

System Configuration Guide

Installation, Operation and Maintenance Setup Manual

5/19/2011



The information provided in this documentation contains general descriptions and/or technical characteristics of the performance of the products contained herein. This documentation is not intended as a substitute for and is not to be used for determining suitability or reliability of these products for specific user applications. It is the duty of any such user or integrator to perform the appropriate and complete risk analysis, evaluation and testing of the products with respect to the relevant specific application or use thereof. Neither Schneider Electric nor any of its affiliates or subsidiaries shall be responsible or liable for misuse of the information contained herein. If you have any suggestions for improvements or amendments or have found errors in this publication, please notify us.

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All pertinent state, regional, and local safety regulations must be observed when installing and using this product. For reasons of safety and to help ensure compliance with documented system data, only the manufacturer should perform repairs to components.

When devices are used for applications with technical safety requirements, the relevant instructions must be followed. Failure to use Schneider Electric software or approved software with our hardware products may result in injury, harm, or improper operating results.

Failure to observe this information can result in injury or equipment damage.

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Safety Information

Read these instructions carefully, and look at the equipment to become familiar with the device before trying to install, operate, or maintain it. The following special messages may appear throughout this documentation or on the equipment to warn of potential hazards or to call attention to information that clarifies or simplifies a procedure.



The addition of this symbol to a Danger or Warning safety label indicates that an electrical hazard exists, which will result in personal injury if the instructions are not followed.



This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

DANGER

DANGER indicates an imminently hazardous situation which, if not avoided, **will result in** death or serious injury.

WARNING

WARNING indicates a potentially hazardous situation which, if not avoided, **can result** in death or serious injury.

CAUTION

CAUTION indicates a potentially hazardous situation which, if not avoided, **can result** in minor or moderate.

CAUTION

CAUTION used without the safety alert symbol, indicates a potentially

hazardous situation which, if not avoided, **can result** in equipment damage..

PLEASE NOTE

Electrical equipment should be installed, operated, serviced, and maintained only by qualified personnel. No responsibility is assumed by Schneider Electric for any consequences arising out of the use of this material.

A qualified person is one who has skills and knowledge related to the construction and operation of electrical equipment and the installation, and has received safety training to recognize and avoid the hazards involved.

BEFORE YOU BEGIN

Do not use this product on machinery lacking effective point-of-operation guarding. Lack of effective point-of-operation guarding on a machine can result in serious injury to the operator of that machine.

 **CAUTION**

EQUIPMENT OPERATION HAZARD

Verify that all installation and set up procedures have been completed.

Before operational tests are performed, remove all blocks or other temporary holding means used for shipment from all component devices.

Remove tools, meters, and debris from equipment.

Failure to follow these instructions can result in injury or equipment damage.

Follow all start-up tests recommended in the equipment documentation. Store all equipment documentation for future references.

Software testing must be done in both simulated and real environments.

Verify that the completed system is free from all short circuits and grounds, except those grounds installed according to local regulations (according to the National Electrical Code in the U.S.A, for instance). If high-potential voltage testing is necessary, follow recommendations in equipment documentation to prevent accidental equipment damage.

Before energizing equipment:

-
- Remove tools, meters, and debris from equipment.
 - Close the equipment enclosure door.
 - Remove ground from incoming power lines.
 - Perform all start-up tests recommended by the manufacturer.

OPERATION AND ADJUSTMENTS

The following precautions are from the NEMA Standards Publication ICS 7.1-1995 (English version prevails):

- Regardless of the care exercised in the design and manufacture of equipment or in the selection and ratings of components, there are hazards that can be encountered if such equipment is improperly operated.
- It is sometimes possible to misadjust the equipment and thus produce unsatisfactory or unsafe operation. Always use the manufacturer's instructions as a guide for functional adjustments. Personnel who have access to these adjustments should be familiar with the equipment manufacturer's instructions and the machinery used with the electrical equipment.
- Only those operational adjustments actually required by the operator should be accessible to the operator. Access to other controls should be restricted to prevent unauthorized changes in operating characteristics.

About The Book

At a Glance

Document Scope

This manual describes the System Configuration Guide used to plan equipment needed for applications.

Validity Notes

This document is valid for all controller and I/O module products.

Product Related Information

 WARNING
UNINTENDED EQUIPMENT OPERATION The application of this product requires expertise in the design and programming of control systems. Only persons with such expertise should be allowed to program, install, alter and apply this product. Follow all local and national safety codes and standards. Failure to follow these instructions can result in death, serious injury or equipment damage.

User Comments

We welcome your comments about this document. You can reach us by e-mail at technicalsupport@controlmicrosystems.com.

Overview

This manual is a system configuration guide for SCADA, telemetry and control applications using the SCADAPack, Micro16 and 5000 I/O modules.

The configuration of a system begins with an understanding of the application requirements of the system. These requirements include; the programming capability of the controller; the types of serial communication needed; the number and type of I/O needed and power supply requirements. After determining the system requirements the selection of controller and 5000 I/O modules are made.

To aid with the selection of modules this manual contains an overview of the specifications of each type of controller and 5000 I/O module available. A section describing how to calculate system power requirements provides the information for selecting power supplies.

The installation section of this manual provides information for mounting and connecting the controller and 5000 modules. Diagrams of various types of system configurations are included to provide examples of correct system layout.

System Layout

System layout is the process of mounting and connecting the controllers and 5000 I/O modules required for an application. The modules mount on DIN rails for ease of installation. Field wiring attaches to one side of the modules. Extended inter-module cabling allows multiple DIN rail installations in restricted areas.

Mounting Modules

SCADAPack controllers, Micro16 controllers and 5000 I/O modules mount on 7.5mm by 35mm DIN type rails.

Mounting Guidelines

Follow these guidelines for mounting modules:

- DIN rails mount horizontally or vertically. Where possible mount DIN rails horizontally. Modules are easier to install on horizontal rails. Cooling is optimal when mounted horizontally.
- The model DIN17 rail supplied by Control Microsystems holds four modules. It is 17 inches (432 mm) long. If you use another length of DIN rail, trim it to a multiple of the module width. See the figure *Module Dimensions* for more details.
- Mount modules tightly together on the rail, to avoid straining the inter-module cable. The spacing dimples on the sides of the modules should touch.

SCADAPack and 5000 I/O modules are certified as components for use within an enclosure.

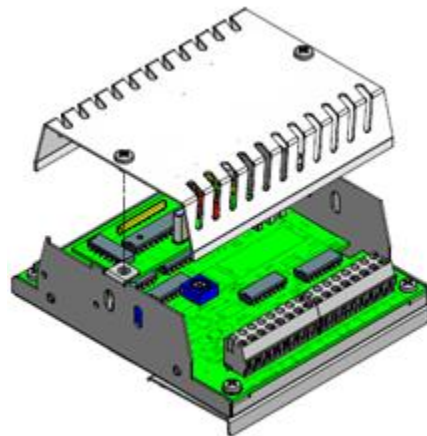
Mounting Procedure

Use the following procedure to mount each module on the DIN rail. Refer to the following diagrams for further details.

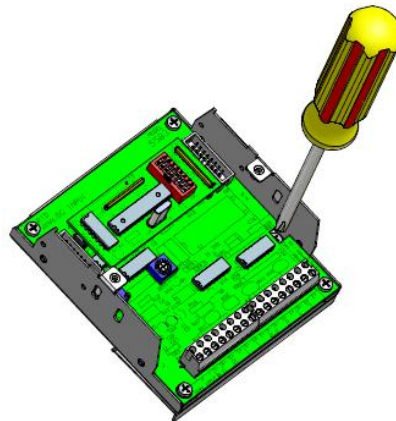
- Unscrew the two cover screws on each module. These screws are permanently attached to the cover for ease of handling.
- Remove the cover.
- There are two clamp screws accessible through notches on either side of the circuit board. Loosen the clamp screws until there is a 1/16 inch (1.5mm) clearance between the back of the module and the clamp.
- Slide the clamp out past the bottom of the module.

- There are two hooks on the back of the module. Place the hooks over the top lip of the DIN rail.
- Slide the clamp upward until it meets the lower lip of the rail. The bottom of the clamp will be flush with the bottom of the module.
- Tighten the clamp screws.

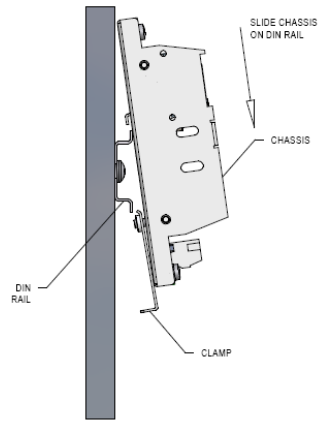
If you route an inter-module cable (IMC) behind the module, take care when installing the module. Avoid pinching the cable in the clamp and check that there is adequate clearance between the module and the hardware used to mount the DIN rails.



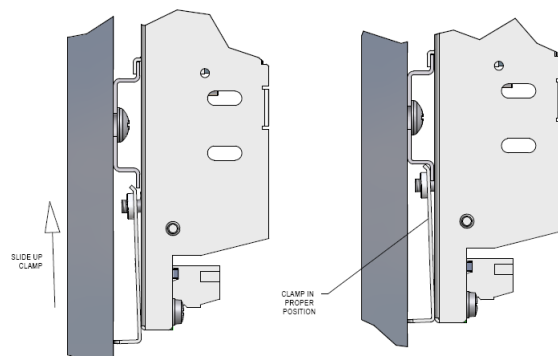
STEP 1
REMOVE COVER



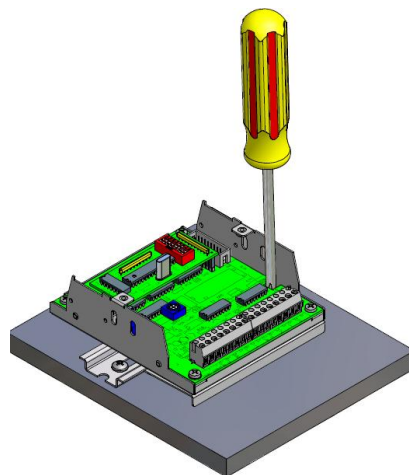
STEP 2
LOOSEN CLAMP



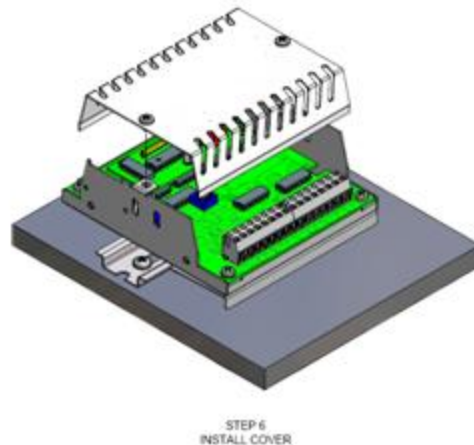
STEP 3
SLIDE MODULE ON
DIN RAIL



STEP 4
SLIDE UP CLAMP



STEP 5
TIGHTEN CLAMP



Connecting Modules

SCADAPack controllers, Micro16 controllers and 5000 I/O modules connect together with inter-module cables (IMC). The IMC distributes power and communication signals to the 5000 modules. These power and communication signals are referred to as the I/O Bus.

The IMC is a 16-conductor ribbon cable. Micro16 controllers and 5000 I/O modules ship with a 2 inch (5cm) IMC cable. SCADAPack and SCADAPack Plus controllers ship with a 3 inch (7.5cm) IMC. This cable connects adjacent modules on a DIN rail. The IMC12 (12 inch) and IMC30 (30 inch) and longer cables connect modules on separate DIN rails.

To install the IMC:

- Remove the module cover.
- Connect the IMC to the I/O bus connector on the left or right side of the module. Align the key on the IMC with the slot in the connector. Press the IMC firmly into the connector.
- Connect the other end of the IMC to an adjacent module.

Use the shortest length IMC that is practical. This minimizes voltage drops and interference from electrical noise. Keep the IMC away from field wiring and other sources of electrical noise.

Shielded Inter-Module Cables

IMC cables longer than 12 inches (30 cm) are shielded for maximum physical protection and protection from electrical noise. Shielded inter-module cables have a foil and braid shielding. The shielding is connected to a terminal lug at one end of the cable.

When using a shield for an IMC cable between modules, the shield should be fastened to one module only, and that module should be the one closest to the controller. Always connect the shield to the enclosure using the self-tapping screw provided.

Module Field Wiring

Field wiring attaches to the field wiring terminal blocks on each module. Refer to the individual module Installation and User Manual for complete wiring details.

WARNING

Remove power or confirm the area is known to be non-hazardous before changing field wiring, including the wiring to the RS-232 ports.

Failure to follow these instructions can result in death, serious injury or equipment damage.

Field Wiring Guidelines

Follow these guidelines when planning for field wiring:

- When modules are installed in a Class I Division 2 area then power, input and output (I/O) wiring needs to be in accordance with Class I, Division 2 wiring methods (article 501-4(b) of the National Electrical Code, NFPA 70) and in accordance with the authority having jurisdiction.
- Arrange the modules so field wiring is accessible.
- Field wiring termination connectors are removable. Leave enough slack in the wiring for the connector to be removed.
- Arrange the modules and wiring so the status LEDs are visible.
- Keep modules switching loads away from communication controllers and analog input modules.
- Route low-level signals separate from high-level and AC power signals.
- No bonding is usually required by Electrical Safety Standards between modules carrying primary power and AC Ground since these modules are certified as components to be installed within an enclosure thereby preventing access by unauthorized personnel. Consult individual module manuals for special bonding instructions should they be required.
- Consult individual module manuals for the connection of external fuses should they be required in particular by primary voltage carrying modules. They need to be installed where required.

Suggested Layouts

Controller and 5000 I/O, power supply and modem modules may be mounted in many ways. Placing modules on one DIN rail minimizes the IMC length, provides the protection against electrical noise and has no module placement restrictions.

Figure 1: Preferred Layout shows the preferred multiple rail layout for a system. Two IMC12 cables distribute power and communication signals from rail to rail. I/O modules designated 5xxx refer to any 5000 I/O modules except the 5103.

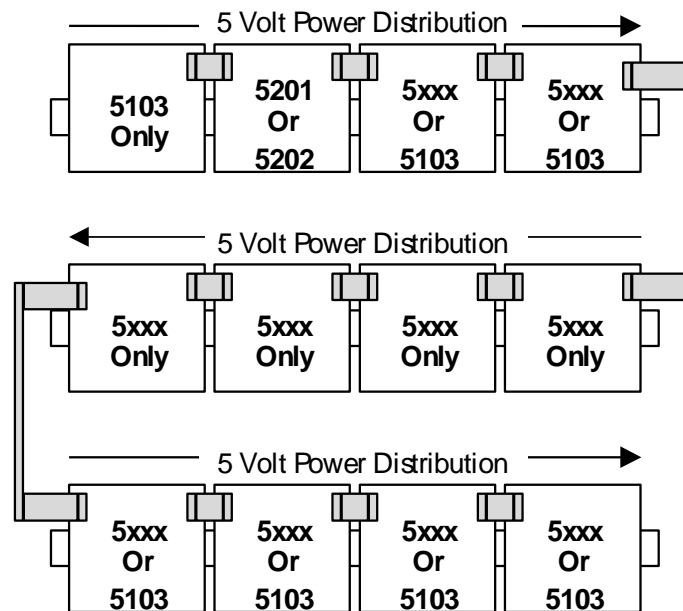


Figure 1: Preferred Layout

Figure 2: Preferred SCADAPack or Micro16 Layout shows the preferred multiple rail layout for a SCADAPack or Micro16 controller system. Two IMC12 cables distribute power and communication signals from rail to rail. I/O modules designated 5xxx refer to any 5000 I/O module, except the 5103 power supply. The 5V Power Distribution in the top row of modules indicates that the SCADAPack or Micro16 controllers may supply power to I/O modules to their left. This is not true for 5103 power supply modules, they supply power to the right only.

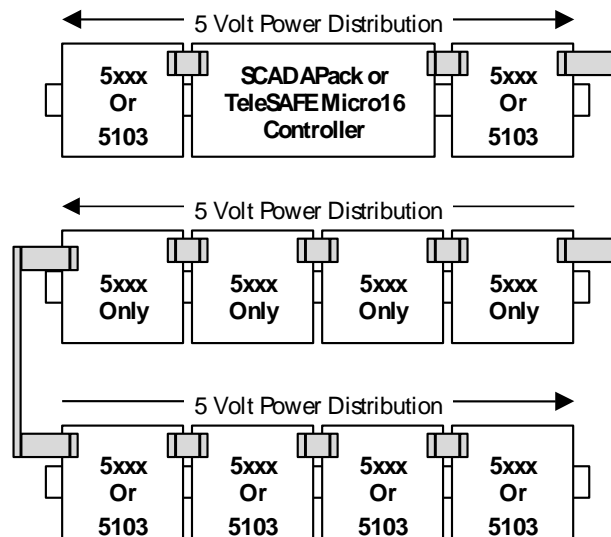


Figure 2: Preferred SCADAPack or Micro16 Layout

The layouts shown in **Figure 1: Preferred Layout** and **Figure 2: Preferred SCADAPack or Micro16 Layout** are the recommended system layouts as they minimize the IMC length. However, they restrict power supply placement, as 5103 power supply modules cannot be placed in the middle row.

The following diagrams show alternate system layouts. These layouts require the use of IMC30 cables and should be used only if it is required that a 5103 power supply module be placed in the middle or bottom rows.

It is recommended that the system layout use the shortest possible IMC length.

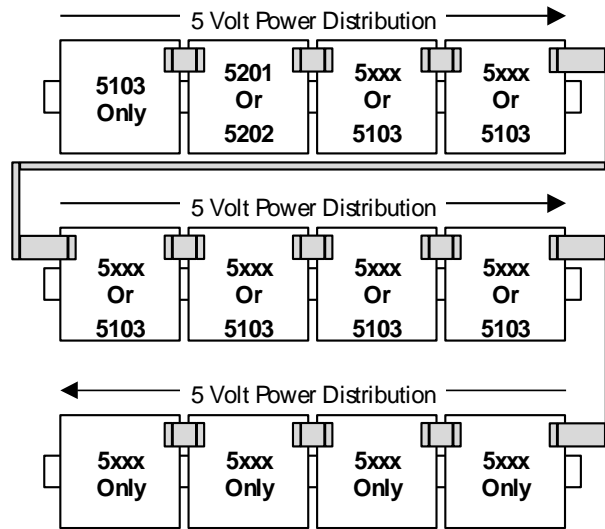


Figure 3: Alternate Layout

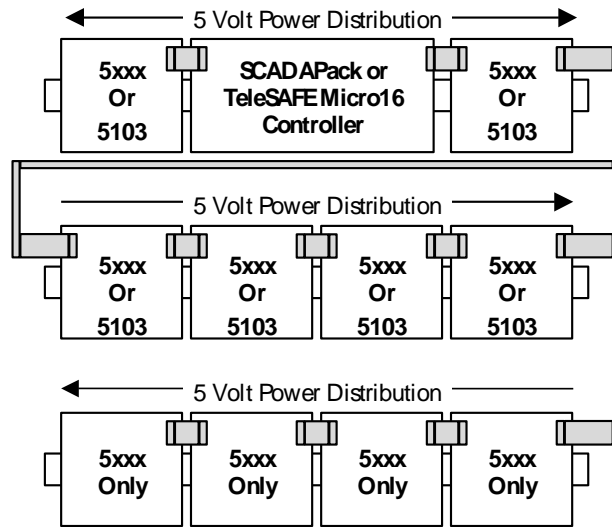


Figure 4: Alternate SCADAPack or Micro16 Layout

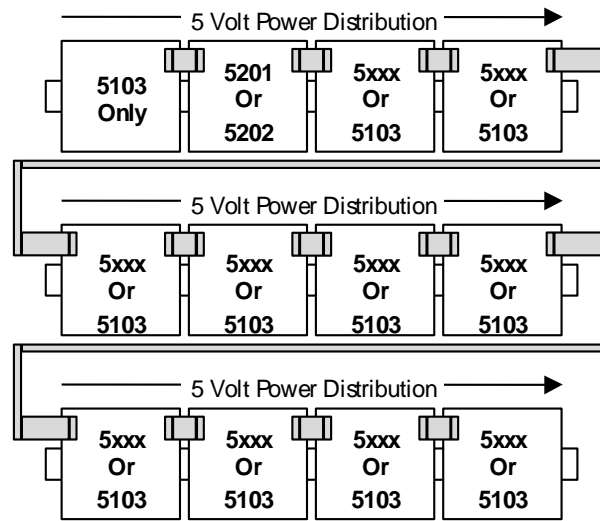


Figure 5: Alternate Layout

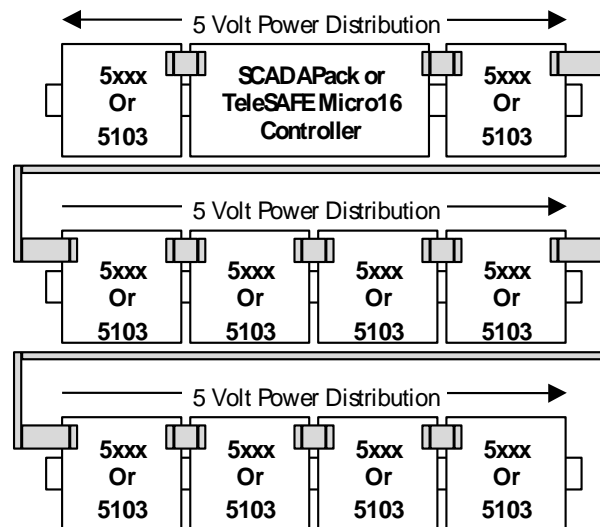


Figure 6: Alternate SCADAPack or Micro16 Layout