
IoT Sensors Harvy2 & Harvy2^{ROGOWSKI}

User Manual and technical data of the
Harvy2 and Harvy2^{ROGOWSKI} LoRaWAN sensors



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Table of contents

Quick Start Guide	4
1. General information	5
1.1 Safety instructions	5
1.2 Intended use.....	5
1.3 Disposal.....	6
1.4 Support	6
2 Functional description.....	7
2.1 What is the Harvy2 used for?	7
2.2 What is the Harvy2 ^{ROGOWSKI} used for?	7
2.3 Product features.....	7
2.4 Applications	9
2.4.1 Harvy2: Metering RMS currents.....	9
2.4.2 Harvy2: Voltage-dependent measured values in the three-phase network.....	10
2.4.3 Harvy2 ^{ROGOWSKI} : Measurement at all levels of the electrical supply	10
3 Installation of the hardware components.....	12
3.1 Installation Harvy2 with clamp-on current transformers.....	12
3.2 Installation Harvy2 with clamp-on current transformers and voltage transformer	13
3.3 Installation Harvy2 ^{ROGOWSKI}	14
4 Configuration.....	16
5 Firmware updates.....	21
6 Special Features.....	22
6.1 Counter function (“counter mode”).....	22
7 Technical data	24
7.1 LED signals.....	24
7.2 Supported LoRaWAN frequencies.....	24
7.3 LoRaWAN payload encoding and decoder description	25
7.3.1 Type: Current Data (A, V, Hz)	25
7.3.2 Type: Counter (kWh)	28
7.3.3 Type: Counter (amph)	29

8 FAQs 30

Appendix..... 34

 I. Updates to firmware versions older than version 1.0.0/Recovery 34

 II. New features (provisionally described) 35

Release notes:

Manual version	Changes made
Version 1.0.4	<p>Currently available: Firmware v1.2.5, GUI version v0.23.0</p> <ul style="list-style-type: none"> • Addition of hardware variant Harvy2^{ROGOWSKI}. • New chapter “Special Features” added, describing the counter mode. • Payload description for counter function updated. • Images and descriptions adjusted to match GUI version v0.23.0, including screenshots of the mobile version. • Information on LED signals expanded (Data Rate) . • Patent status updated.
Version 1.0.3	Payload decoder description for counter mode added in Chapter 6.3. (available as of firmware v1.2.0)

Quick Start Guide

The Quick Start Guide will be updated in due course. Until then, please note the following chapters:

[Installation of hardware components](#)

[Configuration](#)

[Firmware updates \(integrated software\)](#)



TIP

Familiarise yourself thoroughly with all the configuration options of the Harvy2 / Harvy2^{ROGOWSKI} while still in the office. The Harvy2 / Harvy2^{ROGOWSKI} is automatically powered via the USB connection required for configuration, allowing you to explore all the possibilities.

1. General information

This manual applies to the Harvy2 and Harvy2^{ROGOWSKI} sensors. Both are collectively referred to as ‘the product’ in the following.

Please read the following information carefully.

Keep this information in a safe place or pass it on to other users of the product. Visit our website www.dezem.de and the website corresponding to the product for further information about the product.

This product fulfils the legal, national and European product requirements. All company names and product designations are trademarks of their respective owners. All rights reserved.

1.1 Safety instructions



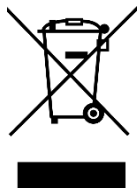
The device complies with electrical protection class III.

- To maintain protection class III, only external sensors/power sources that also fulfil the SELV (safety extra-low voltage) requirements may be connected to the device - protection class III.
- Shocks or impacts must be avoided.
- If the housing or cable are damaged, please contact deZem GmbH and do not install the device.
- deZem clamp-on current transformers must not be connected to uninsulated or damaged lines.
- The product must be installed professionally and according to the specified installation guidelines.
- The installation may only be carried out by appropriately qualified specialist personnel.
- For safety and approval reasons, unauthorized modifications to the product are not permitted.
- Maintenance, adjustment or repair work may only be carried out by qualified personnel/specialist workshops who are familiar with the associated risks and/or relevant regulations.
- The product should not be exposed to extreme temperatures, direct sunlight or strong vibrations. Protect the product from dust and dirt.

1.2 Intended use

The product is intended exclusively for use as described in this product manual. Any other use is considered improper and may result in damage to the product or in injury. Read this manual carefully before using the product.

1.3 Disposal



In Germany and for products delivered directly from Germany: All devices must be recycled properly. Due to the applicable regulations, deZem GmbH's electrical and electronic devices may not be disposed of at public collection points for electrical devices. All of deZem GmbH's old electronic devices must be returned to us for disposal. The prepaid delivery must be sent to the following address:

deZem GmbH, Wilmersdorfer Str. 60, 10627 Berlin, Germany

In European Union countries outside Germany: You can obtain information on correct disposal from your dealer or the responsible sales department.

1.4 Support

Do you have any further questions about setting up and operating the Harvy2/Harvy2^{ROGOWSKI}? The deZem team will be happy to answer them for you.

Call us at: +49 30 3180 0730 or write to us at harvy-support@dezem.de.

2 Functional description

2.1 What is the Harvy2 used for?

The Harvy2¹ is used to wirelessly record AC currents via LoRaWAN². It is self-powered, i.e. it does not require an external power supply or battery, and is thus maintenance-free. With its four inputs, it is particularly suitable for metering RMS currents on all electrical main and sub-distributions or directly on machines by using deZem clamp-on current transformers. When additionally using a voltage transformer on the fourth of inputs, the sensor can also determine the relevant parameters for each phase of the three-phase current, i.e. active power, power factor, reactive power, apparent power, mains voltage and mains frequency.

The intelligent event filter integrated in the sensor provides metering series (inrush currents, etc.) accurately to the second at a specified maximum rate.³

Optionally, the Harvy2 can be integrated into the deZem DataSuite. Metering curves are immediately available online for further purposes.

2.2 What is the Harvy2^{ROGOWSKI} used for?

Like the Harvy2, the Harvy2^{ROGOWSKI} is used to wirelessly record AC currents via LoRaWAN. However, its metering inputs IN1 to IN3 are designed for detecting larger currents using Rogowski coils. The fourth input, IN4, is reserved for use with a voltage converter, which is required to detect a voltage signal and ensure the sensor's power supply. It is thus self-powered, i.e. it does not require an external power supply or battery and is therefore also maintenance-free. The same measured values can be recorded as with the Harvy2.

The intelligent event filter integrated in the sensor delivers measurement series (start-up currents, etc.) accurate to the second at a specified maximum rate⁴.

Optionally, the Harvy2 can be integrated into the deZem DataSuite. There, metering values are immediately available online for further purposes.

2.3 Product features

The Harvy2 and Harvy2^{ROGOWSKI} current sensors are characterized by the following product features:

¹ Patent pending.

² LoRaWAN® and the LoRAWAN® logo are registered trademarks of Semtech Corporation and are used under license from the LoRa Alliance®.

³ Available after one of the upcoming firmware updates. Already available for the HarvyLR.

⁴ Available after one of the upcoming firmware updates. Already available for the HarvyLR.

The sensor can record RMS currents and other relevant metering values on up to four channels using the cable included in the scope of delivery:

- Connection of the cable to the sensor via RJ45 socket
- Four reverse polarity protected and strain-relieved JST plug connections, e.g. for deZem clamp-on current transformers or deZem voltage transformers
- Labels on the four cable ends with numbers 1-4 identify the four channels in1, in2, in3, in4



Side RJ45 socket with 2 flashing LEDs:

- Green LED indicates operation (see [chapter 7.1](#))
- Yellow LED indicates transmittal of LoRaWAN packets (see [chapter 7.1](#))
- RJ45 socket: only suitable for the included deZem cable, this is not an Ethernet connection!



USB-C connection on the long side:

- To charge the capacitor during commissioning
- For configuration via web application
- For firmware updates
- For an ad-hoc display of the metering values



Reset button (small recess next to the USB-C port):

- Used for firmware updates up to v1.0.0 and as Recovery
- Narrow, blunt object required to operate, e.g. a twist tie

Assembly:

- Freely suspended, with magnets or with cable ties
- 2 fastening straps on the long sides
 - with counter bore for attaching magnets (accessories) or, if applicable, a screw connection
 - with elongated recess for attaching cable ties without slipping



2.4 Applications

The Harvy2 is particularly suitable for two areas of application:

- For measuring RMS currents with clamp-on current transformers, and
- When using a voltage transformer, additionally for determining active power, power factor, reactive power, apparent power, mains voltage and mains frequency.

The Harvy2^{ROGOWSKI} is particularly suitable for two areas of application:

- For measuring effective currents, active power, active energy, power factors, reactive power, apparent power, mains voltages, and mains frequency using Rogowski coils and a voltage transformer.
- Thanks to the wide measuring range of the coils and their flexibility, the Harvy2^{ROGOWSKI} can also be installed in difficult locations.



WARNING

The accessories for the Harvy2 and Harvy2^{ROGOWSKI} are NOT compatible with each other. This means that Rogowski coils cannot be used with the Harvy2, and clamp-on current transformers cannot be used with the Harvy2^{ROGOWSKI}. Using the wrong accessories may result in permanent damage to the hardware.

2.4.1 Harvy2: Metering RMS currents

Using up to four deZem clamp-on current transformers, RMS currents can be recorded in electrical mains and sub-distribution boards or directly on machines and systems.

The choice of the appropriate clamp-on current transformer depends on the primary current and the diameter of the supply wire to be measured, including insulation. The following table shows the maximum primary current and the window size of the transformer that matches the core diameter for the most common transformer types. For individual solutions please feel free to contact us.

Type of current transformer	Max. primary current [A]	Min. primary current [A] ⁵	Nominal secondary current [mA]	Current ratio	Window [mm]	Max. wire cross-sect. [mm ²]
	Harvy2	clamp-on current transformer				
T80/26.6	80	approx. 1	26.7	3000	10.0	25
T80/40	80	approx. 0.8	40	2000	10.0	25
T150/40	150	approx. 1	40	3750	16.0	50
T300/250	300	approx. 0.9	250	1200	24.0	150
T300/40	300	approx. 1.6	40	7500	24.0	150
T500/250	500	approx. 0.8	250	2000	36.0	300
T500/40	500	approx. 2.8	40	12500	36.0	300

2.4.2 Harvy2: Voltage-dependent measured values in the three-phase network

When using a voltage transformer and deZem clamp-on current transformers, the Harvy2 is able to measure an AC voltage in the power supply network and to use phase shifts to determine the other two phases of the three-phase-system. In addition to the RMS currents, metering values such as active power, reactive power, apparent power, power factor, mains frequency, mains voltage and much more can be determined.

In order to use this option, a voltage transformer is connected to channel 4 of the Harvy2. Channels 1, 2 and 3 can be used for clamp-on current transformers that are connected to phases L1, L2 and L3. The phases and channels are assigned via the configuration interface (see [Chapter 4](#)).

When using a voltage transformer, the Harvy2 is constantly supplied with sufficient energy so that it can measure continuously and can send at the preset transmission interval or during measurement peaks.

2.4.3 Harvy2^{ROGOWSKI}: Measurement at all levels of the electrical supply

Using three deZem Rogowski coils and a voltage transformer, the Harvy2^{ROGOWSKI} can determine effective currents, active power, reactive power, apparent power, power factors, mains frequency, mains voltage, and much more.

The choice of suitable Rogowski coils depends on the primary current to be measured and the diameter of the coil. deZem offers standard Rogowski coils for up to 1,000 A or up to 3,000 A, but other sizes are also available. Please contact us for special solutions.

⁵Based on a measurement and transmission interval of 15 minutes. Tests to determine the minimum primary currents per transformer type are currently being prepared.

Protection class: CAT IV.

Type	Max. primary current [A]	Secondary voltage [mV]	Inner diameter [cm]	Input/output factor	Measurement range	Standard deviation	Frequency [Hz]
R1000/100	1000	100	11	10.000	> 0,3-100% of the nominal value	< 1 %	45-65
R3000/300	3000	300	16	10.000	> 0,3-100% of the nominal value	< 1 %	45-65

3 Installation of the hardware components

The installation includes the assembly and commissioning of all hardware components including accessories such as deZem clamp-on current transformers, Rogowski coils, voltage transformers and/or magnetic fasteners.

When used for the first time, the battery-free Harvy2/Harvy2^{ROGOWSKI} may be discharged after a long break in operation and might not work. All you need is a USB connection, for example with a laptop, to charge it within a few seconds (recommended). The active USB connection is indicated on the sensor by a continuously lit green LED next to the RJ45 socket. Without a USB connection, the LEDs next to the RJ45 socket indicate operation (green LED) or the sending of LoRaWAN packets (yellow LED). For details see [Chapter 7.1](#). If installed directly without prior charging via USB-C, depending on the primary current, it may take some time until the Harvy2 is sufficiently charged to enter operating mode and to send the first metering values.

3.1 Installation Harvy2 with clamp-on current transformers

For installing the Harvy2 with deZem clamp-on current transformers, please follow these steps:

1. Connect the supplied adapter cable to the Harvy2 via the RJ45 connection.
2. Connect clamp-on current transformers of suitable size to the adapter inputs via the JST connections. Up to four transformers can be connected.
3. Clamp the clamp-on current transformers around the wires to be measured. If you want to measure more values than RMS currents only, pay attention to the orientation of the transformers (see tip).
4. The sensor can then either be suspended freely or be fixed with cable ties or with magnetic holders, e.g. on the inside of distribution box doors.



WARNING

NEVER connect a current transformer to a conductor if it is not connected to the Harvy2 or another terminal device. Otherwise, high voltages can build up at the transformer output. Additional insulation must be attached between the conductor and the clamp-on current transformer in order to achieve the above-mentioned SELV requirements (see safety instructions in [Chapter 1.1](#)) for sensors / power sources connected externally to the device.



TIP

The orientation of the clamp-on current transformers can be seen on the inside of the windows of the respective transformer. The connections of the primary winding are marked with the capital letters “K” and “L” or ‘P1’ and “P2”. The orientation must be such that the “energy flow direction” runs from K to L or from P1 to P2. This is also indicated on the clamp-on current transformers by an arrow. If the hinged current transformer is installed contrary to the energy

flow direction, this may lead to incorrect measurement results. Although this polarity is irrelevant for effective current measurements, it should nevertheless be carried out correctly.

3.2 Installation Harvy2 with clamp-on current transformers and voltage transformer

For installing the Harvy2 with a deZem voltage transformer, please follow these steps:

1. Connect the supplied adapter cable to the Harvy2 via the RJ45 connection.
2. Connect the voltage transformer to channel 4 of the Harvy2 using the reverse polarity protected JST connection.
3. If you use a voltage transformer for mounting on a DIN rail, connect it to the desired phase L1, L2 or L3. If you use a voltage transformer with a Europlug, insert the plug into the socket. Make sure the polarity of the Europlug is correct. For deZem voltage transformers, the polarity is marked by a label, marking the conductor by an “L” and the neutral conductor by an “N”.
4. Connect one to three clamp-on current transformers of suitable size to the adapter inputs of channels 1-3 of the Harvy2 via the JST connections.
5. Clamp the clamp-on current transformer around the wires. Pay attention to the orientation of the clamp-on current transformers (see tip).
6. The sensor can then either be suspended freely or be fixed with cable ties or with magnetic holders, e.g. on the inside of distribution box doors.



WARNING

NEVER connect a current transformer to a conductor if it is not connected to the Harvy2 or another terminal device. Otherwise, high voltages can build up at the transformer output. Additional insulation must be attached between the conductor and the clamp-on current transformer in order to achieve the above-mentioned SELV requirements (see safety instructions in [Chapter 1.1](#)) for sensors / power sources connected externally to the device.



TIP

When using socket voltage converters, it is essential to check the correct polarity according to the labeling and the phase of the conductor using a measuring device. The measured values can be viewed directly in the Harvy2 web application (configuration application). If you are connected to the Harvy2 in the web application, you can view the current measurement data in tabular form via the “Live Data” menu item. If the values under “Power Factor” and “Active Power [W]” are negative, this may indicate a reverse polarity of the voltage converter or an incorrect phase assignment of the relevant input.

**TIP**

The orientation of the clamp-on current transformers can be seen on the inside of the windows of the respective transformer. The connections of the primary winding are marked with the capital letters “K” and “L” or ‘P1’ and “P2”. The orientation must be such that the “energy flow direction” runs from K to L or from P1 to P2. This is also indicated on the clamp-on current transformers by an arrow. If the hinged current transformer is installed contrary to the energy flow direction, this may lead to incorrect measurement results.

3.3 Installation Harvy2^{ROGOWSKI}

The installation of the Harvy2^{ROGOWSKI} with deZem Rogowski coils and a deZem voltage transformer is carried out in the following steps:

1. Connect the supplied adapter cable to the Harvy2^{ROGOWSKI} via the RJ45 connector.
2. Connect the voltage transformer to input IN4 of the Harvy2^{ROGOWSKI} via the reverse polarity protected JST connector.
3. Depending on the variant, either plug the voltage transformer into the socket using the Euro plug or connect it to the desired phase L1, L2, or L3 using the DIN rail adapter. When using the Euro plug, ensure that the polarity is correct. On deZem voltage transformers, the polarity is marked with a label, where the conductor is represented by an “L” and the neutral conductor by an “N.”
4. Connect three Rogowski coils suitable for the supply wires or copper rails to be measured to the IN1, IN2, and IN3 inputs of the Harvy2^{ROGOWSKI} via the reverse polarity-protected JST connections.
5. Attach the Rogowski coils at the measurement location. To do this, open the twist lock, place the coil around the wire/copper busbar to be measured, and close the twist lock again.
6. The sensor can then be suspended freely, secured with cable ties, or fixed with magnetic holders, e.g., on the inside of distribution box doors.

**IMPORTANT WARNING**

The accessories for the Havy2 and Harvy2^{ROGOWSKI} are NOT compatible with each other. This means that Rogowski coils cannot be used with the Harvy2, and clamp-on current transformers cannot be used with the Harvy2^{ROGOWSKI}. Using the wrong accessories may cause permanent damage to the hardware. **In particular, only Rogowski coils may be connected to IN1 to IN3 of the Harvy2^{ROGOWSKI}; no other signal transmitters or voltage or current sources!**



TIP

When using socket voltage converters, it is essential to check the correct polarity according to the labeling and the phase of the conductor using a measuring device. The measured values can be viewed directly in the Harvy2 web application (configuration application). If you are connected to the Harvy2 in the web application, you can view the current measurement data in tabular form via the “Live Data” menu item. If the values under “Power Factor” and “Active Power [W]” are negative, this may indicate a reverse polarity of the voltage converter or an incorrect phase assignment of the relevant input.

4 Configuration

The configuration includes configuring the Harvy2/Harvy2^{ROGOWSKI} including accessories, connecting it to a LoRaWAN server (e.g. deZem IoT platform, i.e. deZem.io), as well as setting up the new metering point in a suitable software, e.g. deZemAd. If desired, we can take care of the registration on the deZem IoT platform as well as the setup in deZemAd and can deliver the device preconfigured.

When the Harvy2/Harvy2^{ROGOWSKI} is delivered, the current firmware version is installed. For updates, see [Chapter 5](#).

The Harvy2/Harvy2^{ROGOWSKI} is configured via a web application, which you can access e.g. on a laptop or mobile phone via your browser (currently Windows, Linux, Android and MacOS possible with Chrome or Edge, for all but MacOS also Opera). It is not necessary to install any software. However, depending on the operating system, a one-time installation of the USB driver “CP210x Universal Windows Driver” might be required, which can be found [here](#). The web application can be accessed via the following link: <https://harvy2.dezem.io/>

The web application recognizes whether you have connected a Harvy2 or a Harvy2^{ROGOWSKI} and offers you a slightly adapted configuration menu for each type. The differences only affect the first three signal inputs IN1 to IN3.

1. Connect the Harvy2/Harvy2^{ROGOWSKI} to your PC via USB-C and open the web application. Make sure that the USB-C connection is fully established (slightly beyond an initial small resistance).
2. Click on "Connect" at the top of the web application to log the Harvy2/Harvy2^{ROGOWSKI} into the web application and gain access to its settings.
3. In the window that opens, select the sensor by clicking on the device name and confirm the registration by clicking on “Connect”.
4. In the menu under “Setup” select the sub-item “Setup Analogue Inputs”.

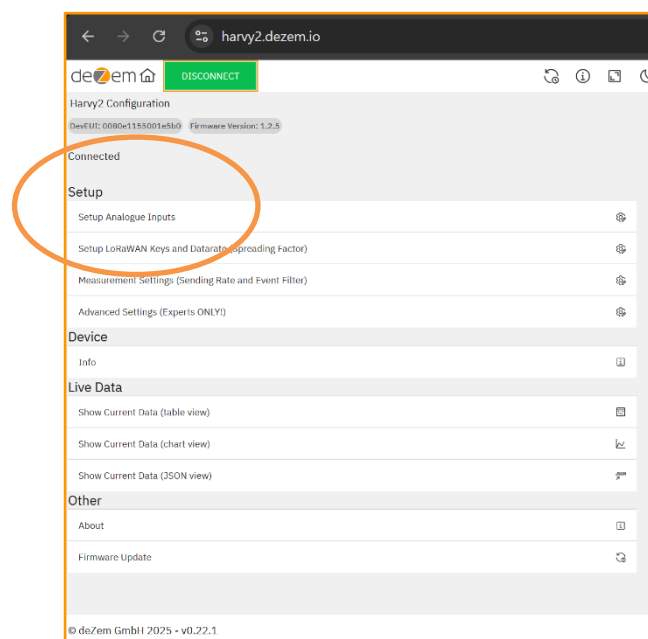
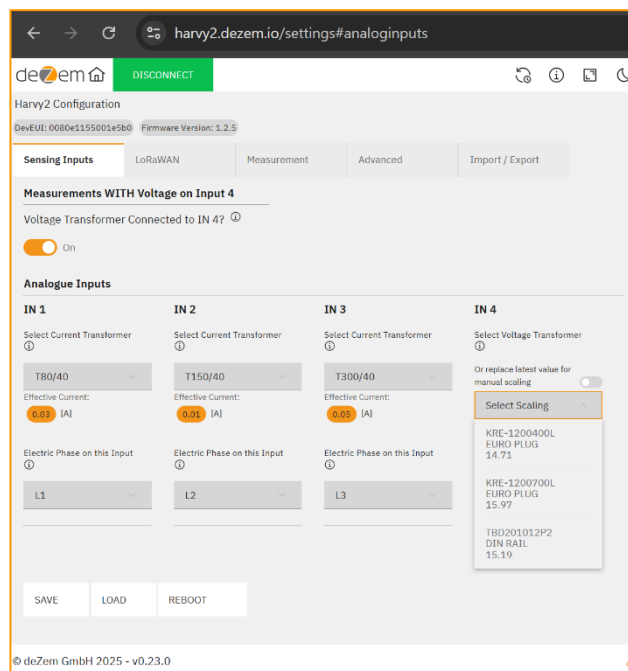


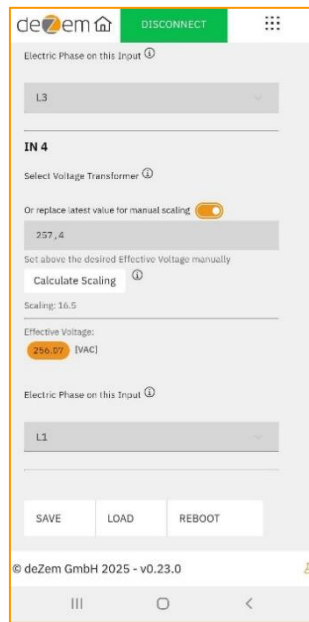
Figure 1: Home page the Harvy2 web application

5. If you have connected a voltage transformer to channel 4, set the slider under "Measurements WITH Voltage on Input 4" to "On". For mere RMS current measurements, this mode remains deactivated. Then determine phase L1, L2, or L3 of your voltage signal and select it from the corresponding dropdown menu for IN 4. Be sure to also ensure the correct polarity of the voltage signal (according to the label on the voltage converter).
6. If you are using a voltage transformer, set the transformer factor under "IN 4 Voltage Transformer Factor" so that the output is correct. To do this, either use one of the specified models or determine the factor manually.



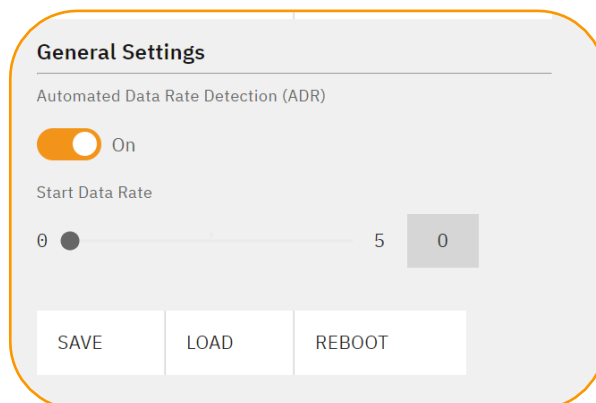
Configuration of channels IN1-IN4

7. Manual factor determination is necessary if the specified last voltage value does not match the value determined by a freshly calibrated measuring device with sufficient accuracy. To do this, move the corresponding slider, enter the voltage value currently displayed on your measuring device, select "Calculate Scaling," and save the setting immediately by clicking on "Save" and then "Reboot." Then wait a few seconds until the voltage value displayed for IN4 is updated and check that it matches your measuring device. The process may need to be repeated.



Manual transformer factor on IN4

8. Then select which types of clamp-on current transformers or which types of coils you want to use on which inputs. If you are using a voltage transformer, also select which phase L1, L2, or L3 the clamp-on current transformers/Rogowski coils and the voltage transformer are installed on. The effective values recorded per input (current or voltage) are displayed directly in the configuration menu. Please check these to verify that the scaling is correct in each case.
9. By configuring the clamp-on current transformer or coil type, the metering values are automatically scaled correctly to the respective SI unit. Additional scaling, e.g. in deZemAd, is therefore not necessary; the scaling factor is set there to “1” by default.
10. Save the settings for this page and restart the device by clicking “Reboot.”
11. Switch to the second tab "LoRaWAN" and verify that the ADR slider under "General Settings" is set to "On" and that the data rate is set to zero. If not, adjust this accordingly to ensure a stable server connection and data transfer. The Harvy2 will then automatically optimize the communication parameters. However, you can also prevent this and specify fixed parameters.

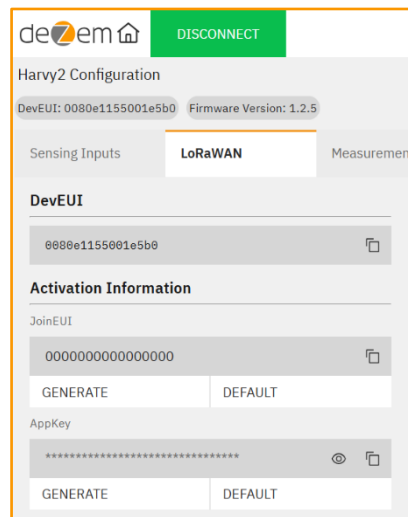


Configuration of the data rate

12. Save the page settings and then restart using “Reboot.”
13. If you have already logged in to the LoRaWAN server, disconnect via “Disconnect” and unplug the USB-C cable. Otherwise, follow the next steps and only then disconnect the sensor from the web application as described.

If you want to register the Harvy2 at a LoRaWAN server, you will need the DevEUI, the JoinEUI and the AppKey of the sensor. You will also need the current decoder.

The DevEUI, the JoinEUI and the AppKey can be accessed in the Harvy2 web application via “Setup LoRaWAN Keys and Datarate (Spreading Factor)” in the main menu, or, if you are still in the configuration interface, switch to the the “LoRaWAN” tab. Please note that there is a button at the end of each field for copying the EUIs/keys to the clipboard.



DevEUI, JoinEUI, AppKey

You will also need to set up the decoder for the device at the LoRaWAN server. The decoder can be accessed [here](#) for free. When setting up the device, select LoRaWAN version 1.0.4 and version 1.0.3 as the regional parameter.

Of course, we are at your disposal if you need support with the configuration.

For the set-up of the metering point in deZemAd, we refer to the corresponding manual.



TIP

The configuration interface, which can be found at <https://harvy2.dezem.io/>, is being expanded and simplified continuously. As a result, the images shown here may differ slightly. However, all relevant steps should be intuitively and easily recognisable in the configuration interface. If you find anything unclear, please let us know.



TIP

If you are using the configuration interface on a mobile device, the application should automatically open in full screen mode. If the display on your device appears very small, either deactivate the desktop view in your settings or click on the small square symbol in the top right corner to switch to full screen mode.

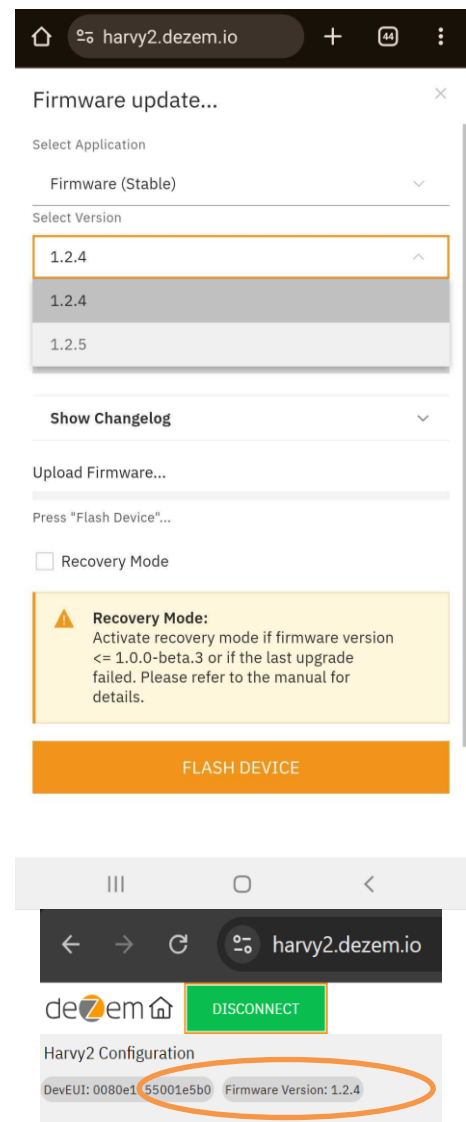
5 Firmware updates

When the Harvy2/ Harvy2^{ROGOWSKI} is delivered, the current firmware version is already installed. If a later update of the firmware (integrated software) is required, the latest version will automatically be made available via the Harvy2 web application. You can install the update on the sensor via USB-C as described below.

The following information applies to firmware updates as of version 1.0.0 and later. If you are using a version of the firmware older than 1.0.0, please refer to the information in the [appendix](#).

Depending on the operating system, it may be necessary to install the USB driver “CP210x Universal Windows Driver” beforehand on your computer. The USB driver can be obtained [here](#).

1. Connect Harvy2/ Harvy2^{ROGOWSKI} to the PC via USB-C using a suitable cable.
2. Open the Harvy2 web application in a suitable browser (see [FAQs](#)):
<https://harvy2.dezem.io/>
3. Go to “Firmware Check and Update” on the main page under “Device”. The latest version of the firmware is preset there. Typically, select the version with the highest serial number under “Firmware (Stable)”. Test versions contain the latest developments, but are not approved for productive use.
4. Click on “Flash Device” in the web application.
5. In the window that now opens, select the sensor by clicking on the device name, then click on “Connect”.
6. Wait briefly until both the update progress bar and the subsequent check have run through.
7. If a time-out error occurs, refresh the page (press F5) and repeat the process.
8. Close update window. Click on “Connect” in the web application, select the sensor and connect.
9. The new firmware version should now be displayed at the top of the application. If not, repeat the process.
10. Disconnect via “Disconnect” and unplug the USB-C cable.



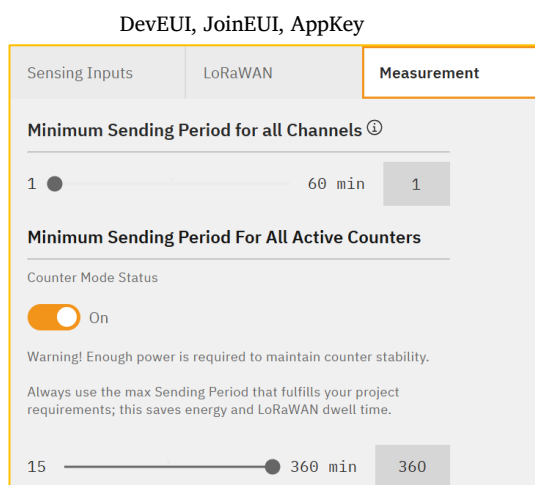
6 Special Features

6.1 Counter function (“counter mode”)

Starting with firmware version 1.2.2, the Harvy2/Harvy2^{ROGOSWKI} offers a dynamic counter function (“counter mode”) that records and accumulates the consumed power and the average power factor. The counter mode can be operated with or without a voltage transformer.

Without a voltage converter, the Harvy2 records the flow of charge in Amph. With a voltage converter connected to input IN4 of the Harvy2 or Harvy2^{ROGOSWKI}, the net energy flow in kWh is automatically recorded instead (net feed-in power – e.g., from PV systems – leads to a decreasing meter reading in consumption-oriented installations).

The counter mode can be activated in the configuration module in the setup under the “Measurement” tab. The transmission interval can also be set individually here. Transmission intervals of at least 15 to a maximum of 360 minutes are possible. For measurements without a voltage converter, the accumulated value for all 4 inputs of the Harvy2 is transmitted. For measurements with a voltage converter, the accumulated value for the 3 inputs IN 1 to IN 3 of the Harvy2 or Harvy2^{ROGOSWKI} is transmitted.



Configuration of counter mode

By default, measurements are taken once per second every 60 seconds. However, an intelligent energy management system dynamically adjusts the measurement and transmission intervals when the internal charge level is low (green LED flashes less than twice, see [Chapter 7.1](#)) in order to extend the operating time.

The cumulative meter readings are continuously and persistently updated from the moment of activation until they are actively reset.



TIP

The counter mode requires additional power for metering and for message transmission. When using the counter mode without a voltage converter, ensure that there is sufficient power supply to enable uninterrupted use of the meter.



TIP

After saving the configuration and rebooting, the first data packet is sent immediately so that you can verify the correct installation under “Live Data.” The restart takes less than a second, so you can use it at any time to send a test data packet.

7 Technical data

7.1 LED signals

LED signal pattern	The signal displays	Meaning
Green LED: flashes 4x	System voltage > 3400 mV	LoRa connection active + measurement active
Green LED: flashes 3x	System voltage > 2800 mV	LoRa connection active + measurement active
Green LED: flashes 2x	System voltage > 2400 mV	LoRa connection active + measurement inactive
Green LED: flashes 1x	System voltage < 2400 mV	LoRa connection inactive + measurement inactive
Green LED: continuously lit	USB-C port active	USB-C port active (only when connected to a PC via USB-C)
Yellow LED: lit for longer period	Transmittal of LoRaWAN packets	Packets are transmitted to the server at this moment
Yellow LED: flashes 1-6x	Data rate	End of uplink at data rate 0-5
Both LEDs flash briefly	Reset button activated	Successful pressing of reset button

7.2 Supported LoRaWAN frequencies

- EU863-870
- AU915-928
- AS923
- KR920-923
- IN865-86
- RU864-870
- US902-928

7.3 LoRaWAN payload encoding and decoder description

7.3.1 Type: Current Data (A, V, Hz)

LoRaWAN Payload Decoder	The Things Stack (TTS)	ChirpStack	Element_iot	Niotix
Latest Version	v1.1.0	v1.0.0	v1.0.0	v2.0.0
Status	always up to date and supported by deZem	available but not fully supported by deZem		
JS Decoder	Decoder			
Decoder Type	Current Data			
Port	10			
Maximum payload size	50 bytes All channels IN1...4 enabled including use of Voltage Transformer (CT Plus Mode)			
Minimum payload size	12 bytes Only vsys_V and temp_C enabled			

Group	Subgroup	Variable (may change, not finalized)	Data Type	Unit	Value Min	Value Max	Comment	Depends on (config)	Meaning	Bytes	Byte index
Meta		usb_powered ch_vsys_en ch_temp_en reserved [5...7]	BIT SET	---					device is usb powered	1	0
Config	Global	ct_plus_mode 1...7 reserved	BIT SET	---					Voltage Transformer available on IN4	1	1
	IN1	ac_en dc_en freq_en scaled_mode voltage_mode 5...7 reserved	BIT SET	---						1	2
	IN2	ac_en dc_en freq_en scaled_mode voltage_mode 5...7 reserved	BIT SET	---						1	3
	IN3	ac_en dc_en freq_en scaled_mode voltage_mode 5...7 reserved	BIT SET	---						1	4
	IN4	ac_en dc_en freq_en scaled_mode voltage_mode 5...7 reserved	BIT SET	---						1	5
	RESERVED_1		U16	---	0	65535				2	6

Group	Subgroup	Variable (may change, not finalized)	Data Type	Unit	Value Min	Value Max	Comment	Depends on (config)	Meaning	Bytes	Byte index
Reserved	RESERVED_2		U16	---	0	65535				2	8
System	Voltage	vsys_V	U8	V	1,8	3,7125		ch_vsys_en	system voltage (relates to internal SuperCap load; full at 3,6V min at 2,8V)	1	10
	Temperature	temp_C	U8	°C	-22	80		ch_temp_en	temperature inside the device	1	11
Analog Input	IN1	in1_ac_raw_A	F16	A	-0,3	0,3		ac_en		2	12
		in1_dc_raw_A	F16	A	0	0,3		dc_en		2	14
		in1_freq	U16	Hz	0	655,35	1/100Hz resolution	freq_en		2	16
		in1_coeff	F16	---	0,1	1000		scaled_mode voltage_mode		2	18
	IN2	in2_ac_raw_A	F16	A				ac_en		2	20
		in2_dc_raw_A	F16	A				dc_en		2	22
		in2_freq	U16	Hz				freq_en		2	24
		in2_coeff	F16	---				scaled_mode voltage_mode		2	26
	IN3	in3_ac_raw_A	F16	A				ac_en		2	28
		in3_dc_raw_A	F16	A				dc_en		2	30
		in3_freq	U16	Hz				freq_en		2	32
		in3_coeff	F16	---				scaled_mode voltage_mode		2	34
	IN4	in4_ac_raw_A	F16	A				ac_en		2	36
		in4_dc_raw_A	F16	A				dc_en		2	38
		in4_freq	U16	Hz				freq_en		2	40
		in4_coeff	F16	---				scaled_mode voltage_mode		2	42
CT Plus Mode	IN1	in1_pow_factor	F16	---	-1	1		ct_plus_mode		2	44
	IN2	in2_pow_factor	F16	---	-1	1				2	46
	IN3	in3_pow_factor	F16	---	-1	1				2	48
											50
Virtual Channels (Computed via TTS JS Decoder)											

Group	Subgroup	Variable (may change, not finalized)	Data Type	Unit	Value Min	Value Max	Comment	Depends on (config)	Meaning	Bytes	Byte index	
CT Plus Mode	IN1	in1_pow_app_VA	F64 (JS Decoder)	VA				ct_plus_mode	Apparent Power			
		in1_pow_act_W	F64 (JS Decoder)	W					Active Power			
		in1_pow_react_VAR	F64 (JS Decoder)	VAR					Reactive Power			
	IN2	in2_pow_app_VA	F64 (JS Decoder)	VA								
		in2_pow_act_W	F64 (JS Decoder)	W								
		in2_pow_react_VAR	F64 (JS Decoder)	VAR								
	IN3	in3_pow_app_VA	F64 (JS Decoder)	VA								
		in3_pow_act_W	F64 (JS Decoder)	W								
		in3_pow_react_VAR	F64 (JS Decoder)	VAR								
	SUM IN1...3	sum_in123_pow_app_VA	F64 (JS Decoder)	VA								
		sum_in123_pow_act_W	F64 (JS Decoder)	W								
		sum_in123_pow_react_VAR	F64 (JS Decoder)	VAR								
CT Mode	IN1	in1_ac_A	F64 (JS Decoder)	A				ac_en AND scaled_mode	Scaled effective AC Current			
		in1_dc_A	F64 (JS Decoder)	A				dc_en AND scaled_mode	Scaled DC Current			
	IN2	in2_ac_A	F64 (JS Decoder)	A				ac_en AND scaled_mode				
		in2_dc_A	F64 (JS Decoder)	A				dc_en AND scaled_mode				
	IN3	in3_ac_A	F64 (JS Decoder)	A				ac_en AND scaled_mode				
		in3_dc_A	F64 (JS Decoder)	A				dc_en AND scaled_mode				
	IN4	in4_ac_A	F64 (JS Decoder)	A				ac_en AND scaled_mode				
		in4_dc_A	F64 (JS Decoder)	A				dc_en AND scaled_mode				
	SUM IN1...4	sum_in1234_ac_A	F64 (JS Decoder)	A								
		sum_in1234_dc_A	F64 (JS Decoder)	A								

7.3.2 Type: Counter (kWh)

LoRaWAN Payload Decoder	The Things Stack (TTS)
Latest Version	V1.1.0
JS Decoder	Decoder
Decoder Type	Counter (kWh)
Port	30
Maximum payload size	25 bytes
Minimum payload size	7 bytes
Required Firmware Version	v.1.2.0 or higher

Group	Subgroup	Variable (may change, not finalized)	Data Type	Unit	Factor	Value min	Value max	Depends on (config)	Bytes	Byte index
Channels	IN1	in1_power_en in1_cosphi_en 3...7 reserved	BIT SET	---					1	0
		IN2	in2_power_en in2_cosphi_en 3...7 reserved	BIT SET	---				1	1
			IN3	in3_power_en in3_cosphi_en 3...7 reserved	BIT SET	---				1
	Count	in_ctr_count	U32	seconds		0	4,294,967,295	--- (always active)	4	3
		in1_kWh	I32	kwhx100	x100			pow_en	4	7
		in1_cosphi	F16					cosphi_en	2	11
		in2_kWh	I32	kwhx100	x100			pow_en	4	13
		in2_cosphi	F16					cosphi_en	2	17
		in3_kWh	I32	kwhx100	x100			pow_en	4	19
			in3_cosphi	F16				cosphi_en	2	23
25										

Virtual Channels
(Computed via TTS JS

Decoder

Date-time

string	Global	in_ctr_time_elapse	String (js)	**	--- (always active)					
SUM	Global	sum_in123_kWh	F64 (JS Decoder)	kWh	--- (always active)					

** "[D: "+ ctr_days + "|H: "+ ctr_hours + "|M: "+ ctr_minutes + "|S: "+ ctr_seconds + "]"

8 FAQs

Q: I had a connection loss while installing an update and can no longer carry out the update successfully. How can I install the update?

A: Do the update in recovery mode.

If there is a connection loss during the update, the firmware must be reset completely and reinstalled. To do this, simply carry out the update for versions older than 1.0.0 as described in the [appendix](#). That is, activate recovery mode and gently press and hold the reset button on the sensor with a blunt object until the update starts.

Q: Although the Harvy2/ Harvy2^{ROGOWSKI} is connected to the web application, I do not receive a DevEUI for the connection to the LoRaWAN server, why is that?

A: Log out via “Disconnect” and then log in again via “Connect”.

In rare cases, a time-out error may occur when logging into the web application. In such cases, you do not see any DevEUI. After a new login, all information is accessible again.

Q: The values measured by the Harvy2/ Harvy2^{ROGOWSKI} look strange. Why is that?

A1: Do you use a photovoltaic system?

If the energy flow direction is inverted, e.g., due to photovoltaics, the measurement data may be distorted or negative.

A2: First check the currents and, if necessary, measure with a current clamp. If the currents are plausible, but the power output is not, then check in the web application whether a voltage transformer used has been configured correctly.

If you are using a voltage transformer, the correct factor must be set in the configuration. For deZem voltage converters, the correct factors are available for selection in the configuration application.

Unfortunately, however, voltage converters do not always have the same conversion factors, even if they are the same model; we have seen deviations of up to approx. 3%. Please check that the voltage value displayed is correct and, if necessary, proceed as described in [chapter 4](#) to optimise the factor manually. This procedure is particularly important if you are using a voltage transformer not supplied by deZem, for example due to special primary voltages. In this case, it is also essential to ensure that the output signals are suitable in order to avoid hazards or damage!

A3: Alternatively, check whether the polarity of the clamp-on current transformers and/or voltage transformer you are using is correct.

If a clamp-on current transformer was installed against the energy flow or a voltage transformer was used the wrong way around, the power values may be inverted. See [Chapter 3.1](#) and [Chapter 3.2](#).

Channel	IN 1	IN 2	IN 3	IN 4
avg [mV]	-0.015	-0.011	-0.014	-0.025
freq [Hz]	49.97	49.97	49.97	49.97
rms [mV]	1.133	1.15	1.151	5.859
ac_rms [mA]	2.834	2.876	2.877	14.647
ac [A]	5.667	5.751	5.754	29.294

Channel	IN 1	IN 2	IN 3
IN 4 Voltage [VAC]: 229.96			
Apparent Power [VA]	1303.297	1322.503	1323.103
Power Factor	0.667	0.665	0.667
Reactive Power [VAR]	971.307	987.278	986.239
Active Power [W]	868.992	879.941	882.005

Channel	IN 1	IN 2	IN 3	IN 4
avg [mV]	0.03	0.015	0.03	0.044
freq [Hz]	49.96	49.96	49.96	49.96
rms [mV]	1.136	1.153	1.154	5.868
ac_rms [mA]	2.841	2.882	2.884	14.67
ac [A]	5.681	5.764	5.768	29.34

Channel	IN 1	IN 2	IN 3
IN 4 Voltage [VAC]: 230.32			
Apparent Power [VA]	1306.527	1327.647	1328.351
Power Factor	-0.659	-0.657	-0.658
Reactive Power [VAR]	984.563	1000.533	999.721
Active Power [W]	-861.904	-872.686	-874.686

Positive values with correct polarity vs. inverse values with incorrect polarity

Q: What operating voltage does the Harvy2/ Harvy2^{ROGOWSKI} need?

A: The sensor requires an operating voltage of at least 2.8 V to record and send metering values.

The sensor draws its energy from the measurement signal without falsifying it metrologically by switching between measuring and charging (“energy harvesting”). There is a crucial difference between the Harvy2 and Harvy2^{ROGOWSKI} sensor variants, as only the former can “harvest” energy from split-core current transformers—this is not possible with Rogowski coils. The Harvy2^{ROGOWSKI} must therefore always be supplied via IN4—usually with a voltage transformer.

The better the state of charge, the more frequently the sensor can transmit metering values. The more clamp-on current transformers are used, the faster the charging occurs. If the operating voltage falls below 2.8 V, the Harvy2 switches to sleep mode, where it still maintains a connection to the LoRaWAN server, but does no longer measure and send data. Below an operating voltage of 2.4 V, the connection to the LoRaWAN server is interrupted. The respective status is indicated by the flashing green LED. For details see [Chapter 7.1](#).

Q: Do all channels have to be used for the Harvy2 to operate "energy harvesting"?

A: Approximately 1 A on any of the measured wires is sufficient to supply the Harvy2 with enough energy for operation, i.e., approximately 200 W.

The T80/26.6 clamp-on current transformer from deZem is best suited for harvesting with very small currents. When using a voltage transformer (harvesting on IN4 is then sufficient) or with a permanent USB connection, the Harvy2 is constantly supplied with power.

Q: Which browsers can I use to access the configuration application?

A: Preferably use Chrome or Edge.

The configuration application is suitable for the following operating systems and browsers:

- Windows, Linux: Chrome and Edge
- Android: Chrome, Edge and Samsung Internet
- MAC OS: Chrome and Edge

The application does currently not work with Firefox and Safari and on iOS.

Q: I have reinstalled the Harvy2/Harvy2^{ROGOWSKI} in a location with good LoRaWAN coverage, but data transmission is slow to get started. How can I fix this?

A: Reboot the sensor at the installation site or wait a few hours.

After installation, the Harvy2/Harvy2^{ROGOWSKI} automatically adjusts the data rate after relocation by determining the optimal spreading factor and transmission power for the new location through communication with the LoRaWAN Network Server (LNS). This process may take several hours. The spreading factor affects both the transmission speed and the range, and the adjustment ensures efficient communication with the LNS. For immediate optimization, you can restart the sensor directly at the installation site. This results in faster adjustment, as the Harvy2/Harvy2^{ROGOWSKI} reconnects to the network and immediately searches for the optimal spreading factor and appropriate transmission power. You can easily restart the device via the configuration interface (connect Harvy2/Harvy2^{ROGOWSKI}, trigger reboot, disconnect).

Q: The Harvy2/Harvy2^{ROGOWSKI} is supposed to log in to a new LoRaWAN Network Server (LNS) via rejoin, but does not seem to do so.

A: If no response is received from an LNS, the sensor automatically performs a rejoin after 27 hours at the latest and thus logs on to the new LNS.

You can also perform a “Force Rejoin” manually via the configuration interface. To do this, you must activate Expert Mode.

Q: My connection to Harvy2/Harvy2^{ROGOWSKI} is interrupted. What is the reason for this?

A: Check the preset data rate.

For the optimal data transmission, the data rate (ADR) must be configured correctly. With the current decoder and the latest firmware, this should be correctly preset. If you are experiencing problems,

check the settings as described in [chapter 4](#). If the problems persist, check whether you have stored the current decoder.

Q: I use several sensors of different types and noticed that the temperature values do not match. Are the values correct?

A: The Harvy2's/Harvy2^{ROGOWSKI}'s temperature output refers to the built-in chip.

The temperature measurement of the Harvy2 does not refer to external temperatures, but to the internal temperature in the device, or to be more precise, to the built-in chip. Depending on the processing capacity and the current load, the temperatures of different sensors may vary.

Q: After an update, I get a “DevNonce” error displayed on the LoRaWAN Network Server (LNS). What is the reason for this?

A: This is an error on the level of the LoRaWAN server. Set up the device again.

In individual cases (especially when updating prototypes with firmware < 1.0.0), it may happen that the counters for sending LoRaWAN packets within the sensor and on the LoRaWAN server no longer match, as an update with a large version jump can cause all LoRaWAN parameters, including the counter in the sensor, to be reset. In this case, delete the affected sensor from the LoRaWAN server and set it up again to reset the counter there as well.

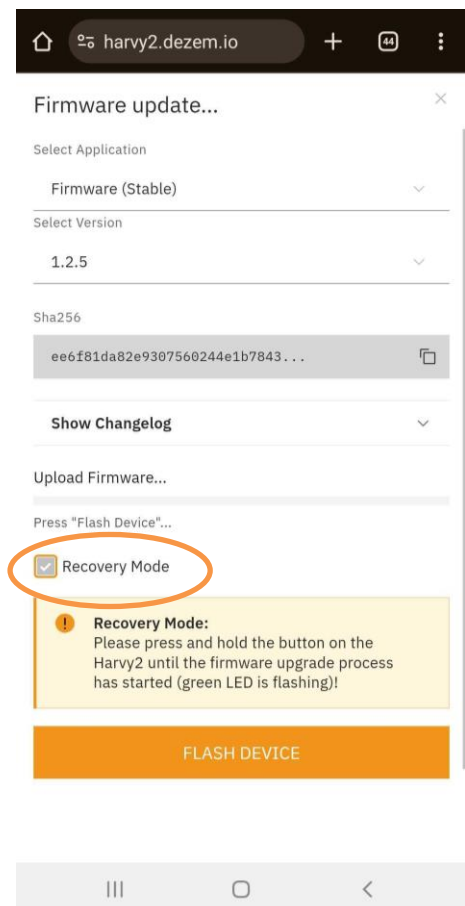
Appendix

I. Updates to firmware versions older than version 1.0.0/Recovery

If the version currently installed on the Harvy2 is older than version 1.0.0, e.g., in the case of prototypes, or if an update of the Harvy2/Harvy2^{ROGOWSKI} has failed, the following notes apply to the installation of updates.

Depending on the operating system, it may be necessary to install the USB driver “CP210x Universal Windows Driver” beforehand on your computer. The USB driver can be obtained [here](#).

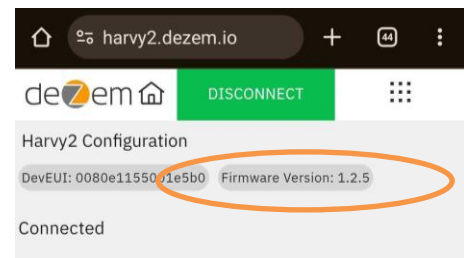
1. Connect the Harvy2/Harvy2^{ROGOWSKI} to the PC via USB-C using a suitable cable.
2. Open the Harvy2 web application in a suitable browser (see [FAQs](#)):
<https://harvy2.dezem.io/>
3. Go to “Firmware Check and Update” on the main page under “Device”. The latest version of the firmware is preset there. Typically, select the version with the highest serial number under “Firmware (Stable)”. Test versions contain the latest developments, but are not approved for productive use.
4. Activate “Recovery Mode” (tick the box).
5. Gently press and hold the reset button next to the sensor’s USB-C port.
 - To avoid damage to the circuit board, please use a narrow but blunt object, e.g. a twist tie or a wire end ferrule (e.g., 0.75 mm), that you insert vertically (not at an angle).
 - Please test the engagement of the internal reset button a few times and then keep it pressed.
6. With the reset button pressed, click on “Flash Device” in the web application.
7. In the window that now opens, select the sensor by clicking on the device name, then click on “Connect”.
8. As soon as the update progress bar starts, you can release the reset button.
9. Wait briefly until both the update progress bar and the subsequent check have run through.
10. If a time-out error occurs, refresh the page (press F5) and repeat the process.



11. Close update window. Click on “Connect” in the web application, select the sensor and connect.
12. The new firmware version should now be displayed at the top of the application. If not, repeat the process.
13. Disconnect sensor via “Disconnect” and unplug the USB-C cable.



Please note that the decoder has changed between the prototype and version 1.0.0, as well as to version 1.2.0 (addition of counter function). If you have registered your Harvy2 as a prototype on a LoRaWAN server, you may need to update the decoder information there. The new decoder is can be obtained [here](#).



II. New features (provisionally described)

Below you will find an unsorted overview of new features that are still in (beta) testing, only available for special cases in expert mode, and/or not yet integrated in detail into this manual:

- In the configuration application <https://harvy2.dezem.io/>, advanced modes can currently still be activated at the bottom right via the test tube icon, including an expert mode and an experiment mode. After activation, advanced functions and configuration options are visible in the application, but may not yet be fully functional. These include
 - Advanced configuration options for inputs IN1-IN4,
 - the option to reset the counter function to zero ("Erase Counter Memory"), and
 - an oscilloscope view of live data.
 - These new features will be gradually incorporated into the main configuration.

Latest update news from our development department:

+++ Harvy2 app v0.23.0 is live on PROD (31.07.2025) +++

What's new?

Live Data on Sensing Inputs

- Live Data in orange tags are shown under dropdowns for presets
- Effective Current is shown on all channels if Voltage Transformer is not connected

- Effective Voltage is shown on channel 4 if Voltage Transformer is connected

Manual scaling for Voltage Transformer

- Process for adjusting scaling manually was changed
- User can now adjust the latest value first and then the scaling will be calculated after clicking on "Calculate Scaling" button
- To fully save this process, user needs to click on SAVE and REBOOT afterwards on the Setup Page
- Also some additional info and tooltips were added to help users with this new process

+ + + **Harvy2 app v0.22.1 is live on PROD (09.07.2025)** + + +

What's new?

Bug fix for Web Serial API incorrectly available on Android

- List of Harvy2 devices is correctly shown even if chrome's experimental flag #web-serial-overbluetooth is enabled
- Implemented platform detection to force WebUSB usage on Android
- Error message is now more precise when browser or device is not supported

+ + + **Harvy2 app v0.22.0 is live on PROD (07.07.2025)** + + +

What's new?

Flags can be viewed in the footer

- Previously the flag setup was hidden as it is only for advanced users; now it can be accessed via a small tag on the right side of the footer
- User can click the tag to see short descriptions for each flag and change its setup to default/off/on states
- Default for production is always OFF

Transmit data and harvesting options are hidden behind expert flag

- It's possible to change transmit data and harvesting only if user turned on the expert mode
- Those options are hidden in any other case

Successful message on import json with configuration

- Previously user was informed only if import had errors
- Now they should always get a message depending on the status of the import

JSON and Oscilloscope tabs were added to the home page

- Both can be found under Live Data section
- Right now Oscilloscope is only available when experiments flags is ON

+++ Harvy2 2.x elixir decoder (for Niotix platform) (23.06.2025) +++

Added counter messages to the decoder (port 30 and port 31)

Decoder page updated: <https://docs.harvy2.dezem.io/docs/decoders/unsupported/niotix>

+++ Harvy2 app v0.21.0 is live on PROD (02.06.2025) +++

What's new?

Uploading and downloading pre-configured settings with json files

- There is a new tab Import/Export under setup options
- Export allows to assign a name to a file (default is harvy2config) and download it as a json file. File contains settings from Sensing Inputs, LoRaWAN (but no DevEUI, JoinEUI and AppKey fields) and Measurement tabs
- Import allows to upload previously prepared json file to the GUI, user needs to save changes separately on each tab to change settings on the device