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Remote HMI client RIA600
Version 1.5
User guide

Hitachi Energy

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Table of contents

Section 1 Introduction

1.1 Document revision history

Document revision	Date	Product revision	History
A	2022-07	1.5.0	First release

1.2 RIA600 general description

RIA600 is a software implementation of the IED LHMI panel. It runs on virtually any device that runs the Windows™ operating system (for example, laptops, desktop PCs, Windows™ tablets, and so on). It is designed to connect to IEDs using TCP/IP and shows the same information and behaves the same way as the physical LHMI panel with a few extensions.

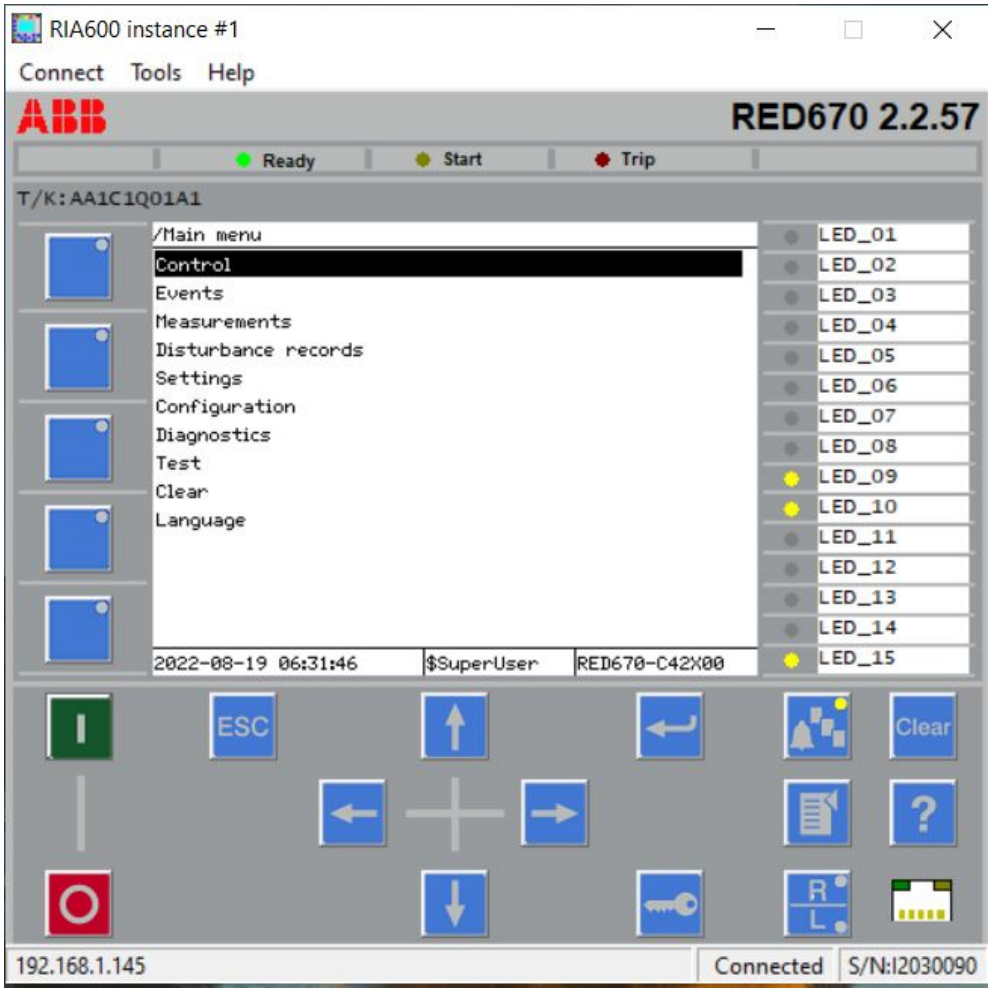

Figure 1: Example RIA600 instance

1.2.1 Screen fields

The RIA600 instance number is unique for each running instance, for example, RIA instance #1. The technical key for the IED is set at PCM600. The product type and serial number of the IED are set in

the factory during the production time. The IED alias name, which is shown together with the IP address, can be set by the RIA600 user.

1.2.2 Download and installation

RIA600 can be downloaded from the Hitachi Energy Software library. RIA600 can be installed on any Windows™ device of the user's choice. The platform on which RIA600 runs will be designated simply as *device*.

Depending on how the device is managed from a security perspective, a user may need an administrator right to install and uninstall RIA600. To run RIA600 after installing it, the user doesn't need administrator rights.

1.2.2.1 Requirements on devices running RIA600

The installation of the RIA600, as such, consumes ~25 MB of disk space. The fonts downloaded from IEDs connected to consume an additional ~400 kB of disk space for each IED connected to. Finally, each running instance of RIA600 also consumes ~15 MB of main RAM.

To make all aspects of the IED menu system work properly, the device needs to support *key repeat* (i.e., when pressing and holding a key for a certain time, the key gets repeated at a certain rate until the key is released). Since not all solutions support *key repeat*, the issue usually only occurs with touch screens. The function keys to the left of the RIA600 LCD will not function without *key repeat*, and navigating some menus (such as the events menu) may be difficult without *key repeat*, while the majority of the menu system will still be usable without *key repeat*. Some touch screen solutions have settings to enable *key repeat*, so it is advised to read up on such facilities before selecting a device on which to run RIA600.

Section 2 Connection to the IED

TCP-IP is used to connect to the IED, which means that the device running RIA600 must have a network connection to the IEDs at issue. To connect to an IED, a user must know its IP address.

Any access point can be used to connect to the IED, except the front port (when you have an LHMI panel without a RJ45 connector).

Front port is not available in the IED's with blank front panel. By default, AP1 is available for engineering.

2.1 Enforce enabling of IED access points

When no LHMI panel is detected on an IED, the first access point equipped with an SFP is enabled unconditionally. This is to guarantee connectivity for external tools like RIA600 or PCM600.

2.2 Firewall considerations

The RIA600 connects to the IED using TCP/IP port 7734. This means that any firewalls on the device where RIA600 is running must have that port open for outbound connections. RIA600 does not open any ports for inbound connections.

2.3 Downloading font

When the connection is established for the first time, RIA600 will download all text and symbol fonts from the IED. The RIA600 can then be used in the same way as a real HMI panel once the download is complete. The downloaded fonts will be used the next time RIA600 is connected to the same IP address, and they will be ready to use immediately.

2.4 Encryption of communication

For security reasons, the communication between the IED and the RIA600 is encrypted.But if the IED is equipped with a real LHMI panel, it should be noted that any activity on RIA600 is visible on the LHMI panel and vice versa. This means that if you log on to the IED, it will be possible to eavesdrop on the entered username and password. If the IED does not have an LHMI panel, the communication is secure and no data is leaked.

2.5 Orderly disconnect or connection loss

To change settings/parameters when users are defined, the LHMI user must login using the Login key, or login when prompted to do so due to an attempt to change a value. This concept has not changed with RIA600.

However, to avoid the risk that another RIA600 instance can take over an existing session and transaction after logging on, the IED will treat a RIA600 disconnect as a user inactivity timeout. This implies that when the RIA600 connection terminates, any changes made after logging on will be lost, and the menu focus will return to the default menu.

Note that this will occur when the RIA600 is orderly disconnected from the IED and when the communication is broken for an extended period of time (for example, by taking out a network cable or switching off some network equipment).

Section 3 Usage instructions

3.1 Keys

Any standard mouse or other pointing device can be used to simply click on the keys. Press and hold the Ctrl key on the device keyboard, then click all the keys except the final one in the key chord to take chords of keys (i.e., emulate pressing multiple keys simultaneously). Finally, release the device's control key and click the last key in the key chord.

If the user wants to have the chord repeated infinitely, then keep the last key pressed down after clicking it.

3.2 Keyboard hot keys

Additionally, there are hot keys (as show in the Table 1) that enable users to use the device's keyboard instead of a pointing device.

Table 1: Hot keys

Device keyboard key	RIA600 key
Function key F1	LCD function key 1
Function key F2	LCD function key 2
Function key F3	LCD function key 3
Function key F4	LCD function key 4
Function key F5	LCD function key 5
1	Close / 1
0	Open / 0
Esc	ESC
Left arrow, or L	Left
Up arrow, or U	Up
Down, or D	Down
Right arrow, or R	Right
Return, or E	Enter
K	Logon
P	Multipage
M	Menu
O	Local/Remote
C	Clear
H	Help

3.3 RIA600 instance number

Each RIA600 started gets assigned to a unique instance number, which is shown at the top of its window. This instance number goes from 1 to 99. This means that not more than 99 instances can be running on the same device. When starting a new RIA600 instance, it is always assigned the lowest free instance number initially.

All setting changes made to a RIA600 instance (for example, its position on the screen, the last IP address used and so on) are saved persistently for each user on the device where the RIA600 is run. The settings will be restored next time that the same RIA600 instance is started. A RIA600 can also be started and then its instance number can be changed to the desired one, in which case all settings for that instance are loaded.

Note that since RIA600 instance settings are stored separately for each user on each device where the RIA600 is run, this means that:

- If two users have accounts on the same device, each user has to setup each RIA600 instance to the user's liking (i.e., there is no inheritance of RIA600 setups between users)
- If the same user uses RIA600 on two different devices, even if connecting to the same IED, that user has to setup RIA600 on both devices (i.e., there is no inheritance of RIA600 setups between devices).

3.4 Multiple RIA600 instances

Multiple instances of RIA600 can run simultaneously on the same device. This makes it possible to build a virtual "control room" for multiple IEDs, where LED status and other operational data (for example, the SLD) are continuously visible.

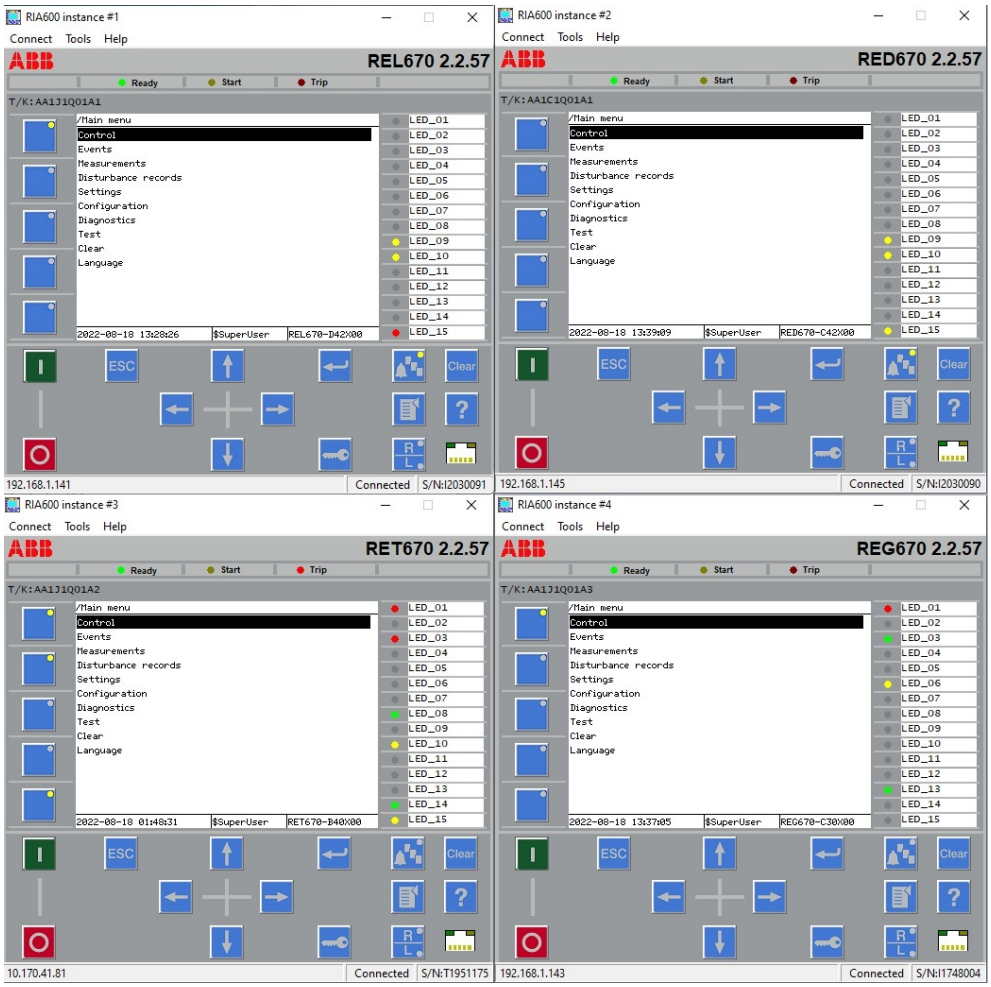

Figure 2: RIA600 instances

3.5 Recommended sequence for RIA600 customization

To get multiple RIA600 instances to behave the way described in the Section 2, it is recommended to follow the sequence of operations.

1. Preparations
2. Customizations

3.5.1 Preparations

Determine the IP addresses for the IEDs that user intend to access through RIA600 on Windows device.

For each IP address, select a unique RIA600 instance number. The IP addresses and instance numbers should be noted.

3.5.2 Customizations

For each of the IP addresses follow the specified sequence.

1. Start RIA600 and immediately use the menu: **Tools /Change instance nr …** to switch instance number to the one earlier selected for this IP address.
2. Click and drag the RIA600 instance to the correct location on your device's screen.
3. Perform the necessary RIA600 customizations like setting IED alias name, LCD LED labels, LCD colour and so on.
4. Using the IP address,connect the RIA600 instance to the IED.
5. Close the RIA600 instance (this saves all customizations for this RIA600 instance, including the last IP address connected).

After executing this sequence for all IP addresses, the user can either start up all RIA600 instances in sequence, or just start one RIA600 and then switch instance number to the desired one. Regardless of the start method, each RIA600 instance will recall all customizations performed earlier, and it will automatically connect to the IED using the most recent IP address and take up the screen position it had when the user last closed it.

3.6 RIA600 command line support

The command line can have options that will override any parameters previously saved in order to enable using RIA600 through, for instance, desktop shortcuts or batch files.

-ipaddess	<IP address>
-instancenr	[1.. 99]
-iedaliasname	<IED_alias_name_without_any_space_characters>

Command line example:

hmicli2.exe -ipaddress 10.1.150.4 -instancenr 17 -iedaliasname BAY2_DISTPROT

Section 4 Options and parameters

4.1 General

In the RIA600, a number of features can be customized.

All changes to options and parameters are related to the RIA600 instance number. This means that they will be switched out when the RIA600 instance number is changed. For more information, see Section 4.2.2.2.

4.2 Menus

4.2.1 Connect menu

To connect to an IED, click *IED* and enter the IP address of the IED.

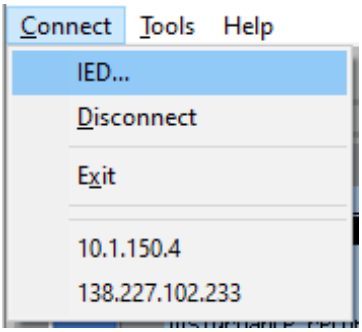

Figure 3: Connect to an IED

4.2.1.1 Certificate management

A certificate identifying the IED is made available when the user connects to it for the first time. It is the user's responsibility to review this and select whether to accept it or reject it for the duration of their RIA600 session, or save it as a trusted certificate permanently. The RIA600 session is defined as the time between when the user first start RIA600 and close it. This means that if the user connects to an IED and accept its certificate for the duration of the session, any loss of connection will not prompt a new certificate acceptance dialogue. However, a new prompt about the certificate will appear if the user closes RIA600 and restarts it.

Client certificates are neither required nor supported.

4.2.2 Tools menu

In RIA600, users can adjust a range of items, the majority of which should be self-explanatory.

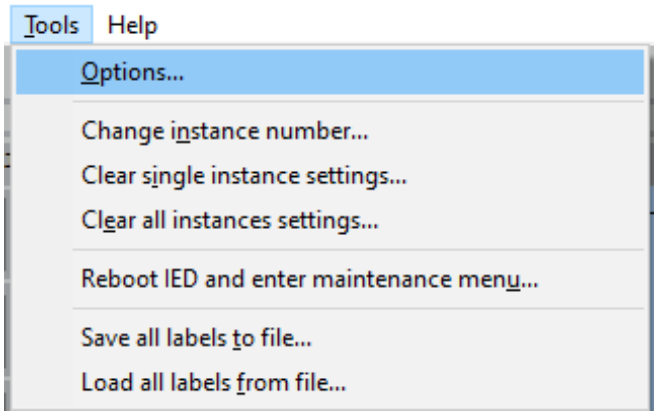

Figure 4: Tools menu

4.2.2.1 Options

Key repeat
Key repetition rate and the delay before key repetition can be adjusted.

Display
If the user wants RIA600 to stay on top of any other application running on their device, select the Stay on top option. If necessary, it is possible to select a different colour for the LCD portion of the screen, for example, to increase contrast.

The IED serial number, product type, and technical key are sent to RIA600 when it connects to an IED to help in identifying which IED it is. To further help with identification, it is recommended to set an IED alias name that indicates the function of the IED in the substation. This IED alias is displayed when changing the RIA600 instance number. This option, as well as all other customizations, is saved in the RIA600 instance persistent storage per device user and will be restored the next time the same RIA600 instance is started by the same device user.

Connections
The default communication behaviour for each RIA600 instance is to automatically connect to the last IED used for each instance. This is intended to simplify usage but can be disabled if desired.

If a user wants to freely connect to different IP addresses but always have a specific IP address connected whenever a certain RIA600 instance is started, then set the parameter "IP address for launch auto-connect" in that RIA600 instance. By doing this, the RIA600 will disregard the IP address history and always use that same IP address when auto-connecting on startup.

If the connection is lost for any reason (for example, if the IED is power cycled), RIA600 tries to re-connect indefinitely to restore communication. If a user wants to detect when communication has been lost, this can be disabled (but is not recommended since re-connection then must be performed manually).

Additionally, there are options to control how the screen looks when not having a connection for an extended time (the IED failure screen) and whether the screen and LEDs should be cleaned if the connection is lost.

LCD LED labels
If necessary, change the LED labels to include information about the LEDs' functions. These changes are (as are all options and parameters) connected to the IED instance, therefore they will be switched out if the RIA600 instance number is changed (see “Change HMI client instance” for details). LED labels can also be saved and loaded from a file.

4.2.2.2 Change instance number

When the user sets up multiple RIA600 instances on the same device to communicate with multiple IEDs, the user may not want to open all RIA600s in sequence, for example, if it is only to communicate with a specific IED. In this case, this menu entry can select the correct HMI instance number directly. When the user presses **OK** in the confirmation dialogue, RIA600 loads all of the specified instance's settings, including the window position. The user-defined IED alias name is displayed along with the IP address in order to make it easier to identify which IP address connects to which IED.

4.2.2.3 Clear single instance settings

See Section 4.2.2.4 for details.

4.2.2.4 Clear all instances settings

If the user has worked with a lot of IEDs, or has a dynamic setup of the device with regards to changed displays on which RIA600s are shown, the user may need to reset a single instance or all RIA600 instances to their default settings and screen positions. To make sure the command is successfully executed, all instances of RIA600 must be closed first, except the one where the user gives this command.

The user will be prompted to accept that the client will close when settings are cleared for a single instance (necessary to clear the settings).

Close all RIA600 instances except the one where the user entered the command before clearing the settings for all RIA600 instances. This will ensure that the command cleaning is successfully carried out.

4.2.2.5 Entering maintenance menu using RIA600

If the RIA600 is connected to IED, user can enter in to maintenance menu using option **Tools/ Reboot IED and enter maintenance menu**. If the user gives this command, RIA600 will reboot the IED. When the IED starts, it will enter the maintenance menu automatically with no need to press any keys on the RIA600. Once RIA600 is connected to the IED again, the maintenance menu can then be used in the same way as with the LHMI panel.

If users are defined in the IED, then users must be logged in and also have config-Advanced access rights (see manual *Cyber security deployment guideline*, section *Predefined user roles*) before this command is executed. If the user is not logged on, the IED will not reboot and an information dialogue will be displayed instead.

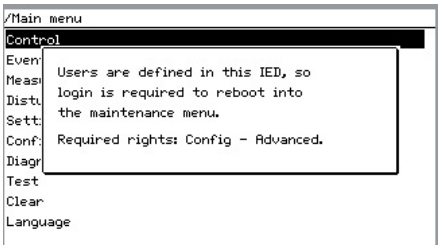

Figure 5: Information dialogue

If users are not defined, then there is no need to log in and anyone can execute this command.

4.2.2.6 Save all labels to file

See Section 4.2.2.7 for details.

4.2.2.7 Load all labels from file

These menu entries intend to simplify the setup of the LCD LED labels. The suggested method for use is to first save the labels to a file, update that file as desired, and then load the labels once more.

Only data between quotation marks is allowed to edit in the files.

4.2.3 Help

This menu contains *Remote HMI client RIA600* user guide (1MRK 511 619-UEN) and an *About box* which shows the RIA600 version number.

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