



# E-HRS-AS

# HRS Availability Transmitter (HRS-AT) Assembly Instructions







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## **1** Introduction

This HRS-AT has been developed for the European Hydrogen Refueling Station Availability System (E-HRS-AS) to support the growth of fuel cell electric vehicle (FCEV) technology. It provides Hydrogen Refueling Station (HRS) availability information for FCEV drivers by transmitting the availability status information gathered from the HRS to the E-HRS-AS servers approximately every 10 seconds.

## 2 Contents of the HRS-AT Assembly Kit

The supplied package contains a separately packaged HRS-AT assembly kit, which includes the following items:

- RevPi Core 3 (compute module for DIN rail usage), cf. 2.1, page 4
- DI module (signal module for DIN rail usage), cf. 2.2, page 4
- connectors bag, cf. 2.3, page 5
- maintenance switch bag, cf. 2.4, page 6
- ◆ CAT 5e patch cable (2 m)
- ♦ HRS-AT assembly instructions (this manual)
- + HRS-AT Quickstart Guide and HRS-ATS (Type A) Data Sheet





### 2.1 RevPi Core 3



	REVO RevPi (	LUTION PI Core 3
HDMI Aldonaza Microbrocessor Microbrocessor Microbrocessor USB A USB A USB A USB A USB A USB A USB A	SV USB A max. 2 x 500 mA	
12-24 VDC -15% /+20% (X4) 10 W (incl. 2x 450 mA US8) CC ROHS compliant Adde in Germany KUNNUS Gmbi, Hearway 15c 06-73770 Denkandord www.kunbus.com		ldent. No.: 100257 YOM: 2018

## 2.2 DI Module

224

Power

IIN

RevPi DI

	REVOLUTION RevPi DI	PI
All and a constraints of the second s	1       1	
12-24 VDC -15% / +20% 1.5 W (X4) 0.1 W (X2 IN)	X2 & X4)	





### 2.3 Connectors Bag







## 2.4 Maintenance Switch Bag





## **3** Assembly Instructions

The assembly consists of the following steps, which should be completed in this order:

- 1. Mount both modules on a DIN rail.
- 2. Couple the DI module and the RevPi Core 3.
- 3. Prepare the main power connectors.
- 4. Prepare the signal power connector.
- 5. Connect the RevPi Core 3 to the internet
- 6. Mount the maintenance switch.
- 7. Connect the maintenance switch and plant signals to the DI module.
- 8. Power both devices.





#### HRS-AS

## 3.1 Mount both modules on a DIN rail

Snap both the RevPi Core 3 and the DI module onto the DIN rails of the plant's switch panel, with the DI module on the left side and the RevPi Core 3 on the right side, making sure that the two modules are touching each other without a gap.



## 3.2 Couple the DI module and the RevPi Core 3

Couple the DI module and the RevPi Core 3 by using the PiBridge connector from the connectors bag, as depicted below.







### 3.3 Prepare the main power connectors

#### A Wire the connectors as explained, but do not turn on the power afterwards.

The connectors bag contain two X4 power connectors to supply power to the DI module and the RevPi Core 3.

To connect each X4 power connector, use the following configuration:

Pin 1 (leftmost):24 VPin 2:0 VPin 3:not connectedPin 4 (rightmost):groun







### **3.4** Prepare the signal power connector

#### A Wire the connectors as explained, but do not turn on the power afterwards.

The connectors bag contains one X2 power connector.

Use the X2 power connector to supply signal power to the DI module by wiring up using the following configuration:

 Pin 1 (leftmost):
 24 V

 Pin 2:
 0 V

 Pin 3:
 0 V

 Pin 4 (rightmost):
 24 V







### 3.5 Connect the RevPi Core 3 to the internet

Use the provided network cable to connect the RevPi Core 3 to a local network that is capable of providing internet access to the device according to the network configuration chosen when the device was ordered (either DHCP or static IP).

Find details on the specific internet access requirements in section 4.1 on page 16.







### 3.6 Mount the maintenance switch

Open the maintenance switch bag and take out the contents.

Snap both contact blocks into the fixing adapter as depicted below.



Find a suitable location to mount the the maintenance switch, making sure it is not accessible to unauthorized individuals.

Drill a 22.5 mm hole through the front door of the switchboard cabinet and create a cutout on the top of the hole to secure the switch actuator against twisting.

Connect the switch actuator with with the tag carrier through the hole and fix the switch in place with the retainer nut.











Attach the fixing adapter with the contact blocks to the rear of the switch actuator.







## 3.7 Connect the maintenance switch and plant signals to the DI module

The DI module has 16 inputs, numbered as shown below. The maintenance switch and the actual availability signals from the plant will both be connected to these inputs.







#### 3.7.1 Wiring of the availability signals

Connect all of the applicable availability signals to the DI module according to the following table.

DI input pin no.	availability signal
5	700 bar H2 car dispenser availability
7	350 bar H2 car dispenser availability
9	350 bar H2 bus dispenser availability

In each case, the signal should be mapped as follows:

0 V on input pin means, that the dispenser is **unavailable** to the customer.

24 V on input pin means, that the dispenser is **available** to the customer.

#### 3.7.2 Wiring of the maintenance switch

Attach 24 V VCC to pin 2 on both contact blocks (working in opening mode) of the maintenance switch.

Use the grey I/O connector for the input pins on the DI module as follows:

DI input pin no.	maintenance signal
1	contact block pin 1 of the "Maintenance" position
3	contact block pin 1 of the "Limited avail." position

**0 V** on maintenance pin (DI input 1) means, HRS is **in maintenance**.

24 V on maintenance pin (DI input 1) means, HRS is not in maintenance.

**0 V** on limited availability pin (DI input 3) means, HRS is **limited available**.

**24 V** on limited availibility pin (DI input 3) means, HRS is **not limited available**.

The switch ensures that only one of both pins is set to 0 V VCC at the same time.

### 3.8 Power both devices and check the setup

Insert now both the main power connectors and the signal power connectors that were prepared in sections 3.3 and 3.4. If this step was done before any of the previous steps, please finish the previous steps, disconnect all power connectors for 5 seconds, and then reconnect them.

After both devices have been running for a few minutes, verify that the "PWR" and "A2" LEDs on the RevPi Core 3, as well as the "PWR" and "IN" LEDs on the DI module, are permanently green. If any of these LEDs are not permanently green, refer to section 6 for troubleshooting guidance.

If the devices are running correctly, please log in to the E-HRS-AS operator's portal (<u>https://h2-map.eu/portal</u>), navigate to the HRS in question, and check that the received signals displayed in the availability transmission overview on the right hand side are correct. If the availability transmission section contains more than one transmission, only the one marked with "type B" is relevant. Try changing the availability signals and the position of the maintenance switch and verify that the received signal is received correctly in each case.







## 4 IT Security

### 4.1 Network communication

### 4.1.1 outbound traffic

The HRS-AT is designed to only make outgoing connections to E-HRS-AS cloud servers at 194.29.233.160/27 and only on the following ports:

- 1195/tcp (to establish a VPN for data transmission, diagnosis and security updates),
- 9022/tcp (to establish an emergency SSH connection in case VPN fails),
- 123/udp (for time synchronisation via NTP)

Please configure your firewall to allow this traffic. You may also configure it to reject all other traffic.

#### 4.1.2 inbound traffic

Incoming communication is not neccessary for standard operation. However, there is an SSH server running on port 22/tcp as an emergency for debugging purposes in case the connection to the E-HRS-AS cloud servers fail. If this becomes necessary, we will contact you to discuss recovery measures. There is no need to have the SSH server accessible on a permanent basis.

Incoming requests to any other port are rejected.

Please configure your firewall to reject all inbound traffic to the HRS-AT system, including on port 22/tcp.

### 4.2 OS, software and updates

The HRS-AT system runs on the Raspbian operating system and regularly receives over-the-air updates through the OpenVPN connection from the E-HRS-AS cloud servers. The system may experience short signal interruptions during the update process.

### 4.3 Local access (SSH or the like)

Local access is prohibited for security reasons. The device runs an SSH server for emergency purposes, but password login has been disabled. Authentication is only possible using personal keys belonging to a few selected members of the E-HRS-AS technical support team.

## 5 Hardware operating conditions

Voltage:	min. 10.7 V - max. 28.8 V
Max. power consumption:	12 W
Fuse:	500 mA at 24 V
Operating temperature:	-40 °C to +55 °C
Humidity:	max. 93 %, non-condensing





## 6 LED status display

### 6.1 RevPi Core

#### "Power"/"PWR":

Status	Description	Problem solution
permanent green	device is running	
permanent red	device is malfunctioning	Please check the power supply. Contact support if the problem persists.
off	device is off	

#### "A1": not in use

#### "A2": availability transmission status

Status	Description	Problem solution
permanent green	transmission service is running	
permanent red	transmission service is not working	Please check the internet connection. Contact support if the problem persists.
off	transmission service is initialising	





## 6.2 DI module

#### "Power"/"PWR":

Status	Description	Problem solution
permanent green	DI module operational	
permanent red	DI module without connection to RevPI Core 3	Check if the PiBridge connector is mounted correctly.
blinking red	DI module is connecting to RevPi Core 3	

#### "IN": signal status

Status	Description	Problem solution	
permanent green	inputs operational		
permanent red	missing signal power supply	Check that the X2 signal power	
blinking red	wrong wiring of signal power	connector is mounted and wired according to this manual.	
off	DI module is connecting to the RevPi Core		





## 7 Contact Addresses



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