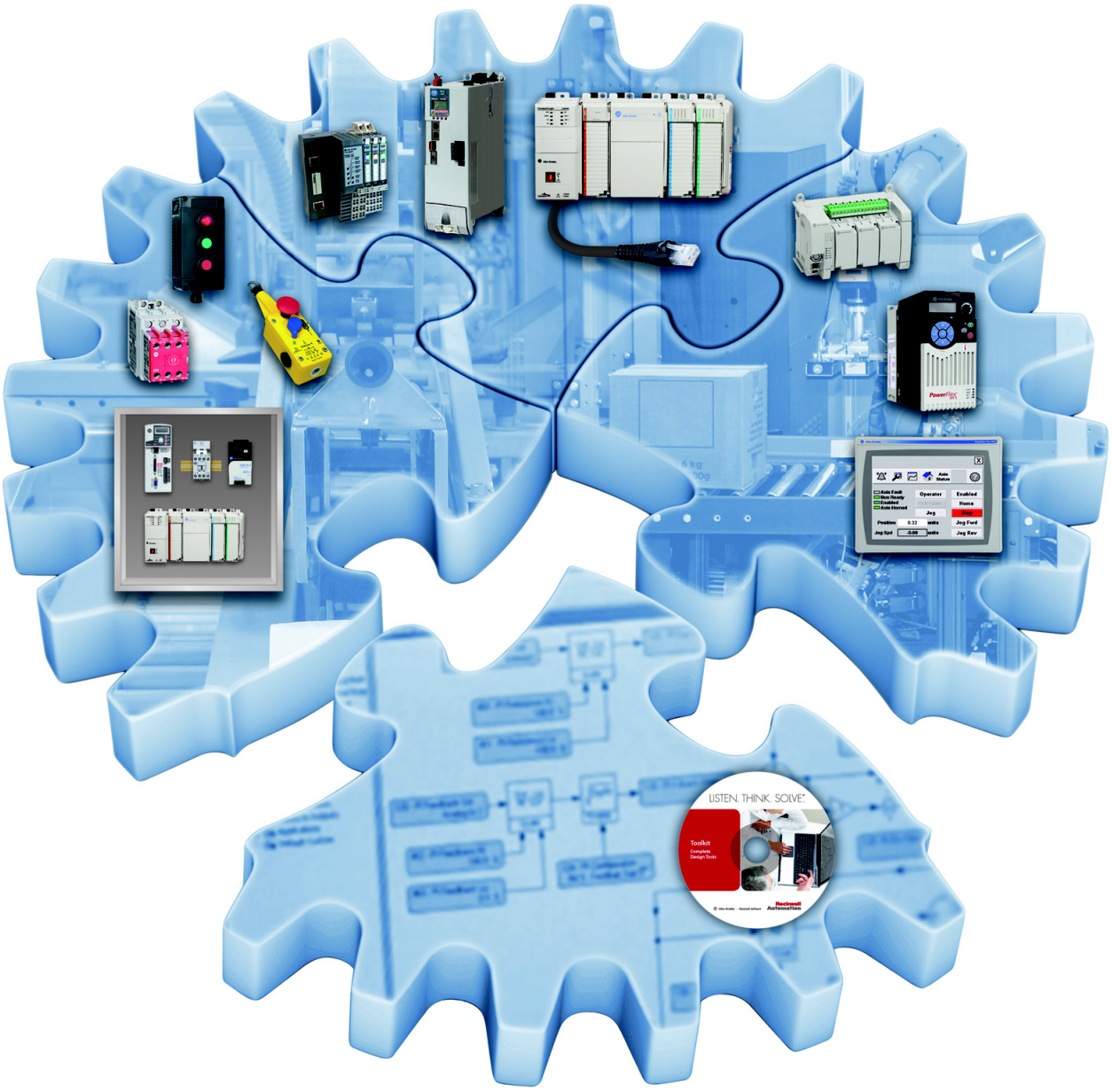
Quick Start

Allen-Bradley

Kinetix 3 Motion Control Indexing Device Building Block

Connected Components Accelerator Toolkit



Important User Information

Read this document and the documents listed in the additional resources section about installation, configuration, and operation of this equipment before you install, configure, operate, or maintain this product. Users are required to familiarize themselves with installation and wiring instructions in addition to requirements of all applicable codes, laws, and standards.

Activities including installation, adjustments, putting into service, use, assembly, disassembly, and maintenance are required to be carried out by suitably trained personnel in accordance with applicable code of practice.

If this equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

In no event will Rockwell Automation®, Inc. be responsible or liable for indirect or consequential damages resulting from the use or application of this equipment.

The examples and diagrams in this manual are included solely for illustrative purposes. Because of the many variables and requirements associated with any particular installation, Rockwell Automation, Inc. cannot assume responsibility or liability for actual use based on the examples and diagrams.

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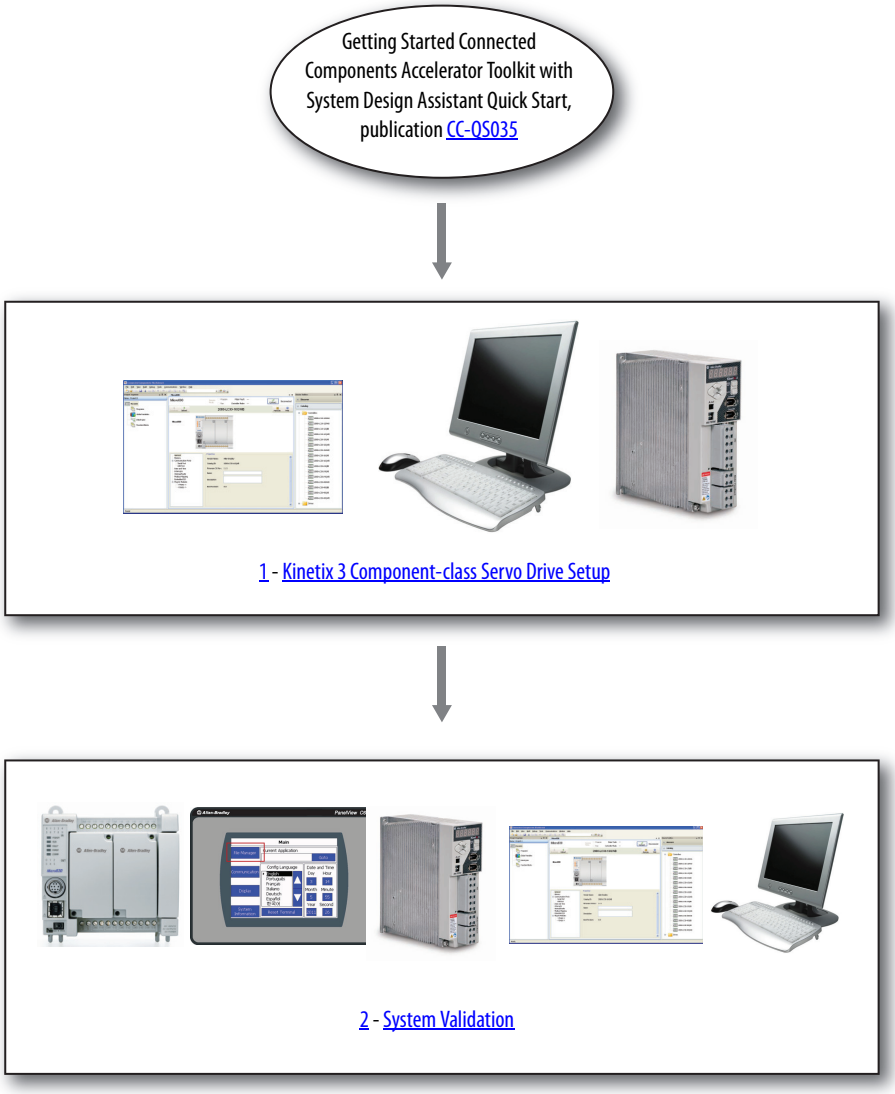
Throughout this manual, when necessary, we use notes to make you aware of safety considerations.

	**WARNING:** Identifies information about practices or circumstances that can cause an explosion in a hazardous environment, which may lead to personal injury or death, property damage, or economic loss.
	**ATTENTION:** Identifies information about practices or circumstances that can lead to personal injury or death, property damage, or economic loss. Attentions help you identify a hazard, avoid a hazard, and recognize the consequence.
IMPORTANT	Identifies information that is critical for successful application and understanding of the product.

Labels may also be on or inside the equipment to provide specific precautions.

	**SHOCK HAZARD:** Labels may be on or inside the equipment, for example, a drive or motor, to alert people that dangerous voltage may be present.
	**BURN HAZARD:** Labels may be on or inside the equipment, for example, a drive or motor, to alert people that surfaces may reach dangerous temperatures.
	**ARC FLASH HAZARD:** Labels may be on or inside the equipment, for example, a motor control center, to alert people to potential Arc Flash. Arc Flash will cause severe injury or death. Wear proper Personal Protective Equipment (PPE). Follow ALL Regulatory requirements for safe work practices and for Personal Protective Equipment (PPE).

Follow this path to complete your Connected Components Accelerator Toolkit (CCAT) project.



Notes:

Appendix B

Configure Your Personal Computer and Series A Kinetix 3 Drive Connection with Ultraware Software

About This Publication

This quick start is designed to provide instructions for implementing a Kinetix® 3 component-class drive motion control indexing application by using Connected Components Workbench™ software and a Micro800® programmable logic controller (PLC).

To help with the design and installation of your system, application files and other information are provided by the Connected Components Accelerator Toolkit (CCAT). The CCAT provides bills of materials (BOM), CAD drawings for panel layout and wiring, control programs, human machine interface (HMI) screens, and more. With these tools and the built-in best-practices design, the system designer is free to focus on the design of their machine control and not on design overhead tasks.

The CCAT is available on the Connected Components Accelerator Toolkit DVD, publication CC-QR002, or through the Rockwell Software® Download and Registration System (SDRS) at http://www.rockwellautomation.com/rockwellautomation/products-technologies/connected-components/tools/accelerator-toolkit.page.

The beginning of each chapter contains the following information. Read these sections carefully before you begin work in each chapter:

- Before You Begin - The chapters in this quick start do not have to be completed in the order in which they appear. However, this section defines the minimum amount of preparation that is required before completing the current chapter.
- What You Need - This section lists the tools that are required to complete the steps in the current chapter, including, but not limited to, hardware and software.
- Follow These Steps - This section illustrates the steps in the current chapter and identifies the steps that are required to complete the examples.

Terminology

Term (abbreviation)	Definition
Application Sequence Programs	User-modified programs that work together with the standard state machine logic to control what the machine does while in the abort, clear, reset, run, and stop states.
Auto/manual operation	When the PanelView™ 800 terminal is in Auto mode, the controller logic controls the machine and monitors machine status. When the PanelView 800 terminal switches to Manual mode, the terminal takes over control. Command buttons and numeric entry fields are available only when the machine is in Manual mode.
Bill of Materials (BOM)	A list of components that are needed for your system.
Building block (BB)	Tools for accelerating and simplifying the development of a Micro800 controller-based application. A typical building block includes a starting Bill of Material (BOM), Computer-Aided Design (CAD) drawings, Micro800 controller programs, PanelView 800 terminal applications, and a quick start document.
CCAT project	A project that consists of these items: • ProposalWorks™ - based bill of materials • Set of CAD drawings (dimensions and schematics) • Connected Components Workbench project • HMI screens • Set of Quick Start documents • Project document with information about the project components and links to reference materials
Computer-Aided Design (CAD)	A computer-based system that is developed to facilitate design of mechanical parts.
Connected Components Accelerator Toolkit (CCAT)	Software with application files and other information to speed the design and startup of component-based machines.
Connected Components Workbench	Software environment for configuring or programming Micro800 controllers, PanelView 800 terminals, Kinetix 3 drives, and other component-level products.
Connected Components Workbench project	A project consists of one or more of the following: • Micro800 controller configuration • Up to 256 Micro800 controller programs, each with program local variables • Micro800 controller global variables • PanelView 800 terminal application • Kinetix 3 drive parameter lists
Global variables	Project variables that any program can access, including all I/O and system variables.
State Machine control code	Machine logic for coordinating overall machine operation that is based on states. The state machine broadcasts commands and receives feedback information from each of the building blocks via user-modified application sequence programs.
Tags	A PanelView 800 terminal term for variables.
User-defined Function Blocks (UDFBs)	Function block instructions that can be used like standard function block instructions within any Connected Components Workbench programming language. Anyone using Connected Components Workbench software can write these functions blocks. Many UDFBs are posted on the Rockwell Automation sample code website: http://samplecode.rockwellautomation.com/idc/groups/public/documents/webassets/sc_home_page.hcst.
User-defined Object (UDO)	A collection of PanelView 800 terminal screen objects that can be pasted into a new screen.

Additional Resources

These resources contain information about related products from Rockwell Automation.

Resource	Description
Connected Components Accelerator Toolkit DVD, publication CC-QR002	Provides files for the Connected Component Accelerator Toolkits.
Micro800 and Connected Components Workbench Getting Started Guide, publication 2080-QR001	Provides information on basic Micro800 controller and Connected Components Workbench software functions.
Micro800 and Connected Components Workbench Application Guide, publication 2080-QR002	Provides procedures for completing basic tasks in Connected Components Workbench software and for using Connected Components Workbench software with component-class products.
Micro800 Programmable Controller External AC Power Supply Installation Instructions, publication 2080-IN001	Provides information on mounting and wiring the optional external power supply.
Micro820 Programmable Controllers User Manual, publication 2080-UM005	Provides information on installing the Micro820™ Programmable Controller including wiring and troubleshooting.
Micro830 and Micro850 Programmable Controllers User Manual, publication 2080-UM002	Provides information on installing the Micro830® and Micro850® Programmable Controllers including wiring and troubleshooting.
PanelView 800 HMI Terminals Installation Instructions, publication 2711R-IN001	Provides information on installing the PanelView 800 HMI terminals including wiring, grounding, and troubleshooting.
PanelView 800 HMI Terminals User Manual, publication 2711R-UM001	Provides information about using PanelView 800 HMI terminals.
Kinetix 3 Component Servo Drives User Manual, publication 2071-UM001	Provides a reference guide for Kinetix 3 drive systems, and accessories. It also contains procedures on how to install, wire, and troubleshoot your drive.
Kinetix 3 Host Commands for Serial Communication Reference Manual, publication 2071-RM001	Provides information on the serial communication commands, both ASCII and ModBus-RTU, for interfacing a motion controller with the Kinetix 3 drive.
Kinetix 3 Component Servo Drives Installation Instruction, publication 2071-IN001	Provides information on installing your Kinetix 3 drive system.

You can view or download publications at http://www.rockwellautomation.com/literature. To order paper copies of technical documentation, contact your local Allen-Bradley distributor or Rockwell Automation sales representative.

Available Connected Components Accelerator Toolkits

For the most up-to-date listing of available Connected Components Accelerator Toolkits and related quick starts, refer to these resources:

- Rockwell Automation Connected Components Accelerator Toolkit website at http://www.rockwellautomation.com/rockwellautomation/products-technologies/connected-components/tools/accelerator-toolkit.page.
- Connected Components Accelerator Toolkit Building Block Project Descriptions Quick Reference, publication CC-QR003.

Notes:

Kinetix 3 Component-class Servo Drive Setup

In this chapter, you configure the Kinetix 3 drive parameters to enable the drive to send data and receive command from the Micro800 controller. The drive is configured by using a personal computer that is connected to the drive.

The Kinetix 3 drive communicates with the Micro800 controller through a Modbus-RTU connection.

This chapter also specifies the minimum number of parameters that must be changed from factory default settings for the Micro800 controller to control the Kinetix 3 drive. You can adjust other drive parameters for your machine application as necessary. Consult the drive documentation for information on all other drive parameters.

Before You Begin

Review the Getting Started CCAT with System Design Assistant Quick Start, publication CC-QS035.

What You Need

Kinetix 3 Drive Setup:

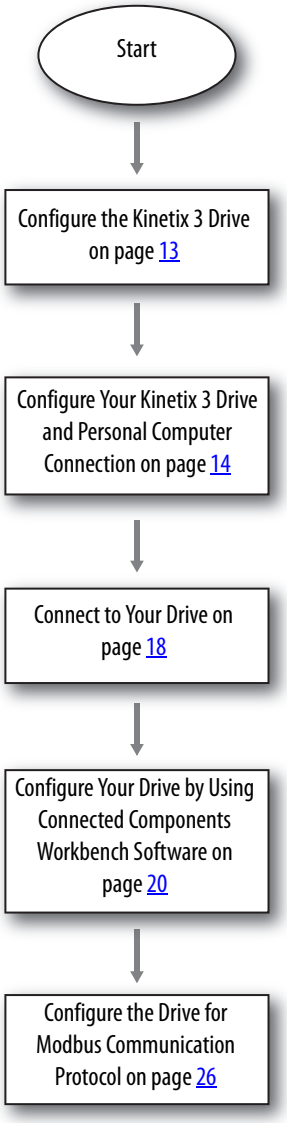
- Personal computer with an available USB port
- Connected Components Workbench software, version 6 or later
- RSLinx® Classic software
- 1203-USB converter
- 2090-CCMUDS-48AAxx communication cable
- Kinetix 3 drive Series B or later; firmware revision 3.005 or later

Micro800 Controller Setup:

- Personal computer with an available USB port
- Connected Components Workbench software, version 6 or later
- USB printer cable (A to B) for personal computer to Micro800 controller communication
- Micro820, Micro830, or Micro850 controller

Follow These Steps

To configure your Kinetix 3 Component-class drive, follow these steps.



Configure the Kinetix 3 Drive

In this section, you configure your personal computer and Kinetix 3 drive by using Connected Component Workbench version 6 or later software for hardware Series B and firmware revision 3.005 or later. You can find the hardware series identifier on the label that is attached to the side of the product.

See Figure 1 and Figure 2 to identify the Series of your Kinetix 3 drive.

Figure 1 - Label of a Series B Kinetix 3 Drive - That Is Supported by Connected Component Workbench Version 6 or Later

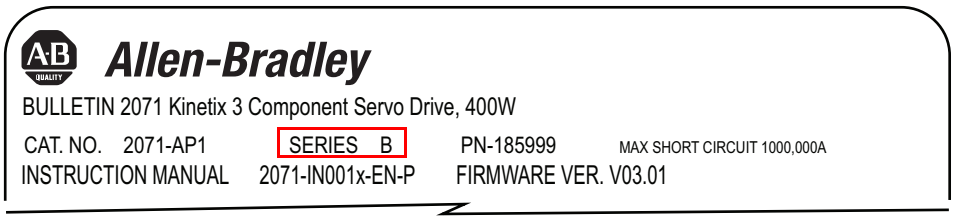
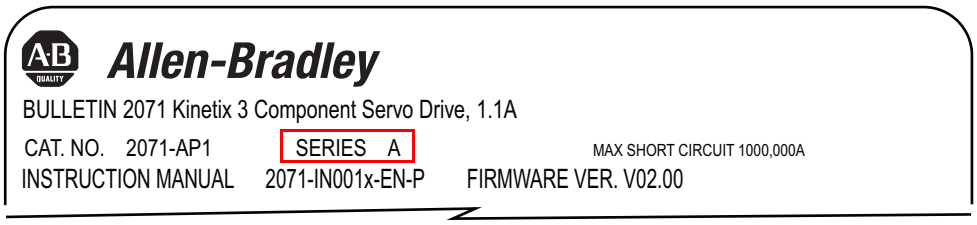


Figure 2 - Label of a Series A Kinetix 3 Drive - That Is Supported by Ultraware Software



To configure a Kinetix 3 drive - Series A, refer to Configure Your Personal Computer and Series A Kinetix 3 Drive Connection with Ultraware Software in Appendix B.

Configure Your Kinetix 3 Drive and Personal Computer Connection

Follow these steps to configure the connection between your personal computer and your drive.

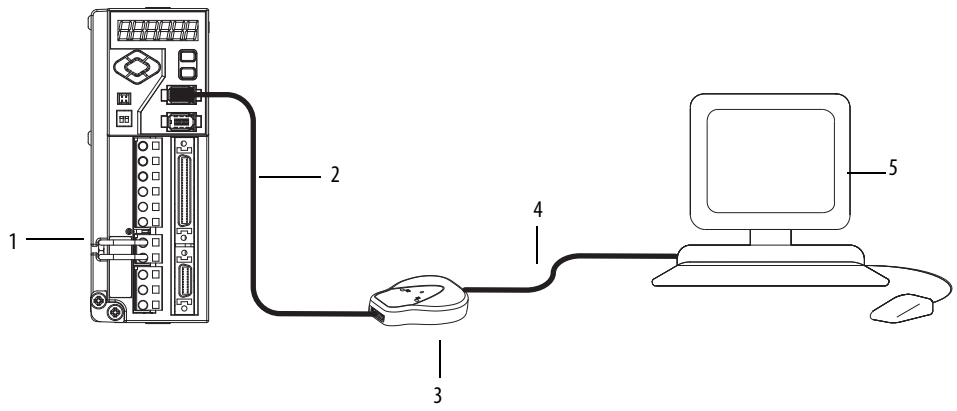
1. Verify that your Kinetix 3 drive is Series B with firmware revision 3.005 or later.

   See page 13 for examples.

2. Set the following parameters by using the keypad on the front of the drive.

Parameter Name	Parameter	Setting
Drive Address	Pr0.07	248
Serial Port Configuration	Pr0.09	1102 Where, 2 -19,200 Kbps Baud Rate 0 - 8 Data Bits, No Parity, 1 Stop Bit 1 - Modbus-RTU protocol 1 - RS-485

3. Connect the Kinetix 3 drive to your personal computer by using cables that are shown here.



Item	Description
1	Kinetix 3 drive
2	1203-USB converter cable, catalog number 2090-CCMUSDS-48AAxx
3	1203-USB converter
4	USB cable
5	Personal computer with Connected Components Workbench software

   If you are prompted to install drivers, use the recommended drivers.

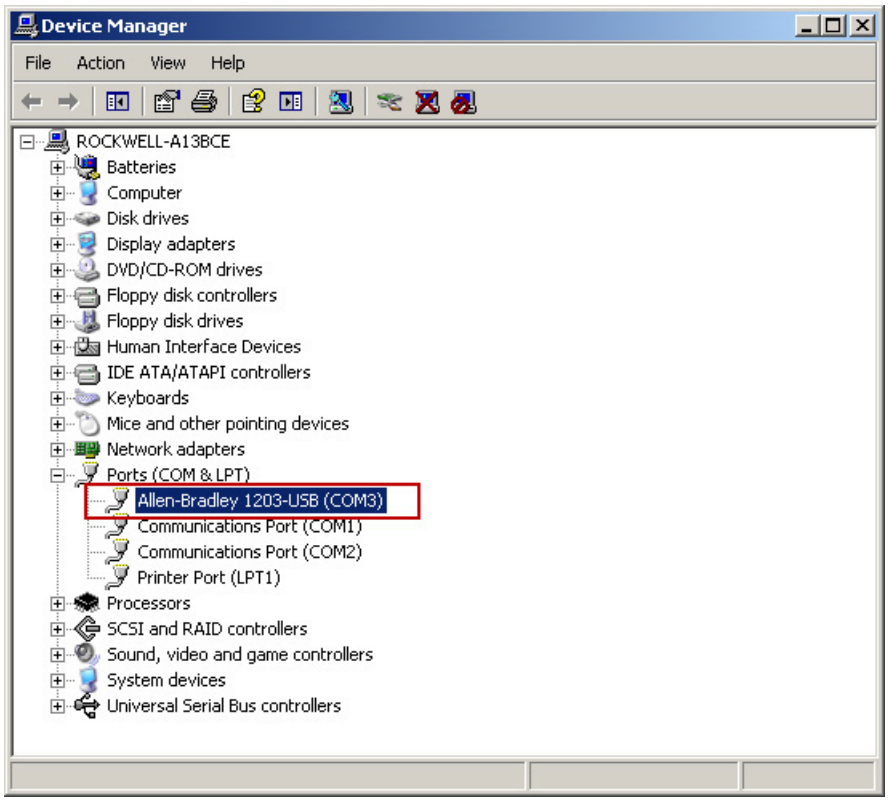
4. Verify the COM port number of the 1203-USB adapter in Device Manager on your computer, from the Start menu, choose Run.

   The Run dialog box appears.

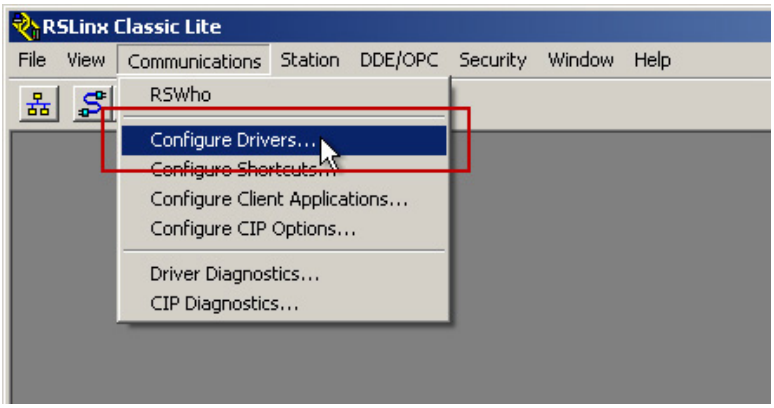
5. Type devmgmt.msc in the Open field.

6. Expand the Ports (COM & LPT) group, and locate the Allen-Bradley 1203-USB device.

   The COM port is specified in parentheses next to the device name, COM3 in this example. It can be different on your computer.

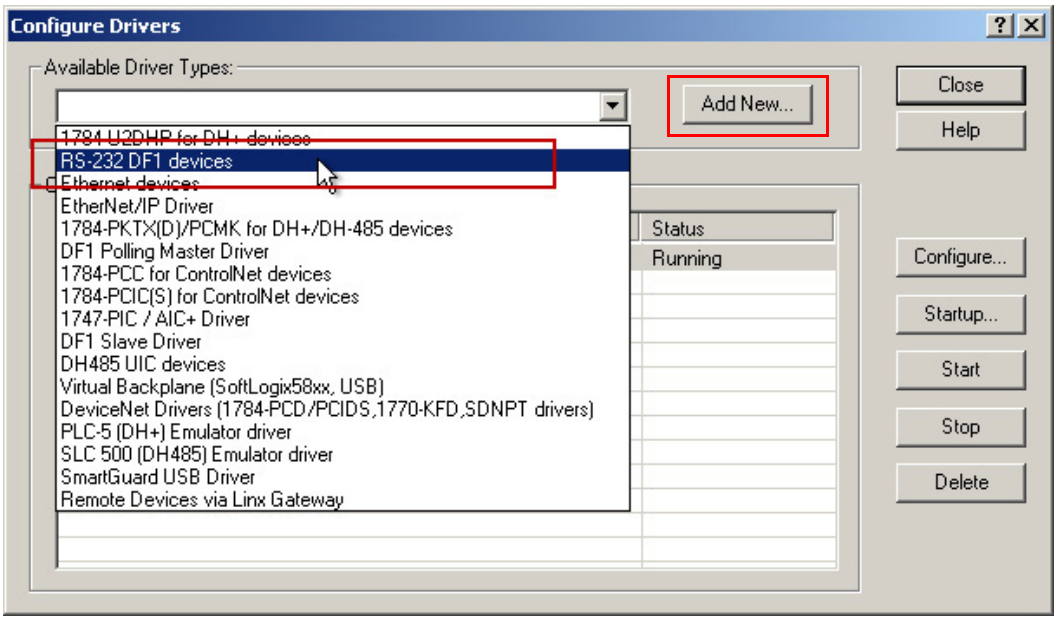


7. Note your COM port name and close the Device Manager window.
8. To configure an RS-232 DF1 driver, start RSLinx® Classic software.
9. From the Communication menu, choose Configure Drivers.



The Configure Drivers dialog box appears.

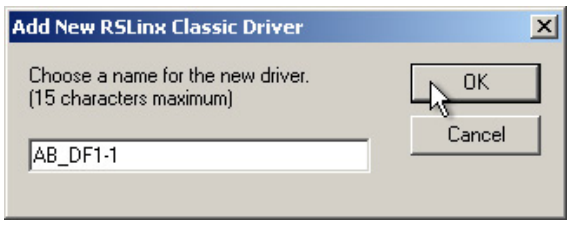
10. From the Available Driver Types pull-down menu, choose RS-232 DF1 devices.
11. Click Add New.



The Add New RSLinx Classic Driver dialog box appears.

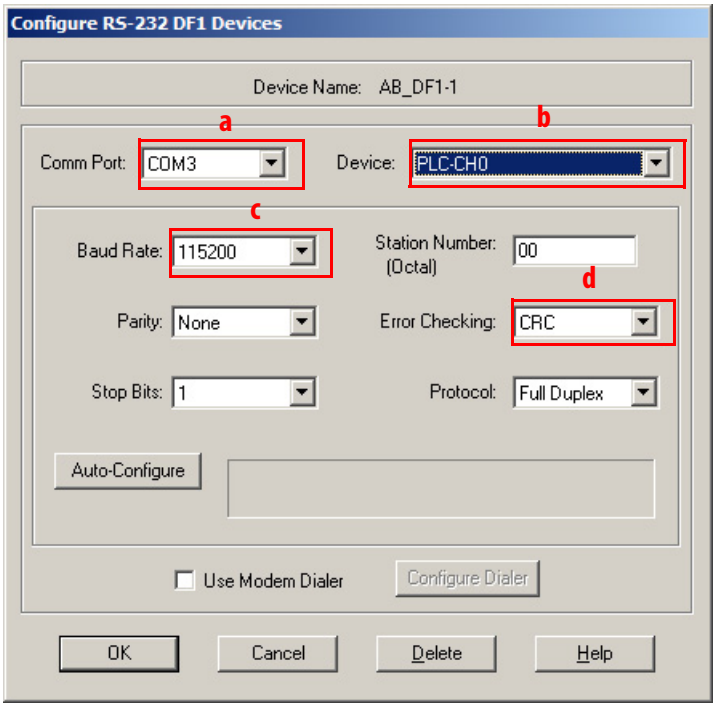
12. Type a name for your driver,

    You can use the default name, if desired.
13. Click OK.



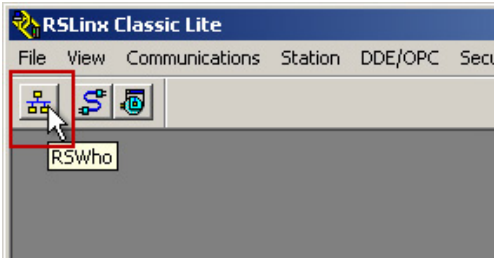
14. Configure the driver settings.
    a. From the Comm Port pull-down menu, choose the port number of your 1203-USB serial adapter.
    b. From the Device pull-down menu, choose PLC-CH0.
    c. From the Baud Rate pull-down menu, choose 115200-baud rate.
    d. From the Error Checking pull-down menu, choose CRC.

IMPORTANT Do not click auto-configure.



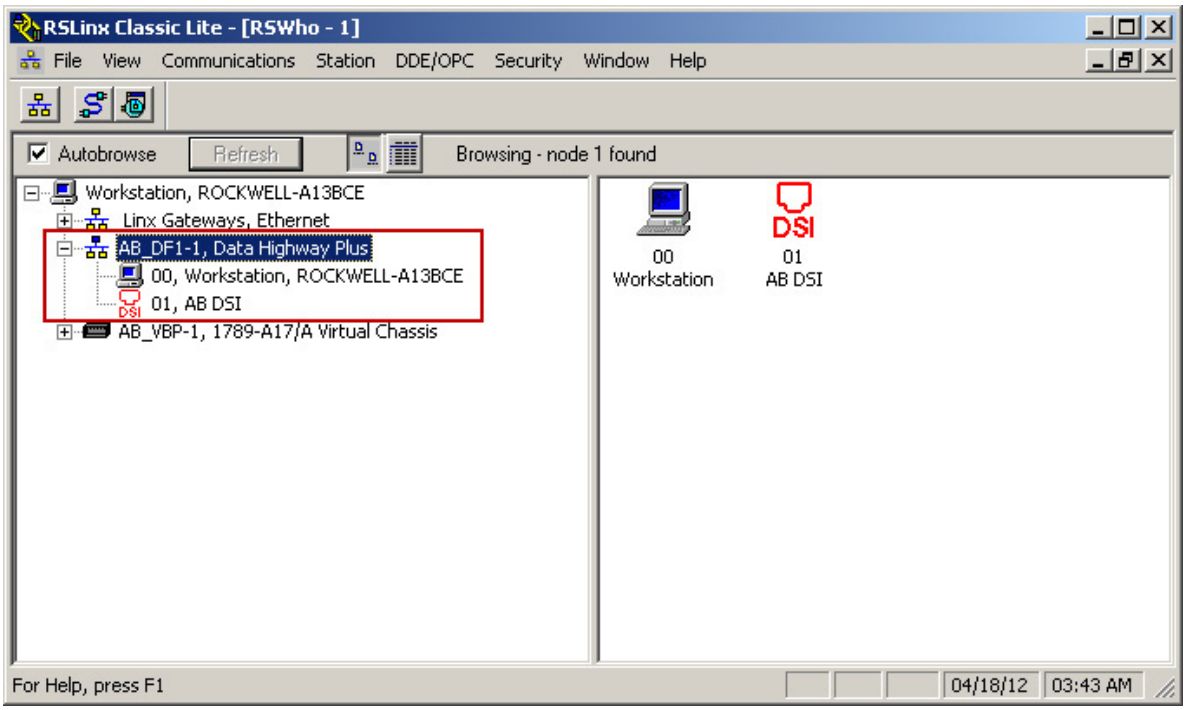
15. Click OK.

16. In the RSLinx toolbar, click the RSWho icon to verify that your drive is properly communicating with RSLinx Classic software.



17. Expand your RS-232 DF1 driver, and verify that your drive is displayed.

    It is listed as 01, AB DSI. If the drive does not display below the driver, check your COM port and driver settings.

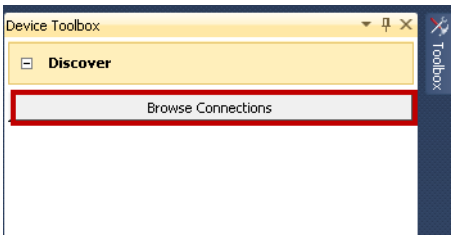


18. Close RSLinx Classic software.

Connect to Your Drive

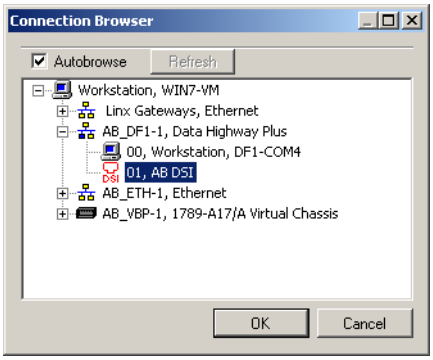
To connect to the Kinetix 3 drive, follow these steps. The Kinetix 3 drive must be Series B or later with firmware revision 3.005 or later.

1. From the Connected Components Workbench Device Toolbox, expand Discover, and click Browse Connections.

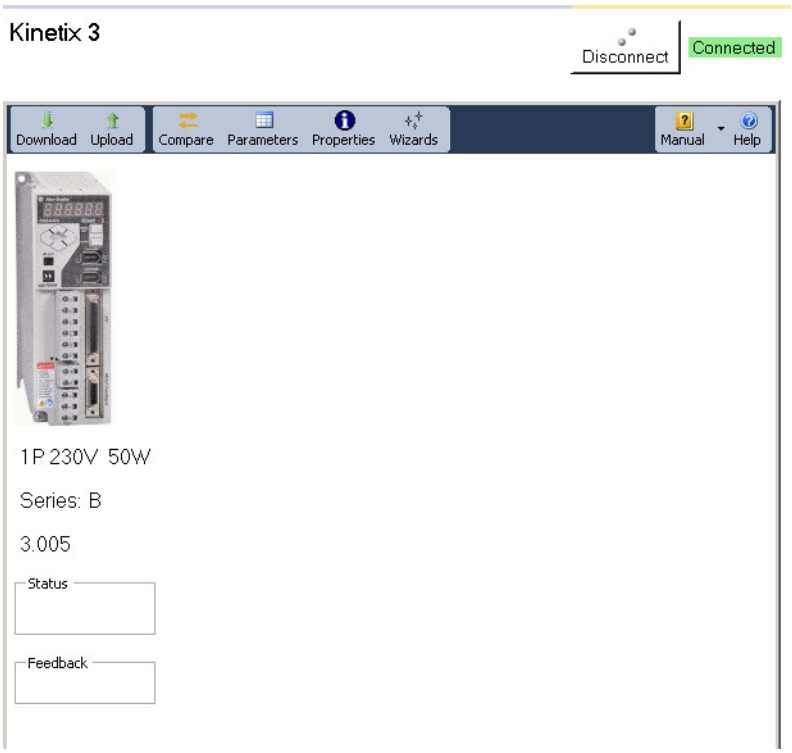


   The Connection Browser dialog box appears.

2. From the Connection Browser, under AB_DF1-1, select your drive (01, AB DSI) and click OK.



A drive is added to the Project Organizer and the drive Device Details window appears in the main project workspace.

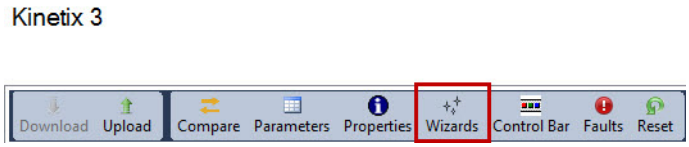


Configure Your Drive by Using Connected Components Workbench Software

Configure your drive parameters for the Kinetix 3 Motion Control Indexing Device Building Block, follow these steps.

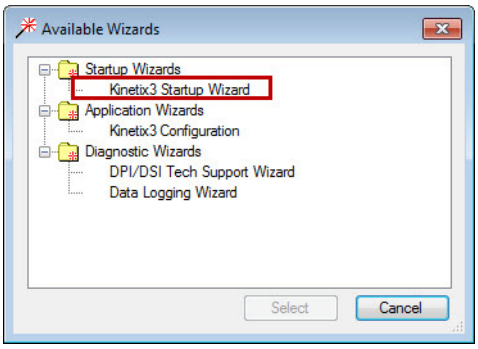
This procedure assumes that your motor is wired to your Kinetix 3 drive.

1. In the toolbar, click the Wizards icon.



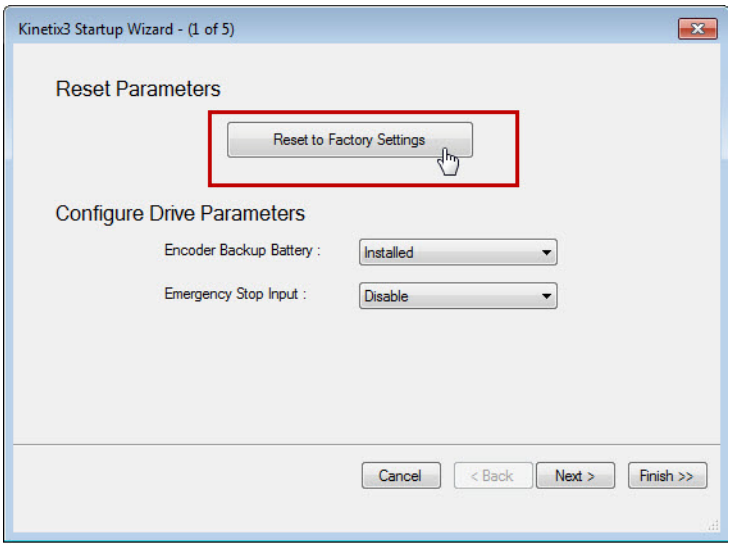
   The Available Wizards dialog box appears.

2. From the list, select the Kinetix3 Startup Wizard and click Select.



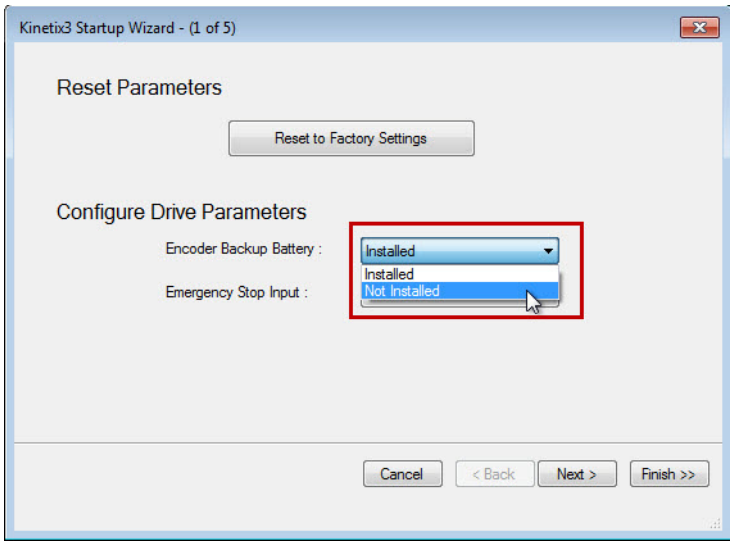
   To provide a consistent starting point, reset the drive to factory defaults.

3. Click Reset to Factory Settings.
4. Click Yes.



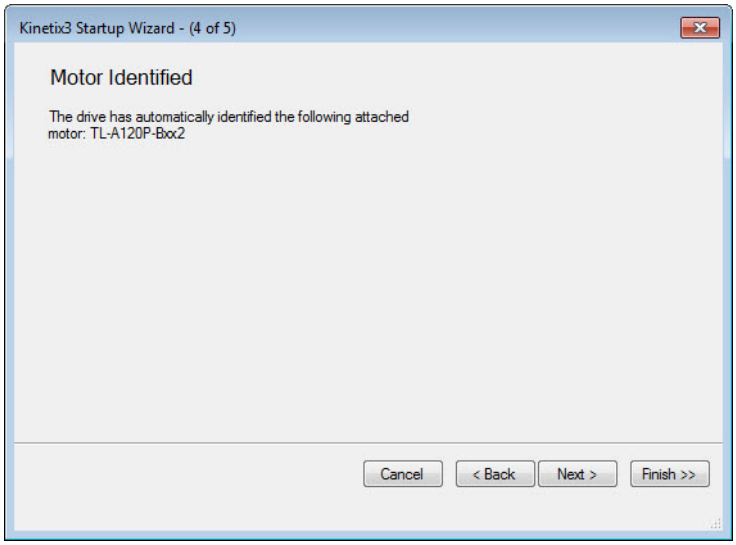
If you are using a motor with an intelligent encoder and do not want to use a battery to maintain absolute position reference during power off, do the following.

5. From the Encoder Backup Battery pull-down menu, select Not Installed and click Next.



6. Review settings in the Kinetix 3 Startup Wizard (2 of 5) through (4 of 5) dialog boxes and click Next when finished with each.

   If your motor does not have an intelligent encoder, to configure your motor in start at step 17. If it does have an intelligent encoder, the Kinetix 3 Startup Wizard (4 of 5) dialog box shows the motor that the drive identified.



7. Click Next.

   The Kinetix3 Startup Wizard (5 of 5) Autotuning dialog box is displayed. Use Autotune for best performance. Autotune can be done later and as required. Follow these steps to Autotune your drive.

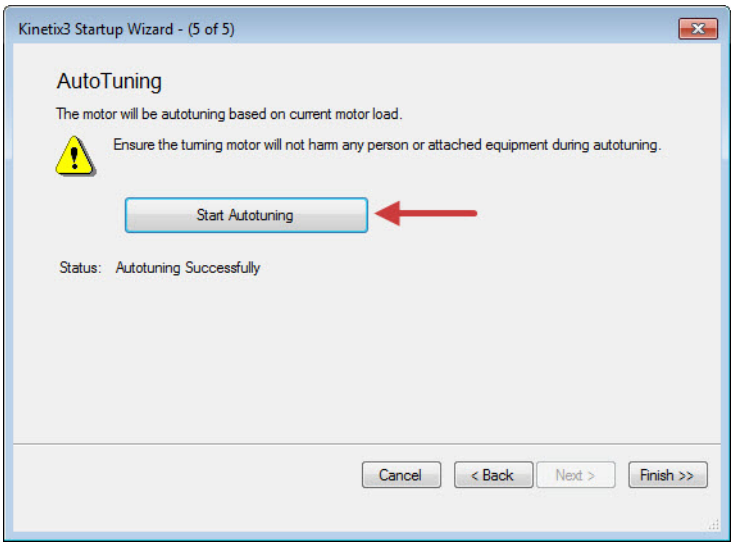
a. Verify that the load is free to move without obstruction and that all personnel and equipment are away from the load and motor shaft or line of motion.

IMPORTANT The autotune process causes motion.

b. Read and acknowledge the warning and prepare the area.

c. Click Start Autotuning.

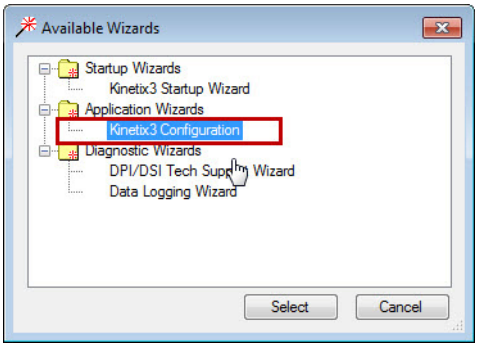
The drive enables, moves the motor, and then performs a resonance test. When the test is complete, the drive disables again continue once Autotuning is successful.



8. Click Finish.
9. Click Yes.

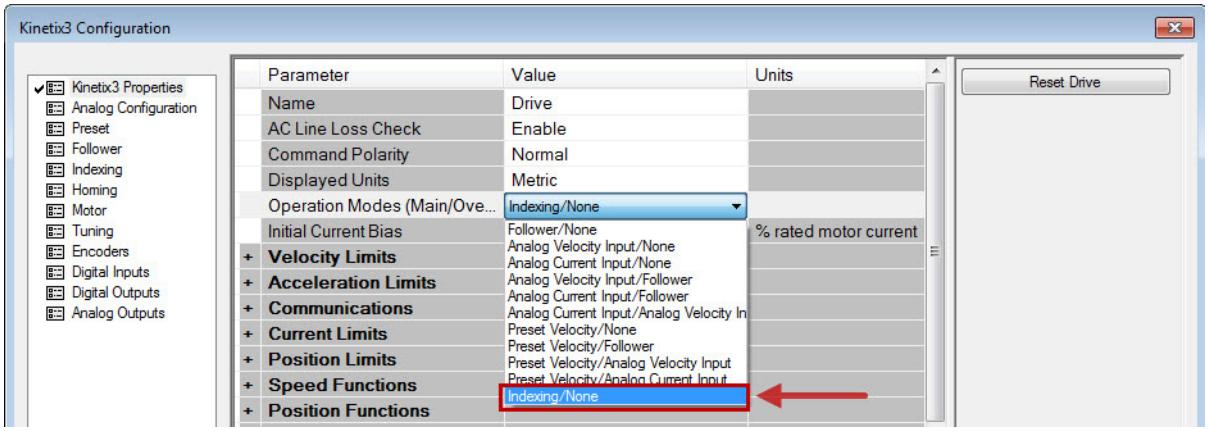
The drive resets.

10. From the tool bar, click the Wizards icon.
11. Select the Kinetix3 Configuration Application Wizard and click Select.

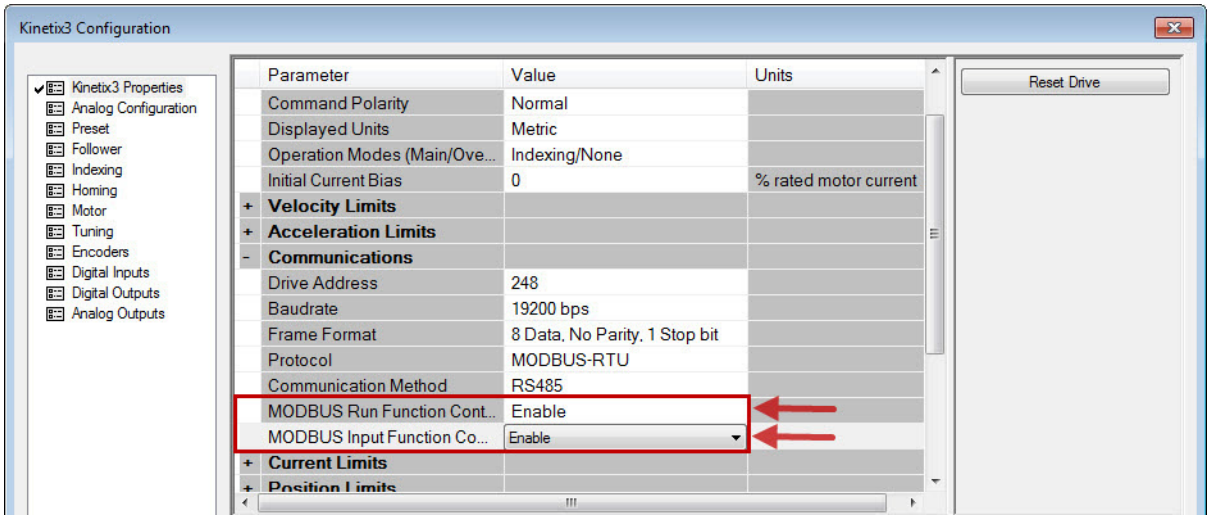


12. Click Kinetix 3 Properties category.
13. From the Operations Modes (Main/Override) pull-down menu, choose Indexing/None.

    You prompted to reset the drive.
14. Click Yes.



15. Click Communications category.
    a. From the MODBUS Input Function Control pull-down menu, choose Enable.
    b. From the MODBUS Run Function Control pull-down menus, choose Enable.

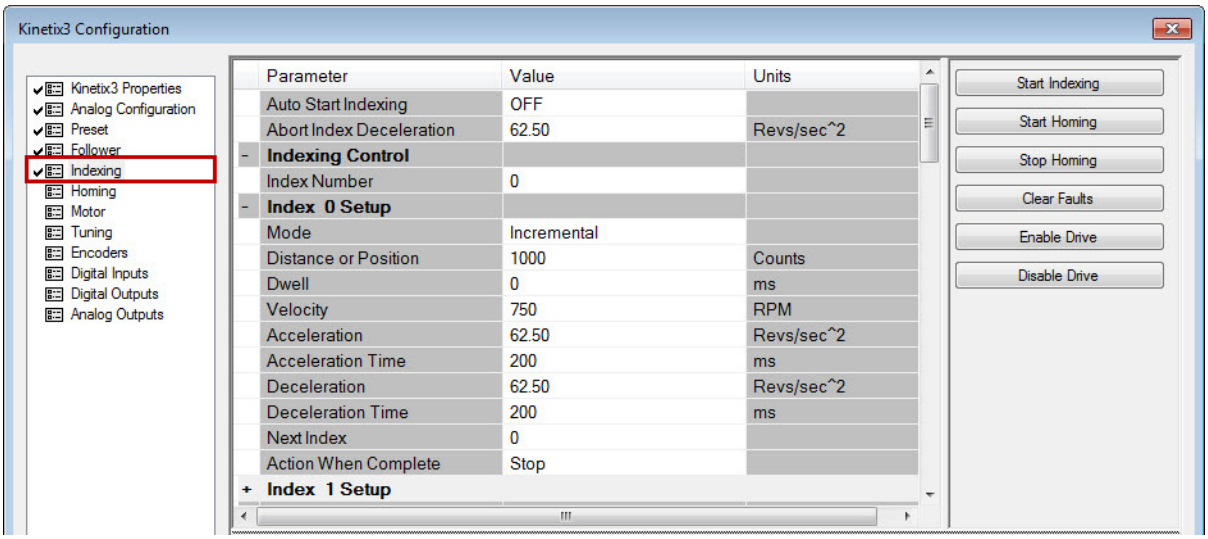


16. Click Next to move though the Kinetix 3 Configuration Wizard categories for Analog Configuration, Preset, and Follower, and set the parameters as needed for your application.

a. Click Next.

b. Set the indexing parameters as needed by your application.

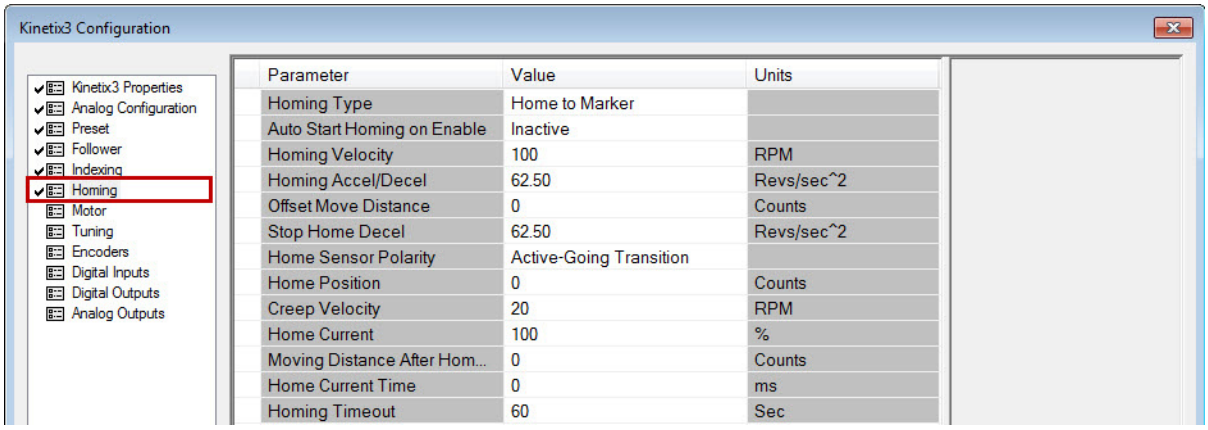
You can have up to 64 indexes.



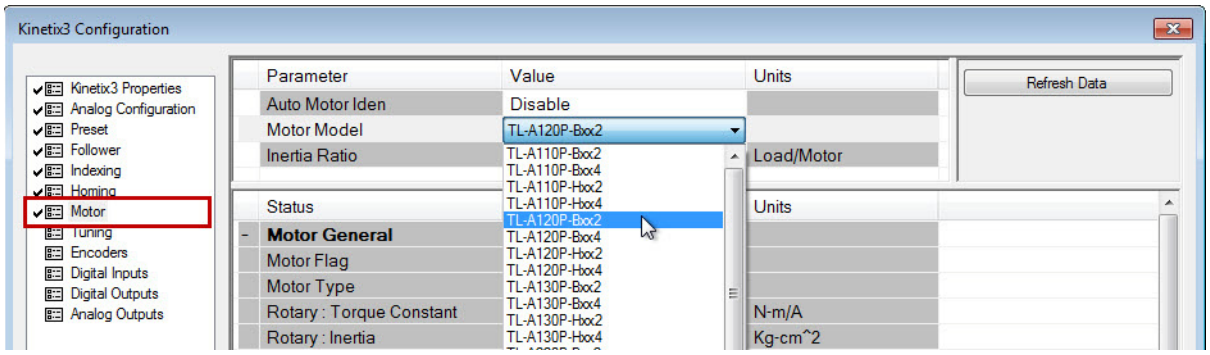
c. Click Next.

d. Set the homing parameters as needed by our application.

To perform absolute moves, the drive must be homed.



17. your motor does not have an intelligent encoder, follow these steps.
    a. Click Next until the Motor category appears.
    b. Set Auto motor Iden to Disabled.
       You are prompted to reset the drive.
    c. Click Yes.
    d. From the Motor Model pull-down menu, choose your motor model.



18. Click Next and continue through the Kinetix 3 Configuration Wizard categories for Encoder, Digital Inputs, Digital Outputs, and Analog Outputs, setting the parameters as needed for your application.
19. Click Finish.

Configure the Drive for Modbus Communication Protocol

When the configuration of your Kinetix 3 drive with Connected Components Workbench software is complete, follow these steps to set the drive to Modbus mode.

1. Disconnect the serial cable from the personal computer and the drive.
2. Press Mode/Set until the first two characters of the status indicator display Pr.
3. Change the status indicator to display Pr0.09 by using the arrow keys
4. Press Enter.
5. The status indicator displays 0005.
6. Change the value to 1102 by using the arrow keys.
7. Press Mode/Set.
8. Press Enter.
9. Change the number until the display reads Pr0.07 by using the arrow keys.
10. Press Enter.
11. Change the node address that is shown to a unique Modbus node address for the drive, and press Mode/Set.
12. By default, the node address is 1.
13. Click Enter.

System Validation

This chapter provides instructions on how to configure, connect, and validate communication between the devices in your Kinetix 3 Motion Control Indexing system.

Before You Begin

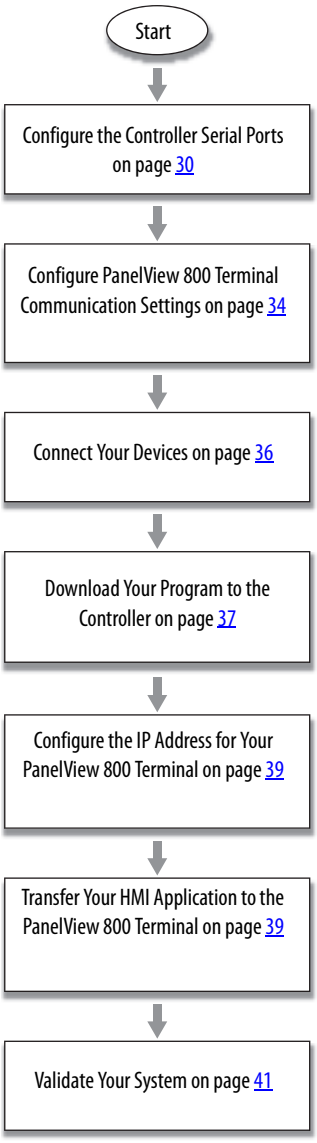
- Complete the steps in Chapter 1.
- Verify that the devices are connected as shown in the assembled wiring diagrams.
- Verify that the Micro800 controller, the Kinetix 3 drive, and the PanelView 800 terminal have power that is applied to them.

What You Need

- Micro820, Micro830, or Mirco850 controller with 2080-SERIALISOL module
- Kinetix 3 drive
- 4 in. (or larger) PanelView 800 terminal
- 2090-CCMDSDS-48AA01 communication cable
- 1761-CBL-PM02, 9-pin to 8-pin MINI-DIN RS232 communication cable
- USB printer cable (A to B) for personal computer to Micro800 communication
- USB flash drive for personal computer to PanelView 800 terminal file transfer

Follow These Steps

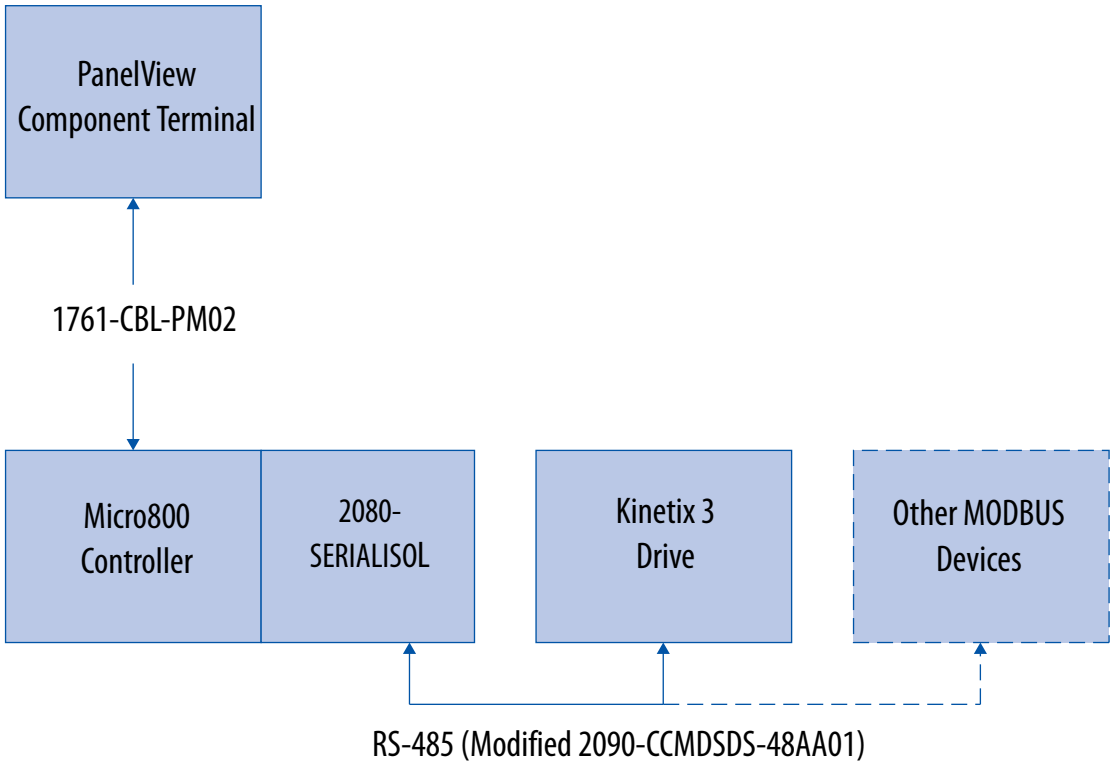
To validate your system, follow these steps.



Review the System Overview

All drives communicate by using the Modbus RTU protocol. The PanelView 800 terminal is configured for CIP Serial communication and communicates to the Micro800 controller via its embedded serial port. The Micro800 controller communicates to the Kinetix 3 component-class drive from the Isolated Serial Port plug-in module. The Isolated Serial Port is configured as a Modbus RTU Master, and the drive is natively a Modbus RTU Slave device. Additional drives or Modbus RTU RS-485 slave devices can be daisy-chained from the Isolated Serial Port or from the Kinetix 3 communication port.

Figure 3 - Device and Network Layout Diagram



Configure the Controller Serial Ports

The Micro800 controller communicates with the Kinetix 3 drive via Modbus-RTU on an RS-485 network. Information is read from and written to the drive by using MSG_MODBUS instructions that are embedded within the supplied user-defined function blocks (UDFBs). The MSG_MODBUS instruction requires a channel and a node address for the communication path. These parameters are configured outside of the UDFB in the program and must be set before communication.

The slot that contains the plug-in module determines the channel. In this example, the plug-in module is in the first slot, which is Channel 5.

Do not use the embedded port, Channel 2, for switching devices because it is not isolated. Channel 2 is used for the PanelView 800 terminal. In the default project, the first expansion port, Channel 5, is used for the 2080-SERIALISOL module. By default, communication is already configured for use.

For reference, the following settings are used for each port.

Table 1 - Serial Port Settings

Embedded Serial Port	
Setting	**Value**
Driver	CIP Serial
Baud rate	38400
Parity	None
Unit address	1

Advanced Setting	
Error detection	CRC
Embedded responses	After one received
Duplicate packet detection	Yes
Ack timeout (x20 ms)	50
NAK retires	3
ENQ retires	3
Transmit retries	3
RTS off delay	0
RST send delay	0

2080-SERIALISOL Plug-in Module	
Setting	**Value**
Drive	Modbus RTU
Baud rate	19200
Parity	None
Modbus role	Modbus RTU Master

Advanced Setting	
Media	RS485
Data bits	8
Stop bits	1
Response timer	200
Broadcast pause	200
Inter-char timeout	0
RST-pre delay	0
RTS-post delay	0

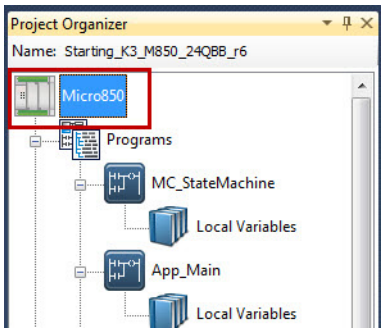
Follow these steps to modify these settings in the default Connected Components Workbench project.

1. Open the starting project Starting_K3_M850_24QBB_r6.

   You can download project Starting_K3_M850_24QBB_r6 from the Sample Code Library at http://samplecode.rockwellautomation.com/idc/groups/public/documents/webassets/sc_home_page.hcst) or the SDA generated project if either is not already open from Chapter 1.

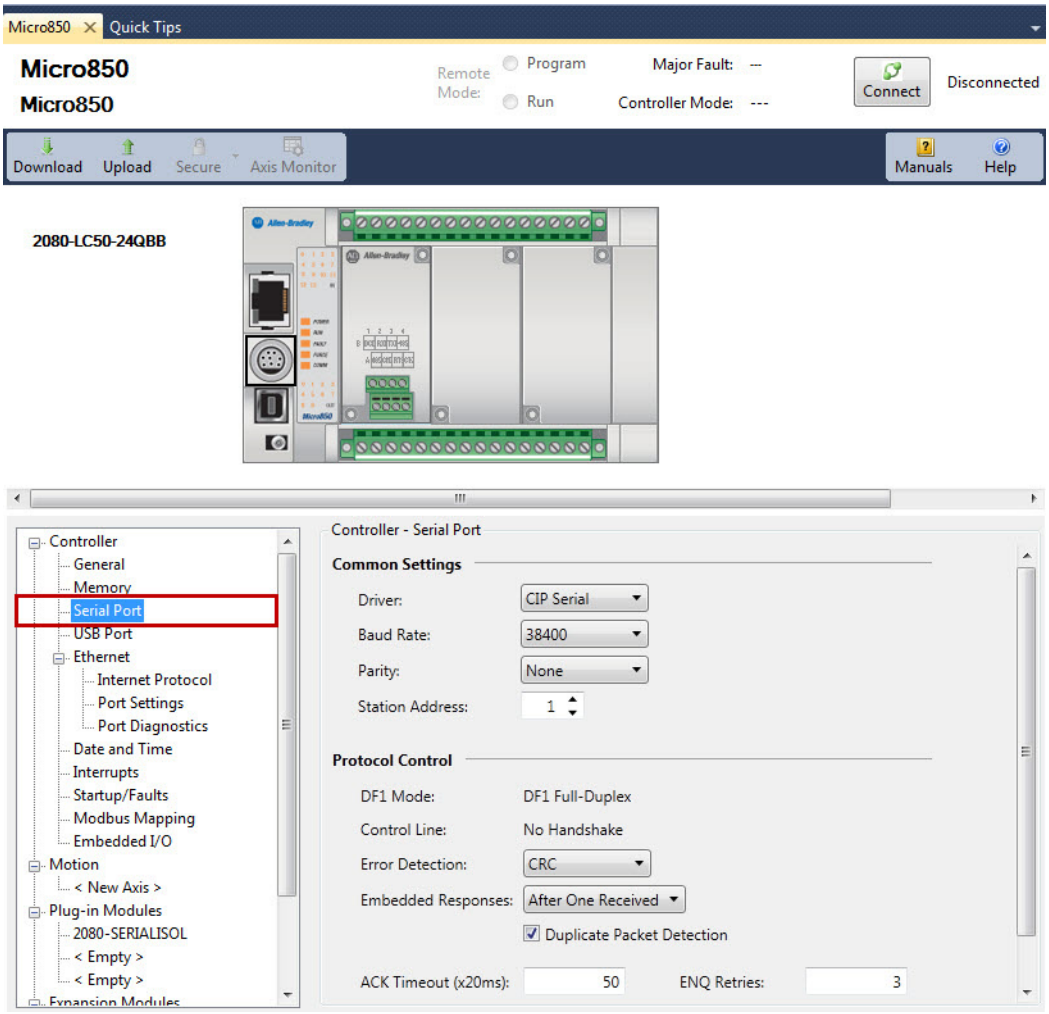
2. In the Project Organizer, double-click the controller icon.

   This example shows a Micro850 controller.

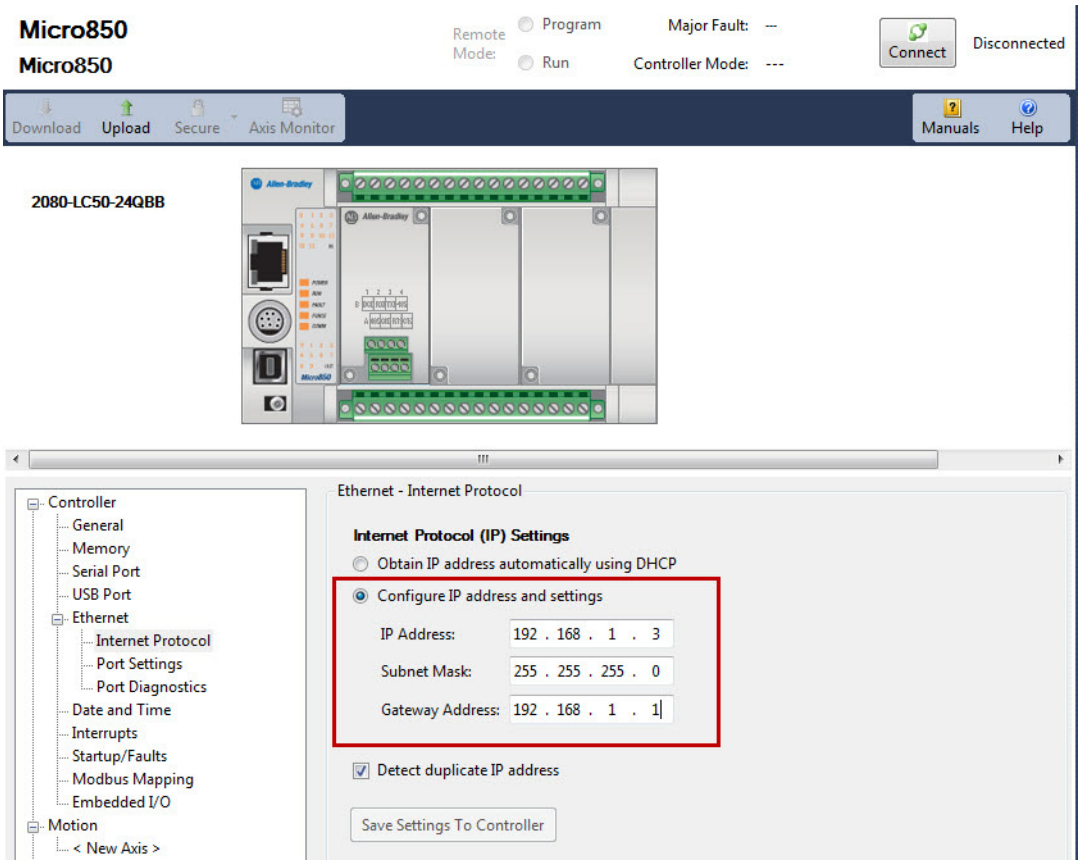


   The Controller Detail view appears in the Project Organizer.

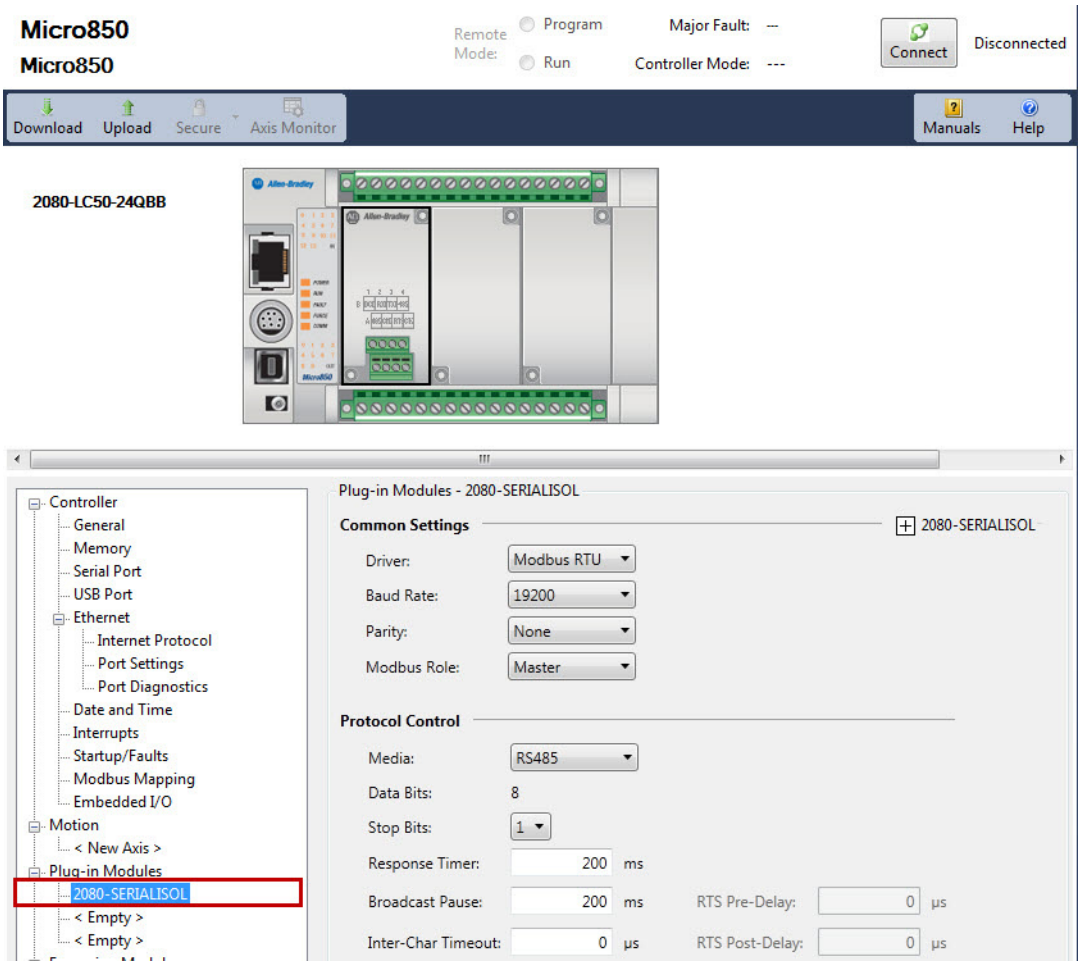
3. Configure the settings for your PanelView 800 terminal communication port.
   a. If a CIP serial connection is used, select the embedded serial port in the controller configuration list and edit the required settings.



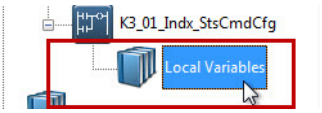
b. If a CIP on Ethernet connection is used, select Ethernet>Ethernet Protocol, check Configure IP address and settings and edit the IP Address, Subnet Mask, and Gateway Address settings.



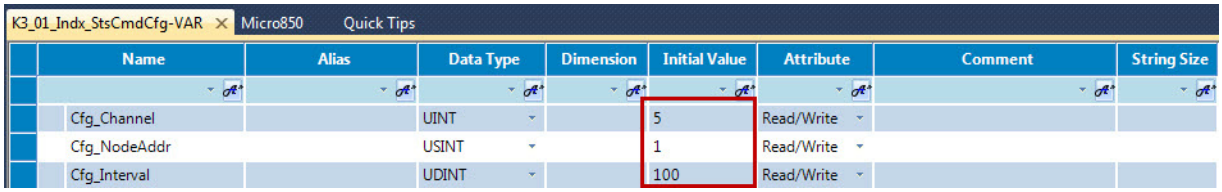
4. Expand Plug-in Modules in the controller configuration list, add (if not already present) and configure the 2080-SERIALISOL port for your controller in slot 1 as shown.



5. From the Project Organizer, expand the program that is named K3_01_Indx_StsCmdCfg, and open the Local Variables for that program.



6. Set Cfg_Channel to the same channel as the 2080-SERIALISOL module.
7. Set Cfg_NodeAddr to the node address that you assigned to the drive.



Configure PanelView 800 Terminal Communication Settings

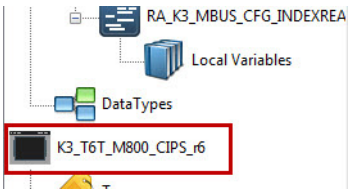
In the default project, the CIP serial communication and controller settings have already been configured. The following settings are used.

Table 2 - Default CIP Serial Communication and Controller Settings

Driver Configuration	
Protocol	CIP Serial
Port	RS232
Baud rate	38400
Data format: 8-N-1	8-N-1
Flow control	None
Controller Settings	
Name	PLC-1
Controller type	Micro800
Address	1

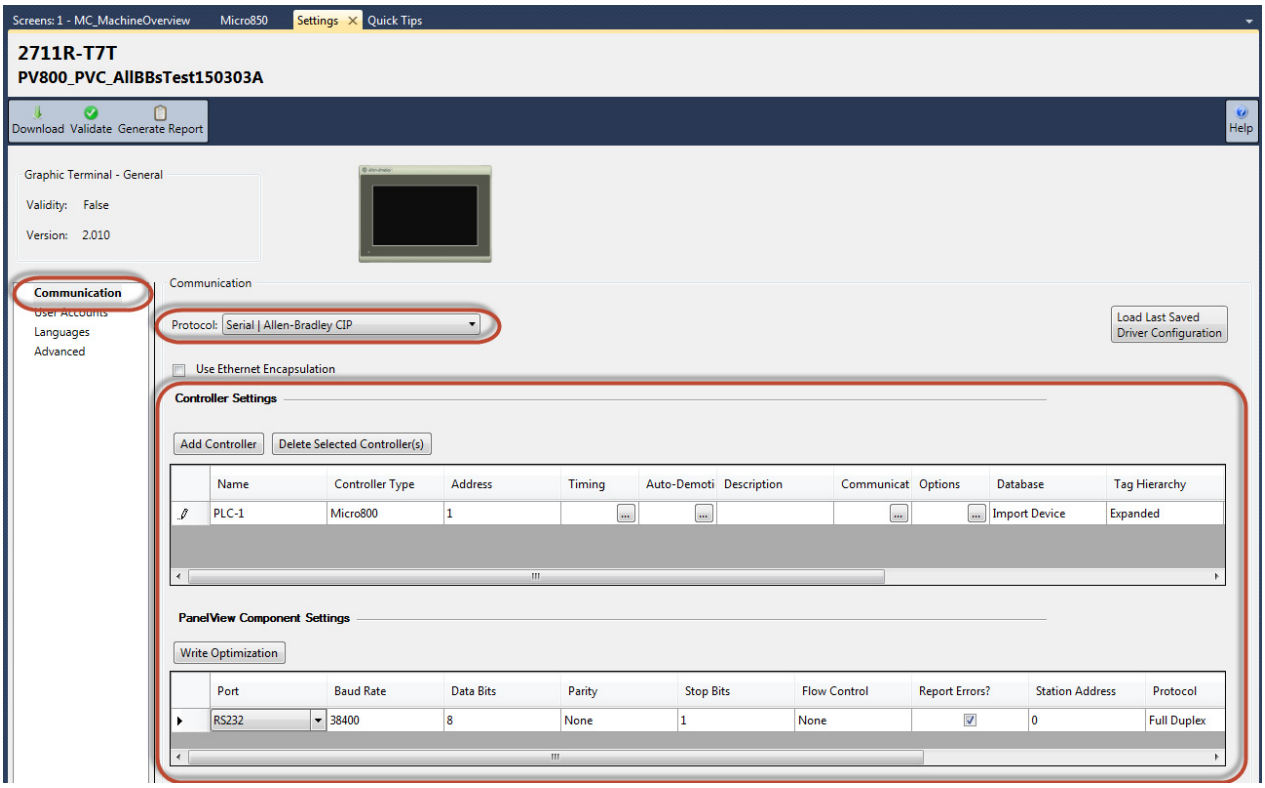
Follow these steps to modify these settings in the default Connected Components Workbench project.

1. To open the PanelView 800 terminal application editor, in the Project Organizer double-click the PanelView 800 terminal icon.

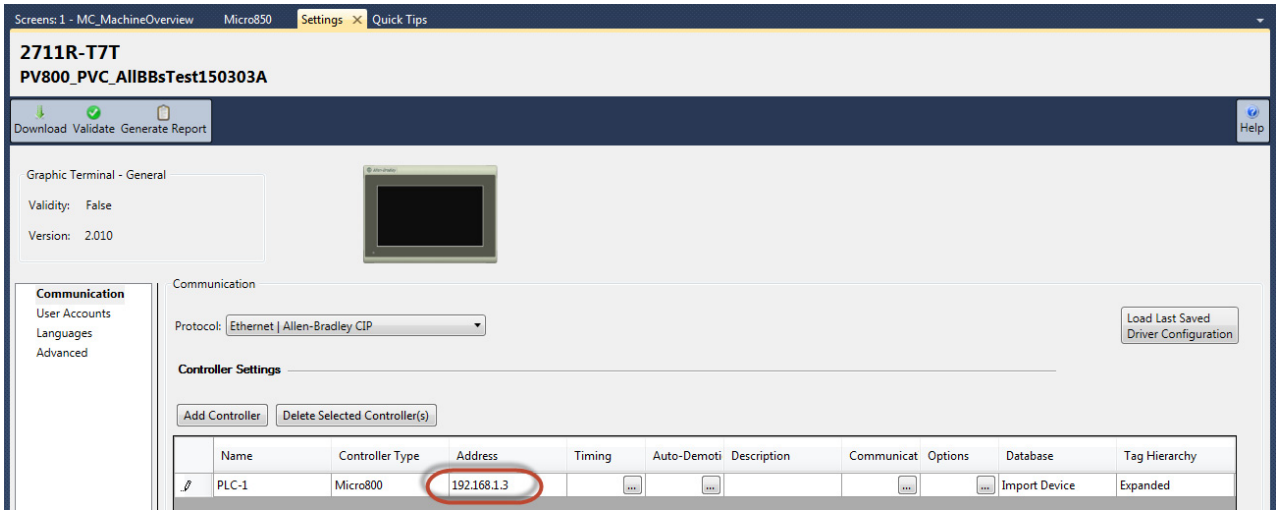


   The PanelView 800 Communication Settings pane appears in the main project window.

2. Configure the appropriate communication settings:
   - For CIP Serial communication, configure the settings that are shown.



   - For CIP on Ethernet communication, configure the settings that are shown.



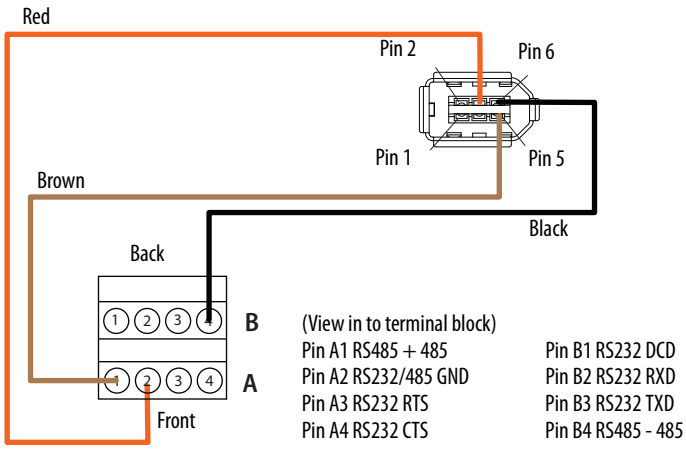
Connect Your Devices

Follow these steps to connect your devices.

1. Connect the PanelView 800 terminal RS-232 serial port to the embedded serial port on your Micro800 controller by using a 1761-CBL-PM02 cable.
2. Connect the IEEE1394 plug on your Kinetix 3 component-class servo drive to the Isolated Serial Port (2080-SERIALISOL) on your Micro800 controller by using a modified 2090-CCMDSDS-48AA01 cable.

   The modified cable can be made by removing one end to expose the conductors. See the following wiring diagram, but note that the red wire does not need to be connected.

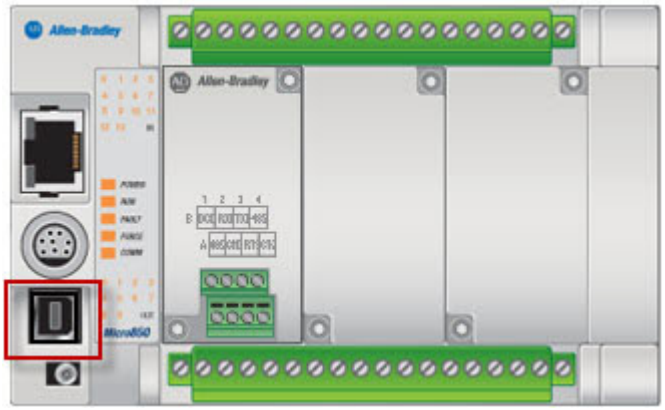
Comm0A or Comm0B Pin	Description	Signal
1	RS-232 transmit	XMT
2	RS-232 receive	RCV
3	Reserved	—
4	+5V power ground	GND
5	RS-485+	DX+
6	RS-485	DX-



Download Your Program to the Controller

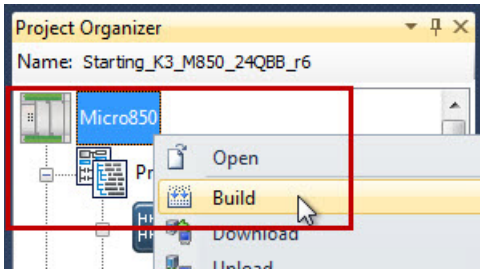
Follow these steps to download your program to the controller.

1. Connect the computer to the controller by using either an Ethernet or USB connection.



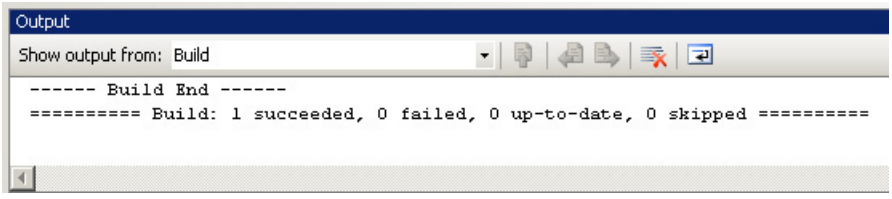
   If you are prompted to install any drivers, use the recommended drivers.

2. In your Connected Components Workbench project, in the Project Organizer, right-click your controller icon and choose Build.

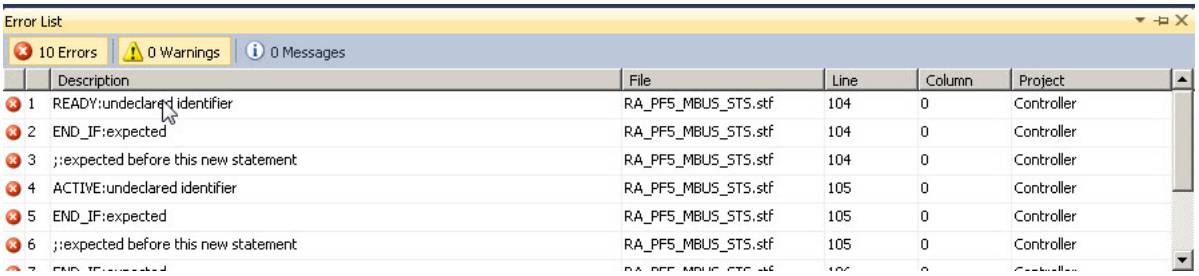


   If the build was successful, the Output pane at the bottom of your project window displays a success message. Or, if the build was unsuccessful, an error list appears.

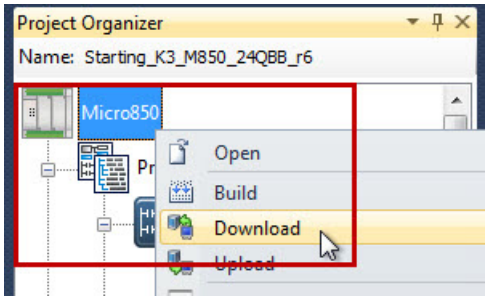
   Example Output pane: build successful



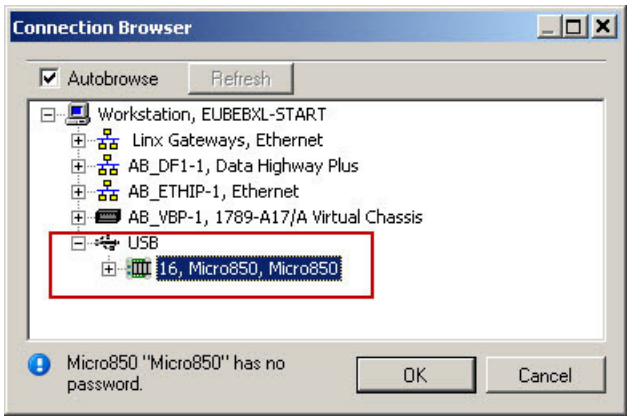
Example Output pane: error list



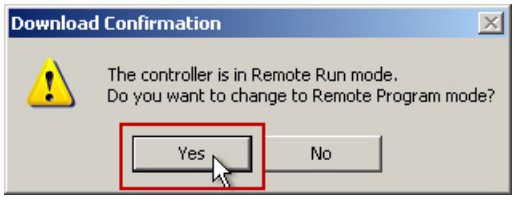
3. If the build is successful, continue to step 4. Otherwise do the following.
   a. Double-click an error description.
   b. Correct error.
   c. Repeat step 2 and step 3 until the build is successful and continue with step 4.
4. From the Project Organizer, right-click your controller icon and choose Download.



5. From the Connection Browser, select your controller and click OK.



6. If prompted to change the controller mode to Remote Program mode, click Yes.



Configure the IP Address for Your PanelView 800 Terminal

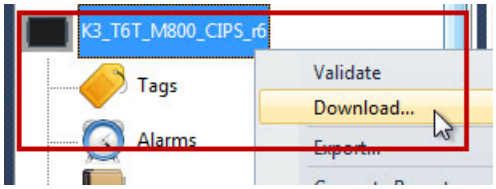
Follow these steps to configure a static IP address on the PanelView 800 terminal.

1. From the Main menu, press Communication to open the Communication screen.
2. Press Set Static IP Address.
3. Configure the IP Address and Mask values so they are in the same range as your Micro800 controller.
4. To return to the Main, menu Press Main.

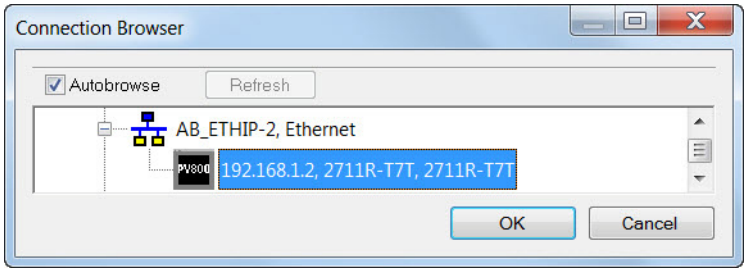
Transfer Your HMI Application to the PanelView 800 Terminal

Follow these steps to transfer your HMI application to the PanelView 800 terminal by using Connected Components Workbench software.

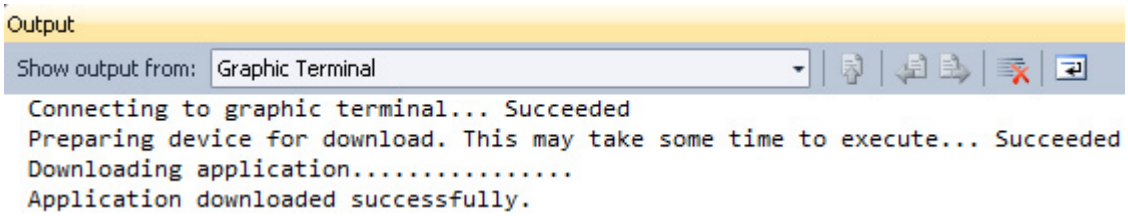
1. In the Project Organizer, right-click the PanelView 800 terminal icon and choose Download.



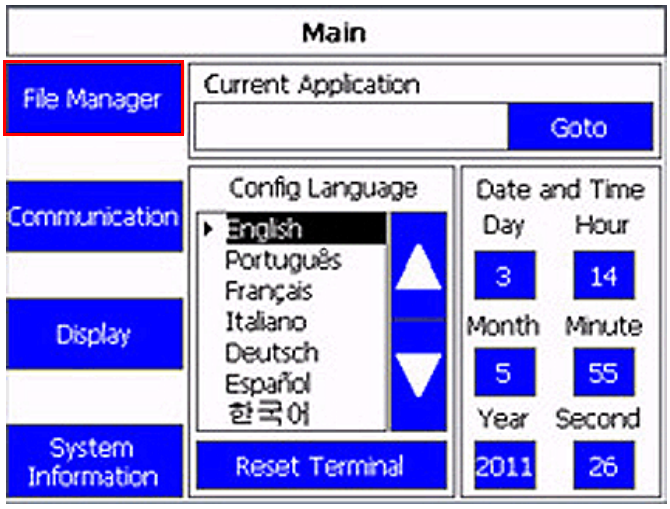
2. In the Connection Browser dialog box, select the PanelView 800 terminal to download to.



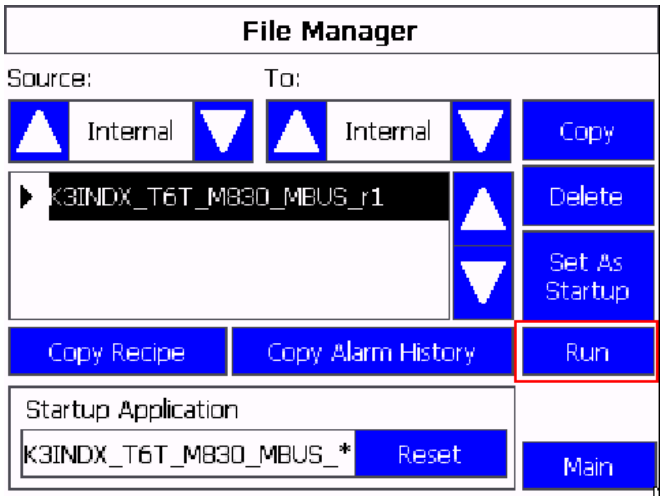
3. Click OK.
4. Verify that the download completed successfully.



5. From the Main menu of your PanelView 800 terminal, press File Manager.



6. On the File Manager screen, select Internal as your Source.
7. Select your application.
8. Press Run.



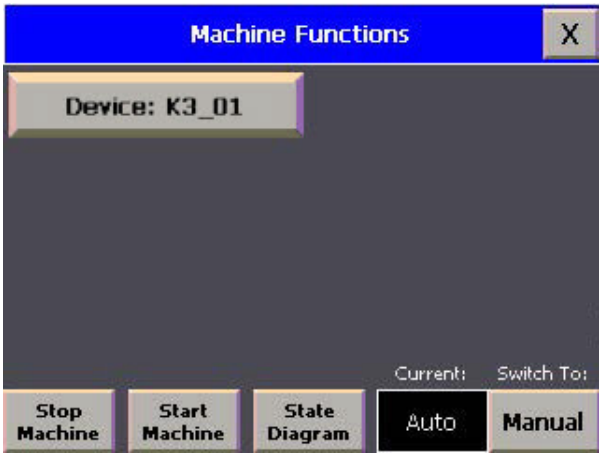
Validate Your System

In this section, you review the Machine Functions screen and explore the Status and Command screens to test the manual control of the building block.

Understand the Machine Functions Screen

The Machine Functions screen is the screen that links to all installed building blocks. When this screen is first loaded, you can complete the following tasks.

- Return to the Machine Overview screen by pressing the 'X' in the upper right-hand corner of the screen.
- View a device in detail by pressing its button.
- View the current machine Auto/Manual state.
- Change the current machine Auto/Manual state.
- Clear machine faults, start/stop the machine (while in Auto mode) and go to the machine state-diagram overview screen.

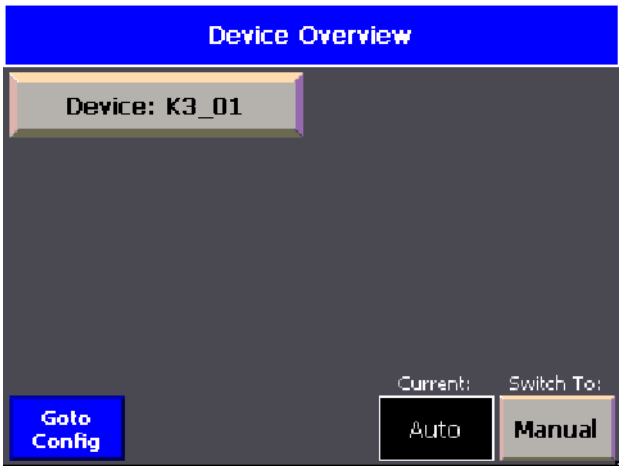


The border of the device button changes color to indicate a specific status. For the Kinetix 3 drives, the button border colors indicate the following status:

- A green border indicates that the drive is active and running.
- A gray border indicates that the drive is inactive and stopped.
- A red border indicates that there is a fault or an alarm is present.

Understand the Device Overview Screen

The Device Overview screen in the default project is common among all Building Block projects. When this screen is first loaded, you can do the following:



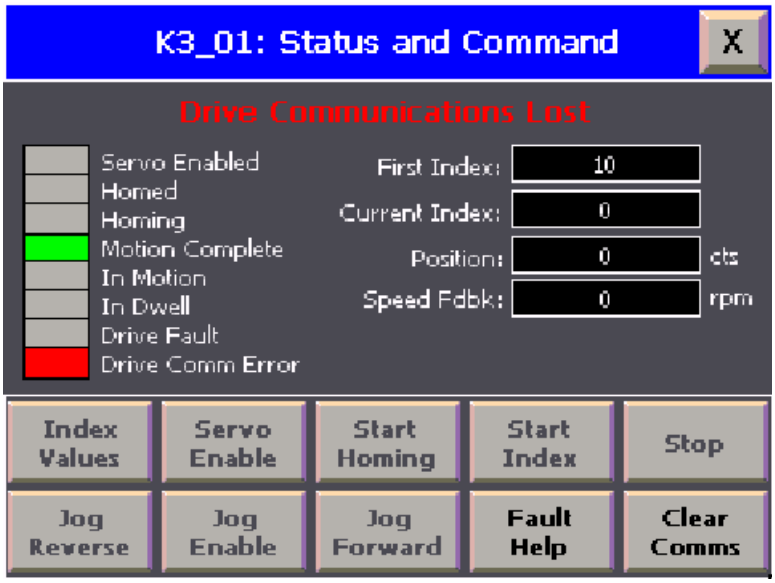
- Return to the configuration screen and exit the program.
- Review a particular device in detail.
- View the current machine state.
- Change the current machine state.
- Add your own buttons to use additional screens for your machine information.

Understand the Status and Command Screen

Follow these steps to understand the Simple Motion Control functionality.

1. From the Device Overview screen, switch the Operation mode to Manual.
2. Press the device.

   The Status and Command screen for the device appears in Manual mode. The Auto mode screen is shown here, with many of the features disabled.



3. At any time, press X in the top-right corner to return to the previous screen.

   If the dialog box is opened while the program is in Auto mode, some of the commands are inactive and some of the input selectors are unavailable.

Table 3 - Drive Status Indicators

Parameter	Description
Servo Enabled/Jog Enabled	The box indicates whether the servo loop is active and the drive is maintaining control of the motor. The text indicates whether the enabling control is the Standard Operating mode or the Jog Operating mode.
Homed	This indicator displays the home status of the drive. When the box is gray, the drive is not homed. If the box is green, the drive has an absolute position reference.
Homing	This indicator displays the homing status of the drive. If the drive has started homing but has not attained an absolute position reference, the box displays green; otherwise, it displays gray.
Motion Complete	This box displays gray while the drive is in motion or in dwell. The box displays green after the last index in a chain has completed motion.
In Motion	If the drive is moving as part of an index command, this indicator is green.
In Dwell	If the drive is not moving as part of an index dwell command, this indicator is green.
Drive Fault	If the drive is healthy, this indicator is gray. If there is a fault on the drive, it is red and shows the error number in the text.
Drive Comm Error	If any of the Modbus messages to the drive fail, this bit latches on until it is cleared. Bad checksums, lost connections, or an invalid configuration in the drive cause m message failures.

Table 4 - Numeric Displays And Inputs

Parameter	Description
First Index	This parameter contains the index that is initiated when the Start Index command is sent. The operator can edit the first index only while the drive is stopped and in Manual mode. It is in the Edit mode when the background is blue. Valid values are 0…63.
Current Index/Jog Speed	While indexing, this field displays the current index that is executing in the drive. If the drive is jogging, this editable field lets the operator change the jog speed. Valid values for the jog speed are 0…6000.
Position	This field displays the position feedback for the motor in encoder counts. Homing resets this field to the home value.
Speed Fdbk	This field displays the speed feedback for the motor in revolutions per minute.

Table 5 - Control Buttons

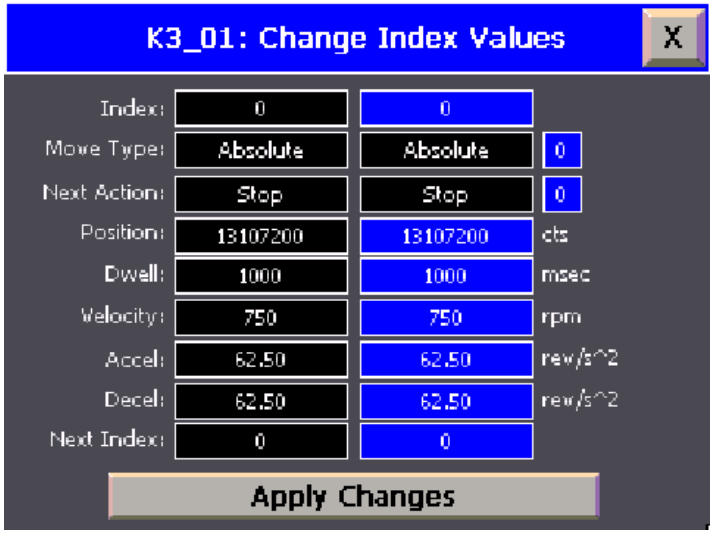
Parameter	Description
Index Values	This button takes the operator to another screen to change index parameters. It is visible only when the drive is stopped and in Manual mode.
Servo Enable	This maintained push button closes the servo loop and energizes the motor for indexing operation. It is visible when the program is in Manual mode and jogging is not active. Once enabled, the display changes to read Servo Disable.
Start Homing	This momentary push button starts the homing process for the drive. It is available only when the drive is stopped and enabled while the program is in Manual mode.
Start Index	This momentary push button starts the index that is shown in First Index. It is available only when the drive is stopped and enabled while the program is in Manual mode. The drive does not need to be homed for incremental position moves. The drive generates a fault if an absolute move is commanded before an absolute position reference is established.
Stop	This momentary push button stops the homing or indexing process. It is available only when the program is in Manual mode. It is important to create another button for stopping the drive in Auto mode, and by using physical emergency stop buttons.
Jog Reverse	This momentary push button jogs the axis in the reverse direction at the specified jog speed. This button must be held down to continue jogging. It is available only while the drive is enabled for jogging.
Jog Enable	Use this maintained push button to enable the drive for jogging. It is available only when the drive is already jogging in Manual mode or when the drive is disabled in Manual mode. Once enabled, the display changes to read Jog Disable.
Jog Forward	This momentary push button jogs the axis in the forward direction at the specified jog speed. This button must be held down to continue jogging. It is available only while the drive is enabled for jogging.
Fault Help	This button takes the operator to another screen that displays information about diagnosing and fixing the drive faults. It is always available, and displays the information for the last fault code that is registered on the drive.
Clear Faults / Clear Comms	When the Clear Faults button is displayed, this momentary push button attempts to clear faults on the drive. When the Clear Comms button is displayed, this momentary push button attempts to unlatch the Drive Comms Error status bit.

Understand the Index Values Screen

1. To switch to the Index Values screen, from the Status and Command screen, press Index Values.

   It looks similar to the screen shown.

The left side of the screen shows the values that are currently programmed in the drive, while the blue fields are used for editing. Pressing Apply Changes writes the new values to the drive, and must be done before switching to another index.



These parameters can be changed.

Parameter	Description	Range
Index	This parameter is the index number.	0…63
Move Type	This parameter is the move type for that index.	0 = Absolute 1 = Relative
Next Action	When the index completes, this action is taken next.	0 = Stop 1 = Start Next 2 = Wait for Start
Position / Distance	If the move type is absolute, this field displays as Position. If the move type is Relative, this field displays as Distance.	-2,147,483,648…2,147,483,647 encoder counts (1)
Dwell	This parameter is the dwell time for the axis after the move has been completed, before starting the next or ending the cycle.	0…65,536 ms
Velocity	This parameter is the maximum velocity that the index moves. It is limited by the motor selection.	0…6000 rpm
Accel	This parameter is the acceleration rate that is used for the index, in rev/s^2.	0…21,474,836.47
Decel	This parameter is the deceleration rate that is used for the index, in rev/s^2.	0…21,474,836.47
Next Index	This parameter is the number of the index that is selected next if the next action is set to Start Next or Wait for Start.	0…63

(1) Truncated to 311778856 in this release due to a PanelView 800 terminal anomaly.

2. To practice changing the values, follow these steps.
   a. Change the position value for Index 00 to the value needed in your application.
   – For an unloaded motor, use the number of counts in your encoder.
   – For TL-Series motor with an incremental encoder, use 8000 counts.
   – For TL-Series motor with an absolute encoder, use 131,072 counts.
   b. Change the dwell value for Index 00 ms to 1000 ms.
   c. Press Apply.
3. To return to the Status and Command screen, press X on the top right corner.

Verify the Manual Operation of the Drive

IMPORTANT	This section assumes that your motor is free to move and causes no harm when in motion. Take precautions before enabling and moving the motor.

1. Press Jog Enable.

   The motor energizes, and it attempts to hold its present position. The Servo Enable button is no longer active.
2. Locate the numeric entry field on the right side of the screen for Jog Speed.
3. Enter a value appropriate for your application.

   For a bare motor shaft, use 100 rpm.
4. Press and hold Jog Forward.

   The motor turns forward.
5. Monitor the Position and Speed Fdbk indicators as they show the movement of the motor.

   Release the Jog Forward button.
6. Press Jog Enable.

   Servo Enable becomes available.
7. Press Servo Enable.

   The motor energizes.
8. Press Start Homing.

   The motor moves to the home position.

   If the homing mode was never defined in the Ultraware software, the motors turn until the homing input goes active.
9. Press Stop.

   Wait until motion has stopped.
10. Press Start Index.

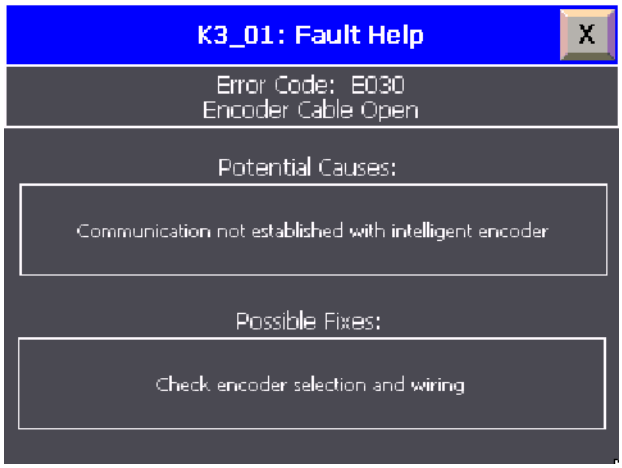
    The motor moves the distance that was configured in the previous section.

    Monitor the status bits that change as the motor moves, such as In Motion, In Dwell, and End of Sequence.
11. After the motion has stopped, disconnect the feedback cable from the drive.

    A drive fault occurs.
12. Monitor the Drive Fault indicator.

    It turns red, and a fault code displays on the drive status indicator and in Ultraware software.
13. Connect the feedback cable.

14. Press Fault Help.



15. Explore the Fault Help screen.
16. To return to the Status and Command screen, press X in the top right corner of the screen.
17. Press and hold Clear Faults until the Drive Fault indicator clears.

Notes:

Kinetix 3 Component-class User-defined Function Block

Six user-defined function blocks (UDFBs) are included with the Kinetix 3 Building Block. All are used in the device module code to return the status of the drive, send commands to the drive, and configure parameters.

RA_K3_MBUS_STS User-defined Function Block

This UDFB provides the basic status word for the Kinetix 3 drive. The outputs are updated at the interval that is specified on the input side of the function block.

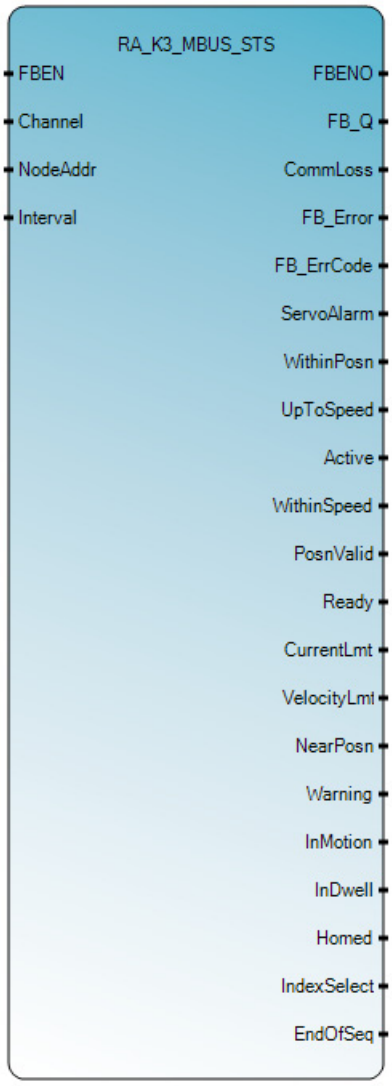


Table 6 - RA_K3_MBUS_STS Inputs

Variable	Type	Description	Range
FBEN	BOOL	The Function Block Enable bit (FBEN) controls the operation of the function. On the rising edge of this bit, the function block initialization takes place. While this bit is held high, the function block continues to execute.	1, 0
Channel	UINT	This variable is the port or channel on the controller that is connected to the drive. For this UDFB, it is recommended you use a 2080-SERIALISOL module instead of the embedded serial port.	2, 5, 6, 7, 8, and 9
NodeAddr	USINT	Each drive has a node address that the Modbus Master uses to reference that drive. For each Modbus network, those addresses must be unique.	1… 247
Interval	UDINT	This parameter controls how often the UDFB sends Modbus messages to the device, with zero representing the Continuous Operation mode. In Continuous mode, the drive status updates often, limited by the network traffic and buffer.	0…65,536 ms

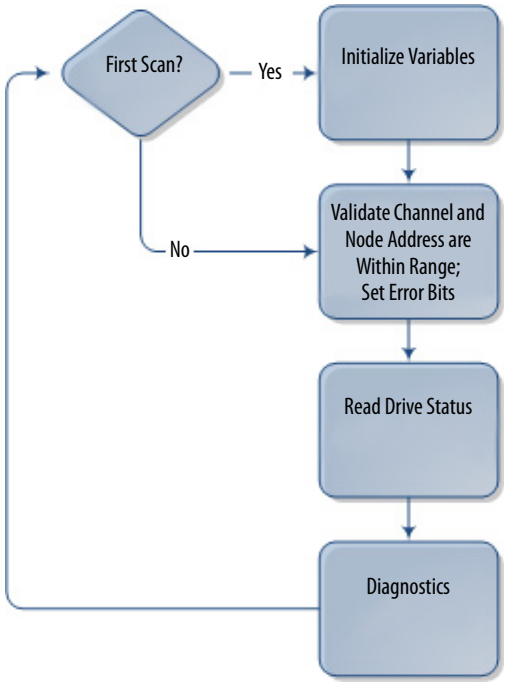
Table 7 - RA_K3_MBUS_STS Outputs

Variable	Type	Description	Range
FBENO	BOOL	This variable reflects the state of the Function Block Enable bit (FBEN).	1, 0
FB_Q	BOOL	This variable shows whether the status message has completed. After the response from the drive has been received, this bit becomes true. It stays true until another message is sent or until the UDFB sees a rising edge of the enable input.	1, 0
CommLoss	BOOL	This bit signifies a communication timeout between the controller and the drive and also triggers FB_Error to be true. The bit is cleared after a successful completion of a message to the drive, or the UDFB sees a rising edge of the enable input.	1, 0
FB_Error	BOOL	This bit shows that an error occurred within the UDFB. For a more detailed description of the error code, see FB_ErrCode.	1, 0
FB_ErrCode	UDINT	This variable enumerates the errors that have occurred within the UDFB. Bit 0 - Modbus Message Communication Error Bit 1 - Invalid Channel Bit 2 - Invalid Node Address	—
ServoAlarm	BOOL	This bit is normally true for a ‘healthy’ drive. If the bit changes to false, there is a servo alarm within the drive.	1, 0
WithinPosn	BOOL	This bit is true when the motor feedback position is within the specified position tolerance of parameter Pr5.00 - In Position Size.	1, 0
UpToSpeed	BOOL)	This bit is true when the motor feedback velocity is greater than the value in Pr5.04 - Up To Speed.	1, 0
Active	BOOL	This bit is true when the drive is disabled and goes false when the drive is enabled. This bit operates opposite to the digital output that is associated with the Brake.	1, 0
WithinSpeed	BOOL	This bit is true when motor feedback velocity is within the specified speed tolerance of parameter Pr5.03 - Speed Window.	1, 0
PosnValid	BOOL	This bit is true when the drive is connected to an absolute encoder configured with battery backup and it can read a valid position from the encoder.	1, 0
Ready	BOOL	This bit is true when the drive is not faulted and can be enabled.	1, 0
CurrentLmt	BOOL	This bit is true when the current is being limited by the drive. The current limits are entered in parameters Pr4.01 - Positive Internal Current Limit, Pr4.02 - Negative Internal Current Limit, Pr4.03 - Positive External Current Limit, and Pr4.04 - Negative External Current Limit.	1, 0
VelocityLmt	BOOL	This bit is true when the velocity is being limited by the drive. The velocity limit can be derived from the analog velocity input or the manual limit that is entered in parameter Pr2.12 - Manual Velocity Limit.	1, 0
NearPosn	BOOL	This bit is true when motor feedback position is within the specified position tolerance of parameter Pr5.02 - Near Position Size.	1, 0
Warning	BOOL	This bit is true when there is a warning on the drive. Warning descriptions can be seen in the Kinetix 3 Component Servo Drives User Manual. See the Additional Resources on page 9.	1, 0
Inertion	BOOL	This bit is true when the drive is moving as part of an index.	1, 0

Table 7 - RA_K3_MBUS_STS Outputs (continued)

Variable	Type	Description	Range
InDwell	BOOL	This bit is true when the drive is holding position for a specified time as part of an index.	1, 0
Homed	BOOL	This bit is true when the drive has completed the homing sequence and has a valid home position. This bit does not clear if the encoder exceeds its range, however it does not have a valid absolute position reference.	1, 0
IndexSelect	UINT	This variable is binary combination that represents the current index that is being acted on. If an index is in process, it represents the value of the last index that was acted on.	0…63
EndOfSeq	BOOL	This bit is true when motion has stopped on the axis in indexing mode. It could be due to completion of the motion cycle, or an aborted index.	1, 0

Figure 4 - RA_K3_MBUS_STS Function Block Flowchart



RA_K3_MBUS_STS_Extended User-defined Function Block

This UDFB retrieves the extended status information from the drive. The drive supports only two analog outputs; this function block lets many more values to be updated. The outputs are updated at the interval that is specified on the input side of the function block.

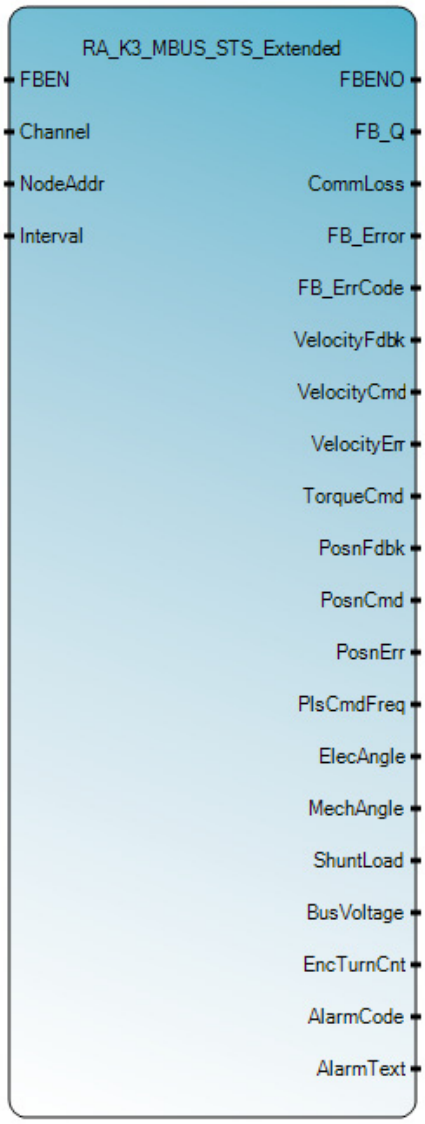


Table 8 - RA_K3_MBUS_STS_Extended Inputs

Variable	Type	Description	Range
FBEN	BOOL	The Function Block Enable bit (FBEN) controls the operation of the function. On the rising edge of this bit, the function block initialization takes place. While this bit is held high, the function block continues to execute.	1, 0

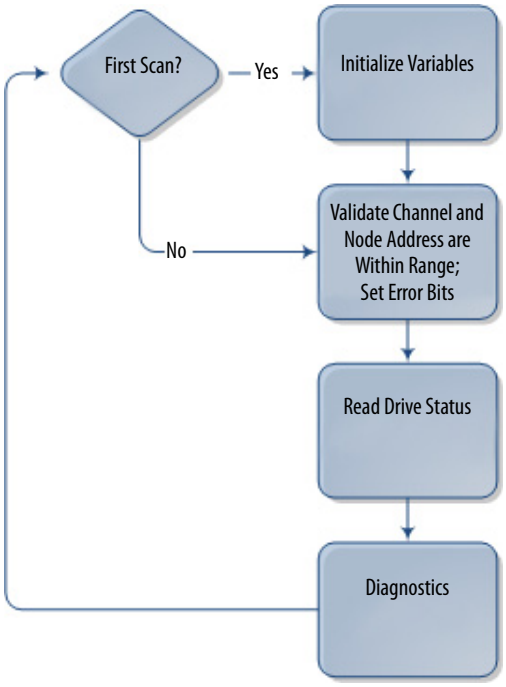
Table 8 - RA_K3_MBUS_STS_Extended Inputs (continued)

Variable	Type	Description	Range
Channel	UINT	This variable is the port or channel on the controller that is connected to the drive. For this UDFB, it is recommended to use a 2080-SERIALISOL module instead of the embedded serial port.	2, 5, 6, 7, 8, and 9
NodeAddr	USINT	Each drive has a node address that the Modbus Master uses to reference that drive. For each Modbus network, those addresses must be unique.	1…247
Interval	UDINT	This parameter is used to control how often the UDFB sends Modbus messages to the device. Zero representing the continuous operation mode. In continuous mode, the drive status updates often, limited by the network traffic and buffer.	0…65,536 ms

Table 9 - RA_K3_MBUS_STS_Extended Input

Variable	Type	Description	Range
FBENO	BOOL	This variable reflects the state of the Function Block Enable bit (FBEN).	1, 0
FB_Q	BOOL	This variable shows whether the status message has completed. After the response from the drive has been received, this bit becomes true. It stays true until another message is sent or until UDFB sees a rising edge of the enable input.	1, 0
CommLoss	BOOL	This bit signifies a communication timeout between the controller and the drive. This bit also triggers FB_Error to be true. This bit is cleared after a successful completion of a message to the drive or the UDFB sees a rising edge of the enable input.	1, 0
FB_Error	BOOL	This bit shows that an error occurred within the UDFB. For a more detailed description of the error code, see FB_ErrCode.	1, 0
FB_ErrCode	UDINT	This variable enumerates the errors that have occurred within the UDFB. This UDFB has the following error designations: Bit 0 - Modbus Message Communication Error Bit 1 - Invalid Channel Bit 2 - Invalid Node Address	—
VelocityFdbk	INT	This value is the motor feedback velocity in revolutions per minute.	—
VelocityCmd	INT	This value is the motor command velocity in revolutions per minute.	—
VelocityErr	INT	This value is the difference between the motor command and motor feedback velocity, in revolutions per minute.	—
TorqueCmd	REAL	This value is the commanded current to the motor, in percent of maximum for the drive.	—
PosnFdbk	DINT	This value is the motor feedback position in encoder counts.	—
PosnCmd	DINT	This value is the motor command position in encoder counts.	—
PosnErr	DINT	This value is the difference between the motor command and motor feedback position, in encoder counts.	—
PlsCmdFreq	REAL	This value is the frequency of pulses, in pulses per second, while in Position Follower mode.	—
ElecAngle	REAL	This value is the electrical angle of the motor, in degrees.	—
MechAngle	REAL	This value is the mechanical angle of the motor, in degrees.	—
ShuntLoad	INT	This value is the regenerative loading, in percent of maximum.	—
BusVoltage	INT	This value is the bus voltage, in volts.	—
EncTurnCount	INT	This value is the absolute encoder turn count. It is active only when the encoder is using absolute feedback with a battery.	—
AlarmCode	INT	This value is the most recent alarm code that the drive has registered.	—
AlarmText	STRING	This value is the alarm message that is associated with the most recent alarm code.	—

Figure 5 - RA_K3_MBUS_STS_Extended Function Block Flowchart



RA_K3_MBUS_CMD_Indexing User-defined Function Block

This UDFB provides basic control of the servo drive while it is in Indexing mode. This UDFB compares the current state of the inputs against the previous state of the inputs. If there is a difference, the new command word is sent to the drive. This UDFB does not perform any status checks or interlocks. It is possible to send a command that the drive cannot accept and it can produce an error, depending on the cause of the failed command. The drive parameter Pr0.32 must be set to 0x01 or 0x11 for this function to operate.

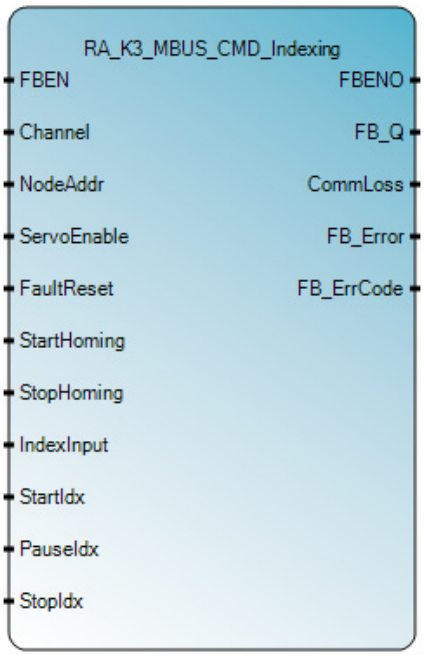


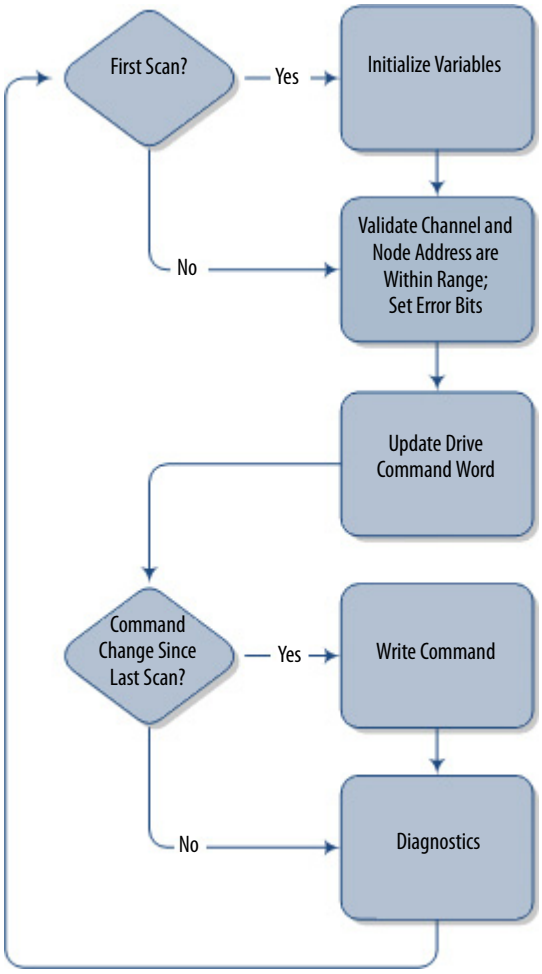
Table 10 - RA_K3_MBUS_CMD_Indexing Inputs

Variable	Type	Description	Range
FBEN	BOOL	The Function Block Enable bit (FBEN) controls the operation of the function. On the rising edge of this bit, the function block initialization takes place. While this bit is held high, the function block continues to execute.	1, 0
Channel	UINT	This variable is the port or channel on the controller that is connected to the drive. For this UDFB, it is recommended to use a 2080-SERIALISOL module instead of the embedded serial port.	2, 5, 6, 7, 8, and 9
NodeAddr	USINT	Each drive has a node address that the Modbus Master uses to reference that drive. For each Modbus network, those addresses must be unique.	1…247
ServoEnable	BOOL	This bit enables the servo while true, and disables it when false.	1, 0
FaultReset	BOOL	A rising edge of this bit causes the drive to attempt to clear faults.	1, 0
StartHoming	BOOL	A rising edge of this bit causes the drive to attempt to start homing. The drive must be enabled first.	1, 0
StopHoming	BOOL	A rising edge of this bit causes the drive to stop the homing sequence.	1, 0
IndexInput	UINT	This value is the starting index that is used when the StartIdx bit sees a rising edge. This value is broken into a binary combination before being sent to the drive.	0…63
StartIdx	BOOL	A rising edge of this bit causes the drive to start the index that is specified at IndexInput. The drive must be enabled first. If the index uses an absolute position reference, the axis must be homed.	1, 0
PauseIdx	BOOL	When this bit is true, indexing operations pause. On a rising edge, the index move decelerates to a stop, and on a falling edge, the index resumes.	1, 0
StopIdx	BOOL	A rising edge of this bit stops the current index or dwell.	1, 0

Table 11 - RA_K3_MBUS_CMD_Indexing Outputs

Variable	Type	Description	Range
FBENO	BOOL	This variable reflects the state of FBEN.	1, 0
FB_Q	BOOL	This variable shows whether the status message has completed. After the response from the drive has been received, this bit becomes true. It stays true until another message is sent or until the UDFB sees a rising edge of the enable input.	1, 0
CommLoss	BOOL	This bit signifies a communication timeout between the controller and the drive. This bit also triggers FB_Error to be true. The bit is cleared after a successful completion of a message to the drive, or the UDFB sees a rising edge of the enable input.	1, 0
FB_Error	BOOL	This bit shows that an error has occurred within the UDFB. For a more detailed description of the error code, see FB_ErrCode.	1, 0
FB_ErrCode	UDINT	This variable enumerates the errors that have occurred within the UDFB. Bit 0 = Modbus Message Error Bit 1 = Channel Invalid Bit 2 = Node Address Invalid bit 3 = Index Input Invalid	—

Figure 6 - RA_K3_MBUS_CMD_Indexing Flowchart



RA_K3_MBUS_CMD_Jog User-defined Function Block

This UDFB lets you jog the motor at a preset speed while in Indexing mode. This function block uses the internal jog function of the drive. The drive parameter Pr0.32 must be set to 0x10 or 0x11 for this function to operate.

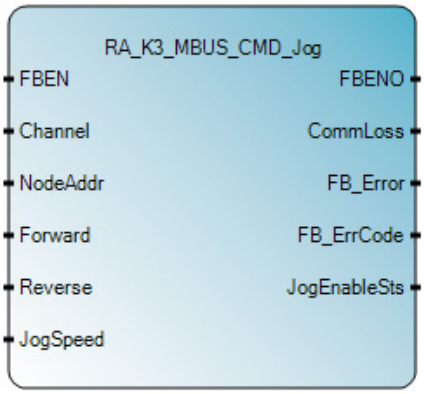


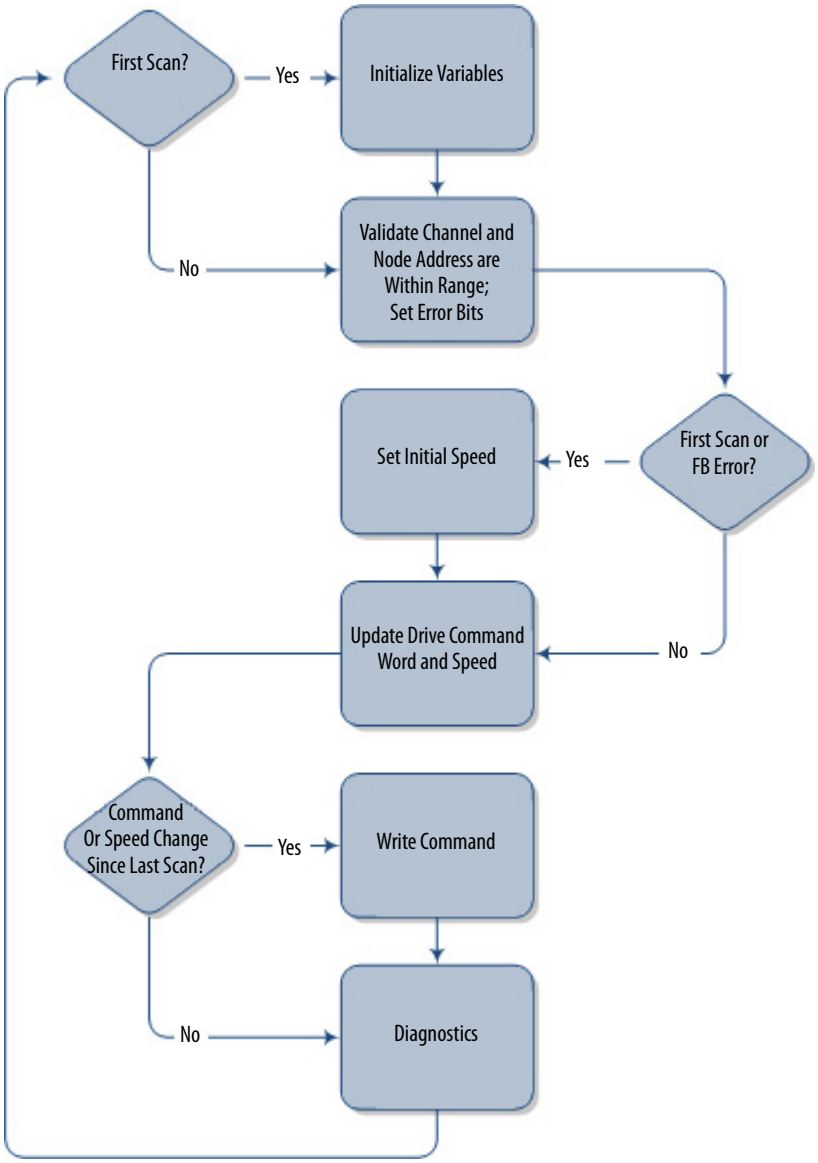
Table 12 - RA_K3_MBUS_CMD_Jog Inputs

Variable	Type	Description	Range
FBEN	BOOL	The Function Block Enable bit (FBEN) controls the operation of the function. On the rising edge of this bit, the function block initialization takes place. During this initialization, the jog speed input is written to the drive, and the jog function is enabled. On a falling edge, the jog function is disabled.	1, 0
Channel	UINT	This variable is the port or channel on the controller that is connected to the drive. For this UDFB, it is recommended to use a 2080-SERIALISOL module instead of the embedded serial port.	2, 5, 6, 7, 8, and 9
NodeAddr	USINT	Each drive has a node address that the Modbus Master uses to reference that drive. For each Modbus network, those addresses must be unique.	1…247.
Forward	BOOL	If the jog function is enabled, with the rising edge of this bit the drive starts to jog in the forward direction, at the specified jog speed.	1, 0
Reverse	BOOL	If the jog function is enabled, with the rising edge of this bit the drive starts to jog in the reverse direction, at the specified jog speed.	1, 0
JogSpeed	UINT	This variable sets the jog speed for the motor in rpm.	0…6000

Table 13 - RA_K3_MBUS_CMD_Jog Outputs

Variable	Type	Description	Range
FBENO	BOOL	This variable reflects the state of FBEN.	1, 0
CommLoss	BOOL	This bit signifies a communication timeout between the controller and the drive. This bit also triggers FB_Error to be true. The bit is cleared after a successful completion of a message to the drive, or the UDFB sees a rising edge of the enable input.	1, 0
FB_Error	BOOL	This bit shows that an error has occurred within the UDFB. For a more detailed description of the error code, see FB_ErrCode.	1, 0
FB_ErrCode	UDINT	This variable enumerates the errors that have occurred within the UDFB. Bit 0 = Modbus Message Error Bit 1 = Channel Invalid Bit 2 = Node Address Invalid Bit 3 = Jog Speed Invalid	—
JogEnableSts	BOOL	This bit shows the status of the last message that was sent to the drive. If the bit is true, the jog function in the drive is enabled. If the bit is false, the jog function in the drive is disabled.	1, 0

Figure 7 - RA_K3M_BUS_CMD_Jog Function Block Flowchart



RA_K3_MBUS_CFG_IndexWriteValues User-defined Function Block

This UDFB writes the index configuration parameters for any of the 64 index points in the drive.

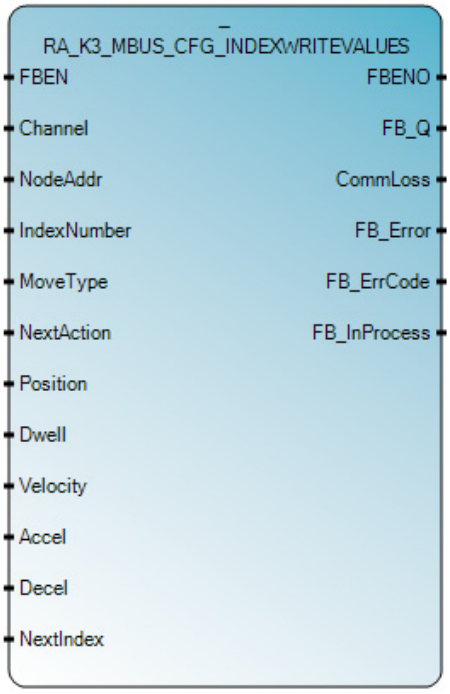


Table 14 - RA_K3_MBUS_CFG_IndexWriteValues Inputs

Variable	Type	Description	Range
FBEN	BOOL	The Function Block Enable (FBEN) bit starts the operation of the function. On the rising edge of this bit, the function block initialization takes place. After initialization, regardless of the status of the enable input, the function block begins to send the configuration messages to the drive until it completes or encounters an error.	1, 0
Channel	UINT	This variable is the port or channel on the controller that is connected to the drive. For this UDFB, it is recommended to use a 2080-SERIALISOL module instead of the embedded serial port.	2, 5, 6, 7, 8, and 9
NodeAddr	USINT	Each drive has a node address that the Modbus Master uses to reference that drive. For each Modbus network, those addresses must be unique.	1…247
IndexNumber	INT	This variable is the index number that is changed.	0…63
MoveType	DINT	This variable is the move type for that index.	0 = absolute position reference 1 = relative or incremental position reference
NextAction	DINT	This variable is the action that the drive must take upon completing the index.	0 = stop 1 = start next index 2 = wait for start before starting next index
Position	DINT	This variable is the position reference, in encoder counts.	-2,147,483,648… 2,147,483,647
Dwell	UINT	This variable is the dwell time, in milliseconds, the drive holds the position reference after the move is complete.	0…65,536
Velocity	INT	This variable is the maximum velocity of the index move, in revolutions per minute. The value is limited by motor model.	0…6000

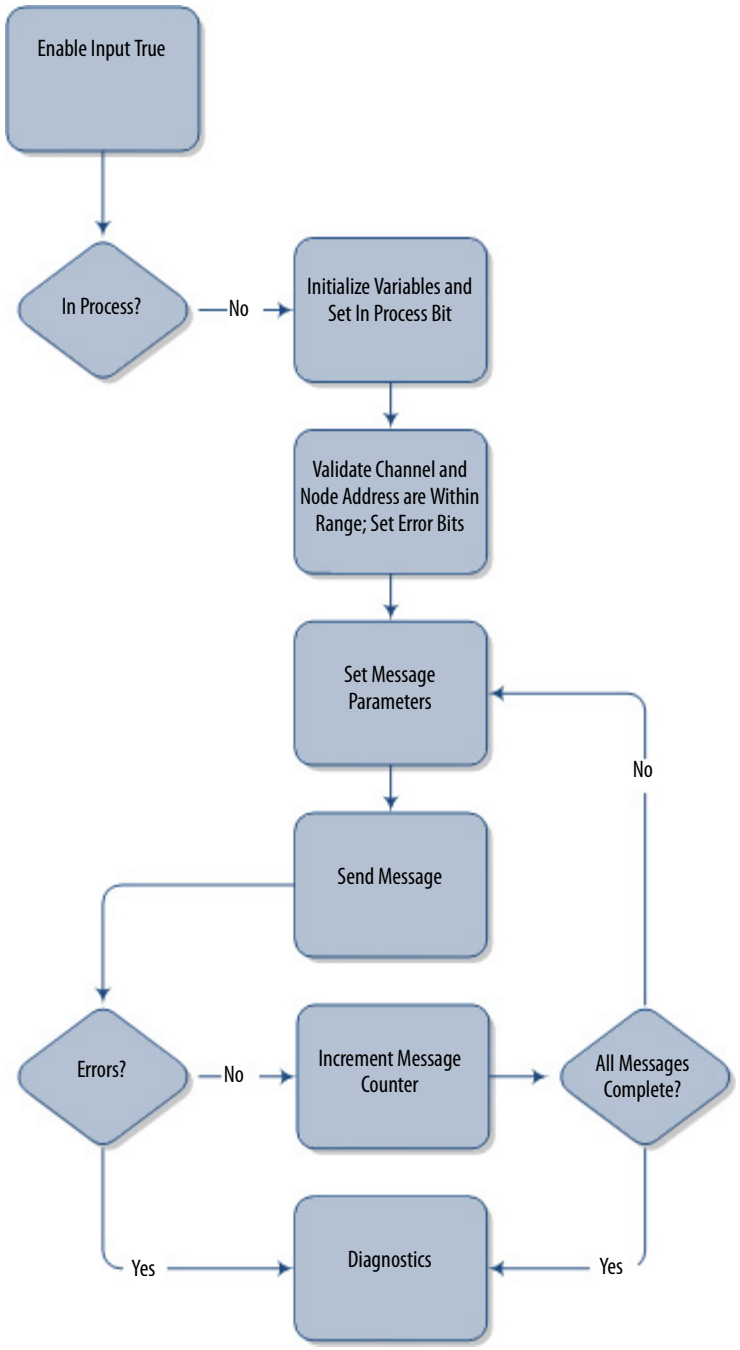
Table 14 - RA_K3_MBUS_CFG_IndexWriteValues Inputs (continued)

Variable	Type	Description	Range
Accel	REAL	This variable is the acceleration that the drive uses to attempt to reach the maximum velocity for the index move, in revolutions per second^2. It has seven digits of precision and two decimal places. The value is limited by motor model.	0…21,474,836.47
Decel	REAL	This variable the deceleration that the drive uses to attempt to stop the motor for the index move, in revolutions per second^2. It has seven digits of precision and two decimal places. The value is limited by motor model.	0…21,474,836.47
NextIndex	INT	This variable is the value of the index that is acted on next if the NextAction configuration is not set to stop.	0…63

Table 15 - RA_K3_MBUS_CFG_IndexWriteValues Outputs

Variable	Type	Description	Range
FBENO	BOOL	This variable reflects the state of FBEN.	1, 0
FB_Q	BOOL	This variable shows whether the status message has completed. After the response from the drive has been received for last configuration message, this bit becomes true. It stays true until the UDFB sees a rising edge of the enable input.	1, 0
CommLoss	BOOL	This bit signifies a communication timeout between the controller and the drive and it also triggers FB_Error to be true. The bit s is cleared only after the UDFB sees a rising edge of the enable input.	1, 0
FB_Error	BOOL	This bit shows that an error has occurred within the UDFB. For a more detailed description of the error code, see FB_ErrCode.	1, 0
FB_ErrCode	UDINT	This variable enumerates the errors that have occurred within the UDFB. Bit 0 = Modbus Message Error (all communication errors, including loss) Bit 0 = Channel Invalid Bit 1 = Node Address Invalid Bit 2 = Index Number Invalid Bit 3 = Move Type Invalid Bit 4 = Next Action Invalid Bit 5 = Position Invalid Bit 6 = Dwell Invalid Bit 7 = Velocity Invalid Bit 8 = Accel Invalid Bit 9 = Decel Invalid Bit 10 = Next Index Invalid	—
FB_InProcess	BOOL	This variable shows that the function block is in the saving process and has not reached an error state. Use it to prevent messages from being sent to the drive during the saving process. Messages that are sent during the saving process can generate communication errors.	1, 0

Figure 8 - RA_K3_MBUS_CFG_IndexWriteValues Function Block Flowchart



RA_K3_MBUS_CFG_IndexReadValues User-defined Function Block

This UDFB reads the index configuration parameters for any of the 64 index points in the drive.

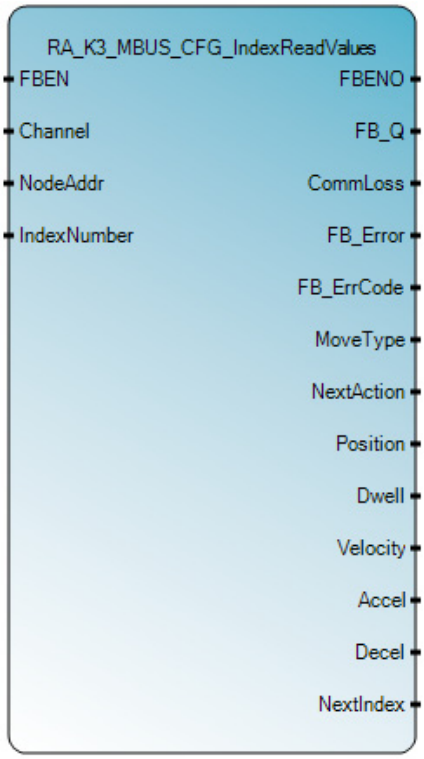


Table 16 - RA_K3_MBUS_CFG_IndexReadValues Inputs

Variable	Type	Description	Range
FBEN	BOOL	The Function Block Enable bit (FBEN) starts the operation of the function. On the rising edge of this bit, the function block initialization takes place. After initialization, regardless of the status of the enable input, the function block begins to read the configuration from the drive for the specified index. The function block continues reading until it completes or encounters an error.	1, 0
Channel	UINT	This variable is the port or channel on the controller that is connected to the drive. For this UDFB, it is recommended to use a 2080-SERIALISOL module instead of the embedded serial port.	2, 5, 6, 7, 8, and 9
NodeAddr	USINT	Each drive has a node address that the Modbus Master uses to reference that drive. For each Modbus network, those addresses must be unique.	1…247
IndexNumber	INT	This variable is the index number that is read.	0…63

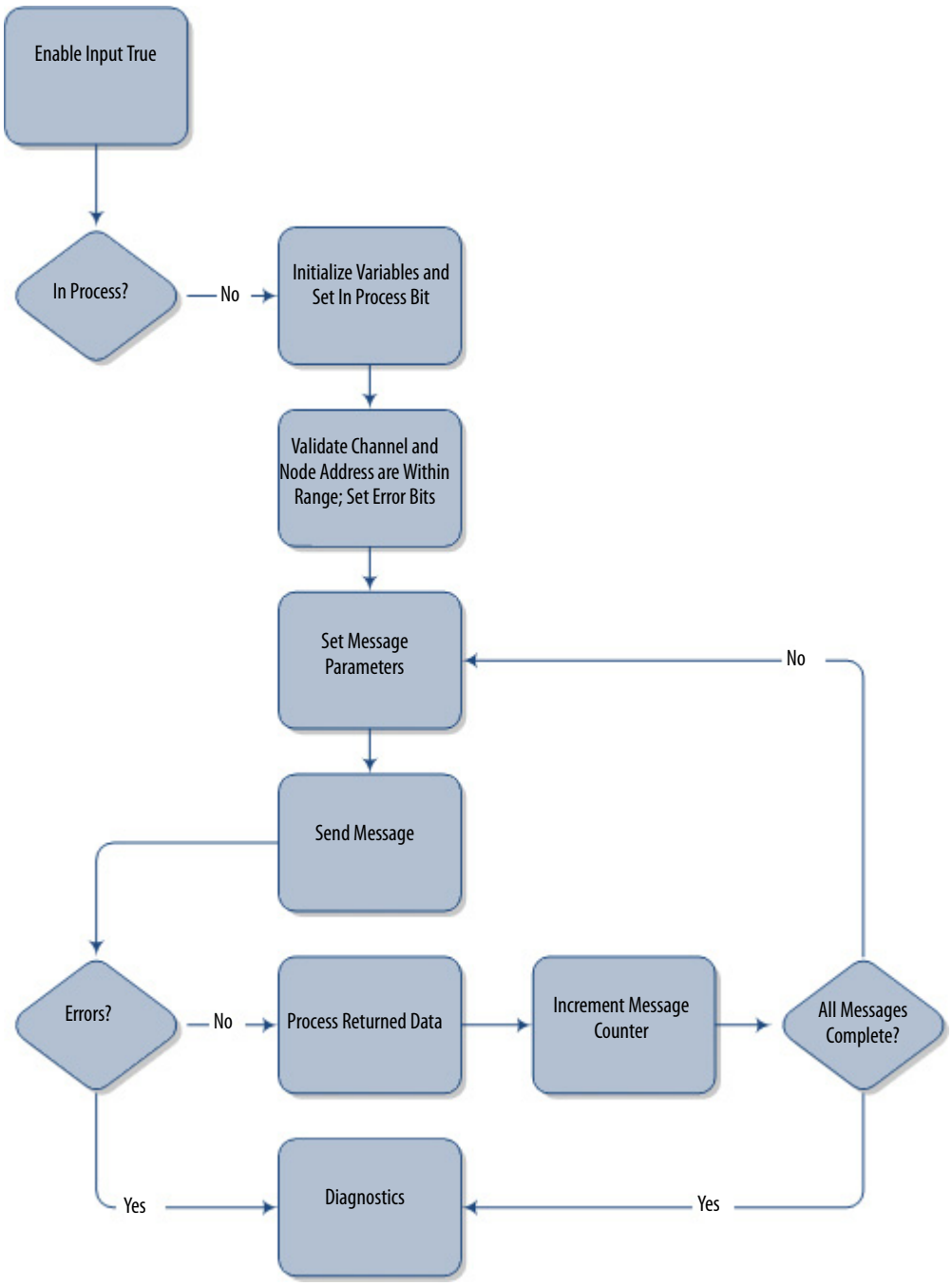
Table 17 - RA_K3_MBUS_CFG_IndexReadValues Outputs

Variable	Type	Description	Range
FBENO	BOOL	This variable reflects the state of FBEN.	1, 0
FB_Q	BOOL	This variable shows whether the status message has completed. After the response from the drive has been received for last read message, this bit becomes TRUE. It stays true until the UDFB sees a rising edge of the enable input.	1, 0
CommLoss	BOOL	This bit signifies a communication timeout between the controller and the drive and it also triggers FB_Error to be true. The bit is cleared only after the UDFB sees a rising edge of the enable input.	1, 0
FB_Error	BOOL	This bit shows that an error has occurred within the UDFB. For a more detailed description of the error code, see FB_ErrCode.	1, 0

Table 17 - RA_K3_MBUS_CFG_IndexReadValues Outputs (continued)

Variable	Type	Description	Range
FB_ErrCode	UDINT	This variable enumerates the errors that have occurred within the UDFB. Bit 0 = Modbus Message Error (all communication errors, including loss) Bit 1 = Channel Invalid Bit 2 = Node Address Invalid Bit 3 = Index Number Invalid	—
MoveType	DINT	This variable is the move type for that index.	0 = absolute position reference 1 = relative or incremental position reference.
NextAction	DINT	This variable is the action that the drive must take upon completing the index.	0 = stop 1 = start next index 2 = wait for start before starting next index
Position	DINT	This variable is the position reference, in encoder counts.	-2,147,483,648… 2,147,483,647
Dwell	UINT	This variable is the dwell time, in milliseconds, the drive holds the position reference after the move is complete.	0…65,536
Velocity	INT	This variable is the maximum velocity of the index move, in revolutions per minute. Valid values are limited by the actual motor configuration.	0…6000
Accel	REAL	This variable the acceleration that the drive uses to attempt to reach the maximum velocity for the index move, in revolutions per second^2. It has seven digits of precision and two decimal places. The value is limited by motor model.	0…21,474,836.47
Decel	REAL	This variable is the deceleration that the drive uses to attempt to stop the motor for the index move, in revolutions per second^2. It has seven digits precision and two decimal places. The value is limited by motor model.	0…21,474,836.47
NextIndex	NT	This variable is the value of the index that is acted on next if the NextAction configuration is not set to stop.	0…63

Figure 9 - RA_K3_MBUS_CFG_IndexReadValues Function Block Flowchart



Configure Your Personal Computer and Series A Kinetix 3 Drive Connection with Ultraware Software

This appendix provides the steps for configuring a Series A Kinetix 3 drive with Ultraware software.

Before You Begin

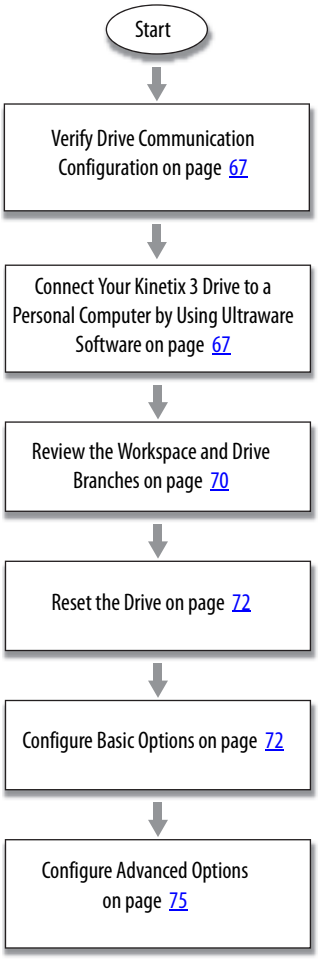
- Apply power to your drive.
- Kinetix 3 drives are configured by using Ultraware software, a standalone program that can be downloaded for free from the Rockwell Automation website.

What You Need

- Personal computer with an available RS232 port
  If RS232 port is not available, you can use a USB port and USB/RS232 converter.
- Ultraware software version 1.82.00 or later
- 2090-CCMPCDS-23AAxx communication cable for Kinetix 3 drive
- Kinetix 3 drive

Follow These Steps

Follow these steps to configure your Kinetix 3 Component-class drive.



Verify Drive Communication Configuration

The Series A Kinetix 3 drives are shipped ready to communicate with Ultraware software. Before you connect your drive to your personal computer, you can verify the configuration by using the keypad.

Follow theses steps to verify the communication settings.

1. Apply control power to the drive.
2. Press Mode/Set until the first two characters of the 7-segment status indicator display Pr.
3. Press the arrow key, until the status indicator displays Pr0.09
4. To view the setting, press Enter.
5. The status indicator displays 0005.
6. If 0005 is not displayed, do the following.
   a. Change the value to 0005 by using the arrow keys.
   b. Press Mode/Set.

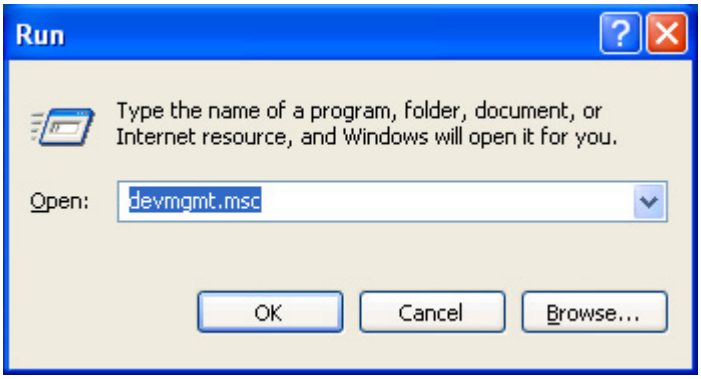
Connect Your Kinetix 3 Drive to a Personal Computer by Using Ultraware Software

Follow these steps to connect your Kinetix 3 drive to your personal computer by using Ultraware software.

1. From your personal computer, start Ultraware software.
2. Select Create new file and click OK.
3. If you receive a warning that the COM port is not available, click OK.

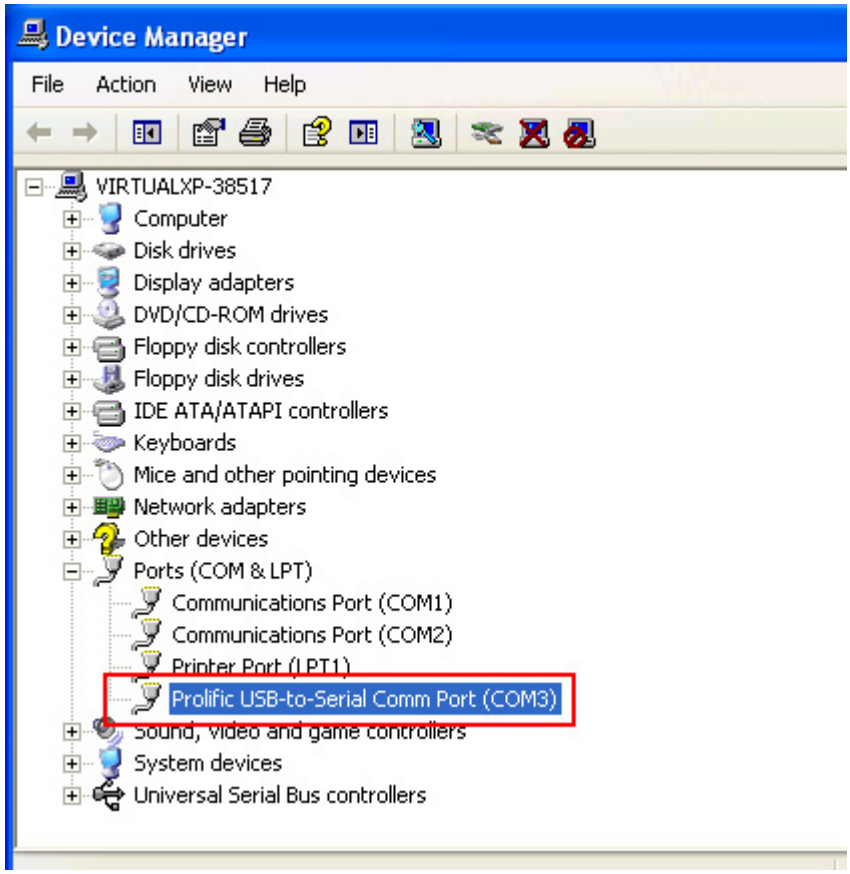
4. Connect the IEEE1394 connector of 2090-CCMPCDS-23AA, RS-232 serial communication cable to your drive and the serial connector to your personal computer.

5. Navigate to the Device Manager on your personal computer or use the Run command and enter 'devmgmt.msc'.

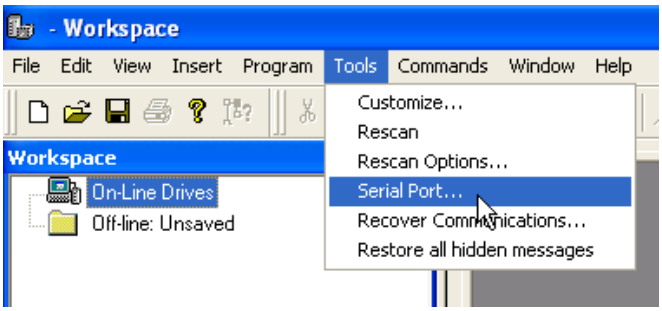


6. Determine the COM port that you want to use with Ultraware software.

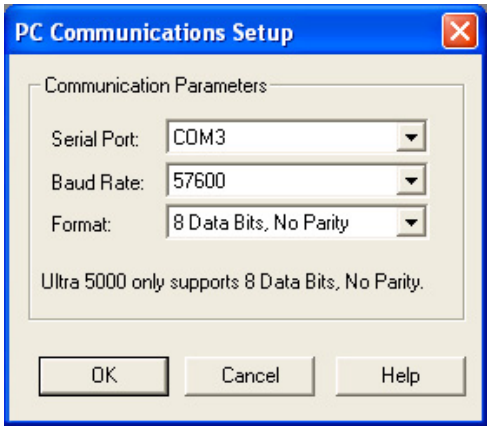
   The example that is shown uses a serial-to-USB converter on Port 3.



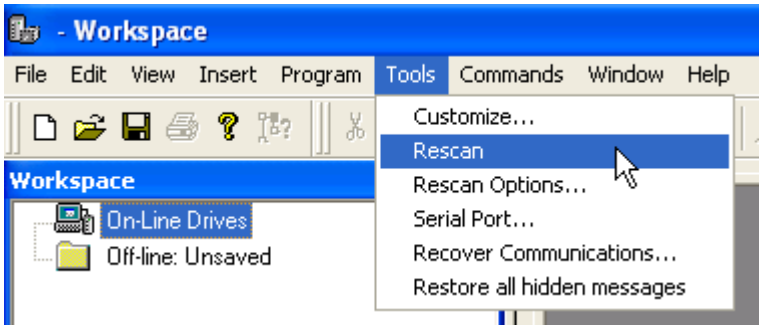
7. From the Tools menu in Ultraware software, choose Serial Port.



8. In the PC Communications Setup dialog box, configure the serial port, as follows:
   - Serial Port that is chosen in step 6
   - Baud Rate: 57600
   - Format: 8 Data Bits, No Parity



9. Click OK.
10. From the Tools menu, choose Rescan.



The drive attaches at Node 1 and is displayed in the On-Line Drives tree when the scan is complete.

Communication Established	Then
Yes	You are prompted to use a wizard to configure the Kinetix 3 drive. You are not required to use it, but it simplifies configuration.
No	There is an error in the communication setup, the drivers, or the wiring.

Review the Workspace and Drive Branches

This section provides a description of the Ultraware software workspace and the drive branches.

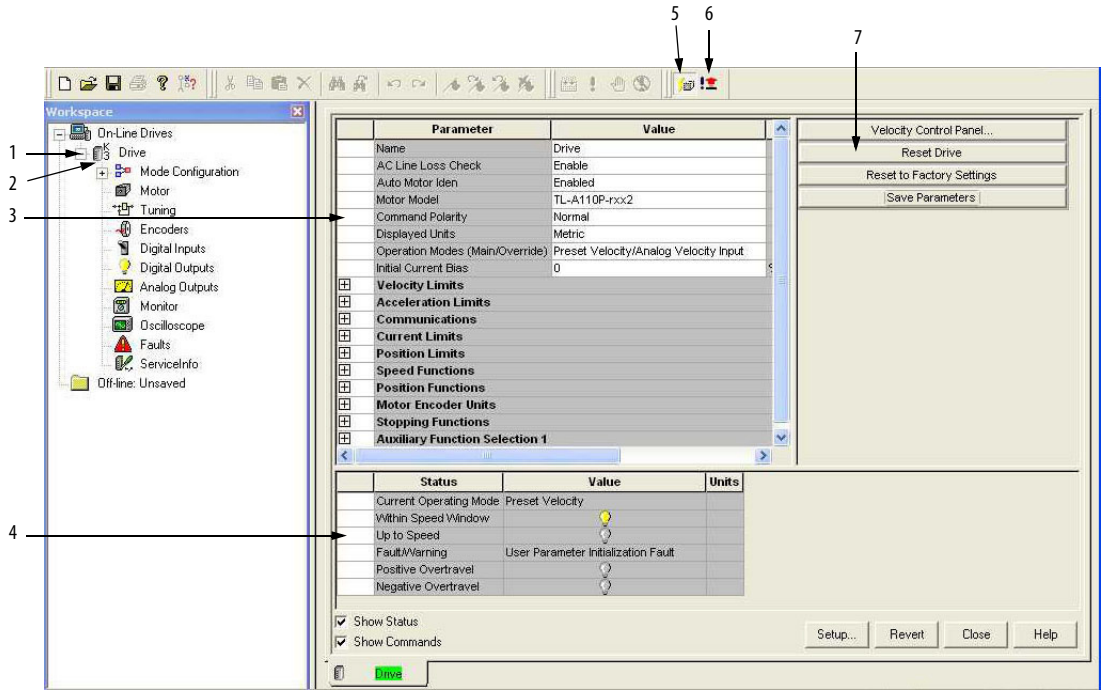


Table 18 - Ultraware Software Environment

Item	Description
1	Click [+] next to the Kinetix 3 drive to expand the parameter group.
2	Double-click the Kinetix 3 drive icon in the Ultraware software workspace to display the various drive branches.
3	Configure drive parameters for an online drive.
4	Monitor the status of an online drive.
5	Software Enable icon.
6	Disable All Drives icon.
7	Execute commands to clear faults, reset the drive, or reset the EEPROM.

Mode Configuration Branch

To select the command source of the drive, click the [+] next to Mode Configuration.

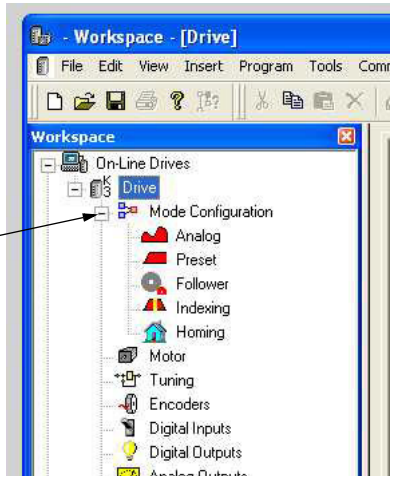


Table 19 - Branch Uses

Branch	Use this branch for the following
Motor	• Choose a motor for the associated online or offline Kinetix 3 drive. Once you have chosen a motor, the status values associated with the chosen motor appear in the Status pane of this dialog box. • Monitor the status as related to the chosen motor. • Perform diagnostics on the motor.
Tuning	• Configure Velocity and Position Regulator Gains that are used in tuning. • Monitor Velocity, Position, and Current loop status. • Open dialog boxes where you can execute commands for autotuning, manual position tuning, and manual velocity tuning.
Encoders	Use the Encoders branch to configure the motor encoder.
Digital Inputs	• Assign functionality to digital inputs. • Monitor the status of digital inputs.
Digital Outputs	• Assign functionality to digital outputs. • Set both active and inactive brake delays. • Monitor the status of digital outputs and the digital relay.
Analog Outputs	• Assign drive signals to analog outputs. • Monitor the status of analog outputs.
Monitor	• View a collection of statuses. • Open the Monitor Setup dialog box where you can choose the collection of statuses to be displayed in this dialog box. • Save a monitor for later use. • Load a monitor that was previously saved.
Oscilloscope	• Configuring the oscilloscope by choosing the drive signal to trace. • Executing commands that run the trace function of the oscilloscope continuously or in response to the configured trigger. • Monitoring the oscilloscope as it traces the chosen drive signal.
Faults	• Set fault limits. • Monitor fault status. • Execute the Clear Faults command. • Open a dialog box where you can review the fault history of the drive.
Service Information	• Display and monitor service information about the drive. • Display the firmware revision of the drive.

Reset the Drive

To provide a consistent starting point, reset the drive to factory defaults.

1. From the top-level Drive branch, click Reset to Factory Settings.

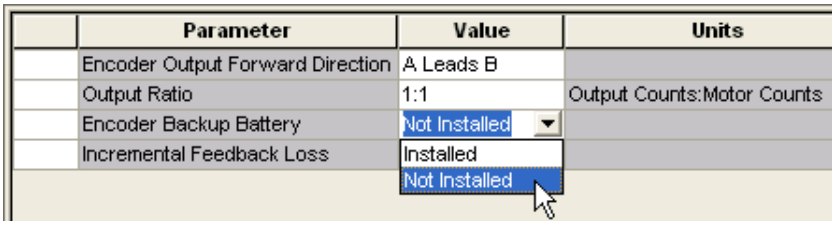
2. Acknowledge the prompt and click Yes.

   The drive resets to its factory defaults.

Configure Basic Options

Follow these steps to configure the drive for your application.

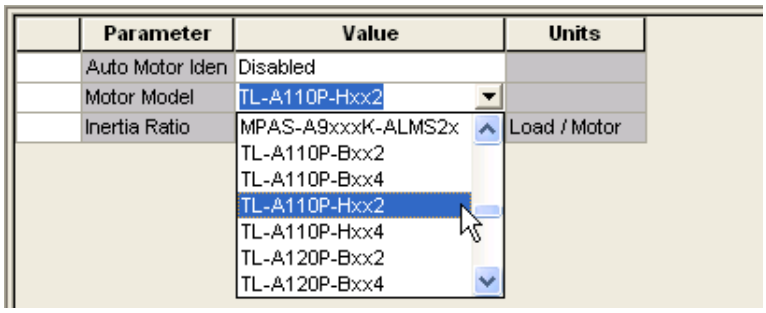
1. If you are using a motor with an intelligent encoder, and do not want to use a battery to maintain absolute position reference during power off, do the following.



   a. Double-click the Encoder branch.
   b. Set Encoder Backup Battery to Not Installed.

      You are prompted to reset the drive.
   c. Click Yes.

2. Follow these steps if your motor does not have an intelligent encoder.
   a. Double-click the Motor branch.



   b. Set Auto Motor Iden to Disabled.

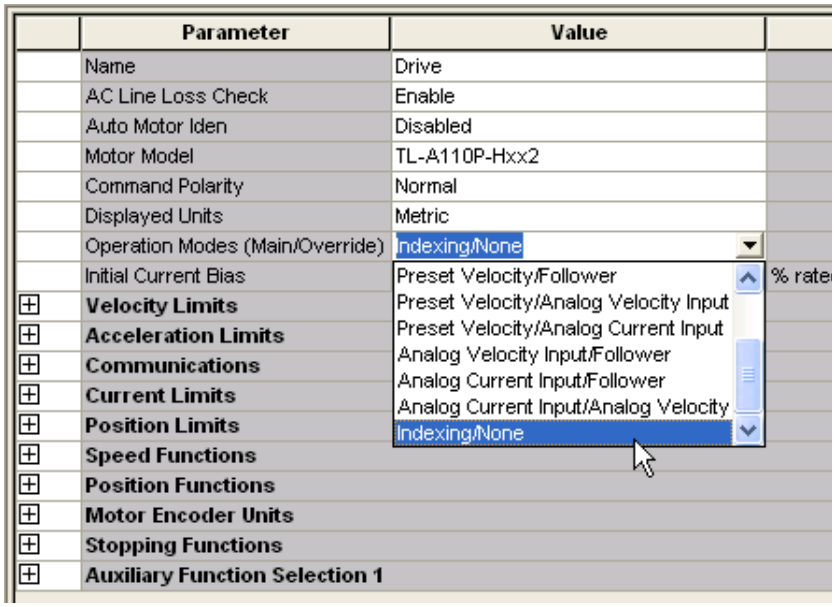
      You are prompted to reset the drive.

c. Click Yes.

d. From the Motor Model pull-down menu, choose your motor model.

3. Double-click the Drive branch.

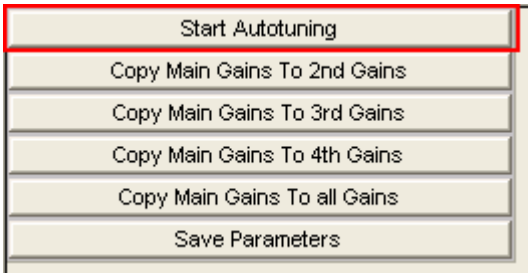
4. Set the Operation Modes (Main/Override) to Indexing/None.



5. Click Yes when prompted to reset the drive.

6. Use Autotune for best performance. Autotune can also be done later and as required.

a. Double-click the Tuning branch.



b. Verify that the load is free to move without obstruction and that all personnel and equipment are away from the load and motor shaft or line of motion.

IMPORTANT The Autotune process causes motion.

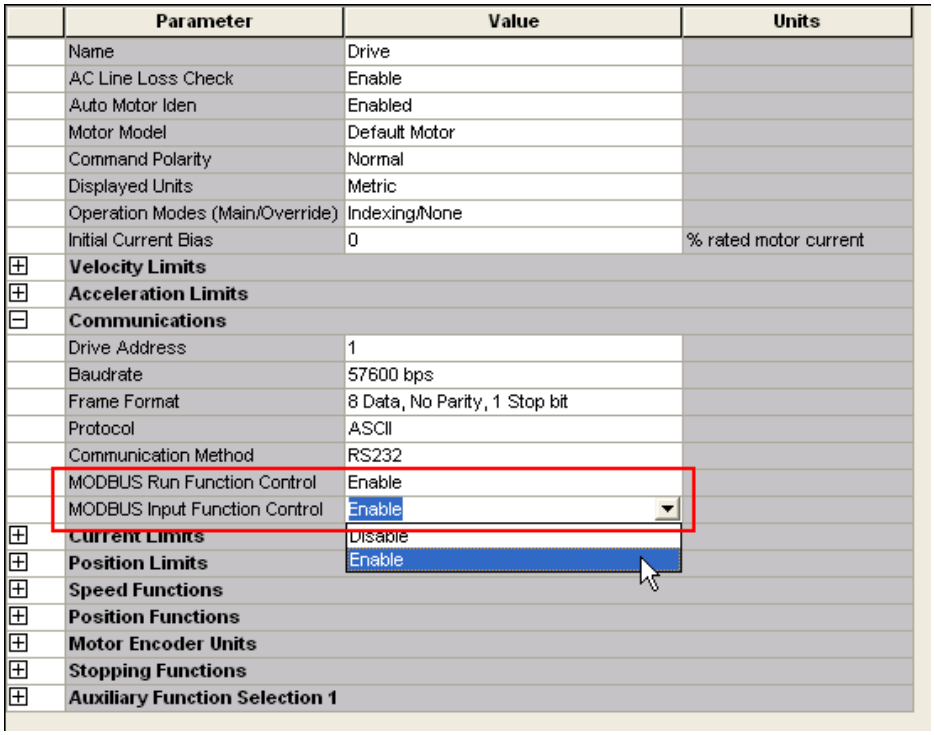
c. Click Start Autotuning.

d. Read and acknowledge the warning and prepare the area.

e. Click Yes.
The drive enables, moves the motor, and then performs a resonance test. When the test is complete, the drive disables again.

7. Double-click the Drive branch.

8. Click Communications.
9. Set the MODBUS Input Function Control to Enable.



10. Set the MODBUS Run Function Control to Enable.

Configure Advanced Options

To perform absolute moves, the drive must be homed. The homing parameters are set in the Homing branch within the Mode Configuration branch. After the home sequence has been completed, you can configure the drive for indexing.

1. Double-click the Mode Configuration branch.
2. Double-click the Homing subbranch.

	Parameter	Value	Units
	Homing Type	Home to Marker	
	Auto Start Homing on Enable	Inactive	
	Homing Velocity	100	RPM
	Homing Accel/Decel	62.50	Revs/s^2
	Offset Move Distance	0	Counts
	Stop Home Decel	62.50	Revs/s^2
	Home Sensor Polarity	Active-Going Transition	
	Home Position	0	Counts
	Creep Velocity	20	RPM
	Home Current	100	%
	Moving Distance After Home Sensor	0	Counts
	Home Current Time	0	ms
	Homing Timeout	60	sec

3. Set the parameters as your application requires.

   You can configure the indexing parameters through the Indexing branch or at another time through the HMI.

4. Set indexing parameters through the Indexing branch.
   a. Double-click the Indexing subbranch.

	Parameter	Value	Units
	Auto Start Indexing	off	
	Abort Index Decel	62.50	Revs/s^2
⊟	**Index 0 Setup**		
	Mode	Incremental	
	Distance or Position	1000	Counts
	Dwell	0	ms
	Velocity	750	RPM
	Acceleration	62.50	Revs/s^2
	Acceleration Time	200	ms
	Deceleration	62.50	Revs/s^2
	Deceleration Time	200	ms
	Next Index	0	
	Action When Complete	Stop	
⊞	**Index 1 Setup**		

   b. Expand the section for each index by clicking [+].
   c. Modify the index parameters.
   d. Repeat for up to 64 indexes.
   e. Click Save Parameters.

Make all other changes to parameters while the drive is connected to the personal computer and Ultraware software is running.

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Rockwell Automation provides technical information on the Web to assist you in using its products. At http://www.rockwellautomation.com/support you can find technical and application notes, sample code, and links to software service packs. You can also visit our Support Center at https://rockwellautomation.custhelp.com/ for software updates, support chats and forums, technical information, FAQs, and to sign up for product notification updates.

In addition, we offer multiple support programs for installation, configuration, and troubleshooting. For more information, contact your local distributor or Rockwell Automation representative, or visit http://www.rockwellautomation.com/services/online-phone.

Installation Assistance

If you experience a problem within the first 24 hours of installation, review the information that is contained in this manual. You can contact Customer Support for initial help in getting your product up and running.

United States or Canada	1.440.646.3434
Outside United States or Canada	Use the Worldwide Locator at http://www.rockwellautomation.com/rockwellautomation/support/overview.page, or contact your local Rockwell Automation representative.

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Rockwell Automation tests all of its products to help ensure that they are fully operational when shipped from the manufacturing facility. However, if your product is not functioning and needs to be returned, follow these procedures.

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