Programming Manual

Original Instructions

SetPointPS Configuration Software

Catalog Number 857
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.

No patent liability is assumed by Rockwell Automation, Inc. with respect to use of information, circuits, equipment, or software described in this manual.

Reproduction of the contents of this manual, in whole or in part, without written permission of Rockwell Automation, Inc., is prohibited.

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).
# Table of Contents

**Preface**
- Summary of Changes ........................................ 7
- What Is Needed to Use SetPointPS .......................... 7
- Relay Setting Files ........................................... 8
- Compatibility ...................................................... 8
- Version ............................................................... 8
- Additional Resources ............................................ 8

**Chapter 1**
- Settings Menu .................................................... 11
  - Communication Settings ..................................... 11
  - Serial Port Connection ..................................... 11
  - Ethernet Connection (Alternative Connection Method) .... 12
  - Miscellaneous Communication Settings ....................... 12
  - Program Settings ............................................. 13
  - Initial Reading and Group Refresh Settings .................. 14
  - View Settings .................................................. 14
  - Log Files ....................................................... 15
  - Device Library ................................................ 15
  - Default Passwords ............................................ 16
  - Read/Write Settings .......................................... 16

**Chapter 2**
- Communication Menu ........................................ 19
  - Communication ................................................ 19
  - Communication Special Commands ........................ 20
    - Connect, Disconnect, and Quick Connect .................. 20
    - Search and Select Devices ................................ 21
    - Update Firmware ........................................... 21
    - Update Language .......................................... 22
    - Exporting ICD, IID, SCD, and EDS Files .................. 24
    - Additional Relay Configuration Commands ................. 24

**Chapter 3**
- Relay Configuration Window ................................ 25
  - Main Window ................................................... 25
  - Views .......................................................... 25
  - Tools .......................................................... 26
  - Passwords ..................................................... 26
  - Reading All Settings From Device .......................... 26
  - Save a SetPointPS File ....................................... 28
  - Load a Document .............................................. 28
  - Download to Device (Copy Settings Between Devices) ...... 28

**Chapter 4**
- Setting Groups ................................................ 31
  - Device Information .......................................... 31
  - Basic Groups ................................................. 32
<table>
<thead>
<tr>
<th>Protection Stage Groups</th>
<th>32</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phase Angle Diagrams</td>
<td>33</td>
</tr>
<tr>
<td>Event Buffer</td>
<td>33</td>
</tr>
<tr>
<td>Local Panel Display</td>
<td>34</td>
</tr>
<tr>
<td>Matrix Groups</td>
<td>35</td>
</tr>
<tr>
<td>Output Matrix</td>
<td>35</td>
</tr>
<tr>
<td>Block Matrix</td>
<td>36</td>
</tr>
<tr>
<td>Placing a Matrix Connection</td>
<td>37</td>
</tr>
<tr>
<td>Disturbance Recorder (DR)</td>
<td>37</td>
</tr>
<tr>
<td>Making Relay Settings</td>
<td>38</td>
</tr>
<tr>
<td>Change Values</td>
<td>38</td>
</tr>
<tr>
<td>Change Parameter Values</td>
<td>39</td>
</tr>
<tr>
<td>Automatic Restart Requested (Boot Pending)</td>
<td>39</td>
</tr>
<tr>
<td>Communication Protocol Settings</td>
<td>40</td>
</tr>
<tr>
<td>Change Protocols</td>
<td>40</td>
</tr>
<tr>
<td>SPA-Bus Settings</td>
<td>41</td>
</tr>
<tr>
<td>Modbus Settings</td>
<td>41</td>
</tr>
<tr>
<td>Deadband and Scaling</td>
<td>42</td>
</tr>
<tr>
<td>PROFIBUS Settings</td>
<td>43</td>
</tr>
<tr>
<td>IEC 60870-5-103 Settings</td>
<td>44</td>
</tr>
<tr>
<td>Main Configuration</td>
<td>44</td>
</tr>
<tr>
<td>Data Configuration</td>
<td>45</td>
</tr>
<tr>
<td>Communications Protocol for 857-RAA and 857-RAD</td>
<td>46</td>
</tr>
<tr>
<td>Events and Fault Logs</td>
<td>46</td>
</tr>
<tr>
<td>Enabling Events</td>
<td>46</td>
</tr>
<tr>
<td>Reading From Device</td>
<td>47</td>
</tr>
<tr>
<td>Saving to Disk</td>
<td>48</td>
</tr>
<tr>
<td>Clearing Events</td>
<td>48</td>
</tr>
<tr>
<td>Reading Fault Logs from Device</td>
<td>48</td>
</tr>
<tr>
<td>Mimic Editor</td>
<td>49</td>
</tr>
<tr>
<td>Clearing Mimic Display</td>
<td>49</td>
</tr>
<tr>
<td>Selecting Continuously Displayed Measurands and Status</td>
<td></td>
</tr>
<tr>
<td>Indicators</td>
<td>50</td>
</tr>
<tr>
<td>Working with Virtual Buttons</td>
<td>51</td>
</tr>
<tr>
<td>Location Information</td>
<td>52</td>
</tr>
<tr>
<td>Adding Lines</td>
<td>52</td>
</tr>
<tr>
<td>Adding Objects</td>
<td>53</td>
</tr>
<tr>
<td>Adding, Deleting, and Moving of Text Objects.</td>
<td>54</td>
</tr>
<tr>
<td>Deleting Objects, Text and Lines</td>
<td>54</td>
</tr>
<tr>
<td>Sending to Device</td>
<td>55</td>
</tr>
<tr>
<td>Logic Editor Fundamentals</td>
<td>55</td>
</tr>
<tr>
<td>Adding the First Function</td>
<td>55</td>
</tr>
<tr>
<td>Logic Function Properties</td>
<td>56</td>
</tr>
<tr>
<td>Adding and Selecting of Input Signals</td>
<td>57</td>
</tr>
<tr>
<td>Connections Between Functions</td>
<td>57</td>
</tr>
<tr>
<td>Add a New Connection</td>
<td>57</td>
</tr>
<tr>
<td>Removing a connection</td>
<td>58</td>
</tr>
</tbody>
</table>
Table of Contents

Disturbance Record Evaluator

- Main Window ........................................ 63
  - Views ........................................ 64
  - Tools ........................................ 65
- Changing the Disturbance Recorder Settings ............... 65
  - Disturbance Recorder Channel Selection .......... 67
  - Selecting the Disturbance Recorder Sampling Rate .... 67
  - Recorder Controls ................................ 69
  - Trigger Settings ................................ 69
- Evaluating Disturbance Recordings ....................... 70
  - Reading from Device ................................ 70
  - Print a Disturbance Recording ...................... 72
  - Open a Disturbance Recording from Disk ............ 72
- Channel Displays .................................. 73
  - Adding ........................................ 73
  - Removing ....................................... 73
- Changing the Viewing Configuration .................... 73
  - Using the Display Buttons ......................... 73
  - Using the Mouse .................................. 74
- Using Cursors .................................... 74
  - Adding ........................................ 74
  - Moving .......................................... 74
  - Removing ........................................ 75
  - Locking Together ................................ 75
- Calculations ...................................... 76
  - Calculations Values ............................... 76
- Other Functions ................................... 76
  - Finding the Trigger Point ......................... 76
  - Resetting All Views ................................ 76

Troubleshooting Communication Configurations

- Check for Current Version of SetPointPS ............... 77
- SetPointPS and Relay Settings ...................... 78
  - Change Communication Speed ...................... 78
  - Communication Port ................................ 79
  - Connection Cable and Adapters .................... 81
  - Incorrect Configuration Password ................... 81
  - Error Messages .................................... 81
<table>
<thead>
<tr>
<th>Table of Contents</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Appendix A</strong></td>
</tr>
<tr>
<td>Virtual Measurement Tool</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td><strong>Appendix B</strong></td>
</tr>
<tr>
<td>Disturbance Recording Example</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td><strong>Index</strong></td>
</tr>
</tbody>
</table>
Summary of Changes

This table contains the changes made to this revision.

<table>
<thead>
<tr>
<th>Topic</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Replaced Program Settings dialog graphic</td>
<td>13</td>
</tr>
<tr>
<td>Replaced View Settings dialog graphic</td>
<td>14</td>
</tr>
<tr>
<td>Added Folder View section and graphic</td>
<td>14</td>
</tr>
<tr>
<td>Added Important table</td>
<td>15</td>
</tr>
<tr>
<td>Added Important table</td>
<td>22</td>
</tr>
<tr>
<td>Added information concerning exporting DeviceNet EDS files</td>
<td>24</td>
</tr>
<tr>
<td>Updated the firmware version to 10.96</td>
<td>83</td>
</tr>
</tbody>
</table>

SetPointPS is a free software configuration tool for Rockwell Automation Bulletin 857 and 865 relays. All configurations are made with a user-friendly graphical interface and the created documents can easily be printed and saved for later use. You do not need to know anything about the model or hardware of the Rockwell Automation relays, SetPointPS reads all information directly from the device.

This manual is intended for qualified personnel. You must be able to program and operate a Bulletin 857 or 865 medium voltage motor protection relay. In addition, you must have an understanding of the parameter settings and functions.

What Is Needed to Use SetPointPS

SetPointPS runs on a PC with a Windows operating system. The SetPointPS software can be downloaded for free at www.ab.com. SetPointPS connects to the Bulletin 857 and 865 via the front local port using a special serial communications cable (part no. 857-VX003-3). Cable schematics are in the 857 relay user manual, publication 857-UM001. A USB to serial adapter can also be used if a dedicated serial port is not available on your computer. The recommended adapter is a Rockwell Automation 9300-USBS or equivalent.

Depending on the relay hardware configuration, an option to use a rear remote port or Ethernet connection may also be available for communication to the SetPointPS software. Consult publications 857-UM001, 865-UM001, or Rockwell Automation customer support for further information.
Relay Setting Files

SetPointPS handles the relay settings as documents, (*.vef file extension). A SetPointPS document file stores information about the device settings, events, and fault logs. A new file is created when the device is connected and settings are read from the device. Documents can be saved to a disk. The file can later be used to:

- change the settings offline. The SetPointPS file tracks changes that are made offline. Once SetPointPS is connected to the device, all changes can be transmitted to the device at once.
- copy or transfer settings to another device
- store a copy of the setting files when devices are commissioned and when they are reconfigured.

It is also possible to read and evaluate disturbance recordings from Rockwell Automation Bulletin 857 and 865 relays. The built-in evaluator uses standard COMTRADE files for saving the records.

Compatibility

SetPointPS is compatible with all Microsoft Windows operating systems.

SetPointPS interacts with all Rockwell Automation Bulletin 857 and 865 Protection Relays.

Version

The latest SetPointPS version can be downloaded from Rockwell Automation website, www.rockwellautomation.com

Additional Resources

These documents contain additional information concerning related products from Rockwell Automation.

<table>
<thead>
<tr>
<th>Resource</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>857 Protection System for Feeder and Motor Protection, Series A, publication 857-UM001</td>
<td>Provides information on parameters, installation, dimensions, troubleshooting, control functions, and specifications</td>
</tr>
<tr>
<td>857 Protection System for Feeder and Motor Protection Quick Start, publication 857-05001</td>
<td>Provides information on mounting, wiring, and installation of the 857 relay</td>
</tr>
<tr>
<td>857 Protection System Specification Guide, publication 857-SR001</td>
<td>Provides specifications on protective features, measuring and monitoring, arc flash protection, and cold load pickup monitoring</td>
</tr>
<tr>
<td>857-RRA/857-RAD RTD Scanner User Manual, publication 857-UM002</td>
<td>Provides information on layout, wiring, installation, configurations, mounting and I/O</td>
</tr>
<tr>
<td>857-VPA3CG PROFIBUS DP Option Module, publication 857-UM003</td>
<td>Provides information on the PROFIBUS option modules, including installation, commissioning, dimensions, and specifications</td>
</tr>
<tr>
<td>Industrial Automation Wiring and Grounding Guidelines, publication 1770-4.1</td>
<td>Provides general guidelines for installing a Rockwell Automation industrial system.</td>
</tr>
</tbody>
</table>
You can view or download publications at http://www.rockwellautomation.com/global/literature-library/overview.page.
To order paper copies of technical documentation, contact your local Allen-Bradley distributor or Rockwell Automation sales representative.
Notes:
Chapter 1

Settings Menu

Communication settings can be found on the menu bar:

Communication Settings Serial Port Connection

If a serial port is used with the 857-VX003-3 programming cable, the port configuration and speed must be defined. The default communications speed is 38400 bps, however this can be changed in the SetPointPS software. The relay default communications speed for the front port is 34800 bps. The default port is COM1, but this varies between different computer hardware configurations. Some of the available speeds may not be supported by all serial ports or USB to serial converters. Consult the manual of your serial port product for further information.

TIP Default communications speed in the relay must match the setting within SetPointPS.
Chapter 1  Settings Menu

Ethernet Connection (Alternative Connection Method)

The Ethernet settings can be activated by selecting 'Network' as a communication port. After the Ethernet settings have been enabled, you can define the IP address and TCP port that is used for the connection. The IP address must match the IP address in the relay to which you are directly connecting to. The port must always be 23 with Bulletin 857 and 865 relays.

By selecting “Take address from Document Files”, you can force SetPointPS to read the address automatically when a previously saved setting-file is opened.

Miscellaneous Communication Settings
See 857 Protection System for Feeder and Motor Protection, Series A, user manual, publication 857-UM001, for details on configuring the EtherNet/IP communications interface. The network IP address must match the IP address configured in the device.

Sometimes it is useful to adjust different communication timeout values. For example, the timeout values might need to be increased when using a slow and unreliable communications pathway.

Fast reading mode increases the speed of the communication, but this can be disabled if the communications pathway is unreliable.

Changing some of the parameters causes the relay to recalculate some other related parameters. By default, SetPointPS refreshes the view when changes have been made. This feature can be also disabled, if necessary.

**Program Settings**

Program settings can be found on the menu bar:
Initial Reading and Group Refresh Settings

These settings relate to how the SetPointPS software and the Bulletin 857 or Bulletin 865 relays interact. It is recommended to keep the default settings.

View Settings

Show parameters using boxes:
- When enabled, SetPointPS draws borders around parameters that belong together.
- It is recommended to enable this setting.

Enable folder view:
- When enabled, this feature provides configuration Tabs across the display, organizing the setting functions in a more logic and organized manner. **It is highly recommended that you enable this setting.** An example of the Folder View display format is shown below.

PQ-diagram style:
- This setting changes the axes of the PQ-diagram.
Log Files

The file path of the different kinds of logging states is enabled by checking the appropriate box. The file paths can be entered directly into the text boxes or selected by using the Browse buttons.

**IMPORTANT** The path and folder must already exist within your Windows directory tree or the log is not created. Double-check the file folders exist.

If the file does not exist, a new undefined file is created automatically. Log files are ASCII text so they can be opened using any text editor, for example, Windows Notepad.

<table>
<thead>
<tr>
<th>Log Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Events log</td>
<td>Event logs are appended when events are read from the device.</td>
</tr>
<tr>
<td>Changes log</td>
<td>Changes logs are updated every time that any parameter is changed in SetPointPS and saved/sent to the relay.</td>
</tr>
</tbody>
</table>

Device Library

This section allows for specific indication of the location of the primary SetPointPS program (root directory) and an associated location where the software can save specific relay data (backup directory). The root directory and the backup directory must be mapped. Do not map the root directory to the file location where the SetPointPS executable file (setpointps.exe) resides.

The backup directory location is a file location where data from the relay can be stored temporarily. A backup directory must be mapped if any firmware updates to the relay are made. All database files within the relay are stored temporarily in this location and then recovered and reloaded back into the relay. Failure to map a backup directory can cause a firmware update to fail prematurely.

**IMPORTANT** The path and folder must already exist within your Windows directory tree or the log is not created. Double-check the file folders exist.
If the file does not exist, a new undefined file is created automatically. Log files are ASCII text so they can be opened using any text editor, for example, Windows Notepad.

**Default Passwords**

It is possible to redefine the factory default passwords in SetPointPS. These passwords are automatically used with the corresponding access level when you do not manually provide a password. See Chapter 3 for additional details. If the factory default passwords have been changed in the relay, these passwords will no longer be valid.

**Read/Write Settings**

The write settings parameter controls when any changes you make are transferred to the relay. Check **Write changes automatically after change (WAC)** to transfer any change into the settings within the relay. The recommended condition is disabled to prevent accidental parameter changes within the relay.

**Device Not Connected or WAC Disabled**

- Changed parameter values are displayed in a red font.
- New value must be transferred to the device manually, by pressing or using menu command: **Communication/Write Changed Settings to Device**.
- When the document is saved, any changes that are shown in red font are only be saved to the offline file. They are not transferred to the relay automatically. This makes it possible to make changes offline and to write the parameter changes to the relay later from the saved document.
Device Connected and WAC Enabled

- Changed values are transferred to the device immediately and are displayed in a black font.
- Changed parameters are read back from the device after the transfer.
- It is recommended that the WAC feature is not enabled for the average user. Changes are made automatically, which could cause adverse reactions in running protection situations.

**ATTENTION:** The WAC feature is for qualified personnel only. Unpredictable results can occur if the device is operating in a live protection and control environment with WAC enabled.
Notes:
Communication

The Communication pull-down menu contains special commands for interaction with the relay.

The Communication pull-down menu contains control selections such as:

- Connecting/disconnecting communication with the relay.
- Writing and reading setting values to and from the relay.
- Running script files and updating firmware.
- Running device diagnostic routines and entering Terminal commands.
- Extracting EDS and ICD file information.
Many of these commands are also using the control tabs on SetPointPS toolbar. SetPointPS toolbar commands are defined on page 26.

**Communication Special Commands**

**Connect, Disconnect, and Quick Connect**

The normal “Connect/Disconnect Device” buttons are available both in the Communication-menu and in the toolbar. Function keys also initiate these functions; F5 connects to the device downloading the relays settings and CTRL+F5 disconnects the relay from the software.

The **Connect Device** command causes SetPointPS to read ALL the available menus and parameters from the relay reads. Reading the full menu structure might take some time if using slower communication rates.
The menu has one additional command that can connect to the relay “Quick connect”. This command connects and reads only the menu structure and device info data. Push F11 on your keyboard to initiate the Quick connect command. The remaining parameters are read from the relay on demand only.

**IMPORTANT**  Do not use the quick connect command for creating backups of settings files. Only the menu parameters that you have viewed are retained. Use the F5 command (or Connect button) to download ALL settings from the relay, and save the parameters in the relay. Only use the quick connect feature for quick interrogation of specific menus and parameters within the relay.

**Search and Select Devices**

With this command, SetPointPS tries to find any Rockwell Automation Bulletin 857 and 865 relays that are attached to the common communications system. When commanded, SetPointPS polls all available communication ports and displays any Rockwell Automation Bulletin 857 and 865 relays found. The relays that found are displayed can be selected from the list.

**Update Firmware**

This command is used only when the relay firmware must be updated. The firmware file is only available from Rockwell Automation upon request and it will be sent to you after Rockwell Automation has confirmed the need for a firmware update. Updating of the firmware is necessary only if recommended by Rockwell Automation to correct an anomaly.

**ATTENTION:** Firmware updates must be performed by experienced personnel only. Failure to follow the appropriate procedure can result in the relay being inoperable. Updating the firmware when the device is operating in a live protection and control environment will inject process and control anomalies. Contact your local Rockwell Automation service professionals for assistance.
Update Language

With this command, the relay’s language set can be updated to use other languages. The default language is English. Other language files are available from Rockwell Automation.

1. Verify that you are using the latest SetPointPS program from the Rockwell Automation website.
2. Copy all given files to your hard disk to a place you can find them easily.
3. Connect the 857-VX003-3 cable between the PC and front port of the relay.

**IMPORTANT** Language file updates are not supported using the Ethernet port.

4. Start SetPointPS and select a communication port by selecting **Settings** > **Communication settings**.
5. Select menu **Communication/Update Language**.
6. Choose **Yes** from the warning dialog.
7. Select the language file and click Open.

   SetPointPS starts the update and the Serial Communication dialog is displayed. Uploading a language file takes about 5 minutes.

8. Do not disconnect the power supply from the relay. When the language update is complete, this will show in the final row of the update dialog.
9. Close the dialog window and SetPointPS.
10. Navigate to the LANGUAGE window. The window now shows the default language and the language which was uploaded to the relay.

11. Press INFO in the HMI.

12. Press ENTER and give the Configurator password (default 2).

Press ENTER again.

13. The currently active language is displayed with black background.

14. Select the desired language and press enter. The relay language changes to the new selection in 10…20 seconds.

Press CANCEL to return to the main display.

15. Verify that the language is changed in the relay.

16. Read a new SetPointPS setting-file from the relay using the computer and save the new settings for archiving. Do not use older setting files which were made using different languages.
Chapter 2  Communication Menu

Exporting ICD, IID, SCD, and EDS Files

SetPointPS can be used for exporting a number of communication files, which is required for interfacing the relay with other systems. This functionality is found in the Communication menu of SetPointPS.

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Get ICD File</td>
<td>Reads an IEC 61850 IED capability description file from the connected relay (unconfigured IEC 61850 server device description).</td>
</tr>
<tr>
<td>Create ICD File</td>
<td>Builds an IEC 61850 IED capability description file from SetPointPS configuration data (offline, without connecting to the relay).</td>
</tr>
<tr>
<td>Get IID File</td>
<td>Reads an IEC 61850 instantiated IED description file / configured IED description file from the connected relay (configured IEC 61850 server device description).</td>
</tr>
<tr>
<td>Configure with SCD file</td>
<td>Configures the IEC 61850 interface of the relay with provided System Configuration Description file.</td>
</tr>
<tr>
<td>Get DeviceNet EDS</td>
<td>DeviceNet is not supported in this product line.</td>
</tr>
<tr>
<td>Get EtherNet IP EDS</td>
<td>Reads the EtherNet/IP slave electronic data sheet file from the connected relay.</td>
</tr>
</tbody>
</table>

Additional Relay Configuration Commands

These commands are not used by the average relay user. These commands are only needed for special troubleshooting situations and their usage shall be by a Rockwell Automation customer support engineer, when required.

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Run Script File</td>
<td>These selections are needed only in special cases. The procedure is similar to the firmware and language updates and the usage is advised by Rockwell Automation support when necessary.</td>
</tr>
<tr>
<td>Update Boot Code and Restore Device DB</td>
<td>With this command SetPointPS reads the database of the relay into a text file. This command is used for creating language files for the relay.</td>
</tr>
<tr>
<td>Read All DB Texts from device</td>
<td>This command opens a terminal window that is used to interface with the relay by using the Get/Set protocol. The usage of the terminal method is only advised by Rockwell Automation support when necessary.</td>
</tr>
</tbody>
</table>
Chapter 3

Relay Configuration Window

Main Window

The main window of SetPointPS is divided into six parts.

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Menu Bar</td>
</tr>
<tr>
<td>B</td>
<td>Toolbar</td>
</tr>
<tr>
<td>C</td>
<td>Caption View</td>
</tr>
<tr>
<td>D</td>
<td>Group List</td>
</tr>
<tr>
<td>E</td>
<td>Group View</td>
</tr>
<tr>
<td>F</td>
<td>Status Bar</td>
</tr>
</tbody>
</table>
Passwords

Access to the Bulletin 857 and 865 parameters is divided into 3 levels:

- User (no password needed)
- Operator (default password is 1)
- Configurator (default password is 2)

The SetPointPS document file remembers the access level that is given when the settings are initially read from the device. For example, if the document file has been created with a User access level, it cannot be changed later to configurator level. See publications 857-UM001 or 865-UM001.

Reading All Settings From Device

A new SetPointPS document file is initially created by reading all settings from the device. Initially the SetPointPS screen is empty and only the mechanism to read information from the device is shown. Setting values, protection stages, analog input information and so on, are obtained from the device.

To read the device, close any open document file in SetPointPS.

To connect the device press or F5 or by using menu command:

Communication/Connect device
If the communication between SetPointPS and the device is successfully established, SetPointPS starts to upload the available menu parameter groups and displays this dialog.

After a few moments, SetPointPS asks for the access level. If the password field is left empty, SetPointPS tries to use a default password.

All Rockwell Automation Bulletin 857 and 865 products use the following default passwords:

- Configurator: 2 (can be entered as 0002)
- Operator: 1 (can be entered as 0001)
- User: no password is required
After pressing the **OK** button, SetPointPS starts to upload information about the settings and special features that are available in the relay. Depending on the device and communication speed, this will between 2…3 minutes. The upload can be stopped by choosing the **Stop operation** button on the lower left corner of the communication dialog.

**Save a SetPointPS File**

Press ![Save](image) to save a SetPointPS file to a disk, or use menu command: **File/Save**.

**Save as** saves the file to a specific location.

**Load a Document**

Press ![Open](image) to open a SetPointPS document file, or use menu command: **File/Open**.

**Download to Device (Copy Settings Between Devices)**

Open the appropriate document file and press ![Connect](image) to connect to a device, or use menu command: **Communication/Connect Device**.

The whole SetPointPS document can be transmitted to the device by using menu command: **Communication/Write all settings to device**.

The destination device can be the same one that was used when the file was created, or any other device of the same type with a similar firmware level. This makes it easy to configure several devices with the same settings.

**IMPORTANT** The settings files are firmware version dependent. You can upload a settings file used in a relay with an older version of firmware to a relay that has a newer firmware version, but not vice versa.
1. Open a SetPointPS document or create a new one by reading from device. The following dialog opens automatically.

2. Select the access level for the opened document from the SetPointPS shown dialog.

3. Change the settings, if necessary.

4. Save the document.

5. Connect to the device and transmit the settings to the device by using menu command: Communication/Write all settings to device or click the Write All Settings on the tool bar.

6. Press to disconnect the device, or use menu command: Communication/Disconnect Device.

7. Connect the serial cable to the next device, or if you are using Ethernet, change the IP address in via the Protocol Configuration tab in the Group List.

8. Change the device name and location on Device Info setting group.
   This step is optional but it is a recommended best practice to give individual names to different devices.

9. Save the document with a new name by using menu command: File/Save as. This step is not needed if only one document is enough for all devices.

10. Connect to the new device using menu command: Communication/Disconnect Device. SetPointPS gives a notice that the serial number differs from the currently connected device. Click OK and write all settings into the relay.

11. Return to item 6 until all devices have been configured.

**IMPORTANT** The specifics that are related to each connected load (full load current, CT ratios, and so forth) must still be modified.
Notes:
Setting Groups

The device settings are divided into several groups. There are different groups for every protection stage, communication protocol, analog output and so on. Most of the setting groups are of the basic type, which only contains a list of parameters. There are also some special groups like Matrix and PQ-diagram.

This chapter gives a short description of some of the different kinds of setting groups.

Device Information

Device info contains general information about the device. The device can be individualized by setting the location information and by giving a special name to it. Calibration information and the firmware version are also stored in this group. The last parameter can be used for changing the access level in use.
Basic Groups

### Protection Stage Groups

A protection stage group consists of four parts.

<table>
<thead>
<tr>
<th><strong>Stage Enabling</strong></th>
<th>The protection stage can be enabled or disabled by checking or clearing the selection box.</th>
<th>Configurator access level is needed for changing the parameter.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Stage Status</strong></td>
<td>Shows the state of the input signals that are used by the stage.</td>
<td>Shows the present state of the stage, estimated time to trip and also start (alarm) and trip counters.</td>
</tr>
<tr>
<td><strong>Stage Settings</strong></td>
<td>Contains limit and delay settings for the stage. Provides for selection of setting group (up to four) on some protection stages</td>
<td>Configurator access level is needed for changing the stage settings.</td>
</tr>
<tr>
<td><strong>Fault Log</strong></td>
<td>Shows eight latest events of the stage.</td>
<td>The fault log is in descending order; the latest event is on the first row.</td>
</tr>
</tbody>
</table>
Phase Angle Diagrams

This group shows the phasor angles for different analog measurements. The amplitudes are relative to the maximum of all phasors or to a calculated mean value. Some of the angle diagrams have a settable maximum value for the amplitude and all phasors are drawn relative to that setting.

When the device is connected and continuous updating is enabled, the diagrams are updated in real-time.

Event Buffer

The event buffer is used for saving and viewing all activated and deactivated stages and events that the relay has captured. The event buffer can store several hundred events. The maximum capacity of the event buffer varies between devices and is configurable. See publications 857-UM001 or 865-UM001 for further information on configuring the size of this buffer.

The oldest event is at the top of the list; the newest at the bottom. When the buffer is full the oldest events are discarded when new ones are created.
An event carries the following information:

- full-time stamp
- event code
- short description

Local Panel Display

With the ‘Local panel display’ you can remotely control the relay and input front panel commands just as they would by using the physical HMI on the relay.

Click any of the operator push buttons to mimic the physical depression of the push buttons on the face of the relay.
Matrix Groups

There are several different settings groups under the Matrix command, including Output Matrix, Block Matrix, External Digital Output Matrix, and Object Block Matrix.

By using the Output Matrix, the output signals of the various protection stages, digital inputs, logic outputs, and other internal signals can be electronically connected to the output relays, front panel indicators, virtual outputs, and the Disturbance Recorder.

The Alarm and Trip status indicators on the front panel and the three general-purpose status indicators ("A", "B", and "C") are available for customer-specific indications. The output matrix can also be configured to trigger the disturbance recorder (DR) and four virtual outputs.

An output relay or status indicator can be configured as either being latched or non-latched. A non-latched relay follows the condition of the controlling signal. A latched relay remains activated even if the controlling signal has changed state a second time.

The output matrix can be viewed by selecting it from the group list or by pressing . This matrix has two kinds of connections:

- **Matrix connection without latch**
  - When the protection element is activated, the output tied to this signal is activated.
  - When the protection element is released, the output tied to this signal is released.
**Latched matrix connection**

- When the protection element signal is activated, the output is activated
- When the protection element is released, the output remains active until cleared manually. Latched outputs can be cleared from the “Release Output Matrix Latches” settings group and from the HMI of the relay by pushing Enter on the front of the relay.
- When a connection is latched, it provides a lockout protection feature (IEEE Device Number 86).

**Block Matrix**

The Block Matrix group inhibits protection stages from operating by using input signals from other protection stages, digital inputs, and arc sensors. Input signals are on the left side and protection stages to be blocked are displayed on the top.
Placing a Matrix Connection

Placing a connection is done by clicking the left mouse button at a crossing point of a signal and output line.

Press to clear the entire matrix.

Disturbance Recorder (DR)

All Allen-Bradley 857 and 865 relays include a built-in disturbance recorder for evaluating all measured signals, including currents, voltages, and the status information of all of digital inputs (DI) and digital outputs (DO). The digital inputs include arc protection signals S1, S2, BI, and BO, if the optional arc protection is configured.

At maximum there can be 12 recordings, and the maximum selection of channels in one recording is also 12 (limited in waveform recording). The digital inputs reserve one channel (includes all inputs). Also the digital outputs reserve one channel (includes all outputs). If digital inputs and outputs are recorded, there are 10 channels that are left for analog waveforms.
This subject is covered in detail in Chapter 5.

This group is used for configuring the disturbance recorder. See Changing the Disturbance Recorder Settings on page 65 for a more detailed description about the settings of disturbance recorder.

Making Relay Settings

Change Values

A device parameter can have four different access types:
- Read (for example, measurements)
- User Write (for example, display brightness)
- Operator Write (for example, I> current limit)
- Configurator Write (for example, I> stage enable)

SetPointPS shows parameters in three colors depending on present access level, the access type of the parameter and if the value has been changed or not.

A parameter has one of the following colors:

Red
- Parameter value has been changed in the SetPointPS software but not downloaded to the device

Black
- Parameter value in SetPointPS matches the setting in the relay

Dimmed (Greyed Out)
- No write access
- Parameter is either read-only or the present access level is not high enough
Change Parameter Values

Click the left mouse button on the value that must be changed. When the text input box appears, use the keyboard to type a new value and press enter. The valid setting range is displayed at the bottom left corner of the main window.

If the typed value is out of permitted the range, SetPointPS will give a warning after transmitting changes to the device and the illegal value is replaced by current device value.

Some of the parameters have a fixed set of values that can be chosen from a pull-down menu.

Click the value and choose the correct value.

Automatic Restart Requested (Boot Pending)

Some parameter changes require the relay to restart to become valid. When such a parameter has been changed and transferred to the device, the following dialog appears:

- **Boot Now**
  - SetPointPS sends a restart command to the device immediately.
**Boot Later**

- The dialog box closes without restarting the device.
- Latest changes that need restarting are not taken into account.
- The device can be restarted later by pressing Esc or F9, by cycling control power, or by using menu command: Communication/Boot Device.

**Communication Protocol Settings**

**Change Protocols**

Remote port, Local port, and Extension port protocols are changed in the Protocol Configuration group. This group also contains message and error counters for the selected protocol and ports. See publications 857-UM001 and 865-UM001 for a description of protocol usage. Available protocols are EtherNet/IP, ModBus, ModBus TCP/IP, SPA-Bus, PROFIBUS, IEC-103, External I/O, DNP3, ANSI85 and IEC-61850.
SPA-Bus Settings

SPA-Bus protocol has following settings available:

**SPA-Bus Address**
- Setting range 1...899.

**SPA-Bus bit Rate**
- The available bit rates are 1200, 2400, 4800, 9600, 19200.

Modbus Settings

The first three settings in the Modbus MAIN CONFIGURATION group are used in both Modbus Master and Modbus Slave protocols. In Modbus master mode, the slave address is the destination address and in slave mode, the slave address is the device address. Setting range for bit rate is 1200...19200 bps.
Chapter 4  Setting Groups

Modbus item has four settings:

Enable
- Enables/disables item (Modbus master only).

Address
- Modbus holding register address (Modbus master only).

Deadband
- If item value has changed more than the deadband setting, it will be sent to the slave (Modbus master only).

Scaling
- Settable scaling points x1, x2, y1, y2.

Deadband and Scaling

This image shows an example of deadband and scaling settings. Frequency has a deadband of 40 MHz and scaling divides the values by 10. Scaling is needed for frequency, because Modbus handles 16-bit signed integer values only (between -32768 and +32767).

For example, if the frequency is 60000 Hz, the raw value is 60000 which doesn't fit into the permitted range. Dividing the raw value by 10 gives 6000, which is within the permitted range (for 50000 Hz, the raw value is 50000. Dividing the raw value by 10 gives 5000, which is within the permitted range.)

Modbus Slave protocol has its own item list with fixed holding register addresses. See the appropriate device manual for a list of Modbus Slave items and addresses.
PROFIBUS Settings

PROFIBUS mode can be selected in the PROFIBUS: MAIN CONFIGURATION group.

PROFIBUS item has three settings:

On/Off
- Enables/disables item
- Continuous mode only

Offset
- Address for item
- Continuous mode only

Scaling
- Settable scaling points x1, x2, y1, y2
- Works the same way as Modbus scaling. See Modbus Settings on page 41.

In request mode, all items are enabled and they have fixed offsets. See the device manual for a list of request mode items.
**IEC 60870-5-103 Settings**

**Main Configuration**

**IEC-103 Slave Number**
- setting range 1…254 (255 is reserved for broadcasts)
- this is used as link layer address and as common address of ASDU in application layer

**IEC-103 Bit Rate**
- 9600 bps or 19200 bps

**Meas sending interval**
This setting restricts measurement sending. The next measurement is not sent until the time interval has elapsed since last sending. During this time, the device responds to a class-2 poll by sending a ‘data not available’ message.

**ASDU 6 Response Time Mode**
This setting defines which time stamp is sent in response to a time synchronizing message. The following modes are available:

<table>
<thead>
<tr>
<th>Mode</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SYNC</strong></td>
<td>Device sends back the same time stamp that the master sent in the synchronizing message.</td>
</tr>
<tr>
<td><strong>SYNC + PROC</strong></td>
<td>Device adds its internal processing time to the time stamp in the synchronizing message and sends the sum in the response message.</td>
</tr>
<tr>
<td><strong>MSG</strong></td>
<td>Device sends back its internal time stamp of the first received bit of the synchronizing message from master. This mode can be useful because subtracting the time stamp found in the response message from the time stamp that the master sent in the sync message gives the time difference between the master and the device just before the new sync became valid.</td>
</tr>
<tr>
<td><strong>MSG + PROC</strong></td>
<td>Otherwise the same as MSG but internal processing time is added to the time stamp</td>
</tr>
</tbody>
</table>
Data Configuration

Data configuration is divided into Digital and Analog sections. Any line can be changed or removed and new lines can be added to both sections.

Digital Configuration

D1 - Click here to add new lines to digital configuration

D2 - Click any line to change its context

D3 - Select an item, define FUN and INF and select some of the available functions (GI/Event/Control). Availability of functions depends on the selected item.

<table>
<thead>
<tr>
<th>Function</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>GI</td>
<td>Item is included in general Interrogation</td>
</tr>
<tr>
<td>Event</td>
<td>Class 1 events are generated. Remember also enable corresponding events on event mask groups. See &quot;Enabling Events&quot; for information on how to enable events.</td>
</tr>
<tr>
<td>Control</td>
<td>Item can be controlled via master</td>
</tr>
</tbody>
</table>

Analog Configuration

A1 - Click here to add new lines to analog configuration

A2 - Click any line to change its context

A3 - Select ASDU type and define FUN and INF. Finally select measurements. Notice that ASDU 4 has its own set of available measurements. To use ASDU 4 measurement, first select the ASDU 4 and after that select a measurement.

IEC-60870-5-103 data configuration is sent to the device by pressing or from the Communication menu: Write Changed Settings to Device.
Communications Protocol for 857-RAA and 857-RAD

The 857-RAA and 857-RAD remote RTD Scanner options require specific protocol configurations. See publication 857-UM002 for complete details on the appropriate protocol settings.

Events and Fault Logs

Enabling Events

Different events can be activated on the EVENT MASK groups. There are two different types of event selection available. For the protection stages, each have four individual events that can be enabled; start on, start off, trip on, and trip off. All other events are of binary-type; they can be only enabled or disabled.
Reading From Device

Before events can be read from the device, the EVENT BUFFER group must be selected from the group list.

Events are read from the device by pressing . If Continuous updating is enabled, events are updated automatically when the EVENT BUFFER group is selected. Continuous updating can be enabled by pressing and disabled by pressing .

**IMPORTANT** SetPointPS can only read new events (which have not been read by SetPointPS earlier) from the device. Once the events have been transferred from the device, it’s not possible to read those particular events again and thus it is important to save the SetPointPS setting file.
Saving to Disk

Events and fault logs are saved with the SetPointPS file extension (.vf2).

Events can be saved into a log file, which is updated automatically after reading events from the device. Event logs are plain ASCII files thus they can be opened with any text editor like Windows Notepad. See page 13 for information on how to enable event logging.

Clearing Events

SetPointPS event buffer can be cleared by pressing .

**TIP** This DOES NOT clear event from the relay, only from the SetPointPS document.

Reading Fault Logs from Device

Most of the protection stages also have their own fault logs. To read a fault log from the device, select the appropriate protection stage screen from the group list.

Fault logs are read the same way as the events, by pressing or keeping Continuous updating enabled. Continuous updating can be enabled by pressing and disabled by pressing .
Mimic Editor

The Mimic editor group is used for creating and editing mimic display of the relay local panel.

To show the mimic editor, select MIMIC group from the group list.

Clearing Mimic Display

1. Select the deleting tool.
2. Click left mouse button over any empty space. Confirmation window appears.
3. Press OK to clear the display.
Selecting Continuously Displayed Measurands and Status Indicators

Maximum of 6 analog measurements or status indicators to be continuously displayed can be selected on the right side of the display.

Follow these steps to select your desired measurands and status indicators.

1. Select the General tab from the main SetPointPS screen.

2. Select MIMIC from the left-side pane.

3. Click on the desired value to access the pulldown menu.

4. Click the measurand for status indicator to select.
Setting Groups

Chapter 4

Working with Virtual Buttons

Depending on the device model, the local panel mimic display can contain some virtual status indicators.

- Auto-reclose ON/OFF
- Remote/Local switch
- Virtual outputs

Follow these steps to show/hide the virtual status buttons.

1. Select the desired virtual status button on the bottom row.
2. To move the value around the screen, click, hold, and drag the value.
3. Click the virtual status button to hide the value.

This may be necessary based on the selection of other screen display options and their default locations.

The status of the four virtual inputs can be monitored on the front display as well. The status for each individual virtual input can be independently selected and displayed by clicking on the appropriate location.
Location Information

Location information is displayed in the top of the display. This is the same setting as Sublocation on Device Info group and is also displayed on the caption view of SetPointPS.

To change the sublocation, follow these steps.

1. Click the Sublocation button.
2. Click on SubLoc.
3. Enter the new location information and press ENTER.

Adding Lines

1. Select one of the line characters.
2. Press and hold the left mouse button over empty space.
   Short piece of line appears at mouse cursor.
3. Move the piece to desired location.
4. Release the left mouse button.
5. Continue from step 2 until the line is complete.
### Adding Objects

1. Select object type from the palette.
2. Press and hold left mouse button over empty space. New object appears at mouse cursor.
3. Move the object to correct place.
4. Release the left mouse button.
5. Select correct internal object numbers by clicking the left mouse button over active parts of the object. Clicking alternates unused object numbers. Use numbers 1 and 2 for objects that are controlled by the relay. More objects can be available for these purposes, depending on the relay software version. Check the Objects group for more information.
6. Make object settings in Objects group (if not done yet).

Relationship between object numbers in the Mimic group and the object settings in Objects group.
Chapter 4  Setting Groups

Adding, Deleting, and Moving of Text Objects

Adding Text

1. Select the text tool (‘A’).
2. Press and hold left mouse button over empty space. New text object appears at mouse cursor.
3. Move text object to correct place.
4. Release the left mouse button and the editing window displays.
5. Type text and press OK.

Editing Text

1. Move mouse over a text object. The text becomes green.
2. Click left mouse button to show the editing dialog.
3. Type new text and press OK.

Deleting Objects, Text and Lines

1. Select the object to be deleted.
2. Press and hold left mouse button over desired object.
3. Move mouse over desired object. The object becomes red.
4. Release the left mouse button and the object is deleted.
1. Select the deleting tool (an empty box).
2. Move mouse over an object you want to delete. Object becomes red.
3. To delete the object, click left mouse button.

**Sending to Device**

MIMIC display configuration is sent to the device by pressing or selecting from the **Communication** menu: Write Changed Settings to Device

**Logic Editor Fundamentals**

**Adding the First Function**

If the logic display is empty, to add the first function:

1. Click left mouse button anywhere on the display. Request window is displayed (1).
2. Press OK. An AND logic gate without inputs and outputs appears on the screen.

If an AND logic gate is not the type of function wanted, see Logic Function Properties on page 56 for information on how to change function types.
Logic Function Properties

To edit properties of a logic function:

1. Click a function.
2. Click Edit Properties.

Type
- Use this setting for changing the function type.

Count Setting
- This is active only for Counter (CT)-function.
- Defines how many rising edges must be detected in inputs before the output is activated.

TON - (Time On)
- Defines how long it takes to activate the output.

TOF - (Time Off)
- Defines how long it takes to deactivate the output.

Output Setting - Inverted
- This setting can be used for inverting the output signal.
Adding and Selecting of Input Signals

Only the left-most functions can take input from signals. Inputs of other functions are outputs from functions on their left side.

1. Click the input line of a function. Some functions can have several input groups. For example, ANDINV has direct inputs and inverted inputs. With those functions click the specific group to change the inputs.

2. To add new signals: select input signals from 'Input signals available' list and press the Add button.

3. To remove signals: select input signals from 'Selected input signals' list and press the Remove button.

4. To accept the changes, press OK.

Connections Between Functions

Add a New Connection

1. Press and hold the left mouse button over function output that is going to be connected to an input of another function.

2. Move the mouse near function input and release the left mouse button.

Several functions can be connected to the same destination function. SetPointPS adds new input pins for the destination function as necessary.

IMPORTANT Only connections between consecutive functions are valid and permitted.
Removing a connection

1. Click a connection.
   Confirmation window appears.
2. Press OK.

Adding and Selecting of Logic Output Connections

Only the right-most functions can have output connection to relays, status indicators, and so on. If a function has one or more output connections, the function output cannot be simultaneously connected to input of any other function.

1. Click an output line of a function.
2. To add output connections: select outputs from ‘Outputs available’ list and press Add.
3. To remove connections, select outputs from ‘Selected outputs’ list and press Remove.
4. To accept changes, press OK.
Deleting Functions

1. Click a function.
2. Press the Delete button.

Sending Revised Logic Configurations to a Device

The logic changes must be downloaded to the device before they become active. Logic configurations are sent to the device by pressing or selecting from the Communication menu: Write Changed Settings to Device. This forces the relay to restart.

Other Functions

Sending Time and Date to Device

SetPointPS can read time and date from the PC to synchronize the device. Time and date is transferred by pressing or using menu command:

Transfer can be confirmed by selecting Device Info from the group list and then pressing. Now the device time and date is the same as PCs.
Chapter 4  Setting Groups

Comparing Settings between SetPointPS and a Relay

SetPointPS can compare all parameter values between a SetPointPS document and the connected device. Comparing starts by pressing and then the following dialog is displayed:

After all settings have been compared, a new group will be added to the group list and set visible. This group shows the comparison result of the differences.

The results of the comparison are also saved with the SetPointPS document.
Generating a SerCom-File

SerCom is a communication program, which writes parameters to the device via serial port. SerCom is a DOS program, so it works only under MS DOS and Windows 95 MS-DOS Prompt. The SerCom file can write calibration data to the device during production test. This feature is not for general use. It should be used only under the direction of a Rockwell Automation Service and Support Engineer. The explanation is for information purposes only.

Select groups that you want to include in a SerCom file:

1. Select one or more groups from the group list.

2. Press . Return to Step 1 until all required groups have been selected. Selected groups have a little dot before their names in the group list.

SerCom file is generated by using menu command:

File/Generate SerCom-file from selected groups
Disturbance Record Evaluator

Main Window

All Allen-Bradley 857 and 865 relays include a built-in Disturbance Recorder (DR) for evaluating all measured signals, including currents, voltages, and the status information of the digital inputs (DI) and digital outputs (DO). The digital inputs include arc protection signals S1, S2, BI, and BO, if the optional arc protection is configured.

There can be a maximum of 12 recordings, and the maximum selection of channels in one recording is also 12 (limited in waveform recording). The digital inputs reserve one channel (includes all inputs). Also the digital outputs reserve one channel (includes all outputs). If digital inputs and outputs are recorded, there will be still 10 channels left for analog waveforms. See Appendix B for an example of a Disturbance Recording.

The Disturbance Record Evaluator is displayed by pressing or using menu command: View/Disturbance Record.
**Views**

**DR Info**
- Shows the device type and custom name
- Shows start and trig time stamps
- If the device is connected, all available records are displayed on the right side of the view

**Channel List**
- Shows all recorded channels
- Selects new channels to the upper and lower views

**Distance View**
- Displays time between trig point and mouse cursor
- Displays distances between cursors

**Upper View**
- Displays analog and digital channels
- All analog channels are added by default
- The right scroll bar scrolls between displays
- The left scroll bar changes the maximum number of displays, which are shown simultaneously

**Lower View**
- Displays analog and digital channels
- All digital channels are added here by default
- The right scroll bar scrolls between displays
- The left scroll bar changes the maximum number of displays, which are shown simultaneously

**Time View**
- Displays the time axis
- The scroll bar scrolls through the time
Changing the Disturbance Recorder Settings

The device has three types of settings that must be adjusted before making any records:

1. channel selection
2. sampling settings: mode, rate, and time
3. trigger settings: source and pre trigger rate

The following parts assume that you have a basic knowledge of setting the device via SetPointPS. See Mimic Editor on page 49 before continuing.

Before making any DR settings, the device must be connected via SetPointPS. Otherwise it’s not possible to select channels or sampling time correctly. It’s also recommended that Settings/Program Settings/Write changes automatically after change is enabled for making the channel selection easier.

All device settings, except the trigger source selection, are made in the Disturbance Record group. See page 35 for disturbance recorder trigger source selection. Select the group from the group list.
Disturbance Recorder Channel Selection

Use the following sequence to select channels:

1. Clear all recorded channels by setting ‘Clear’ to the ‘Remove all channels’ menu
2. Use ‘Add recorder channel’ to select one channel from a list of all available channels
3. Return to 2, until all required channels have been selected.

The selected channels are shown in gray color on the ‘Ch’ view.

Selecting the Disturbance Recorder Sampling Rate

Set the recording mode according to desired operation:

*Saturated*

- All buffers are recorded once. If there are no empty buffers, the recording freezes.

**IMPORTANT** All buffers will be lost if:
- relay is rebooted (power supply fails)
- changes made to the sampling settings, excluding Pre trigger rate.

- Buffers can be cleared manually. If new triggering occurs, the cleared buffer will be used for recording

*Overflow*

- If new triggering occurs and there are no empty buffers, the oldest buffer will be overwritten
Rockwell Automation 857 and 865 devices can do two different types of sampling. The sampling type is dependent on the sampling rate setting as shown in the following table.

<table>
<thead>
<tr>
<th>Sampling Type</th>
<th>Sampling Rate</th>
<th>Sampling Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waveform</td>
<td>32 / cycle</td>
<td>ADC samples</td>
</tr>
<tr>
<td></td>
<td>16 / cycle</td>
<td>Instant</td>
</tr>
<tr>
<td></td>
<td>8 / cycle</td>
<td>Instant</td>
</tr>
<tr>
<td>Amplitude</td>
<td>1 / 10 ms</td>
<td>20 ms mean</td>
</tr>
<tr>
<td></td>
<td>1 / 20 ms</td>
<td>200 ms mean</td>
</tr>
<tr>
<td></td>
<td>1 / 1 s</td>
<td>1 s mean</td>
</tr>
<tr>
<td></td>
<td>1 / 5 s</td>
<td>1 min mean</td>
</tr>
<tr>
<td></td>
<td>1 / 10 s</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1 / 15 s</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1 / 30 s</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1 / 1 min</td>
<td></td>
</tr>
</tbody>
</table>

Selectable sampling rates can vary between different devices and firmware versions.

**IMPORTANT** Changing the sampling rate will clear the record buffers.

Time setting defines the recording time. The setting cannot be more than the **MAX time** that is displayed in gray color in the Disturbance Record group. **MAX time** is total available time for all records. The following table shows the relationship between time settings and MAX time:

<table>
<thead>
<tr>
<th>Time (Less or Equal)</th>
<th>Number of Records</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Saturated Mode</td>
</tr>
<tr>
<td></td>
<td>Overflow Mode</td>
</tr>
<tr>
<td>1/5 MAX time</td>
<td>5</td>
</tr>
<tr>
<td>1/4 MAX time</td>
<td>4</td>
</tr>
<tr>
<td>MAX time</td>
<td>3</td>
</tr>
<tr>
<td>1/2 MAX time</td>
<td>2</td>
</tr>
<tr>
<td>MAX time</td>
<td>1</td>
</tr>
</tbody>
</table>

Maximum number of records is 12. Even if the time setting is 1/6 **MAX time** the number of available records remains at 12.
Recorder Controls

- By selecting ‘Trig’ from the ‘Manual triggering’ – menu, the Disturbance recorder may be triggered to capture the waveform from the present measurements.
- Selecting ‘Clear’ from the ‘Clear oldest buffer’ – menu deletes the oldest triggered disturbance recording from the relay’s memory.
- Selecting ‘Clear’ from the ‘Clear all buffers’ – menu deletes all disturbance recordings from the relay’s memory.

Trigger Settings

Pre Trigger Rate defines how many samples are recorded before the trig. If Pre Trigger Rate is 50% and Time is 0.50 s, the device will record 0.25 s before and 0.25 s after the trig.

Trigger source is selected on Output Matrix group. Select one or more of the elements that are listed down the left side of the Output Matrix display. Click the intersection point of the DR vertical axis and the required element.

All connected signals cause a new recording when activated.
Evaluating Disturbance Recordings

SetPointPS stores the disturbance records to disk in COMTRADE format (revision year 1999). Data files are saved in ASCII format (binary format is not supported).

Reading from Device

Reading starts by menu command:

*Disturbance Record/Read from device* or *Read any from device* or *Read all from device* depending on the desired operation.

If the menu command is disabled,
- the device is not connected, or
- the device does not have DR recorder, or
- there are no records available.
The following dialog is displayed when reading is in process:

After the reading is ready, the record must be saved and cleared from the device. If Disturbance Record/Read all from device is selected, SetPointPS reads all records from the relay one-by-one and will ask after each finished read record to save the COMTRADE file to disk. Click Save As on the Disturbance Record menu bar item. You can save or discard the read file.

If Disturbance Record/Read any from device is selected, a dialog appears where you can select the recording to be read.

The oldest record is cleared by pressing or using menu command:

Disturbance Record/Clear oldest Record. All recordings from the recorder may be cleared by selecting Disturbance Record/Clear all Records.
Print a Disturbance Recording

You can print a disturbance recording by using the following commands:

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preview active view</td>
<td>Shows a preview of printed record</td>
</tr>
<tr>
<td>Print active view</td>
<td>Prints the record</td>
</tr>
<tr>
<td>Print setup</td>
<td>Printer selection and settings</td>
</tr>
<tr>
<td></td>
<td>Paper type and orientation</td>
</tr>
</tbody>
</table>

Paper layout is dependent on the following settings:

<table>
<thead>
<tr>
<th>Paper Layout</th>
<th>Settings and Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upper view displays per page</td>
<td>Same as on screen</td>
</tr>
<tr>
<td>Lower view displays</td>
<td>Same as on screen</td>
</tr>
<tr>
<td></td>
<td>Printed to the footer of every page</td>
</tr>
<tr>
<td>Number of pages</td>
<td>Upper view displays /</td>
</tr>
<tr>
<td></td>
<td>displays per page (left scroll bar)</td>
</tr>
<tr>
<td>Time period</td>
<td>Same as on screen</td>
</tr>
<tr>
<td>RMS, AVG, Min, and Max</td>
<td>Same as on screen</td>
</tr>
<tr>
<td>Cursors</td>
<td>Same as on screen</td>
</tr>
</tbody>
</table>

The upper view has six displays and the left scroll bar position is two, which results in three pages and two upper view displays per page. The lower view on paper looks the same as on screen and is printed on every page.

Open a Disturbance Recording from Disk

Disturbance records can be opened from a file by menu command:

*Disturbance Record/Open.*
Channel Displays

Adding

Use the following sequence to add a display.

1. Select one or more channels from the Channel List.

2. Press to add a display to the Upper View or to the Lower View. The display contains all selected channels.

Removing

To remove one or more displays:

1. Double-click one or more displays to select them.

2. Remove the selected displays by pressing .

   Remove all displays by pressing .

Changing the Viewing Configuration

Using the Display Buttons

The following buttons are used for zooming:

<table>
<thead>
<tr>
<th>Axis</th>
<th>Direction</th>
<th>Button</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time</td>
<td>In</td>
<td>![Image]</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Out</td>
<td>![Image]</td>
<td></td>
</tr>
<tr>
<td></td>
<td>View all</td>
<td>![Image]</td>
<td></td>
</tr>
<tr>
<td>Amplitude</td>
<td>In</td>
<td>![Image]</td>
<td>If displays or channels are selected, only those will be zoomed. All displays and channels are zoomed.</td>
</tr>
<tr>
<td></td>
<td>Out</td>
<td>![Image]</td>
<td></td>
</tr>
<tr>
<td></td>
<td>View all</td>
<td>![Image]</td>
<td></td>
</tr>
</tbody>
</table>
Using the Mouse

Time and amplitude can be zoomed by using the mouse.

1. Press left mouse button down.
2. Drag a rectangle.
3. Release the left mouse button.

Using Cursors

Adding

New cursor is added by pressing \( \text{F}1 \). The cursor appears in the middle of the screen. The maximum number of cursors is 5.

If multiple cursors are used, all calculations (like RMS and AVG) are made from samples between the first and the second cursor.

Moving

To move a cursor with the mouse:

1. Move the mouse over a cursor.
2. Press left mouse button down.
3. Move the cursor to desired location.
4. Release the left mouse button.
Removing

All cursors are removed by pressing "\[\]."

Locking Together

Distances between cursors can be locked by pressing "\[\]" and unlocked by "\[\]."

Locking can be used, for example, to examine instant RMS values of a waveform display:

1. Add two cursors.
2. Move one cursor to one cycle distance from the other.
3. Lock the cursors together.
4. Enable RMS calculation.
   The displayed RMS value is calculated from samples between the two cursors.
5. Move one cursor with the mouse.
   The RMS value is updated in real time.
Calculations

Calculations Values

SetPointPS can calculate RMS and Average values and show min & max from recorded samples. Calculations are based on samples between the first and last sample or between two cursors, if they exist.

Calculations can be activated from the Disturbance Record menu:

Other Functions

Finding the Trigger Point

The trigger point is found easily by pressing .

Resetting All Views

Press to reset all views to the initial state.

The views will look the same as after opening the record from a disk or after reading the record from device:
- analog channels are in the upper view
- digital channels are in the lower view
- all cursors are removed
- amplitudes are zoomed to fit in the display
- time is zoomed to show all record
Troubleshooting Communication Configurations

There are few things that can be checked and verified if there are any problems in communication between 857/865 relays and your PC running SetPointPS.

Check for Current Version of SetPointPS

The SetPointPS version is checked from the command section.

Click Help>About.

TIP Download the latest software version at:

SetPointPS and Relay Settings

Change Communication Speed

Communication speed must be same in the SetPointPS and in the relay.

- Click Settings, and Communication settings.

The factory-default communication speed of the relay is 38400 bps. The default communication speed of SetPointPS is also 38400 bps.

The communication speed is increased or decreased via the operator interface panel, or if a Configurator password has been entered in SetPointPS and a connection is already working between SetPointPS and the relay from:

- Mimic
- Local panel display
- Local Panel Conf
If you haven’t set the configurators password, the following text appears:

If the screen above is displayed:

1. Press info (1).
2. Press Enter (2).

Set configurators password by using Right and UP arrow buttons. The factory default password is 0002 for the Configurator level of access (0001 is for the Operator level).

3. Press Enter (3).

**Communication Port**

The Microsoft Windows communications port must be selected in SetPointPS (see page 78). Select Settings>Communication Settings to change the communication port setting in SetPointPS.

If there are numerous communications channels shown and you don’t know which the right one is, disconnect the cable from the PC and open the Communication settings again and check which COM port disappeared from the menu.

Alternatively,

1. Click the Windows Start button, and click Control Panel.
2. Click System>Hardware>Device Manager.
3. Click Ports (COM&LPT).
SetPointPS does not support COM port numbers above 25.
Connection Cable and Adapters

There is special RS-232 serial cable to connect a PC to an 857 or 865 relay: 857-VX-003.

If a USB to serial adapter is used, Rockwell Automation recommends the following adapters:
- Rockwell Automation Bulletin 9300-USBS
- FTDI CHIP ES-U-1001-R100/ US232R-100
- ATEN USB-to-Serial (RS-232) Converter Model UC-232A

The drivers for any USB-Serial adapter must also be up to date. Update the drivers using the device manager. You must be connected to the internet.

Incorrect Configuration Password

Sometimes a connection is successful but SetPointPS does not accept the password. If this occurs,

1. Verify that the correct password is entered.
2. Restart SetPointPS and connect to relay again.
3. Cycle power to the relay, which restarts the relay.

**IMPORTANT** If an incorrect password is tried more than three times, the relay restricts access for 30 minutes or you will need to restart the relay.

Error Messages

An error “File is incompatible with the device. Cannot connect...” message could appear when connecting to the relay or when downloading a settings file to a relay.

There are three possible reasons for this error.

<table>
<thead>
<tr>
<th>Reason</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Device type is different.</td>
<td>A file from a Rockwell Automation Bulletin 865 relay cannot be sent to a Rockwell Automation Bulletin 857 relay.</td>
</tr>
<tr>
<td>The major version number is different.</td>
<td>A V6.21 file cannot be sent to a device that has V10.55 firmware, because the major version numbers are different (6.xx versus 10.xx). Version number can be checked from the DEVICE INFO view.</td>
</tr>
<tr>
<td>The minor version number of the file is greater than the version on device.</td>
<td>For example, a V10.96 file cannot be sent to device that has V10.61 firmware, because the minor version of the file is greater.</td>
</tr>
</tbody>
</table>
Notes:
Virtual Measurement Tool

Virtual measurement functionality is available on 857 and 865 relays with firmware version 10.96 or later. The Virtual Measurement tool makes it possible to inject simulated currents and voltages, including 2nd, 3rd, and 5th harmonic content, into the relay. This tool permits a simple testing method of the protection settings within the relay without an external secondary injection testing device. This function validates the protection settings within the relay without applying power to the load. You must have a relay connected using the SetPointPS software to use this tool.

1. Connect to a relay via the SetPointPS program and log in to the Configurator Mode to enable the use of the virtual measurement functionality feature.

2. Click the Enable Virtual Measurement checkbox to engage and move the window.

3. If the tool is not visible, place the mouse pointer on the far right edge of the SetPointPS main window, until the cursor changes to a horizontal arrow.

4. Once the cursor changes state, hold the right mouse button and drag the border to the left.

5. Click the Enable virtual measurement checkbox. An example of the control mechanism is shown on page 84.
The length of the virtual measurement depends on the frequency used and the number of cycles. If the frequency is 60 Hz and the number of cycles is set at 300, the injected length of the virtual signals is 300/60 = 5 seconds.
Create and Inject Profiles and Sequences

The tool permits one current/voltage injection sequence or it permits the creation of up to five current/voltage profiles. To create a sequence, open another sequence window by clicking on one of the 5 tabs and add a value greater than zero to the Cycles field. Launch the by pressing the Run sequence button. There will be no delay between the sequence windows. You can also repeat a sequence without any extra delay by entering the number of sequences in the Repeats area.

Virtual COMTRADE Files

Virtual COMTRADE files can be loaded into the device that is exercised under the conditions that are contained in the COMTRADE file. The relay behavior is analyzed by playing the recorder data repeatedly in the relay memory.

IMPORTANT This is not applicable to the arc protection functions of the device.

Open Virtual COMTRADE Files

1. Click "Disturbance record" on the menu bar.
2. Select Open from the pull-down menu (A).
3. Select the COMTRADE file from your hard disk or other storage media. SetPointPS is now ready to read the recording.
4. Enable the Virtual Measurement Tool (B) to send record data to the relay (C).
5. Initiate playback of the file by pressing the GO button (D).

Clicking "Charge to control mode" returns to the virtual measurement.

**TIP**  The sample rate of the COMTRADE file must be 32 samples/cycle. The channel names must correspond to the channel names in 857 and 865 relays: \( I_{L1}, I_{L2}, I_{L3}, I_{O1}, I_{O2}, U_{13}, U_{23}, U_{UL1}, U_{UL2}, U_{UL3} \) and \( U_{V} \)
Disturbance Recording Example

Evaluation

This disturbance recording has been read from the relay. The default display shows the recording, so all the signals are in separate graphs.

The view is arranged for analyzing, so the currents and voltages are displayed in separate own graphs by following procedure:

1. To clear the view, press $\text{Ctrl} + \text{C}$.

2. Hold Control and select the currents from the signal list using the mouse.

3. To plot the selected signals in the upper view, press $\text{Ctrl} + \text{V}$. 
4. Select the voltages from the signal list and press  

The voltage waveforms plot in the lower graph.

5. To add cursors when the recording display is as desired, press .

If multiple cursors are added, SetPointPS displays the time difference between the cursors and the measurement value of each cursor.

**TIP** Use the zoom buttons to enlarge desired areas of the graph.
**Import Older Recordings**

1. Read the recording from the relay or open with SetPointPS.
2. Select Disturbance Record.
3. Click Import and select the desired disturbance recording.
4. Click “Open”.

   Repeat the Import procedure as necessary to retrieve all desired recordings to the SetPointPS.

```
[Image of SetPointPS interface showing Import and Open options]
```

The signal list for the disturbance recording is displayed on the left side of the window.

```
[Image of signal list with graphs]
```

5. To clear the display, press **C1**.
6. Select the desired signals to be evaluated from the signal list by using mouse click and Control button pressed. Plot the signals to SetPointPS by pressing **button** and evaluate the recordings.

```
[Image of signal list with graphs]`
Retrieve Vector Data

For the waveform data, SetPointPS can show the phase vectors within the cursors.

1. Read from the relay or open the desired waveform disturbance recording.

2. Press \text{C1} to clear the view and plot currents and voltages to their own graphs.
3. To add the cursor to the graph, press F6.

The graph now shows cursor with the phasor vectors.

4. Double-click any of the curves to show detailed vector data with reference to the other waveforms.

In this example, voltage signal UB has been selected as the phasor display reference, and the signal curve is shown as bold in the upper graph. To change the reference to another signal, double-click another curve.

Phasors in the graphs shows vector relationships to the same selected reference. By moving the cursors in the recording, the phasors change according to the measurement data.
Appendix B  Disturbance Recording Example

Notes:
Index

A
adapter 81
average values
calculate 76

B
basic groups 32
protection stage groups 32
block matrix 36

C
cable schematics 7
cata configuration 45
channel displays 73
add 73
remove 73
clear events 48
communication protocol 40
857-RAA 46
857-RAD 46
change 40
ModBus 41
PROFIBUS 43
SPA-Bus 41
communication settings 11
adapters 81
change speed 78
connection cable 81
port 79
compatibility 8
connect 20
quick connect 20
connection cable 81

data configuration
analog 45
digital 45
date 59
deadband 42
device
information 31
library 15
read events 47
search 21
select 21
disturbance recorder 63
calculations 76
controls 69
example 87
import older recordings 89
main window 63
print record 72
print recording from disk 72
read from device 70
retriece vector data 90
sample rate 67
select channel 67
settings 65
toolbar 65
trigger 69

E
error messages 81
event buffer 33
event logs 46
events 46
clear 48
enable 46
read from device 47
save to disk 48
export files 24

F
fault logs 46
read from device 48
files
EDS 24
export 24
ICD 24
IIFD 24
load 28
save 28
SCD 24
firmware 21
update 21
functions 57
add connection 57
add/select logic output connections 58
delete 59
remove connection 58

G
group refresh 14

I
IEC 60870-5-103 44
ASDU6 response time 44
bit rate 44
configure 44
meas sending interval 44
slave number 44
initial reading 14
input signals 57

L
language 22
update 22
local panel display 34
log files 15
logic editor 55
add first function 55
add input signals 57
function properties 56
select input signals 57
logic function properties
count setting 56
output setting 56
time off 56
time on 56
type 56

M
main window 25
caption view 25
channel list 64
distance view 64
DR info 64
group list 25
group view 25
lower view 64
menu bar 25
status bar 25
time view 64
toolbar 25
upper view 64
matrix groups 35
block matrix 36
output matrix 35
place connection 37
menu
settings 11
mimic editor 49
add lines 52
add objects 53
add, delete, and move text 54
clear display 49
delete objects, text, and lines 54
location information 52
select measurement 50
send to device 55
virtual buttons 51
ModBus 41
address 42
deadbond 42
enable 42
scaling 42

O
operating system 8
output matrix 35

P
parameter values 39
change 39
passwords
configurator 26
default 16
incorrect password 81
operator 26
user 26
phase angle diagrams 33
event buffer 33
local panel display 34
PROFIBUS 43
offset 43
on/off 43
scaling 43
protection stage groups 32
fault log 32
stage enabling 32
stage status 32
quick connect 21
ramping rate 67
rear remote port 7
relay configuration 24
RMS values
calculate 76
sampling rate
overflow 67
saturated 67
save events to disk 48
scaling 42
search device 21
select device 21
SerCom-file 61
generate 61
serial port connection 11
settings 11
communication 11
communication protocol 40
compare 60
disturbance recorder 65
group refresh 14
IEC 60870-5-103 44
Modbus 41
PROFIBUS 43
program 13
read all 26
read/write 16
reading 14
SPA-Bus 41
trigger 69
view 14
Index

SPA-Bus 41
  address 41
  bit rate 41
stage settings 32

time 59
trigger point
  find 76
troubleshooting 77

update
  check version 77
  firmware 21
  language 22

vector data 90
version
  download 8
  view 14
  reset all 76
virtual comtrade files 85
  open 85
virtual measurement tool 83
  configuration 83
  create profiles 85
  create sequences 85
  virtual comtrade files 85

W
WAC. See settings
Notes:
Rockwell Automation Support

Use the following resources to access support information.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct Dial Codes</td>
<td>Find the Direct Dial Code for your product. Use the code to route your call directly to a technical support engineer.</td>
<td><a href="http://www.rockwellautomation.com/global/support/direct-dial.page">http://www.rockwellautomation.com/global/support/direct-dial.page</a></td>
</tr>
</tbody>
</table>

Documentation Feedback

Your comments will help us serve your documentation needs better. If you have any suggestions on how to improve this document, complete the How Are We Doing? form at http://literature.rockwellautomation.com/idc/groups/literature/documents/du/ra-du002_-_en-c.pdf.


Allen-Bradley, Rockwell Automation, and Rockwell Software are trademarks of Rockwell Automation, Inc.

Trademarks not belonging to Rockwell Automation are property of their respective companies.

Rockwell Otomasyon Ticaret A.Ş., Kar Plaza İş Merkezi E Blok Kat:6 34752 İçerenköy, İstanbul, Tel: +90 (216) 5698400

www.rockwellautomation.com

Power, Control and Information Solutions Headquarters

Americas: Rockwell Automation, 1201 South Second Street, Milwaukee, WI 53204-2496 USA. Tel: (1) 414.382.2000, Fax: (1) 414.382.4444

Europe/Middle East/Africa: Rockwell Automation NV, Paganus Park, De Kiezelbaan 12a, 1831 Diegem, Belgium. Tel: (32) 2 663 0600, Fax: (32) 2 663 0640

Asia Pacific: Rockwell Automation, Level 14, Core F, Cyberport 3, 100 Cyberport Road, Hong Kong. Tel: (852) 2887 4788, Fax: (852) 2508 1846

Publication 857-PM001C-EN-P - February 2018

Supercedes Publication 857-PM001B-EN-P - February 2011

Copyright © 2018 Rockwell Automation, Inc. All rights reserved. Printed in Canada.