Radio-over-IP Gateway

TRBOnet Swift A100

User Manual

Last revised on 10 February 2025

Contents

1 Introduction

1.1 About This Document

The information in this document is intended for engineers responsible for building MOTOTRBO radio networks and programming two-way radios for end users.

The document describes in detail how to connect, set up, and maintain the TRBOnet Swift A100 hardware radio-over-IP gateway.

1.2 About TRBOnet Swift

TRBOnet Swift is a family of hardware products designed by Neocom Software Solutions, Ltd for MOTOTRBO radio networks. The Swift family hardware is presented by the RoIP gateways A100 and A200, and the option board ST002.

For more information about the TRBOnet Swift family products, refer to our website.

1.3 Contacts

Region	Phone	Email & Support
EMEA	+44 203 608 0598	info@trbonet.com — general and commercial inquiries
Americas	+1 872 222 8726	support@trbonet.com — technical support
APAC	+61 28 607 8325	https://trbonet.com/kb/— online knowledge base

2   About TRBOnet Swift A100

TRBOnet Swift A100 (also referred to as the "A100 gateway") is a hardware radio-over-IP gateway intended to connect a control radio to TRBOnet Server. The radio can transfer voice and data to one or multiple connected TRBOnet Servers over IP.

2.1   Features

- Designed for DM4000 (EMEA), XPR 5000 (NAR), DGM 5000, DGM 8000 (LACR), and XiR M8600i, XiR M8600, XiR M6660 (APAC) series mobile radios
- Compatible with digital radios by Motorola
- Support for multiple (up to 8) connected TRBOnet Servers
- Control of a connected MOTOTRBO radio (power on/off, restart)
- Self-diagnostics and alarm notifications over IP
- 2U, 19" rack mount design
- Power supply 110/220V AC
- Compatible with backup battery units
- Forced-air cooling with integrated fans
- Automatic temperature monitoring and control
- 4 input/output contacts for external hardware, such as sensors, etc.

2.2   Capabilities

2.2.1   Radio-over-IP gateway

Connected to a mobile radio and to the LAN, the A100 gateway acts as a radio-over-IP gateway between the mobile radio and TRBOnet Server(s), providing the following features:

- Voice and data communications between a MOTOTRBO radio and TRBOnet over IP
- No encryption of the transferred voice and data traffic
- Support for the voice detection signal (VOX) from a control radio via the A100 gateway
- Automatic power-on/off of a MOTOTRBO radio upon turning on/off the A100 gateway
- Broadcasting outgoing IP traffic (voice, data, alarm notifications) to multiple connected TRBOnet Servers

2.2.2   Temperature control system

The A100 gateway is equipped with two fans and a controller to keep the hardware at its optimum operating temperatures. The cooling system has the following features:

- Performs continuous temperature monitoring inside the unit.

- Automatically activates/deactivates the fans and controls their speed, thus keeping the appropriate temperature.
- Sends an alarm notification to all connected TRBOnet Servers when a temperature threshold is exceeded.

2.2.3 Battery backup power system

The A100 gateway features a built-in power supply unit that accepts an AC input and produces a DC voltage to the IP controller, the temperature control system, and the connected radio. The power supply system can also be enhanced with a reserve battery (not included, 12 V nominal battery) to support the battery backup feature so that if the AC power fails, the A100 gateway will be powered from a DC battery.

The battery backup power system has the following features:

- Controls the power supply and switches to the backup battery automatically if the AC power fails.
- Sends an alarm notification to all connected TRBOnet Servers in case of power loss or when switching to the backup power supply.
- Charges the battery while operating from the AC power supply.

2.3 Restrictions

- It is prohibited to install any Radio-over-IP gateways in the same subnet as trunked repeaters (applies to Capacity Plus and Linked Capacity Plus).

2.4 Package Contents

The package contents of TRBOnet Swift A100 include the following items:

Item	Description	Quantity
TRBOnet Swift A100	The hardware unit with an integrated IP controller, power supply unit, and temperature control system.	1
TRBOnet Swift ST002	The option board for a MOTOTRBO radio. The flex cable to connect the option board to the main board of a MOTOTRBO radio. The screw kit.	1
Power cable	The cable to connect the unit to 110/220V AC.	1
USB cable	A programming cable.	1
Ring terminal	The ring connector for the ground cable.	1
Screw kit	The screw kit for mounting the unit in a 19" 2U rack.	1
Spare fuses	3A (5x20) and 10A (6x30)	2
5-pin connector plug	The connector plug used to connect the A100 gateway to external hardware.	1
Passport	Technical documentation for TRBOnet Swift Agent A100.	1

2.5 Specification

General	
Dimensions	485 x 370 x 88 mm
Weight	7 kg
Operation temperature range	-10 °C to +45 °C
Storage temperature range	-40 °C to +85 °C
Ingress protection rating	IP20
Relative humidity, max	85% at +40 °C
Power Supply	
Power input	100-240 V AC, 50/60 Hz, 2.5 A max
Emergency power supply (reserve battery)	12-14 V DC
Battery type	Lead-acid battery, nominal voltage 12 V, recommended capacity 12-40 Ah
Current consumption from reserve battery, max	10 A
Charge current of reserve battery from built-in power source, max	0.5 A
Display	OLED*, monochrome, 128 x 32 pix, 0.91 inch
Clock Battery	3 V, CR1220
Interfaces	4 I/O, USB type B, LAN, Audio In/Out, Radio interface
Network Requirements	
Network connection	RJ45, Ethernet 10/100Base-T, 10/100 Mbit/s
Payload per server connection	160 kbps (PCM/8000) 8 kbps (AMBE)***
Packet delay	< 1800 ms < 3000 ms**
Packet jitter	< 400 ms < 1200 ms**
Packet loss	< 2 %
Number of Server Connections, max	8 1***
Device Programming	USB type B
Radio Connection Interfaces	
MOTOTRBO	USB (RADIO)
Inputs/Outputs	
Output type	Open collector
Output current, max	100 mA
Input voltage, max	12 V

*   The OLED is located on the IP controller
**   TRBOnet Swift Agent Firmware Version R04
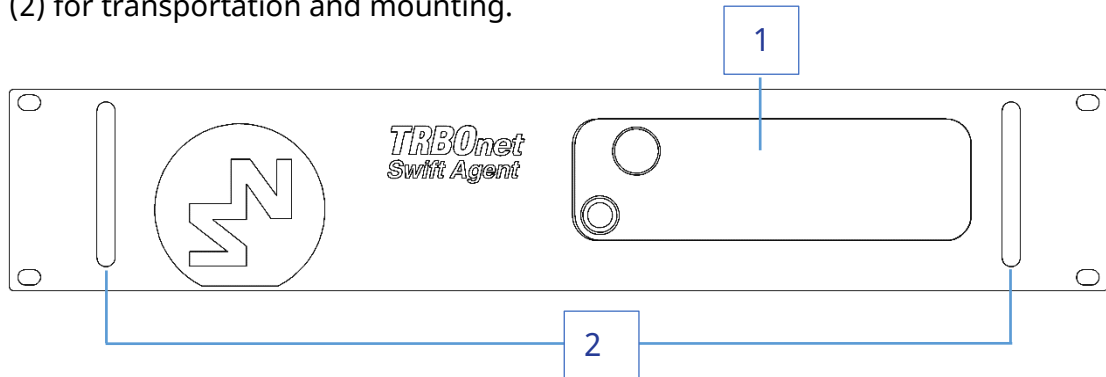   TRBOnet Enterprise/PLUS of version 5.4 or newer

*** TRBOnet Swift Agent Firmware Version HL_R04
TRBOnet Enterprise/PLUS of version 5.4 or newer
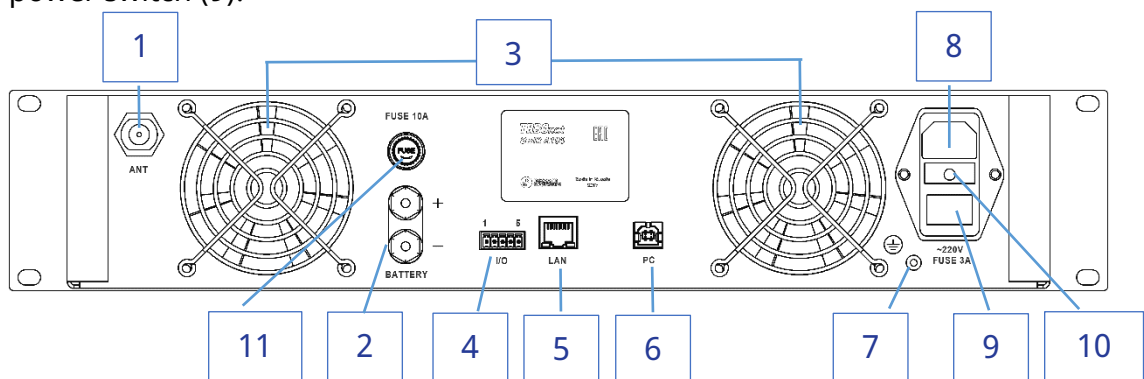
2.6 Panels

TRBOnet Swift A100 comes in a metal case.

2.6.1 Front Panel

The front panel features a slot for a two-way mobile radio (1) and two handles (2) for transportation and mounting.
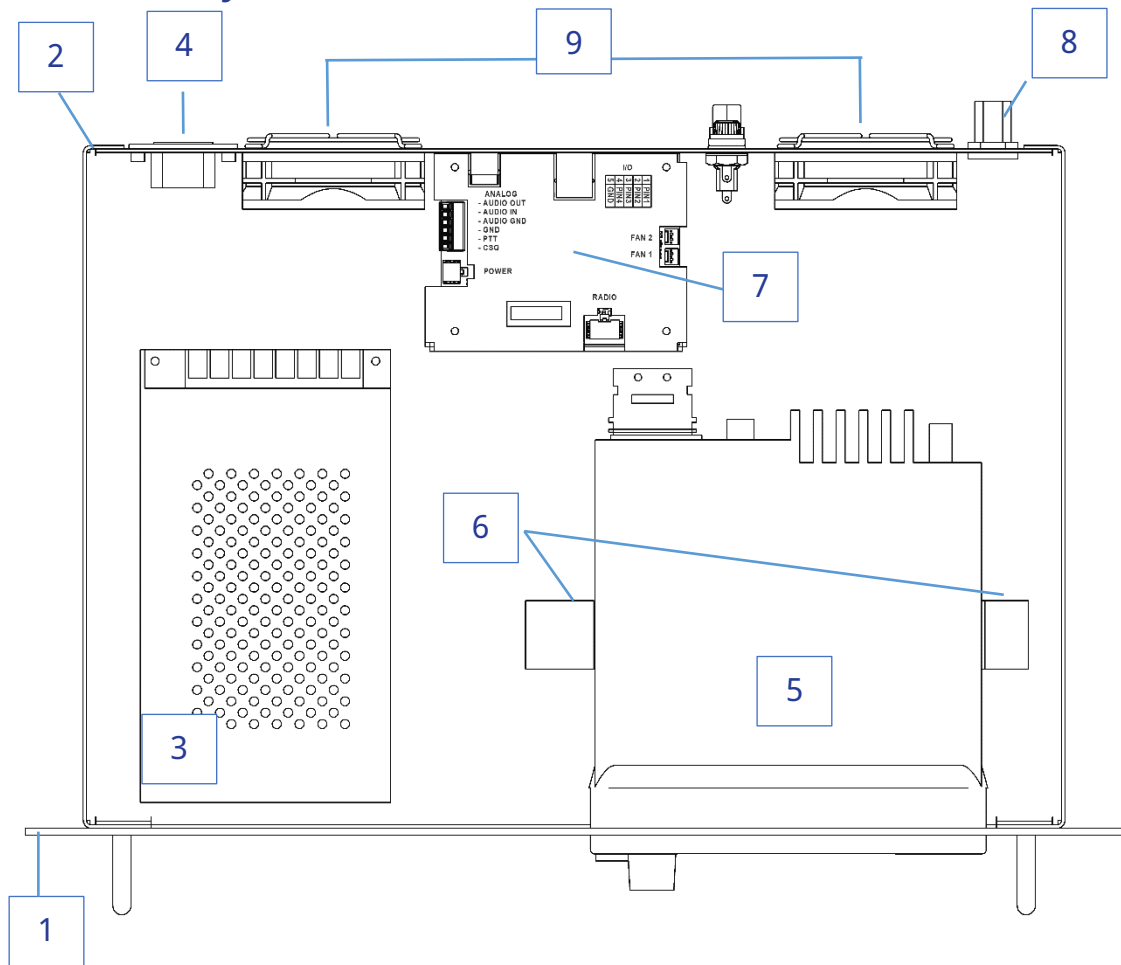

2.6.2 Rear Panel

The rear panel of the unit has two built-in fans (3), several connectors, and a power switch (9).

1. External antenna socket
2. External battery (+)/(-) terminals
3. Two built-in fans
4. Input/Output pins
5. LAN port
6. USB port, type B
7. Earth ground socket
8. AC power socket
9. Power switch
10. Fuse block 3A (5x20), 220V AC
11. Fuse block 10A (6x30), 12 V battery

2.7   Interior Layout

1. Front panel
2. Rear panel
3. Power supply unit
4. AC power socket and switch
5. Radio (user supplied)
6. Brackets for the radio
7. IP controller (see section 2.7.1)
8. External antenna socket
9. Built-in fans

2.7.1 IP Controller
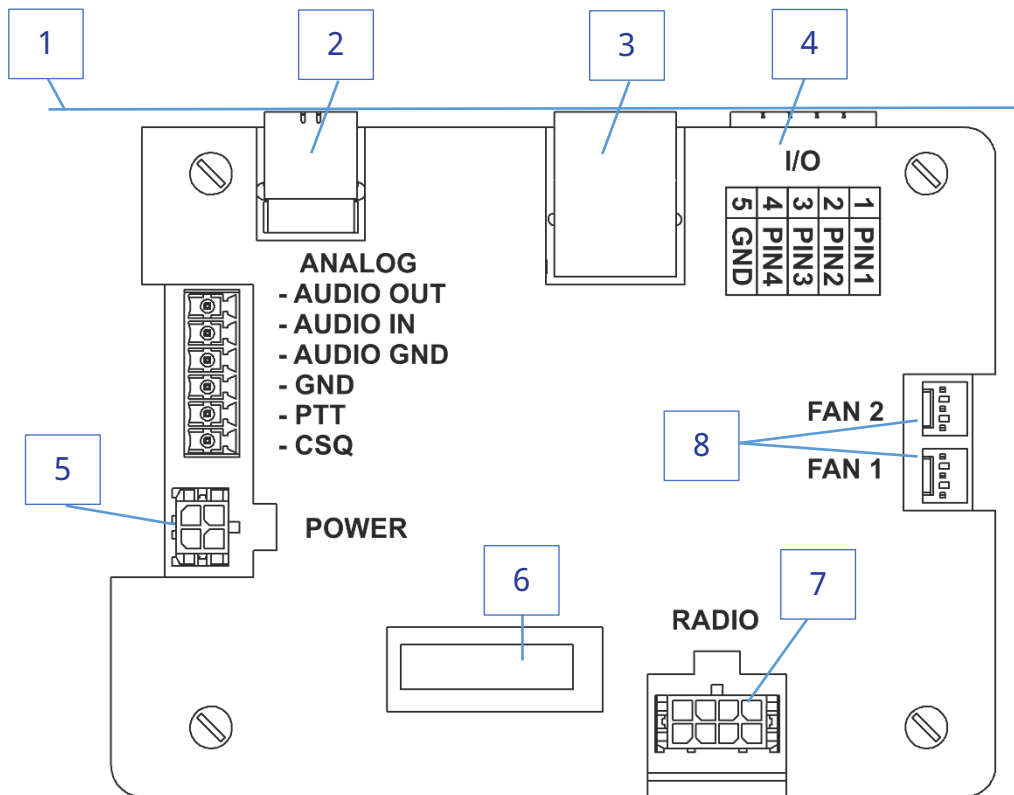
1. Rear panel
2. USB port, type B
3. LAN port
4. Input/Output terminal block (for pin assignment, see section 2.7.1.1)
5. Power terminal block
6. LED Display (see section 2.8)
7. Radio terminal block (see section 3.2)
8. Fan terminal blocks

2.7.1.1 Input/Output terminal block
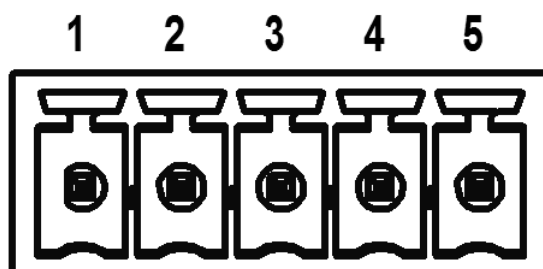
I/O terminal block pinout:

1 – PIN1

2 – PIN2

3 – PIN3

4 – PIN4

5 – GND

2.7.1.2 Radio terminal block
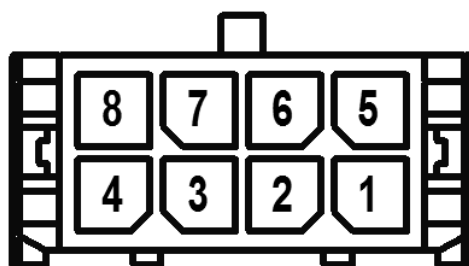
RADIO terminal block pinout:

1 – D- USB

2 – +VBUS USB

3 – ---

4 – IGNITION (radio on)

5 – D+ USB

6 – GND

7 – GND

8 – SWB (radio detect)

2.7.1.3 Power terminal block
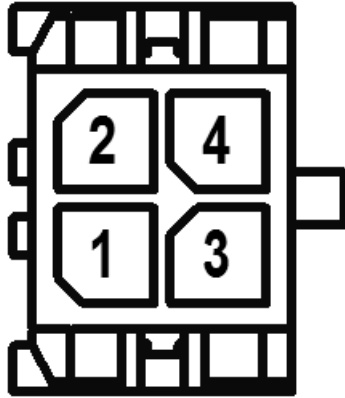
POWER terminal block pinout:

1 – GND

2 – GND

3 – AC-GOOD (AC detection)

4 – V-IN (power)

2.8 LED Indication

Icon	State
	Radio connection Flashing icon: The radio is disconnected or powered off.
	Radio TX
	Radio RX
	IP connection The number next to the icon indicates how many TRBOnet Servers are connected. Flashing icon: the A100 gateway is not connected to an IP network.
	Incoming/outgoing data indicator
	USB connection to the radio
	Low battery charge Battery replacement is required.
	Built-in clock not set The built-in clock is not set. Update of the device configuration or battery replacement is required.

3   Setup and Connection

To configure your A100 gateway, download the Swift Utilities Pack (version 1.7 and higher) from www.trbonet.com and install the TRBOnet Swift CPS software tool on your computer.

Follow the steps in the table below.

#	Step	Refer to:
1	Install the option board into the MOTOTRBO radio	3.1, Installing the Option Board
2	Install and connect the MOTOTRBO radio	3.2, Installing and Connecting the Radio
3	Configure the MOTOTRBO radio	3.3, Configuring the Radio
4	Configure the option board	3.4, Configuring the Option Board
5	Configure the A100 gateway	3.5, Configuring the A100

3.1   Installing the Option Board

The package contents include an option board that you need to install into a MOTOTRBO radio.

To install the option board into the radio:

1. Insert the dismantling tool in the groove between the control head and the radio assembly.
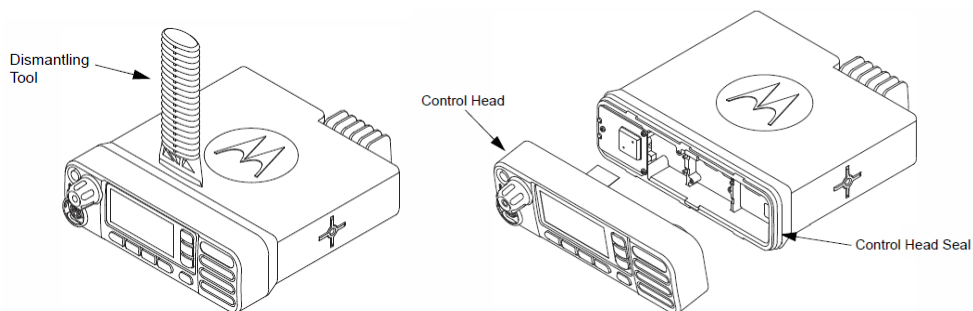

Figure 1: Removing the control head

2. Press the dismantling tool under the control head to release the snap features. Pull the control head away from the radio assembly. Remove the control head seal.
3. Orient the flex cable (included in the package contents) so that it contacts face the option board. Secure the connector latch to the flex cable.
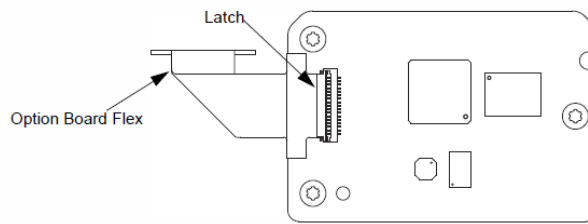
Figure 2: Connecting the flex cable to the option board

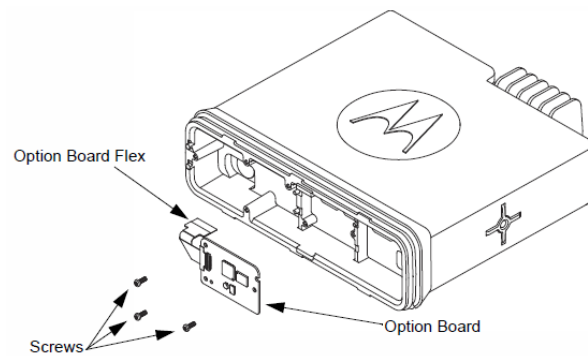4. Connect the flex cable from the option board to the main board connector.

Figure 3: Connecting the option board to the main board of the radio

5. Align the option board to the mounting holes ensuring that the flex tabs are against the chassis alignment posts.
6. Using a T6 TORX™ driver, tighten the three screws to 0.28 N-m (2.5 lbs-in) to secure the option board to the chassis.
7. Assemble the control head seal on the radio. Assemble the control head to the radio chassis by aligning one side of the control head assembly tabs to one side of the radio chassis tabs and then rotate the control head assembly until the other side engages.

Note: Verify that the control head seal is not pinched and not visible. If a pinch is found, disassemble the control head, reseat the seal and reassemble the control head.

3.2 Installing and Connecting the Radio

Now install your MOTOTRBO radio into the A100 gateway and connect it to all required components inside the unit.

1. Remove the screws and lift the top cover of the unit.
2. Insert the radio into the slot on the front panel of the unit, orienting the radio's back panel inside the unit. Use the screws of the proper size to secure the radio in the unit.
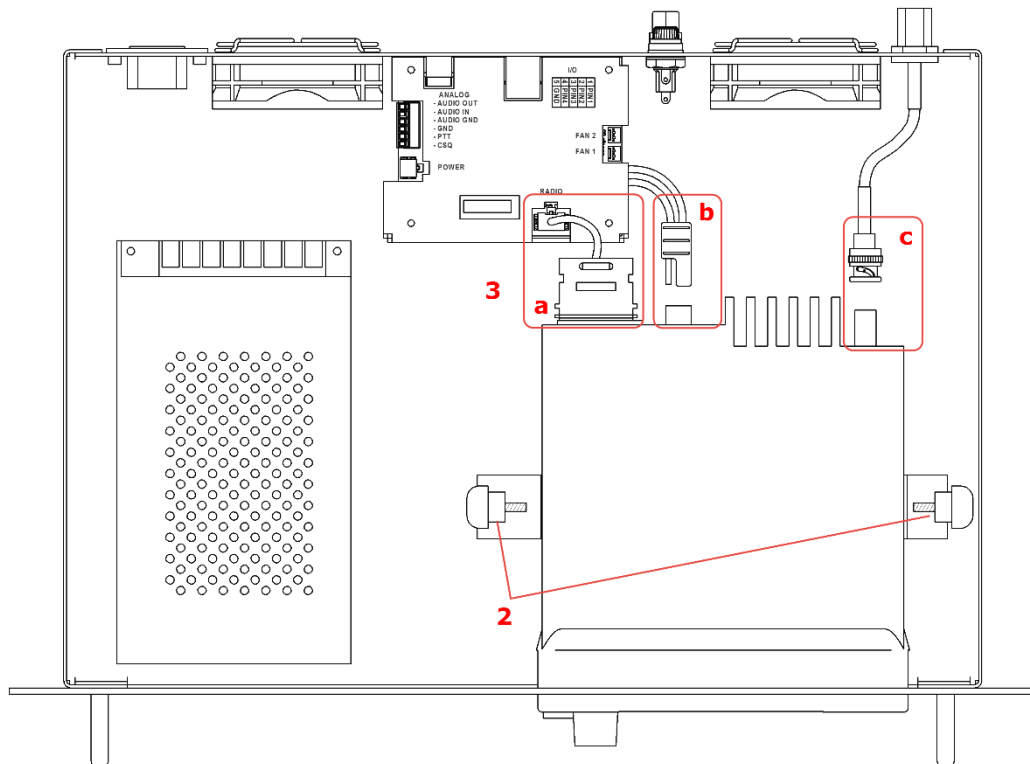

Figure 4: Installing a MOTOTRBO radio into the unit

3. Perform the following connections:

   a. Connect the radio to the IP controller with the cable plugged into the RADIO terminal on the controller.
   b. Connect the radio to the power supply. The black-and-red power cable is already connected to the integrated power supply unit.
   c. Connect the RF antenna to the mobile radio. The antenna cable is included in the package contents.

4. Reinstall the top cover and secure it with the screws.

3.3   Configuring the Radio

Now configure your MOTOTRBO radio using the MOTOTRBO CPS software.
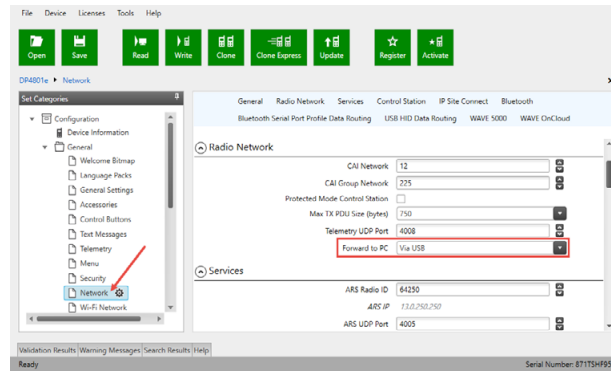
To configure the radio:

1. Power off the A100 gateway. Connect the programming cable to the radio and to a USB port of your computer. Power up the A100 gateway.
2. Launch the MOTOTRBO CPS software on your computer.
3. Open the configuration settings of your radio by clicking **Read** on the **Device** menu.
4. In the **Set Categories** pane, select **General > General Settings**.
   In the right pane, uncheck the **Min Speaker Volume Muted** check box.
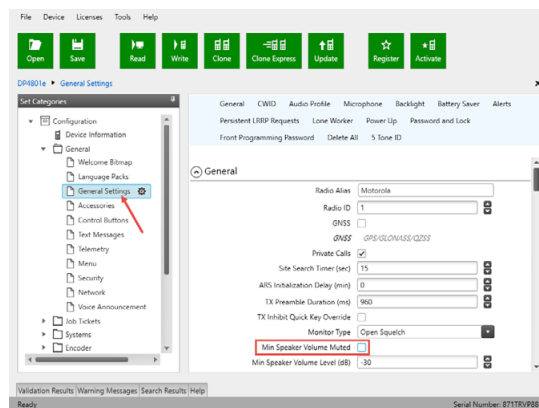

5. In the **Set Categories** pane, select **General > Accessories**.
   In the right pane, from the **Cable Type** drop-down list, select **Motorola Solutions**.
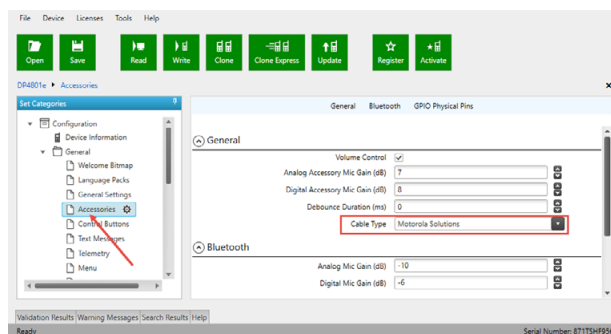
6. In the **Set Categories** pane, select **General > Network**.
   In the right pane, navigate to the **Radio Network** section, and from the **Forward to PC** drop-down list, select **Via USB**.

7. In the **Set Categories** pane, select **Zone/Channel Assignment > Zone**. For all channels on which the radio should work with the A100 gateway via the ST002 option board, select **Option Board** in the right pane.
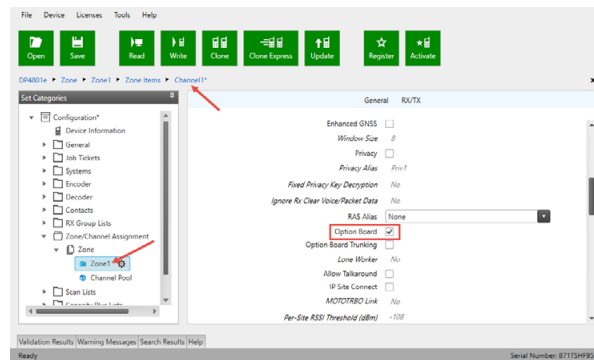

8. Save the updated settings to the radio by clicking **Write** on the **Device** menu.
9. Close the application and disconnect the radio from the computer.

3.4   Configuring the Option Board

To configure the option board:

1. Power off the A100 gateway. Connect the programming cable to the radio and to a USB port of your computer. Power up the A100 gateway.
2. Launch TRBOnet Swift CPS on your computer. In the main window, select **USB** as the programming interface (Figure 5, page 16).
3. Click the **Read** button, or open the **Device** menu and click **Read**.
4. In the left pane, select **Device > Device Information**. In the Device Information pane, click the **Update Firmware** link.
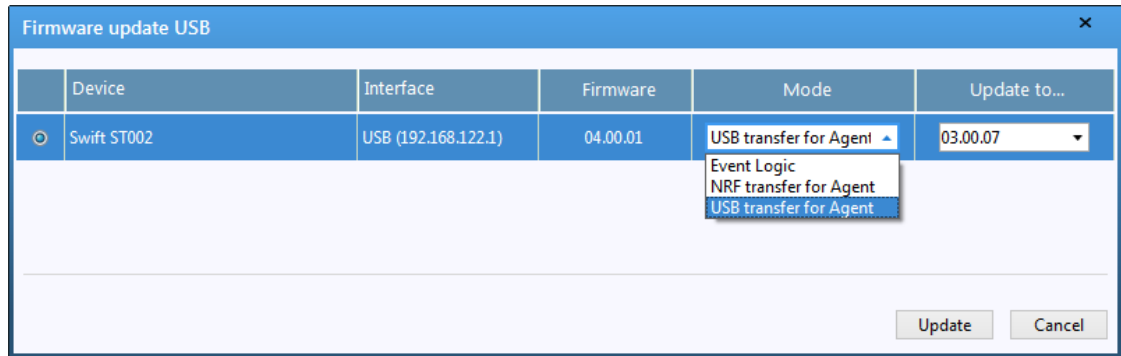
5. In the **Firmware update USB** window, make sure your Swift ST002 is selected. From the **Mode** drop-down list, select "USB transfer for Agent". From the **Update to** drop-down list, select the latest firmware version. Click **Update**.

3.5 Configuring the A100 Gateway

To configure the A100 gateway:

1. Launch TRBOnet Swift CPS. In the main window's bottom bar, select **USB** as an interface for device programming (Figure 5). Connect the programming cable to a USB port of your computer.
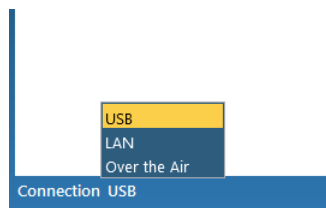

Figure 5: Selecting the USB connection for programming

If you prefer to program your A100 gateway using the LAN connection, select LAN as the programming interface and connect the A100 gateway to the LAN and to the power supply.

2. Update the firmware of your A100 gateway:

   a. On the **Tools** menu, click **Options**. In the right pane, make sure that the **Allow changing device firmware type** option is switched on (Figure 6).
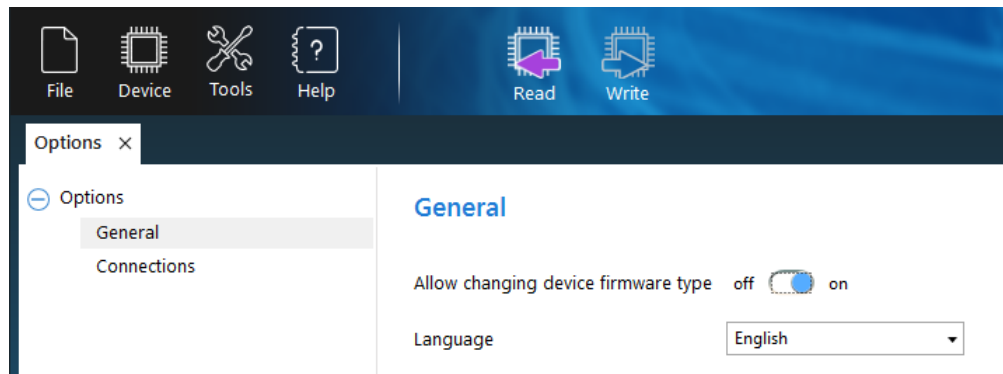
Figure 6: The device mode change is enabled

b. Click the **Read** button, or open the **Device** menu and click **Read**.
If you use the **LAN** connection for programming, in the
Reading by LAN window that appears, specify the **Device type** and
IP address of your A100 gateway, and click **OK**.
If you use the **USB** connection and the **Select device** window
appears, point your device.

c. In the left pane, select **Device > Device Information**.
In the **Device Information** pane, click the **Update Firmware** link.

d. In the **Firmware update** window, make sure your A100 gateway is
selected. From the **Mode** drop-down list, select "USB RoIP Gateway".

e. From the **Update to** drop-down list, select the latest firmware
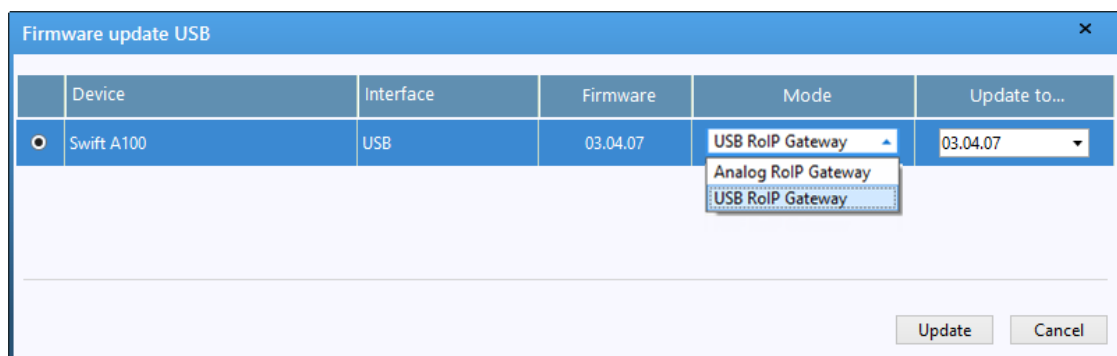version. Click **Update**.

Figure 7: Updating firmware on the A100 gateway connected through USB

3. To open the configuration of your A100 gateway, click the **Read** button,
or open the **Device** menu and click **Read**.

▪ If you use the **LAN** connection, the **Reading by LAN** window appears.
Specify the **Device type** and **IP Address** of your A100 gateway and
click **OK**.

▪ If you use the **USB** connection and the **Select device** window appears,
point your device.

The configuration settings appear in a separate tab.
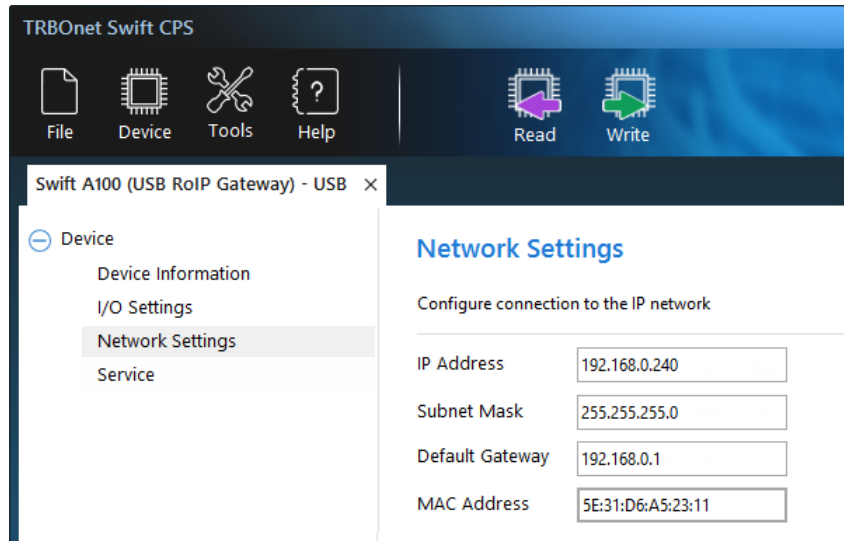
4. Click **Network Settings** in the left panel.

Figure 8: Configuring the IP network settings of the A100 gateway

In the right panel, specify the following settings:

- **IP Address**: The IP address assigned to your A100 gateway.
- **Subnet Mask**: The mask of the subnet to which the A100 gateway belongs.
- **Default Gateway**: The default gateway of the IP network.
- **MAC Address**: The default network address of the A100 gateway.
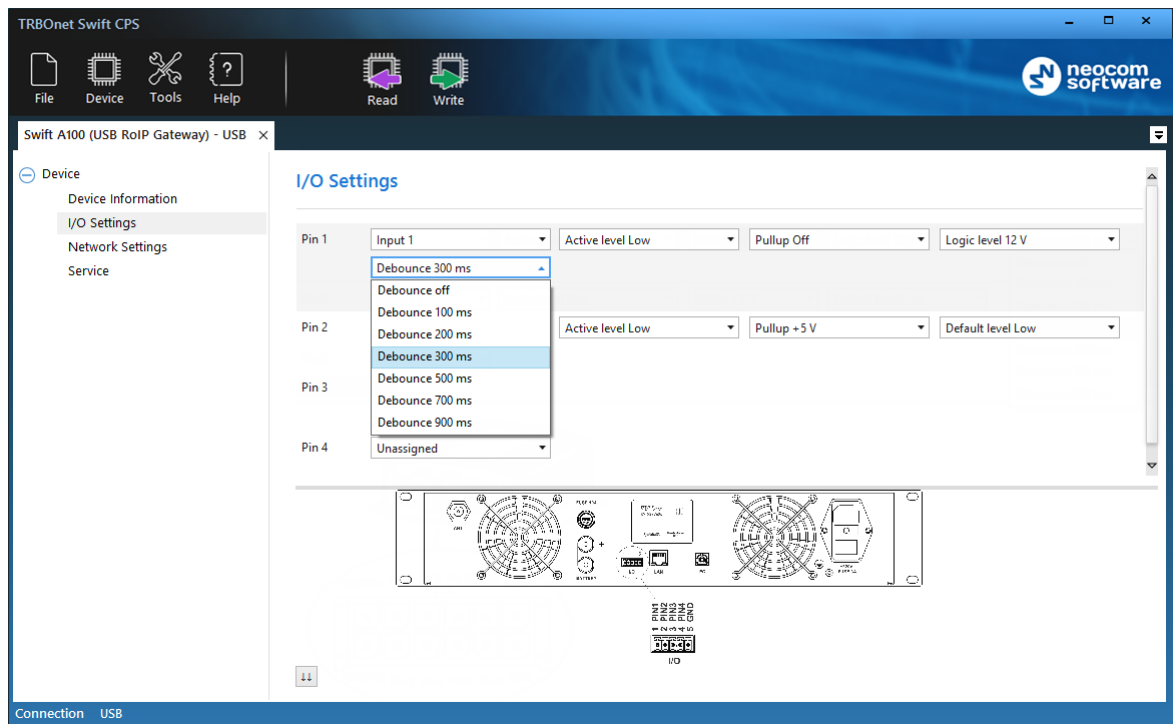
5. Click **I/O Settings** in the left panel.

Figure 9: Configuring I/O pins

3 Setup and Connection

- In the right panel, configure the I/O pins of A100 gateway that are connected to external hardware (Figure 9). For each connected I/O pin, expand the menu and select the logical pin in TRBOnet:

  Specify the active level of the signal and other I/O pin settings.

Note:	For TRBOnet software to display the states of the A100 pins, configure TRBOnet software as described in section 4 TRBOnet Configuration (page 20).

  If a physical pin is not connected, leave it unassigned.

6. To save the configuration on your A100 gateway, click the **Write** button or open the **Device** menu and click **Write**.

4 TRBOnet Configuration

This section describes how to configure TRBOnet Server and TRBOnet Dispatch Console, so that the operator can see and manage the physical I/O pins of the A100 gateway.

In the A100 configuration, the physical I/O pins are mapped to the logical pins of TRBOnet (Figure 9).

To complete the I/O pin configuration in TRBOnet, read the following sections:

- 4.1 TRBOnet Enterprise/PLUS Configuration (page 20)
- 4.2 TRBOnet Watch Configuration (page 24)

4.1 TRBOnet Enterprise/PLUS Configuration

In this example, TRBOnet Swift A100 is registered as a radio system in the TRBOnet Enterprise (PLUS) Server configuration (Figure 10).
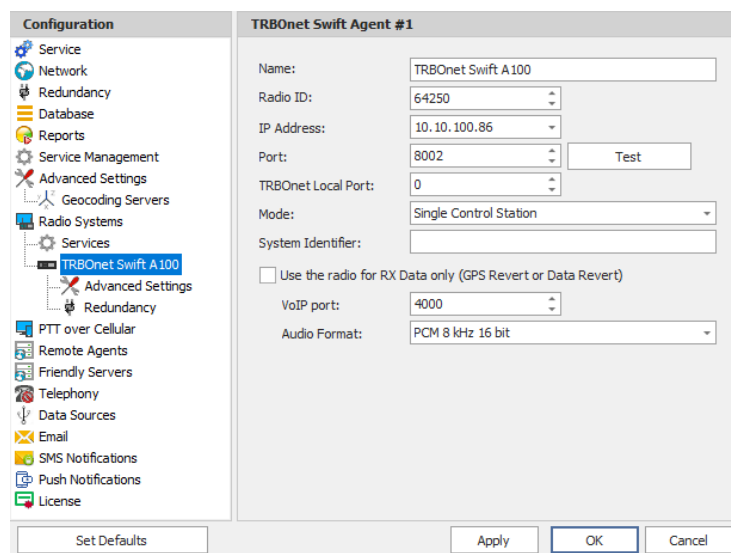

Figure 10: Registering the A100 gateway as a radio system

Launch the TRBOnet Dispatch Console and click **Voice Dispatch** in the left pane. If registered correctly, your A100 gateway appears on the **Radio Interface** tab with the green ("connected") icon (Figure 11).
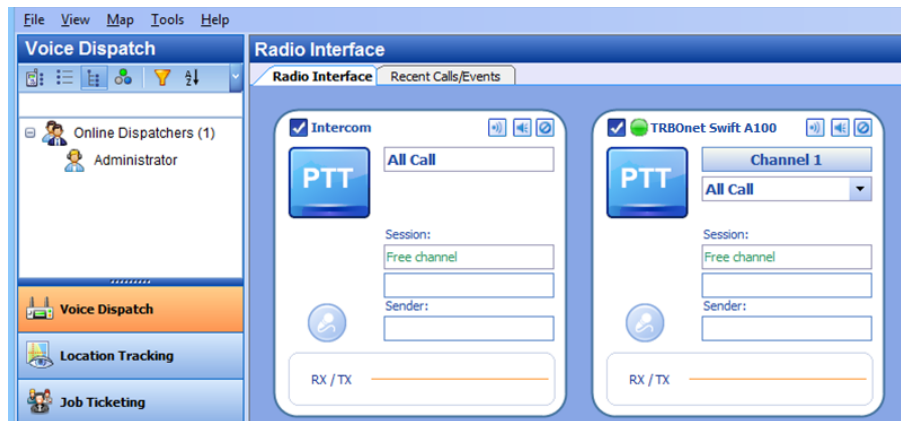
Figure 11: The RoIP gateway "TRBOnet Swift A100" is connected properly

To configure pins:

1. In the TRBOnet Dispatch Console, click **Administration** and **Radio Systems** in the left pane (Figure 12, step 1 and 2).
2. In the right pane, the list of the registered radio systems appears. Double-click the radio system associated with your A100 gateway (Figure 12, step 3).
3. In the popup window, click the **Channels** tab. Double-click the channel (Figure 12, step 4), or select it and click **Properties**. Another popup window appears.
4. In the second popup window, click the **Master Control** tab and configure pins.
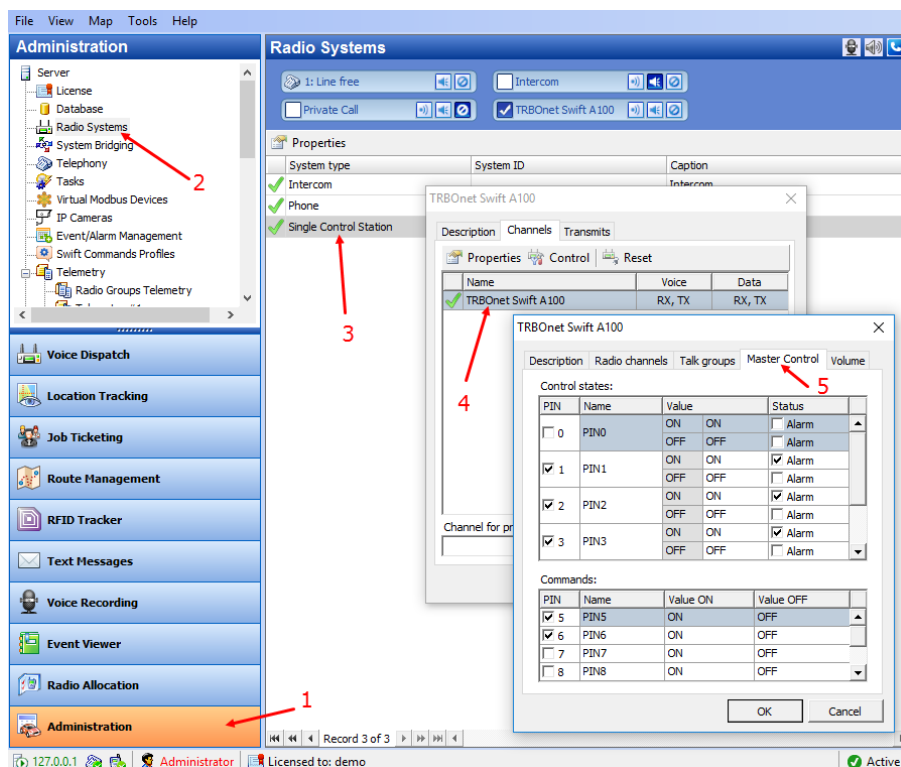

Figure 12: Configuring the A100 gateway pins in TRBOnet Dispatch Console

- Under **Control states**, select the logical input pins that you have mapped in the configuration of your A100 gateway (see section 3.1). Do not select pin 0. For each selected pin:
  - Double-click the value in the **Name** field and enter a descriptive pin name.
  - In the **Value** field, you see the pin states (ON and OFF) and their displayed values (also ON and OFF by default). If necessary, double-click the value in the second column and enter a custom name of the pin state.
  - In the **Status** field, select **Alarm** for the TRBOnet Dispatch Console operator to see an alarm box when the given pin state is detected.
- Under **Commands**, select the logical output pins that you mapped to the physical pins of your A100 gateway (see section 3.1). For each selected pin, specify a descriptive name. In the **Value ON** and **Value OFF** fields, double-click the value and enter a custom name of the command.

5. Click **OK** and again **OK**.

To see the configured pins, click **Voice Dispatch** in the left pane. Click the green icon in the PTT box corresponding to your A100 gateway (Figure 13).
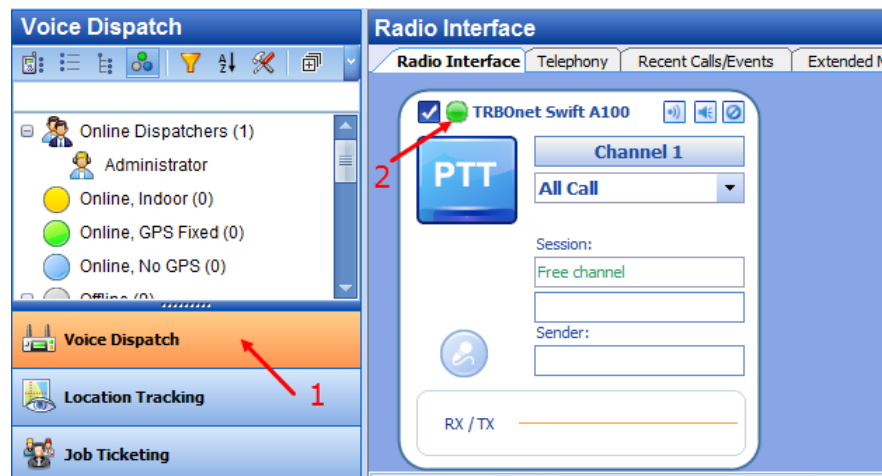

Figure 13: Opening the A100 pin states

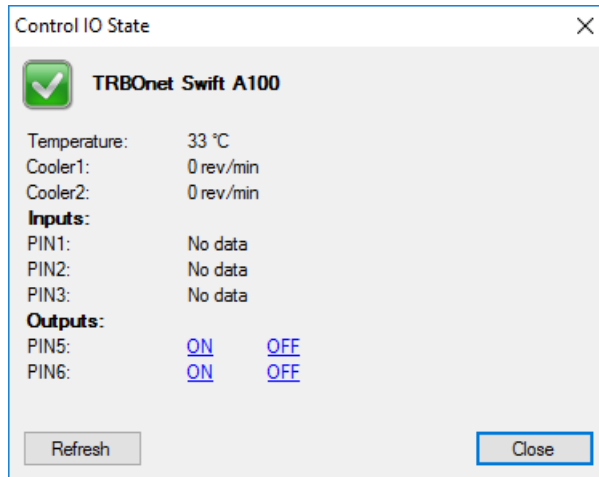A pop-up window appears displaying the pin states:

Figure 14: Pin states

The temperature is measured inside the unit and transmitted to TRBOnet by default, no additional configuration is required. The fan speeds for each of the two coolers are displayed in revolutions per minute.

Input and output pins appear with their custom names. The input pin states are read-only. The operator can change the output pin states by clicking a respective command next to the pin name (**ON** and **OFF** under **Outputs** in Figure 14). Or, the operator can right-click the green icon in the PTT box of the A100 gateway and change the output pin states from the popup menu (Figure 15).
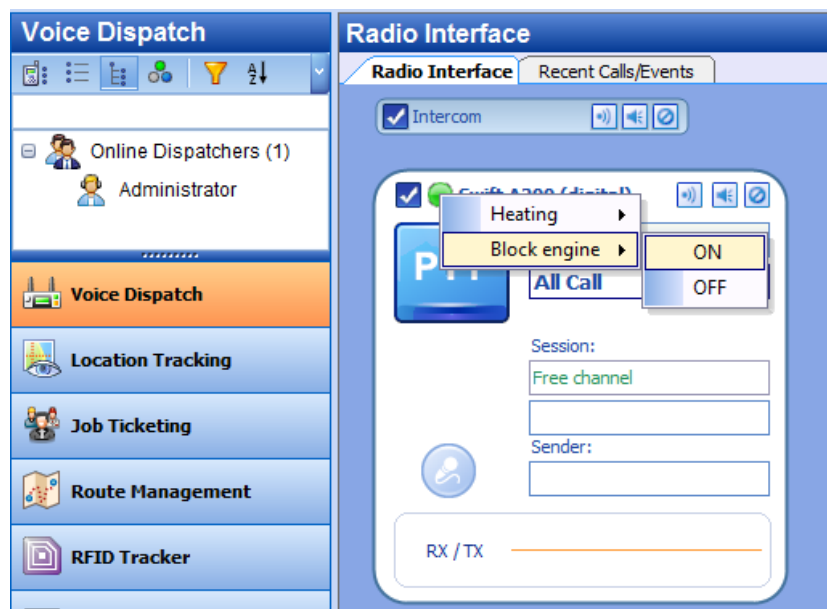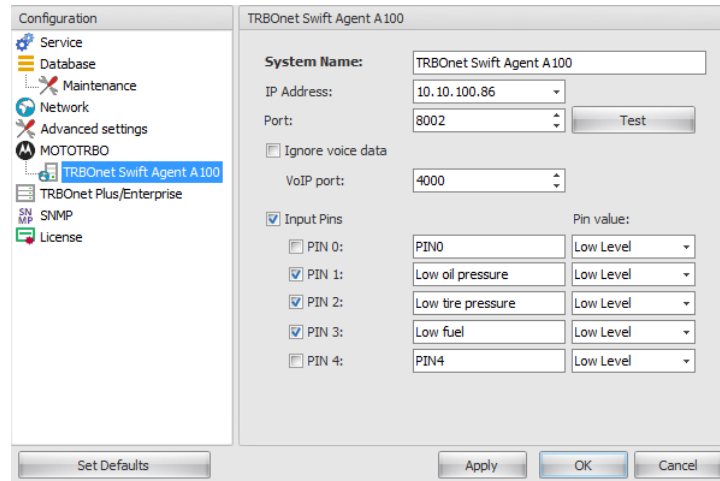

Figure 15: Changing the output pin states

4.2 TRBOnet Watch Configuration

The I/O pins of TRBOnet Swift A100 are supported in TRBOnet Watch 2.5 and later versions. In this example, the A100 gateway is registered as a radio system in the TRBOnet Watch Server configuration (Figure 16).

Figure 16: Registering TRBOnet Swift A100 as a radio system

Enable the **Input Pins** feature and configure pins as follows:

- Select the logical input pins (**PIN 1** through **PIN 4**) that you have mapped in the configuration of your A100 gateway (see section 3.5). Leave **PIN 0** unselected.
- If needed, enter a descriptive name for each input pin. Otherwise, the console will display the default pin names (PIN1, PIN2, and so on).
- For each pin, expand the **Pin value** menu and select the active level exactly as specified in the A100 configuration (see section 3.5).

After you apply the changes, launch the TRBOnet Watch console and click **Live Monitor** in the left pane. You can see the states of the connected A100 pins on the **Diagnostics** tab and on the **Physical GPIO Pins** tab.
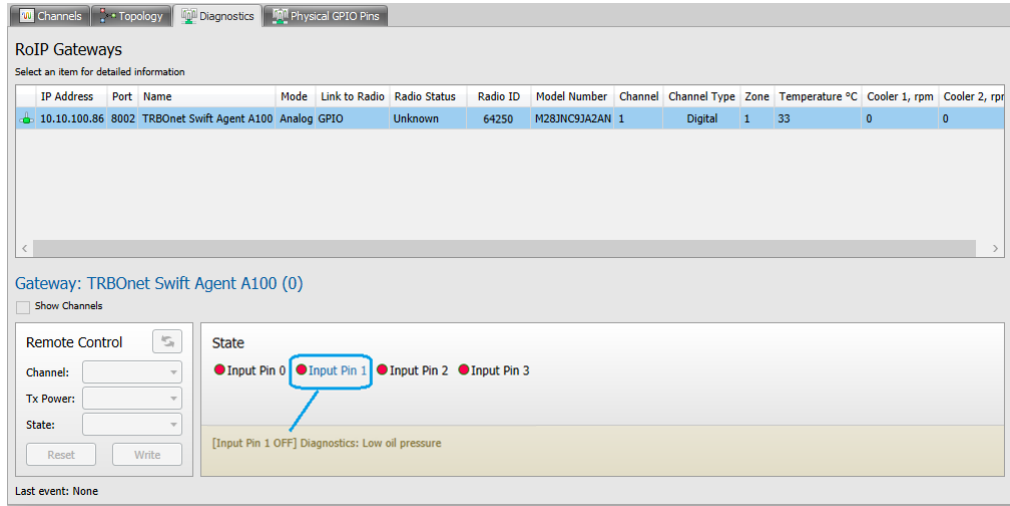

Figure 17: TRBOnet Swift A100 pin states on the Diagnostics tab

The **State** panel shows all pins (input and output) that are connected to external hardware.

- The green icon indicates the active level on the pin.
- The red icon indicates an inactive pin.

Point the mouse cursor at the pin in the **State** panel to see the detailed information about the pin (Figure 17).

5 Maintenance

5.1 Built-in Clock Battery Replacement

When the dispatcher receives a **Low battery charge** message, they need to replace the built-in clock battery.
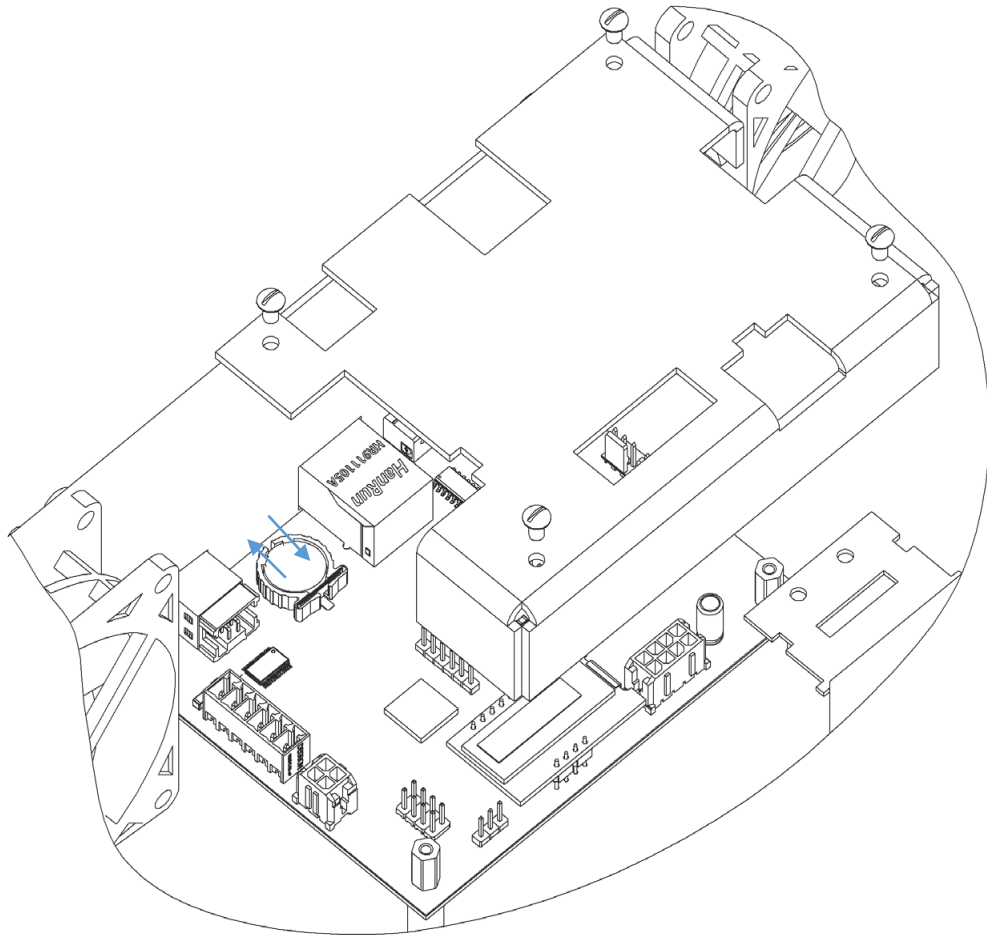

Figure 18: Replacement of the battery

To replace the battery:

1. Disconnect the unit from the power supply.
2. Undo the screws and remove the cover from the IP controller.
3. Remove the old battery from the battery slot (Dispose of it according to local laws).
4. Insert a new CR1220 3V lithium coin battery so it matches the polarity.
5. Replace the cover and tighten the screws.

Note: Use the recommended battery type. Batteries that look similar may differ in voltage.

6   Important Notes

- Disconnect TRBOnet Swift A100 from the power supply before connecting it to any external hardware.
- Remember to update the firmware of TRBOnet Swift A100 and TRBOnet Swift ST002 (option board) before starting any operation.
- The manufacturer reserves the right to make changes and/or improvements in designs and dimensions without notice and without incurring obligation.