DC Electronic Loads

RMX-400x Series

USER MANUAL
Table of Contents

SAFETY INSTRUCTIONS .................................................. 6

GETTING STARTED ......................................................... 12
  Main Features ............................................................ 14
  Series Overview ....................................................... 16
  Package Contents and Accessories ............................. 18
  Measurement Overview ............................................ 20
  Front Panel Overview ............................................... 21
  Display Overview – Mainframe ................................. 27
  Rear Panel Overview ............................................... 31
  Front Panel Overview – Load Module ....................... 35
  LED Display Overview – Load Module ....................... 39
  Installation ............................................................ 42
  Load Connections ................................................... 49
  Frame Link Connection .......................................... 61
  Channel Control Connection .................................... 63
  Go/NoGo Connection ............................................... 67

OPERATING DESCRIPTION ............................................ 68
  Operating Mode Description ................................... 69
  Group Unit Mode ................................................... 80
  Run Program .......................................................... 82
  Sequence ............................................................... 85
  OCP Test Automation ............................................ 90
  Parallel Dynamic Loading ...................................... 91
  Configurations Description .................................. 92
  Interface and System ............................................ 104

TUTORIALS ........................................................... 112
  Local Loads .......................................................... 113
SAFETY INSTRUCTIONS

This chapter contains important safety instructions you must follow when operating the RMX-4000/4002, and when keeping it in storage. Read the following before operating the RMX-4000/4002 to ensure your safety and to keep the RMX-400x Series in the best possible condition.

Safety Symbols

These safety symbols may appear in this manual or on the RMX-4000/4002.

⚠️ WARNING
Warning: Identifies conditions or practices that could result in injury or loss of life.

⚠️ CAUTION
Caution: Identifies conditions or practices that could result in damage to the RMX-4000/4002 or to other properties.

⚡ DANGER High Voltage

⚠️ Attention Refer to the Manual

🛡️ Protective Conductor Terminal

接地 (ground) Terminal
Waste Electrical and Electronics Equipment (WEEE)

**EU Customers** At the end of the product life cycle, all NI products must be disposed of according to local laws and regulations. For more information about how to recycle NI products in your region, visit ni.com/environment/weee.

Safety Guidelines

**General Guideline**
- Do not place any heavy object on the RMX-4000/4002.

**CAUTION**
- Avoid severe impact or rough handling that leads to damaging the RMX-4000/4002.
- Do not discharge static electricity to the RMX-4000/4002.
- Do not block or obstruct the cooling fan vent openings.
- Do not perform measurement at circuits directly connected to Mains (Note below).
- Do not disassemble the RMX-4000/4002 unless you are qualified as service personnel.
- The equipment is not for measurements performed for CAT II, III and IV.
EN 61010-1:2010 specifies the measurement categories and their requirements as follows. The RMX-4000/4002 falls under category I.

- Measurement category IV is for measurement performed at the source of low-voltage installation.
- Measurement category III is for measurement performed in the building installation.
- Measurement category II is for measurement performed on the circuits directly connected to the low-voltage installation.
- Measurement category I is for measurements performed on circuits not directly connected to Mains.

### Power Supply

**WARNING**

- 100-120 Vac/ 200-240 Vac (90-132 Vac/ 180-250 Vac)
- Frequency: 47-63 Hz
- Power rating: RMX-4002: 250 VA Max
  - RMX-4000: 150 VA Max
- The power supply voltage should not fluctuate more than 15%.
- Connect the protective grounding conductor of the AC power cord to an earth ground, to avoid electrical shock.

### Fuse

**WARNING**

- Fuse type: T3.15 A/250 V
- Make sure the correct type of fuse is installed before power up.
- To avoid fire, replace the fuse with only the specified type and rating.
- Disconnect the power cord before fuse replacement.
- Make sure the cause of a fuse blowout is fixed before replacing the fuse.
Cleaning the RMX-400x

- Disconnect the power cord before cleaning.
- Use a soft cloth dampened in a solution of mild detergent and water. Do not spray any liquid.
- Do not use chemicals or cleaners containing harsh material such as benzene, toluene, xylene, and acetone.

Operation Environment

- Location: Indoor, no direct sunlight, dust free, almost non-conductive pollution (refer to the pollution degree descriptions below)
- Temperature: 0 °C to 40 °C
- Altitude: Up to 2000 m
- Transient Overvoltage on the main supply is 2500 V.

(Pollution Degree) EN 61010-1:2010 specifies the pollution degrees and their requirements as follows. The RMX-4000/4002 falls under degree 2.

Pollution refers to “addition of foreign matter, solid, liquid, or gaseous (ionized gases), that may produce a reduction of dielectric strength or surface resistivity”.

- Pollution degree 1: No pollution or only dry, non-conductive pollution occurs. The pollution has no influence.
- Pollution degree 2: Normally only non-conductive pollution occurs. Occasionally, however, a temporary conductivity caused by condensation must be expected.
- Pollution degree 3: Conductive pollution occurs, or dry, non-conductive pollution occurs which becomes conductive due to condensation which is expected. In such conditions, equipment is normally protected against exposure to direct sunlight, precipitation, and full wind pressure, but neither temperature nor humidity is controlled.

Storage environment

- Location: Indoor
- Relative Humidity: < 80%
- Temperature: −10 °C to 70 °C
Disposal

**Waste Electrical and Electronics Equipment (WEEE)**

**EU Customers** At the end of the product life cycle, all NI products must be disposed of according to local laws and regulations. For more information about how to recycle NI products in your region, visit ni.com/environment/weee.
Power Cord for the United Kingdom

When using the RMX-4000/4002 in the United Kingdom, make sure the power cord meets the following safety instructions.

NOTE: This lead/appliance must only be wired by competent persons.

⚠️ WARNING: THIS APPLIANCE MUST BE EARTHED

IMPORTANT: The wires in this lead are colored in accordance with the following code:

- Green/ Yellow: Earth
- Blue: Neutral
- Brown: Live (Phase)

As the colors of the wires in main leads may not correspond with the colored marking identified in your plug/appliance, proceed as follows:

The wire which is colored Green and Yellow must be connected to the Earth terminal marked with either the letter E, the earth symbol 🌊 or colored Green/Green and Yellow.

The wire which is colored Blue must be connected to the terminal which is marked with the letter N or colored Blue or Black.

The wire which is colored Brown must be connected to the terminal marked with the letter L or P or colored Brown or Red.

If in doubt, consult the instructions provided with the equipment or contact the supplier.

This cable/appliance should be protected by a suitably rated and approved HBC mains fuse: refer to the rating information about the equipment and/or user instructions for details. As a guide, a cable of 0.75 mm² should be protected by a 3 A or 5 A fuse. Larger conductors would normally require 13 A types, depending on the connection method used.

Any exposed wiring from a cable, plug or connection that is engaged in a live socket is extremely hazardous. If a cable or plug is deemed hazardous, turn off the mains power and remove the cable, any fuses and fuse assemblies. All hazardous wiring must be immediately destroyed and replaced in accordance to the above standard.
GETTING STARTED

This chapter describes the features and functions of the RMX-4000/4002, including the front and rear panel appearance, panel installation and connection types. Use the Tutorial section for quick access to step-by-step instructions on the main functions.

Main Features .................................................................................. 14
Series Overview ............................................................................. 16
Package Contents and Accessories ......................................... 18
Measurement Overview ................................................................. 20
Front Panel Overview .................................................................... 21
Display Overview – Mainframe ............................................... 27
Rear Panel Overview ................................................................. 31
Front Panel Overview – Load Module ........................................ 35
LED Display Overview – Load Module ........................................ 39
Installation ....................................................................................... 42
Load Module Installation ............................................................... 42
Rack Mount Installation .......................................................... 45
Channel Number ...................................................................... 46
Power Up and Self Test ........................................................... 47
Load Connections .................................................................... 49
Precautions and Procedures ...................................................... 49
Remote (Sense) Connection ....................................................... 54
Single-Load Connections ......................................................... 55
Parallel Load Connections ....................................................... 58
Frame Link Connection ............................................................ 61
Channel Control Connection ..................................................... 63
Go/NoGo Connection ............................................................... 67
Main Features

<table>
<thead>
<tr>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>The RMX-4000 and 4002 are multichannel programmable DC electronic load mainframes. The RMX-4000 mainframe can hold two load modules, while the RMX-4002 can hold four. The flexible module configuration allows the mainframes to either sink multiple loads independently or large loads when used in parallel. The RMX-400x Series supports four operation modes: constant current (CC), constant voltage (CV and CV+CC), constant resistance (CR) and constant power (CP). Constant current and constant resistance mode can operate in either static or dynamic mode.</td>
</tr>
</tbody>
</table>
Feature Overview

- Flexible operation with removable load modules
- Multiple independent isolated channels
- High performance, up to 5-digit resolution
- High slew rate enabling a high response speed
- High capacity when frame linked
- You can use different load module types in the same mainframe
- Dedicated parallel mode
- Supports rack mount installation (RMX-4002)
- Supports frame link connections, with up to four slave units
- Color LCD display
- 120 different sets of programmable sequences
- Accurate load simulation using sequences
- Four panel setups
- USB flash drive support

Interface

- USB
- RS-232C
- LAN
Series Overview

The RMX-400x Series comprises of two different mainframes: the RMX-4000 and the RMX-4002. The mainframes differ by the number of load modules that can be accommodated. The RMX-4000 has two load module slots, while the RMX-4002 has four. There are four different load module models, the RMX-4003, RMX-4004, RMX-4005, and RMX-4006.

The four different load module models each differ in the amount of current, voltage and power and the number of channels that the load module can accommodate. The procedures in this manual will be load module model independent unless specifically stated. Below is a table...
showing the basic differences between each load module model. For detailed specifications, refer to page 334.

<table>
<thead>
<tr>
<th>Load Module</th>
<th>Channels</th>
<th>Power (W) CH L/R (Low/High Range)</th>
<th>Current (A) Range Low/High</th>
<th>Voltage (V)</th>
</tr>
</thead>
<tbody>
<tr>
<td>RMX-4003</td>
<td>2</td>
<td>100/100</td>
<td>2/20</td>
<td>0-80</td>
</tr>
<tr>
<td>(100 W x 2)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RMX-4004</td>
<td>2</td>
<td>30/(25/250)</td>
<td>5/4/40</td>
<td>0-80</td>
</tr>
<tr>
<td>(30/(25/250 W))</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RMX-4005</td>
<td>1</td>
<td>(35/350)</td>
<td>7/70</td>
<td>0-80</td>
</tr>
<tr>
<td>RMX-4006</td>
<td>1</td>
<td>(35/350)</td>
<td>1/10</td>
<td>0-500</td>
</tr>
</tbody>
</table>
Package Contents and Accessories

The RMX-400x electronic load has a number of standard and optional accessories. For more information, visit the National Instruments website at [ni.com](http://ni.com) or consult your authorized distributor for details.

<table>
<thead>
<tr>
<th>Standard Accessories</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power Cable</td>
<td>Mains power cable (region dependent) (18 AWGx3C, 125 V/10 A, 1.8 m)</td>
</tr>
<tr>
<td>CD ROM</td>
<td>Contains RMX-400x Series User Manual, Programming Manual, and USB Driver</td>
</tr>
<tr>
<td>Load Cables</td>
<td>2X red, 2X black (per load module)</td>
</tr>
<tr>
<td>Sense Cables</td>
<td>1X red, 1X black (per load channel)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Options</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>RMX-4003</td>
<td>Load Module</td>
</tr>
<tr>
<td>RMX-4004</td>
<td></td>
</tr>
<tr>
<td>RMX-4005</td>
<td></td>
</tr>
<tr>
<td>RMX-4006</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Optional Accessories</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>786533-01</td>
<td>RMX-400x Rack Mount kit (handle only)</td>
</tr>
<tr>
<td>182238-01</td>
<td>RS-232C Cable (9F-9F serial cable, 1m)</td>
</tr>
<tr>
<td>182238-02</td>
<td>RS-232C Cable (9F-9F serial cable, 2m)</td>
</tr>
<tr>
<td>182238-04</td>
<td>RS-232C Cable (9F-9F serial cable, 4m)</td>
</tr>
<tr>
<td>184125-01</td>
<td>USB 2.0 Cable (Type A to Type B, 1m)</td>
</tr>
<tr>
<td>184125-02</td>
<td>USB 2.0 Cable (Type A to Type B, 2m)</td>
</tr>
</tbody>
</table>
GTL-249     Frame link cable
Measurement Overview

The RMX-400x Series has several operating modes that are completely configurable. All the modes have customizable Go/NoGo limits, range limits, timers, slew rates, alarms, and protection limits. For parallel loads, there is a dedicated parallel configuration mode. You can create programs and sequences to create tests.

<table>
<thead>
<tr>
<th>Function</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant Current Mode (CC)</td>
<td>In constant current mode, the load module sinks a constant amount of current, regardless of the voltage.</td>
</tr>
<tr>
<td>Constant Voltage Mode (CV)</td>
<td>Under constant voltage mode, the voltage remains unchanged, regardless of the current.</td>
</tr>
<tr>
<td>Constant Resistance Mode (CR)</td>
<td>In constant resistance mode, the resistance load will remain unchanged as the voltage and current remain proportional.</td>
</tr>
<tr>
<td>Constant Power Mode (CP)</td>
<td>In constant power mode, the load module ensures the power consumed is constant.</td>
</tr>
<tr>
<td>Programmable Sequences (Prog.)</td>
<td>The load module supports programming sequences with up to 120 memory settings in 12 programs with 10 sequences.</td>
</tr>
<tr>
<td>Sequences (Seq.)</td>
<td>Use sequences to create load profiles to accurately simulate a load. You can create sequences for each channel.</td>
</tr>
<tr>
<td>Group Unit Mode</td>
<td>Group Unit Mode enables the RMX-400x mainframes to use load modules (of the same type/rating) easily in parallel. Use parallel mode in conjunction with CC or CR modes. You cannot use CP and CV mode with this mode.</td>
</tr>
</tbody>
</table>
Front Panel Overview

- **LCD display**: 320 by 240, TFT LCD display.
- **Function keys**: Access the menu functions on the bottom of the display.
System keys

Use CHAN/LOCAL to select the load channel. Use LOCAL combined with the shift key to activate/deactivate local control (during remote control via the interface or frame link connections).

- **LOCAL**
- **CHAN**

Brings up the Channel Menu.

- **LOCAL**
- **CHAN**

Activates local control mode during remote control via the interface.

- **FUNC**

Accesses the Program, Sequence, or OCP automation menu.

- **FILE**

Accesses the File menu.

- **UTILITY**

Brings up the Help menu and utility menu.

- **UTILITY**
- **HELP**

Accesses help for the last function/key pressed.

- **SHIFT**
- **HELP**

Activates the Utility Menu.
Number pad

- Enters numerical values or save/recall presets (P0-P9).

- Presets numbers P0-P9.

- Decimal point and Calibration key.

- Decimal point.

- Activates calibration mode.

Note

- Calibration mode is not supported. Refer to your distributor for calibration needs.

- Clears current values. Alternate function locks the keys and selector knob.

- Clears the current value.

- Locks all keys and selector knob.

USB Input

- USB flash memory slot.
Selector Knob

Selects operations and increase/decrease values.

When turned left or right, moves the cursor in menus or changes the selected item or value.

When pressed, acts as the Enter key.

Operation Keys

Saves and recalls preset settings and values.

Press in combination with the number pad to recall or save presets P0-P9.

Inactive.

Active. Use in combination with the number pad and/or shift key.

Press to recall a channel preset.

Hold to save a channel preset.

Press to recall all channel presets.

Hold to save all channel presets.
Use the shift key to access alternate functions assigned to select keys. You also can use the shift key to toggle between coarse and fine control mode when used in conjunction with the selector knob to adjust parameters.

**SHIFT**

Inactive mode.

**SHIFT**

Active. When active, use the shift key to access the Local and Utility menus.

**SHIFT**

Coarse control mode.

**SHIFT**

Fine control mode

**ENTER**

Confirms selections.

**LOAD ON/OFF**

Turns the current load/channel on or off.

Load is off. (unlit)

Load is on. (orange light)
Power

![ON / STBY](image)

Turns the unit on or to standby mode.

- **Standby mode.**

- **On.**
Display Overview – Mainframe

The Mainframe Status Panel displays the Mainframe interface, programs, and alarm status.

Frame Link Status Indicates Frame Link is turned on and that the mainframe is set as either a master (FRM) or slave (FRS) unit.
### Load Type

Indicates whether a Sequence (SEQ) or Program (PROG) is turned on. If not, LOAD is displayed as default. When any Load type is running, its icon turns orange.

### Interface Status

Displays which interface type is set.

### Current Operation Channel Status Panel

Generally displays the current channel’s status.

<table>
<thead>
<tr>
<th>Channel</th>
<th>Mode</th>
<th>Response Speed</th>
<th>Voltage Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>CH1-CH8</td>
<td>SPEC</td>
<td>Slow</td>
<td>80V main</td>
</tr>
<tr>
<td>*CHx</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CHxS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CHxP</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* = independent mode
S = Group Channels
P = Group Channels
Parallel mode

Displays the current channel.
<table>
<thead>
<tr>
<th>Mode</th>
<th>Displays the current mode.</th>
</tr>
</thead>
<tbody>
<tr>
<td>CCL</td>
<td>CC Static Low Range</td>
</tr>
<tr>
<td>CCH</td>
<td>CC Static High Range</td>
</tr>
<tr>
<td>CCDL</td>
<td>CC Dynamic Low Range</td>
</tr>
<tr>
<td>CCDH</td>
<td>CC Dynamic High Range</td>
</tr>
<tr>
<td>CRL</td>
<td>CR Static Low Range</td>
</tr>
<tr>
<td>CRH</td>
<td>CR Static High Range</td>
</tr>
<tr>
<td>CRDL</td>
<td>CR Dynamic Low Range</td>
</tr>
<tr>
<td>CRDH</td>
<td>CR Dynamic High Range</td>
</tr>
<tr>
<td>CVL</td>
<td>CV Static Low Range</td>
</tr>
<tr>
<td>CVH</td>
<td>CV Static High Range</td>
</tr>
<tr>
<td>CPL</td>
<td>CP Low Range</td>
</tr>
<tr>
<td>CPH</td>
<td>CP High Range</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Go/NoGo</th>
<th>SPEC</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>If Go/NoGo is on, SPEC is displayed.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Response Speed</th>
<th>Slow</th>
<th>Fast</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>In CV mode, the Slow or Fast response speed is shown.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Channel Control</th>
<th>EXT</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>When Channel Control is set to External, EXT is displayed.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Voltage Range</th>
<th>Displays the current setting’s voltage range.</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Menu</th>
<th>Shows the current menu.</th>
</tr>
</thead>
<tbody>
<tr>
<td>main</td>
<td>= Chan menu</td>
</tr>
<tr>
<td>conf</td>
<td>= Chan→Configure menu</td>
</tr>
<tr>
<td>s_edit</td>
<td>= Chan→Seq.Edit menu</td>
</tr>
<tr>
<td>file</td>
<td>= File menu</td>
</tr>
<tr>
<td>s_loop</td>
<td>= Chan→Seq&gt;Edit→Loop menu</td>
</tr>
</tbody>
</table>

Main Screen     Main display screen.
| Menu Icons | F1-F5 | The F1-F5 function keys control each menu icon. |
Rear Panel Overview

RMX-4002

- Go/NoGo Output
- RS232C
- LAN
- USB-B terminal
- USB-A terminal
- Power Switch, Power Socket, Fuse
- Channel Control, 1~8
- Frame Control 1,2

The Go/NoGo Output terminal outputs a pass (high)/fail (low) voltage for each channel.

Refer to pages 67 and 318 for details.
<table>
<thead>
<tr>
<th>Port Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>RS232 port</strong></td>
<td>The RS232 port is used for remote control connections.</td>
</tr>
<tr>
<td><img src="image" alt="RS232C" /></td>
<td>RS-232C: DB-9 pin male</td>
</tr>
<tr>
<td></td>
<td>Refer to page 312 for remote control details.</td>
</tr>
<tr>
<td><strong>LAN port</strong></td>
<td>Ethernet port for controlling the RMX-4000 remotely.</td>
</tr>
<tr>
<td><img src="image" alt="LAN" /></td>
<td></td>
</tr>
<tr>
<td>**USB-A (host)/</td>
<td>Like the RS232 port, the USB-B (device) port is for remote control.</td>
</tr>
<tr>
<td>USB-B (device)</td>
<td>The USB-A (host) port is reserved for power delivery 5 V only. If you use</td>
</tr>
<tr>
<td><strong>port</strong></td>
<td>the USB-A (host) as a USB flash memory slot, do not set the interface to</td>
</tr>
<tr>
<td></td>
<td>USB.</td>
</tr>
<tr>
<td></td>
<td>Refer to page 104 for interface details.</td>
</tr>
</tbody>
</table>
The Frame Control port is for Frame Link connections. Mainframes are daisy-chained together. There are two Frame control ports:

1: Slave
2: Master

Connection type: MIL 20-pin connector.

For frame link connection details, refer to pages 61 and 315.

Power Switch

External Power Switch

The power supply socket accepts the AC mains Voltage. The fuse holder is below the power socket.

Power: 47-63 Hz

Fuse: T3.15 A/250 V

For fuse replacement details, refer to page 321.
Channel Control port (1-8)

Each channel has a dedicated channel control port to enable external monitoring and control. The channel control port has six wire sockets that are screw-less and self clamping.

Required wire gauge:
24 AWG

For connection or specification details, refer to pages 63 and 313.
Front Panel Overview – Load Module

LED display 2 x 5-digit custom LED display.

Right/Left Key Use the L/R key to switch between the right and left load channel on a dual-channel load module. Use the A/B key to switch between A and B Values for single-channel load modules.

A/B Key
Display Key

 Alternates the display output on the load module.

 - **00000** Current
 - **00000** Voltage
 - **000** Power
 - **00 s** Load time

Load Key

 Activates the load for the active channel. (right or left/ A or B)

Left Voltage Sense

 Use the voltage sense terminals when you need precise measurements, to compensate for voltage drops across the main terminals caused by the load wires’ resistance.

Right Voltage Sense

 It is automatically activated when connected to a DUT.

The voltage difference between the DUT and load voltage should not exceed 2 V. Otherwise, you will get an incorrect measurement for the voltage. (Applicable to all models.)
Positive and Negative Terminals Left

The terminals for both the left and right side of a load can draw differing amounts depending on the load module specifications.

Positive and Negative Terminals Right

For two-channel load modules, the left terminals are for the first channel, and the right terminals are used for the second channel.

On single-channel load modules, the left terminals are the lower (-) potential terminals, while the right terminals are the positive (+) potential terminals.

Static/Dynamic Selector Key

The STATIC/DYNA. key manually switches the load from static (manual) to dynamic.

Dynamic loads are supported in only CC and CR mode. For more information, refer to pages 69 and 72.
Slave Knob (Load)

Use the Slave Knob to edit and vary parameters for the active channel on the local load. Depending on the mainframe setup, the Slave Knob updates either the load only (locally) or both the local module and mainframe*. You also can configure the Slave Knob to display measured or set values on the local load module**.

*For more information about knob types, refer to page 233.

**For more information about the Slave Knob, refer to page 237.

Short Key

Use the SHORT key to short circuit the active channel manually on the local active load. When a load is off, the SHORT key toggles the short key type.

You can set the Short key to enable or disable in the configuration setting.

Load on: Pressing or holding the SHORT key shorts the load, depending on the short type selected.
LED Display Overview – Load Module

1 and 2 Channel Display

R or L Left and right channel indicator.

5-digit display.

3 and 7 Channel Number Indicator

Indicates the channel number (1-8).

L-ON Indicates whether the load is active on the load module for dual-channel load modules.

ON Indicates whether the load is on for single-channel load modules.
The Mode Indicator LEDs indicate the current mode or settings on the active channel(s).

**A** or **B** Value A or B for a single-channel load module. Applies to CR, CV, CP, and CC static mode only.

**CC** Constant Current Mode (CC) mode activated.

**CV** Constant Voltage Mode (CV) mode activated.

**CR** Constant Resistance Mode (CR).

**CP** Constant Power Mode (CP).

**Disp.** Display is shown on dual-channel load modules when both left (L) and right (R) channel information is displayed.

Press the Display button repeatedly to show information for both channels.

**GO** Lights up when Go/NoGo is activated and the load passes the Go/NoGo limits.

**L** or **R** L or R lights up when you select the left or right channel.

**Static** Lights up when in Static mode.

**Dyna.** Lights up when in Dynamic mode.
**Short**  Lights up when a load is shorted.

**NG**  Lights up when Go/NoGo is activated and the load fails the Go/NoGo limits.

Channel Unit Indicators

The Unit Indicators display the current unit.

- **V**  Voltage
- **Ω**  Resistance
- **A**  Current
- **W**  Power
- **S**  Second
Installation

This chapter describes how to load the load modules, install the optional rack mount kit, and determine each channel number.

If you need to move all installed devices to another location, disassemble the modules first, then reassemble the modules after moving to the desired location.

Load Module Installation

WARNING: To avoid static electricity, use appropriate anti-static work practices.

Module installation: The RMX-4000 and 4002 can accommodate two and four load modules, respectively. Module loads can have one or two channels. Load module installation is the same for both models.

Steps:

1. Ensure that the mainframe is turned off from the rear panel. Disconnect the power cord.

2. Slide the module onto the rails of an empty load slot.
3. Use the supplied screw to attach the module to the load slot under the load terminals.

4. Install any additional modules as described above.

5. If there are any empty slots, install the supplied panel cover (National Instruments part number 63FP-AG106501). The panel cover improves safety and increases air flow.
6. Use the supplied screws to attach the panel cover(s) over the load slot.
Rack Mount Installation

Background

You can use the RMX-4002 in a standard 19 in. rack mount enclosure with the optional rack mount kit (National Instruments part number 11EL-20040201). Each unit requires a rack height of 4U with a 1U space for ventilation top and bottom. The rear of the rack mount enclosure must be free of obstruction to allow heat to dissipate from the mainframe(s).

Steps

1. Attach the rack mount brackets as shown below using the supplied bolts.

2. Insert the RMX-4002 into a standard 19 in. rack enclosure with at least 1U of space top and bottom for ventilation.
Channel Number

Description

The slot a module load occupies on the mainframe chassis determines the module load channel number. There can be one or two channels per slot, depending on the load module type.

The RMX-4000 has two slots; the RMX-4002 has four slots. Channel 1 is the farthest away from the main display panel, and channel 8 (RMX-4002) or channel 4 (RMX-4000) is the closest to the main display panel.

As shown in the following figure, the RMX-4002 has all four slots occupied with the RMX-4003, RMX-4004, RMX-4005, and RMX-4006 load modules (LM), respectively. The RMX-4003 and 4004 have two channels per load module; the RMX-4005 and RMX-4006 have only one. The channel determination is:

LM1: CH1, CH2; LM2: CH3, CH4; LM3: CH5; LM4: CH6.
Power Up and Self Test

Panel Operation

1. Connect the power cord to the power socket.

2. Turn on the external power switch.

3. Hold the power button on the front panel to turn on the power.

The power button turns from red (standby) to green.

⚠️ WARNING

Ensure that the power outlet has a ground socket. The power outlet has a ground connection if it is a three-socket type.

When turned on, the Mainframe performs a self-test. The self-test checks the system, followed by any attached channels.

⚠️ NOTE

When the mainframe and slave firmware versions are not identical, the following message appears on the mainframe: “The firmware will be updated, please access to website www.ni.com to confirm the firmware version.”
When the system check happens, the load modules display each channel as it is checked, then display the current mode.

4. If any System checks fail, power down the load and reinstall the appropriate load module(s).

5. To turn off the load, hold the power button for a few seconds.

The RMX-400x mainframe returns to standby mode.
Load Connections

Precautions and Procedures

Introduction

The RMX-400x series supports several load configurations for flexible operation:

- Single DUT, single load
- Single DUT, parallel load
- Multiple DUTs, multiple loads
- Multiple DUTs, multiple mainframe loads
- Single DUT, parallel mainframes

The RMX-400x series also supports a number of different control methods and interfaces. The connections used are described here:

- Frame link
- Channel control
- Go/NoGo

Wire Gauge Considerations

Before connecting the RMX-400x series, you must consider the wire gauge. Load wires must be large enough to resist overheating when a short-circuit condition occurs, as well as maintain good regulation. The size, polarity, and length of a wire are all factors in determining if it can withstand short circuiting.
Wire Selection

Wires must be large enough to withstand a short circuit and limit voltage drops to no more than 2 V per wire. Use the table below to help make a suitable selection.

<table>
<thead>
<tr>
<th>AWG</th>
<th>Max Current (Amp)</th>
</tr>
</thead>
<tbody>
<tr>
<td>24</td>
<td>7.64</td>
</tr>
<tr>
<td>22</td>
<td>10.0</td>
</tr>
<tr>
<td>20</td>
<td>13.1</td>
</tr>
<tr>
<td>18</td>
<td>17.2</td>
</tr>
<tr>
<td>16</td>
<td>22.6</td>
</tr>
<tr>
<td>14</td>
<td>30.4</td>
</tr>
<tr>
<td>12</td>
<td>40.6</td>
</tr>
<tr>
<td>10</td>
<td>55.3</td>
</tr>
</tbody>
</table>

Load Line Inductance Considerations

When using the RMX-series, you must consider the voltage drop and voltage generated due to load line inductance and current change. Extreme changes in voltage may exceed the minimum or maximum voltage limits. Exceeding the maximum voltage limit may damage the RMX-400x series.

To determine the voltage generated, use the following equation:

\[ E = L \times \frac{\Delta I}{\Delta T} \]

- \( E \) = voltage generated
- \( L \) = load line inductance
- \( \Delta I \) = change of current (A)
- \( \Delta T \) = time (us)

You can approximate load line inductance (L) as 1 uH per meter of wire. \( \frac{\Delta I}{\Delta T} \) is the slew rate in A/us.
The diagram above shows how changes in current can affect voltage.

**Limiting Load Line Inductance**

You can reduce load line inductance by ensuring load wires are as short as possible and twisting positive and negative load wires together. You can limit current change by limiting the slew rate when switching.

A twisted pair is shown on any connection diagram where you should twist the load wires together.
Load Module Considerations

The RMX-400x series supports single and dual-channel load modules.

Single-channel load modules have one bank of negative terminals and one bank of positive terminals. Each terminal pair has a 40 A capacity. For higher loads, you can wire each terminal in parallel to increase capacity.

Dual-channel load modules have one bank of positive and negative terminals for each channel.

<table>
<thead>
<tr>
<th>Single-Channel Load Module</th>
<th>Dual-Channel Load Module</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single channel</td>
<td>Left channel</td>
</tr>
<tr>
<td></td>
<td>Right channel</td>
</tr>
</tbody>
</table>

Connection

Follow the procedure below for all load connections.

⚠️ CAUTION

Ensure that power is off from the load and the DUT before making any connections.

Steps

1. Carefully lift the terminal covers.

2. Connect the positive (+) terminal on the load module to the DUT high potential output.

3. Connect the negative (-) load terminal to the DUT low potential output.
4. Close the terminal cover securely. Ensure that the wires are secured properly and the wires are not exposed when the cover is in place.

⚠️ WARNING

Ensure that the wires are tied or twisted together to prevent noise and inductance.

⚠️ CAUTION

Ensure the polarity is correct before proceeding with any connections. Using the wrong polarity could result in reverse voltage damage.

Ensure that the input voltage does not exceed specifications. Exceeding the voltage specifications could result in damage to the instrument.
Remote (Sense) Connection

Background  The electronic load modules have two voltage sense contacts: $V_{sense}^+$ and $V_{sense}^-$. You can use voltage sense to help compensate for long cable length. The longer the cable, the higher the potential resistance and inductance; therefore, a short cable is best. Twisting the cable can help reduce induced inductance, and using the $V_{sense}$ terminals compensates the voltage drop seen across the load leads, especially leads with higher resistance. This is useful when used in CV, CR, or CP mode.

⚠️ WARNING  $V_{sense}^+$ must have a higher potential than $V_{sense}^-$.  

Connection  The diagram below shows how you can connect a DUT using voltage sense. Note that the sense wires are also twisted pairs.

⚠️ Note  The wire gauge for the sense wires should be no smaller than 16 gauge.

Input  The voltage sense terminals must use a wire gauge of 16 to 14 (diameter 1.29 mm - 1.63 mm).
Remote Sense Terminal connection

The voltage sense terminals use a screwless clamp connector. You must open the clamp prior to inserting a wire. Use a small screwdriver to push the clamp release mechanism, as shown below. Insert both wires, then release the clamp mechanism.

---

**Single-Load Connections**

**Dual Channel Load Module Connection**

You can use a dual-channel load module to sink two loads concurrently.

---

**Single Channel Load Module Connection**

On a single-channel load module, the left terminals are both negative (-), while the right terminals are both positive (+). Note that this also applies to the voltage sense terminals.
CAUTION

For loads exceeding 40 A, you must use both positive and both negative terminals in parallel.

DC Connection

For purely DC operation, you can connect a resistor and capacitor in parallel to the electronic load to reduce oscillation. The capacitor and resistor values depend on the load settings. Ensure that the capacitor ripple current is within allowable limits.

Low Voltage Connection

Using the load with low voltage loads is generally limited to over 1 V (load module dependent). To support low voltage loads, you need an auxiliary power supply to boost the voltage to a range suitable for the load.

Precautions:

- Take into account the combined power of the load and auxiliary power supply.
- Make sure the auxiliary power supply can provide enough current.
- Take into account any noise or irregularities from the auxiliary supply.
The diagram below shows a typical connection.

![Diagram](image)

**WARNING**

Using an auxiliary power supply may induce reverse current. The RMX-400x Series has reverse voltage protection. For details, refer to the protection section on page 92.
Parallel Load Connections

When the power output of a DUT exceeds the power rating of a channel or load module, you can use the channel terminals, load modules, or mainframes in parallel to dissipate more power when used in CC or CR mode. Each channel sinks the amount of current specified. The total power sunk is the sum of all channels/modules. The amount of power can vary from each channel. For example, if CH1 is 25 A and CH2 is 20 A, the total current sunk is 45 A. Parallel loads are supported for both static and dynamic loads (refer to page 90 for a description on parallel dynamic loading). Note that you must use the same modules when operating the parallel.

The RMX-400x series also features a dedicated parallel configuration setting known as Group Unit. When Group Unit is turned on, you must use load modules of the same type and rating in parallel for CC and CR mode. Refer to pages 80 and 221 for more information.
Parallel Load

You must use the same load modules in parallel.

Note

Parallel Loads Using Frame Link Connections

You also can connect RMX-400x series mainframes in parallel. When using a frame link connection, there is a delay between the master and slave. Refer to page 61 for details.
The RMX-400x series also can sink a number of loads concurrently from multiple DUTs or sink a number of loads from the same DUT (that is, a multiple output power supply).
Frame Link Connection

Background

Frame link control involves connecting multiple mainframes using the frame link connections. You can connect up to four slave mainframes to the master mainframe. You can use the first mainframe (master) to control the other slave frames. There is a delay time of 2 µs between the master and first slave mainframe, and 4 µs, 6 µs, and 8 µs to the second, third, and fourth slave mainframes, respectively. The connectors used are standard MIL 20-pin connectors. For pin arrangement, refer to page 315. The frame link cable (part no. GTL-249) is an optional accessory; refer to page 18 for details.
The first mainframe connected is the master frame; any additional frames are slave units. The ribbon cable connects to the master from connector 2, and the slave from connector 1. Each successive slave unit is connected in a cascading manner the same way.

Ensure that the mainframes are turned off before connecting the ribbon cables. Push the cable into the frame link connector. Ensure that the arrows line up. The latches close when the connection is complete. To remove, pull the latches out, and the connector comes out.

**WARNING** Ensure that all the mainframes are off and disconnected from mains power before connecting.
Channel Control Connection

Background

The Channel Control connecters are on the rear panel of each mainframe. There are two channel control connectors for each load slot, one for each channel, if applicable. Use the channel control connector to externally:

- Turn on/off loads.
- Supply a reference voltage.
- Monitor the load input.

For further details on channel control and the interface, refer to pages 100 and 313.

The Channel Control input/output pinout is shown below.

<table>
<thead>
<tr>
<th>Pin</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>GND</td>
</tr>
<tr>
<td>2</td>
<td>I MON</td>
</tr>
<tr>
<td>3</td>
<td>V MON</td>
</tr>
<tr>
<td>4</td>
<td>EXT VREF</td>
</tr>
<tr>
<td>5</td>
<td>Load On</td>
</tr>
<tr>
<td>6</td>
<td>+15V Output</td>
</tr>
</tbody>
</table>
**External Voltage Connection**

The external voltage reference input must be 0-10 V.

![Diagram of EXT VREF and GND connections]

**WARNING**

Ensure the external voltage reference is stable and has low noise. The External Voltage should be no more than 10 V.

You can use an external voltage of no more than 12 V. More than 12 V may damage the load.

**Load on connection**

To turn a load on, you must apply an active low voltage (0-1 V) across Load On (pin 5) and GND (pin 1). Similarly, you must apply an active high voltage (4-5 V) to turn a load off. The Load On input must be TTL.

![Diagram of Load On and TTL connections]
### Voltage and Current Monitor Output

The Voltage Monitor Output (VMON) and Current Monitor Output (IMON) output the load input voltage and load input current as a percentage of rating current/voltage, where 0 V = 0% rating and 10 V = 100% load input rating voltage or current.

The voltage monitor output is across pins 1 and 3, and the current monitor output is across pins 1 and 2. Pin 6 outputs a +15 V reference voltage.

The following diagram shows the voltage and current monitor output pin configuration.

![Diagram of pin configuration](diagram.png)

### Connector Connection

The channel control connector is a screwless clamp connector. You must open the internal clamp mechanism before you can insert a wire. To open the internal clamp, push the button above the wire socket. To close, release the button. Ensure that at least 10 mm is stripped from the wire. The diagram below shows the wire insertion procedure.

![Diagram of wire insertion procedure](diagram2.png)
All connections to the channel control connector must use a 24 AWG wire gauge.
Go/NoGo Connection

Background  The Go/NoGo port is a 15-socket port. Each channel has a dedicated line for a Go/NoGo output. The ports are open-collector with active high (30 V) indicating a pass and active low (1.1 V) indicating a fail (an alarm). The Go/NoGo terminal is a DB-15 female.

For more details on the Go/NoGo interface, refer to page 318.
OPERATING
DESCRIPTION

Operating Mode Description .............................................. 69
  Constant Current Mode .................................................. 69
  Constant Resistance Mode .............................................. 72
  Constant Voltage Mode .................................................. 75
  Constant Power Mode ...................................................... 78
Group Unit Mode ................................................................. 80
Run Program ....................................................................... 82
Sequence .......................................................................... 85
OCP Test Automation ......................................................... 90
Parallel Dynamic Loading .................................................... 91
Configurations Description ............................................... 92
  Protection Modes ............................................................ 92
  Operating Configurations ............................................... 94
  Channel Control ............................................................... 100
Interface and System ........................................................... 104
  Interface .......................................................................... 104
  File System ...................................................................... 104
  File Format ...................................................................... 110
Operating Mode Description

There are four basic operating modes: constant current (CC), Constant Resistance (CR), Constant Voltage (CV/CV+CC) and Constant Power (CP). All channels operate using any of the modes. Each mode has a number of configurable options including slew rate, levels, protection modes, Go/NoGo and extensive save options.

Constant Current Mode

**Background**

In Constant Current Mode, the load units sink the amount of current programmed. Regardless of the voltage, the current stays the same. There are two ranges in CC mode: High and Low. There are two main modes in CC mode: Static and Dynamic. You can use static mode for stability tests and dynamic mode to test transient load conditions.

Go/NoGo is supported for both High and Low range as well as Static and Dynamic mode.

---

**CC Mode**

![CC Mode Diagram](image)

- Load Current
- Load Input Voltage
### Range

There are two selectable ranges for constant current mode: high and low range.

Low range has a higher resolution, but a lower range. If the current exceeds the Low Range, you must use High range.

### Static Functions

Static mode tests the stability of the voltage output from a power source. Single-channel load modules can have two current levels: A (A Value) and B (B Value). A and B have the same range. Pressing the A/B key on the module load cycles through the A and B states. Alternatively, the mainframe can select the A or B Value.

Dual-channel load modules have only one current level (A Value) per channel in static mode.

### Dynamic Functions

Dynamic load functions allow you to set load levels (Level 1 or Level 2), load time (Timer 1 or Timer 2), and the slew rate (rising or falling). Depending on the settings, the load switches automatically between levels 1 and 2.

You can use dynamic loading for charge discharge cycle testing, and so on.
Slew rate

The slew rate is the rate at which the current increases to a set level. There are two slew rates: rising slew rate and falling slew rate. In CC mode, the slew rate is defined as A/uS.

As shown above, the rising and falling slew rate need not be the same.

Go/NoGo

Using Go/NoGo, you can set the Center, High, and Low voltage limits for both Static and Dynamic modes. You also can set a delay time of up to 1 second.
GO is specified as between the Low and High Go/NoGo limits. NoGo is specified as outside the Go/NoGo limits.

Constant Resistance Mode

Background

In constant resistance mode, the load units linearly sink current and voltage to match a set resistance. CR mode has two values (single load modules), two ranges, and rising and falling slew rates. Like CC mode, constant resistance mode supports both dynamic and static loads. As with the other modes, Go/NoGo is supported.
Resistance Range  There are two ranges: high and low. The low range is for low-voltage ranges, while the high range is for high-voltage ranges. The current range always remains in high range, regardless of the selected resistance range.

Static Functions  For static mode, single-channel load modules have two resistance levels, A and B Value. A and B have the same range. Use the A/B key to switch between these resistance levels. Dual-channel load modules have only one resistance level, A Value.

Dynamic Functions  CR mode supports Dynamic loading. Dynamic load has two resistance levels (Level 1 and 2), and two timers (Timer 1 and 2) to switch between the resistance levels. You can set rising and falling slew rates to determine the speed at which the load switches between load levels.
Slew Rate  The rising and falling slew rate (A/μS) determines the speed at which the load levels change from A to B Value (static mode) or from Level 1 to 2 (dynamic mode) and vice versa.

Go/NoGo  Go/nogo is also supported. You can set center, high, and low limits as either percentages or voltage values. You also can set delay time of up to 1 second.
Constant Voltage Mode

Background  In constant voltage mode, the load units sink current while keeping the voltage constant.

Single-channel load modules support two values (A Value and B Value) and have an adjustable cut-off current limit. Dual-channel load modules have only A value.

You also can set response speed to fast (Fast) or slow (Slow). The response speed relates to the current response’s slew rate.

Go/NoGo functionality is also supported either as a percentage or as a current value.

Voltage levels  You can set two voltage levels: A and B (single channel load module).
When using CV mode, you can set a current limit for CV + CC mode.

When the voltage input is greater than A Value (load voltage), the channel operates in CV mode if the input current is less than the current limit. When the input current exceeds the current limit, the channel operates in CC mode.

When the voltage input is less than A Value (load voltage), current stops flowing.
Response Speed  You can set response speed to fast or slow. The load module specifications determine fast response and slow response. Slow response speeds are suitable for large loads, as quick current changes induce induction that can cause large voltage drops. The RMX series tries to rectify any voltage drops. However, if voltage drops are too large, they may cause the load to go into oscillation. Large voltage drops that line voltage induction causes may damage the machine.

<table>
<thead>
<tr>
<th>Range</th>
<th>Fast</th>
<th>Slow</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 kHz</td>
<td></td>
<td>100 Hz</td>
</tr>
</tbody>
</table>

Go/NoGo  Go/nogo testing can be with either current (Ampere) values (High or Low) or percentage values (Center, High %, or Low %). You also can set a delay time of up to 1 second.

CV Mode: GO/NOGO
Constant Power Mode

Background

In constant power mode, the load units ensure a constant power load for the power supply.

Single-channel load modules support two values (A Value and B Value) and have an adjustable cut-off current limit. Dual-channel load modules have only A value.

Constant power mode can operate in high or low range.

Constant power mode also supports Go/NoGo functionality as either a percentage or current value.

Power Levels

You can set two power levels: A and B (single-channel load module).
CP + CC  When using CP mode, you can set a current limit for CP + CC mode.

When the constant power current is less than current limit, the channel operates in CP mode. When the constant power current exceeds the current limit, the channel operates in CC mode.

High/Low Range  There are two ranges: high and low. The how range is for low power ranges, while the high range is for high power ranges.

Go/NoGo  Go/nogo testing can set high and low current limits as a value (in amperes) or as a percentage. You also can set a delay time of up to 1 second.
Group Unit Mode

Background
Use the Group Unit menu to configure load modules of the same type and rating as a single unit when used in parallel. This eliminates the need to configure each channel individually.

Group Unit is supported under only CC and CR mode.

Group Unit has three configuration settings: Total Unit, Group Mode, and Display Mode.

Total Unit
This configuration setting sets the number units to be used in parallel and enables or disables the Total Unit mode.

Group Mode
The Group Mode setting determines how the current levels/resistance values are set when used in parallel. There are two settings: para and sync.

The para setting allows the all the parallelized load modules to be operated as a single large load module.

Sync mode allows the settings of a single unit to be synchronized across all the other parallelized load modules.

CC Example
Consider three load modules set to CC mode in Parallel.

In CC mode, the total current for all units is the sum of each unit.

Total \( I = I_1 + I_2 + I_n \)
For example, to set a total load current of 90 A, the current level setting in para mode would be 90 A, while it would be 30 A sync mode.

---

Para Mode

<table>
<thead>
<tr>
<th>Level1</th>
<th>90 A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level2</td>
<td>30 A</td>
</tr>
<tr>
<td>SlewRate ↑</td>
<td>0.80 A/μS</td>
</tr>
<tr>
<td>SlewRate ↓</td>
<td>0.80 A/μS</td>
</tr>
<tr>
<td>Timer1</td>
<td>0.025 ms</td>
</tr>
<tr>
<td>Timer2</td>
<td>0.025 ms</td>
</tr>
</tbody>
</table>

Sync Mode

<table>
<thead>
<tr>
<th>Level1</th>
<th>30 A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level2</td>
<td>10 A</td>
</tr>
<tr>
<td>SlewRate ↑</td>
<td>0.80 A/μS</td>
</tr>
<tr>
<td>SlewRate ↓</td>
<td>0.80 A/μS</td>
</tr>
<tr>
<td>Timer1</td>
<td>0.025 ms</td>
</tr>
<tr>
<td>Timer2</td>
<td>0.025 ms</td>
</tr>
</tbody>
</table>

---

CR Example

When used in CR mode, the equation for equivalent resistance for all parallel loads is:

\[
\frac{1}{R_{eq}} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_n}
\]

For example, if two load modules have a set resistance of 100 Ω each, the equivalent resistance of the load modules would be 50 Ω. The Level setting in para mode would be 50 Ω, and 100 Ω in sync mode.

---

Para mode

<table>
<thead>
<tr>
<th>Level1</th>
<th>50,000 Ω</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level2</td>
<td>100,000 Ω</td>
</tr>
<tr>
<td>SlewRate ↑</td>
<td>0.40 A/μS</td>
</tr>
<tr>
<td>SlewRate ↓</td>
<td>0.40 A/μS</td>
</tr>
<tr>
<td>Timer1</td>
<td>0.025 ms</td>
</tr>
<tr>
<td>Timer2</td>
<td>0.025 ms</td>
</tr>
</tbody>
</table>

Sync mode

<table>
<thead>
<tr>
<th>Level1</th>
<th>100,000 Ω</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level2</td>
<td>100,000 Ω</td>
</tr>
<tr>
<td>SlewRate ↑</td>
<td>0.40 A/μS</td>
</tr>
<tr>
<td>SlewRate ↓</td>
<td>0.40 A/μS</td>
</tr>
<tr>
<td>Timer1</td>
<td>0.025 ms</td>
</tr>
<tr>
<td>Timer2</td>
<td>0.025 ms</td>
</tr>
</tbody>
</table>
Display Mode

Display mode determines what units are displayed on the local load modules: V/I, V/W, I/W, and S. You can control the displayed units through only this menu.

Run Program

Background

The program function on the RMX-400x Series supports a total of 12 programs at any one time, with 10 sequences to each program. You can chain up to 12 programs. The program function can create several go/nogo tests.

Group Mode does not support Run Program (refer to page 80).

Program Sequence

A program sequence is a single load test. A program is a battery of each of these tests run in succession. Each sequence loads the settings for each channel from memory mata (memory MXXX). The memory data stores settings such as the operating mode and range for each channel. Each sequence loads all channels at the same time, unless programmed otherwise. Sequences for each channel run synchronously.
Each sequence has several configuration options that apply to all the channels equally.

<table>
<thead>
<tr>
<th>Sequence Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Memory</td>
<td>Loads the channel settings for each load module. Range: M001-M120</td>
</tr>
<tr>
<td>Run</td>
<td>Sets the running configuration for the current sequence. You can skip the sequence, run it, or run manually only. Range: Auto</td>
</tr>
<tr>
<td>On-Time</td>
<td>Sets the sequence Run On-Time Range: 0.1 s-60.0 s</td>
</tr>
<tr>
<td>Off-Time</td>
<td>Sets the sequence off-time Range: Off</td>
</tr>
<tr>
<td>Short-Time</td>
<td>Sets the sequence short-time. Range: Off</td>
</tr>
<tr>
<td>P/F-Time</td>
<td>Sets the sequence Pass/Fail time Range: Off</td>
</tr>
<tr>
<td>Short Channel</td>
<td>Selects which channel is shorted during the sequence Range: CH1-CH8</td>
</tr>
</tbody>
</table>

Program

Sequences are run sequentially to create a program. There are 10 sequences in each program.
If you want less than 10 sequences in a program, you can skip any additional sequences.

Sequence 2 and 3 are skipped.

Program Chain

You can chain any of the 12 programs to create a program chain. Unlike program sequences, you don’t need to run program chains sequentially in numerical order. You can chain any program to any program. You also can chain programs into an infinite loop to continue a program indefinitely.

Above, a program chain running sequences out-of-order.

Go/NoGo Results

If you have configured go/nogo limits, the pass/fail results for each channel are displayed for all sequences and programs.
Sequence

Background

Use the sequence function to create high-resolution load simulations. You can configure each sequence to create a unique load profile to accurately simulate loads in real time. Sequences are applicable for only CC (Static) and CR (Static) modes.

Note

Note: Do not confuse sequences with the sequences used to create a program. They are not the same, and you cannot use them interchangeably. You cannot use sequences (SEQ memory) in programs, and programs cannot load Sequences.

Load Profiling

The sequence function can simulate a load to a high resolution. Each channel can change its load sink within 25 us - 60000 s per point independently. When used in parallel, you can set multiple loads concurrently to simulate the loads placed on multiple output power sources.

The following diagram shows a DUT load profile at start-up.
Points

You can use up to 120 points with each sequence. Each point can have a different duration, slew rate, and value.

You can insert or delete a new point at any stage of a sequence. Any new point you insert has a value averaged from its neighbors as default.

![Sequence - Points](image)

A new point inserted after Point 3.

Loop

You can program sequences to loop a number of times starting from any point in the sequence.

![Sequence - Loop](image)

From Point 3, the sequence is looped two times.
On End Of Seq. function

If you program more than one sequence on the mainframe, the On End Of Seq. function holds the load current (of the selected sequence) to a designated value until all other sequences finish running.

In the example above, sequence 1 holds the load current at 1 A at the end of its sequence until the last sequence finishes. Sequence 2 is the longest sequence, and as such the End of Sequence setting is not applicable. Sequence 3 is turned off after its sequence has finished (0 amps).

Trig Out

The Trigger Out function allows a trigger sequence signal to be output from a channel via PIN 4 on frame link connector 1 when using sequences. The Trig Out function is in the Channel Duration menu.
As shown above, a trigger sequence signal is output for every rising edge point.

**Trig In**

The Trigger In setting allows a sequence to start after a trigger (Trig Out) is received via the frame link connector. The Trig In setting is for frame linked mainframes.

**Channel Duration Time Setting**

The Channel Duration Time Setting feature allows the point time duration of one sequence to be imported by another sequence. If the receiving sequence does not have enough points, more are created (without values).

For example, the sequences for CH1 and CH2 are shown below. CH1 has a total of six points with long durations, while CH2 has only two points, looped five times. The points from CH2 are also significantly shorter in duration.
The following figure shows the resulting sequence when CH1 imports CH2. CH1 imports the duration time settings and number of points from CH2, but not the value data.
OCP Test Automation

Background

The OCP Test Automation function creates an automatic test to test the over current protection of power supply products. Refer to page 189 for operation details.

This test finds when the over current protection of a power supply is tripped and returns the measurements for the voltage and current when the over current protection was tripped. The RMX-400x series also has a user-defined OCP setting in the event that the power supply OCP fails.

The diagram below shows an example of the OCP Test Automation function.
Parallel Dynamic Loading

Background
The RMX-400x Series of DC electronic loads support parallel dynamic loading. This means that when the load modules of a mainframe are connected in parallel and set to dynamic mode, they can perform dynamic tests synchronously following the same clock. Under dynamic mode, load current or resistance is pulsed between two preset levels. When used in parallel, you can test higher powered outputs. This ability gives the RMX-400x Series the flexibility to perform dynamic tests over a wide range of power outputs.

For connection details, refer to the Parallel Load Connections section on page 58.

The diagram below shows how two load modules can sink a higher load when used in parallel under dynamic mode.

⚠️ Note
You must use the same type of load modules operated in parallel.
Configurations Description

There are several configurations for the RMX series, including protection modes, operating configurations, and file system configurations. This section describes what the configurations are for and how they are relevant to different operations.

Protection Modes

Background

The RMX-400x Series includes several protection modes: over current protection, over voltage protection, over power protection, under voltage protection, and constant power protection.

The protection modes are useful to protect both the load modules and the DUT(s). You can set a buzzer to notify when a protection setting is tripped. When a protection feature is activated and tripped, the load unit displays an alarm. The mainframe also displays an alarm. When an alarm is tripped, the load stops sinking current/voltage. There are three over load protection settings: on, off, and clear.

![Configuration Settings Table]

<table>
<thead>
<tr>
<th>Setting</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>OCP Level</td>
<td>5.075 A</td>
</tr>
<tr>
<td>OCP Setting</td>
<td>OFF</td>
</tr>
<tr>
<td>OVP Level</td>
<td>81.6 V</td>
</tr>
<tr>
<td>OVP Setting</td>
<td>ON</td>
</tr>
<tr>
<td>OPP Level</td>
<td>29.75 W</td>
</tr>
<tr>
<td>OPP Setting</td>
<td>OFF</td>
</tr>
</tbody>
</table>
Over Current Protection

When a load unit is operating in CR, CV, or CP mode, the unit may need over current protection to prevent excessive current being set. Over current protection stops the load from sinking more current than its recommended limit, which can damage the unit.

Over Voltage Protection

Over voltage protection limits the amount of voltage sunk. If the OVP trips, the RMX-400x series load stops sinking voltage.
Over Power Protection

Use over power protection to limit the amount of power sunk. When OPP is tripped, power ceases to be sunk.

Reverse Voltage Protection

Reverse voltage protection prevents reverse voltage damage to the RMX-400x Series up to the specified rating. When reverse voltage protection is tripped, an alarm tone sounds until the reverse voltage is removed.

Refer to the specifications for more details.

Under Voltage Protection

Under voltage protection turns off the load when the voltage drops below a set limit.

Constant Power Protection

Constant power protection prevents excessive power draw.

Operating Configurations

Background

There are operating configuration settings for the following: CC Vrange, Von Voltage, Von Latch, CH Cont, Independent, load D-Time, Response settings, Step resolution settings, and Short settings.

CC Vrange

Use CC Vrange (refer to page 201) to set the voltage range as high or low for CC mode. CC voltage range depends on the load module specifications.
Von Voltage

Von voltage is the voltage limit at which the load starts to sink current. There are two operation modes for Von voltage -- Von latched: on and Von latched: off.

Latched: off sinks current when Von is tripped, and continues to sink current even if the voltage drops below the Von voltage.

Von latched: off sinks current when Von is tripped, but stops sinking current when the voltage drops below the Von voltage setting.

As shown below, when Von latch is set to off, the load module starts to sink current when the Von-voltage limit is tripped. It stops sinking current when the output drops below the Von voltage limit.
Short

When short mode is on, the load unit can simulate a short circuit.

You can set shorting individually for each channel when programming sequences.

Use the short key to initiate a short circuit manually. You can use it at any time during an operation. It does not affect the settings. After a short circuit finishes, the load unit resumes the previous operation.

You can set the short key to toggle or hold. When pressed in toggle mode, shorts are toggled on and off. When pressed in hold mode, you need to hold the key to short the load.

⚠️ Note

A short circuit may trip a protection mode if too much current is sunk.

CH CONT

Channel Control. When channel control is activated (external), you can use it to monitor the load voltage and current output as well as turn loads on or off remotely from the channel control (CH CONT) connectors on the rear panel.

For more information about channel control, refer to external voltage control on page 100.

Independent

Use the independent setting to control the load modules independently from the mainframe.
Load D-Time Use load delay time to delay activating a load (up to 10 seconds) after pressing the load key. However, the load delay time setting works for only loads initiated manually or when the RMX-400x series mainframe is configured to auto load (refer to page 226) at run time.

Response The Response setting sets the bandwidth of the load to 1 kHz (normal) or 100 kHz (fast). The Response setting is particularly important for limiting startup current.

Step Resolution For each channel, you can configure the step resolution for the current, resistance, voltage, and power setting. The step resolution refers to the coarse adjustment step resolution of these settings. You cannot configure the fine adjustment; refer to page 213 for details.

For example, if the step resolution for CCH (CC high range) is 0.5 A, you can increment the resolution in 0.5A steps:

\[8.0 \leftrightarrow 8.5 \leftrightarrow 9.0 \leftrightarrow 9.5\]
The step resolution parameters apply to the following:

- CCH Step – CC high range
- CCL Step – CC low range
- CRH Step – CR high range
- CRL Step – CR low range
- CVH Step – CV high range
- CVL Step – CV low range
- CPH Step - CP high range
- CPL Step - CP low range

**Step Resolution Range**

The step resolution range depends on the load module and the range:

- Max resolution: Module dependent
- Min resolution: Module dependent
Short Key

When short mode is on, the load unit can simulate a short circuit.

You can set shorting individually for each channel when programming sequences.

Use the short key to initiate a short circuit manually. You can use it at any time during an operation. It will not affect the settings. After a short circuit has finished, the load unit resumes the previous operation.

You can set the short function ON or OFF. When set to ON, the short key is enabled. When set to OFF, the short key is disabled.

You can set the short key to toggle or hold. When you press the short key in toggle mode, shorts are toggled on and off. When you press the short key in hold mode, you must hold the key to short the load.

You can use the Short Safety to set the short operation mode. When set to ON, you must use the short function in the case of Load ON. When set to OFF, you can use the short function directly.
Channel Control

Background  Use external channel control with the Channel Control connectors. Each channel control connector can activate each load, monitor voltage and current, and has an external voltage reference input. The voltage and current monitors output 0-100% of the rated current/voltage as a voltage of 0-10 V.

External Voltage Reference  A voltage reference of 0-10 V represents 0-100% of a load module’s rating voltage/current. As shown below, the external voltage reference and the rating voltage/current have a linear relationship. Varying the reference voltage between 0-10 V changes the voltage/current setting accordingly.

External Voltage Control
To determine the Percent Rating (voltage or current load input), use the following formula:

\[
Load \ Input = \frac{\text{External Voltage}}{10(V)} \times \text{Rating \ VorA}
\]

where \( \text{Rating V or A} \) is the load module’s rating voltage/current.

**Current Monitor**

You can monitor the load current input externally using the IMON pin of a channel control connector. The IMON pin outputs a voltage of 0-10 V to represent the input current as a percentage (0-100%) of rating current.

To determine the Current Monitor Output (IMON), use the following formula:

\[
IMON = \frac{\text{Load input current}}{\text{Rating A}} \times 10V
\]

where \( \text{Rating A} \) is the load module’s rating current.
Voltage Monitor

Like the load input current, you can monitor the input voltage externally with the channel control connectors. The channel control connector VMON pin outputs a voltage of 0-10 V to represent the load input voltage as a percentage (0-100%) of the rating voltage.

Voltage Monitor

![Graph showing the relationship between Load Input Voltage and Voltage Monitor Output. The graph has a linear relationship with a slope of 10V/Rating V.]

To determine the Voltage Monitor Output (VMON), use the following formula:

$$ VMON = \frac{Load \ input \ voltage}{Rating \ V} \times 10V $$

where $Rating \ V$ is the load module’s rating voltage.
Turning On the Load

To turn on a load, set the Load On input to On (active low). To turn off a load, set the Load On input to Off (active high).

When you turn on a load from the channel control interface, you can turn off the load from the mainframe, the local module, and via remote control. However, the opposite is not true; when you turn off a load using the channel control interface, you cannot turn on the load via the mainframe, the local module, or via remote control.

For connections and configurations, refer to pages 63 and 313, respectively.
Interface and System

Interface

Background

The RMX-400x series supports RS232, LAN, and USB remote frame control. The series supports only one type of connection at any one time. For more information about remote control, refer to the National Instruments website at ni.com or contact your local distributor about the RMX-400x series programming manual.

For connection options and configurations, refer to the following options.

- RS-232 configuration
  - Page 251
- RS-232 pin connection
  - Page 312
- USB configuration
  - Page 253
- Configuring Ethernet connection
  - Page 253

File System

Background

The RMX series can save and recall several data types for each channel:

- Presets
- Memory
- Setup
- SEQ (Sequence)

You can save and recall all data types to internal memory or save them to a USB flash drive. Each channel has its own dedicated memory for each data type. Thus, you can save and recall files for
Each channel and data type.

### Preset Data
You can save preset data into 10 memory slots for each channel. Preset data contains the mode, range, CV response speed, and Go/NoGo settings.

<table>
<thead>
<tr>
<th>Format</th>
<th>Preset Data Contents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal Format</td>
<td>P0-P9</td>
</tr>
<tr>
<td>External Format</td>
<td>400X_XX.P</td>
</tr>
</tbody>
</table>

### Preset Contents
Preset data contains the following data:

<table>
<thead>
<tr>
<th>Field</th>
<th>Contents</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHAN</td>
<td>Mode</td>
</tr>
<tr>
<td></td>
<td>Static/dynamic</td>
</tr>
<tr>
<td></td>
<td>Range</td>
</tr>
<tr>
<td></td>
<td>CV response speed</td>
</tr>
<tr>
<td>Go/NoGo</td>
<td>SPEC test</td>
</tr>
<tr>
<td></td>
<td>Entry mode</td>
</tr>
<tr>
<td></td>
<td>High</td>
</tr>
<tr>
<td></td>
<td>Low</td>
</tr>
<tr>
<td></td>
<td>Center</td>
</tr>
</tbody>
</table>

### Memory Data
Each channel can save up to 120 different Memory data types (M001-M120) into internal memory. Memory data contains general channel settings, and you use it when programming sequences. You can store memory data both internally and externally to USB. Preset data and Memory data store the same contents.

<table>
<thead>
<tr>
<th>Format</th>
<th>Memory Data Contents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal Format</td>
<td>M001-M120</td>
</tr>
<tr>
<td>External Format</td>
<td>400X_XX.M</td>
</tr>
</tbody>
</table>

### Memory Contents
Memory data contains the following data:

<table>
<thead>
<tr>
<th>Field</th>
<th>Contents</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHAN</td>
<td>Mode</td>
</tr>
<tr>
<td></td>
<td>Static/dynamic</td>
</tr>
<tr>
<td></td>
<td>Range</td>
</tr>
<tr>
<td></td>
<td>CV response speed</td>
</tr>
<tr>
<td>Go/NoGo</td>
<td>SPEC test</td>
</tr>
<tr>
<td></td>
<td>Entry mode</td>
</tr>
<tr>
<td></td>
<td>High</td>
</tr>
<tr>
<td></td>
<td>Low</td>
</tr>
<tr>
<td></td>
<td>Center</td>
</tr>
</tbody>
</table>
### SEQ Data
SEQ data contains Sequence data. You can save SEQ data only to and from USB. SEQ refers to Sequence data, not Program sequences.

<table>
<thead>
<tr>
<th>Internal format</th>
<th>N/A (Internal buffer)</th>
</tr>
</thead>
<tbody>
<tr>
<td>External format</td>
<td>400X_XX.A</td>
</tr>
</tbody>
</table>

### SEQ Contents
SEQ data contains the following data:

<table>
<thead>
<tr>
<th>Seq.Edit</th>
<th>No. (Points)</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Slew rate</td>
<td>Slew rate</td>
</tr>
<tr>
<td></td>
<td>Duration time</td>
<td></td>
</tr>
<tr>
<td>Loop</td>
<td>Repeat</td>
<td>Start of loop</td>
</tr>
<tr>
<td></td>
<td>On end load</td>
<td>CC Vrange</td>
</tr>
</tbody>
</table>

### Setup Data
You can save setup data to four internal memory slots. Setup data contains memory data, program sequence, chain data, configuration settings, and operation settings for every channel. You can save setup data to internal memory or USB.

<table>
<thead>
<tr>
<th>Internal format</th>
<th>Setup memory 1-4</th>
</tr>
</thead>
<tbody>
<tr>
<td>External format</td>
<td>400X_XX.S</td>
</tr>
</tbody>
</table>

### Setup Contents
Setup data contains the following data:

<table>
<thead>
<tr>
<th>Program</th>
<th>PROG</th>
<th>SEQ (program sequence number)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Memory</td>
<td>On-time</td>
<td>Run</td>
</tr>
<tr>
<td>P/F-time</td>
<td>Short channel</td>
<td>Off-time</td>
</tr>
<tr>
<td></td>
<td>Start</td>
<td>Short-time</td>
</tr>
<tr>
<td>Chain</td>
<td>Start</td>
<td>Program sequence (P01-P12)</td>
</tr>
</tbody>
</table>
### Run
- Active channel (CH01-08)

### CHAN
- Mode
- Range
- Static/dynamic
- CV response speed

### Go/NoGo
- SPEC test
- Entry mode
- High
- Low
- Center

### Save: Internal Memory
When saving data to internal memory, you can save either the current channel or all channel data. Not all data types can save the current channel or all channel data.

<table>
<thead>
<tr>
<th>Data type</th>
<th>Current channel</th>
<th>All channels</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preset</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Memory</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>SEQ</td>
<td>✓ (Single save)</td>
<td>—</td>
</tr>
<tr>
<td>Setup</td>
<td>—</td>
<td>✓</td>
</tr>
</tbody>
</table>

### Save: External Memory
You can save only SEQ, memory, and preset data for a single channel to USB. All four data types (SEQ, memory, setup, preset) can save all channels to USB.

<table>
<thead>
<tr>
<th>Data type</th>
<th>Current channel</th>
<th>All channels</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preset</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Memory</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>SEQ</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Setup</td>
<td>—</td>
<td>✓</td>
</tr>
</tbody>
</table>
Save/Recall USB

To save data from a single channel to USB, you first must save data to the internal memory. After you save data to internal memory, you can save all the files to USB.

To recall saved files, the reverse is also true. You must recall files from the USB flash drive to internal memory. Then from internal memory, you can recall the data to each channel (excluding SEQ data).

Save/Recall All

You can save the SEQ, preset, memory, or setup data from every channel into USB. SEQ, preset, and memory data is saved to a directory (ALL0000-ALL0099) with a file for each channel, while setup data is saved in a single file.
To recall saved files, the reverse is not true. You must recall files to each channel separately.
File Format

Current Channel | Filename Format
--- | ---
Memory data | 4003R_00.M
Preset data | 1 2 3 4
SEQ data | 1: RMX-400x load module type:
 | 4003 = RMX-4003
 | 4004 = RMX-4004
 | 4005 = RMX-4005
 | 4006 = RMX-4006
2: Channel location or voltage range of single channel model:
 | R = Right
 | L = Left or single channel low voltage model
 | H = High voltage model
3: Save file number:
 | 0-99
 | Incremented after each consecutive save.
4: File extension
 | M = Memory data
 | P = Preset data
 | A = SEQ data

All Channel | Directory Format
--- | ---
ALL0000 | 1: All Channel common directory name
 | 2: Directory number:
 | 0000 - 0099
<table>
<thead>
<tr>
<th>All Channel</th>
<th>File Name Format</th>
<th>1: RMX-400x load module type:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Memory data</td>
<td>4003R_C1.M</td>
<td>4003 = RMX-4003</td>
</tr>
<tr>
<td>Preset data</td>
<td></td>
<td>4004 = RMX-4004</td>
</tr>
<tr>
<td>SEQ data</td>
<td></td>
<td>4005 = RMX-4005</td>
</tr>
<tr>
<td>Setup Data</td>
<td></td>
<td>4006 = RMX-4006</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4000 = RMX-4000</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4002 = RMX-4002</td>
</tr>
<tr>
<td>2: Channel, voltage range of single channel model or mainframe indication</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>R = Right</td>
</tr>
<tr>
<td></td>
<td></td>
<td>L = Left or single channel low voltage model</td>
</tr>
<tr>
<td></td>
<td></td>
<td>H = Single channel high voltage model</td>
</tr>
<tr>
<td></td>
<td></td>
<td>F = Mainframe</td>
</tr>
<tr>
<td>3: Channel number:</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>C1 = CH1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>C2 = CH2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Etc.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>00 = All channels (setup data)</td>
</tr>
<tr>
<td>4: File extension</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>M = Memory data</td>
</tr>
<tr>
<td></td>
<td></td>
<td>P = Preset data</td>
</tr>
<tr>
<td></td>
<td></td>
<td>A= SEQ data</td>
</tr>
<tr>
<td></td>
<td></td>
<td>S= Setup data</td>
</tr>
</tbody>
</table>
TUTORIALS

Step-by-Step Operations

Local Loads .......................................................... 113
Single Channel Load ............................................... 115
Parallel Load Modules .......................................... 117
Programming ....................................................... 119
Sequences ........................................................... 121
Frame Link .......................................................... 122
Channel Control .................................................... 124
General Configuration Options ............................... 126
Local Loads

Local mode operation is useful for quickly testing loads using the load module control panel rather than the mainframe control panel. You can configure local load modules to operate independently to the mainframe. This can be useful when settings need to remain unchanged on the mainframe. However, note that the local modules cannot change the modes (CC, CV, CR, CP); the modules can change only the values.

Group Unit mode is not supported for local module control.

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Setup</td>
<td>Ensure that the channel load is set up as desired.</td>
<td>Pages 42 and 49</td>
</tr>
<tr>
<td>2. Channel selection</td>
<td>Ensure that the correct channel or Value (A/B) is selected by using the R/L or A/B key.</td>
<td>Page 130</td>
</tr>
<tr>
<td>3. Measurement mode selection</td>
<td>If in CC or CR mode, you can select static or dynamic mode.</td>
<td>CC Pages 131 and 143 and CR Pages 149 and 151</td>
</tr>
<tr>
<td>4. Run the load</td>
<td>Press the LOAD key to start/end loading the device under test.</td>
<td>Page 132</td>
</tr>
</tbody>
</table>

Optional

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>5. Short configuration</td>
<td>Configure the SHORT settings.</td>
<td>Page 133</td>
</tr>
<tr>
<td>6. Display</td>
<td>To change the display output, use the DISPLAY key.</td>
<td>Page 133</td>
</tr>
<tr>
<td>7. Shorting the load</td>
<td>To short the load, use the SHORT key.</td>
<td>Page 133</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>8.</td>
<td>Independent load</td>
<td>You can set the local load modules to independent load.</td>
</tr>
<tr>
<td>9.</td>
<td>Independent control</td>
<td>You can configure slave knobs to be independent from the mainframe.</td>
</tr>
<tr>
<td>10.</td>
<td>Configure slave knob settings</td>
<td>Display measured or set values with the selector knob.</td>
</tr>
</tbody>
</table>
## Single Channel Load

Use single-channel loads to manually test a DUT quickly or to configure channel settings for program sequences using the mainframe panel.

![DUT](image)

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Setup</td>
<td>Choose the appropriate load module and make sure it is installed. Page 42</td>
</tr>
<tr>
<td>2.</td>
<td>Connection</td>
<td>Connect the terminals to the DUT. Page 49</td>
</tr>
<tr>
<td>3.</td>
<td>Channel selection</td>
<td>Select the load channel on the mainframe. Page 136</td>
</tr>
<tr>
<td>5.</td>
<td>Range selection</td>
<td>Set the range to high or low (CC, CR, CV, and CP mode). CC Page 140 CR Page 147 CP Page 164</td>
</tr>
<tr>
<td>6.</td>
<td>Mode selection</td>
<td>Choose static or dynamic mode (CC and CR mode only). CC Pages 141 and 143 CR Pages 149 and 151</td>
</tr>
<tr>
<td>7.</td>
<td>Dynamic levels (CC and CR)</td>
<td>Set the dynamic levels, slew rate, and timers (CC and CR mode only). CC Page 141 CR Page 149</td>
</tr>
<tr>
<td>8.</td>
<td>Static Values (CC, CR, CV, and CP)</td>
<td>Set the A (B) Value, slew rate (CC, CR) and current limit (CV, CP). CC Page 144 CR Page 152 CV Page 155 CP Page 161</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>9. Go/NoGo</td>
<td>Set the Go/NoGo configurations, if applicable.</td>
<td>Page 217</td>
</tr>
<tr>
<td>10. Protection modes</td>
<td>Configure the protection modes.</td>
<td>Page 197</td>
</tr>
<tr>
<td>11. Run</td>
<td>Activate the load by pressing the load key.</td>
<td></td>
</tr>
<tr>
<td><strong>Optional</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12. Configuration</td>
<td>There are number of configurations that apply to all channels. For details refer to the Configuration Tutorial.</td>
<td>Page 126</td>
</tr>
</tbody>
</table>
Parallel Load Modules

Use the Group Unit setting for quick and easy parallel setup for load modules of the same type and rating. (The Group Unit settings apply to only CC and CR modes.)

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Setup</td>
<td>Page 42</td>
</tr>
<tr>
<td></td>
<td>Choose the appropriate load modules and make sure they are installed. All load modules must be of the same type and rating.</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Connection</td>
<td>Page 49</td>
</tr>
<tr>
<td></td>
<td>Connect the terminals to the DUT.</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Group Unit mode configuration</td>
<td>Page 221</td>
</tr>
<tr>
<td></td>
<td>Enable Group Unit mode and configure.</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Measurement mode selection</td>
<td>CC Page 139</td>
</tr>
<tr>
<td></td>
<td>Select measurement mode (CC and CR mode).</td>
<td>CR Page 144</td>
</tr>
<tr>
<td>5.</td>
<td>Range selection</td>
<td>CC Page 140</td>
</tr>
<tr>
<td></td>
<td>Set the range to high or low (CC and CR mode).</td>
<td>CR Page 147</td>
</tr>
<tr>
<td>6.</td>
<td>Mode selection</td>
<td>CC Pages 141</td>
</tr>
<tr>
<td></td>
<td>Choose static or dynamic mode.</td>
<td>and 143</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CR Pages 149</td>
</tr>
<tr>
<td></td>
<td></td>
<td>and 151</td>
</tr>
<tr>
<td>7.</td>
<td>Dynamic levels</td>
<td>CC Page 141</td>
</tr>
<tr>
<td></td>
<td>For dynamic mode, set the dynamic levels, slew rate, and timers.</td>
<td>CR Page 149</td>
</tr>
<tr>
<td>8.</td>
<td>Static values</td>
<td>CC Page 144</td>
</tr>
<tr>
<td></td>
<td>For static mode, set the A(B) Value and slew rate.</td>
<td>CR Page 152</td>
</tr>
<tr>
<td>Step</td>
<td>Description</td>
<td>Page</td>
</tr>
<tr>
<td>------</td>
<td>-------------</td>
<td>------</td>
</tr>
<tr>
<td>9.</td>
<td><strong>Go/NoGo</strong> Set the Go/NoGo configurations, if applicable.</td>
<td>217</td>
</tr>
<tr>
<td>10.</td>
<td><strong>Protection Modes</strong> Configure the protection modes.</td>
<td>197</td>
</tr>
<tr>
<td>11.</td>
<td><strong>Run</strong> Activate the load by pressing the load key.</td>
<td></td>
</tr>
<tr>
<td></td>
<td><img src="image" alt="LOAD ON/OFF" /></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Optional</strong></td>
<td></td>
</tr>
<tr>
<td>12.</td>
<td><strong>Configuration</strong> There are number of configurations that apply to all channels. For details, refer to the configuration tutorial.</td>
<td>126</td>
</tr>
</tbody>
</table>
Programming

When you create a program sequence or chain, all channels are used at the same time unless programmed otherwise. Program sequences use the channel settings stored from memory data. Program sequences primarily perform a battery of pass/fail tests on DUTs.

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Setup</td>
<td>Choose the appropriate load module(s).</td>
<td>Page 42</td>
</tr>
<tr>
<td>2. Connection</td>
<td>Connect the terminals to the DUT.</td>
<td>Page 49</td>
</tr>
<tr>
<td>3. Channel selection</td>
<td>Select the load channel(s) on the mainframe.</td>
<td>Page 136</td>
</tr>
<tr>
<td>4. Channel setup</td>
<td>Refer to the single-channel load tutorial to configure a single channel. Do not activate the load.</td>
<td>Page 115</td>
</tr>
<tr>
<td>5. Save channel</td>
<td>Save the configured channel.</td>
<td>Page 257</td>
</tr>
<tr>
<td>6. Multiple channels</td>
<td>If you need to configure multiple channels, follow steps 1-5 for any remaining channels.</td>
<td></td>
</tr>
<tr>
<td>7. Program menu</td>
<td>Enter the Program menu.</td>
<td>Page 160</td>
</tr>
<tr>
<td>8. Configure the sequence</td>
<td>Configure the program.</td>
<td></td>
</tr>
<tr>
<td>9. Save sequences</td>
<td>Save the program in the FUNC → Program menu.</td>
<td></td>
</tr>
<tr>
<td>10. Program chains</td>
<td>You can create program chains if required.</td>
<td>Page 171</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>11. Save Program</td>
<td>Save the chain in the Chain menu.</td>
<td></td>
</tr>
<tr>
<td>12. Save Setup</td>
<td>Save everything to the internal setup memory.</td>
<td>Page 276</td>
</tr>
<tr>
<td>13. Run</td>
<td>Run the program sequence/chain.</td>
<td>Page 173</td>
</tr>
</tbody>
</table>
Sequences

Use sequences to accurately simulate loads. As each sequence is independent, sequences are ideally suited to test multiple output power sources.

![DUT Diagram](image)

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Setup</td>
<td>Choose the appropriate load module(s).</td>
<td>Page 42</td>
</tr>
<tr>
<td>2. Connect</td>
<td>Connect the terminals to the DUT.</td>
<td>Page 49</td>
</tr>
<tr>
<td>3. Channel selection</td>
<td>Select a load channel with the mainframe.</td>
<td>Page 136</td>
</tr>
<tr>
<td>4. Channel setup</td>
<td>Create a sequence.</td>
<td>Page 179</td>
</tr>
<tr>
<td>5. Sequence loop</td>
<td>Create a sequence loop if necessary.</td>
<td>Page 181</td>
</tr>
<tr>
<td>6. Multiple channels</td>
<td>If you need to configure multiple channels, follow steps 1-5 for any remaining channels.</td>
<td></td>
</tr>
<tr>
<td>7. Channel Duration menu</td>
<td>Edit the sequence channel duration information. Ensure that the channels containing sequences are not set to OFF.</td>
<td>Page 184</td>
</tr>
<tr>
<td>8. Trigger settings</td>
<td>Set trigger out and in channels, if appropriate.</td>
<td></td>
</tr>
<tr>
<td>9. Run</td>
<td>Run the sequence(s)</td>
<td>Page 186</td>
</tr>
</tbody>
</table>
Frame Link

Use frame link connections to connect up to four slave main frames to a master main frame. When using frame link connections, you can perform several operations in parallel under the master unit’s control.

At first, both the master and slaves are independent. You can see FRM (frame master) on the top panel of each mainframe. When a mainframe is connected as a slave unit, the FRM icon changes to FRS (frame slave). The front panel keys are disabled on slave units when in slave mode (FRS).

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Setup</td>
<td>Page 61</td>
</tr>
<tr>
<td></td>
<td>Connect the mainframes.</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Configure</td>
<td>Page 231</td>
</tr>
<tr>
<td></td>
<td>Configure the frame CONT to ON for all mainframes.</td>
<td></td>
</tr>
</tbody>
</table>

Slave mode  
FRM → FRS

Master/independent  
FRM

3. Program  
Refer to the tutorial sections for programming or channel configuration.  
Pages 115 and 117
4. Run

Run the loads. To run the loads, press the LOAD key on the master mainframe. To stop, press again. When the LOAD key is pressed, all loads are active.

Options

5. Load preset memory

Load preset memory on the mainframe and all frame-linked slaves. Page 306

6. Load setup memory

Load setup memory on the mainframe and all frame-linked slaves Page 305

7. Set slave to independent

Press shift + CHAN on the slave unit to enable local control on a slave unit.

⚠️ Note

When a load is run or memory is recalled from the master mainframe, the slave unit returns to mainframe control.

Ensure that the same firmware is installed on both master and slave mainframes.
Channel Control

Use the Channel Control connectors on the rear panel to control and monitor the status of up to eight channels. For more information about channel control, refer to page 100.

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Setup</td>
<td>Ensure that the load and RMX series mainframe is turned off.</td>
</tr>
<tr>
<td>2.</td>
<td>Choose the appropriate load module(s).</td>
<td>Page 42</td>
</tr>
<tr>
<td>3.</td>
<td>Connection</td>
<td>Connect the terminals to the DUT.</td>
</tr>
<tr>
<td>4.</td>
<td>Connect the channel control connectors on the rear panel.</td>
<td>Page 63 and 313</td>
</tr>
<tr>
<td>5.</td>
<td>Turn on the RMX series mainframe and DUT (load).</td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>Configure</td>
<td>Select the mode* and range* via the front panel.</td>
</tr>
<tr>
<td>7.</td>
<td></td>
<td>Activate channel control for each channel used for external control (that is, set CH CONT to External).</td>
</tr>
<tr>
<td>8.</td>
<td>Run</td>
<td>Run the load. Turn the load on by either outputting an active low signal to the appropriate channel control connector or pressing the LOAD key on the load module or mainframe**.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>9. Monitor</td>
<td>Use IMON and VMON to monitor the current and voltage of load outputs.</td>
<td>Page 100</td>
</tr>
<tr>
<td>10. End</td>
<td>To turn the load off, output an active high signal to the channel control connector or press the LOAD key on the load module or mainframe**.</td>
<td></td>
</tr>
</tbody>
</table>

*You cannot configure mode and range via the channel control (CH CONT) interface. You can configure mode and range only via the front panel.

**You cannot always use the LOAD key to turn on/off the load. Refer to page 100 for details.
General Configuration Options
Each channel has several options, which are described below.

<table>
<thead>
<tr>
<th>Options</th>
<th>Description</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. CC Vrange</td>
<td>Configure the CC voltage range from high or low.</td>
<td>Page 201</td>
</tr>
<tr>
<td>2. Von voltage</td>
<td>Configure the Von voltage settings.</td>
<td>Page 203</td>
</tr>
<tr>
<td>3. Short settings</td>
<td>Configure the short key settings.</td>
<td>Page 205</td>
</tr>
<tr>
<td>4. CH CONT</td>
<td>Turn channel control on/off.</td>
<td>Page 208</td>
</tr>
<tr>
<td>5. Independent load</td>
<td>Turn the load module control to dependent (via mainframe) or independent control.</td>
<td>Page 209</td>
</tr>
<tr>
<td>6. Delay time</td>
<td>Configure the load delay time for each channel (0-10 seconds).</td>
<td>Page 211</td>
</tr>
<tr>
<td>7. Clear all protection</td>
<td>Clear all the protection alarms.</td>
<td>Page 200</td>
</tr>
<tr>
<td>8. Display</td>
<td>Adjust display settings.</td>
<td>Page 228</td>
</tr>
<tr>
<td>9. Control type</td>
<td>Configure the knob control.</td>
<td>Page 233</td>
</tr>
<tr>
<td>10. Slave knob setting</td>
<td>Display measured or set values with the selector knob.</td>
<td>Page 237</td>
</tr>
<tr>
<td>11. Alarm</td>
<td>Configure alarm settings.</td>
<td>Page 234</td>
</tr>
<tr>
<td>12. Step resolution</td>
<td>Configure the step resolution (CC high and low range, CR high and low range, CV high and low range, and CP high and low range).</td>
<td>Page 213</td>
</tr>
<tr>
<td>13. Response</td>
<td>Configure the response setting.</td>
<td>Page 217</td>
</tr>
<tr>
<td>14. Sound</td>
<td>Turn the sound on/off for the mainframe IU.</td>
<td>Page 228</td>
</tr>
</tbody>
</table>
OPERATION

The following chapters describe RMX series operation. The sections are divided into small operations. For detailed electronic load operation examples, refer to the tutorial section on page 113.

Local Mode Operation ................................................. 130
Selecting a Channel ...................................................... 130
Selecting Static/Dynamic .............................................. 131
Turning On the Load ..................................................... 132
Shorting ........................................................................ 133
Display Output View ..................................................... 133
Editing CC/CR/CV/CP A/B Value ................................. 135

Mainframe Basic Operation ............................................. 136
Help Menu ...................................................................... 136
Channel Selection ......................................................... 137
Select CC Mode............................................................. 139
Select CC Range ........................................................... 140
Select CC Dynamic Mode .............................................. 141
Editing CC Dynamic Parameters ................................. 141
Select CC Static Mode ................................................... 143
Editing CC Static Parameters ................................. 144
Set to CR Mode ............................................................ 146
Select CR Range ............................................................ 147
Select CR Dynamic Mode .............................................. 149
Editing CR Dynamic Parameters ................................. 149
Select CR Static Mode ................................................... 151
Editing CR Static Parameters ................................. 152
Select CV Mode ............................................................ 154
Editing CV Parameters ................................. 155
Select CV Range ............................................................ 158
Select CV Response Speed ............................................ 159
Select CP Mode ............................................................ 160
Editing CP Parameters ................................. 161
Select CP Range ............................................................. 164
Creating a Program Sequence ............................... 165
  Program Chains............................................................. 171
  Running a Program.......................................................... 173
Edit Sequence ............................................................... 179
  Create Sequence Loop ................................................... 182
  Channel Duration Time Settings .............................. 184
  Run Sequence ................................................................. 186
OCP Test Automation ........................................... 189
Channel Configuration ........................................... 196
  Accessing the Configuration Menu ............................. 196
  Setting OCP/OVP/OPP/UVP ............................................ 197
  Protection Clear ............................................................. 200
  Setting the CC Voltage Range ..................................... 201
  Adjusting the Von Voltage and Latch ......................... 203
  Configuring the Short Settings ................................ 205
  Configuring Channel Control ................................. 208
  Configuring the Independent Setting ....................... 209
  Configuring the Load Delay Time ............................ 211
  Configuring Step Resolution .................................... 213
  Configuring Response Time .................................... 217
  Go/NoGo ................................................................. 219
  Group Unit ................................................................. 221
Mainframe Configuration ...................................... 225
  Accessing System Information ............................... 225
  Accessing the Load Menu .......................................... 226
  Adjusting the Speaker ............................................ 228
  Adjusting the Display Settings ............................... 229
  Adjusting the Frame Control ................................. 231
  Adjusting the Knob Control Type ............................ 233
  Configuring Alarm Sound ..................................... 234
  Configuring Go/NoGo Alarm Sound ....................... 235
  Adjusting Slave Knob Settings ............................. 237
  View Language Settings ........................................ 239
  Adjusting the High Resolution ................................ 240
  Adjusting the System Mode ................................... 242
  Adjusting the Von Latch Clear .............................. 244
  Adjusting the Measure Period ................................ 246
  Adjusting the Jog Shuttle Control ....................... 247
Adjusting the RVP Load Off ............................................ 248
Setting the Date and Time .............................................. 250
Interface Configuration (Settings) ......................... 251
  Configuring RS232 Connection .................................. 251
  Configuring USB Connection ................................... 253
  Configuring Ethernet Connection ............................ 257
  Web Server Function Check ................................ 260
RS232 and USB CDC Function Check .................... 263
Socket Server Function Check ............................. 266
Saving/Recalling Channels ........................................... 271
  Saving/Recalling Preset memory ............................ 274
  Saving/Recalling Setup Memory ............................. 276
  Setting the Default USB Path/File ......................... 278
  Saving Setups to USB Memory .............................. 283
  Saving/Recalling Memory Data to USB ................. 286
  Saving/Recalling Presets to USB ......................... 292
  Saving/Recalling Sequences to USB .................... 298
Quick Preset Recall/Save ........................................... 304
Recall Setup Memory (Frame Link) ....................... 305
Recall Preset Memory (Frame Link) ....................... 306
Recall Factory/User’s Defaults ......................... 307
Local Mode Operation

Local load modules can edit each channel. Depending on the configuration, the mainframe can reflect local changes. In this section, all operations refer to knobs and buttons on the local load module panels, unless stated otherwise.

Selecting a Channel

<table>
<thead>
<tr>
<th>Background</th>
<th>You can select each channel individually by using its load module panel. Changing channels on a load module applies only to dual-channel load modules.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single Channel Panel Operation</td>
<td>Press any key on a load module to select its channel.</td>
</tr>
<tr>
<td>Dual Channel Panel Operation</td>
<td>For dual-channel load modules, press any key on a load module that has the desired channel. Press the R/L key to cycle between the channels on the load module. L or R is displayed on the bottom left hand to indicate which channel (left or right side) is active on the load module.</td>
</tr>
</tbody>
</table>

⚠️ Note

On single channel modules, pressing the A/B key repeatedly changes the level from A or B when in static mode.

You cannot select channels in Group Unit mode.
Selecting Static/Dynamic

**Background**
You can switch each load channel individually from static to dynamic using the local load module.

1. Select a channel on the load module.

**Panel Operation**
2. Press the STATIC/DYNA. key to switch from dynamic to static mode and vice versa.

⚠️ **Note**
All changes are shown on the display and, depending on the configuration, reflected on the mainframe.

You cannot select static/dynamic in parallel mode.
Turning On the Load

Background
Use local operation to select loads individually to be turned on.

1. Select a channel on the load module.

Panel Operation
2. Press the LOAD key to turn on the load.

Note
When you activate a channel load, the load on symbol appears under the channel number.

Range

- **L-ON**: Left channel
- **R-ON**: Right channel
- **ON**: Single channel

Turning the load off
3. Press the LOAD key.
Shorting

Background  You can set the short key to simulate a short circuit.

1. Configure the short settings.  Page 130
2. Select a channel on the load module.  Page 130

Panel Operation  3. Press the SHORT key to enter the shorting modes.

        SHORT

Shorting  4. a. Press the SHORT key (toggle mode).
          or

        SHORT

        b. Hold the SHORT key (hold mode).

⚠️ Note  You cannot short the load from the local load module in Group Unit mode.

Display Output View

Background  Use the DISPLAY key to switch the display output to different views.
Panel Operation

1. Press the DISPLAY key repeatedly to switch between the different views.

\[
\begin{align*}
  V & \quad \text{Voltage} \\
  A & \quad \text{Current} \\
  W & \quad \text{Power} \\
  S & \quad \text{Load on time}
\end{align*}
\]

⚠️ Note

You cannot change the display mode in Group Unit mode.
Editing CC/CR/CV/CP A/B Value

Background
Use the slave knob to edit the A Value or B Value (single-channel load module) when in static mode. The slave knob also can operate in fine or coarse editing mode.

Panel operation
1. Ensure that the mode is in static mode.
Page 131
2. Choose a channel (or choose A or B Value) by pressing the R/L or A/B key.
3. Press the slave knob to toggle between fine and coarse editing mode.
SEt_C = coarse mode.
SEt_F = fine mode.

Fine mode example:

Coarse mode example:

4. Turn the slave knob to edit the A/B Value for the selected mode.

Note
When the slave knob is set to Measure, you must press the slave knob first to display the values on the load module display.
You cannot edit the A/B Value using this method in Group Unit mode.
Mainframe Basic Operation

In this section, all operations refer to the knobs and keys on the main configuration panel, unless otherwise stated.

Help Menu

Background

When you press any function key or open a menu, use the HELP key to display a detailed description.

1. Press a function or system key on the front panel or open a menu.

Help Selection

2. Press the HELP key to display the built-in help. A description of the function or menu item appears, as shown below.

3. Use the scroll wheel to scroll down if necessary. A

File System

The system is able to save and recall a number of different data types for each channel: Memory, Preset, Sequence. And, a data type for all channels is Setup.

All data types can be saved and recalled to internal memory or saved to a external
4. Press F5 to exit.

Channel Selection

Background

There are up to two channels per load module, depending on the model. Use the main display to control each channel individually.

⚠️ Note

When Group Unit mode is enabled, channel selection is disabled.

Mainframe Channel Selection

1. Press the CHAN button.

2. Select a channel by turning the variable knob.

The channel selection appears highlighted in orange on the top right of the screen.
3. Press the selector knob or Enter to confirm.
Select CC Mode

Background  The RMX-400x series loads operate in four different modes: constant current (CC), constant resistance (CR), constant voltage (CV), and constant power (CP).

When a channel is active, use the F1 key to switch between operating modes.

Panel Operation  1. Select a channel using the CHAN button and selector knob.

2. Press F1 repeatedly until CC mode is displayed in the display panel.

Note  Changing the operating mode affects only the current (active) channel. Changes do not affect other channels.
Select CC Range

Background
Constant current mode can run in high and low range. Maximum range depends on the load module. Some models are only high range.

Ensure that the menu is in CC mode. Refer to page 139.

Panel Operation
1. Press the F2 (range) key repeatedly until high or low range is selected.

The range is reflected in both the bottom menu system and the Current Operation Channel Status panel.

<table>
<thead>
<tr>
<th>Range</th>
<th>Mode</th>
<th>Channel</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>CC</td>
<td>CCDH</td>
</tr>
<tr>
<td>Low</td>
<td>CC</td>
<td>CCH</td>
</tr>
<tr>
<td>Dynamic</td>
<td>CC</td>
<td>CCDL</td>
</tr>
<tr>
<td>CC</td>
<td></td>
<td>CCL</td>
</tr>
</tbody>
</table>

Note
Changing the range affects only the current (active) channel. Changes do not affect other channels.

Not all load modules support dual ranges. If only one range is supported, it is usually high range.
Select CC Dynamic Mode

**Background**
You can set constant current mode to dynamic or static mode. Use dynamic mode to set varying load rates automatically.

Ensure that the menu is in CC mode. Refer to page 139.

<table>
<thead>
<tr>
<th>Mode</th>
<th>Range</th>
<th>Dynamic</th>
<th>Configure</th>
</tr>
</thead>
<tbody>
<tr>
<td>CC</td>
<td>High</td>
<td>Dynamic</td>
<td></td>
</tr>
</tbody>
</table>

**Panel Operation**
1. Press the F3 key until dynamic range mode is selected.

![Dynamic Static F3]

**Note**
Changing from static to dynamic mode affects only the current (active) channel.

Editing CC Dynamic Parameters

**Background**
Dynamic constant current mode has two operating current levels: slew rates and timers.

Slew rates determine the speed at which the load changes from one level to the next.

The timers determine how long the load module/channel stays at level 1 or level 2.

Ensure that the menu is in CC dynamic mode. Refer to page 141.

<table>
<thead>
<tr>
<th>Mode</th>
<th>Range</th>
<th>Dynamic</th>
<th>Configure</th>
</tr>
</thead>
<tbody>
<tr>
<td>CC</td>
<td>High</td>
<td>Dynamic</td>
<td></td>
</tr>
</tbody>
</table>
Parameters

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level1</td>
<td>0 - Setting Max A</td>
</tr>
<tr>
<td>Level2</td>
<td>0 - Setting Max A</td>
</tr>
<tr>
<td>SlewRate</td>
<td>Load module dependent</td>
</tr>
<tr>
<td>Timer1</td>
<td>0.025-30000.0 ms</td>
</tr>
<tr>
<td>Timer2</td>
<td>0.025-30000.0 ms</td>
</tr>
</tbody>
</table>

Note

In Group Unit mode, the Level1 and Level2 range is the combined rating of all units used in Group Unit mode.

Panel Operation

1. Use the selector knob to highlight Level1.
2. Press the selector knob to edit the selected level, then turn to increase or decrease the value.*

or

Use the number pad to enter a number.

![Number pad]

| Level1 | 0.80 A |

3. Press the selector knob or Enter to confirm the selection.

4. Repeat steps 1-3 for the remaining parameters.

⚠️ Note

You can set Level1 and Level2 for both high and low range.

*Press Shift to toggle between coarse and fine adjustment when editing the Level1 and Level2 parameters. Refer to page 213 for details.

## Select CC Static Mode

### Background

You can set constant current mode to dynamic or static mode. Static mode is for manually varying the load for single-channel load modules or setting a static load on dual-channel modules.

Ensure that the menu is in CC mode. Refer to page 138.
Panel Operation

1. Press the F3 key until static mode is selected.

```
F3
```

![Diagram]

Note Changing from static to dynamic mode affects only the current (active) channel.

Editing CC Static Parameters

**CC Values**

When using a single channel load module, Static Constant Current mode has two operating current values, A and B. If a dual channel load is used, only one current value is available per channel: A Value.

If Group Unit mode is enabled, an additional parameter, Switch Value, is available to switch from A Value to B Value.

Ensure the menu is in CC Static mode. Refer to page 143.
**Parameters**

- **A Value**: 0 - Setting Max A
- **B Value**: 0 - Setting Max A
- **SlewRate**: Load module dependent
- **Switch Value**: A/B (Group Unit mode only)

**Note**

When Group Unit mode is enabled, the A Value and B Value range is the combined rating of all the units used in Group Unit mode. Refer to page 80.

**Panel Operation**

1. Use the Selector knob to highlight A Value.

2. Press the Selector knob to edit the selected value, then turn to increase or decrease the value*.

   OR

   Use the number pad to enter a number.

   ![A Value 0.80 A]

3. Press the selector knob or Enter to confirm selection.
4. Repeat steps 1-3 for the remaining parameters.

Note

The last value (A Value or B Value) set becomes the active setting. To switch between A Value and B Value, use the A/B keys on the local load module. This is not applicable to Group Unit mode.

For Group Unit mode, use the Switch Value parameter to switch between A and B Value.

You can set A/B Value and rising/falling Slew Rate for both High and Low Range.

*Press Shift to toggle between coarse and fine adjustment when editing the A Value and B Value parameters. Refer to page 213 for details.

Set to CR Mode

Background

The RMX-400x Series load operates in four different modes, constant current (CC), constant voltage (CV), constant resistance (CR) and constant power (CP). Constant resistance mode maintains a constant resistive load, using variable current and voltage levels.

When a channel is active, use the F1 key to switch between each operating mode.

Panel Operation

1. Press the CHAN button and use the selector knob to select a channel.

2. Press F1 until CR mode is displayed in the display panel.
Note
Changing the operating mode affects only the current (active) channel. Changes do not affect other channels.

Select CR Range

Background
Constant resistance mode can run in high and low range. Range is dependent on the load module.

Ensure that the menu is in CR mode. Refer to page 144.

Panel Operation
1. Press the F2 (Range) key repeatedly until high or low range is selected.

The range is reflected in both the bottom menu system and current operation channel status panel.

<table>
<thead>
<tr>
<th>CR Static Low</th>
<th>CRL</th>
</tr>
</thead>
<tbody>
<tr>
<td>CR Static High</td>
<td>CRH</td>
</tr>
<tr>
<td>CR Dynamic Low</td>
<td>CRDL</td>
</tr>
<tr>
<td>CR Dynamic High</td>
<td>CRDH</td>
</tr>
</tbody>
</table>
Note

Changing the range affects only the current (active) channel. Changes do not affect other channels.

All resistance values and slew rates depend on range (that is, A Value in low range can be different from A Value in high range).
Select CR Dynamic Mode

Background You can set constant resistance mode to dynamic or static mode. Use dynamic mode to set varying load rates automatically.

Ensure that the menu is in CR mode. Refer to page 144.

Panel Operation 1. Press F3 until dynamic range mode is selected.

Note Changing from static to dynamic mode affects only the current (active) channel.

Editing CR Dynamic Parameters

CR levels Dynamic constant resistance mode has two operating resistance levels: slew rates and timers.

Slew rates determine the speed at which the load changes from one level to the next.

The timers determine how long the load module/channel stays at level 1 or level 2. Refer to the CR operating description on page 72 for details about slew rates and timers.
Ensure that the menu is in CR dynamic mode. Refer to page 149.

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Level1</th>
<th>Minimum- rating Ω</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level2</td>
<td></td>
<td>Minimum- rating Ω</td>
</tr>
<tr>
<td>SlewRate</td>
<td>Load module dependent</td>
<td></td>
</tr>
<tr>
<td>SlewRate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Timer1</td>
<td>0.025-30000.0 ms</td>
<td></td>
</tr>
<tr>
<td>Timer2</td>
<td>0.025-0000.0 ms</td>
<td></td>
</tr>
</tbody>
</table>

Note: In Group Unit mode, the Level1 and Level2 range is the combined rating of all units used in Group Unit mode.

Panel Operation:
1. Use the selector knob to highlight Level1.

![Panel Operation Diagram]
2. Press the selector knob to edit the selected level, then turn to increase or decrease the value*.

or

Use the number pad to enter a number.

![Number Pad]

<table>
<thead>
<tr>
<th>7</th>
<th>8</th>
<th>9</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>0</td>
<td>▼</td>
<td>CLEAR</td>
</tr>
</tbody>
</table>

**Level1** 100.000 Ω

3. Press the selector knob or Enter to confirm the selection.

4. Repeat steps 1-3 for the remaining parameters.

⚠️ Note

You can set Level1 and Level2 for both high and low range.

*Press Shift to toggle between coarse and fine adjustment when editing the Level1 and Level2 parameters. Refer to page 213 for details.

---

**Select CR Static Mode**

**Background**

You can set constant resistance mode to dynamic or static mode. Static mode is for manually varying the load for single-channel load modules or setting a static load on dual-channel modules.

Ensure that the menu is in CR mode. Refer to page 144.
Panel Operation

1. Press the F3 key until static mode is selected.

![Dynamic to Static](image)

**Note**

Changing from static to dynamic mode affects the current (active) channel.

---

**Editing CR Static Parameters**

**Background**

Single-channel load modules have two resistance levels, A Value and B Value. Dual-channel load modules have only one resistance level per channel, A Value.

When Group Unit mode is enabled, an additional parameter, switch value, is available to switch from A Value to B Value.

Ensure that the menu is in CR static mode. Refer to page 151.

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Setting Min - Rating Ω</th>
</tr>
</thead>
<tbody>
<tr>
<td>A Value</td>
<td></td>
</tr>
<tr>
<td>B Value</td>
<td></td>
</tr>
<tr>
<td>SlewRate</td>
<td>Load module dependent</td>
</tr>
<tr>
<td>SlewRate</td>
<td></td>
</tr>
<tr>
<td>Switch Value</td>
<td>A/B (Group Unit mode only)</td>
</tr>
</tbody>
</table>

**Note**

When Group Unit mode is enabled, the A Value and B Value range is the combined rating of all units used in Group Unit mode.
Panel Operation

1. Use the selector knob to highlight A Value.

2. Press the selector knob to edit A Value / B Value, then turn to increase or decrease the value*.

   or

   Use the number pad to enter a number.

3. Press the selector knob or Enter to confirm the selection.

4. Repeat steps 1-3 for B Value (if applicable) and rising and falling SlewRate.
The last Value (A Value or B Value) you set becomes the active setting. To swap between A Value and B Value, use the A/B keys on the local load module (not applicable to Group Unit mode).

For Group Unit mode, use the switch value parameter to switch between A and B Value.

You can set A/B Value and rising/falling SlewRate for both high and low range.

*Press Shift to toggle between coarse and fine adjustment when editing the A Value and B Value parameters. Refer to page 213 for details.

Select CV Mode

Background

The RMX-400x Series electronic load operates in four different modes, constant current (CC), constant resistance (CR), constant voltage (CV), and constant power (CP).

You cannot use CV mode with the Group Unit mode.

When a channel is active, you can use the F1 key to switch between each operating mode.

Panel Operation

1. Press the CHAN button and use the selector knob to select a channel.
2. Press F1 until CV mode is displayed in the display panel.
Changing the operating mode affects only the current (active) channel. Changes do not affect other channels.

CV mode only operates in high range.

Editing CV Parameters

Background

Constant voltage mode can be set to a maximum limit (Curr Limit). Using the current limit enables limiting the current draw.

When using CV mode on single-channel load modules, you can set two voltage levels, A Value and B Value. On a dual-channel load module, you can set only one voltage level per channel: A Value.

Ensure that the menu is in CV mode. Refer to page 154.

<table>
<thead>
<tr>
<th>Parameters</th>
<th>A Value</th>
<th>0 - Setting Max V</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B Value</td>
<td>0 - Setting Max V</td>
</tr>
<tr>
<td></td>
<td>Curr Limit</td>
<td>Load module dependent</td>
</tr>
</tbody>
</table>

Panel Operation

1. Use the selector knob to highlight A Value.
2. Press the selector knob to edit the selected value, then turn to increase or decrease the value*.

   or

   Use the number pad to enter a number.

3. Press the selector knob or Enter to confirm the selection.

4. Repeat steps 1-3 for the remaining parameters.
The last value (A Value or B Value) you set becomes the active setting. To swap between A Value and B Value, use the A/B keys on the local load module.

When setting the current limit, ensure that the current limit is within the test device's limits.

You can set A/B Value for both High and Low range.

*Press Shift to toggle between coarse and fine adjustment when editing the A Value and B Value parameters. Refer to page 213 for details.
Select CV Range

Background  
Constant Voltage mode can run in high and low range. Range depends on the load module.

Ensure that the menu is in CV Mode. Refer to page 154.

<table>
<thead>
<tr>
<th>Mode</th>
<th>Range</th>
<th>Configure</th>
</tr>
</thead>
<tbody>
<tr>
<td>CP</td>
<td>Low</td>
<td></td>
</tr>
</tbody>
</table>

Panel Operation  
1. Press the F2 (Range) key repeatedly until High or Low range is selected.

The range is reflected in both the bottom menu system and the Current Operation Channel Status panel.

CV High Range  CVH
CV Low Range  CVL

Note  
Changing the range affects only the current (active) channel. Changes do not affect other channels.
Select CV Response Speed

Background  Constant voltage mode has fast and slow response speeds. Quick current changes can induce line voltage, making it more difficult for the RMX-400x series load to maintain a constant current. In these types of conditions, slow response speed is recommended.

Maximum current range depends on the load module type.

Ensure that the menu is in CV mode. Refer to page 154.

Panel Operation  1. Press F3 (response) to switch between fast and slow response speeds.

Response speed settings are reflected in the Current Operation Channel Status panel.

<table>
<thead>
<tr>
<th>CV slow response</th>
<th>CV fast response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slow</td>
<td>Fast</td>
</tr>
</tbody>
</table>

Note  Changing the response speed affects only the current (active) channel. Changes do not affect other channels.
Select CP Mode

Background
The RMX-400x Series electronic load operates in four different modes, constant current (CC), constant resistance (CR), constant voltage (CV), and constant power (CP).

You cannot use CP mode with the dedicated Group Unit mode.

When a channel is active, you can use the F1 key to switch between each operating mode.

Panel Operation
1. Press the CHAN button and use the selector knob to select a channel.

2. Press F1 until CP mode is displayed in the display panel.

Note
Changing the operating mode affects only the current (active) channel. Changes do not affect other channels.
Editing CP Parameters

Background
You can set constant power mode to have a maximum limit (Curr Limit). Using the current limit enables limiting the current draw.

When using CP mode on a single-channel load module, you can configure two power levels, A Value and B Value. On a dual-channel load module, you can configure only one power level per channel: A Value.

Ensure that the menu is in CP mode. Refer to page 154.

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Mode</th>
<th>Range</th>
<th>Configure</th>
</tr>
</thead>
<tbody>
<tr>
<td>A Value</td>
<td>CP</td>
<td>Low</td>
<td>Configure</td>
</tr>
<tr>
<td>B Value</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Curr Limit</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Panel Operation
1. Use the selector knob to highlight A Value.
2. Press the selector knob to edit the selected value, then turn to increase or decrease the value*.

or

Use the number pad to enter a number.

3. Press the selector knob or Enter to confirm the selection.

4. Repeat steps 1-3 for the remaining parameters.
Note

The last Value (A Value or B Value) you set becomes the active setting. To swap between A Value and B Value, use the A/B keys on the local load module.

You can set A/B Value for both High and Low range.

When setting the current limit, ensure that the current limit is within the test device’s limits.

*Press Shift to toggle between coarse and fine adjustment when editing the A Value and B Value parameters. Refer to page 213 for details.
Select CP Range

Background  Constant Power mode can run in High and Low range. The maximum range depends on the load module. Some models are only High range.

Ensure that the menu is in CP Mode. Refer to page 154.

<table>
<thead>
<tr>
<th>Mode</th>
<th>Range</th>
<th>Configure</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Low</td>
<td></td>
</tr>
</tbody>
</table>

Panel Operation  2. Press the F2 (Range) key repeatedly until high or low range is selected.

![Diagram showing high and low range]

The range is reflected in both the bottom menu system and the Current Operation Channel Status panel.

CP High Range  CPH
CV Low Range  CPL

⚠️ Note  Changing the range affects only the current (active) channel. Changes do not affect other channels.

Not all load modules support dual ranges. If a module supports only one range, it is usually high range.
Creating a Program Sequence

Background

The RMX-400x Series has 12 programs and 10 sequences to each program, for 120 configurations.

Each sequence in each program uses the settings saved from memory data (Memory MXXX). Memory data contains settings such as the mode and range for each channel. Different sequences can use the same memory data repeatedly. Each sequence loads all channels at the same time, unless programmed otherwise.

<table>
<thead>
<tr>
<th>Sequence1</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>CH1 M001</td>
<td>Run</td>
</tr>
<tr>
<td>CH2 M001</td>
<td>On-Time</td>
</tr>
<tr>
<td>CH3 M001</td>
<td>Off-Time</td>
</tr>
<tr>
<td>CH4 M001</td>
<td>Short-Time</td>
</tr>
<tr>
<td>CH5 M001</td>
<td>P/F-Time</td>
</tr>
<tr>
<td>CH6 M001</td>
<td>Short CH1</td>
</tr>
<tr>
<td>CH7 M001</td>
<td>~</td>
</tr>
<tr>
<td>CH8 M001</td>
<td>Short CH8</td>
</tr>
</tbody>
</table>

Sequences run sequentially to create a program. There are 10 sequences in each program.

<table>
<thead>
<tr>
<th>Program 1 (P01)</th>
<th>Sequence</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1 2 3 4 5 6 7 8 9 10</td>
</tr>
</tbody>
</table>
If you want fewer than 10 sequences for a program, you can skip (not run) any additional Sequences.

In the following program, sequences 2 and 3 are skipped.

<table>
<thead>
<tr>
<th>Program 1 (P01)</th>
<th>Sequence</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parameters</td>
<td>Memory</td>
<td>M001-M120</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Run</td>
<td>Skip-auto-manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>On-Time</td>
<td>0.1-60.0 seconds</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Off-Time</td>
<td>Off – 0.1-60.0 seconds</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>P/F Time</td>
<td>Off – 0.1 (On-Time+Off-Time)-0.1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Short-Time</td>
<td>Off – 0.1-On-Time</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Short Ch</td>
<td>Off – 1-8 (CH1-CH8)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Note** Before you create a program, you first must preconfigure the settings for each sequence for every channel in the program and save them into channel memory (MXXX). Refer to the Save/Recall chapter for further details.

**Sequence Settings**

1. Press the FUNC key and then F1 (Program) to access the Program menu.
2. Use the selector knob to highlight PROG:.

3. Press the selector knob to edit PROG:, then turn to select the program number.
   
   or

   Use the number pad to enter a program number.

   Program: 01-12

4. Press Enter or the selector knob to confirm.

Repeat steps 2-4 to choose the sequence number (SEQ:).

   Sequence: 01-10

5. As sequences are executed sequentially, start at SEQ: 01.
6. Repeat steps 2-4 to configure the following for the current program sequence:

Memory: M001-M120

Choose the memory data for the sequence. M001-M0120

Run: Skip – Auto - Manual

Choose whether to run the sequence in the program automatically, skip the sequence, or manually start the sequence.

On-Time: 0.1-60.0 seconds

Determines how long the sequence runs (seconds).

Off-Time: Off – 0.1-60.0 seconds

Sets how long the sequence will stay off (in seconds) between each sequence. Assuming short time is not set to OFF, Off-Time always runs after On-Time.

Short Time: Off – 0.1-On-Time (seconds)
Determines how long a short circuit lasts (seconds). However, the shorting time cannot be longer than the On-Time. Short Time starts at the same time as On-time.

\[ \text{P/F Time: Off} - 0.1 - (\text{On-Time} + \text{Off-Time}) - 0.1 \text{ (seconds)} \]

You can set the Pass(P)/Fail(F) Delay Time to 0.1 seconds less than the total test time. The total test time is defined as:

\[ \text{On-Time} + \text{Off-Time} \text{ (seconds)} \]

If Go/NoGo is turned on, but the pass fail time is off, Go/NoGo test continues, but there will not be a specified pass/fail time window.

\[ \text{Short Channel: Off} - 1-8 \text{ (CH1-CH8)} \]

You can set each channel individually to simulate a short circuit (CH1-8) or can have shorting disabled (Off). When you set Short Channel to Off, the channel ignores the execution of Short-Time.

7. Repeat the above steps for all 10 sequences for the same (current) program.

8. Press F3 (Save) to save all sequence data for all the program.

![Note](https://via.placeholder.com/150)

The program data is not yet saved into setup memory. To save the program to setup memory, refer to page 274.
Recall Default


Note

If you recall the default, all data is lost. This does not include the internal setup memory. To see the default settings, refer to page 331.

Timing Diagram for Single Step

Below is a timing diagram of a single step in a program.

\[
\begin{align*}
\text{P/F Start Test Time (fixed)} & \quad \text{P/F End Test Time (fixed)} \\
\downarrow & \quad \downarrow \\
0.06s & \quad 0.04s \\
\text{Short-Time} & \\
\text{Start of Step} & \quad \text{On-Time} \quad \text{Off-Time} \quad \text{End of Step} \\
& \quad \text{Step test time}
\end{align*}
\]
Program Chains

Background

On the RMX-400x, there are up to 12 different programs containing 10 sequences.

If 10 sequences in a program sequence are not enough for testing, the RMX-400x Series can chain programs, effectively making a larger program sequence.

Unlike program sequences, program chains do not need to be run in numerical order. You can chain up to 12 program sequences.

Panel Operation

1. Create one or more program sequences.  
Page 160

2. If you created program sequences in a different session, ensure that you have loaded the programs from setup memory.  
Page 274

3. Press the FUNC key, then program (F1), followed by chain (F1).
4. Press F1 (Edit Start) and use the selector knob to edit Start and confirm which program sequence (PXX) starts the program chain. You can use any program (P01-P12) to start a program chain.

5. Use the selector knob to scroll down to P01 (program 1).

6. Use the selector knob to choose the program that will execute after P01 (P02-P12).

   or

   Select (Off) to end the program chain after (P01).

   or

   Select (P01) to execute after P01. This creates a continuously looping program chain.
7. Repeat the above procedure for P02-P12 to complete the program chain.

The program chain ends at the first program (PXX) followed by Off. You can create continuously looping program chains.

8. Press F3 (Save) to save the program chain.

The program chain data is not yet saved into setup memory. To save the program chain to setup memory, refer to page 274.


If the default is recalled, Start reverts to P01 and all program sequences are set to Off.

10. Press F5 (Previous Menu) to return the sequence menu.

Running a Program

Once you create a program chain/program sequence, you can execute it. As program sequences apply to all the channels, you can program any channels that do not need to be active (load off) in the Active Channel menu. At default, all channels are set to (load) Off.

EXT is shown next to any channels set to external channel control.
Panel Operation

1. Create one or more program sequences.  Page 160.

2. Create a program chain.  Page 171.

3. Press the FUNC key, Program (F1), and Active Channel (F2).

   Channel 1 (CH01) is highlighted. Note that CH1 has CH CONT set to External.

4. Edit the channel using the selector knob.

   CH 01-08: ON (activate channel) – OFF (not activated)

5. Press Enter or the selector knob to confirm the selection.

6. If needed, repeat steps 4-5 for the remaining channels.

   ! Note

   If all channels are Active OFF, you cannot run a program because there are no active channels.


   Save Program

⚠️ Note  If you recall the default, all channels revert to Active OFF.

Previous Menu 9. Press F5 (Previous Menu) to return to the Sequence menu.

Turn Program On/Off 10. Press F1 (Prog) to turn the current program on or off.

Pressing F1 will cycle from program on to off.

11. PROG appear on the mainframe status panel when the program is turned on.

Run Program 12. Press the load key on the mainframe to start the program.

13. The Run Program screen appears, and the PROG icon turns orange.
As each sequence or program is completed, the screen updates to display the active sequence/program. Notice that if you have set up a channel with Go/NoGo limits, a pass (GO) or fail (NG) is displayed on the main display and the local load module display.

The program icon becomes orange when a program has started.

Note

If the Active is OFF for all the channels, No Active Channel is displayed instead of channel numbers.

Each active load module displays the output as the program runs.
14. If you configured Run to manual in any program sequence, press F2 (Next) to continue the program sequence; otherwise, the program continues automatically.

15. Press F1 (Stop) at any time to abort the program when it is running.

When the program finishes, the physical channels that have run are displayed, and a PASS or FAIL is displayed if you have set Go/NoGo testing.

16. When the program finishes, press F1 to see any result details.
The program (P) and sequence (S) numbers for the program are displayed on the left side, and the Go/NoGo (G/N) results are displayed on the right side for each channel in the program.

Use the selector knob to scroll down to view the rest of the list if necessary.

17. Press F5 to exit at any time.

Upon exiting, the previous menu before running the program loads.
Edit Sequence

Background
You can configure the sequence function to create a unique load profile to accurately simulate loads in real time for single or multiple loads. You can use sequence with only CC static or CR static modes. For details, refer to page 85.

Each sequence is composed of several points with customizable current/resistance, slew rate, and duration times. You can loop each sequence an infinite amount of times. Sequences are applicable for only CC (Static) and CR (Static) modes.

Note
Do not confuse the sequence function with program sequences. You cannot use program sequences with the sequence function and vice versa.

Parameters

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
<th>Setting Min-Setting Max Ω/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>SlewRate ↑</td>
<td>Load module dependent</td>
<td></td>
</tr>
<tr>
<td>SlewRate ↓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Duration Time</td>
<td>0.000025-60,000 seconds</td>
<td></td>
</tr>
</tbody>
</table>

Panel Operation

1. Choose a channel and mode.  

Pages 136 and 139

2. Press the CHAN key, F4 (Seq. Edit) to enter the Sequence Edit menu.
3. Use the selector knob to highlight Value.

4. Press the selector knob to edit the value, then turn to increase or decrease the value.

   or

5. Use the number pad to enter a number.

Value 0.800 A

6. Press the selector knob or Enter to confirm the selection.

7. Repeat for rising and falling slew rate and duration time.
Add Point

8. To add an extra point after the current point, press Add Point (F1).

| Range | 001-120 |

⚠️ Note
Add Point inserts a new point directly after the current point. The current/resistance value of the inserted point is the average of the point before and after. All other settings remain unchanged.

Delete Point

9. To delete the current point, press Delete Point (F2).

Edit Previous Point

10. Use the selector knob to change the current point number.

⚠️ Note
You can change the point number only if you already have added more points.

Save Sequence

11. Press Save (F3) to save the sequence.

⚠️ Note
The save icon appears only after you have made a change in the menu.
Create Sequence Loop

Background
You can loop sequences can be looped many times. You can start the loops at any point in the sequence. The start of loop function determines which point starts each repeating loop.

The On End of Seq. function holds the load current (of the selected sequence) to a designated value until all other sequences finish running.

CC Vrange sets the range in CC mode for sequences.

Refer to page 85 for more details.

Ensure that the menu is in the Seq. Edit menu and that you have created a sequence. Refer to page 179.

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Repeat</th>
<th>1-9999/Infinity (0)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Start of Loop</td>
<td>001-last point</td>
<td></td>
</tr>
<tr>
<td>On End of Seq.</td>
<td>OFF/Setting Min-Setting Max</td>
<td></td>
</tr>
<tr>
<td>CC Vrange (CC mode only)</td>
<td>High/low</td>
<td></td>
</tr>
</tbody>
</table>

Panel Operation
1. Press Loop (F4) to enter the Loop menu.
2. Use the selector knob to highlight Repeat.

3. Press the selector knob to edit Repeat, then turn to increase or decrease the value.

4. Use the number pad to enter a number.
   Select 0 to choose infinity.

5. Press the selector knob or Enter to confirm the selection.

6. Repeat for the remaining parameters.

7. Press Save (F3) to save the loop.
Channel Duration Time Settings

Background

Each sequence can have the timing duration data of another sequence. For example, CH1’s sequence can import the timing duration settings of CH2’s sequence.

This is useful to quickly compare two different loads to the same timing characteristics. Refer to page 85 for more details.

You can turn off each channel’s sequence by configuring the channel setting to OFF. If a channel uses the same channel number, (for example, CH 01 → 01), the duration time settings are not altered for that channel.

At least one channel must output a Trigger Sequence Signal via PIN4 of the first frame link connector (master) if a sequence is run. For more details, refer to page 85.

The Trigger In signal starts any sequence with TRIG set to IN. The trigger input signal is input via PIN4 of the second frame link connector (slave).

For more details, refer to page 85.

Any channels with channel control (CH CONT) set to external are shown on the right side as EXT. Refer to page 208 for details of setting channel control.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>CH 01-08 Setting</th>
<th>CH 01-08 TRIG</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>OFF-maximum channels</td>
<td>IN, OUT, IN/OUT, OFF</td>
</tr>
</tbody>
</table>
Ensure that you have created and saved at least one sequence. Refer to page 179.

Panel Operation

1. Press FUNC, then Sequence (F2) to enter the Channel Duration Time menu.

![Channel Duration Time Setting]

<table>
<thead>
<tr>
<th>TRIG</th>
<th>CH</th>
<th>Setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>IN</td>
<td>01</td>
<td>OFF</td>
</tr>
<tr>
<td>OFF</td>
<td>02</td>
<td>OFF</td>
</tr>
<tr>
<td>IN/OUT</td>
<td>03</td>
<td>OFF</td>
</tr>
<tr>
<td>OFF</td>
<td>04</td>
<td>OFF</td>
</tr>
</tbody>
</table>

Note that CH3 is set to TRIG OUT, while CH1 and CH3 are set to TRIG IN. CH2 has no trigger settings and has CH CONT set to external.

2. Use the selector knob to highlight a channel.

3. Press the selector knob to edit the channel, and then turn to choose which channel’s duration time setting to import.

<table>
<thead>
<tr>
<th>Range</th>
<th>Ch 01-08 / OFF</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>01</td>
</tr>
</tbody>
</table>

4. Press the selector knob or Enter to confirm the selection.
5. Press Define TRIG OUT (F2) if you want the currently selected channel to output the Trigger sequence signal.

You must set one channel as the TRIG OUT channel.

6. Press TRIG In Channel (F4) to allow the current sequence to be triggered with the Input trigger.

7. To turn the Input trigger source on, press Trig In (F5).

8. Repeat the previous steps for any other remaining channels.

9. Press Save (F3) to save the settings.

Run Sequence

Like programs, you must turn on sequences before you can run them.

When running a Sequence, the front panel function keys, number pad, operation keys, and selector knob are disabled for the specific channel(s). The load module panel is also disabled (except the display key) for the specific channel.

You still can edit channels that do not have a sequence by changing channels via the CHAN key or by using the local load module.

Ensure that you have created and saved at least one sequence.
Ensure that you also have configured the channel duration time settings and that no sequence (CH01-08) that you want to run is set to off.

Panel Operation

1. Press FUNC, then Sequence (F2) to enter the Channel Duration Time Setting menu.

2. Press Seq. (F1) to turn on the sequences.

3. SEQ is displayed on the Mainframe Status panel.

4. Press the LOAD key to run all sequences. If a channel has TRIG set to IN, that channel now waits for a trigger before running.

5. Run SEQ Mode is displayed on the bottom of the display for the specific channels. On the Mainframe Status panel, SEQ turns orange.
### Run SEQ Mode

#### Stop the load
6. Press the LOAD key again or wait for the sequence (if not infinitely looped) to end/stop the load.

#### Turn off SEQ
7. Press Seq. (F1) to turn off the sequence(s) when the load is not running.

⚠️ **Note**
All UI keys/knobs are disabled for all channels that run a sequence, except the function keys and R/L keys.
OCP Test Automation

Background
The OCP test function creates an automatic test to test the OCP of power supply products.

Parameters

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Active Channel</td>
<td>Applies the setting to the load channel.</td>
</tr>
<tr>
<td>Range</td>
<td>High (CC mode high) or low (CC mode low)</td>
</tr>
<tr>
<td>Start Current (Start C)</td>
<td>Starting current value for the test.</td>
</tr>
<tr>
<td>End Current (End C)</td>
<td>The current value that ends the test. The value must be higher than the OCP value of the DUT you are testing. This parameter is a fail-safe if the DUT over current protection fails.</td>
</tr>
<tr>
<td>Step Current (Step_C)</td>
<td>Sets the step resolution of the current.</td>
</tr>
</tbody>
</table>
Last Current (Last_C)  Sets the final current value after OCP has tripped. This is the steady-state current draw after the OCP has tripped.

Step Time (Step_T)  Sets each step’s execution time. (50 ms-1600 s)

Delay Time (Delay)  The OCP testing delay time. Sets the how long to delay starting the test after you press the Load On key. (0-160 s)

Trig Voltage (Trig_V)  Sets the voltage trigger level needed to see whether the power supply OCP has been triggered. When the power supply OCP has triggered, its voltage output drops. Use the voltage trigger level to test to see whether the voltage output has been dropped.

Keep Time (Keep_T)  Set how long to enter the Last Current after detecting the OCP. (0-160 s)

⚠️ Note  Use this mode only under CC mode.

Panel Operation

1. Press the FUNC key F4 (OCP) to enter the OCP Test Automation menu.
2. Use the selector knob to highlight the parameter you want to edit.

3. Press the selector knob to edit the parameter, then turn to increase or decrease the value.

   or

   Use the number pad to enter a number.

4. Press the selector knob or Enter to confirm the selection.

5. Repeat steps 2-4 for all parameters.

   Save the OCP Test Automation Settings

6. Press Save (F3) to save the OCP Test Automation settings.
7. **Select Active Channel**

To select the load channels for the test, press Active Channel (F2).

<table>
<thead>
<tr>
<th>CH</th>
<th>Active Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>OFF</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>OCP Function</th>
<th>Chan: 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Range: High</td>
<td>Step_T: 0.05</td>
</tr>
<tr>
<td>Start C: 0.000</td>
<td>Delay: 0.000</td>
</tr>
<tr>
<td>End C: 71.400</td>
<td>Trig_V: 0.0000</td>
</tr>
<tr>
<td>Step_C: 0.002</td>
<td>Keep_T: 0.000</td>
</tr>
<tr>
<td>Last_C: 0.000</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>OCP</th>
<th>Active Channel</th>
</tr>
</thead>
<tbody>
<tr>
<td>On</td>
<td></td>
</tr>
</tbody>
</table>

Previous Menu
8. Use the selector knob to Enter key to turn the Active value to on.

9. Press Save (F3) to save the OCP test automation channel.

10. Press Previous Menu (F5) to return to the OCP Test Automation menu.

11. Press OCP (F1) to turn OCP to on.
Save the OCP Test 12. Press Save (F3) to save the OCP test automation parameters.

Start the OCP Test 13. Press the Load key to start OCP Test Automation.

Test Results 14. Review the test results.

Voltage reading: The DUT voltage before the OCP was triggered.

Current reading: The DUT current before the OCP was triggered.

⚠️ Note In addition to the setting the OCP test parameters as described above, you also must set the Von voltage settings according to the DUT output characteristics.
The following image shows an OCP Test Automation example using actual current and voltage waveforms.
Channel Configuration

This chapter describes the configuration options for individual channels. Any configuration settings you change apply to only the current channel; other channels are not changed.

Accessing the Configuration Menu

Background
Use the configuration menu to access instrument settings and properties and set the protection levels for each channel.

Panel Operation
1. Select the channel to be configured by pressing the CHAN key and using the selector knob.
2. Press the F5 (Configure) key to enter the configuration (Protection) menu.

<table>
<thead>
<tr>
<th>Protection</th>
<th>Other</th>
<th>Go-NoGo</th>
<th>Group</th>
<th>Previous Menu</th>
</tr>
</thead>
<tbody>
<tr>
<td>OCP Level</td>
<td>71.400 A</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OCP Setting</td>
<td>OFF</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OVP Level</td>
<td>81.6 V</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OVP Setting</td>
<td>OFF</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OPP Level</td>
<td>357.00 W</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OPP Setting</td>
<td>OFF</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

06/15/18 16:50
USB
LOAD
Setting OCP/OVP/OPP/UVP

**Background**

Use over protection to set the voltage, current, or power limit. In the event that the current, voltage, or power exceeds the over protection settings, the load module display shows an error message and beeps an alarm.

When tripped, under voltage protection (UVP) will turn off the load. UVP trips when the load voltage drops below a set limit.

The protection modes are active only when the protection settings are set to on (XXP Setting -On).

You can set all protection settings to 2% higher than specification rating.

<table>
<thead>
<tr>
<th>Parameters</th>
<th>OCP Level</th>
<th>1.25% Rating A-102% Rating A</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>OCP Setting</td>
<td>ON/OFF/Clear</td>
</tr>
<tr>
<td>OVP Level</td>
<td>1.25% Rating V-102% Rating V</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.5% Rating V-102% Rating V for RMX-4006)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>OVP Setting</td>
<td>ON/OFF/Clear</td>
</tr>
<tr>
<td>OPP Level</td>
<td>RMX-4003 : 1 W-102 W</td>
<td></td>
</tr>
<tr>
<td></td>
<td>RMX-4004 (L) : 0.9 W-30.6 W</td>
<td></td>
</tr>
<tr>
<td></td>
<td>RMX-4004 (R) : 1.25 W-255 W</td>
<td></td>
</tr>
<tr>
<td></td>
<td>RMX-4005 : 1.75 W-357 W</td>
<td></td>
</tr>
<tr>
<td></td>
<td>RMX-4006 : 1.75 W-357 W</td>
<td></td>
</tr>
<tr>
<td>OPP Setting</td>
<td>ON/OFF/Clear</td>
<td></td>
</tr>
<tr>
<td>UVP Level</td>
<td>OFF—current using operating voltage range of slave module.</td>
<td></td>
</tr>
<tr>
<td>UVP Setting</td>
<td>Clear</td>
<td></td>
</tr>
</tbody>
</table>
Protection Clear  All

Panel Operation  Ensure that you are in the configuration menu. Refer to page 196.

1. Use the selector knob to highlight OCP Level.

2. Press the selector knob to edit the selected level, then turn to increase or decrease the value.

or

3. Use the number pad to enter a number.

4. Press the selector knob or Enter to confirm the selection.
5. Use the selector knob to highlight OCP Setting.

6. Use the selector knob to turn ON, turn OFF, or CLEAR the OCP Setting.

7. Repeat steps 1-5 for:
   OCP Level
   OVP Level
   OVP Setting
   OPP Level
   OPP Setting
   UVP Level
   UVP Setting

Clearing an Alarm  When any protection setting is tripped, Alarm displays on the Mainframe Status Panel, and an alarm tone sounds by default.

On the local load module, the tripped protection setting is displayed.

<table>
<thead>
<tr>
<th>Setting</th>
<th>Display</th>
</tr>
</thead>
<tbody>
<tr>
<td>OCP</td>
<td>O C P</td>
</tr>
<tr>
<td>OVP</td>
<td>O U P</td>
</tr>
<tr>
<td>REV*</td>
<td>r E U _U</td>
</tr>
<tr>
<td>OPP</td>
<td>O P P</td>
</tr>
<tr>
<td>OTP*</td>
<td>O L P</td>
</tr>
<tr>
<td>CPP*</td>
<td>C P P</td>
</tr>
<tr>
<td>UVP</td>
<td>U U P</td>
</tr>
</tbody>
</table>
8. Turn the load off by pressing the Load key, and turn off the load input.

9. Change the XXP Setting to Clear to clear the alarm.

![OCP Setting Clear]

⚠️ Note

*You cannot clear REV, OTP, and CPP using this method. You must use the Protection Clear function instead. Refer to page 200.

Refer to pages 67 and 318 to output alarms via the Go/NoGo output terminal.

The configuration settings apply to only the current channel.

## Protection Clear

### Background

When any protection circuit tripped, use the Protection Clear function to reset the alarms.

*Alarm* will display on the Mainframe Status Panel, and an alarm tone sounds by default when any protection setting is tripped.

On the local load module, the tripped protection setting is displayed.

**Example:** Reverse Voltage Protection
Panel Operation

Ensure that the menu is in the configuration menu. Refer to page 196.

1. Turn the load off by pressing the load key if necessary.
2. Use the selector knob to scroll down to Protection Clear.
3. Press the selector knob or Enter to clear all.

Note
The configuration settings apply to only the current channel. Other channels are not affected.

Setting the CC Voltage Range

<table>
<thead>
<tr>
<th>Background</th>
<th>You can set the Constant Current Voltage range to high or low.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parameter</td>
<td>CC Vrange  High/Low</td>
</tr>
</tbody>
</table>
Panel Operation

Ensure that the menu is in the configuration menu. Refer to page 196.

1. Press the F2 (Other) key to enter the Other menu.

2. Use the selector knob to highlight CC Vrange.

3. Press the selector knob to edit CC Vrange, then turn to increase or decrease the range.

4. Press the selector knob or Enter to confirm the selection.

Note: The configuration settings apply to only the current channel.
Adjusting the Von Voltage and Latch

Background

The Von voltage is the voltage point at which the load module will start to sink current. When Von latch is set to ON, the load continues to sink current after being tripped, even if the voltage drops below the Von voltage level. The step resolution of Von voltage is load module dependent.

Parameters

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Von voltage</td>
<td>0.0-Rating volts</td>
</tr>
<tr>
<td>Von latch</td>
<td>ON/OFF</td>
</tr>
</tbody>
</table>

Panel Operation

Ensure that the menu is in the configuration menu. Refer to page 196.

1. Press the F2 (Other) key to enter the Other menu.

![Panel Configuration Screen](image)
2. Use the selector knob to highlight Von voltage.

3. Press the selector knob to edit the selected value, then turn to increase or decrease the value.

or

Use the number pad to enter a number.

4. Press the selector knob or Enter to confirm the selection.

5. Repeat steps 3 to 5 to turn Von latch ON or OFF

For details of Von and Latch settings, refer to page 94.

⚠️ Note

The configuration settings apply to only the current channel. Other channels are not affected.
Configuring the Short Settings

**Background**

Use the Short Key option to simulate a short circuit.

Use the Short Function option to set whether the short function is enabled or disabled.

You can configure the Short Key option to toggle (press SHORT on the load module to toggle ON or OFF) or Hold (hold the SHORT key to short the load).

Use the Short Safety option to set whether enabling the short function depends on Load ON. When set to ON, the short function is enabled only when Load ON mode is enabled. When set to OFF, the short function is directly enabled independent of the Load ON mode.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Short Function</th>
<th>ON/OFF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short Key</td>
<td>Hold/Toggle</td>
<td></td>
</tr>
<tr>
<td>Short Safety</td>
<td>ON/OFF</td>
<td></td>
</tr>
</tbody>
</table>

**Panel Operation**

Ensure that the menu is in the configuration menu. Refer to page 196.

1. Press the F2 (Other) key to enter the Other menu.
2. Use the selector knob to highlight Short Function.

3. Press the selector knob to edit the selected setting, and turn to change the setting.

4. Press the selector knob or Enter to confirm the selection.

5. Use the selector knob to highlight Short Key.

6. Press the selector knob to edit the selected setting, and turn to change the setting.

7. Press the selector knob or Enter to confirm the selection.
8. Use the selector knob to highlight Short Safety.

9. Press the selector knob to edit the selected setting, and turn to change the setting.

10. Press the selector knob or Enter to confirm the selection.
Configuring Channel Control

Background When you set channel control (CH CONT) to external, it disables editing the active channel load. You still can use instrument buttons and knobs to access the menu for the active channel or to edit other channels that do not have channel control active. This prevents settings on the active channel from being changed on the local machine. Refer to pages 63 and 100 for details.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>CH CONT</th>
<th>Panel/External</th>
</tr>
</thead>
</table>

Panel Operation Ensure that the menu is in the configuration menu. Refer to page 196.

1. Press the F2 (Other) key to enter the Other menu.

![Parameter Configuration]

06/15/18 16:50
USB LOAD

CC Vrange High
Von Voltage 0.0 V
Von Latch ON
Short Key Toggle
CH CONT Panel
Independent OFF

06/15/18 16:50
USB LOAD

CC Vrange High
Von Voltage 0.0 V
Von Latch ON
Short Key Toggle
CH CONT Panel
Independent OFF
2. Use the selector knob to highlight CH CONT.

3. Press the selector knob to edit the selected setting, and turn to change the setting from panel to external.

4. Press the selector knob or Enter to confirm the selection.

Channel control is now activated. To turn channel control off, you must set CH CONT to panel again. When channel control is active, EXT is displayed on the side panel for the active channel.

⚠️ Note
You can activate channel control on only the active channel; other channels are not affected.

Configuring the Independent Setting
Background

The independent setting allows a channel to be load independent from the mainframe. This means that a load module with independent set to on can load from only the local load module. If you press the LOAD ON/OFF key from the mainframe, the mainframe does not affect the channel with independent set to on, except when running a program.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Independent ON/ OFF</th>
</tr>
</thead>
</table>

Panel Operation

Ensure that the menu is in the configuration menu. Refer to page 196.

1. Press the F2 (Other) key to enter the Other menu.

2. Use the selector knob to highlight Independent.
3. Press the selector knob to edit the selected setting, and turn to change the setting.

![Independent OFF]

4. Press the selector knob or Enter to confirm the selection.

When you set a channel to independent, an asterisk (*) appears next to the channel number indicator in the Current Operation Channel Status panel.

⚠️ Note

The configuration settings apply to only the current channel. Other channels are not affected.

---

Configuring the Load Delay Time

**Background**

The mainframe can delay loading a channel by up to 10 seconds. However, the delay time applies only to manual loading. Delay time does not apply to programs or sequences.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Load D-Time 0-10 s</th>
</tr>
</thead>
</table>

**Panel Operation**

Ensure that you are in the configuration menu. Refer to page 196.

1. Press the F2 (Other) key to enter the Other menu.
2. Use the selector knob to highlight Load D-Time.

   Note: Load D-Time is below Independent, off screen.

3. Press the selector knob to edit the selected setting, and turn to change the setting.

   or

   Use the number pad to enter a number.

4. Press the selector knob or Enter to confirm the selection.

   ! Note

   The Delay Time applies to only the current channel; other channels are not affected.

   Delay time applies only when you manually turn on the load or during start up with the Auto Load On setting (refer to page 226).
Configuring Step Resolution

Background

You can edit the CC, CR, CV, and CP step resolution settings in the configuration menu. These step resolution settings directly correspond to the step resolution of the coarse adjustment when setting the CC, CR, CV, and CP parameters.

The minimum and maximum step resolution you can set for each channel is dependent on the load module. For more information about step resolution, refer to page 94.

<table>
<thead>
<tr>
<th>Step Resolution</th>
<th>Minimum*1</th>
<th>Maximum*2</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>RMX-4003</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CCH Step</td>
<td>HR/20000</td>
<td>HR/2</td>
<td>Amperes A</td>
</tr>
<tr>
<td>CCL Step</td>
<td>LR/20000</td>
<td>LR/2</td>
<td>Amperes A</td>
</tr>
<tr>
<td>CRH Step</td>
<td>HR/40000</td>
<td>HR/2</td>
<td>Siemens Ø</td>
</tr>
<tr>
<td>CRL Step</td>
<td>LR/40000</td>
<td>LR/2</td>
<td>Siemens Ø</td>
</tr>
<tr>
<td>CVH Step</td>
<td>HR/40000</td>
<td>HR/2</td>
<td>Voltage V</td>
</tr>
<tr>
<td>CVL Step</td>
<td>LR/40000</td>
<td>LR/2</td>
<td>Voltage V</td>
</tr>
<tr>
<td>CPH Step</td>
<td>HR/10000</td>
<td>HR/2</td>
<td>Watt W</td>
</tr>
<tr>
<td>CPL Step</td>
<td>LR/10000</td>
<td>LR/2</td>
<td>Watt W</td>
</tr>
<tr>
<td>RMX-4004 (L)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CCH Step</td>
<td>HR/40000</td>
<td>HR/2</td>
<td>Amperes A</td>
</tr>
<tr>
<td>CRH Step</td>
<td>HR/40000</td>
<td>HR/2</td>
<td>Siemens Ø</td>
</tr>
<tr>
<td>CRL Step</td>
<td>LR/40000</td>
<td>LR/2</td>
<td>Siemens Ø</td>
</tr>
<tr>
<td>CVH Step</td>
<td>HR/40000</td>
<td>HR/2</td>
<td>Voltage V</td>
</tr>
<tr>
<td>CVL Step</td>
<td>LR/40000</td>
<td>LR/2</td>
<td>Voltage V</td>
</tr>
<tr>
<td>CPH Step</td>
<td>HR/30000</td>
<td>HR/2</td>
<td>Watt W</td>
</tr>
<tr>
<td>RMX-4004 (R)</td>
<td>CCH Step</td>
<td>HR/40000</td>
<td>HR/2</td>
</tr>
<tr>
<td>------------</td>
<td>----------</td>
<td>----------</td>
<td>------</td>
</tr>
<tr>
<td></td>
<td>CCL Step</td>
<td>LR/40000</td>
<td>LR/2</td>
</tr>
<tr>
<td></td>
<td>CRH Step</td>
<td>HR/40000</td>
<td>HR/2</td>
</tr>
<tr>
<td></td>
<td>CRL Step</td>
<td>LR/40000</td>
<td>LR/2</td>
</tr>
<tr>
<td></td>
<td>CVH Step</td>
<td>HR/40000</td>
<td>HR/2</td>
</tr>
<tr>
<td></td>
<td>CVL Step</td>
<td>LR/40000</td>
<td>LR/2</td>
</tr>
<tr>
<td></td>
<td>CPH Step</td>
<td>HR/25000</td>
<td>HR/2</td>
</tr>
<tr>
<td></td>
<td>CPL Step</td>
<td>LR/25000</td>
<td>LR/2</td>
</tr>
</tbody>
</table>
### RMX-400x Series User Manual

<table>
<thead>
<tr>
<th>Model</th>
<th>CCH Step</th>
<th>CCL Step</th>
<th>CRH Step</th>
<th>CRL Step</th>
<th>CVH Step</th>
<th>CVL Step</th>
<th>CPH Step</th>
<th>CPL Step</th>
</tr>
</thead>
<tbody>
<tr>
<td>RMX-4005</td>
<td>HR/35000</td>
<td>LR/35000</td>
<td>HR/40000</td>
<td>LR/40000</td>
<td>HR/40000</td>
<td>LR/40000</td>
<td>HR/35000</td>
<td>LR/35000</td>
</tr>
<tr>
<td></td>
<td>HR/2</td>
<td>LR/2</td>
<td>HR/2</td>
<td>LR/2</td>
<td>HR/2</td>
<td>LR/2</td>
<td>HR/2</td>
<td>LR/2</td>
</tr>
<tr>
<td></td>
<td>Amperes A</td>
<td>Amperes A</td>
<td>Siemens Ń</td>
<td>Siemens Ń</td>
<td>Voltage V</td>
<td>Voltage V</td>
<td>Watt W</td>
<td>Watt W</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Model</th>
<th>CCH Step</th>
<th>CCL Step</th>
<th>CRH Step</th>
<th>CRL Step</th>
<th>CVH Step</th>
<th>CVL Step</th>
<th>CPH Step</th>
<th>CPL Step</th>
</tr>
</thead>
<tbody>
<tr>
<td>RMX-4006</td>
<td>HR/20000</td>
<td>LR/20000</td>
<td>HR/40000</td>
<td>LR/40000</td>
<td>HR/50000</td>
<td>LR/50000</td>
<td>HR/35000</td>
<td>LR/35000</td>
</tr>
<tr>
<td></td>
<td>HR/2</td>
<td>LR/2</td>
<td>HR/2</td>
<td>LR/2</td>
<td>HR/2</td>
<td>LR/2</td>
<td>HR/2</td>
<td>LR/2</td>
</tr>
<tr>
<td></td>
<td>Amperes A</td>
<td>Amperes A</td>
<td>Siemens Ń</td>
<td>Siemens Ń</td>
<td>Voltage V</td>
<td>Voltage V</td>
<td>Watt W</td>
<td>Watt W</td>
</tr>
</tbody>
</table>

*1 HR = High range rated value. LR = Low range rated value.
*2 Maximum value = HR (LR)/2 * 1.02.

⚠️ **Note**

Use the Shift key to toggle between coarse and fine adjustment mode when editing the CC, CR, CV, and CP values with the Selector knob on the main display. The fine adjustment resolution varies between the function and load module used.

**Coarse mode:**

![Coarse mode diagram]

**Fine mode:**

![Fine mode diagram]
Panel Operation

Ensure that you are in the configuration menu. Refer to page 196.

<table>
<thead>
<tr>
<th>Protection</th>
<th>Other</th>
<th>Go-NoGo</th>
<th>Parallel</th>
<th>Previous Menu</th>
</tr>
</thead>
</table>

1. Press the F2 (Other) key to enter the Other menu.

2. Use the selector knob to scroll down to highlight CCH Step.

   Note: CCH Step is off screen when entering the Other menu.

   CCH Step is off-screen when entering Other menu.

3. Press the selector knob to edit the selected setting, and turn to change the setting.

   or

   Use the number pad to enter a number.
4. Press the selector knob or Enter to confirm the selection.

5. Repeat steps 2-4 to edit the step resolution of:
   
   CCL Step
   CRH Step
   CRL Step
   CV Step

⚠️ Note

The Step resolution settings apply to only the active channel; other channels are not affected.

Configuring Response Time

**Background**

Use the Response time setting to limit current draw when input voltage is less than 1 V. The Response setting sets the load bandwidth to fast (100 MHz) or normal (1 kHz).

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Response</th>
<th>Normal, Fast</th>
</tr>
</thead>
</table>

**Panel Operation**

Ensure that you are in the configuration menu. Refer to page 196.

1. Press the F2 (Other) key to enter the Other menu.
2. Use the selector knob to scroll down to highlight Response.

! Note
Response is offscreen when entering Other menu.

3. Press the selector knob to edit the selected setting, and turn to change the setting.

4. Press the selector knob or Enter to confirm the selection.

! Note
The Response settings apply to only the active channel; other channels are not affected.
Go/NoGo

Background

Use Go/NoGo mode to set threshold limits. When a load is within the limit(s), it is considered to be “Go”; when the load exceeds the limit, it is considered to be “NoGo.”

You can set Go/NoGo limits as either absolute values (entry mode set to “Value”) or a percentage offset from a nominal (center) value (entry mode set to “Percent”).

You can use Go/NoGo in both high and low ranges, as well as CC, CV, CR, and CP modes. You can read the Go/NoGo status using the rear Go/NoGo output.

You also can impose a delay time for up to 1 second.

⚠️ Note

Any Go/NoGo configuration applies to only the current channel with the same mode and range.

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Value</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>CC Mode</td>
<td>High: V</td>
<td>High: %</td>
</tr>
<tr>
<td></td>
<td>Low: V</td>
<td>Low: %</td>
</tr>
<tr>
<td>CR Mode</td>
<td></td>
<td>Center: V</td>
</tr>
<tr>
<td>CV Mode</td>
<td>High: A</td>
<td>High: %</td>
</tr>
<tr>
<td>CP Mode</td>
<td>Low: A</td>
<td>Low: %</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Center: A</td>
</tr>
<tr>
<td>Delay Time</td>
<td>0.0-1.0 seconds</td>
<td></td>
</tr>
<tr>
<td>SPEC Test</td>
<td>ON/OFF</td>
<td></td>
</tr>
</tbody>
</table>

Panel Operation

Ensure that you are in the Configuration menu. Refer to page 196.
Choose Absolute/Percentage Limits

1. Press Go-NoGo (F3) to access the Go/NoGo menu.

2. Use the selector knob to edit Entry Mode.

3. Choose Value for absolute limits or Percent for percentage offset limits.

**Entry Mode**

<table>
<thead>
<tr>
<th>Value</th>
<th>Percent</th>
</tr>
</thead>
</table>

Or

**Entry Mode**

4. The menu changes according to the selection.

Value

<table>
<thead>
<tr>
<th>SPEC Test</th>
<th>OFF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delay Time</td>
<td>0.0 S</td>
</tr>
<tr>
<td>Entry Mode</td>
<td>Value</td>
</tr>
<tr>
<td>High</td>
<td>10.0000 A</td>
</tr>
<tr>
<td>Low</td>
<td>0.00000 A</td>
</tr>
</tbody>
</table>

Percent

<table>
<thead>
<tr>
<th>SPEC Test</th>
<th>OFF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delay Time</td>
<td>0.0 S</td>
</tr>
<tr>
<td>Entry Mode</td>
<td>Value</td>
</tr>
<tr>
<td>High</td>
<td>100.0 %</td>
</tr>
<tr>
<td>Low</td>
<td>100.0 %</td>
</tr>
<tr>
<td>Center</td>
<td>10.0000 A</td>
</tr>
</tbody>
</table>

5. Use the selector knob and number pad to edit Delay time, High, Low, and Center (percent mode only).

6. Press the selector knob or Enter to confirm each value.
7. Use the selector knob to edit SPEC test.

8. Choose ON to turn on Go/NoGo.

9. Choose OFF to turn off Go/NoGo.

When SPEC test is set to ON, SPEC appears on the Current Operation Channel Status panel.
Background

Use the Group Unit menu to configure load modules of the same type and rating as a single unit when used in parallel. You can use up to four load modules in this mode.

Operating the RMX-400x series load modules in Group Unit mode is almost the same as using the load modules separately. The only difference is that you need to set up the channel configuration for only channel 1 and not individually for each channel.

There are two mode types: para and sync. Use the para setting to operate the all parallelized load modules as a single large load module. Use sync mode to synchronize the settings of a single unit across all other parallelized load modules.

The display mode determines which parameters are displayed on the local load modules.

⚠️ Note

You can use only CC or CR mode in Group Unit.

The single channel load modules, RMX-4005 and RMX-4006, fully support these two modes (Para, Sync) of group function.

The RMX-4004 does not support group function.

The dual channel RMX-4003 does partially support group function. It can support grouping two units of the same module under the Sync mode only. That means the RMX-4003 can be 2 ch x 100 W or 1 ch x 200 W.

Ensure that you use the same firmware for both units.

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Total Unit</th>
<th>2/3/4/OFF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group Mode</td>
<td>Para/Sync</td>
<td></td>
</tr>
<tr>
<td>Display Mode</td>
<td>V,I/,V,W/I,W/ S</td>
<td></td>
</tr>
</tbody>
</table>
Panel Operation

1. Ensure that the current channel is selected as the active channel. Refer to page 137.

2. Ensure that the menu is in the Configuration menu. Refer to page 196.

Parallel Setup

3. Press Group (F4) to access the Group menu.

4. Use the selector knob to change Total Unit from the OFF setting to the number of parallel units.

5. Press the selector knob or Enter to confirm.

Parallel Mode

6. To change the type of mode, use the selector knob to edit Group Mode.
7. Choose Para to operate the units as a single large load module, or Sync to synchronize the load settings across each parallel unit.

**Parallel Mode**  Para

**Display Mode**

8. Use the selector knob to change the display settings on the local load modules.

9. Choose from V,I/V,W/I,W, or S.

**Display Mode**  V,I

When para unit is active, an indicator appears on the screen. The indicator depends on the Group mode. P appears for para mode and S appears for sync mode.

CHXP  Para mode
CHXS  Sync mode

The RMX-400x is now ready to operate in parallel mode.

**Turn Parallel Mode Off**

10. To disable parallel mode, use the selector knob to change Total Unit to OFF.

**Total Unit**  OFF
Mainframe Configuration

This chapter describes configuration settings that apply to all channels and general interface settings.

Accessing System Information

Background
The system information displays the mainframe and load module(s) serial numbers.

Parameters

Mainframe Ver: Mainframe firmware version and date (month/day).

RMX-400x SN: Mainframe serial number.

SlotX(Y) Ver: The version number of the Xth load module occupying the Xth slot with channel number Y.

RMX-400x SN: The serial number and module model of the Xth load module

Y designates the channel of each installed load module. For example, if dual channel load modules are installed, Ch (1,2) is for the firmware and serial number.

Panel Operation

1. Press the Shift key and then Help key to access the Utility menu/System Info menu.
If you have set Memo through commands, you can see the Memo information by pressing System Info (F1) once again. (Refer to the chapter describing the :MEMO and :CHANnel:MEMO commands in the programming manual for details.)

Accessing the Load Menu
Background

The RMX-400x series can automatically start loading from the last program or load setting.

If you set Auto Load On to Load, the last load setup used before the machine was reset automatically starts to load on startup.

If program is set to the auto load on configuration, the last program executed starts on the next startup.

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Auto Load</th>
<th>ON/OFF</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Auto Load On</td>
<td>Load/program</td>
</tr>
</tbody>
</table>

Panel Operation

1. Press the Shift key and then the Help key to access the Utility menu.

2. Press F2 (Load).

3. Press the selector knob and then turn to choose Auto Load.

4. Press the selector knob or Enter to confirm the selection.
5. Scroll to Auto Load On and choose Load or Program for the next time the RMX-400x starts.

Adjusting the Speaker

Background
The RMX series has an internal speaker for both the mainframe and load modules. The speaker function turns the UI sound on or off (key presses and scrolling). The speaker setting does not alter the sound for protection or Go/NoGo alarms.

Parameter | Speaker ON/OFF
---|---
Panel Operation
1. Press the Shift key and then the Help key to access the Utility menu.
2. Press F5 (Other menu).
3. Use the selector knob to highlight Speaker.
4. Press the selector knob to edit Speaker, then turn to change from on to off and vice versa.

Speaker ON

5. Press the selector knob or Enter to confirm the selection.

Adjusting the Display Settings

The RMX series has a TFT LCD display. Use the Utility menu to control the display brightness and contrast.

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Brightness</th>
<th>Contrast</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>50-90</td>
<td>3-13</td>
</tr>
<tr>
<td></td>
<td>50 (low)</td>
<td>3 (low)</td>
</tr>
<tr>
<td></td>
<td>90 (bright)</td>
<td>13 (high)</td>
</tr>
</tbody>
</table>

Panel Operation

1. Press the Shift key and then the Help key to access the Utility menu.

2. Press F5 (Other menu).

Other Setting

Speaker ON
Contrast 8
Brightness 64
Frame CONT OFF
Alarm Tone(M) OFF
3. Use the selector knob to highlight Contrast.

4. Press the selector knob to edit contrast, then turn to increase or decrease the value.

![Contrast](image)

5. Press the selector knob or Enter to confirm the selection.

6. Repeat steps 3-5 for the brightness.
Adjusting the Frame Control

Background

Use frame control to control several frame-linked mainframes (slaves) with a master mainframe. For information about frame control, frame control interface, and connection, refer to pages 61 and 315.

Note

When using frame control, ensure that the same firmware is installed in both master and slave units.

Parameters

Frame CONT ON/OFF

Panel Operation

1. Connect the mainframes using a frame link connection.
2. On the master mainframe, press the Shift key and then the Help key to access the Utility menu.
3. Press F5 (Other menu).

Other Setting

Speaker OFF
Contrast 8
Brightness 64
Frame CONT OFF
Alarm Tone(M) OFF
4. Use the selector knob to highlight Frame CONT.

5. Press the selector knob to edit, then turn to turn frame control on or off.

```
06/15/18  16:50  FRM  USB  LOAD

Other Setting
Speaker   OFF
Contrast   8
Brightness 64
Frame CONT ON
Alarm Tone(M) OFF
```

When Frame CONT is set to on, the mainframe displays FRM (master) or FRS (slave) at the top of the display.

6. Repeat the above steps for any connected slave mainframe units.

Frame control is now ready for both master and slave mainframes.
Adjusting the Knob Control Type

Background

You can set the mainframe control knob to Update or Old mode.

When set to Update mode, rotating the mainframe knob changes the load module setting value at the same time.

When set to Old mode, rotating the mainframe knob does not change the load module setting value unless you press the knob or Enter key.

Parameter  | Knob Type   | Updated/old
---|---|---
Panel Operation
1. Press the Shift key and then the Help key to access the Utility menu.
2. Press F5 (Other menu).
3. Use the selector knob to move the cursor down to Knob Type (below the initial screen).
4. Press the selector knob to highlight Knob Type, then turn to change to Old/Updated.

```
Knob Type: Updated
```

5. Press the selector knob or Enter to confirm the selection.

## Configuring Alarm Sound

**Background**

The RMX series has two different types of alarms, one on the mainframe (alarm tone M) and one for each load module (alarm tone S).

You can set alarm tones M and S individually to on or off.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Alarm Tone (M)</th>
<th>ON/OFF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alarm Tone (S)</td>
<td>ON/OFF</td>
<td></td>
</tr>
</tbody>
</table>

**Panel Operation**

1. Press the Shift key and then the Help key to access the Utility menu.

```
SHIFT HELP UTILITY
```

2. Press F5 (Other menu).
3. Use the selector knob to highlight the master alarm, Alarm Tone (M).

4. Press the selector knob to select Alarm Tone (M), turn to edit, and press to confirm the selection.

5. Repeat the steps to edit the slave alarm, Alarm Tone(S).

Configuring Go/NoGo Alarm Sound

Background
You can set an alarm to sound when any Go/NoGo limits are tripped from any channel.

The Go_NoGo tone alarm settings apply to all channels.

Parameter
Go_NoGo Tone  On/off
Panel Operation

1. Press the Shift key and then the Help key to access the Utility menu.

2. Press F5 (Other menu).

3. Use the selector knob to move the cursor down to Go_NoGo Tone (below the initial screen).

4. Press the selector knob to highlight Go_NoGo Tone, then turn to change to ON/OFF.

5. Press the selector knob or Enter to confirm the selection.
Adjusting Slave Knob Settings

Background

You can edit channel loads using the local load module or the mainframe. When using the slave knob to edit a load, you can set the load module display to two different types: SetValue and Measured.

When a load is on, SetValue always displays the set value (A Value, B Value) on the local load module display, while Measure shows the actual measured value when editing the load. These settings apply to all channels.

You can temporarily disable the Measure setting by pressing the slave knob to display the SetValue instead of the Measure value in the local load module display.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Slave Knob</th>
<th>Measure/SetValue</th>
</tr>
</thead>
<tbody>
<tr>
<td>Panel Operation</td>
<td>1. Press the Shift key and then the Help key to access the Utility menu.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2. Press F5 (Other menu).</td>
<td></td>
</tr>
</tbody>
</table>
### Other Setting

<table>
<thead>
<tr>
<th>Setting</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alarm Tone(S)</td>
<td>OFF</td>
</tr>
<tr>
<td>Knob Type</td>
<td>Updated</td>
</tr>
<tr>
<td>Go-NoGo Tone</td>
<td>OFF</td>
</tr>
<tr>
<td>Slave Knob</td>
<td>SetValue</td>
</tr>
<tr>
<td>Language</td>
<td>English</td>
</tr>
</tbody>
</table>

---

3. Use the selector knob to move the cursor down to Slave Knob (below the initial screen).

4. Press the selector knob to highlight Slave Knob, then turn to change to Measure/SetValue.

5. Press the selector knob or Enter to confirm the selection.
View Language Settings

Background  Use the Utilities menu to view the language settings.

Panel Operation  1. Press the Shift key and then the Help key to access the Utility menu.
2. Press F5 (Other menu).
3. Use the selector knob to move the cursor down to Language (below the initial screen).
Adjusting the High Resolution

**Background**

ON: When there is a difference between the measured value of the voltage, current, or power displayed on the module panel and the setting value, the system fine tunes the load value so that the measured value is close to the setting value. The system performs and completes this action in 1 second after loading is on.

OFF: The system performs no action when there is a difference between the measured value of the voltage, current or power displayed on the module panel and the setting value.

**Parameter**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>High Resolution</th>
<th>ON/OFF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Panel operation</td>
<td>1. Press the Shift key and then the Help key to access the Utility menu.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2. Press F5 (Other menu).</td>
<td></td>
</tr>
</tbody>
</table>

![Image of the Utility menu with the High Resolution setting ON]
3. Use the Selector knob to highlight High Resolution.

4. Press the Selector knob to edit High Resolution, then turn to change from ON to OFF and vice versa.

5. Press the Selector knob or Enter to confirm selection.
Adjusting the System Mode

Background
1: When any command is received, the Master panel automatically enters the Remote fast mode.
0: The Master panel will not enter the Remote fast mode automatically.

Note
For details about remote mode fast/normal, refer to the UTILITY:REMote:MODE command in the programming manual.

Parameters

<table>
<thead>
<tr>
<th>Parameters</th>
<th>System Mode</th>
<th>0/1</th>
</tr>
</thead>
</table>

Panel operation
1. Press the Shift key and then the Help key to access the Utility menu.

2. Press F5 (Other menu).

3. Use the Selector knob to highlight System Mode.
4. Press the Selector knob to edit System Mode, then turn to change from 0 to 1 and vice versa.

5. Press the Selector knob or Enter to confirm selection.
Adjusting the Von Latch Clear

Background

Auto: The load starts when the module terminal voltage exceeds the Von value. The system stops loading when the module terminal voltage is close to 0 V for more than 25 ms, and the system is detecting Von again.

Manual: The load starts when the module terminal voltage exceeds the Von value. Loading continues even if the module terminal voltage is close to 0 V.
Note

This feature is available only when Von Latch is set to ON.

Parameters

Von Latch Clear  Auto/Manual

Panel operation

1. Press the Shift key and then the Help key to access the Utility menu.

2. Press F5 (Other menu).

3. Use the Selector knob to highlight Von Latch Clear.

4. Press the Selector knob to edit Von Latch Clear, then turn to change from Auto to Manual and vice versa.

5. Press the Selector knob or Enter to confirm selection.
Adjusting the Measure Period

Background
Use this setting to select a measure sample rate. Rates of 200 ms or 20 ms are available for voltage and current sampling rate.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Measure Period</th>
<th>200 ms/20 ms</th>
</tr>
</thead>
</table>

Panel operation
1. Press the Shift key then the Help key to access the Utility menu.
2. Press F5 (Other menu).
3. Use the Selector knob to highlight Measure Period.
4. Press the Selector knob to edit Measure Period, then turn to change from 200 ms to 20 ms and vice versa.

Measure Period 200ms
5. Press the Selector Knob or Enter to confirm selection.

### Adjusting the Jog Shuttle Control

**Background**

**ON:** After you enable this setting, the slave knob adjusts the setting value in Jog Shuttle mode when you adjust the setting value. The interval value is adjusted according to the knob speed.

**OFF:** If you disable this setting, the slave knob adjusts the setting value in the form of fixed compartment when you adjust the setting value.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Jog Shuttle Control</th>
<th>ON/OFF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Panel operation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Press the Shift key and then the Help key to access the Utility menu.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Press F5 (Other menu).</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3. Use the selector knob to highlight Jog Shuttle Control.
4. Press the Selector knob to edit Jog Shuttle Control, then turn to change from OFF to ON and vice versa.

   Jog Shuttle Control OFF

5. Press the Selector knob or Enter to confirm selection.

Adjusting the RVP Load Off

<table>
<thead>
<tr>
<th>Background</th>
<th>ON: When RVP is detected, Alarm displays on the screen, and loading stops.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>OFF: When RVP is detected, Alarm displays on the screen, but loading remains on.</td>
</tr>
</tbody>
</table>

**Note**

This setting applies to all channels. But each channel independently detects RVP, emits the alarm, and stops the load.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>RVP Load Off</th>
<th>ON/OFF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Panel operation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td>Press the Shift key and then the Help key to access the Utility menu.</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Press F5 (Other menu).</td>
<td></td>
</tr>
</tbody>
</table>


3. Use the Selector knob to highlight RVP Load Off.

4. Press the Selector knob to edit RVP Load Off, then turn to change from OFF to ON and vice versa.

5. Press the Selector Knob or Enter to confirm selection.
Setting the Date and Time

**Description**
Use the date and time settings to time stamp files when saving them.
- The date is shown at the top of the display.

**Parameters**
- **Month**: 1-12
- **Day**: 1-31
- **Year**: 1990-2038
- **Hour**: 0-23
- **Minute**: 0-59

**Panel operation**
1. Press the Shift key then the Help key to access the Utility menu.
   
2. Press F4 (Date/Time menu).

**Settings**: Month, Day, Year, Hour, Minute
Interface Configuration (Settings)

This chapter describes configuration settings that apply when using the RMX-400x mainframe with a remote connection. There are three interface options for remote control: RS232 and USB. You can use only one interface at a time. For more details about remote control and interface connections, refer to the Interface section on page 311.

Configuring RS232 Connection

Background

When using RS232, you need to set several parameters. These include baud rate, stop bit, and parity. When setting RS232 parameters, ensure that they match those of the host machine.

Parameters

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Baud Rate</th>
<th>Stop Bit</th>
<th>Parity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2400/4800/9600/19200/38400</td>
<td>1-2</td>
<td>None/odd/even</td>
</tr>
</tbody>
</table>

Panel Operation

1. Press the Shift key and then the Help key to access the Utility menu.
2. Press F3 (Interface menu).
3. If the Interface mode is not RS232, turn the selector knob to RS232.


5. Press the selector knob to confirm.

6. The RS232 menu appears.
7. Use the selector knob to edit Baud rate, Stop Bit, and Parity.

⚠️ Note

The baud rate, stop bit, and parity must match that of the host machine.

For RS232 function check, refer to the RS232 and USB CDC Function Check section on page 263.

Configuring USB Connection

Background

Of the three interface options, USB is the easiest to use.

USB connection

<table>
<thead>
<tr>
<th>PC side connection</th>
<th>RMX-4000 side connector</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type A, host</td>
<td>Type B, device</td>
</tr>
</tbody>
</table>

Speed

1.1/2.0 (full speed)

Panel Operation

1. Press the Shift key and then the Help key to access the Utility menu.

2. Press F3 (Interface Menu).
3. If the Interface mode is not USB, use the selector knob to edit Interface.

4. Choose USB.

5. Press the selector knob to confirm.

6. The Interface becomes USB.
7. Connect the USB cable to the USB-B slave port on the rear.

8. If the PC asks for the USB driver, select RMX-4000.inf (downloadable from the National Instruments website, www.ni.com, RMX-4000 product page).

⚠️ Note

For USB CDC function check, refer to the RS232 and USB CDC Function Check section on page 263.
Configuring Ethernet Connection

**Background**
When using Ethernet, you need to set several parameters including DHCP On/Off, IP Address, Subnet Mask, and Gateway. When setting Ethernet parameters, ensure they match the network parameters.

<table>
<thead>
<tr>
<th>Parameters</th>
<th>DHCP</th>
<th>On/Off</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>IP Address</td>
<td>0-255 0-255 0-255 0-255</td>
</tr>
<tr>
<td></td>
<td>Subnet Mask</td>
<td>None/Odd/Even</td>
</tr>
<tr>
<td></td>
<td>Gateway</td>
<td>0-255 0-255 0-255 0-255</td>
</tr>
</tbody>
</table>

**Configuration**
This configuration example configures the RMX-4000 socket server.

The following configuration settings manually assign the RMX-4000 an IP address and enable the socket server. The socket server port number is fixed at 2268.

**Steps**
1. Connect an Ethernet cable from the network to the rear panel Ethernet port. You will see the LED indicator next to Ethernet port turn on.

2. Power on the RMX-4000.
Panel operation 3. Press the Shift key and then the Help key to access the Utility menu.

4. Press F3 (Interface menu).

5. If the Interface mode is not Ethernet, use the Selector knob to edit Interface.

6. Choose Ethernet.

7. Press the Selector knob to confirm.

8. The Ethernet menu appears.
Use the Selector knob to edit the DHCP, IP Address, Subnet Mask, and Gateway settings.

⚠️ Note

If the DHCP is set to ON, the network DHCP server configures the IP Address, Subnet Mask, and Gateway settings automatically. These settings appear after the RMX-4000 gets the information by DHCP.

⚠️ Note

If the DHCP is set to OFF, make sure the IP address, Subnet Mask, and Gateway settings match those of the network.
Web Server Function Check

Functionality check: The web server allows you to check the RMX-4000 function settings.

Enter the RMX-4000 IP address in a web browser.

The web browser interface appears.

The web browser interface allows you to access the following:

- Network configuration settings
- RMX-4000 dimensions
- Operating area diagram

Click **Network Configuration** to see the configuration information.
Click **Figure of Dimensions** to see the device dimensions information.

Click **Operating Area** to see the load operating area.
RS232 and USB CDC Function Check

Background
You can use National Instruments Measurement & Automation Explorer (MAX) to test the RS232 and USB CDC functionality. This program is available on the NI website, www.ni.com, via a search for the VISA runtime engine page, or you can download it at www.ni.com/visa/.

Requirements
Operating system: Windows XP, 7, 8, 10

Note
You can perform a functionality check only after connecting the cable and setting the RMX-4000 interface.

Functionality check

2. In My System>>Devices and Interfaces in MAX, select the corresponding port connected to the RMX-4000 via the USB or RS232 interface.

3. In this example (NI MAX Version 18.0.0f0), assume the RMX-4000 is connected to COM 1 (ASRL1). After selecting ASRL1::INSTR “COM1”, click Open VISA Test Panel.
4. On the ASRL Settings page, you can see the **Serial Settings** information.

5. Click **I/O Settings**.

6. Make sure the **Enable Termination Character** check box is checked and the terminal character is `\n (Value: xA)`.

7. Click **Apply Changes**.

8. Click the **Input/Output** icon.

9. Enter `*IDN?\n` in the **Select or Enter Command** dialog box if it is not already entered.
10. Click the **Query** button.

11. The *IDN?
 query returns the manufacturer, model name, serial number, and firmware version in the dialog box.

```
NATIONAL\s\sINSTRUME, RMX-4002, 00000001, V108
```

---

**Note**

The COM port corresponding to the USB CDC exists until the USB driver is installed. To do the USB CDC function check, change the VISA resource name to the COM port that the USB CDC protocol occupies as a virtual COM port in your system.
Socket Server Function Check

**Background**
You can use National Instruments Measurement & Automation Explorer (MAX) to test the socket server functionality. This program is available on the NI website, www.ni.com, via a search for the VISA runtime engine page, or you can download it at www.ni.com/visa/.

**Requirements**
Operating system: Windows XP, 7, 8, 10

**Functionality check**

1. Start MAX. In Windows, select **Start>>All Programs>>National Instruments>>Measurement & Automation**.

2. In MAX, select **My System>>Devices and Interfaces>>Network Devices**.

3. Select **Add New Network Device>>VISA TCP/IP Resource**.

4. Select **Manual Entry of Raw Socket** from the popup window.
5. Enter the RMX-4000 IP address and port number. The port number is fixed at 2268.

6. Click **Validate**.

7. A popup appears if a connection is successfully established. If not, check the load device IP address configuration, then click **OK** and **Next**.
8. Click **Finish**.

9. You can see that the network device is set up successfully. Click **Open VISA Test Panel**.
10. On the TCP/IP Settings page, you can see the TCP/IP information.

11. Click **I/O Settings**.

12. Make sure the **Enable Termination Character** check box is checked and the terminal character is \n (Value: xA).

13. Click **Apply Changes**.

14. Click the **Input/Output** icon.

15. Enter \*IDN?\n in the **Select or Enter Command** dialog box if it is not already entered.
16. Click the **Query** button.

17. The *IDN?\n query returns the manufacturer, model name, serial number, and firmware version in the dialog box.

```
NATIONAL\sINSTRUMENT\, rMX-4002, \00000001, V108\n```

18. Enter the command :**SYST:ERR**\n.

19. Click the **Query** button. You will get an error message.
Saving/Recalling Channels

Background

The RMX-400x Series can save data for up to 120 channel configurations. Using the onboard memory, 120 memory slots represent each channel.

Program sequences and individual channel setups use memory. For further memory details, refer to page 104.

Panel Operation

1. Press the File key.

2. Press F1 repeatedly until the Media Memory menu appears.
3. Use the selector knob to edit Channel Data and Data Type.

4. Choose Current or All and Memory.

5. Press the selector knob to edit Memory (M001-M120) or Use the number pad to enter a number.
6. Press F3 to Save or F4 to Recall the memory settings.

7. A message indicates when a save has been successful.

   Memory No 001 Save OK

⚠️ Note

The display reverts to the channel menu after recalling memory.
Saving/Recalling Preset memory

Background
The RMX-400x Series can store up to 10 presets for each channel. You can save or recall the presets either individually for each channel (Channel Data: Current) or at the same time (Channel Data: All), using the All option.

For further memory details, refer to page 104.

Panel Operation
1. Press the File key.

2. Press F1 repeatedly until the Media Memory menu appears.

3. Use the selector knob to edit Channel Data and Data Type.
4. To save or recall only the active channel, choose Current and Preset. To save or recall all the presets, choose All and Preset.

<table>
<thead>
<tr>
<th>Save / Recall</th>
<th>Current Channel</th>
<th>All Channels</th>
</tr>
</thead>
<tbody>
<tr>
<td>Channel Data</td>
<td>Current</td>
<td>All</td>
</tr>
<tr>
<td>Data Type</td>
<td>Preset</td>
<td>Preset</td>
</tr>
</tbody>
</table>

5. Press the selector knob to edit Preset (P0-P9) or Use the number pad to enter a number.

6. Press F3 to Save or F4 to Recall the Presets.
7. A message displays when the save is complete.

**Preset P0 Save OK**

⚠️ Note

The display reverts to the channel menu after recalling memory.

---

**Saving/Recalling Setup Memory**

**Background**

The RMX-400x Series can store up to four setups using the onboard memory. You can save each setup from the file menu. Using Setup Memory saves each channel. For further memory details, refer to page 104.

**Panel Operation**

1. Press the File key.

2. Press F1 repeatedly until the Media Memory menu appears.

---

![](image)
3. Use the selector knob to edit Channel Data and Data Type.

4. Choose All and Setup.

5. Press the selector knob to edit Setup Memory (1-4)
   or
   Use the number pad to enter a number.

6. Press F3 to Save or F4 to Recall the Setup Memory.

7. A message displays when the save/recall is complete.
Setting the Default USB Path/File

**Background**
When saving files to a USB memory stick, the files are saved into the root directory if a file path has not been set.

**Panel Operation**
1. Insert a USB flash drive into the front panel USB slot.
2. Press the File key.
3. Press F1 repeatedly until the Media USB menu appears.
The top section (window) shows the current USB path.

There are four options:

- **Select** — Selects the current USB path as the default file path to save (Step 5).
- **New Folder** — Creates a new folder (Step 7).
- **Rename** — Renames the current folder/path (Step 13).
- **Delete** — deletes the current file/path name. (Step 20).

5. Use the selector knob to highlight the new path directory

6. Press F1 (Select) to select the new default directory path.
The new path is shown in the upper Path box in green.

Create New Folder

7. To create a new directory, Press F2 (New Folder)

The onscreen keyboard (OSK) appears. The directory has an eight-character size limit.

8. Use the selector knob to scroll left and right through the keys.
9. When a key is highlighted, use the selector knob, F1, or Enter to confirm a key entry.

10. Use F2 (backspace) to delete any previous entries/mistakes.

11. Press F3 (save) to save the directory name.

12. Press F5 (previous menu) to continue to the previous menus.

13. Use the selector knob to highlight the file/directory that you need to rename.

The onscreen keyboard appears

15. Use the selector knob to scroll left and right through the keys.

16. When a key is highlighted, use the selector knob, F1, or Enter to confirm a key entry.

17. Use F2 (backspace) to delete any previous entries/mistakes.

18. Press F3 (save) to save the directory name.

19. Press F5 (previous menu) to continue to the previous menus.

Delete Filename

20. Use the selector knob to highlight a file/directory.

Note

If there is any content in the folder, you cannot delete it and the message Error! This folder may be not empty! will be displayed on the screen.

22. To confirm deletion, press F4 again.

Saving Setups to USB Memory

Background

Setup data contains all channel data including memory, presets, and program sequences.

There are four setups in internal memory. When saving to USB, save all four setups. Conversely, when recalling, recall all four setups to main memory.

The file extension *.S is for Setup data only.

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Save File</th>
<th>400X_XX.S</th>
</tr>
</thead>
</table>
| Panel Operation  | 1. Insert a USB flash drive into the front panel USB slot.
2. Ensure that the USB path is set. Refer to page 278.

3. Press the File key.

4. Press F1 repeatedly until the Media USB menu appears.

5. Use the selector knob to edit Save Chan and Data Type.

6. Choose All and Setup.
The screen updates to show only Setup files (*.S) available to save/recall in the root directory. Press F5 (File Utility) to select the directory to save.

7. Use the selector knob to edit Save File or Recall File. Rotating the selector knob scrolls through all available setup files (*.S).

8. Choose a filename (20XXX_XX.S).

9. Press F3 (Save) to save the setup data or F4 (Recall) to recall the setup data.

10. A screen message appears when the save/recall is complete.

   400X_01.S Save Ok
   400X_00.S Recall Ok

Note: You can save setups only if you have saved them to internal memory first. For details on how to save to internal memory, refer to page 274.
Saving/Recalling Memory Data to USB

Background

There are two options to save memory data to a USB flash drive:

Save Chan Current: Saves the active channel’s memory data (M001-M120) to the root directory (400X_XX.M). Press F5 (File Utility) to select the directory to save.

Save Chan All: Saves every channel’s memory data (CH1 M001-120 to CH8 M001-M120) to a directory (ALL00XX) as separate files for each channel (P0X0X_C1.M-P0X0X_C8.M).

Recall File: Recalls the selected file to the active channel’s memory (MXXX). You cannot update all channels at once; you can recall only one channel at a time.

The file extension *.M is for memory data only.

For more information about the file structures, refer to page 104.

Parameters

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Save Channel Data:</th>
<th>Directory ALL0000-ALL0099 All</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>File: 400X_CX.M</td>
</tr>
<tr>
<td>Save Channel Data:</td>
<td></td>
<td>File: 400X_CX.M</td>
</tr>
<tr>
<td>Current</td>
<td></td>
<td>File: 400X_CX.M</td>
</tr>
<tr>
<td>Recall Channel</td>
<td></td>
<td>File: 400X_CX.M</td>
</tr>
<tr>
<td>Data: Current</td>
<td></td>
<td>File: 400X_CX.M</td>
</tr>
</tbody>
</table>

Panel Operation

1. Insert a USB flash drive into the front panel USB slot.
2. Ensure that the USB path has been set. Refer to page 278.

3. Press the File key.

4. Press F1 repeatedly until the Media USB menu appears.

5. Use the selector knob to edit Save Chan and Data Type.

6. Choose All and Memory
The screen updates to show Save Folder. Note that you cannot recall all channels at once; you can only save them.

7. Use the selector knob to edit Save Folder.

8. Choose a directory name (ALL0000-ALL0099).

   **Save Folder** ALL0003

   ![Note]

   Used directories are not available. You cannot overwrite older directories. You must delete them first.

9. Press F3 (Save).

10. A screen message displays when complete.

   **ALL0003 Save Ok**

Save /Recall File 11. Use the selector knob to edit Save Chan and Data Type.

12. Choose Current and Memory.
13. Use the selector knob to edit Save File or Recall File.

14. Choose a filename.

15. Press F3 (Save) to save or F4 (Recall) to recall the current channel memory.

16. A save or recall message displays when complete.

   4004_00.M Save Ok
   4004_00.M Recall Ok
Recall File from USB Path

17. Press F5 (File Utility).

18. Use the selector knob to select path for saving memory: usb:\ALLXXXX\File: 400X_XX.M.

19. Press the selector knob, Enter or F1.

20. A recall message displays when complete.

Note

Remember that only the data you saved to internal memory is saved to USB. Only the active channel is saved.
If you try to recall data that originated from a load module different than the active channel, an error message appears. The filename must reflect the active channel’s load module type.

Machine Type Error
Saving/Recalling Presets to USB

Background

There are two options to save channel presets to a USB flash drive:

Save Chan Current: Saves the active channel’s presets (P0-P9) into the root directory (400X_XX.P). Press F5 (File Utility) to select the directory to save.

Save Chan All: Saves every channel’s presets (CH1 P0-P9 - CH8 P0-P9) into a directory (ALL00XX) as separate files for each channel (400X_C1.P-400X_C8.P).

Recall: Recalls the selected file to the active channel’s presets (P0-P9). You cannot update all channels at once; you can recall only one channel at a time.

The file extension *.P is for channel Presets only.

For more information about the file structures, refer to page 104.

Parameter

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Save Channel Data:</th>
<th>Directory: ALL0000-ALL0099</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Current File:</td>
<td>400X_XX.P</td>
</tr>
<tr>
<td></td>
<td>Current File:</td>
<td>400X_XX.P</td>
</tr>
<tr>
<td>Recall Channel Data:</td>
<td>File:</td>
<td>400X_XX.P</td>
</tr>
<tr>
<td></td>
<td>Data: Current</td>
<td></td>
</tr>
</tbody>
</table>

Panel Operation

1. Insert a USB flash drive into the front panel USB slot.
2. Ensure that you have set the USB path. Refer to page 278.

3. Press the File key.

4. Press F1 repeatedly until the Media USB menu appears.

5. Use the selector knob to edit Save Channel and Data Type.

6. Choose All and Preset
The screen updates to show Save Folder. Note that you cannot recall all presets at once; you can only save them.

7. Use the selector knob to edit Save Folder.

8. Choose a directory name (ALL0000-ALL0099).

9. Press F3 (Save)

10. A screen message displays when the save is complete.

ALL0001 Save Ok

Save/Recall Preset 11. Use the selector knob to edit (current channel) Save Chan and Data Type.

13. Use the selector knob to edit Save File or Recall file.

14. Choose a filename.

15. Press F3 (Save) to save or F4 (Recall) to recall the channel presets.

16. A message displays when the save or recall has completed.

   4003_01.P Save Ok
   4003_01.P Recall Ok
Recall File from USB Path

17. Press F5 (File Utility).

18. Use the selector knob to select path for saving preset: usb:\ALLXXX\File: 400X_XX.

19. Press the selector knob, Enter, or F1.

20. A recall message displays when complete.

Note

Remember that only data you have saved to internal memory is saved to USB. Only the active channel presets are saved.
If you try to recall data that originated from a load module different than the active channel, an error message appears. The filename must reflect the active channel’s load module type.

Machine Type Error
Saving/Recalling Sequences to USB

Background
There are two options to save sequences to a USB flash drive. You can save sequences from either all channels or the current channel only.

Save All: All channels’ sequences are saved to a directory (ALL00XX) as separate files for each channel (400X_C1.A-400X_C8.A).

Save Current: The current channel’s sequence is saved to the root directory (400X_XX.A). Press F5 (File Utility) to select the directory to save.

Recall: You can recall sequences for only the current channel. You cannot recall all channels’ sequences at once.

The file extension *.A is for sequences only.

For more information about the file structures, refer to page 104.

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Save Channel Data:</th>
<th>Directory: ALL0000-ALL0099</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current</td>
<td></td>
<td>File: 400X_C1.A</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Save Channel Data:</th>
<th>File: 400X_XX.A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Recall Channel Data: All</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Panel Operation
1. Insert a USB flash drive into the front panel USB slot.
2. Ensure that the USB path has been set. Refer to page 278.
3. Press the File key.

4. Press F1 repeatedly until the Media USB menu appears.

5. Use the selector knob to edit Save Channel and Data Type.

6. Choose All and Sequence.
The screen updates to show Save Folder. Note that you cannot recall all Sequence data at once; you can only save it.

7. Use the selector knob to edit Save Folder.

8. Choose a directory name (ALL0000-ALL0099).

9. Press F3 (Save)

10. A screen message displays when saving.

Save All Chan in ALL0000

Save/Recall SEQ (current channel)

11. Use the selector knob to edit Save Chan and Data Type.

12. Choose Current and SEQ.
13. Use the selector knob to edit Save File or Recall File.

14. Choose a filename.

15. Press F3 (Save) to save or F4 (Recall) to recall the current channel’s sequence.

16. A message displays when you save/recall the file.

4004_01.A Save OK
4004_01.A Recall OK
Recall File from USB Path

17. Press F5 (File Utility).

18. Use the selector knob to select path for saving sequence: usb:\ALLXXX\File: 400X_XX.A.

19. Press the selector knob, Enter, or F1.

20. A recall message displays when complete.

Note: Remember that you must save a sequence to the internal buffer before you can save it to USB.
If you try to recall data that originated from a load module different than the active channel, an error message appears. The filename must reflect the active channel’s load module type.

Machine Type Error
Quick Preset Recall/Save

**Background**

The RMX-400x Series mainframes have up to 10 channel presets (P0-P9). Quick recalling or saving presets applies to only the active channel. For example, P1 on CH1 is not the same as P1 on CH2.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Presets</th>
<th>P0-P9 (current channel)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Panel Operation</td>
<td>1. Remove any USB devices from the front panel.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2. Select the channel to which you want to save channel presets.</td>
<td>Refer to page 136.</td>
</tr>
<tr>
<td>Save Current Channel Preset</td>
<td>3. To save a channel preset, press the Preset key and hold any number key (0-9) for a short time until you hear a beep.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4. To save all channel presets, press the Shift and Preset keys and hold any number (0-9) for a short time until you hear a beep.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5. Press the Preset key again to deactivate it.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>The preset is saved to the one of 10 presets depending on the number you chose.</td>
<td></td>
</tr>
<tr>
<td>Recall Current Channel Preset</td>
<td>6. Press the Preset key and any number key.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0 = P0, 1 = P1, etc.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Only the current channel preset is recalled.</td>
<td></td>
</tr>
</tbody>
</table>
Recall All Channel Presets

7. Press the Shift and Preset keys and any number key.
   
   \[0 = \text{P0}, 1 = \text{P0}, \text{etc.}\]

8. Press the Preset key again to deactivate it.

Only the active channel’s channel preset is recalled.

Recall Setup Memory (Frame Link).

Background

A master mainframe can command all mainframes (master and slave) to recall setup memory from their internal memory. No setup data is recalled from the master mainframe to the slave units.

Parameter | Setup memory 1-4.
---|---
Panel Operation | 1. On the master mainframe, follow the procedure for recalling setup memory for all channels. Refer to page 276

All mainframes update setup memory on recall.

⚠️ Note

You must save setup data before recalling both master and slave. If you do not save the setup data first, there will be no value change after recalling.
Recall Preset Memory (Frame Link)

Background
A master mainframe can command all units to recall preset memory from their internal memory. You can recall only the first three preset memories (P0-P2).

You can recall channel presets via the file menu or using the quick recall feature using the number pad.

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Presets</th>
<th>P0-P2 (current channel)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Panel Operation: Quick Keys</td>
<td>1. Remove any USB devices from the front panel.</td>
<td></td>
</tr>
<tr>
<td>2. On the master mainframe, press the Shift and Preset keys.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Press any number key (0-2). 0 = P0, 1 = P1, etc.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The screen flashes momentarily when the presets are recalled.

Panel Operation: File menu
4. On the master mainframe, follow the procedure to recall preset memory for all channels. Refer to page 274

The screen flashes momentarily when the presets are recalled.

Note
You must save preset data before recalling both master and slave. If you do not save preset data first, the value after recalling will be the factory default setting.
Recall Factory/User’s Defaults

Background
You can save or recall the factory/user’s defaults at any time. For details about the factory defaults, refer to the default settings in the appendix, page 331.

Panel Operation
1. Press the File key.

2. Press F1 repeatedly until the Media Default menu appears.

3. Press Factory Default (F2) to recall the factory default settings.
4. Press F2 again to ensure recall factory default setting.

5. Wait a short time for the settings to be recalled.

6. Press Save (F3) to save the user's default.
7. Press Save (F3) again to ensure saving the user's default.

8. Wait a short time for the settings to be saved.

9. Press Recall (F4) to recall the user’s default.
10. Press Recall (F4) to ensure recalling the user's default

11. Wait a short time for the settings to be saved.
INTERFACE

This chapter details the pin configuration of the RS232, frame link, channel control and go/nogo interfaces.

Interface Configuration ........................................... 312
  Configure RS-232C Interface .................................. 312
  Configure Channel Control Interface ....................... 313
  Configure Frame Link Interface ............................... 315
  Configure Go/NoGo Interface .................................. 318
  USB Interface Connection .................................... 319
# Interface Configuration

## Configure RS-232C Interface

<table>
<thead>
<tr>
<th>RS-232C Configuration</th>
<th>Connector</th>
<th>DB-9, male</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baud rate</td>
<td>9600</td>
<td></td>
</tr>
<tr>
<td>Parity</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>Data bit</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Stop bit</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

Connect the RS232C cable (National Instruments part no. GTL-232) to the rear panel port: DB-9 male connector.

### Pin Assignment

1: 5
2: RxD (Receive data)
3: TxD (Transmit data)
5: GND

1, 4, 6, 7, 8, 9: no connection

### PC Connection

Use the null modem connection as shown in the diagram below.
Configure Channel Control Interface

<table>
<thead>
<tr>
<th>Channel Control Configuration</th>
<th>Connector</th>
<th>Screwless connector.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wire gauge</td>
<td>22-28 AWG (24 AWG recommended).</td>
<td></td>
</tr>
<tr>
<td>Wire connection</td>
<td>10 mm strip gauge for connection.</td>
<td></td>
</tr>
</tbody>
</table>

Input 0-10V.

**Pin Assignment**

<table>
<thead>
<tr>
<th>Pin</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>GND, Negative potential of the load input terminal.</td>
</tr>
<tr>
<td>2</td>
<td>I MON (OUTPUT), Load input current monitor; where 0 V = 0% of input current and 10 V = 100% of input current.</td>
</tr>
<tr>
<td>3</td>
<td>V MON (OUTPUT), Load input voltage monitor; where 0 V = 0% of input voltage and 10 V = 100% of input voltage.</td>
</tr>
<tr>
<td>4</td>
<td>Ext Voltage ref (INPUT), External voltage reference, where 0 V = 0% of rating voltage/current and 10 V = 100% of rating voltage/current. The external voltage reference is for CC and CV mode.</td>
</tr>
</tbody>
</table>
5 Load On

Load On Input.
Load on = Active low.
Load off = Active high. (Pin 5 of the connector is internally pulled up to 3.3 V with a 10 kΩ resistor when the switch is open. Thus, when the switch is open, pin 5 is logically high. When the switch is closed, pin 5 is pulled down to the GND ground level, making pin 5 logically low.)

Load On/Off determines whether the external switch is closed (low) or open (high).

6 +15V

Internal power output. Max 50 mA.
Channel Control Interface Constraints

Mode/Range
You can select mode and range configuration via only the front panel.

Configure Frame Link Interface

Connection
Connect the frame link cable (MIL 20 pin connector) to the rear panel port: 20-pin male connector.

Pin Assignment (Frame Link Connector 1)

<table>
<thead>
<tr>
<th>Pin Number</th>
<th>Pin Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pin1</td>
<td>A</td>
<td>Input, Recall Preset memory 0 (all channels)</td>
</tr>
<tr>
<td>Pin2</td>
<td>B</td>
<td>Input, Recall Preset memory 1 (all channels)</td>
</tr>
<tr>
<td>Pin3</td>
<td>C</td>
<td>Input, Recall Preset memory 2 (all channels)</td>
</tr>
<tr>
<td>Pin4</td>
<td>Reserved</td>
<td>Reserved</td>
</tr>
<tr>
<td>Pin5</td>
<td>MEM_1</td>
<td>Input, Recall Setup memory 1 (all channels)</td>
</tr>
<tr>
<td>Pin6</td>
<td>MEM_2</td>
<td>Input, Recall Setup memory 2 (all channels)</td>
</tr>
<tr>
<td>Pin7</td>
<td>MEM_3</td>
<td>Input, Recall Setup memory 3 (all channels)</td>
</tr>
<tr>
<td>Pin8</td>
<td>MEM_4</td>
<td>Input, Recall Setup memory 4 (all channels)</td>
</tr>
</tbody>
</table>
### Pin Assignment

<table>
<thead>
<tr>
<th>Pin Number</th>
<th>Pin Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pin9</td>
<td>Enable</td>
<td>Input, Enable Load (On/Off), recall Preset memory (0-3) and Setup memory (1-4)</td>
</tr>
<tr>
<td>Pin10</td>
<td>Load</td>
<td>Input, Load On/Off</td>
</tr>
<tr>
<td>Pin11</td>
<td>NC</td>
<td>No connection</td>
</tr>
<tr>
<td>Pin12</td>
<td>NC</td>
<td>No connection</td>
</tr>
<tr>
<td>Pin13</td>
<td>NC</td>
<td>No connection</td>
</tr>
<tr>
<td>Pin14</td>
<td>NC</td>
<td>No connection</td>
</tr>
<tr>
<td>Pin15</td>
<td>Load Status</td>
<td>Output, load on status</td>
</tr>
<tr>
<td>Pin16</td>
<td>Alarm Status</td>
<td>Output, alarm activated</td>
</tr>
<tr>
<td>Pin17</td>
<td>+5V</td>
<td>Power source output, +5V, 100 mA</td>
</tr>
<tr>
<td>Pin18</td>
<td>NC</td>
<td>No connection</td>
</tr>
<tr>
<td>Pin19</td>
<td>GND</td>
<td>Ground</td>
</tr>
<tr>
<td>Pin20</td>
<td>GND</td>
<td>Ground</td>
</tr>
</tbody>
</table>

#### Pin Assignment (Frame link connector 2)

<table>
<thead>
<tr>
<th>Pin Number</th>
<th>Pin Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pin1</td>
<td>Sync._A</td>
<td>Output, Sync signal, Recall Preset memory 0 (all channels)</td>
</tr>
<tr>
<td>Pin2</td>
<td>Sync._B</td>
<td>Output, Sync signal, Recall Preset memory 1 (all channels)</td>
</tr>
<tr>
<td>Pin</td>
<td>Description</td>
<td>Function</td>
</tr>
<tr>
<td>------</td>
<td>----------------------------------</td>
<td>--------------------------------------------------------------------------</td>
</tr>
<tr>
<td>3</td>
<td>Sync._C</td>
<td>Output, Sync signal, Recall Preset memory 2 (all channels)</td>
</tr>
<tr>
<td>4</td>
<td>Reserved</td>
<td>Reserved</td>
</tr>
<tr>
<td>5</td>
<td>Sync._MEM_1</td>
<td>Output, Sync signal, Recall Setup memory 1 (all channels)</td>
</tr>
<tr>
<td>6</td>
<td>Sync._MEM_2</td>
<td>Output, Sync signal, Recall Setup memory 2 (all channels)</td>
</tr>
<tr>
<td>7</td>
<td>Sync._MEM_3</td>
<td>Output, Sync signal, Recall Setup memory 3 (all channels)</td>
</tr>
<tr>
<td>8</td>
<td>Sync._MEM_4</td>
<td>Output, Sync signal, Recall Setup memory 4 (all channels)</td>
</tr>
<tr>
<td>9</td>
<td>Sync._Enable</td>
<td>Output, Sync signal, Enable Load (On/Off), recall Preset memory (0-3) and Setup memory (1-4)</td>
</tr>
<tr>
<td>10</td>
<td>Sync._Load On/Off</td>
<td>Output, Sync signal, Load On/Off</td>
</tr>
<tr>
<td>11</td>
<td>NC</td>
<td>No connection</td>
</tr>
<tr>
<td>12</td>
<td>NC</td>
<td>No connection</td>
</tr>
<tr>
<td>13</td>
<td>NC</td>
<td>No connection</td>
</tr>
<tr>
<td>14</td>
<td>NC</td>
<td>No connection</td>
</tr>
<tr>
<td>15</td>
<td>Load Status</td>
<td>Output, load on status</td>
</tr>
<tr>
<td>16</td>
<td>Alarm Status</td>
<td>Output alarm activated</td>
</tr>
<tr>
<td>17</td>
<td>N.C</td>
<td>No connection</td>
</tr>
</tbody>
</table>
Pin18  |  +5V  |  Power source output, +5V, 100 mA
Pin19  |  GND  |  Ground
Pin20  |  GND  |  Ground

**Explanation**
- Input: active low (0-1 V) active high (4-5 V)
- Note: Input type is internally pulled up to 5 V with a 10 kΩ resistor.
- Output: high (floating) low (0-1 V)
- Note: Output type is internally Open collector outputs, maximum 30 VDC with 1.1 V saturation voltage (100 mA).
- When Enable (pin9) is on (active low), the following is disabled from the mainframe: Load On/Off (pin 10) activating loads and recalling preset (pin 1-3) or setup memory (pin 5-8).

**Frame Link Constraints**
- You can link up to five devices (one master and four slave units) with a maximum cable length of 30 cm for each cable.
- You must turn on all connected devices.
- No loop or parallel connections.

**Configure Go/NoGo Interface**

**Connection**
Use a DSUB (DB-15 female) connector to connect to the go/nogo port.

The go/nogo port is an output-only port.
Pin assignment

<table>
<thead>
<tr>
<th>Pin</th>
<th>Description</th>
<th>Pin</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>GND</td>
<td>9</td>
<td>Ch1_GO/NG</td>
</tr>
<tr>
<td>2</td>
<td>GND</td>
<td>10</td>
<td>GND</td>
</tr>
<tr>
<td>3</td>
<td>Ch2_GO/NG</td>
<td>11</td>
<td>Ch6_GO/NG</td>
</tr>
<tr>
<td>4</td>
<td>GND</td>
<td>12</td>
<td>GND</td>
</tr>
<tr>
<td>5</td>
<td>Ch3_GO/NG</td>
<td>13</td>
<td>Ch7_GO/NG</td>
</tr>
<tr>
<td>6</td>
<td>GND</td>
<td>14</td>
<td>GND</td>
</tr>
<tr>
<td>7</td>
<td>Ch4_GO/NG</td>
<td>15</td>
<td>Ch8.GO/NG</td>
</tr>
<tr>
<td>8</td>
<td>GO/NG_Enable</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Connection Type
Open collector output maximum 30 VDC with 1.1 V saturation voltage (100 mA).
30 V DC (high) Pass (go) or SPEC test: off
1.1 V DC (low) Fail (nogo)

USB Interface Connection

Connection For USB remote connection, use the USB-B port on the mainframe rear panel.
FAQ

Q1. The load voltage indicated on the load module is below the expected voltage.

A1. Ensure that the load leads are as short as possible, twisted, and use the appropriate wire gauge. Ensure that you use voltage sense; this can help alleviate the voltage drop across the load leads.

Q2. When I try to start a program sequence, it does not run. “No Active Channel” is displayed.

A2. Ensure that the channel(s) is activated (not set to off) in the FUNC→Program→Active Channel menu.

Q3. When trying to save to USB, the USB memory stick is unresponsive.

A3. Try restarting the RMX-400x mainframe. If this does not solve the problem, ensure that the USB memory is cleanly formatted.

Q4. When I try to clear an alarm, it does not work.

A4. Before clearing an alarm or using the Protection Clear All function, you must turn off the DUT. When the DUT is off, you can clear the alarm(s).

For more information, contact your local dealer or National Instruments at www.ni.com.
APPENDIX

Fuse Replacement

Step | 1. Turn off the power at the wall outlet and rear panel. Remove the power cord.
     | 2. Remove the fuse socket using a minus driver.
     | 3. Replace the fuse in the holder.

Rating | T3.15 A, 250 V
Firmware Update

Background
You can update the RMX-400x firmware using a USB memory stick. For the latest firmware, contact your local National Instruments distributor or download the latest firmware from www.ni.com.

Filename
File: P2KAXXXX.UPG

Note
Copy the firmware file (*.UPG) to the root directory of a USB stick before proceeding with the firmware update.

Panel Operation
1. Insert a USB flash drive into the front panel USB slot.
2. Press the File key.
3. Press F1 repeatedly until the Media USB menu appears.
5. Use the selector knob to scroll down to the firmware file (*.UPG) and press the selector knob, Enter, or F1.
6. Press F1 to confirm the firmware upgrade.
7. Wait for the firmware upgrade to finish. A message displays on completion.

8. Turn the power off.

Recall Factory Default

9. Turn the power on.

10. Press the File key.

11. Press F1 repeatedly until the Media Default menu appears.

12. Press Factory Default (F2) to recall the factory default settings.

13. The firmware updating process is complete, and you can use the device now.
14. Press F2 again to ensure recalling the factory default setting.

15. Wait a short time for the settings to be recalled.
Calibration

Background

Calibrate the RMX-400x load modules at least once a year.

National Instruments does not support End-User calibration. Refer to your distributor for calibration details.
Range Chart

RMX-4003 Low Range
10 W

RMX-4003 High Range
100 W
RMX-4003 CV Low Range

![Graph showing voltage and current for RMX-4003 CV Low Range](image)

RMX-4004 (L) High Range 30 W

![Graph showing voltage and current for RMX-4004 (L) High Range](image)

RMX-4004 (L) CV Low Range

![Graph showing voltage and current for RMX-4004 (L) CV Low Range](image)
RMX-4004 (R) Low Range 25 W

RMX-4004 (R) High Range 250 W

RMX-4004 (R) CV Low Range
RMX-4005 Low Range
35 W

RMX-4005 High Range
350 W

RMX-4005 CV Low Range
RMX-4006 Low Range 35 W

RMX-4006 High Range 350 W

RMX-4006 CV Low Range
## Default Settings

<table>
<thead>
<tr>
<th>Menu Item</th>
<th>CC Mode</th>
<th>CR Mode</th>
<th>CV Mode</th>
<th>CP Mode</th>
<th>CHAN- Protection</th>
<th>CHAN- Other</th>
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<tbody>
<tr>
<td></td>
<td>Mode: Static</td>
<td>Mode: Static</td>
<td>Response: Slow</td>
<td>A/B Value: Min W</td>
<td>OCP Setting: OFF</td>
<td>Von Latch: OFF</td>
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<tr>
<td></td>
<td>A/B Value: Min A</td>
<td>A/B Value: Max Ω</td>
<td>A/B Value: Max V</td>
<td>Curr Limit: Max A</td>
<td>OVP Level: Max</td>
<td>Von Voltage: 0 V</td>
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<td></td>
<td>Rising Slew Rate: Max</td>
<td>Rising Slew Rate: Max</td>
<td>I Meas: High</td>
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<td>Falling Slew Rate: Max</td>
<td>Falling Slew Rate: Max</td>
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<td>OFF Ω/OFF KΩ (CR mode)</td>
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<td><strong>FILE</strong></td>
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<td>Recall File: No File</td>
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<td>Auto Load On: Prog</td>
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<td><strong>Load</strong></td>
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<td><strong>Interface</strong></td>
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<td><strong>UTILITY</strong></td>
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<td>Contrast: 8</td>
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<td><strong>Other</strong></td>
<td>Brightness: 70</td>
<td>Frame CONT: OFF</td>
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<td>Alarm (M): ON</td>
<td>Alarm (S): OFF</td>
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<td>Knob Type: Updated</td>
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<td>Slave Knob: SetValue</td>
<td>Language: English</td>
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<td>High Resoultion: ON</td>
<td>System Mode: 0</td>
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<td>Von Latch Clear: Auto</td>
<td>Measure Period: 200 ms</td>
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<td>Jog Shuttle Control: OFF</td>
<td>RVP Load Off: OFF</td>
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</table>
Specifications

The specifications apply when the RMX-400x series is powered on for at least 30 minutes to warm up to a temperature of 25°C ± 5°C, unless specified otherwise.

<table>
<thead>
<tr>
<th></th>
<th>RMX-4000</th>
<th>RMX-4002</th>
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</thead>
<tbody>
<tr>
<td>MODULE SLOTS</td>
<td>2</td>
<td>4</td>
</tr>
</tbody>
</table>

**General**

**Operating Environment**
- **Temperature**: 0 °C to 40 °C
- **Altitude**: Up to 2000 m
- **Location**: Indoor, no direct sunlight, dust free, almost nonconductive pollution.

**Storage Environment**
- **Temperature**: -10 °C to 70 °C
- **Relative humidity**: < 90% RH
- **Location**: Indoor

**Power supply**
- AC input voltage range: 100-120 Vac / 200-240 Vac (90-132 Vac / 180-250 Vac)
  - Frequency: 47-63 Hz
  - Power rating: RMX-4002: 250 VA Max
    - RMX-4000: 150 VA Max
- Transient overvoltage on the main supply is 2500 V.

**Fuse**
- T3.15 A/250 V

**Pollution degree**
- 2

**Measurement category**
- 1

**Rear panel USB class**
- USB 2.0 full speed (CDC-ACM)

**Weight**
- Approx. 17.1 kg (full modules)
- Approx 28.4 kg (full modules)
### RMX-4003 (100 W x 2)

<table>
<thead>
<tr>
<th>Range</th>
<th>Low</th>
<th>High</th>
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</thead>
<tbody>
<tr>
<td>Current</td>
<td>0-2 A</td>
<td>0-20 A</td>
</tr>
<tr>
<td>Voltage</td>
<td>0-80 V</td>
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</tr>
<tr>
<td>Min. operating</td>
<td>0.4 V at 2 A</td>
<td>0.8 V at 20 A</td>
</tr>
<tr>
<td>voltage (dc)</td>
<td>0.2 V at 1 A</td>
<td>0.4 V at 10 A</td>
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### Static Mode

#### Contant Current Mode

<table>
<thead>
<tr>
<th>Operating range</th>
<th>0-2 A</th>
<th>0-20 A</th>
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<tbody>
<tr>
<td>Setting Range</td>
<td>0-2.04 A</td>
<td>0-20.4 A</td>
</tr>
<tr>
<td>Resolution</td>
<td>0.1 mA</td>
<td>1 mA</td>
</tr>
<tr>
<td>Accuracy</td>
<td>±(0.1% set + 0.1% F.S. (\times 2)) ±(0.1% set + 0.2% F.S.)</td>
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#### Constant Resistance Mode

<table>
<thead>
<tr>
<th>Operating Range</th>
<th>0.075 Ω-300 Ω (100 W/16 V)</th>
<th>3.75 Ω-15 kΩ (100 W/80 V)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Setting Range</td>
<td>0.075 Ω-300 Ω (100 W/16 V)</td>
<td>3.75 Ω-15 kΩ (100 W/80 V)</td>
</tr>
<tr>
<td>Resolution</td>
<td>0.333 mS (100 W/16 V)</td>
<td>6.667 μS (100 W/80 V)</td>
</tr>
<tr>
<td>Accuracy</td>
<td>300 Ω: ±(0.2% set + 0.1 s)</td>
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<tr>
<td></td>
<td>15 kΩ: ±(0.1% set + 0.01 s)</td>
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#### Constant Voltage + Constant Current Mode

<table>
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<tr>
<th>Operating range</th>
<th>1-16 V</th>
<th>1-80 V</th>
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<tbody>
<tr>
<td>Setting range</td>
<td>0-16.32 V</td>
<td>0-81.6 V</td>
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<tr>
<td>Resolution</td>
<td>0.4 mV</td>
<td>2 mV</td>
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<tr>
<td>Accuracy</td>
<td>±(0.05% set + 0.1% F.S.)</td>
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<td>Current setting</td>
<td>0-2.04 A</td>
<td>0-20.4 A</td>
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<tr>
<td>range</td>
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</tr>
<tr>
<td>Resolution</td>
<td>0.1 mA</td>
<td>1 mA</td>
</tr>
<tr>
<td>Accuracy</td>
<td>±(0.1% set + 0.1% F.S. (\times 2)) ±(0.1% set + 0.2% F.S. (\times 2))</td>
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*\(\times 1\): F.S. = Full scale of H range

#### Constant Power + Constant Current Mode

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<tr>
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<th>1-10 W</th>
<th>1-100 W</th>
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<td>Setting range</td>
<td>0-10.2 W</td>
<td>0-102 W</td>
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<tr>
<td>Resolution</td>
<td>1 mW</td>
<td>10 mW</td>
</tr>
<tr>
<td>Accuracy</td>
<td>±(0.5% set + 0.5% F.S. (\times 2)) ±(0.5% set + 0.5% F.S.)</td>
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<td>0-2.04 A</td>
<td>0-20.4 A</td>
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</tr>
<tr>
<td>Resolution</td>
<td>0.1 mA</td>
<td>1 mA</td>
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<tr>
<td>Accuracy</td>
<td>±(0.1% set + 0.1% F.S.(^*1))</td>
<td>±(0.1% set + 0.2% F.S.(^*1))</td>
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\(^*1\): F.S. = Full scale of H range
### Dynamic Mode

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<th>0.025 ms – 10 ms / Res: 1 us</th>
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<tr>
<td></td>
<td></td>
<td>10 ms – 30 s / Res: 1 ms</td>
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<tr>
<td>Accuracy</td>
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<td>1 us/1 ms ± 100 ppm</td>
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### Constant Current Mode

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<thead>
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<th>Slew rate</th>
<th>0.32-80 mA/us</th>
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<tbody>
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<td></td>
<td></td>
<td>3.2-800 mA/us</td>
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<tr>
<td>Slew rate</td>
<td>0.32 mA/us</td>
<td>3.2 mA/us</td>
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<td>Slew rate setting</td>
<td>±(10% + 15 us)</td>
<td>±(10% + 15 us)</td>
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<tr>
<td>accuracy</td>
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<td>0-20.4 A</td>
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<td>1 mA</td>
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### Constant Resistance Mode

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<tbody>
<tr>
<td></td>
<td></td>
<td>3.2 mA/us</td>
</tr>
<tr>
<td>Slew rate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Slew rate setting</td>
<td>±(10% + 50 us)</td>
<td></td>
</tr>
<tr>
<td>accuracy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Resistance</td>
<td>0.075 Ω-300 Ω(100 W/16 V)</td>
<td></td>
</tr>
<tr>
<td>setting range</td>
<td>3.75 Ω-15 kΩ (100 W/80 V)</td>
<td></td>
</tr>
<tr>
<td>Resistance</td>
<td>0.333 mS(100 W/16 V)</td>
<td></td>
</tr>
<tr>
<td>resolution</td>
<td>6.667 μS(100 W/80 V)</td>
<td></td>
</tr>
<tr>
<td>Resistance</td>
<td>300 Ω: ±(0.5% set + 0.1 s)</td>
<td></td>
</tr>
<tr>
<td>accuracy</td>
<td>15 kΩ: ±(0.5% set + 0.01 s)</td>
<td></td>
</tr>
</tbody>
</table>

### Measurement

<table>
<thead>
<tr>
<th></th>
<th>Voltage Readback</th>
<th>Current Readback</th>
</tr>
</thead>
<tbody>
<tr>
<td>Range</td>
<td>0-16 V</td>
<td>0-2 A</td>
</tr>
<tr>
<td>Resolution</td>
<td>0.32 mV</td>
<td>0.4 mA</td>
</tr>
<tr>
<td>Accuracy</td>
<td>±(0.025% set + 0.025% F.S.)</td>
<td></td>
</tr>
</tbody>
</table>

|                  |                     |                               |
| Range            | 0-80 V              | 0-20 A                        |
| Resolution       | 1.6 mV              | 0.4 mA                        |
| Accuracy         | ±(0.025% set + 0.025% F.S.) |                        |
Accuracy

\[ \pm (0.05\% \text{ set} + 0.05\% \text{ F.S.} \times 2) \]

Power Readback

<table>
<thead>
<tr>
<th>Range</th>
<th>0-10 W</th>
<th>0-100 W</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accuracy</td>
<td>[ \pm (0.1% \text{ set} + 0.1% \text{ F.S.}) ]</td>
<td></td>
</tr>
</tbody>
</table>

*1 : Power F.S. = Vrange F.S. × Irange F.S.
*2 : F.S. = Full scale of H range

### Protective

#### Over Power Protection

<table>
<thead>
<tr>
<th>Range</th>
<th>1-102 W</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resolution</td>
<td>0.5 W</td>
</tr>
<tr>
<td>Accuracy</td>
<td>[ \pm (2% \text{ set} + 0.25% \text{ F.S.}) ]</td>
</tr>
</tbody>
</table>

#### Over Current Protection

<table>
<thead>
<tr>
<th>Range</th>
<th>0-25-20.4 A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resolution</td>
<td>0.05 A</td>
</tr>
<tr>
<td>Accuracy</td>
<td>[ \pm (2% \text{ set} + 0.25% \text{ F.S.}) ]</td>
</tr>
</tbody>
</table>

#### Over Voltage Protection

<table>
<thead>
<tr>
<th>Range</th>
<th>1-81.6 V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resolution</td>
<td>0.2 V</td>
</tr>
<tr>
<td>Accuracy</td>
<td>[ \pm (2% \text{ set} + 0.25% \text{ F.S.}) ]</td>
</tr>
</tbody>
</table>

Over temperature protection: 85 °C

#### Rated Power Protection (CPP)

<table>
<thead>
<tr>
<th>Value</th>
<th>110 W</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accuracy</td>
<td>[ \pm 5% \text{ set} ]</td>
</tr>
</tbody>
</table>

### General

#### Short Circuit

<table>
<thead>
<tr>
<th>Current (CC)</th>
<th>2.2/2 A ≈ 22/20 A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage (CV)</td>
<td>0 V</td>
</tr>
<tr>
<td>Resistance (CR)</td>
<td>3.75 Ω ≈ 0.075 Ω</td>
</tr>
</tbody>
</table>

Input resistance (load off): 500 kΩ (typical)

Temperature coefficient: 100 ppm

Weight: Approx. 3.8 kg
## RMX-4004 (30 W/250 W)

<table>
<thead>
<tr>
<th>Range</th>
<th>High</th>
<th>Low</th>
<th>High</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current</td>
<td>0-5 A</td>
<td>0-4 A</td>
<td>0-40 A</td>
</tr>
<tr>
<td>Voltage</td>
<td></td>
<td>0-80 V</td>
<td></td>
</tr>
<tr>
<td>Min Operating Voltage (dc)</td>
<td>0.8 V at 5 A</td>
<td>0.4 V at 4 A</td>
<td>0.8 V at 40 A</td>
</tr>
<tr>
<td>Voltage</td>
<td>0.4 V at 2.5 A</td>
<td>0.2 V at 2 A</td>
<td>0.4 V at 20 A</td>
</tr>
</tbody>
</table>

## STATIC MODE

### Constant Current Mode

<table>
<thead>
<tr>
<th>Operating range</th>
<th>0-5 A</th>
<th>0-4 A</th>
<th>0-40 A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Setting range</td>
<td>0-5.1 A</td>
<td>0-4.08 A</td>
<td>0-40.8 A</td>
</tr>
<tr>
<td>Resolution</td>
<td>0.125 mA</td>
<td>0.1 mA</td>
<td>1 mA</td>
</tr>
<tr>
<td>Accuracy</td>
<td>±(0.1% set + 0.1% F.S.)</td>
<td>±(0.1% set + 0.1% F.S.)</td>
<td>±(0.1% set + 0.2% F.S.)</td>
</tr>
</tbody>
</table>

### Constant Resistance Mode

<table>
<thead>
<tr>
<th>Operating range</th>
<th>0.3 Ω-1.2 kΩ (30 W/16 V)</th>
<th>0.0375 Ω-150 Ω (250 W/16 V)</th>
<th>1.875 Ω-7.5 kΩ (250 W/80 V)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Setting range</td>
<td>0.3 Ω-1.2 kΩ (30 W/16 V)</td>
<td>0.0375 Ω-150 Ω (250 W/16 V)</td>
<td>1.875 Ω-7.5 kΩ (250 W/80 V)</td>
</tr>
<tr>
<td>Resolution</td>
<td>833.333 us (30 W/16 V)</td>
<td>0.666 mS (250 W/16 V)</td>
<td>13.333 uS (250 W/80 V)</td>
</tr>
<tr>
<td>Accuracy</td>
<td>1.2 kΩ: ±(0.2% set + 0.1 s)</td>
<td>150 Ω: ±(0.2% set + 0.1 s)</td>
<td>7.5k Ω: ±(0.1% set + 0.01 s)</td>
</tr>
</tbody>
</table>

### Constant Voltage + Constant Current Mode

<table>
<thead>
<tr>
<th>Operating range</th>
<th>1-16 V</th>
<th>1-80 V</th>
<th>1-16 V</th>
<th>1-80 V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Setting range</td>
<td>0-16.32 V</td>
<td>0-81.6 V</td>
<td>0-16.32 V</td>
<td>0-81.6 V</td>
</tr>
<tr>
<td>Resolution</td>
<td>0.4 mV</td>
<td>2 mV</td>
<td>0.4 mV</td>
<td>2 mV</td>
</tr>
<tr>
<td>Accuracy</td>
<td>±(0.05% set + 0.1% F.S.)</td>
<td>±(0.05% set + 0.1% F.S.)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Current Setting Range

<table>
<thead>
<tr>
<th>Resolution</th>
<th>Accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.125 mA</td>
<td>±(0.1% set + 0.2% F.S.)</td>
</tr>
<tr>
<td>0.1 mA</td>
<td>±(0.1% set + 0.1% F.S.*1)</td>
</tr>
<tr>
<td>1 mA</td>
<td>±(0.1% set + 0.2% F.S.*1)</td>
</tr>
</tbody>
</table>

*1: F.S. = Full scale of H range

### Constant Power + Constant Current Mode

<table>
<thead>
<tr>
<th>Operating range</th>
<th>Setting range</th>
<th>Resolution</th>
<th>Accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-30 W</td>
<td>0-30.6 W</td>
<td>1 mV</td>
<td>±(0.5% set + 0.5% F.S.)</td>
</tr>
<tr>
<td>1-25 W</td>
<td>0-25.5 W</td>
<td>10 mV</td>
<td></td>
</tr>
<tr>
<td>1-250 W</td>
<td>0-255 W</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Dynamic Mode

<table>
<thead>
<tr>
<th>T1 and T2</th>
<th>Accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.025 ms – 10 ms / Res: 1 us</td>
<td>1 us / 1 ms + 100 ppm</td>
</tr>
<tr>
<td>10 ms – 30 s / Res: 1 ms</td>
<td></td>
</tr>
</tbody>
</table>

### Constant Current Mode

<table>
<thead>
<tr>
<th>Slew rate</th>
<th>Slew rate resolution</th>
<th>Slew rate setting accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.8 – 200 mA/us</td>
<td>0.8 mA/us</td>
<td>±(10% + 15 us)</td>
</tr>
<tr>
<td>0.64–160 mA/us</td>
<td>0.64 mA/us</td>
<td>±(10% + 15 us)</td>
</tr>
<tr>
<td>6.4–1600 mA/us</td>
<td>6.4 mA/us</td>
<td>±(10% + 15 us)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Current setting range</th>
<th>Resolution</th>
<th>Current accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-5.1 A</td>
<td>0.125 mA</td>
<td>±0.4% F.S.</td>
</tr>
<tr>
<td>0-4.08 A</td>
<td>0.1 mA</td>
<td></td>
</tr>
<tr>
<td>0-40.8 A</td>
<td>1 mA</td>
<td></td>
</tr>
</tbody>
</table>
### Resistance

<table>
<thead>
<tr>
<th>Setting Range</th>
<th>Resistance Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.3 Ω - 1.2 kΩ</td>
<td>0.0375 Ω - 150 Ω (250 W/16 V)</td>
</tr>
<tr>
<td>15 Ω - 60 kΩ</td>
<td>1.875 Ω - 7.5 kΩ (250 W/80 V)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Resolution Range</th>
<th>Resolution</th>
</tr>
</thead>
<tbody>
<tr>
<td>83.333 μS (30 W/16 V)</td>
<td>0.666 mS (250 W/16 V)</td>
</tr>
<tr>
<td>1.666 μS (30 W/80 V)</td>
<td>13.333 uS (250 W/80 V)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td>±0.5% set + 0.1 s</td>
</tr>
<tr>
<td>±0.5% set + 0.01 s</td>
</tr>
<tr>
<td>±0.5% set + 0.01 s</td>
</tr>
</tbody>
</table>

### Measurement

#### Voltage Readback

<table>
<thead>
<tr>
<th>Range</th>
<th>Resolution</th>
<th>Accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-16 V</td>
<td>0.32 mV</td>
<td>±(0.025% set + 0.025% F.S.)</td>
</tr>
<tr>
<td>0-80 V</td>
<td>1.6 mV</td>
<td></td>
</tr>
</tbody>
</table>

#### Current Readback

<table>
<thead>
<tr>
<th>Range</th>
<th>Resolution</th>
<th>Accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-5 A</td>
<td>0.1 mA</td>
<td>±(0.05% set + 0.05% F.S.)</td>
</tr>
<tr>
<td>0-40 A</td>
<td>0.8 mA</td>
<td></td>
</tr>
</tbody>
</table>

#### Power Readback

<table>
<thead>
<tr>
<th>Range</th>
<th>Resolution</th>
<th>Accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-30 W</td>
<td>0.15 W</td>
<td>±(0.1% set + 0.1% F.S.)</td>
</tr>
<tr>
<td>0-25 W</td>
<td>1.25 W</td>
<td>±(0.1% set + 0.1% F.S.)</td>
</tr>
<tr>
<td>0-250 W</td>
<td>1.25 W</td>
<td></td>
</tr>
</tbody>
</table>

*1: Power F.S. = Vrange F.S. x Irange F.S.
*2: F.S. = Full scale of H range

### Protective

#### Over Power Protection

<table>
<thead>
<tr>
<th>Range</th>
<th>Resolution</th>
<th>Accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.9-30.6 W</td>
<td>0.15 W</td>
<td>±(2% set + 0.25% F.S.)</td>
</tr>
<tr>
<td>1.25-255 W</td>
<td>1.25 W</td>
<td>±(2% set + 0.25% F.S.)</td>
</tr>
</tbody>
</table>

#### Over Current Protection

<table>
<thead>
<tr>
<th>Range</th>
<th>Resolution</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0625-5.1 A</td>
<td>0.5-40.8 A</td>
</tr>
<tr>
<td></td>
<td>Resolution</td>
</tr>
<tr>
<td>-------------------------</td>
<td>------------</td>
</tr>
<tr>
<td></td>
<td>0.0125 A</td>
</tr>
<tr>
<td></td>
<td>0.1 A</td>
</tr>
</tbody>
</table>

**Over Voltage Protection**

<table>
<thead>
<tr>
<th></th>
<th>Range</th>
<th>Resolution</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1-81.6 V</td>
<td>0.2 V</td>
</tr>
<tr>
<td></td>
<td>±(2% set + 0.25% F.S.)</td>
<td>±(2% set + 0.25% F.S.)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>±(2% set + 0.25% F.S.)</td>
</tr>
</tbody>
</table>

**Over Temperature Protection**

|                         | 85 °C      |

**Rated Power Protection (CPP)**

<table>
<thead>
<tr>
<th></th>
<th>Value</th>
<th>Accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>33 W</td>
<td>±5% set</td>
</tr>
<tr>
<td></td>
<td>275 W</td>
<td></td>
</tr>
</tbody>
</table>

**General**

<table>
<thead>
<tr>
<th></th>
<th>Current (CC)</th>
<th>Voltage (CV)</th>
<th>Resistance (CR)</th>
<th>Input resistance (load off)</th>
<th>Temperature Coefficient</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>5.5/5 A</td>
<td>0 V</td>
<td>15 Ω</td>
<td>500 kΩ (Typical)</td>
<td>100 ppm</td>
<td>Approx. 3.8 kg</td>
</tr>
<tr>
<td></td>
<td>4.4/4 A</td>
<td>= 0 V</td>
<td>0.3 Ω</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>44/40 A</td>
<td>= 0 V</td>
<td>1.875 Ω</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0.0375 Ω</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### RMX-400x Series User Manual

<table>
<thead>
<tr>
<th></th>
<th>RMX-4005</th>
<th>RMX-4006</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Range</strong></td>
<td>Low</td>
<td>High</td>
</tr>
<tr>
<td><strong>Current</strong></td>
<td>0-7 A</td>
<td>0-70 A</td>
</tr>
<tr>
<td><strong>Voltage</strong></td>
<td>0-80 V</td>
<td></td>
</tr>
<tr>
<td><strong>Min operating</strong></td>
<td>0.4 V at 7 A</td>
<td>0.8 V at 70 A</td>
</tr>
<tr>
<td>voltage (dc) typ.</td>
<td>0.2 V at 3.5 A</td>
<td>0.4 V at 35 A</td>
</tr>
</tbody>
</table>

### Static Mode

#### Constant Current Mode

<table>
<thead>
<tr>
<th>Operating range</th>
<th>0-7 A</th>
<th>0-70 A</th>
<th>0-1 A</th>
<th>0-10 A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Setting range</td>
<td>0-7.14 A</td>
<td>0-71.4 A</td>
<td>0-1.02 A</td>
<td>0-10.2 A</td>
</tr>
<tr>
<td>Resolution</td>
<td>0.2 mA</td>
<td>2 mA</td>
<td>0.05 mA</td>
<td>0.5 mA</td>
</tr>
<tr>
<td>Accuracy</td>
<td>±(0.1% set + 0.1% F.S.)</td>
<td>±(0.1% set + 0.1% F.S.)</td>
<td>±(0.1% set + 0.2% F.S.)</td>
<td>±0.1% F.S.</td>
</tr>
</tbody>
</table>

#### Constant Resistance Mode

<table>
<thead>
<tr>
<th>Operating range</th>
<th>0.025 Ω-100 Ω</th>
<th>1.25 Ω-5 kΩ</th>
</tr>
</thead>
<tbody>
<tr>
<td>(350 W/16 V)</td>
<td>(350 W/125 V)</td>
<td></td>
</tr>
<tr>
<td>1.25 Ω-5 kΩ (350 W/80 V)</td>
<td>50 Ω-200 kΩ</td>
<td>(350 W/500 V)</td>
</tr>
<tr>
<td>Setting range</td>
<td>0.025 Ω-100 Ω</td>
<td>1.25 Ω-5 kΩ</td>
</tr>
<tr>
<td>(350 W/16 V)</td>
<td>(350 W/125 V)</td>
<td></td>
</tr>
<tr>
<td>1.25 Ω-5 kΩ (350 W/80 V)</td>
<td>50 Ω-200 kΩ</td>
<td>(350 W/500 V)</td>
</tr>
<tr>
<td>Resolution</td>
<td>20 us (350 W/16 V)</td>
<td>200 kΩ: ±(0.1% set + 0.005 s)</td>
</tr>
<tr>
<td>Accuracy</td>
<td>±(0.2% set + 0.1 s)</td>
<td>5 kΩ: ±(0.2% set + 0.02 s)</td>
</tr>
<tr>
<td></td>
<td>5 kΩ: ±(0.1% set + 0.01 s)</td>
<td>200 kΩ: ±(0.1% set + 0.005 s)</td>
</tr>
</tbody>
</table>

#### Constant Voltage + Constant Current Mode

<table>
<thead>
<tr>
<th>Operating range</th>
<th>1-16 V</th>
<th>1-80 V</th>
<th>2.5-125 V</th>
<th>2.5-500 V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Setting range</td>
<td>0-16.32 V</td>
<td>0-81.6 V</td>
<td>0-127.5 V</td>
<td>0-510 V</td>
</tr>
<tr>
<td>Resolution</td>
<td>0.4 mV</td>
<td>2 mV</td>
<td>2.5 mV</td>
<td>10 mV</td>
</tr>
<tr>
<td>Accuracy</td>
<td>±(0.05% set + 0.1% F.S.)</td>
<td>±(0.05% set + 0.1% F.S.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Current setting range</td>
<td>0-7.14 A</td>
<td>0-71.4 A</td>
<td>0-1.02 A</td>
<td>0-10.2 A</td>
</tr>
<tr>
<td>Resolution</td>
<td>0.2 mA</td>
<td>2 mA</td>
<td>0.05 mA</td>
<td>0.5 mA</td>
</tr>
<tr>
<td>Accuracy</td>
<td>( \pm(0.1% \text{ set} + 0.1% \text{ F.S.}^*) )</td>
<td>( \pm(0.1% \text{ set} + 0.2% \text{ F.S.}^*) )</td>
<td>( \pm(0.1% \text{ set} + 0.1% \text{ F.S.}^*) )</td>
<td>( \pm(0.1% \text{ set} + 0.2% \text{ F.S.}^*) )</td>
</tr>
</tbody>
</table>

**Constant Power + Constant Current Mode**

| Operating range | 1-35 W | 1-350 W | 1-35 W | 1-350 W |
| Setting range   | 0-35.7 W | 0-357 W | 0-35.7 W | 0-357 W |
| Resolution      | 1 mW   | 10 mW   | 1 mW   | 10 mW   |
| Accuracy        | \( \pm(0.5\% \text{ set} + 0.5\% \text{ F.S.}) \) | \( \pm(0.5\% \text{ F.S.}) \) | \( \pm(0.2\% \text{ F.S.}) \) | \( \pm(0.2\% \text{ F.S.}) \) |

| Current Setting Range | 0-7.14 A | 0-71.4 A | 0-1.02 A | 0-10.2 A |
| Resolution         | 0.2 mA   | 2 mA     | 0.05 mA  | 0.5 mA   |
| Accuracy           | \( \pm(0.1\% \text{ set} + 0.1\% \text{ F.S.}) \) | \( \pm(0.1\% \text{ set} + 0.2\% \text{ F.S.}) \) | \( \pm(0.1\% \text{ set} + 0.1\% \text{ F.S.}) \) | \( \pm(0.1\% \text{ set} + 0.2\% \text{ F.S.}) \) |

*1 : F.S. = Full scale of H range

---

**Dynamic Mode**

| T1 and T2 | 0.025 ms-10 ms/Res: 1 us |
| Accurate   | 1 us / 1 ms \( \pm 100 \) ppm |

<table>
<thead>
<tr>
<th>Constant Current Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slew rate</td>
</tr>
<tr>
<td>0.001-0.28 A/us</td>
</tr>
<tr>
<td>0.01-2.8 A/us</td>
</tr>
<tr>
<td>0.16-40 mA/us</td>
</tr>
<tr>
<td>1.6-400 mA/us</td>
</tr>
<tr>
<td>Slew rate resolution</td>
</tr>
<tr>
<td>0.001 A/us</td>
</tr>
<tr>
<td>0.01 A/us</td>
</tr>
<tr>
<td>0.16 A/us</td>
</tr>
<tr>
<td>1.6 A/us</td>
</tr>
<tr>
<td>Slew rate setting accuracy</td>
</tr>
<tr>
<td>( \pm(10% + 15 ) us)</td>
</tr>
<tr>
<td>Current setting range</td>
</tr>
<tr>
<td>0-7.14 A</td>
</tr>
<tr>
<td>0-71.4 A</td>
</tr>
<tr>
<td>0-1.02 A</td>
</tr>
<tr>
<td>0-10.2 A</td>
</tr>
<tr>
<td>Current resolution</td>
</tr>
<tr>
<td>0.2 mA</td>
</tr>
<tr>
<td>2 mA</td>
</tr>
<tr>
<td>0.05 mA</td>
</tr>
<tr>
<td>0.5 mA</td>
</tr>
<tr>
<td>Current accuracy</td>
</tr>
<tr>
<td>( \pm 0.4% \text{ F.S.} )</td>
</tr>
<tr>
<td>( \pm 0.4% \text{ F.S.} )</td>
</tr>
</tbody>
</table>

**Constant Resistance Mode**

<p>| Slew rate             |
| 0.01-2.8 A/us         |
| 1.6-400 mA/us         |
| Slew rate resolution  |
| 0.01 A/us             |
| 1.6 A/us              |
| Slew rate setting accuracy |
| ( \pm(10% + 50 ) us) |
| Resistance setting range |
| 0.025 Ω-100 Ω         |
| 1.25 Ω-5 kΩ           |
| (350 W/16 V)          |
| (350 W/125 V)         |
| 1.25 Ω-5 kΩ (350 W/80 V) |
| 50 Ω-200 kΩ (350W/500 V) |</p>
<table>
<thead>
<tr>
<th>Resistance resolution</th>
<th>1 ms (350 W/16 V)</th>
<th>20 us (350 W/125 V)</th>
<th>20 us (350 W/80 V)</th>
<th>0.5 us (350 W/500 V)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resistance accuracy</td>
<td>100 Ω: ±(0.5% set + 0.1 s)</td>
<td>5 kΩ: ±(0.5% set + 0.02 s)</td>
<td>5 kΩ: ±(0.5% set + 0.01 s)</td>
<td>200 kΩ: ±(0.5% set + 0.005 s)</td>
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**Measurement**

**Voltage Readback**

<table>
<thead>
<tr>
<th>Range</th>
<th>0-16 V</th>
<th>0-80 V</th>
<th>0-125 V</th>
<th>0-500 V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resolution</td>
<td>0.32 mV</td>
<td>1.6 mV</td>
<td>2.5 mV</td>
<td>10 mV</td>
</tr>
<tr>
<td>Accuracy</td>
<td>±(0.025% set + 0.025% F.S.)</td>
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<td></td>
<td></td>
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</table>

**Current Readback**

<table>
<thead>
<tr>
<th>Range</th>
<th>0-7 A</th>
<th>0-70 A</th>
<th>0-1 A</th>
<th>0-10 A</th>
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<tbody>
<tr>
<td>Resolution</td>
<td>0.14 mA</td>
<td>1.4 mA</td>
<td>0.02 mA</td>
<td>0.2 mA</td>
</tr>
<tr>
<td>Accuracy</td>
<td>±(0.05% set + 0.05% F.S.)</td>
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</table>

**Power Readback**

<table>
<thead>
<tr>
<th>Range</th>
<th>0-35 W</th>
<th>0-350 W</th>
<th>0-35 W</th>
<th>0-350 W</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accuracy</td>
<td>±(0.1% set + 0.1% F.S.)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*1 : Power F.S. = Vrange F.S. x Irange F.S.

*2 : F.S. = Full scale of H range

**Protective**

**Over Power Protection**

<table>
<thead>
<tr>
<th>Range</th>
<th>1.75-357 W</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resolution</td>
<td>1.75 W</td>
</tr>
<tr>
<td>Accuracy</td>
<td>±(2% set + 0.25% F.S.)</td>
</tr>
</tbody>
</table>

**Over Current Protection**

<table>
<thead>
<tr>
<th>Range</th>
<th>0.875-71.4 A</th>
<th>0.125-10.2 A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resolution</td>
<td>0.175 A</td>
<td>0.025 A</td>
</tr>
<tr>
<td>Accuracy</td>
<td>±(2% set + 0.25% F.S.)</td>
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</table>

**Over Voltage Protection**

<table>
<thead>
<tr>
<th>Range</th>
<th>1.81.6 V</th>
<th>2.5-510 V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resolution</td>
<td>0.2 V</td>
<td>1.25 V</td>
</tr>
<tr>
<td>Accuracy</td>
<td>±(2% set + 0.25% F.S.)</td>
<td></td>
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</tbody>
</table>

Over temperature protection

**Rated Power Protection (CPP)**

<table>
<thead>
<tr>
<th>Value</th>
<th>385 W</th>
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<tbody>
<tr>
<td>Accuracy</td>
<td>±5% set</td>
</tr>
</tbody>
</table>
## General

<table>
<thead>
<tr>
<th>Short Circuit</th>
<th>Current (CC)</th>
<th>Voltage (CV)</th>
<th>Resistance (CR)</th>
<th>Input resistance (load off)</th>
<th>Temperature coefficient</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>= 7.7/7 A</td>
<td>= 0 V</td>
<td>1.25 Ω</td>
<td>500 kΩ (typical)</td>
<td>100 ppm</td>
<td>Approx. 3.8 kg</td>
</tr>
</tbody>
</table>
Dimensions

RMX-4000/RMX-4002

![Dimensions Diagram]
RMX-4003/RMX-4004/RMX-4005/RMX-4006

Dimensions:
- Width: 81.6 mm
- Height: 171.5 mm
- Depth: 475.0 mm
- Depth: 446.8 mm

Specifications:
- Voltage: 80V DC MAX
- Ratings: L V sense R V sense R
EC Declaration of Conformity

We declare that the below mentioned product

Type of Product: Programmable Electronic Load
Model number: RMX-4000, RMX-4002.
Load module: RMX-4003, RMX-4004, RMX-4005, RMX-4006.


For the evaluation regarding the Electromagnetic Compatibility and Low Voltage Directive, the following standards were applied:

<table>
<thead>
<tr>
<th><strong>© EMC</strong></th>
<th>EN 61326-1:</th>
<th>Electrical equipment for measurement, control and laboratory use -- EMC requirements (2013)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage Fluctuations</td>
<td>EN 61000-3-3: 2013</td>
<td>Electrical Fast Transients EN61000-4-4: 2012</td>
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<tr>
<td>------------------------------</td>
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<tr>
<td>Surge Immunity</td>
<td>EN 61000-4-5: 2006</td>
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<tr>
<td>Conducted Susceptibility</td>
<td>EN 61000-4-6: 2014</td>
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<tr>
<td>Power Frequency Magnetic Field</td>
<td>EN 61000-4-8: 2010</td>
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<tr>
<td>Voltage Dip/ Interruption</td>
<td>EN 61000-4-11: 2008</td>
<td></td>
</tr>
</tbody>
</table>
INDEX

Alarm configuration .....234, 247
All Chan save/recall
description................. 108
Baud rate configuration 251, 257
Brightness & contrast ....... 242
Brightness and contrast ..... 229
Calibration ..................... 325
Calibration key ............... 23
CC vrange mode description 94
CC+CV mode .................... 76
Channel configuration
CC voltage range .......... 201
Go/NoGo mode ............... 219
Go/NoGo On/Off .......... 221
Independent setting ........ 210
Load delay time ............. 211
Parallel mode ............... 222
Protection All Clear ....... 200
Response time ............... 217
SPEC test ON/OFF ........ 221
Step resolution .......... 213
Channel configuration
Configuration menu ...... 196
OCP/OCV/OPP ............... 197
Channel configuration
Von voltage configuration 203
Channel configuration
Short.......................... 205
Channel configuration
cchannel control .......... 208
Channel control configuration 208, 313
Channel control connection . 63
Channel control description 100
Channel control mode
description.................. 96
Channel duration time
settings mode description . 88
Cleaning the instrument ...... 9
Clear key ......................... 23
Configuration mode
description.................. 92
Connection
Channel control .......... 63
Frame link .................... 61
Go/NoGo control .......... 67
Remote sense .......... 54
Wire gauge ................. 50
Wire Inductance .......... 50
Connection procedure .... 52
Constant power mode
description.................. 78
Constant Resistance mode
description................ 72
Constant voltage + constant
current mode description .. 76
Constant voltage mode
description.................. 75
Declaration of conformity ... 349
Default Settings ............ 331
Delay time mode description 97
Dimensions ..................... 347
Display key .................... 36
Display settings ........... 229, 242
Dynamic constant current
mode description............. 70
Dynamic loads Constant
Resistance mode description 73
EC Declaration of Conformity
EN61010
    measurement category........8
    Pollution degree.............9
Enter key..........................25
Environment
    operation........................9
    Storage..........................9
Ethernet
    sockets..........................257
External memory save
    description.....................107
External voltage mode
    description.....................100
Features............................14
File format mode description
Firmware update...................322
Frame control configuration
Frame Link configuration......315
Frame link connection..........61
Front panel overview.......21
Function Keys......................21
Fuse
    rating...........................8
Fuse replacement..................321
Go/NoGo Alarm Sound..........235
Go/NoGo connection.............67
Go/NoGo constant current
    mode description...............71
Go/NoGo constant Resistance
    mode description...............74
Go/NoGo constant voltage
    mode description...............77
Go/NoGo interface
    configuration..................319
Independent configuration.....210
Independent mode description
Installation
    Load module...................42
    Rack mount.....................45
Interface configuration......312
    Baud Rate......................251, 257
Operation ......................... 130
R/L keys ............................. 130
Shorting ............................. 133
Static .................................. 131
Lock key ............................... 23
Mainframe configuration
alarm sound .................. 234, 247
Brightness & contrast ....... 242
Brightness and contrast ..... 229
Configuration menu .......... 225
Frame control 231, 242, 245, 248
Go/NoGo Tone ................. 235
Knob type ...................... 233, 246
Language ............................ 239
Load menu ........................... 227
Slave knob ..................... 237, 248
Speaker .......................... 228, 240
System Info .......................... 225
Utility menu .......................... 225
Mainframe operation
CC Dynamic mode .......... 141
CC Mode ............................. 139
CC Range ............................. 140
CC Static mode ................. 143
CC Static Values ............... 144
Channel duration time
settings ......................... 184
Channel Selection .......... 136, 137
CP Current limit ............... 161
CP mode .............................. 160
CP Power values ............... 161
CP range ......................... 158, 164
CR Range ............................. 147
CR Static Parameters ...... 152
CR Dynamic mode .......... 149
CR mode ............................. 146
CR Static mode ................. 151
CV Current limit .......... 155
CV mode ............................. 154
CV response speed ........... 159
CV Voltage values .......... 155
Edit Sequence ................ 179
OCP test automation .......... 189
Program chain .......................... 171
Program Execution ................. 173
Program Sequences ................. 165
Programming ....................... 165
Recall default chain .......... 173
Recall default sequence .... 170
Run Sequence ....................... 186
Save chain ......................... 173
Save Program chain ........ 173
Save sequence ...................... 169
Sequence loop ................. 182
Trig out .............................. 184
Measurement types .......... 18, 20
Memory data description ... 105
Number pad ....................... 23
OCP test automation .......... 189
OCP Test Automation
description ...................... 90
Operating configurations
mode description .............. 94
Operating Description .......... 68
Operating Modes
Channel duration time
settings ......................... 88
Configuration ..................... 92
Configuration - Over current
protection ......................... 93
Configuration - Over power
protection ......................... 94
Configuration - Over voltage
protection ......................... 93
Constant current – Go/NoGo
71
Constant current – Slew rate 71
Constant current - Dynamic.. 70
Constant current - static ..... 70
Constant Power ................... 78
Constant Resistance ........... 72
Constant Resistance –
Dynamic loading .............. 73
Constant Resistance – Slew
rate ................................. 74
Constant Resistance
Go/NoGo ............................. 74
352
<table>
<thead>
<tr>
<th>Topic</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant Voltage</td>
<td>75</td>
</tr>
<tr>
<td>Constant Voltage – Response speed</td>
<td>77</td>
</tr>
<tr>
<td>Constant Voltage + Constant Current Mode</td>
<td>76</td>
</tr>
<tr>
<td>Constant Voltage –Go/NoGo</td>
<td>77</td>
</tr>
<tr>
<td>Constant Voltage -levels</td>
<td>75</td>
</tr>
<tr>
<td>External Voltage Control</td>
<td>100</td>
</tr>
<tr>
<td>File format</td>
<td>110</td>
</tr>
<tr>
<td>File System</td>
<td>104</td>
</tr>
<tr>
<td>Go/NoGo</td>
<td>84</td>
</tr>
<tr>
<td>Interface</td>
<td>104</td>
</tr>
<tr>
<td>Memory data</td>
<td>105</td>
</tr>
<tr>
<td>Operating Configuration s – Von Voltage</td>
<td>95</td>
</tr>
<tr>
<td>Operating Configurations</td>
<td>94</td>
</tr>
<tr>
<td>Operating Configurations – CC vrange</td>
<td>94</td>
</tr>
<tr>
<td>Operating Configurations – independent</td>
<td>96</td>
</tr>
<tr>
<td>Operating Configurations – Load D-Time</td>
<td>97</td>
</tr>
<tr>
<td>Operating Configurations – Short</td>
<td>96, 99</td>
</tr>
<tr>
<td>Operating Configurations – Step Resolution</td>
<td>97</td>
</tr>
<tr>
<td>Parallel Dynamic Loading</td>
<td>91</td>
</tr>
<tr>
<td>Preset data</td>
<td>105</td>
</tr>
<tr>
<td>Program Chain</td>
<td>82</td>
</tr>
<tr>
<td>save/recall All Chan</td>
<td>108</td>
</tr>
<tr>
<td>SEQ data</td>
<td>106</td>
</tr>
<tr>
<td>Sequences</td>
<td>85</td>
</tr>
<tr>
<td>Setup data</td>
<td>106</td>
</tr>
<tr>
<td>Trig Out</td>
<td>87</td>
</tr>
<tr>
<td>USB save/recall</td>
<td>108</td>
</tr>
<tr>
<td>Operation</td>
<td>127</td>
</tr>
<tr>
<td>Contents</td>
<td></td>
</tr>
<tr>
<td>Local load</td>
<td>130</td>
</tr>
<tr>
<td>Operation Environment</td>
<td>9</td>
</tr>
<tr>
<td>Operation keys</td>
<td>24</td>
</tr>
<tr>
<td>Over Current mode description</td>
<td>93</td>
</tr>
<tr>
<td>Over power mode description</td>
<td>94</td>
</tr>
<tr>
<td>Over protection configuration</td>
<td>197</td>
</tr>
<tr>
<td>Over voltage mode description</td>
<td>93</td>
</tr>
<tr>
<td>Overview</td>
<td>16</td>
</tr>
<tr>
<td>Display Overview</td>
<td>27</td>
</tr>
<tr>
<td>Front panel</td>
<td>21</td>
</tr>
<tr>
<td>LED display</td>
<td>39</td>
</tr>
<tr>
<td>Load module</td>
<td>35</td>
</tr>
<tr>
<td>Rear Panel</td>
<td>31</td>
</tr>
<tr>
<td>Parallel Dynamic loading description</td>
<td>91</td>
</tr>
<tr>
<td>pass/fail test</td>
<td></td>
</tr>
<tr>
<td>multiple step tutorial</td>
<td>113</td>
</tr>
<tr>
<td>Power key</td>
<td>26</td>
</tr>
<tr>
<td>Power supply</td>
<td></td>
</tr>
<tr>
<td>Safety information</td>
<td>8</td>
</tr>
<tr>
<td>Power up</td>
<td>47</td>
</tr>
<tr>
<td>Power up sequence</td>
<td>47</td>
</tr>
<tr>
<td>Preset data description</td>
<td>105</td>
</tr>
<tr>
<td>Preset key</td>
<td>24</td>
</tr>
<tr>
<td>Program Chain mode description</td>
<td>84</td>
</tr>
<tr>
<td>Program mode description</td>
<td>82</td>
</tr>
<tr>
<td>Protection All clear</td>
<td>200</td>
</tr>
<tr>
<td>Quick save Presets to internal memory</td>
<td>304</td>
</tr>
<tr>
<td>R/L key</td>
<td>35</td>
</tr>
<tr>
<td>Rack mount installation</td>
<td>45</td>
</tr>
<tr>
<td>Range Chart</td>
<td>326</td>
</tr>
<tr>
<td>Recall factory defaults</td>
<td>307</td>
</tr>
<tr>
<td>Recall Memory data to USB</td>
<td>286</td>
</tr>
<tr>
<td>Recall Presets - Framelink</td>
<td>306</td>
</tr>
<tr>
<td>Recall Setups - Framelink</td>
<td>305</td>
</tr>
<tr>
<td>Remote control</td>
<td></td>
</tr>
<tr>
<td>Ethernet function check</td>
<td>260</td>
</tr>
<tr>
<td>sockets configuration</td>
<td>257</td>
</tr>
<tr>
<td>sockets function check</td>
<td>263, 266</td>
</tr>
<tr>
<td>Remote sense connections</td>
<td>54</td>
</tr>
</tbody>
</table>
Response speed constant
  voltage mode description.. 77
Response time .................. 217
Reverse voltage protection.... 94
RS232 configuration ....... 251, 257
RS-232C configuration ...... 312
Safety Instructions .......... 6
Safety symbols ................ 6
Save Memory data .......... 271
Save Memory data to USB ... 286
Save Preset memory ......... 274
Save presets to USB ......... 292
Save Sequences to USB ...... 298
Save setup memory ........... 276
Save setup to USB .......... 283
Save to internal memory ... 271, 278
Save to internal setup memory 276
Save/Recall
default USB path ........... 278
FrameLink Preset Recall ... 306
FrameLink Setup Recall ... 305
Preset memory ............... 274
Quick save Presets to internal memory .................. 304
Recall factory defaults ..... 307
Recall Memory data to USB 286
Save Memory data to USB . 286
Save Preset Memory ......... 274
Save presets to USB ......... 292
Save SEQ (Sequences) to USB298
Save setup to USB .......... 283
Save to internal Memory .... 278
Save to setup Memory ...... 276
Setup memory ............... 276
USB path ..................... 278
Save/Recall
Memory data ................. 271
Save to internal Memory .... 271
Selector Knob ................ 24
SEQ data description .... 106
Sequence editing/creating .. 179
Sequence mode description .. 85
Sequences mode description . 82
service contance point .... 320
Setting the date and time .... 250
Setup data description .... 106
Shift key ...................... 25
Short configuration .......... 205
Short key ..................... 38
Shorting mode description 96, 99
Slave knob
  settings.................... 237, 248
Slave knob
description .................. 38
Slew rage constant current
  mode description .......... 71
Slew rate Constant Resistance
  mode description .......... 74
Socket server function check 263, 266
Speaker Settings .......... 228, 240
Specifications ............... 334
  RMX-4004 ...................... 339
Static constant current mode
description .................. 70
Static/ Dynamic key ........ 37
Step resolution ............. 213
Step Resolution mode
description .................. 97
Storage Environment .......... 9
System Info .................. 225
System Keys ................ 22
Terminals ................... 37
Trig out ..................... 184
Trig out mode description .... 87
Tutorials
  Local load .................. 113
  Parallel load ............... 117
  Program ..................... 121
  Single load ................ 115
Tutorials
  Basic Operation ............ 112
  Channel control ........... 124
  Frame link ................ 122
  General configuration options 126
Twisted pair description ........ 51
UK power cord .................... 11
USB configuration ............... 253
USB path ................................ 278
USB remote interface
connection .......................... 319
USB save/recall description ... 108
Utility Menu ......................... 225
Voltage levels constant
 voltage mode description .... 75
Voltage sense terminal ........... 36
Von voltage configuration ...... 203
Von voltage mode description ... 95
Web server function check ...... 260
Wire Connections ................... 49
Wire gauge ............................ 49
Wire induction ....................... 50
Wiring procedure ................... 52