

HSR-10

Portable and handheld non-contact radar for mobile and spontaneous velocity measurements

Manual

Setup version 2.48.05 (Firmware 4.12)

22.09.2025



Sommer Messtechnik

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6842 Koblach
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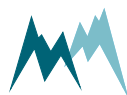
Sommer Messtechnik
Strassenhäuser 27
6842 Koblach
Austria
www.sommer.at
E_office@sommer.at
T +43 5523 55989

Validity

This manual applies to the Portable and handheld non-contact radar for mobile and spontaneous velocity measurements with the setup version 2.48.05, including all its subversions.

Created: 01.01.2020

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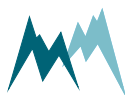


EU conformity



This product is in conformity with the following standards:

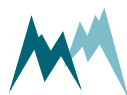
EMC	2014/30/EU	EN 301 489-1 V1.9.2
EMC	2014/30/EU	EN 61326-1:2013
		EN 55022:2010
LVD	2014/35/EU	EN 62311:2008
		EN 62368-1:2014
RED	2014/53/EU	EN 300 440-2 V1.4.1
Machinery directive	2006/42/CE	
RoHS II	2011/65/EU	EN 50581:2012
RoHS III	2015/863/EU	
REACH	1907/2006/EU	



FCC compliance



This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) This device must accept any interference received, including interference that may cause undesired operation.



FCC and IC compliance

This device complies with Part 15 of the FCC Rules and with Industry Canada license-exempt RSS standard(s). Operation is subject to the following two conditions:

1. this device may not cause harmful interference, and
2. this device must accept any interference received, including interference that may cause undesired operation.

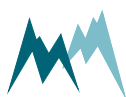
Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes:

1. l'appareil ne doit pas produire de brouillage, et
2. l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Changes or modifications made to this equipment not expressly approved by Sommer Messtechnik may void the FCC authorization to operate this equipment.

NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

ISED Certification Number: 25742-RGSENS



Safety information

Please read this manual carefully before installing or operating this equipment. Non-compliance with the instructions given in this manual can result in failure or damage of the equipment or may put people at risk by injuries through electrical or mechanic impact.

- Make sure that the personnel responsible for installation, configuration and maintenance is familiar with the applicable regulations and standards!
- Installation of equipment on towers, bridges and in discharge channels poses the risk of falling, slipping or dropping of objects. Contact your safety officer or consult applicable safety regulations for precautions and proper personal safety equipment.
- Do not perform any installations in bad weather conditions, e.g. thunderstorms.
- Prior to installation of equipment inform the owner of the measurement site or the authority responsible for it. Upon completion, secure the installation from trespassers.
- Maintenance and repair must be performed by trained personnel or an engineer of Sommer Messtechnik. Only replacement parts supplied by Sommer Messtechnik should be used for repairs.
- Make sure that NO power is connected to the equipment during installation and wiring!
- Only use a power supply that complies with the power rating specified for this equipment!
- Keep equipment dry during wiring and maintenance!
- If applicable, it is recommended to use accessories of Sommer Messtechnik with this equipment.

Disposal

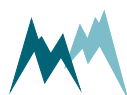


After this device has reached the end of its lifetime, it must not be disposed of with household waste! Instead, dispose of the device by returning it to a designated collection point for the recycling of waste electrical and electronic equipment.



Feedback

Should you come across any error in this manual, or if you miss information to handle and operate the HSR-10 we are pleased to receive your feedback to office@sommer.at.



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1 What is the HSR-10?

The HSR-10 mobile handheld radar sensor is a measurement device for the contact-free determination of the flow velocity of open rivers and channels. The sensor detects the surface flow velocity by the principle of the Doppler frequency shift.

Due to the contact-free measurement method the HSR-10 is ideal for usage at high velocities, turbulent streams and rivers difficult to access. It is ecologically compatible and harmless to the water. Comfortable transmission of measurement values from sensor to receiving unit via WIFI.

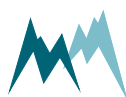


2 Unpacking

When unpacking your HSR-10 sensor box please make sure that the following items are present:

Qty	Art	Item
1	22348	HSR-10 Handheld non-contact radar
1	22427	Charger for Makita batteries
1	22351	HSR-10 Case

In case of missing or damaged items please contact your Sommer Messtechnik sales partner.



3 Get started

Follow the steps described below to set the basic configurations and to acquire the first measurement results.



NOTE Perform the first start-up in your lab or office before installing the equipment in the field!

3.1 Turn on HSR-10

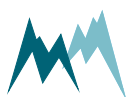
Get the radar and battery from case. Carefully insert the battery into the slots under the holder. When you hear a click, it means the battery is securely fixed. If the battery has a charge, the diode at the bottom of the holder will light up.

If the diode does not turn on - try to remove the battery and insert it again, or charge it.

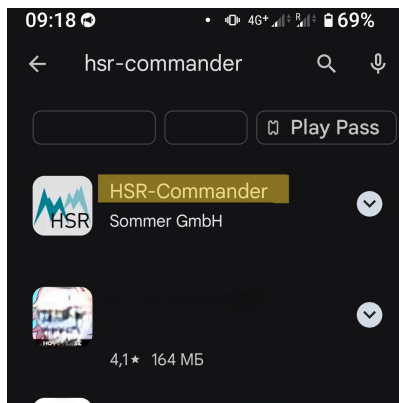
3.2 Install HSR-Commander

To get and install HSR-Commander (by Sommer Messtechnik) application you can use one of the options:

- Scan QR-code below using Google Lens or other application, that can recognize QR-codes



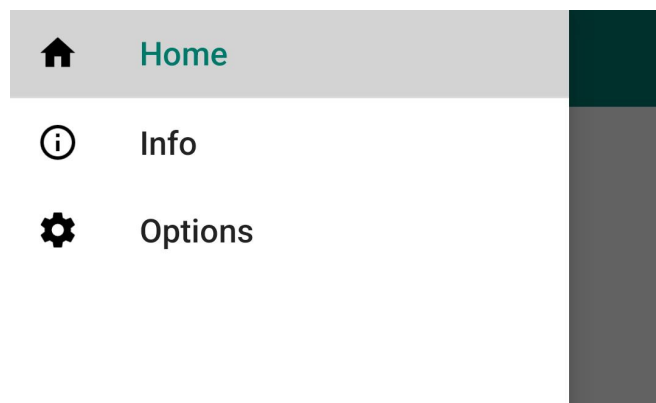
- Search "HSR-Commander" in **Play Store**



- If you are connected to the same Google account on your PC and phone, you can use this link: play.google.com/store/apps/details?id=at.sommer.hsrcommander
click Install and choose your device

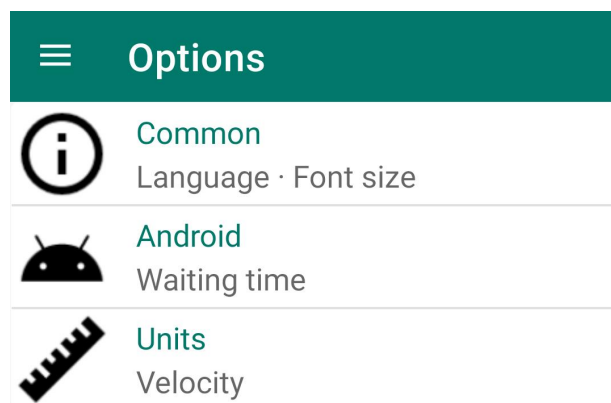
3.3 HSR-10 Options

Start the application and click Menu button (≡) in top left corner and select **Options**.



In HSR-Commander Application you can change:

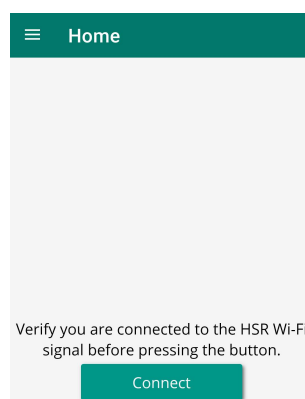
- Language (by default it is English)
- Font size (by default it is 12)
- Waiting time for communication abort (by default 30 min)
- Units for Velocity (by default we use m/s)



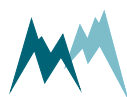
NOTE To apply changes in **Options** just go back with Back button and confirm changes.

3.4 Connect HSR-Commander with your radar

1. Open on your phone [Settings](#) > [Wi-Fi](#)
2. Connect to "**HSR-x**" network using password **Sommer123**.
The 8 digits of "x" number you can find on the sticker on the radar.
3. Open HSR-Commander and click **Connect**:



If HSR-10 connects to application correctly – you can see the link icon on the top right corner of the HSR-Commander:



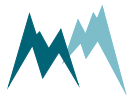
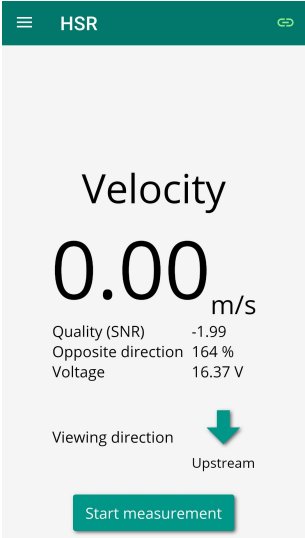


ATTENTION If you have trouble with the connection to the HSR-10, try to deactivate the mobile data communication

3.5 Taking measurements

To take measurements you can either:

- Tap the **Start measurement** button on HSR-Commander
- Pull the switch **trigger** on HSR-10 holder



4 How the HSR-10 works

4.1 Flow velocity

4.1.1 Principle of measurement

The contact-free measurement of the flow velocity is based on the principle of the Doppler Effect. The integrated velocity radar sensor transmits a signal with a constant frequency in a specific angle towards the water surface (see [Figure 1](#)). There, the signal is reflected and shifted in frequency due to the movement of the water body. The reflected signal is received by the antenna of the integrated velocity radar sensor. By comparing the emitted frequency to the frequency of the reflected signal from the water surface the local velocity can be determined.



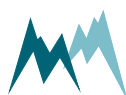
Figure 1 Principle of flow velocity sensor

4.1.2 Flow direction separation

Water can either flow towards or away from the integrated velocity radar sensor. Depending on the flow direction, a frequency shift to higher or lower frequencies occurs. This circumstance allows the HSR-10 sensor to separate the water movements by their directions and to separately evaluate the corresponding velocity distribution.

4.1.3 Conditions of the water surface

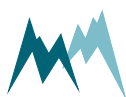
The water surface has to move distinctly and a minimum roughness has to be present to measure a discernible Doppler frequency shift. The more rippled the water surface and the higher the flow velocity is the more reliable the measurements are. The minimum ripple height for a valid analysis is about 2 mm depending on the used frequency. For very slow moving rivers this requirement might not be fulfilled and a continuous and correct velocity measurement cannot be guaranteed.



5 Specifications

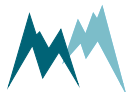
Physical and environmental	
Power supply	9...18V VDC; Reverse voltage protection, overvoltage protection
Battery capacity	2,0 Ah or 3,0 Ah
Charging time	approx. 2 hrs
Outputs	Wi-Fi, 2,4GHz (transmission range up to 50 m)
Operating temperature	-40...60 °C (-40...140 °F)
Storage temperature	-40...85 °C (-40...185 °F)
Relative humidity	0...100 %
Protection rating	IP65
Size L x W x H (with battery)	263 x 123 x 271 mm (10.35 x 4.84 x 10.66 in)
Weight	1.2 kg (2.71 lb) plus 0.6 kg (1.32 lb) battery
Case size L x W x H	480 x 380 x 190 mm (18.9 x 14.9 x 7.5 in)
Case weight (without battery)	4.74 kg (10.45 lb) plus 0.6 kg (1.32 lb) battery

Velocity	
Detectable measurement range	0.08...16 m/s practical range (depending on surface water waves) 0.01...20 m/s technical range
Accuracy	± 0.01 m/s with ± 1 % FS (certified by METAS)
Resolution	1 mm/s
Direction recognition	+/-
Measurement duration	10 s
Measurement frequency	24 GHz (K-Band)
Distance to water surface	0.5...100 m (1.6...328.0 ft)
Noise reduction	Sommer Messtechnik ANR (advanced noise reduction) based on velocity spectrum analysis



Features

Data quality	Internal measurement quality value output with each measurement
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6 Installation

6.1 Site selection

The selection of a suitable measurement site for the HSR-10 is crucial for the reliability and accuracy of the measurement results. Several aspects related to the hydraulic situation and the using of the sensor have to be considered.

6.1.1 Hydraulic requirements

6.1.1.1 Stationary waves

There must be no stationary waves present in the HSR-10 field of view of the as they can negatively influence the measurement accuracy. Stationary waves may be caused by big stones and other obstacles. Stationary waves cause errors in angle as the radar impulse is partly reflected from them and not the plane water surface. Also, they may overestimate the water level.

6.1.1.2 Adequate wave movements

Waves or ripples with a height of at least 2 mm have to be present at the water surface over the full expected water level range. Especially very slow flowing rivers often do not meet this requirement (see also [Conditions of the water surface](#)).

6.1.1.3 Influence of wind

For slow moving deep rivers, the flow velocity measurement may be interfered by waves which are caused by wind. If such an influence is observed, the measurement site should be shielded from wind by proper means or an alternative site should be considered.

6.1.2 Site requirements

The HSR-10 sensor interprets all movements in its field of view. Therefore, no moving objects shall be present in the field of view of the HSR-10.

6.1.3 Documentation

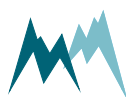
It is recommended to document the measurement site with pictures for future analysis. These may include:

- Measurement site with the sensor
- River or channel facing upstream and downstream
- Flow conditions at the measurement site
- Roughness of the river bed or channel walls

6.1.4 Use the HSR-10 at the fields



NOTE To accurately measure the velocity, you need to direct the HSR-10 parallel to the stream flow. Use the built-in bubble level to align the radar in both dimensions and accurately measure flow rates.



7 Operation

7.1 Take measurements

- Turn on your HSR-10 (see [Turn on HSR-10](#)) and put your phone in holder. The phone must be securely fixed, and the holder must not pinch any its buttons.
- Launch HSR-Commander and connect it to your HSR-10 (see [Connect HSR-Commander with your radar](#)).
- Choose Up- or Downstream.
- Take a safe position and direct the device parallel to the stream flow, considering its features. Please follow the instruction (see [Site selection](#)).
- Using circular bubble/spirit level (bull's eye level), below the phone holder, align the radar in two dimensions, fix HSR-10 position.
- Point for 10 seconds (see [Get started](#)) and measure velocity.
- For an accurate result, measure several times.

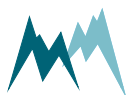


ATTENTION After taking measurements, or during a pause, we recommend keeping the HSR-10 in its case or laying it on its side on a hard horizontal surface.



8 Maintenance

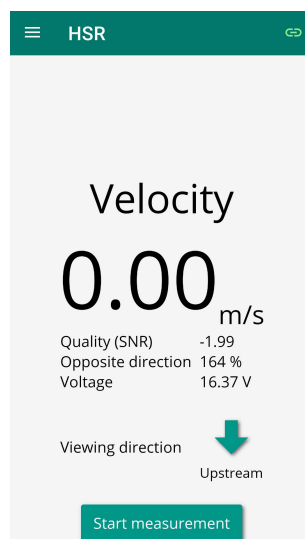
The HSR-10 generally does not require any special maintenance. However, the device should be inspected occasionally for damage and a dirty sensor surface. To remove dirt use a wet cloth with little force. Do not use any abrasive detergent or scraping tool!



9 Software features

The HSR-Commander is a multipurpose software tool to configure and operate HSR-10.

9.1 HSR-Commander main screen



9.1.1 Connection status

If HSR-10 successfully connected to HSR-Commander you can see the number of device and connection parameters.

9.1.2 Velocity value

After measurement you can check velocity in units, that can be changed in [HSR-10 Options](#)

Velocity measurements can be defined as invalid by the criteria quality (SNR) and opposite direction content.

9.1.3 Additional values

Quality (SNR)

The Signal-to-Noise Ratio contains the most important information of the quality value. Generally, a SNR lower than 30 indicates an insufficient flow velocity measurement.

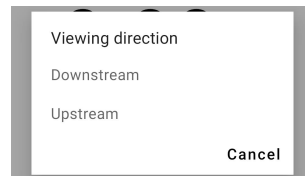
Opposite direction

The opposite direction content is the fraction of counter-flow in measurement direction.

Viewing direction

This setting defines the viewing direction of the HSR-10 sensor in relation to the flow direction of the river.

To change the direction tap on Viewing Direction arrow and choose right one.



10 Troubleshooting

10.1 The HSR-10 (the diode) does not turn on

Reason	Solution
The power supply is not connected or turned off.	Check whether the battery is securely attached, if so – try to charge it fully.

10.2 Phone/tablet can't find "HSR-10 xx" network

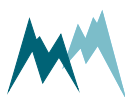
Reason	Solution
The HSR-10 (the diode) does not turn on.	Check whether the battery is securely attached, if so – try to charge it fully.

10.3 HSR-Commander can't connect to radar

Reason	Solution
There is a problem with the connection.	Try deactivate the mobile data communication and restart Wi-Fi.

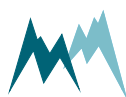
10.4 The HSR-10 returns no or zero velocity

Reason	Solution
The SNR indicator below 30%.	Reverse the viewing direction of the HSR-10 and change the settings.



10.5 The HSR-10 returns negative velocities

Reason	Solution
Waves on water surface are insufficient.	Create surface waves using a chain, rope or other means upstream of the measurement spot.



11 FAQ's

Below are some frequently asked questions regarding HSR-10.

FAQ 1: What is the HSR-10 and its primary function?

Answer: The HSR-10 is a portable, handheld radar sensor for non-contact measurement of flow velocity in rivers and channels. It uses the Doppler effect to determine surface velocity without being submerged or in contact with the water.

FAQ 2: What are the key benefits of using the HSR-10?

Answer: The HSR-10 offers a contact-free measurement method that prevents soiling and damage, reducing maintenance. It provides quick, safe measurements in high-velocity or turbulent waters and is ecologically compatible. The device features a user-friendly interface, self-checking system, and wireless data transmission via Wi-Fi.

FAQ 3: How does the HSR-10 measure water velocity?

Answer: The HSR-10 emits [radar waves](#) to the water surface. By analyzing the frequency shift of the reflected waves, it determines the surface flow velocity.

FAQ 4: What are the operating conditions and physical specs of the HSR-10?

Answer: The HSR-10 operates on 9-18V DC power with a battery capacity of 2.0 Ah or 3.0 Ah, charging in approximately 2 hours. It functions within temperatures of -40°C to 60°C (-40°F to 140°F) and stores between -40°C and 85°C (-40°F to 185°F). The device weighs 1.2 kg (2.71 lb), has an IP65 protection rating, and measures 263 x 123 x 271 mm (10.35 x 4.84 x 10.66 in). It transmits data via Wi-Fi at 2.4 GHz within 50 meters.

FAQ 5: What is the measurement range and accuracy?

Answer: The HSR-10 detects velocities from 0.08 to 16 m/s (practical range) or 0.01 to 20 m/s (technical range).

It offers an accuracy of ± 0.01 m/s; ± 1 % FS (certified by METAS) and a resolution of 1 mm/s, with a measurement range from 0.5 to 100 meters (1.6 to 328 feet) from the water surface.

FAQ 6: What data does the HSR-10 provide?

Answer: In addition to velocity, the HSR-10 provides direction recognition (+/-) and an internal measurement quality value. It uses Advanced Noise Reduction (ANR) based on velocity spectrum analysis.



Measurements take approximately 10 seconds at a frequency of 24 GHz (K-band).

FAQ 7: How do I use the HSR-10 with the app?

Answer: Download the HSR-Commander app from [Google Play](#), connect to the HSR-10's [Wi-Fi network](#), and open the app. Choose whether measuring upstream or downstream, point the radar at the water, and take your reading. **If there are connection issues, deactivate mobile data on your device.**

FAQ 8: What's included in the HSR-10 Bundle?

Answer: The HSR-10 [Bundle](#) includes the handheld radar, a charger for Makita® batteries, and a case. Batteries are sold separately!

FAQ 9: The battery LED does not show the battery status.

Answer: To use the battery status LED on the Makita battery you need to initialize the battery with a Makita charger. The absence of the LED indication only indicates that the battery is not initialized, but does not mean that it is not being charged.

In order to charge, the battery must not click into the supplied charger.

