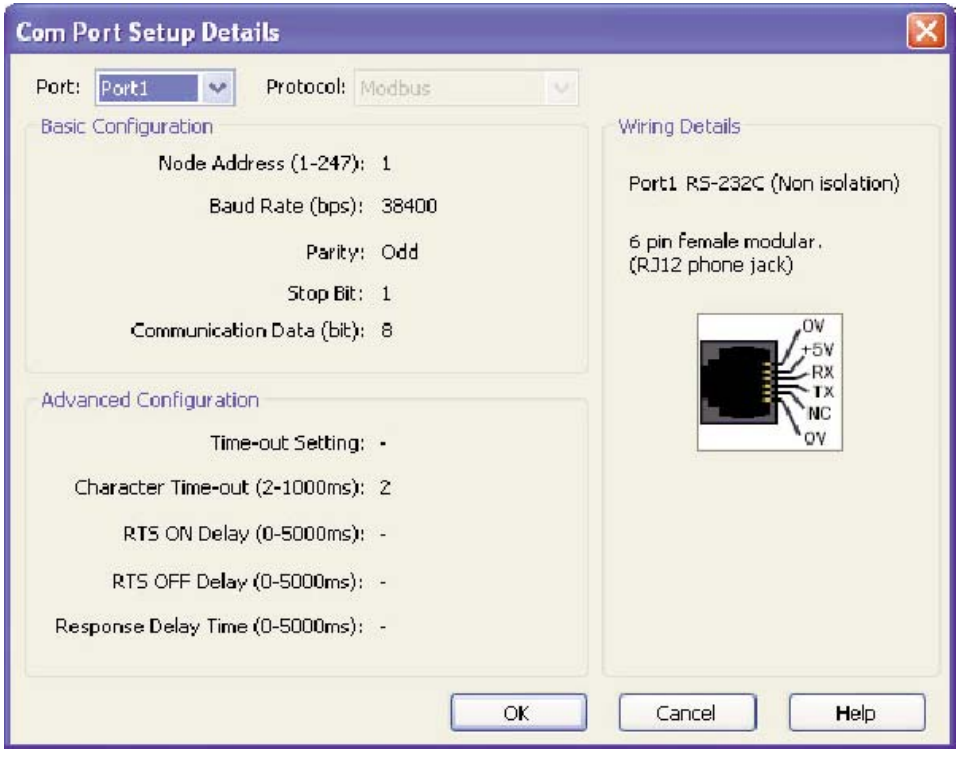


IMPORTANT: The resistance of the termination resistors needs to match the impedance of the communication cable.

Recommended Cable: Belden 9842
(Use 120 ohm resistor as termination resistors.)

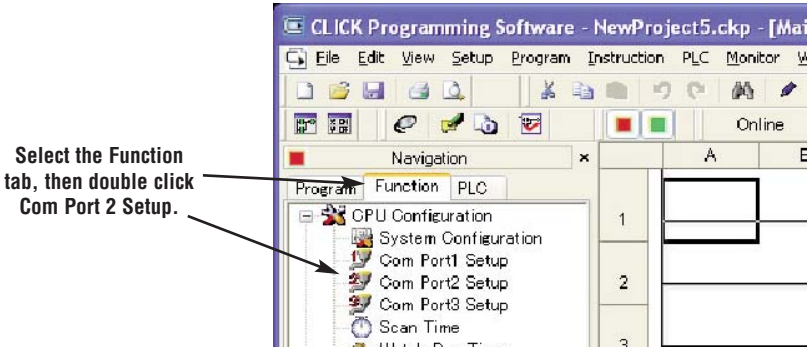
C-1 C-1: Com Port 1 Setup

Com Port 1 has a fixed setup as shown below. This com port works as a Modbus slave only. If you want to connect an external device to this com port, please make sure the external device can be a Modbus master and that the com port setup matches the following setup.

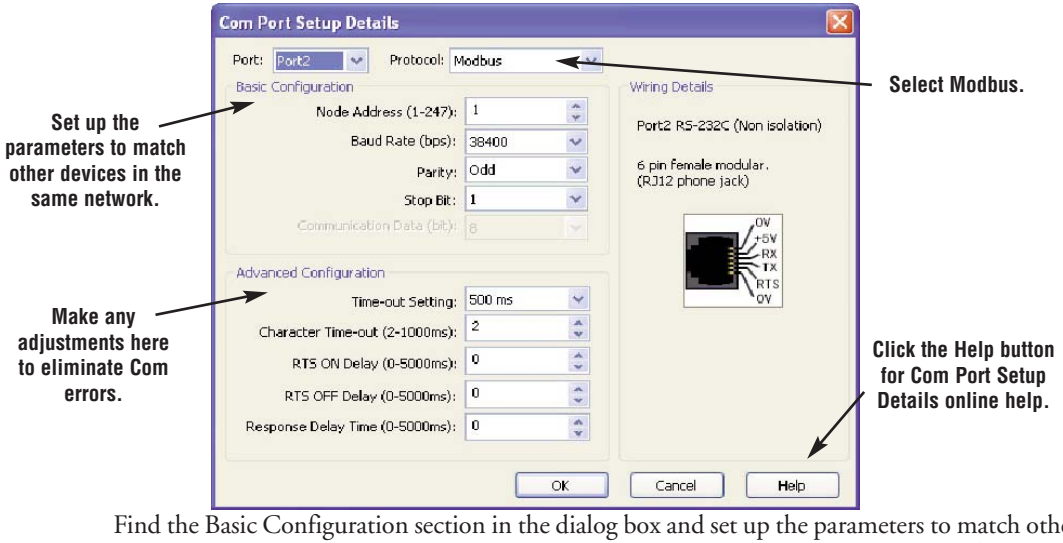


C-2: Com Port 2 Setup (Modbus)

Before you set up the communication ports you must connect the PC with the CLICK programming software to the CLICK PLC Port 1 using a D2-DSCBL or EA-MG-PGM-CBL programming cable. Refer to Chapter 1: Getting Started for step-by-step instructions for this connection. Once the PC and programming software are online with the CLICK PLC, click the Function tab located in the Navigation window and double click Com Port 2 Setup as shown below.



The Com Port Setup Details dialog box will come into view as shown below.



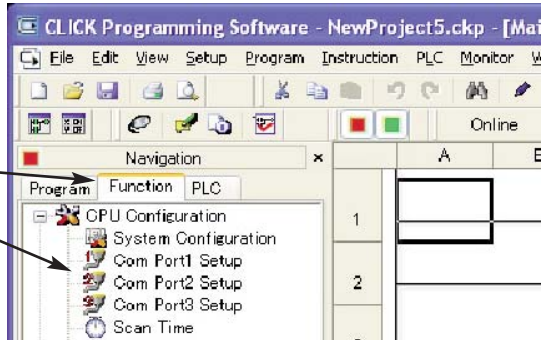
Find the Basic Configuration section in the dialog box and set up the parameters to match other devices in the same network. The dialog box also has a section named Advanced Configuration. You may need to make adjustments to these parameters to overcome communication errors which may occur.

IMPORTANT: The communication port settings are saved in the project file. The project must be transferred to the CLICK PLC in order for any port setting changes to take effect.

C-3 C-3: Com Port 2 Setup (ASCII)

Before you set up the communication ports you must connect the PC with the CLICK programming software to the CLICK PLC Port 1 using a D2-DSCBL or EA-MG-PGM-CBL programming cable. Refer to Chapter 1: Getting Started for step-by-step instructions for this connection. Once the PC and programming software are online with the CLICK PLC, click the Function tab located in the Navigation window and double click Com Port 2 Setup as shown below.

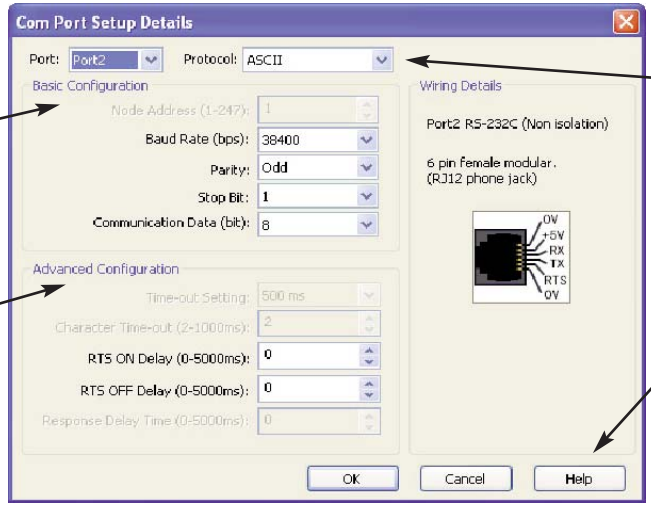
Select the Function tab, then double click Com Port 2 Setup.



The Com Port Setup Details dialog box will come into view as shown below.

Set up the parameters to match the device connected to Port 2.

Make any adjustments here to eliminate com errors.



Select ASCII.

Click the Help button for Com Port Setup Details online help.

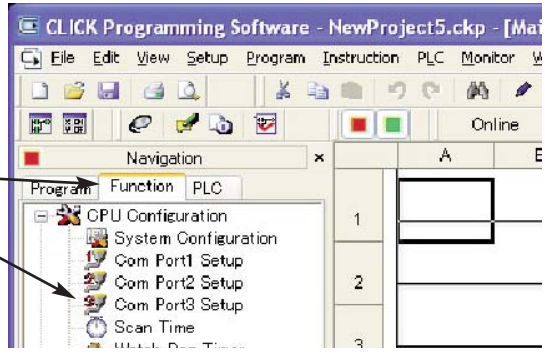
Find the Basic Configuration section in the dialog box and set up the parameters to match the device connected to Port 2. The dialog box also has a section named Advanced Configuration. You may need to make adjustments to these parameters to overcome communication errors which may occur.

IMPORTANT: The communication port settings are saved in the project file. The project must be transferred to the CLICK PLC in order for any port setting changes to take effect.

C-4: Com Port 3 Setup (Modbus)

Before you set up the communication ports you must connect the PC with the CLICK programming software to the CLICK PLC Port 1 using a D2-DSCBL or EA-MG-PGM-CBL programming cable. Refer to Chapter 1: Getting Started for step-by-step instructions for this connection. Once the PC and programming software are online with the CLICK PLC, click the Function tab located in the Navigation window and double click Com Port 3 Setup as shown below.

Select the Function tab, then double click Com Port 3 Setup.



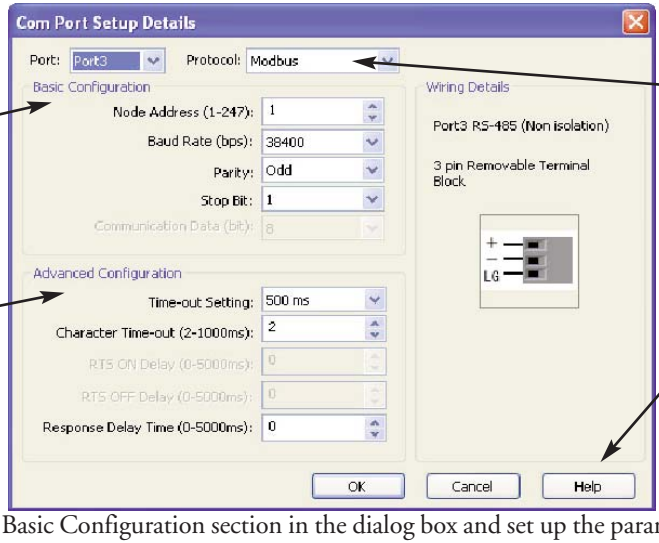
The Com Port Setup Details dialog box will come into view as shown below.

Set up the parameters to match other devices in the same network.

Make any adjustments here to eliminate com errors.

Select Modbus.

Click the Help button for Com Port Setup Details online help.

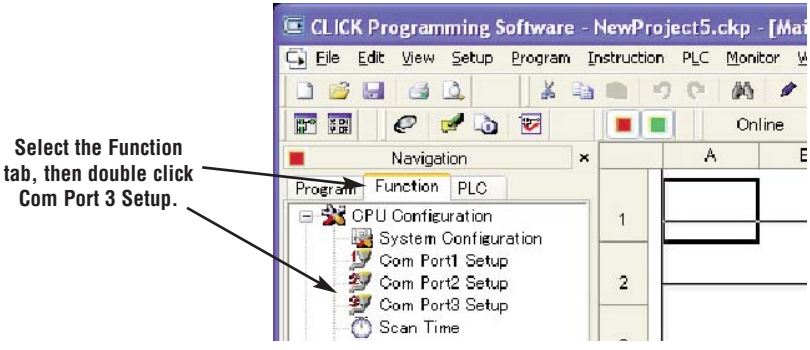


Find the Basic Configuration section in the dialog box and set up the parameters to match other devices in the same network. The dialog box also has a section named Advanced Configuration. You may need to make adjustments to these parameters to overcome communication errors which may occur.

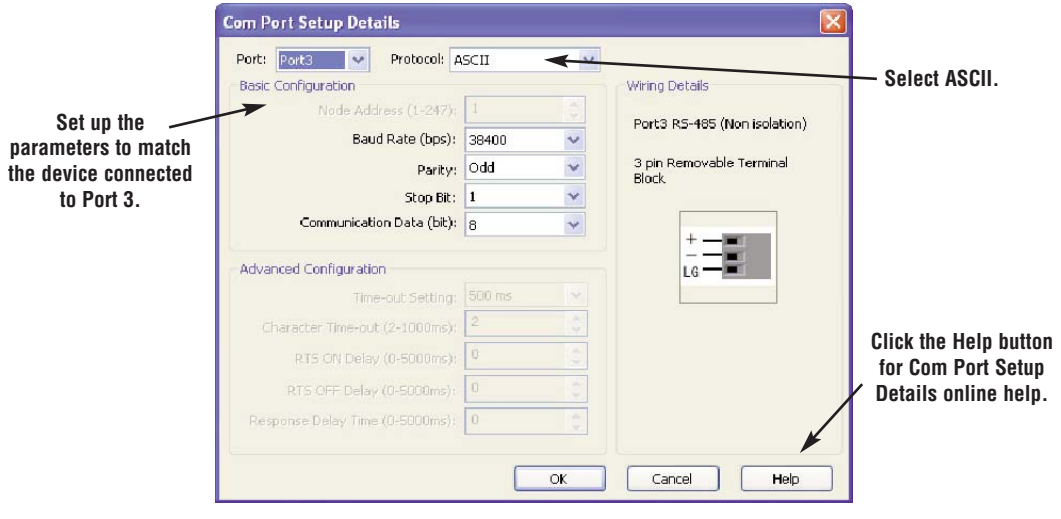
IMPORTANT: The communication port settings are saved in the project file. The project must be transferred to the CLICK PLC in order for any port setting changes to take effect.

C-5 C-5: Com Port 3 Setup (ASCII)

Before you set up the communication ports you must connect the PC with the CLICK programming software to the CLICK PLC Port 1 using a D2-DSCBL or EA-MG-PGM-CBL programming cable. Refer to Chapter 1: Getting Started for step-by-step instructions for this connection. Once the PC and programming software are online with the CLICK PLC, click the Function tab located in the Navigation window and double click Com Port 3 Setup as shown below.



The Com Port Setup Details dialog box will come into view as shown below.



Find the Basic Configuration section in the dialog box and set up the parameters to match the device connected to Port 3.

IMPORTANT: The communication port settings are saved in the project file. The project must be transferred to the CLICK PLC in order for any port setting changes to take effect.

P-1 P-1: Modbus Slave Programming

Ladder Program

To use a CLICK PLC as a Modbus slave, you don't need any special ladder program. You just need an End instruction in the ladder program to put the PLC in Run mode.

However, you can add any additional ladder program to let the slave CLICK PLC control something by itself. For instance, you may want to shut down the outputs on the slave CLICK PLC when it lost communication with the Modbus master.

Note: The Modbus master can communicate with the Modbus slave CLICK PLC without any ladder program. However, output points on the Modbus slave CLICK PLC cannot be turned on if the CPU is not in the Run mode. Because of this, we recommend having at least one End instruction and to put the CPU in Run mode.

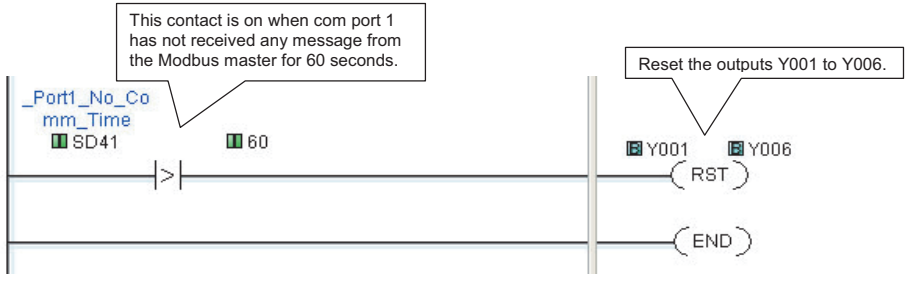
Lost Communication Situation

You may want to detect if there is something happening at the Modbus master side that stops communication with the Modbus slaves. Or, the communication cable might have been disconnected. In the situation, you may want the Modbus slaves to take an action. For instance, you may want to shut down the outputs on the slave CLICK PLC when the communication with the Modbus master is lost. We offer an easy method to accomplish this.

The CLICK keeps counting how long it has been since each com port received a message from the Modbus master, and enters the time duration in the following system data registers.

System Data Registers		
System Data Register	**Nickname**	**Range**
SD41	_Port1_No_Comm_Time	0 - 32767 (sec)
SD51	_Port2_No_Comm_Time	0 - 32767 (sec)
SD61	_Port3_No_Comm_Time	0 - 32767 (sec)

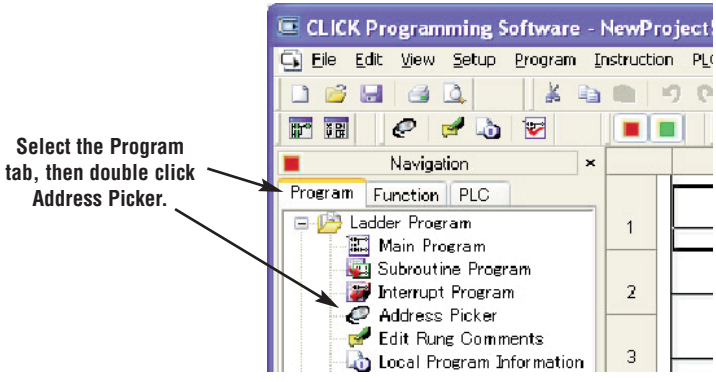
Each register is reset to zero automatically when the com port receives a message from the Modbus master. Then, its value keeps increasing by 1 per second until the com port receives another message from the Modbus master. If one of these registers has 60 as its value, it means the com port has not received any message from the Modbus master for 60 seconds. You can use this info to shut down the outputs on the slave CLICK PLC. Here is an example program.



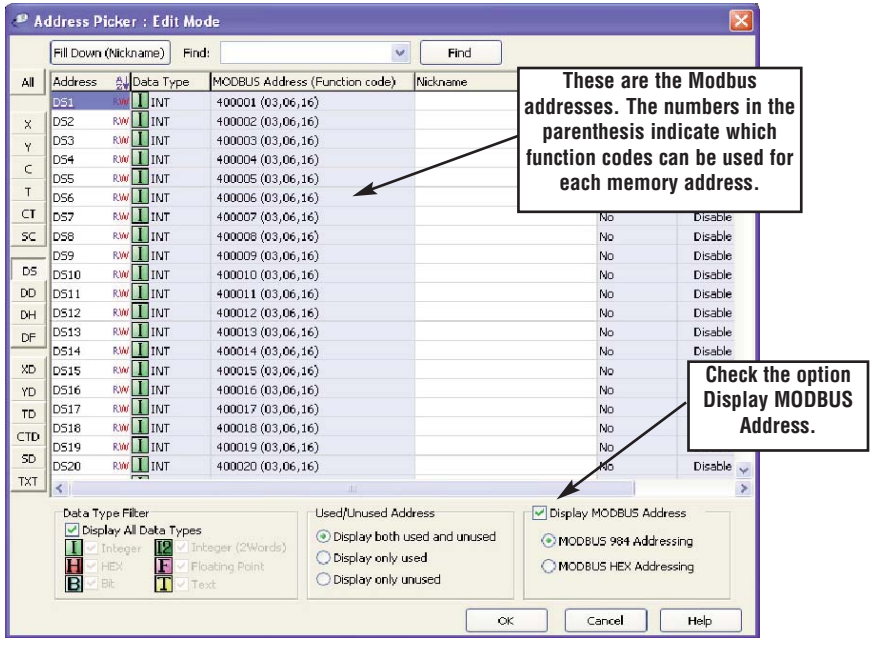
Modbus Addressing

Each of the memory addresses in the CLICK (X1, DS1, etc.) has a unique Modbus address. This means the network master in the Modbus network can access any memory address in the slave CLICK PLC. The best way to check what Modbus address is assigned to a particular CLICK memory address is to use the CLICK programming software.

Click the Program tab located in the Navigation window and double click Address Picker as shown below.



After the Address Picker window opens, check the option Display MODBUS Address on the right bottom.



Exception Response (Exception Code)

When the slave CLICK PLC receives a request from the Modbus master that it cannot respond to, the slave CLICK PLC sends an exception response to the Modbus master. The CLICK PLC supports the following Exception Responses.

Exception Response (Exception Code)		
Code	**Name**	**Details of Exception Response**
01	Illegal Function	The CLICK PLC does not support the function code received from the MODBUS master.
02	Illegal Data Address	The MODBUS master tried to access to an invalid address.
03	Illegal Data Value	The data length is zero or exceeds the maximum size.
		The data for Write Single Coil is not FF00h (ON) or 0000h (OFF).
		The PLC mode change request from the MODBUS master is not valid.
04	Slave Device Failure	Password is locked.
		When the PLC mode switch is in STOP position, the MODBUS master requested to switch to RUN mode.
		When the PLC mode switch is in RUN position, the MODBUS master requested to switch to the Firmware Update mode.

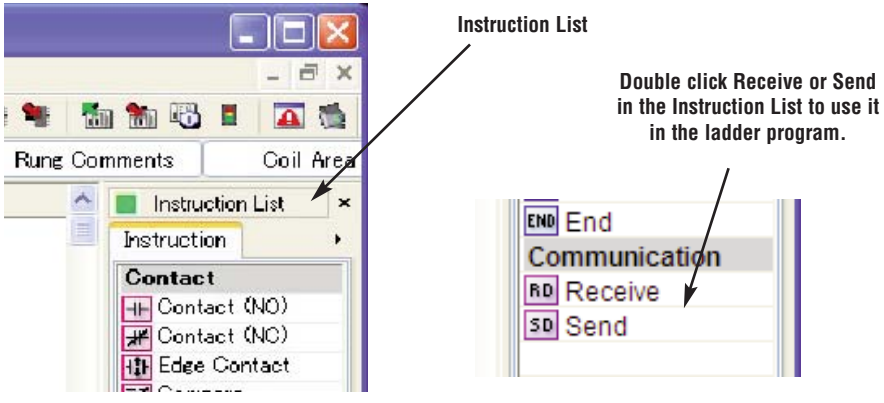
P-2 P-2: Modbus Master Programming

Instructions

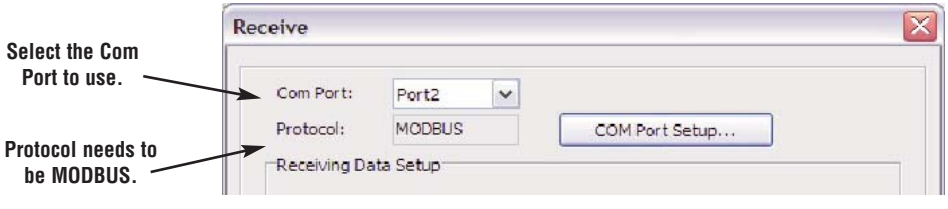
The CLICK PLC has two instructions to exchange data with external Modbus devices through the com ports; the Receive and Send instructions.

- **Receive** instruction: Read data from an external Modbus device.
- **Send** instruction: Write data to external Modbus device(s).

To use these instructions, double click Receive or Send in the Instruction List window as shown below.

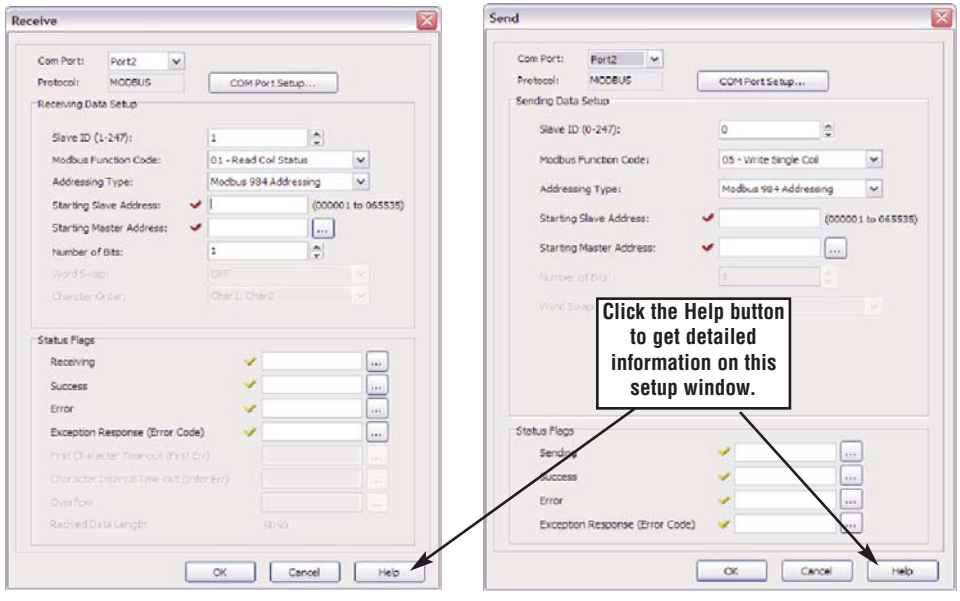


Select the Com Port that you are going to use and confirm the Protocol is MODBUS.



If the Protocol is not MODBUS, click the Com Port Setup button to open the Com Port Setup Details window and change the Protocol to MODBUS. If the Protocol selection is grayed out as shown below, it means the Com Port is used by another Receive and/or Send instruction in the ladder program. You cannot change the Protocol setup until you delete those instructions.

When you open the Receive or Send instruction in the Modbus mode, their windows should look like this. For the explanation of each setup parameter, please click the Help button on the bottom right.



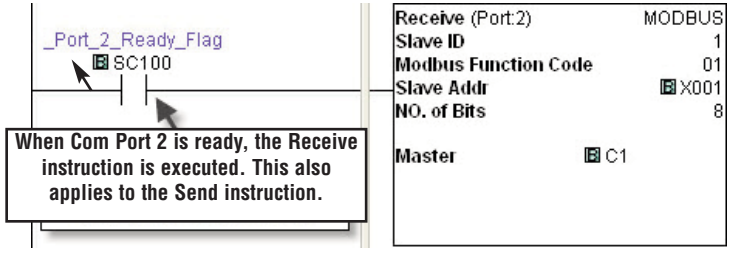
Com Port Status Indicators

The CLICK PLC has the following System Control Relays to indicate the status of the Com Ports.

System Control Relays		
Address	**Nickname**	**Description**
SC100	_Port_2_Ready_Flag	On when Port 2 is ready.
SC101	_Port_2_Error_Flag	On when Port 2 has a communication error.
SC102	_Port_3_Ready_Flag	On when Port 3 is ready.
SC103	_Port_3_Error_Flag	On when Port 3 has a communication error.

Example Program

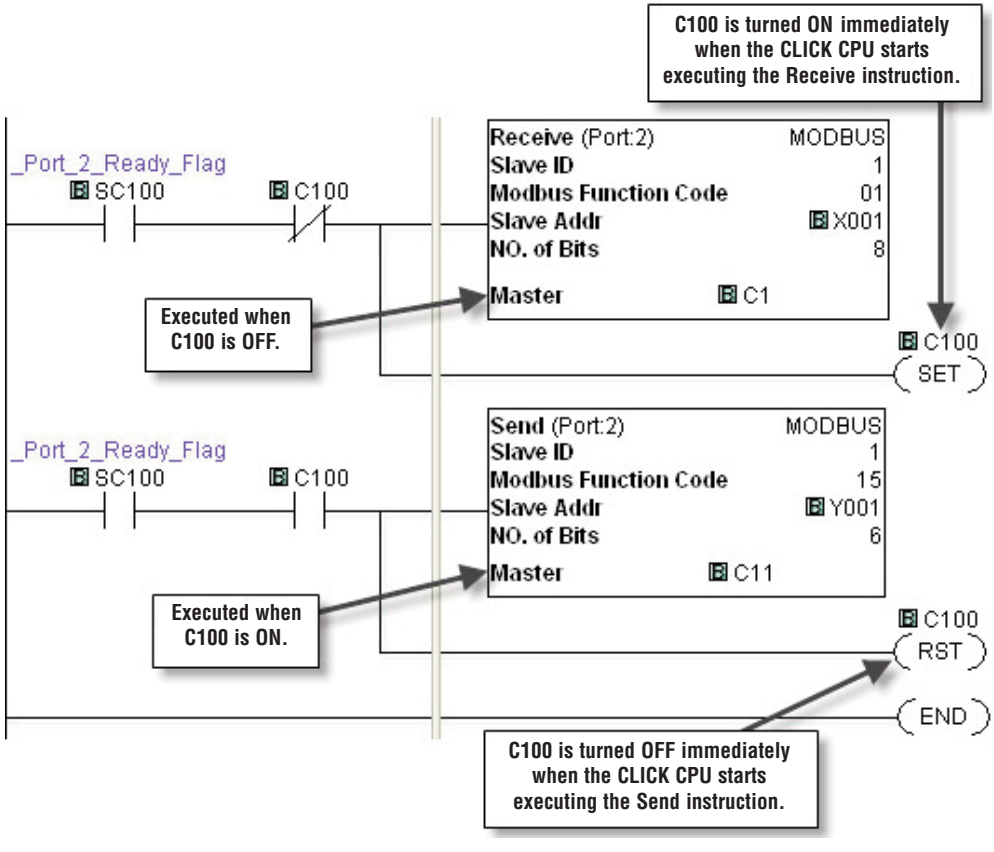
The ladder program to use these Receive and Send instructions are easy. You just need one NO (Normally Open) contact instruction to check if the com port is ready to receive or send data.



Interlocking

These instructions keeps receiving or sending data when the enable input is on. If you want to use more than one Receive and/or Send instruction, you need to be sure only one of the instructions is enabled at any point during the operation. The technique to execute more than one Receive and/or Send instruction in order is called 'Interlocking'. Here is an example of interlocking.

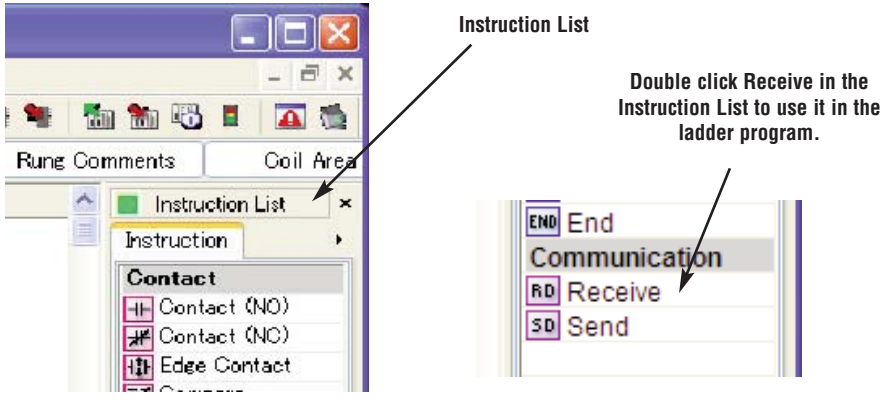
When this sample program is executed, the Receive and Send instructions are executed alternatively.



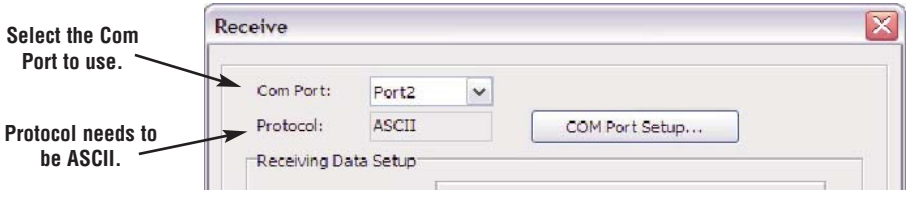
P-3 P-3: ASCII Receive Programming

Instruction

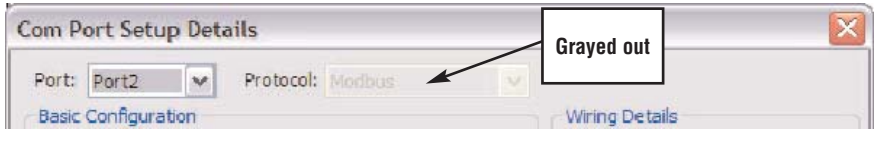
The Receive instruction allows the CLICK PLC to read ASCII message from an external device. To use this instruction, double click Receive in the Instruction List window as shown below.



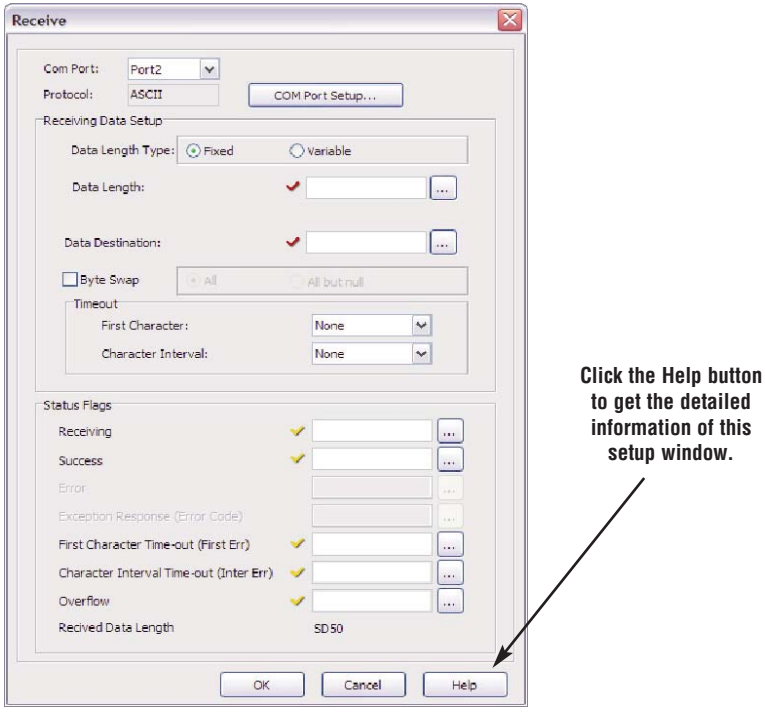
Select the Com Port that you are going to use and confirm the Protocol is ASCII.



If the Protocol is not ASCII, click the Com Port Setup button to open the Com Port Setup Details window and change the Protocol to ASCII. If the Protocol selection is grayed out as shown below, it means the Com Port is used by another Receive and/or Send instruction in the ladder program. You cannot change the Protocol setup until you delete those instructions.

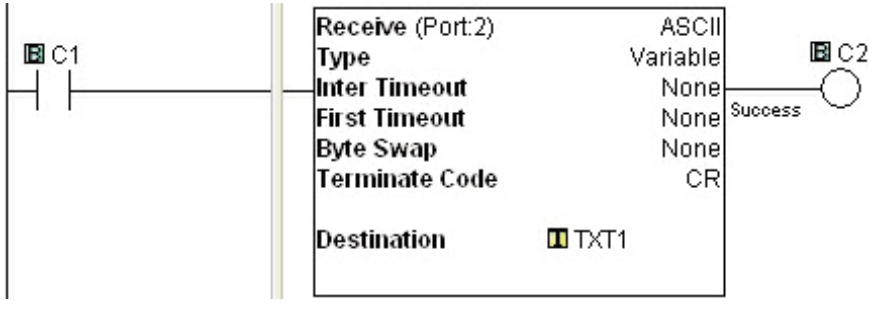


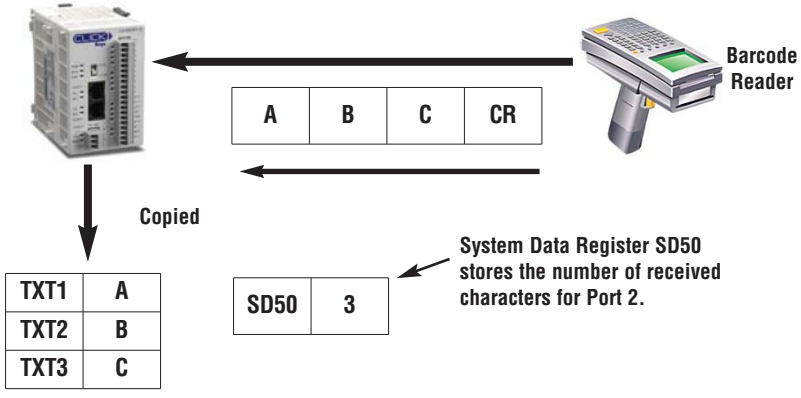
When you open the Receive instruction in the ASCII mode, the window should look like this. For the explanation of each setup parameter, please click the Help button on the bottom right



Example 1: Read ASCII message from a barcode reader.

With the following example program, when C1 is ON, the Receive instruction is activated and Com Port 2 waits for an ASCII message from the barcode reader. When Com Port 2 receives an ASCII message and it includes the termination character (CR = Carriage Return in this example), C2 is turned on and the received ASCII message is copied to TXT1 address.

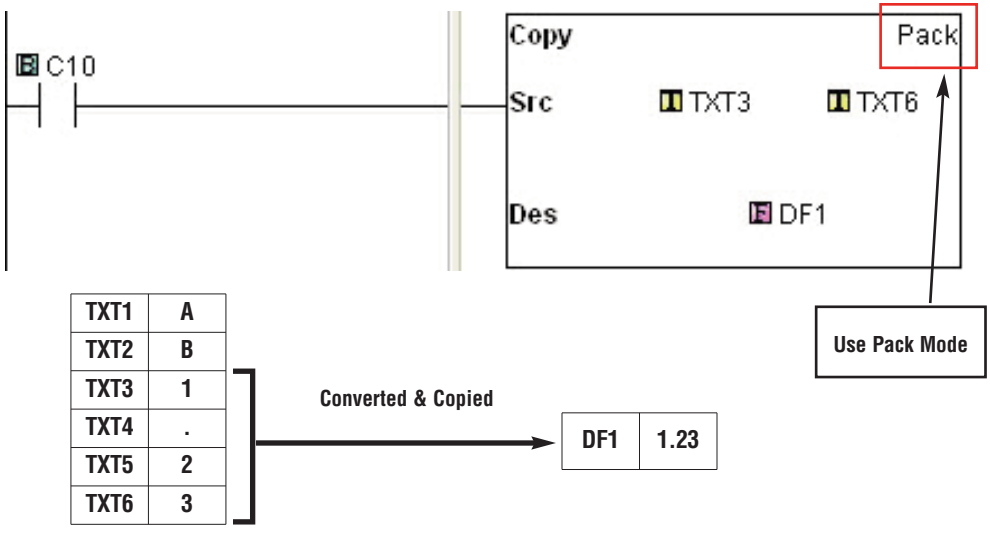




Example 2: Retrieve numerical data from the received ASCII message.

When numerical data is included in the received ASCII message, you may want to retrieve the numerical data and copy into a data register. The Copy instruction can be used for this purpose.

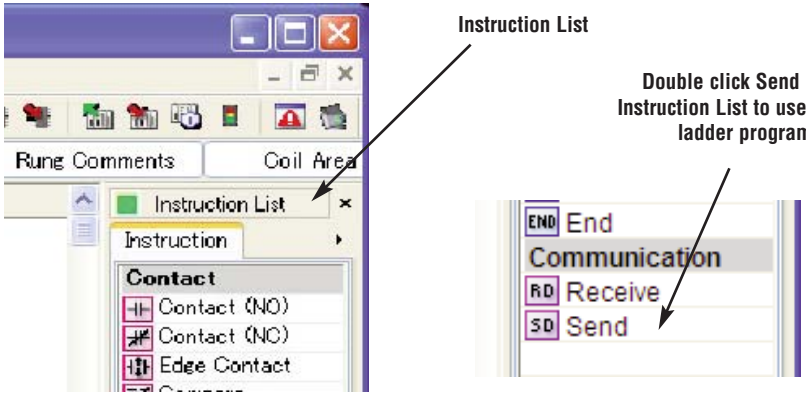
In this example, received ASCII message is stored in TXT1 to TXT6. This ASCII message includes a numerical data '1.23' as ASCII characters from TXT3 to TXT6. The Copy instruction converts those ASCII characters into the equivalent numerical data and copies into data register DF1.



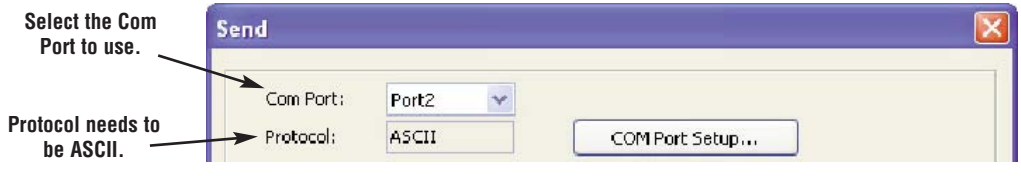
P-4 P-4: ASCII Send Programming

Instruction

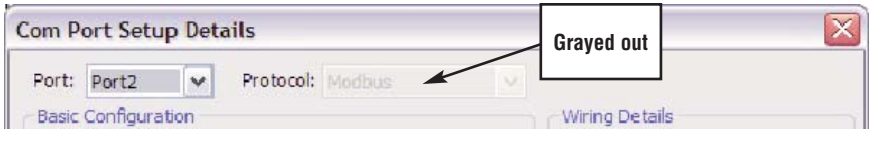
The Send instruction allows the CLICK PLC to send ASCII messages to an external device. To use this instruction, double click Send in the Instruction List window as shown below.



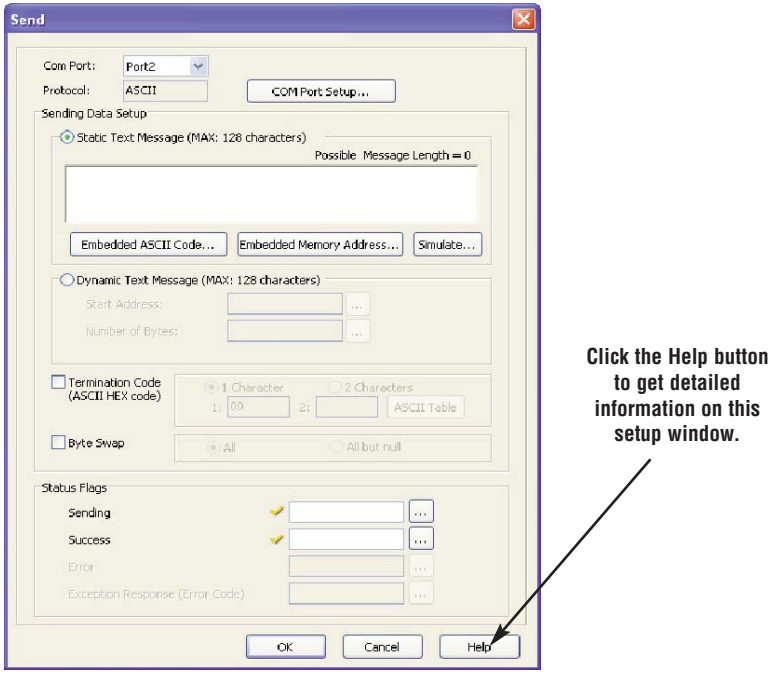
Select the Com Port that you are going to use and confirm the Protocol is ASCII.



If the Protocol is not ASCII, click the Com Port Setup button to open the Com Port Setup Details window and change the Protocol to ASCII. If the Protocol selection is grayed out as shown below, it means the Com Port is used by another Receive and/or Send instruction the ladder program. You cannot change the Protocol setup until you delete those instructions.

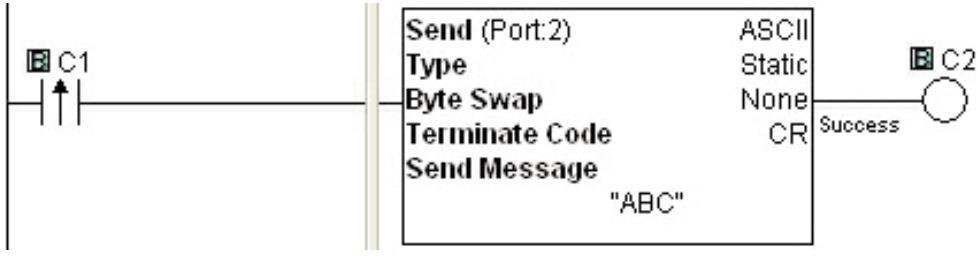


When you open the Send instruction in the ASCII mode, the window should look like this. For the explanation of each setup parameter, please click the Help button on the bottom right.



Example: Send ASCII message to a serial printer.

With the following example program, when status of C1 changes from OFF to ON, the Send instruction sends ASCII message 'ABC' and the termination character (CR = Carriage Return in this example). C2 is turned on when sending the ASCII message is completed.



Maintenance

In This Chapter...

PLC Maintenance

Although the CLICK PLC requires very little maintenance, setting up a routine maintenance schedule will ensure the longevity of the PLC in your application. We suggest checking the following items as part of a quarterly or bi-annual preventative maintenance schedule.

Check LED Indicators

Check the PWR and ERR LED indicators on the PLC CPU and I/O modules. If the PWR LED indicator is off or flickering, or if the ERR indicator is on or flickering, refer to Chapter 6: Troubleshooting for more information.

Project Backup

Saving a copy of the project file during routine maintenance ensures that you will have a fairly up-to-date backup copy of the PLC program. Although the CLICK PLC programming software can upload the complete project from the PLC anytime the PLC is operable, it is wise to maintain a project backup in case the PLC becomes inoperable and has to be replaced. The backup file of the project can then be downloaded into the new PLC.

Check Operating Environment

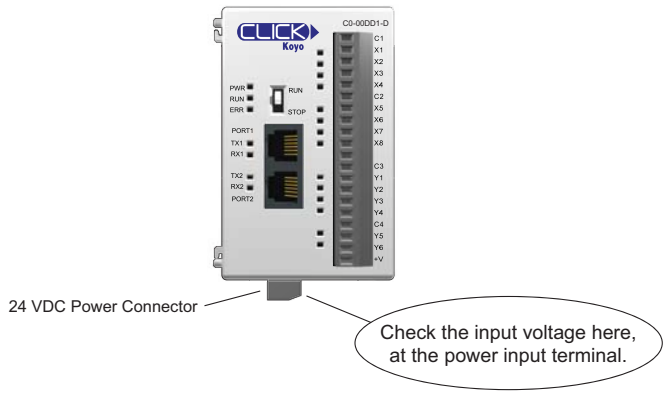
Make sure that the CLICK PLC is operating within the proper temperature range (0–55°C; 32–131°F).

Make sure that the CLICK PLC is operating within the proper humidity range (30–95% RH, non-condensing).

Make sure that the CLICK PLC operating environment is free of corrosive gases.

Check Operating Voltage

Check the input voltage that is powering the CLICK PLC to make sure that the voltage is within the appropriate range (20–28 VDC).



Check the input voltage for the I/O module terminal blocks. Refer to Chapter 2: Specifications for the voltage specifications of the various I/O modules.

Check Physical Condition

Check the CPU and modules for distorted, warped, or discolored cases and burnt odors that could indicate overheated components.

Check to ensure that none of the PLC and module cooling vents are clogged or blocked by dust or debris. Make sure that there is sufficient unobstructed heat dissipation space around the PLC as shown in Chapter 3: Installation and Wiring.

Ensure that all of the CLICK PLC modules are connected together tightly. Also make sure that all communication cables, wiring, and terminal blocks are connected properly.

Warning: The CLICK PLC does not have hot swap capability. Do not disconnect or replace any I/O modules without first shutting off power to the PLC CPU unit.

Check Project Functionality

During routine maintenance, check the functionality of your project (PLC program). Make sure the system or equipment that is being controlled is operating as intended.

Check the PLC Program from CLICK PLC Programming Software

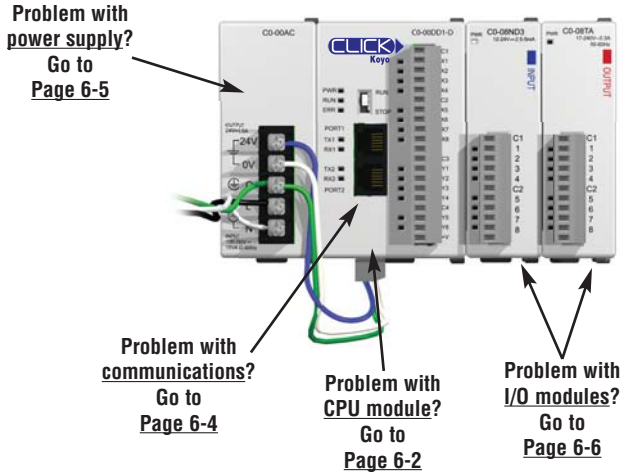
You can read the following PLC information from CLICK PLC programming software:

- System configuration.
  Check whether or not the PLC CPU module is recognizing the actual I/O configuration correctly.
- Error history.
  Check whether or not any errors occurred recently.
- Scan time.
  Check whether or not the scan time is normal, and if the minimum and maximum scan times are reasonable. (Refer to Chapter 2: Specifications for information regarding scan times.)

NOTES

TROUBLESHOOTING

In This Chapter...

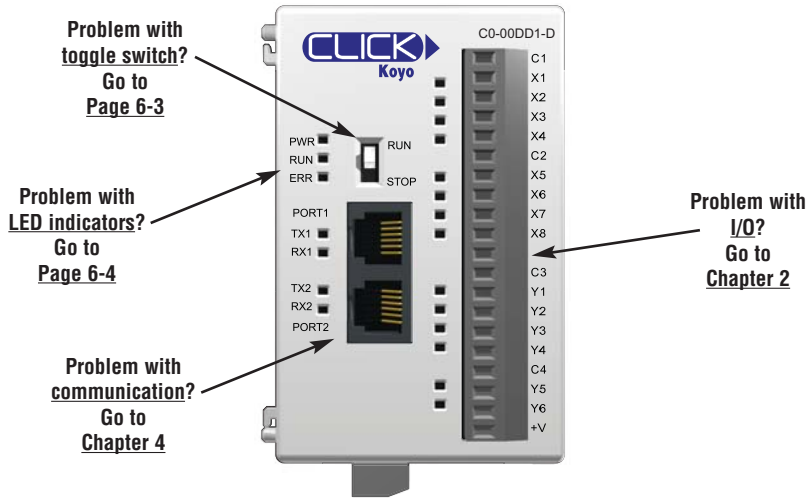


Troubleshooting Direction

Use this section to figure out where to start when troubleshooting CLICK PLC problems.

CPU Module Troubleshooting

CPU module issues are grouped according to their function. Use the illustration below to find the appropriate document page numbers for issues with different CPU module functions.



Toggle Switch

Switch is in RUN position

When the toggle switch is in the RUN position, the CPU module should normally be in Run mode (indicated by the RUN LED being ON), unless the PLC has been placed in Stop mode by a peripheral device through one of the communication ports. To put the CPU module in Run mode, move the toggle switch to the STOP position and then switch it back again to the RUN position. If the RUN LED then remains off, check the PWR and ERR LED indicators per the chart shown below.

LED	Status*	Necessary action
PWR	OFF	There is insufficient power for the CPU module. Check the power cable and input voltage.
ERR	ON	There is a fatal error in the CPU module. Connect the **CLICK** programming software to read the error information. Refer to the "Error Codes" section of this chapter for error message instructions.

**** If you see LED indications different from the ones shown in this table, refer to the "LED Indicators Troubleshooting" section for further explanations.***

Switch is in STOP position

When the toggle switch is in STOP position, the CPU module should be in Stop mode (indicated by the RUN LED being OFF). Cycle power to the PLC. If the CPU module starts up in Run mode, it means the CPU module does not recognize the toggle switch position correctly. Please replace the CPU module.

LED Indicators

The CLICK PLC performs many pre-defined diagnostic routines with every CPU scan, using onboard diagnostics that can detect various errors or failures in the PLC.

The CPU module has 3 LED indicators (PWR, RUN and ERR) to indicate the status of the CPU module.

The CPU module also has other LED indicators, which are discussed in other sections of this chapter.

- TX1/RX1/TX2/RX2 – Chapter 2
- LED indicators for I/O – Chapter 2

LED	Status	Meaning	Necessary action
PWR	On	The PLC is powered correctly.	No action is necessary.
	Blinking	The PLC input power is not sufficient.	Check the voltage on the terminal located on the bottom of the CPU. The input voltage should be 20-28 VDC. Also check the power input wiring & terminal connections. The power supply may need to be replaced.
	Off	There is no power to the PLC.	Check the voltage on the terminal located on the bottom of the CPU. The input voltage should be 20-28 VDC. Also check the power input wiring & terminal connections. The power supply may need to be replaced.
RUN	On	The CPU is in RUN mode.	If the toggle switch next to the LED indicators is in RUN position, no action is necessary. If the toggle switch is in STOP position, cycle power the PLC. If the CPU module starts up in Run mode, it means that the CPU module does not recognize the toggle switch position correctly, and the CPU module must be replaced.
	Off	The CPU is in STOP mode.	If the toggle switch next to the LED indicators is in STOP position, no action is necessary. If the switch is in RUN position and you want to put the CPU module in Run mode, toggle the switch to STOP position and then back to RUN position. If the RUN LED stays off, connect the **CLICK** programming software to read the error information. See error message instructions later in this section.
ERR	On	There is a fatal error.	Connect the **CLICK** programming software to check the error. See error message instructions later in this section.
	Blinking	There is a non-fatal error.	Non-fatal errors do not prevent the CPU module from running. However, you should check what non-fatal errors are active. Connect the **CLICK** programming software to read the error information. See error message instructions later in this section.
	Off	There is no error.	No action is necessary.

Fatal Errors (ERR LED on) – Errors which may cause the system to function improperly, perhaps causing a safety problem. The CPU will automatically switch from RUN Mode to STOP Mode. (In STOP Mode all outputs are turned off.) If the CPU is already in STOP Mode when the fatal error is detected, the CPU will not allow a transition to RUN Mode until the error has been corrected. Examples of fatal errors:

- ***Power supply failure***
- ***Parity error or CPU malfunction***
- ***CPU does not have firmware***
- ***Particular programming errors***

Non-fatal Errors (ERR LED blinking) – Errors that require attention, but do not cause improper operation. They do not cause or prevent any CPU mode transitions. The application program can use special relay contacts to detect non-fatal errors, and even take the system to an orderly shutdown or switch the CPU to STOP Mode if desired. Examples of Non-fatal errors:

- ***Certain programming errors. The programming devices will notify you of an error if one occurs while online.***
- ***The CLICK programming software provides the error number and an error message.***

Power Supply Troubleshooting

When the PWR LED indicator on the CLICK PLC is on, the PLC is receiving enough power for operation. However, you can measure the power input voltage at the bottom connector on the CPU module. To run the CLICK PLC correctly, the input voltage needs to be 20-28 VDC.

The input voltage measures less than 20VDC

Remove the bottom connector from the CPU module and measure the voltage again. If the voltage at the connector then measures more than 20 VDC, the power supply cannot provide enough current for the CLICK PLC. Replace the power supply with a higher output current power supply. Check the power budget to determine the current required from the power supply (see below).

If the voltage still measures less than 20 VDC with the connector removed from the CPU, and the power supply voltage is not adjustable, then the power supply cannot be used for the CLICK PLC. Replace the power supply with another one.

The input voltage measures greater than 28 VDC

If the output current of the power supply is adjustable, decrease the output voltage. If the output voltage cannot be lowered to less than 28 VDC, replace the power supply with another one.

How to check the power budget

You can use the programming software to check the power budget of the CLICK PLC.

- Connect the PLC to a computer running the CLICK programming software.
- From the software menus, connect the software to the PLC by selecting PLC and Connect...
- From the software menus, select Setup and System Configuration...
- The System Configuration Setup window opens, and displays the Power Budget in mA required by the PLC system. The PLC power supply must be capable of providing more current than the Power Budget amount.

I/O Module Troubleshooting

First, check the status of the PWR LED indicators on the I/O modules. If the PWR LED on the CPU module is on, but there are I/O modules which have PWR LEDs that are off, check the connections between the modules. If the I/O module PWR LEDs remain off, replace those modules.

Troubleshooting input modules is slightly different from troubleshooting output modules. Please refer to the proper subsection.

- DC/AC input module troubleshooting
- DC output module troubleshooting

DC/AC Input Module Troubleshooting

The input modules (including the CPU built-in inputs) can have the following symptoms:

Symptom	Necessary Action
Input signal is on, but the LED indicator on the module is off.	Check the external power input voltage on the terminal block.
	Check whether the terminal block is attached correctly.
	If the input voltage is correct but the LED indicator is still off, replace the input module.
The LED indicator is on, but the PLC does not work as expected.	Check whether the CPU module RUN LED is ON. If not, put the CPU in RUN mode.
	Check the I/O configuration with the programming software. (See "Troubleshooting with Programming Software" later in this section for instructions.)
	Connect the programming software and check the X bit related to the input point that is on. (See online help files for instructions.) If the X bit is off, replace the input module. (See Chapter 2: Specifications)

DC Output Module Troubleshooting

The output modules (including the CPU built-in outputs) can have the following symptoms:

Symptom	Necessary Action
The module LED indicator is ON, but there is no output.	Check the external power input voltage on the terminal block.
	Check whether the terminal block is attached correctly.
	If it is a DC sinking, relay, or AC output, check the voltage between the output and the common. If the output is working correctly, the voltage should be close to zero.
	If it is a sourcing output, check the voltage between the output and the 24 VDC input. If the output is working correctly, the voltage should be close to zero.
	Check whether the terminal block is attached correctly.
	If the LED indicator is ON, but the output voltage is not correct, replace the output module. (See Chapter 2: Specifications for instructions.)
The module LED indicator is OFF, even though the output status bit (Y---) is supposed to be ON.	Check whether the CPU module RUN LED is ON. If not, put the CPU in RUN mode.
	Check the I/O configuration with the programming software. (See "Troubleshooting with Programming Software" later in this section for instructions.)
	Connect the programming software and check whether the Y bit related to the output point is ON. If the Y bit is not actually ON, use the override feature to manually turn the Y bit ON. (See online help files for instructions.) If the Y bit is ON, but the output is OFF, replace the output module. (See Chapter 2: Specifications for instructions.)
The module LED indicator is OFF, but the output is sending an ON signal to the field device.	Leakage current can be a problem when connecting field devices to I/O modules. False input signals can be generated when the leakage current of the output point is great enough to turn on the connected input device. To correct this issue, install a resistor in parallel with the input or output of the circuit. The value of this resistor will depend on the amount of leakage current and the voltage applied, but usually a 10k to 20k Ohm resistor will work. Ensure that the wattage rating of the resistor is correct for your application.

How to Check the I/O Configuration

You can use the CLICK programming software to check the I/O configuration that the CPU is recognizing.

Checking I/O configuration with programming software

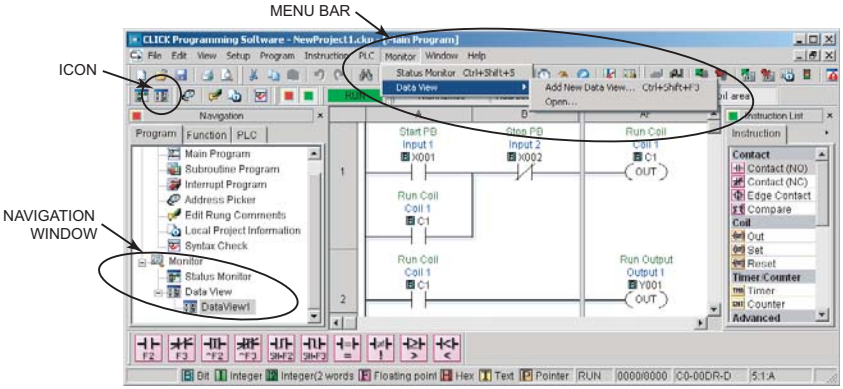
- Connect the PLC to a computer running the CLICK programming software.
- From the software menus, connect the software to the PLC by selecting PLC and Connect...
- From the software menus, select Setup and System Configuration...
- The System Configuration Setup window opens, and displays all of the CLICK module types the CPU recognizes that are connected in the PLC system.

How to Check the I/O Status

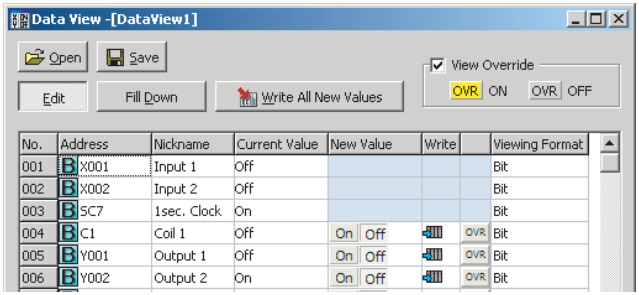
You can use a CLICK programming software Data View to check the I/O status in the CPU module.

Warning: Only authorized personnel fully familiar with all aspects of the application should make changes to the program. Make sure that you thoroughly consider the impact of any changes to minimize the risk of personal injury or damage to equipment. Specifically, forcing inputs and outputs to their on state will cause externally connected equipment to operate.

- Open or create a data view window by selecting Monitor and Data View from either the menu bar, the Navigation window, or the Data View icon.



- To add new memory addresses to a Data View window:
  - Click on an empty Address field to bring up a small browser button. 
  - Click the browser button to open the Address Picker window,
  - From the Address Picker window, click the Pickup Mode button, select the desired I/O or memory location, and then click OK to add that address into the data view.



- To troubleshoot I/O from the Data View window:
  - Connect to PLC
  - Force outputs on/off, then check actual outputs to see whether they are actually on or off.
  - Edit, Write All New Values, or double click individual output Write icon.
  - Externally turn inputs on or off, then check their status in data view. Inputs cannot be forced from Data View.

Replacement of I/O modules

Warning: The CLICK PLC does not have hot swap capability. Do not disconnect or replace any I/O modules without first shutting off power to the PLC CPU unit.

Before replacing an I/O module, please consider the cause of the module problem. If you suspect that another device may have caused the failure in the module, that device may also cause the same failure in the replacement module. As a precaution, you may want to check power supplies or other devices connected to the failed module before replacing it.

Troubleshooting Electrical Noise Problems

Electrical Noise Problems

Noise is one of the most difficult problems to diagnose. Electrical noise can enter a system in many different ways and can fall into one of two categories, conducted noise or radiated noise. It may be difficult to determine how the noise is entering the system, but the corrective actions are similar for both types of noise problems.

- Conducted noise is electrical interference introduced into the system by way of an attached wire, panel connection, etc. The interference may enter through an I/O circuit, a power supply connection, the communication ground connection, or the chassis ground connection.
- Radiated noise is electrical interference introduced into the system without a direct electrical connection, much in the same manner as radio waves.

Reducing Electrical Noise

Although electrical noise cannot be completely eliminated, it can be reduced to a level that will not adversely affect the system.

- Most noise problems result from improper grounding of the system. A good earth ground can be the single most effective way to correct noise problems. If a ground is not available, install a ground rod as close to the system as possible. Ensure that all ground wires are single point grounds, and are not daisy chained from one device to another. Ground other metal enclosures near the system. A loose wire can act as a large antenna, introducing noise into the system; so, tighten all connections in your system. Loose ground wires are more susceptible to noise than the other wires in your system. Review Chapter 3: Installation and Wiring, if you have questions regarding how to ground your system.
- Electrical noise can enter the system through the power source for the PLC and I/O circuits. Installing an isolation transformer for all AC sources can correct this problem. DC sources should be well-grounded, good quality power supplies.
- Separate input wiring from output wiring. Never run low-voltage I/O wiring close to high voltage wiring.

Error Codes

When there is an error or warning, the error code is stored in the system data register SD1.

PLC Error Codes					
Error Code	**SC bit***	**Error Name**	**Category**	**Causes**	**Solutions**
0101	SC20	I/O Module Error	Error	There are more than 8 I/O modules.	A CLICK PLC system can support up to 8 I/O modules. Remove any excessive I/O modules.
				At least one I/O module was added to the CLICK PLC during operation.	Power off the CLICK PLC and check the connection of the I/O modules. Then power on the CLICK PLC again. If the problem remains, connect the CLICK software to the PLC and check the System Configuration. If there is any I/O module that is not shown in the System Configuration, replace it.
				An I/O module has failed.	Connect the CLICK software to the CLICK PLC and check the system configuration. If there is any I/O module that is used in the PLC system but not shown in the System Configuration window, replace the I/O module.
0102	SC21	System Config Error	Error	The current system configuration does not match the configuration saved in the project file.	Connect the CLICK software to the CLICK PLC and open the System Configuration window. Modify the current configuration of the CLICK PLC to match the configuration in the project file, or uncheck the 'Start-up I/O Config Check' option if you want to use the current configuration.
0103	SC22	I/O Config Error	Error	At least one I/O module was removed from the CLICK PLC during operation.	Power off the CLICK PLC and check the connection of the I/O modules. Then power on the CLICK PLC again. If the problem remains, connect the CLICK software to the PLC and check the System Configuration. If there is any I/O module that is not shown in the System Configuration, replace it.
				The CPU module can not access one or more I/O modules.	Connect the CLICK software to the CLICK PLC and open the System Configuration window. If there is any I/O module that is used in the PLC system but not shown in the System Configuration window, replace the I/O module.
0104	SC23	Memory Check Error	Error	There is a memory check error.	Power cycle the CLICK PLC. If the same error occurs again, download the project again and/or try the 'Reset to Factory Default' command. If the same error still occurs, replace the CPU module.
0105	SC24	Project File Error	Error	There is no project file in the CLICK PLC.	Download a project file into the CLICK PLC.
				The project file stored in the CLICK PLC is corrupted.	Download the project file into the CLICK PLC again.
0106	SC25	Firmware Version Error	Error	The project file was written on a newer version of CLICK software. The firmware in the CLICK PLC is too old to execute the project.	Connect the CLICK software to the CLICK PLC and update the firmware of the CPU module.
0107	SC26	Watchdog Timer Error	Error	The PLC scan time exceeded the watchdog timer setup.	Connect the CLICK software to the PLC and check the maximum PLC scan time and the watchdog timer setup.

** The SC bits are turned ON when the related errors occur.*

Error codes continued on next page.

Error Codes (cont'd)

PLC Error Codes					
Error Code	**SC bit***	**Error Name**	**Category**	**Causes**	**Solutions**
0201	SC27	Lost SRAM Data	Warning	The data in the SRAM was lost while the CLICK PLC was powered off.	The CLICK CPU module does not have a battery back-up, but it has a capacitor that will hold memory for a few days. The data in the SRAM is lost if the CLICK PLC is powered off for long enough for the capacitor to discharge. In this case, the CLICK PLC initializes the data in the SRAM automatically.
0202	SC28	Battery Low Voltage	Warning	Battery voltage is too low to retain data in the SRAM.	Replace the battery (ADC part #: D2-BAT-1). Also, set the new battery installation date and the anticipated replacement date in the CLICK programming software if the Battery Replacement Notification option is selected. (Pull-down menu: Setup > Battery Backup Setup)
0203	SC29	Battery Replace-ment	Warning	The anticipated battery replacement date has passed.	Replace the battery (ADC part #: D2-BAT-1). Also, set the new battery installation date and the anticipated replacement date in the CLICK programming software. (Pull-down menu: Setup > Battery Backup Setup)

**** The SC bits are turned ON when the related errors occur.***