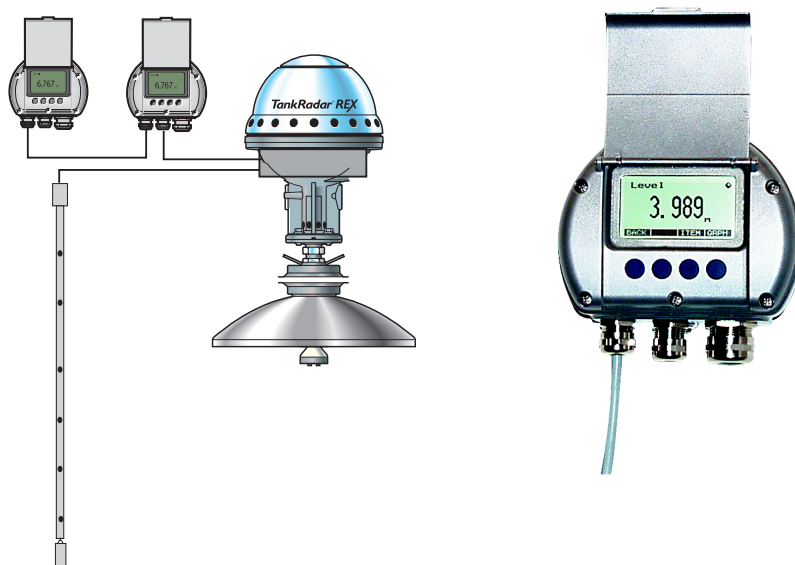


# *TankRadar<sup>®</sup> REX*

## **Display Unit RDU 40**

*Product Discontinued*





# *TankRadar<sup>®</sup> REX*

**Display Unit RDU 40**

**User's Guide**

Second edition

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# Rosemount Tank Radar AB

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Rosemount TankRadar REX has been FCC certified under test conditions which assume a metallic tank. Installation on a non-metallic tank is not certified, and is not allowed.

The FCC certificate for Rosemount TankRadar REX requires that the tank is closed as far as emitted radio energy is concerned. Tanks with open manholes, external-floating-roof tanks without still pipes etc. are not covered by the certificate.

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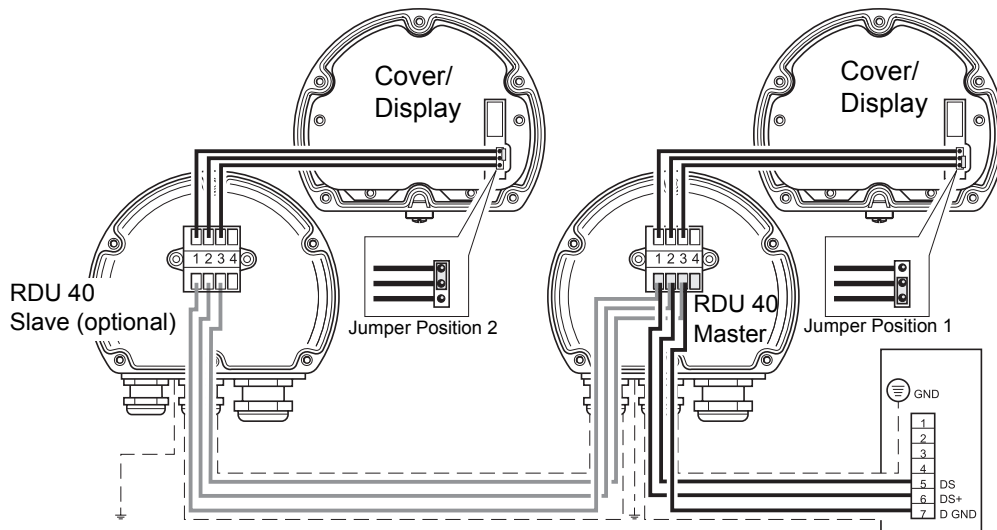
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## 1. Installation

Remove the rubber plug for access to the upper screw of the RDU40 cover. Unscrew and remove all six screws. Remove the cover and take care of the locking device for the weather protection hatch.

The RDU40 shall be connected to the TankRadarREX junction box for cable connections.



*Figure 1-1. Installation of RDU40 master and slave.*

Any of the three cable glands may be used to take the cable into the RDU40:

- 2xM20 – Cable diameter min 7 mm, max 14 mm.
- 1xM25 – Cable diameter min 9 mm, max 18 mm.

External adapters 1/2 NPT and 3/4 NPT are optional.

Connect the RDU40 to the X12 terminal (also marked "Exi") in the REX junction box as described in picture 1. Requirements for the cable between the RDU40 and the REX junction box to fulfill performance regarding functionality and EMC are:

- Shielded cable. Minimum 3 wires. The shield shall be circular connected inside the cable gland of the RDU40 and connected to ground in the REX junction box.
- All wires must have at least 0.25 mm individual insulation.
- Maximum total length of 100 m, both master and slave included.
- Minimum AWG 20 or 0.5 mm<sup>2</sup> for each wire.

The RDU40 housing shall be grounded locally to the tank. Use minimum 4 mm<sup>2</sup> or AWG 11 wire. Additional protective ground connection to the power distribution central or the REX junction box is not recommended except where required according to national code of practice. A ground loop with circulating current may occur.

If a cable with two shields is used, one shield shall be connected to ground in the REX junction box and the other shall be circular connected inside the cable gland of the RDU40.

Check the packing and put the locking device for the weather protection hatch in position when remounting the RDU-cover. Tighten all six screws firmly.

Mount the RDU40 with the four M4 screws. Distances between the screws are 60 mm and 68 mm, see Figure 1-2.

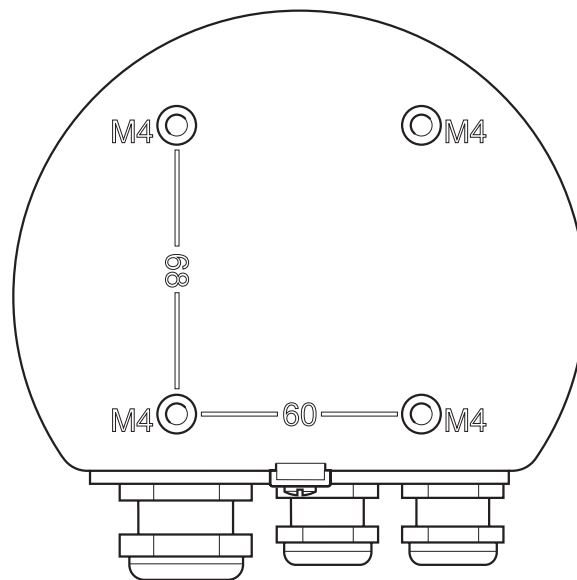


Figure 1-2. Back of RDU40.

## 1.1 Two RDU40 connected to the same REX

If two RDU40 are to be installed to the same REX one of them has to be “slave” while the other is “master”. The slave cannot be configured or controlled individually but follows the master. Only the LCD-contrast can be individually controlled at the slave.

To make an RDU40 work as a slave it is necessary to move the jumper at the RDU40 cover to position 2 according to Figure 1-1.

## 2. Device Handling

Before you can start using the RDU40 you must enable it in the REX device, using the REX installation wizard in WinSetup (see TankMaster WinSetup User's Guide Chapter 3.8.4).

### 2.1 Operation

You can use the display panel RDU40 for viewing tank data. The four softkeys allow you to navigate through the different menus and to select various functions for service and viewing tank data. If you leave the RDU40 in Service mode or Display setup mode without pushing any buttons for a time pre-set by the user (default timeout is 2 minutes), the RDU40 is automatically switched to View mode, presenting the default display.

The LCD contrast can be increased by simultaneously pressing the two buttons on the right-hand side. Press the two left-hand buttons to decrease the contrast. It takes approximately 10 seconds to adjust from minimum to maximum LCD contrast.

In the RDU40 for REX the user navigates in a menu system:

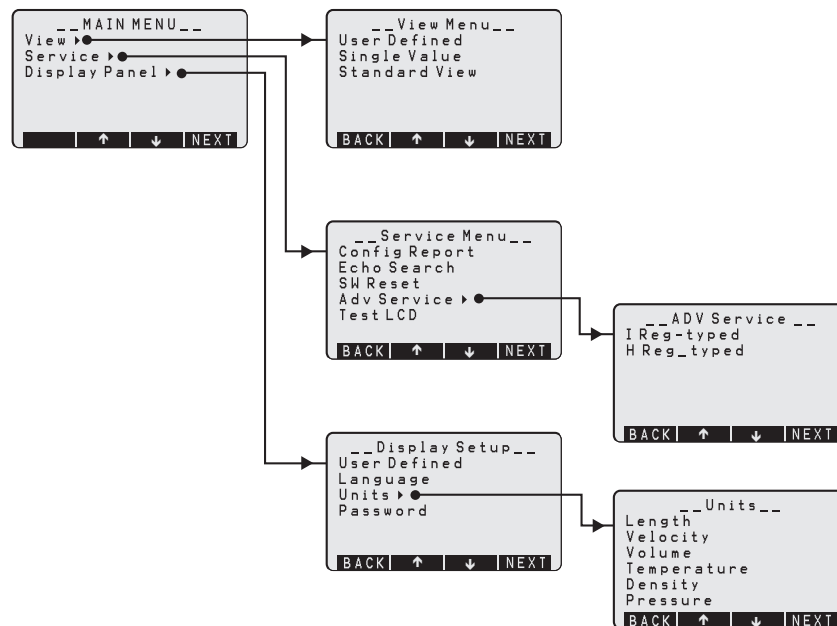


Figure 2-1. Menu system of RDU40.

For normal operation, only the **View menu** is used. It has the following options:

### 2.1.1 User defined view

To see the most important parameters the user can define an own view where up to six values can be shown, either all at the same time (standard), one by one (toggling) or in **Two rows** (max three values). Setup of a **User Defined** view is described below (Display setup from RDU40 / WinSetup).

### 2.1.2 Single value view

The **Single value** view shows only one value. By default **Level** is set as the value to be shown, but it can from WinSetup be changed to any other value, described in "The single value view" on page 2-9.

### 2.1.3 Standard view

The **Standard view** always shows these six values, all at the same time: Level, Ullage, Level rate, Signal strength, Volume and Temperature.

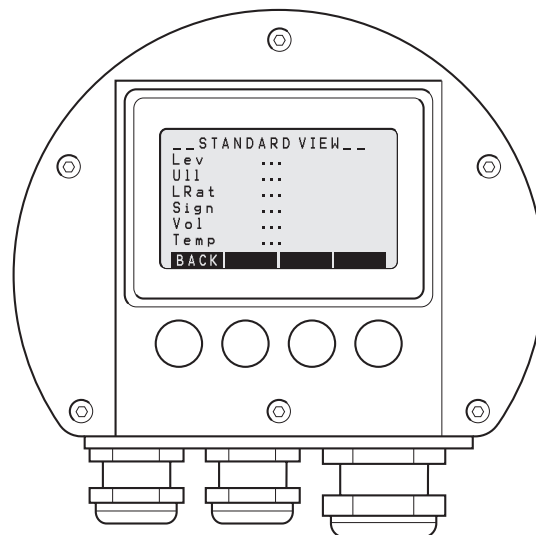


Figure 2-2. Standard view.

## 2.2 Service menu

The **Service menu** provides functions to check REX status by means of a **Configuration report**, invoke the special commands **SW Reset** and **Echo Search**, and perform a **Test LCD** to simplify visual inspection of the display. Also there is a mode for **Advanced service** which is to be used by authorised personnel only.

## 2.3 Setup display for User Defined view

Setup can only be made from a master RDU40. See "Two RDU40 connected to the same REX" on page 1-2.

Press the **Back** button until you reach the **Main menu** and choose **Display panel**. A password is required - by default the password is blank (just press OK) but the user can change it to prevent unauthorised users from reconfiguring the RDU40.

Now the menu **Display setup** is shown. To start setup of the user defined panel, choose **User Defined** and you arrive at **Select items**. This is where you select which items (values) are to be shown. A maximum of six items can be selected. If you wish to view the items in a **Two rows** mode, the maximum is three. An item is selected (or unselected) by moving the cursor down to it and then pressing the **Mark** button. A tick in the corresponding square indicates the selected items.

24 items are available, of course dependent of how the REX gauge is equipped:

- Level
- Ullage
- Level rate
- Signal strength
- Volume
- Average temperature
- Temperature spot 1 - 6
- Analog input 1-2
- Vapor pressure
- Liquid pressure
- Vapor temperature
- Observed density
- Free water level
- Hart slave 1-3
- Relay 1-2

Press **Next** to continue.

The next step is to **Select mode**, i.e. determine how the selected items shall be shown. Select mode by moving the cursor to the desired mode and press the **Mark** button. Three options are available:

### 2.3.1 Standard view

In the **Standard** view the items are listed below each other, just as for the **Standard view** mentioned above, but now the items selected by the user will be shown.

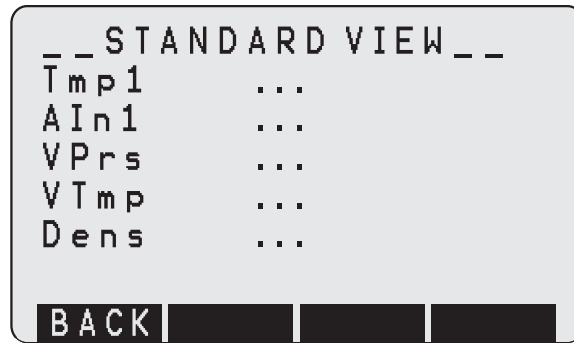


Figure 2-3. User defined **Standard view**.

### 2.3.2 Toggling view

In the **Toggling** view the items selected by the user will be shown one by one. If the **Toggling** view is selected the dialogue **Set how long time each item will be shown** will appear. Set the time in seconds with the arrow buttons and confirm by pressing **Next**.

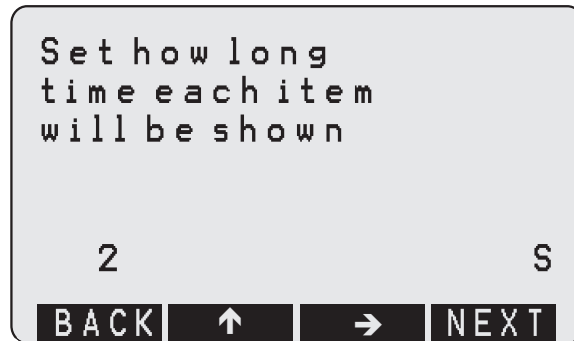


Figure 2-4. Toggling time setting.

### 2.3.3 Two rows view

In the **Two rows** view the individual status for each value is shown, such as **High**, **HW error** and **Invalid**.

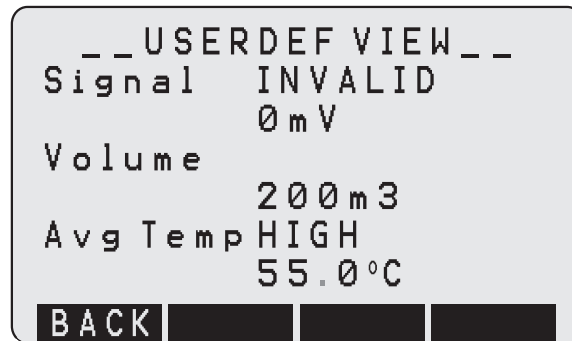


Figure 2-5. User defined **Two rows** view.

Now units corresponding to the selected items must be defined. The RDU40 will take you through the necessary units. You select unit by moving the cursor to it and press the **Mark** button. Continue by pressing **Next**. One or more units may have to be defined, depending on which items were selected previously.

The last step is to **Set timeout for return to default display**. This means that if the RDU40 is left in **Display setup** or **Service** mode it will go back to the default display after the set time. Default display is at delivery **Single value**, but once a user-defined panel has been configured, user-defined panel becomes the default display. After that, the only way to change default display is via WinSetup.

The timeout is set in minutes by using the arrow keys. Press the **Save** button and you have completed the setup of the user-defined panel.

## 2.4 Display setup by using WinSetup

The setup of RDU40 described above can also be done via WinSetup. When using WinSetup you don't have the same controlled guidance as you would when using the RDU40. It is important to be familiar with the system and therefore it is recommended that only service personnel use WinSetup to setup the RDU40.

To edit a holding register, right click on the REX device and choose **View Holding Registers**.

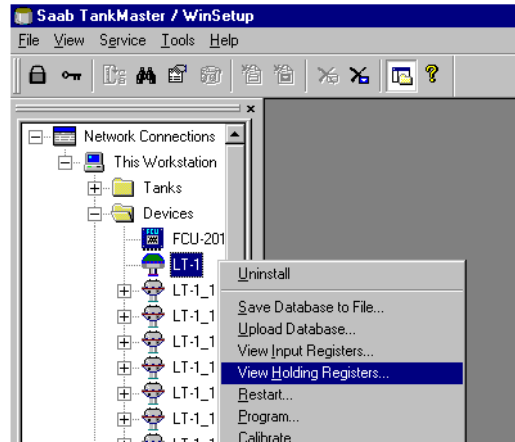


Figure 2-6. View holding registers of the REX device in WinSetup.

Write the number of requested holding registers in the **Start Register** field and press the **Read** button. The current value in that holding register is now presented. To change the holding register value, enter the new value in the **Value** field.

If the value is presented in a grey field, double click the **Value** field. A list of available values appears. Choose a new value and press the OK button to close the window.

To save the changes press the **Apply** button. To close the *View Holding Registers* window, click the **Close** button

To make the changes take effect after using WinSetup, always remember to restart the REX gauge.

Enable the display by setting holding register 69 bit 0 to 1.

Select **Display Startup View** in holding register 57. This is the default display that will be used after a reset or after a timeout in **Display setup** or **Service** mode:

- 0 = Single value
- 1 = Standard
- 2 = ILLEGAL
- 3 = User defined

### 2.4.1 User defined view

Select items for the **User defined view** by setting the corresponding bits in holding register 58. Remember the maximum of six items for **Toggling** or **Standard** mode and the maximum of three items for **Two rows** mode:

- Bit 0 = Level
- Bit 1 = Ullage
- Bit 2 = Level rate
- Bit 3 = Signal strength
- Bit 4 = Volume
- Bit 5 = Average temperature
- Bit 6 = Temperature spot 1
- Bit 7 = Temperature spot 2
- Bit 8 = Temperature spot 3
- Bit 9 = Temperature spot 4
- Bit 10 = Temperature spot 5
- Bit 11 = Temperature spot 6
- Bit 12 = Analog in 1
- Bit 13 = Analog in 2
- Bit 14 = Vapor pressure
- Bit 15 = Liquid pressure
- Bit 16 = Vapor temperature
- Bit 17 = Observed density
- Bit 18 = Free water level
- Bit 19 = Hart slave 1
- Bit 20 = Hart slave 2
- Bit 21 = Hart slave 3
- Bit 22 = Relay 1
- Bit 23 = Relay 2

In holding register 60, select display mode for the user defined view:

- 0 = Standard
- 1 = Toggling
- 2 = ILLEGAL
- 3 = ILLEGAL
- 4 = Two rows

If you choose **Toggling** above, remember to set the toggling time in seconds by writing it into holding register 61.

Always remember to check the units corresponding to the selected items:

Length unit in holding register 50:

- 0 = meters
- 1 = feet
- 2 = inches
- 3 = imperial (1/16)

Velocity unit (Level rate) in holding register 51:

- 0 = Meters per second
- 1 = Meters per hour
- 2 = Feet per hour

Volume unit in holding register 52:

- 0 = Cubic meters
- 1 = Cubic feet
- 2 = US gallons
- 3 = Barrels

Density unit in holding register 63:

- 0 = kg per cubic meter
- 1 = AP

Pressure unit in holding register 64:

- 0 = Bar
- 1 = PSI
- 2 = Atm
- 3 = Pascal
- 4 = mm H<sub>2</sub>O

Temperature unit in holding register 65:

- 0 = degrees Celsius
- 1 = degrees Fahrenheit
- 2 = Kelvin

### **2.4.2 The single value view**

From WinSetup it is possible to change the item in the **Single value** view. The item for the **Single value** view is selected in holding register 54.

### **2.4.3 Set timeout for return to default display**

If the RDU40 is left in **Display setup** or **Service** mode it will go back to the default display after the set time. Change time by simply writing into the value square of holding register 66.

## **2.5 Change password**

Return to the **Main menu** and choose **Display panel**. A password is required - by default the password is blank (just press OK), but the user can change it to prevent unauthorised users from changing the setup of the RDU40. Though, setup from WinSetup will always be possible.

Now the menu **Display setup** is shown. Move the cursor to **Password** and press **Next**. You will be asked to give the old password. Do so and press **OK**. Give the new password and press OK. Confirm the new password by giving it again and press **OK**. Finally you press **YES** to confirm that you wish the change to take effect. If you regret changing password, simply press **NO** instead to keep the old password. When you have completed the change of password you will be back at the **Display setup** menu.



## 3. Troubleshooting

### 3.1 The RDU40 flashes a checkered pattern.

Check the following:

Bit 0 in holding register 69 set to 1 to enable display control.

The part number of the FCC card must be 9150072673b, 9150072675a or later, otherwise the jumpers on the FCC card have to be moved to position 1, according to picture 10. The part number is printed on a stick-on label on the FCC card.

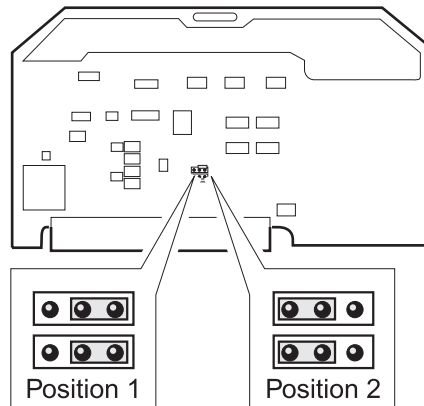


Figure 3-1. Jumpers on FCC card.

REX SW version is 1.D1 or later. In WinSetup, click right mouse button on the present REX device and choose **Properties**. Under **Communication** you can see the label **Version** telling the REX SW version. REX SW version 1D.1 will give reduced functionality, according to "Limited functionality of RDU40." on page 3-2.

The RDU40 for REX cannot be combined with a Slave Data Acquisition Unit (SDAU). No SDAU shall be configured in holding register 5 in WinSetup.

All wires are connected correctly.

REX gauge shall not be in boot mode.

Make sure the RDU40 SW version is 1.B1 or later. To check you must remove the cover on the back of the display. The SW version can be read from a stick-on label on a PROM, according to *Figure 3-2*.

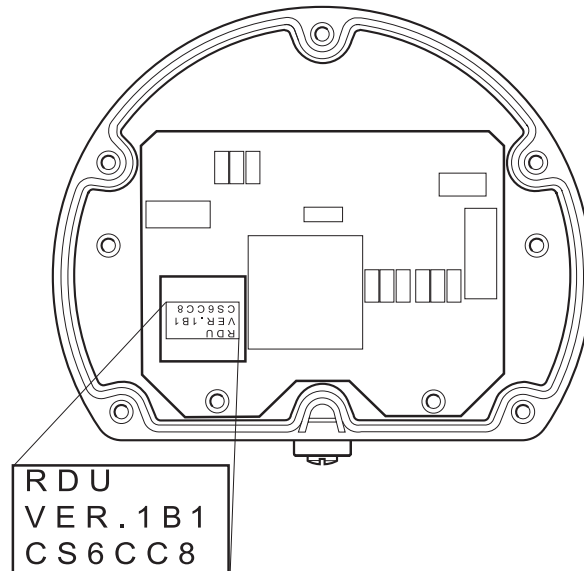


Figure 3-2. RDU40 SW version.

If you run the **Test LCD** a checkered pattern will show but the RDU40 returns to default view in less than a minute.

### 3.2 RDU40 LCD problem.

RDU40 shows nothing but four black rectangles in the bottom of the LCD. Make sure that you have a master RDU40. A master RDU40 shall have the jumper at the back of the RDU40 cover in position 1, according to picture 1. Slave RDU40 is only used when it already has a master RDU40 to follow.

### 3.3 RDU40 does not respond.

RDU40 does not respond when buttons are pressed and keeps starting up, showing only the default view.

If you have two RDU40 connected, make sure one of them is set to be slave (jumper in position 2, see *Figure 3-1.*)

### 3.4 Limited functionality of RDU40.

Only a few items can be shown and imperial unit is 1/8 instead of 1/16.

You may have REX SW version 1D.1. The RDU40 will work, but with reduced functionality. To get full functionality, upgrade REX SW to 1D.2 or later.



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