VEMAVENTURI

InSite Construction (ISC)

Data acquisition system

Installation and operating instructions – Version 1.2

Content

Overview

Main components

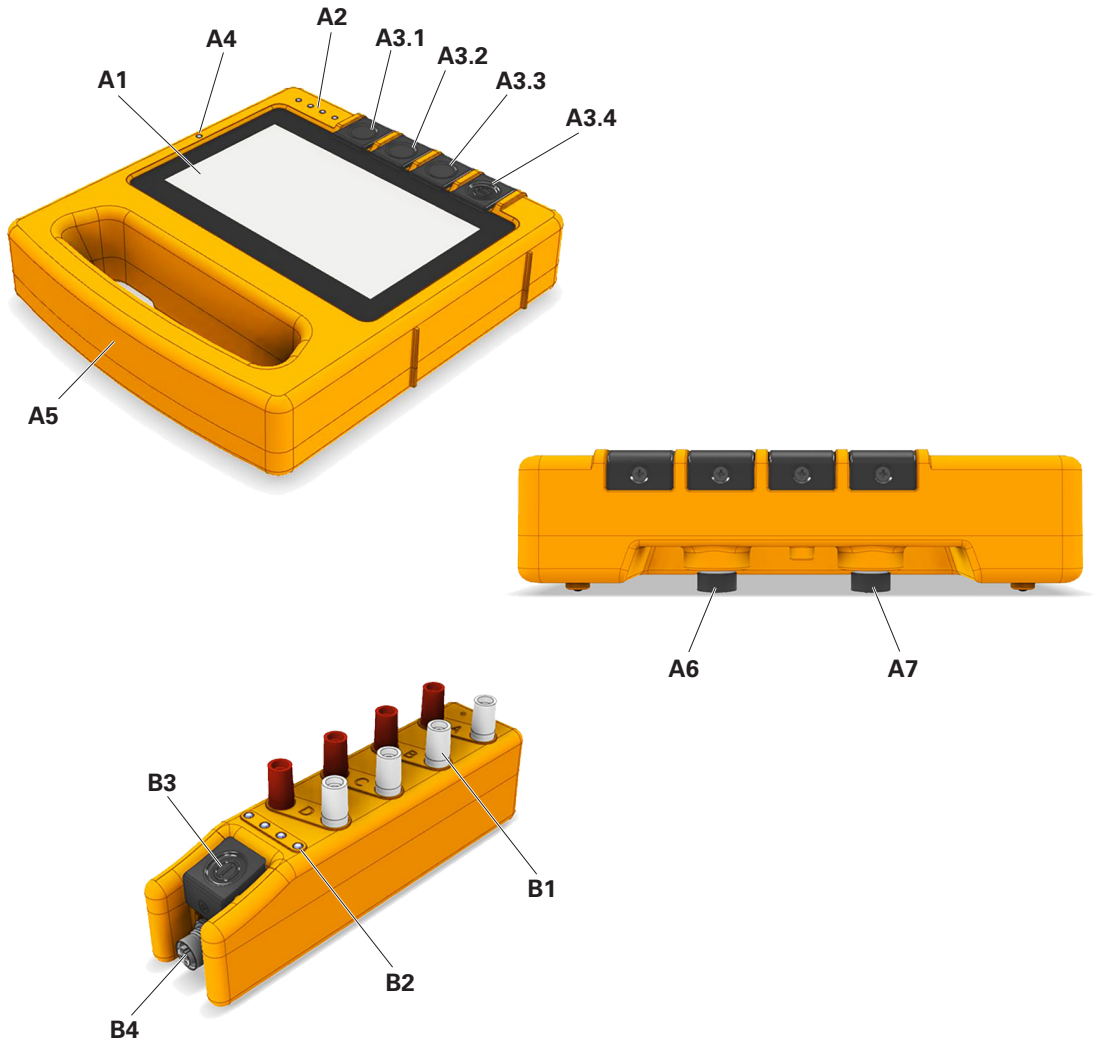


Fig. 01

ISC hub

A1 Touchscreen
A2 LED status indicators
A3 Mechanical control buttons
A4 Light sensor
A5 Antenna
A6 PERI bus connection
A7 Ethernet/CAN connection

Analogue input module

B1 Connections for temperature and vibration sensors
B2 LED status indicators
B3 Mechanical function button
B4 PERI bus connection

Overview

Key

Pictogram | Definition

 Danger/Warning/Caution

 Note

 To be complied with

 Visual inspection

 Tip

 Incorrect use

 Safety helmet

 Safety shoes

 Safety gloves

 Safety goggles

 Personal protective equipment to prevent falling from a height (PPE)

Warning notices

Warnings appear before instructions for action and are categorised as follows:

⚠ Danger

means that serious bodily injury or death will occur if the aforementioned precautions are not taken.

⚠ Warning

means that serious bodily injury or death may occur if the aforementioned precautions are not taken.

⚠ Caution

means that minor bodily injury may occur if the aforementioned precautions are not taken.

!

means that damage to property or an undesirable situation may occur if the aforementioned precautions are not taken.

Layout of the warning messages

⚠ Signal word

Type and source of hazard!
Consequences of non-compliance.
⇒ Preventative measures.

Conventions of representation

- Instructions are numbered with: 1. ..., 2. ..., 3. …
- Individual actions are represented by: ►
- The result of an instruction is shown by: →
- Position numbers are clearly provided for the individual unit components and are given in the drawing, e.g. **A1**, in the text in brackets, for example (**A1**).
- Several position numbers, i.e. alternative components, are represented with a slash: e.g. **A1/2**.
- Screen text is shown in bold, e.g. **Pressure** status screen.

Arrows in drawings

- → Arrow representing an action
- ⇨ Arrow representing a reaction of an action*
- → Arrow representing forces

* If not identical to the action arrow.

Introduction

Target groups

Contractor
These installation and operating instructions are intended for contractors involved in concrete construction for structural and civil engineering projects.

Competent person
(construction site coordinator)
The Safety and Health Protection Coordinator*
- is appointed by the client,
- must identify potential hazards during the planning phase,
- determines measures that provide protection against risks,
- creates a safety and health protection plan,
- coordinates the protective measures for the contractor and site personnel so that they do not endanger each other,
- monitors compliance with the protective measures.

Competent persons qualified to carry out inspections
Due to the specialist knowledge gained from professional training, professional experience and recent professional activity, the competent person qualified to carry out inspections has a reliable understanding of safety-related issues and can carry out inspections correctly. Depending on the complexity of the inspection to be undertaken, e.g. scope of testing, type of testing or the use of certain measuring devices, a range of specialist knowledge is necessary.

Qualified personnel
The data acquisition system may only be used by instructed** specialists. The specialist must have concrete engineering skills and be able to manage and oversee the process of concreting and curing in professional structural and civil engineering projects.
Instruction on the system must cover at least the following points:
- Instruction on the functions and operation of the ISC hub.
- Description of the associated sensors, and how to install and connect them.
- Instruction on data collection and evaluation of results.

The user of the system must also be technically capable of drawing the correct conclusions from the measurement results in order to be able to take the appropriate measures, e.g. the decision to strip the formwork.

- **In other countries, ensure that the relevant national guidelines and regulations in the respective current version are complied with!**
- **If no country-specific regulations are available, it is recommended to proceed according to German guidelines and regulations.**

* Valid in Germany: Regulations for Occupational Health and Safety on Construction Sites 30 (RAB 30).

** Instructions are given by the contractor themselves or a competent person selected by them.

Additional technical documentation

- Installation and operating instructions:
  - TEMO Temperature Monitoring
  - PHONO Concrete Detection and Compaction Measurement
  - PREMO Concrete Pressure Monitoring

Introduction

Intended use

Product description
Vemaventuri AB products have been designed to be used exclusively in industrial and commercial sectors by suitably trained personnel only.

InSite Construction (ISC) is a data acquisition system for recording, transmitting and evaluating various sensor data. The system may only be used in concrete construction for structural and civil engineering projects.

Data transmission between the ISC hub and ISC node takes place wirelessly via WLAN.
Data transmission between the ISC hub and Vemaventuri AB's cloud-based web services can take place via LTE, WLAN or Ethernet.
The radio regulations in the country of operation must be observed.

The system supports the use of a variety of peripheral probes and sensors from different manufacturers. The information on intended use in the relevant instructions must be observed.

The units are designed for outdoor use. However, they should be protected from intense weather, long periods of exposure to sunlight, and dirt.

Features of the ISC hub
- Dust- and waterproof plastic housing
- IPS LCD touchscreen monitor with high luminosity
- Clear user interface
- Four mechanical control buttons
- Four LED status indicators
- Light sensor for touchscreen brightness
- Loudspeaker for unit signals
- Connections for PERI bus and Ethernet
- Data transmission to the cloud via LTE, WLAN or Ethernet
- Battery operation
- Prepared for GNSS (satellite positioning)

Features of the node
- Dust- and waterproof plastic housing
- Four analogue measuring channels for connection of thermocouples, and concrete recognition and compaction detectors
- Permanent magnet for attachment to ISC hub or other magnetic surface
- One mechanical function button
- Four LED status indicators
- One PERI bus connection
- Data transmission via WLAN

Directives and standards
The system meets the requirements of the EU directives:
- 2014/30/EU (EMC)
- 2014/35/EU (low voltage)
- 2014/53/EU (radio equipment/RED)
- 2011/65/EU & 2015/863/EU (RoHS)

The system also meets the requirements of the US directive:
- FCC-247, section 15

as well as the Canadian Information Technology Equipment (ITE) guidelines:
- ISED RSS-Gen, Edition 5
- ISED ICES-003, Edition 7

Harmonised standards applied:
- EN 55032, EN 55035
- IEC 61010-1
- IEC 62133-2
- IEC 65029

The CE marking test was carried out by the conformity assessment body NEMKO Group AS (NB 0470).

Certifications pursuant to TELEC, JIS and UL are currently being prepared.

Instructions for Use

Improper use may result in incorrect measurements or damage to the unit.

The system is not suitable for permanent monitoring of concrete structures and bridges. There is no failure safety.

Only sensors approved by the manufacturer may be connected. Each sensor type is designed for a specific purpose and must not be used for other purposes.

- The system is not suitable for use in systems or environments where radio communication is disrupted.
- The ISC hub and node must not be immersed in water.
- The system must not be operated in potentially explosive areas (Ex).
- The units must not be opened. Opening the unit will invalidate the warranty.
- Modifications to hardware and software are not permitted.

The system described in these instructions may contain patent-protected components.

Safety instructions

If the equipment is used in a manner not specified by the manufacturer or this document, the protection provided by the equipment may be impaired.

The ISC hub and ISC node are only for indoor charging with the power adapter and are powered by an internal battery inside the unit when operated in outside environment.

Safety instructions apply to all service life phases of the system.

General information
The contractor must ensure that the installation and operating instructions provided are available at all times and understood by the site personnel.

Before using the system
⇒ Read and understand this manual and the safety instructions it contains carefully.
⇒ Observe the laws and regulations in force in the country of use. This includes, in particular, safety precautions as required when handling live equipment.
⇒ Check units, mains cables and accessories for damage and functional correctness.
⇒ Damaged connectors and cables must be removed immediately and no longer used.
⇒ Only use original spare parts from the manufacturer.
⇒ Send damaged units to a service workshop approved by the manufacturer for inspection and repair, see the chapter "Transportation and storage" on page 17.

Failure to observe these safety precautions may result in injury or damage to the unit.

Obligations of the operating company
The operating company owns the unit and its peripherals or has rented both. It is responsible for adhering to the intended use at all times.

The operating company must:
- assign the various tasks carried out on the unit to qualified and authorised personnel
- instruct the personnel on how to carry out their duties and responsibilities, and provide evidence of this instruction
- provide all the means necessary for the personnel to carry out the tasks assigned to them
- ensure that the unit is only operated in a technically faultless condition
- ensure that the unit is protected against unauthorised use

Technical details

ISC hub

Electrical characteristics		
	Input	12 V DC max, 2.5 A
Lithium-ion rechargeable battery	Total rated capacity	86.4 Wh / up to 12 W
	Rated voltage per cell	3.6 V
	Number of cells	5
Charger/power supply unit	Input	100 … 240 V AC, 50/60 Hz, 1.2 A max.
	Output	12 V DC, max. 4.2 A, 50.4 W
Display		
	Screen	IPS LCD touchscreen monitor
	Size	7 inches
	Resolution	600 × 1024 pixels
	Light sensor	Detection of ambient light to control the screen brightness
	LED display	4 × status LEDs
Ambient conditions		
	Operating temperature (discharging)	-5 … 40°C (23 … 104°F)
	Ambient temperature when charging the battery	5 … 40 °C (41 … 104 °F) recommended 15 ... 25°C (59... 77°F)
	Transport temperature	15 … 25 °C (59 … 77 °F)
	Storage temperature	15 … 25 °C (59 … 77 °F)
	Ambient humidity	≤ 90 % rF non-condensing
Emissions		
Noise level	Unit signals	≤ 80 dBm at distance of 1 m
Interfaces, communication		
PERI bus	Serial interface	1 × 5-pin socket, digital, semi-proprietary
	Protocol	I²C
	Function	12 V charging bus for battery
Ethernet	Serial interface	1 × 8-pin socket, digital
	Network	100BASE-TX
	Transmission rate	100 Mbit/s
	Protocol	TCP/IP
WLAN	Standard	IEEE 802.11 b/g/n
	Frequency band	2.4 GHz
LTE grid	EU frequency bands	Cat M1; 1, 3, 8, 20, 28 Cat NB2; 1, 3, 8, 20, 28
	US frequency bands	Cat M1; 2, 4, 5, 8, 12, 13, 25, 26, 66, 71 Cat NB2; 2, 4, 5, 8, 12, 13, 66, 71
Global Navigation Satellite System (GNSS)	NAVSTAR GPS	Positioning of the ISC hub
	Frequency band	1550 … 1600 MHz

Technical details

ISC hub

Unit structure		
	Housing material	Plastic
	Protection type	IP66 pursuant to EN 60529
	Weight	1.46 kg
	Over voltage category	OVC I
	Degree of polution	3
	Usage	indoor and outdoor up to 2000 m a.s.l. Can also be used in wet locations. Definition of wet locations: The environment in which water or another conductive liquid may be present and in which it is likely that the resistance of the human body will be reduced by wetting of the contact between the human body and the device and by wetting of the contact between the human body and its environment.

Tab. 01

Technical details

ISC node

Electrical characteristics		
	Input	12 V DC max, 0.5 A
Lithium-ion rechargeable battery (NITECORE NL2150)	Rated capacity	up to 17.28 Wh
	Rated voltage	3.6 V
	Number of cells	1
Display		
	LED display	4 × status LEDs
Ambient conditions		
	Operating temperature (discharging)	-5 … 40°C (23 … 104°F)
	Ambient temperature when charging the battery	5 … 40 °C (41 … 104 °F) recommended 15 ... 25°C (59... 77°F)
	Transport temperature	15 … 25 °C (59 … 77 °F)
	Storage temperature	Indoor and outdoor 15 … 25 °C (59 … 77 °F)
	Ambient humidity	≤ 90 % rF non-condensing
Interfaces, communication		
PERI bus (Pressure sensors connection/interface)	Serial interface	1 × 5-pin socket, digital, semi-proprietary
	Protocol	I²C
	Function	12 V charging bus for battery
Multifunction channel	Serial interface	4 × screw sockets, analogue, I/O
	Function	Temperature measurement[1] -15 … +55°C (5 … 131°F)
		Concrete detection and compaction measurement
WLAN	Standard	IEEE 802.11
Unit structure		
	Housing material	Plastic
	Protection type	IP66 pursuant to EN 60529
	Weight	0.4 kg
	Over voltage category	OVC I
	Degree of polution	3
	Usage	indoor and outdoor up to 2000 m a.s.l.
	Can also be used in wet locations Definition of wet locations: The environment in which water or another conductive liquid may be present and in which it is likely that the resistance of the human body will be reduced by wetting of the contact between the human body and the device and by wetting of the contact between the human body and its environment.	

Tab. 02

1 Temperature measurement with thermocouple type T. The measuring range for this type is -250 … 400°C

Unit description

Dimensions

ISC hub

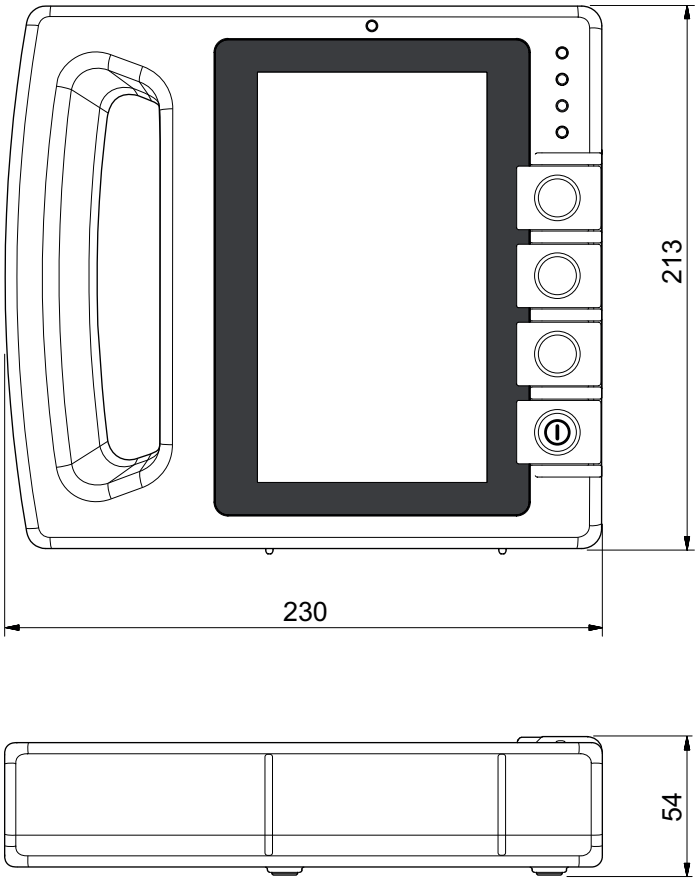


Fig. 02 All dimensions in millimetres

ISC node

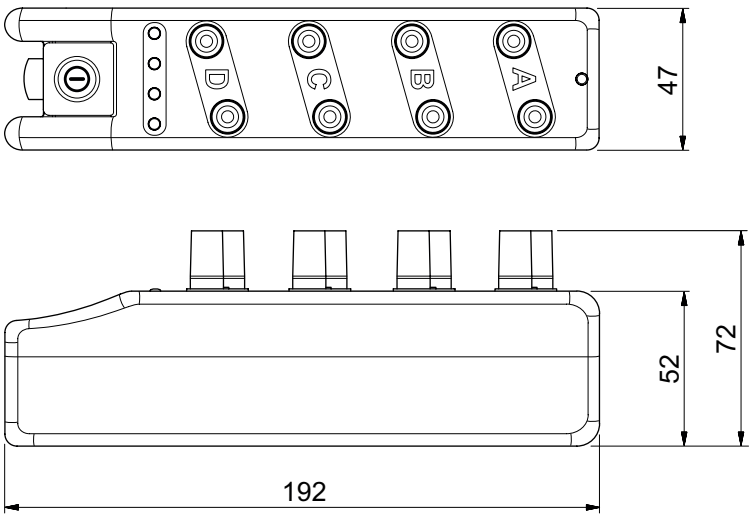


Fig. 03 All dimensions in millimetres

Unit description

Structure and function

ISC hub
The hub consists of a robust housing with touchscreen monitor, four mechanical control buttons, LED status indicators and two connections for PERI bus and Ethernet.
A light sensor controls the display brightness.
The unit contains a rechargeable battery that is charged using an external charger. The charge level is displayed on the screen.
The connection to the nodes and to the mobile radio or WLAN network is established using the integrated TETRA band antenna. The hub can receive measured data from the nodes and forward it to the web application at the same time.
The ISC hub also has a built-in GNSS/GPS receiver for locating the unit.

ISC node
The node has four analogue measuring channels for connection of thermocouples, and concrete recognition and compaction detectors. The unit also has a mechanical function button, LED status indicators and a PERI bus connection.
The node can be connected to digital devices such as pressure transducers via the PERI bus.
The PERI bus connection also serves as a 12 V charging bus for the integrated battery. The charging status is displayed via the LED lamps.
In the base of the housing, there are magnets that can be used to attach the node to the hub or to steel elements of the concrete formwork.

Connections/interfaces
ISC hub – PERI bus:
5-pin serial digital interface with integrated charging bus for the battery as well as a power supply (3.3 V DC / max. 1 A) for external measuring probes.

ISC hub – Ethernet bus:
8-pin serial digital interface with power supply (12 V DC / max. 48 W) for external measuring probes.

Node – PERI bus:
5-pin serial digital interface with power supply (3.3 V DC / max. 1 W) for external measuring probes.

Node – serial multifunction channels:
Four connections for analogue measuring probes (channels A to D).

The connections on the units are protected from dirt and damage by protective caps.

The hub can be connected to the manufacturer's cloud-based web services via LTE, WLAN or Ethernet.

Software / user interface
An application for receiving, forwarding and evaluating measured data is installed on the ISC hub.
The hub display shows the records in list form and as a graph.
There is a ring buffer in the node for all connections and measured data. The existing data is automatically transferred as soon as the node is connected to the hub. The measured data is encrypted and sent from the node to the hub and, if necessary, on to the cloud.


Web application
The ISC hub acts as a gateway between the nodes and the InSite Construction web application.
All collected and current measured data can be transmitted from the hub to the web application. The connection is established via LTE, WLAN or Ethernet.
The user needs an account and access authorisation.

Functions:
- Display of measured data in real time.
- Tabular and graphical depiction of the temperature and pressure measurements.
- Freely configurable dashboards within a project.
- Automatic notifications in the web app and by email about setpoints that have been reached or exceeded.
- Blog function for communication within the project team.
- Output of measurement reports about completed concreting operations.

Unit description

Energy management

The ISC hub has an intelligent energy management system that monitors the charging and discharging cycles of the lithium-ion battery.
An integrated temperature sensor detects the ambient temperature, thereby enabling efficient, careful charging of the cells.
In cold environments below 0°C, the battery is warmed up to 10°C by a heating coil before a charging cycle begins.
The charging process of the node module is stopped at 40°C.
The ambient temperature of the ISC hub is also monitored during discharge cycles. When the temperature drops below -15°C, the battery's heating coil is activated and the hub is warmed up. At temperatures below -20°C and above 55°C, the hub switches off.
The node switches off if the temperature exceeds 55°C or falls below -15°C.

The hub also has a deep sleep mode that maintains the battery charge for several months without recharging.

Scope of delivery and accessories

Scope of delivery
The rental and purchase system includes the following items:
- ISC hub
- ISC node
- Charger/power supply unit
- Mains cable (plug type E/F, G or B)
- Installation and operating instructions
- Transport cases

Accessories
Depending on the order placed, the following sensors may be included in the delivery:
- TEMO Temperature sensor/ thermocouple
- PHONO Concrete Detection sensor
- PREMO Concrete pressure sensor
- Other sensors
- Installation and operating instructions are included in each delivery

Unit description

LED indicators on hub

The four status LEDs on the hub indicate the following states and modes, among others:

- Availability
- Cloud connection
- Measured data transmission
- Battery charge levels

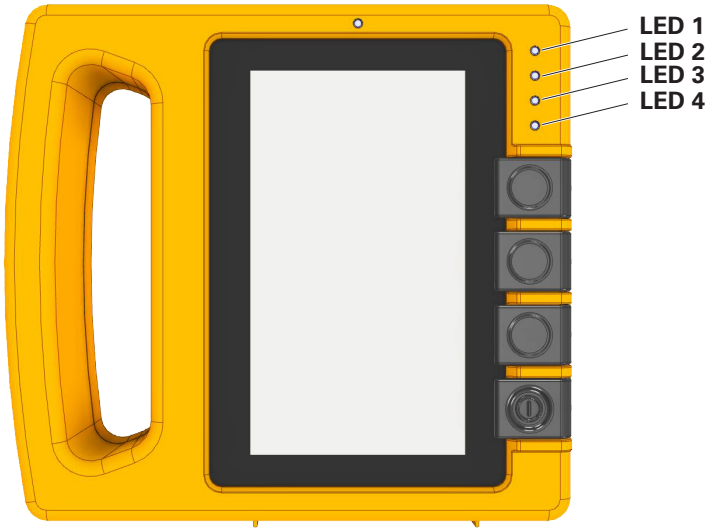


Fig. 04

State	LED 1	LED 2	LED 3	LED 4	Description
Steady green	●	●	●	●	System is booting. The four LEDs light up green one after the other until all four LEDs are lit
Steady green	●				Connection between hub and cloud is established
Flashing green		◉			The hub and node are connected. The hub is receiving measured data from the node
Flashing green			◉		Measured data is being uploaded to the cloud
Steady green				●	Battery is fully charged
Steady yellow				●	Battery is half-charged
Steady red				●	Battery is almost flat

Unit description

LED indicators on node

The four status LEDs on the node indicate the following states and modes, among others:

- Availability
- Unit coupling
- Measured data transmission
- Channel assignments
- Firmware update
- Battery charge levels

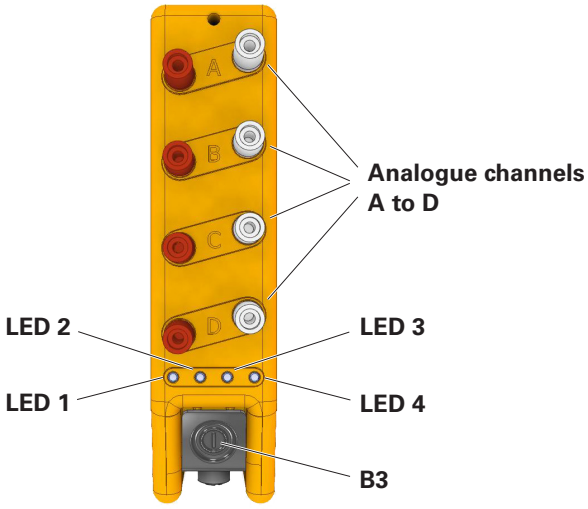


Fig. 05

State	LED 1	LED 2	LED 3	LED 4	Description
Steady green					■ On: Function button (**B3**) is held down. Node is switching on. The four LEDs light up green one after the other until all four LEDs are lit and the node has booted ■ Off: Function button (**B3**) is held down. The LEDs light up and go out one after the other until all four LEDs are off. Node is switching off
Flashing blue					■ The LEDs flash at regular intervals after booting until the node is put into pairing mode. ■ The LEDs will flash for 5 seconds ■ Function button (**B3**) has been pressed three times in quick succession. The node is being uncoupled from the hub
Flashing blue rapidly					Node is in pairing mode and trying to pair with the hub
Steady blue					LEDs light up blue for 2 seconds. The node has paired successfully with the hub and is switching back to the operating mode
Steady green					All 4 LEDs light up green for about 1 minute 40 seconds. Internal memory is being erased.
Flashing red SOS					LEDs flash "SOS" (3 times fast, 3 times slow). The node has detected a hardware error.
Flashing red					LEDs will flash for 2 seconds. The node has detected a software error.
Flashing white					Ongoing software update is processing

Node status
Function button (**B3**) is pushed **once**
1. Status analog channels A to D: Connected sensors light up green, not connected channels light up orange for 0.5 seconds
2. Status PERI bus: Connected concrete pressure sensors light up purple, not connected channel light up orange for 0.5 seconds
3. Status Connectivity: All 4 LEDs light up blue for 0.5 seconds when active connection to Hub. LED 1 flashes 3 times blue, if there is no connection to Hub.

Battery status
Function button (**B3**) is pushed **twice**
Each brightly lit green LED represents a charge level of 25 %.

Transportation and storage

Rental and purchase equipment

Receipt

The ISC hub and nodes are supplied in plastic boxes with outer packaging. Sensors and other accessories can be supplied in separate boxes or packaging.

- ▶ Check that the delivery is complete and undamaged immediately upon receipt.
- ▶ Document visible transport damage.
- ▶ If possible, have the carrier officially acknowledge the damage.
- ▶ Inform the manufacturer about the damage.
- ▶ Keep the boxes and cardboard packaging in case the delivery needs to be returned.

Returning rental equipment

- ▶ Return all units to the manufacturer in a timely manner.
- ▶ Notify the manufacturer of late returns.
- ▶ Check the hub and nodes for damage and clean if necessary.
- ▶ Fit protective caps on the connections.
- ▶ In the web application, release the hub and close the project. The measured data in the ring memory of the hub and the nodes is automatically deleted.
- ▶ Put the hub into transport mode. **Transport mode:** The battery is switched to safe transport mode as per the IATA Dangerous Goods Regulation (DGR).
- ▶ Switch off the hub and nodes.
- ▶ Place the units in the transport boxes provided.
- ▶ Package sensors and other accessories separately from the ISC hub and node.
- ▶ Inform the manufacturer about damaged or defective units.
- ▶ Send the boxes with all rented units and accessories to the address stated in the rental agreement.

Returning purchased equipment

- ▶ Arrange a return shipment for repair purposes with the manufacturer.
- ▶ Fit protective caps on the connections.
- ▶ Put the hub into transport mode. **Transport mode:** The battery is switched to safe transport mode as per the IATA Dangerous Goods Regulation (DGR).
- ▶ Switch off the units.
- ▶ Package the hub and/or node in a secure way.
- ▶ Send the units to the workshop approved by the manufacturer.

The ISC hub and node contain lithium-ion batteries.

- ▶ Observe the current regulations for national or international shipment of batteries. The sender is responsible for ensuring that the units are shipped correctly and in compliance with the law.
- ▶ If the units are switched off and charged to a maximum of 30 %, then they can be transported as air cargo within the framework of the IATA Dangerous Goods Regulation (DGR).
- ▶ The packaging used for the hub and the node must be clearly marked with Dangrous Goods regulations as it contains the lithium Ion batteries installed into the system. UN3481 markings are recommended.
- ▶ Other dangerous goods must be packaged and shipped separately.

Storage

- ▶ Store the hub and nodes in their original packaging or in their plastic boxes.
- ▶ Fit protective caps on the connections.
- ▶ Protect the units from moisture, heat and frost.
- ▶ Take note of the ambient conditions, see “Technical details” on page 9.
- ▶ Do not place heavy objects, such as formwork and scaffolding elements, on the units or on the box.
- ▶ Check units for damage before reuse or after a long period of storage.
- ▶ The built-in batteries can be stored for a maximum of three years. Deep discharge can damage the batteries.

Commissioning

Charging the batteries

Lithium-ion batteries are installed in the units. The ISC hub and node can therefore be operated without a mains connection.
The usage time or the discharge speed of a battery depends on several factors:

- Ambient temperature
- Usage time with the screen ON
- Number and type of connected sensors
- Screen brightness
- Battery age

Every charging and discharging process ages the battery. In particular, charging above 80 % and discharging below 20 % will accelerate the ageing process.
If the battery capacity and discharge time have decreased significantly, the battery should be replaced. To do this, contact a service workshop designated by the manufacturer. Never replace the batteries yourself.

The batteries must be charged **before the units are used for the first time**.
The charging electronics ensure that the battery does not overheat and become damaged during the charging process. Overcharging is prevented.

During the charging process, the ambient temperature must be between 0 and +40°C (32 ... 104°F).
To prolong the life of the batteries, it is advisable to charge the units at room temperature (approx. 20°C/68°F).

Charging the ISC hub

1. Connect the charging cable to the PERI bus port.
2. Insert the mains plug of the charger into the socket.
3. Charge the battery to 80 to 100 %. The battery charge level is shown on the indicator in the status bar.

The unit can be used while it is charging.

Charging the node

4. Connect the charging cable to the PERI bus port.
5. Insert the mains plug of the charger into the socket.
6. Charge the battery to 80 to 100 %.

Battery charge level indicator

The four status LEDs of the node will indicate the charge level when the function button (**B3**) is pressed once briefly. Each brightly lit LED represents a charge level of 25 %.
Examples:
If three LEDs light up brightly, the node is 75 % charged.
If two LEDs light up brightly and the third LED lights up dimly, the battery is about 60 % charged.

During the charging process, the LEDs flash and also indicate the charge level in %.
Other operating states are not displayed during the charging process.

Operating modes

The ISC hub has five operating modes:

1. **Fully active:** The hub is active, the display is switched on. Measured data is being received and sent to the cloud.
2. **Dark:** The hub is active, the display is switched off. Measured data is being received and sent to the cloud.
3. **Transport mode:** The battery is switched to safe transport mode as per the IATA Dangerous Goods Regulation (DGR).
4. **Switched off:** The microcontroller and all function modules are switched off.

Commissioning

Switching on the hub

Make sure that the battery is sufficiently charged.

► When the hub is switched off (all LEDs are off), press and hold the lower button (**A3.4**, Fig. 01) until all four LEDs light up green and go out again (the LEDs switch on one after the other from left to right).

→ The system boots and the screen switches on.

► If it is only the screen that is off, press any button or tap the screen.

→ The screen will switch back on.

The screen switches off after 30 seconds if no button is pressed.

Putting the hub into operation

1. When starting up for the first time, select a display language. (Fig. 06)
2. Tap **Continue**.

→ The hub attempts to connect to the internet and Vemaventuri AB's web services.

→ The system checks whether a firmware update is available. (Fig. 07)

3. If an update is available, tap **Install update**.

→ Once the update has been successfully installed, the hub reboots.

4. Enter the PIN code. (Fig. 09)
5. Register the hub using the QR code displayed or the URL in the web application. (Fig. 08)
6. If the hub is to be connected to a new project, tap **New project** and **Continue**.
7. Enter the new PIN code and confirm with Repeat.

If you have forgotten your PIN, tap **Forgot your PIN code?** and scan the QR code with your mobile phone. The PIN can be displayed and changed on the web portal.

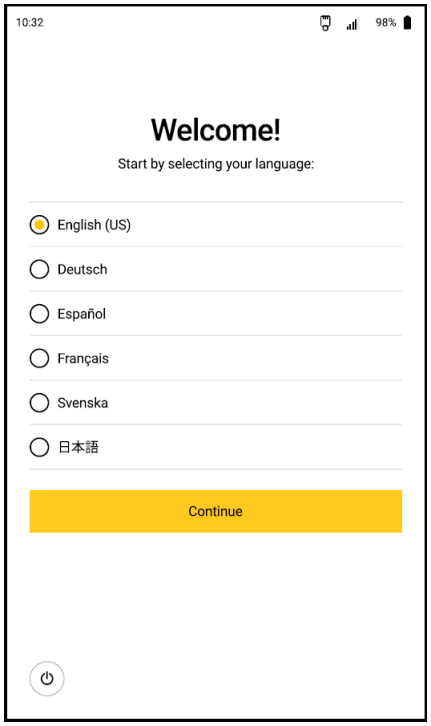


Fig. 06

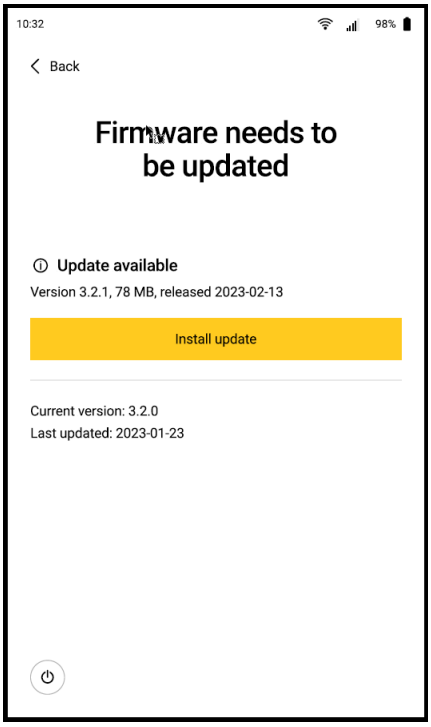


Fig. 07

Fig. 08

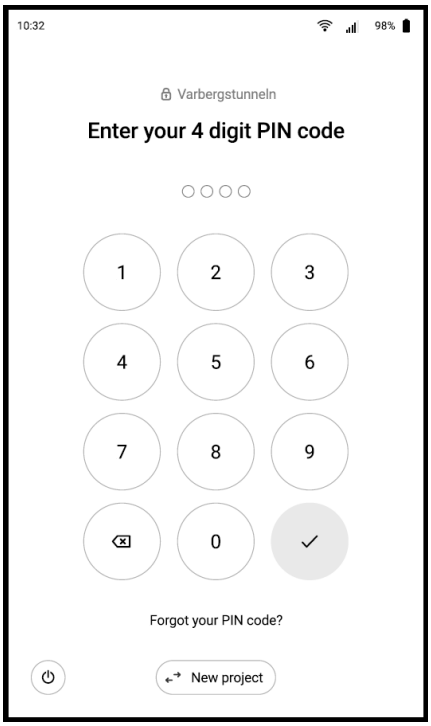


Fig. 09

Commissioning

Switching off the hub

1. Press the power button on the display (**A3.4**, Fig. 01)
2. Press the **Power off** button to confirm.

→ The hub is switched off.

Always switch off the hub if no measurement is to be carried out. This prevents invalid measured data from being collected and forwarded to the cloud in an uncontrolled manner.

Resetting after a system error

► Keep the button (**A3.4**) pressed for at least 20 seconds.

→ The system is reset and rebooted.

Switching on the node

Make sure that the battery is sufficiently charged.

► Keep the function button (**B3**, Fig. 01) pressed until all four LEDs light up green (the LEDs will switch on one after the other from left to right).

→ The node is switched on.

Coupling the node and hub

The two units are paired wirelessly via WLAN, and this must happen immediately after they are switched on.

1. Press the function button (**B3**) three times in quick succession within 30 seconds of switching on.

→ The node switches to pairing mode. The LEDs will flash rapidly in blue.

→ Once the units are successfully paired, the node switches back to operating mode. The LEDs indicate the normal operating states, see section "LED indicators on hub" on page 15.

If pairing does not occur within 30 seconds of switching on, all of the LEDs go out and the node switches off.

Four nodes can be paired with one hub (1st release 2023).

If the connection between the hub and a node is interrupted, the node continues to take readings and stores them. As soon as the connection to the hub is re-established, the stored measured data is transferred to the hub.
The transfer can take several minutes. The four LEDs on the node flash blue during data transfer.

Switching off the node

► Keep the function button (**B3**, Fig. 01) pressed until all four LEDs light up green, and then go out one after the other from right to left.

→ The node is switched off.

Always switch off the node if no measurement is to be carried out. This prevents invalid measured data from being collected in an uncontrolled manner.

Installation and connection (construction site)

Safety instructions

The data acquisition system may only be installed by instructed specialists, see section “Target groups” on page 6.

Observe the general safety instructions (Page 8) and the intended use (Page 7).

Damage to electronics!

⇒ Only establish or release connections when the units are switched off.

The connections on the devices are protected by protective caps.

⇒ Only remove protective caps when connecting peripheral devices.

⇒ When a peripheral device is removed, fit the protective cap back onto the connection.

Digital radio communication

The system has been radio tested and complies with the limits for electronic digital units. The limits are designed to provide reasonable protection against harmful interference in a residential and industrial installation.
The data acquisition system generates, uses and can radiate radio frequency energy. If it is not installed and used in accordance with these instructions, it may cause harmful interference to radio communications.
However, there is no guarantee that interference will not occur even if it is installed correctly.

If the system causes interference to radio or television reception, which can be determined by switching the units on and off, try to eliminate the interference by taking the following measures:

► Reposition the ISC hub and/or node module or place them in a different location.

► Place the units in as open an environment as possible to improve signal reception.

Installation and connection (construction site)

Installing the hub

After charging the battery, the hub is immediately ready for use in the field and receives the measured data from the node after pairing.

1. Connect concrete pressure sensors to the PERI bus.
2. Switch on the hub.
   The measured data is received automatically from the connected node.

When the hub is connected to the InSite Construction web portal, the measured data is transferred in real time and stored for further processing.

Do not suspend the hub from the connection cables or the antenna (**A5**, Fig. 01) or fix it in place on site.

Installing the node

After charging the battery, the node is immediately ready for use and sends the measured data to the ISC hub after pairing.

- ▶ Affix the node safely and securely near the measuring points, e.g. on the formwork or scaffolding tubes.
- ▶ Attach the node magnetically to metal surfaces.
- ▶ On non-magnetic surfaces, secure the node with cable ties.
- ▶ Connect max. one temperature or vibration sensor to each of the four analogue multifunction channels.
- ▶ Connect concrete pressure sensors to the PERI bus.
- ▶ Switch on the node.
  The measured data is received automatically from the connected sensors.

Measurements can also be taken when the hub is switched off. The measured values are stored in the node.
The hub receives the stored values as soon as it is switched on and it is in "Fully active" or "Dark" operating mode.

Connecting peripheral devices

Detailed information on the installation and connection of sensors and probes can be found in the respective installation and operating instructions.

Installation and connection (construction site)

Connections

Hub
The ISC hub has two connection sockets:
- A PERI bus connection (**A6**, Fig. 01) which is used to connect to an ISC node or an external digital measuring probe, such as the concrete pressure sensor.
  In addition, the hub battery can be charged using the external charger via the PERI bus connection.
- An Ethernet bus port (**A7**, Fig. 01) used to connect to the internet or cloud.

Incorrect pin assignment!
Unit malfunctions or defects may occur as a result.
⇒ Only use the pre-assembled connection cables supplied by the manufacturer.

Node
The node has the following connection sockets:
- Four pairs of screw/plug-in sockets (**B1**, Fig. 01) used for connecting to analogue probes or sensors, such as the thermocouple or the vibration sensor.
- A PERI bus connection which is used to connect to the ISC hub or an external digital measuring probe, such as the concrete pressure sensor.
  In addition, the node battery can be charged using the external charger via the PERI bus connection.

Operation

Operating and display elements

Start screen/main menu

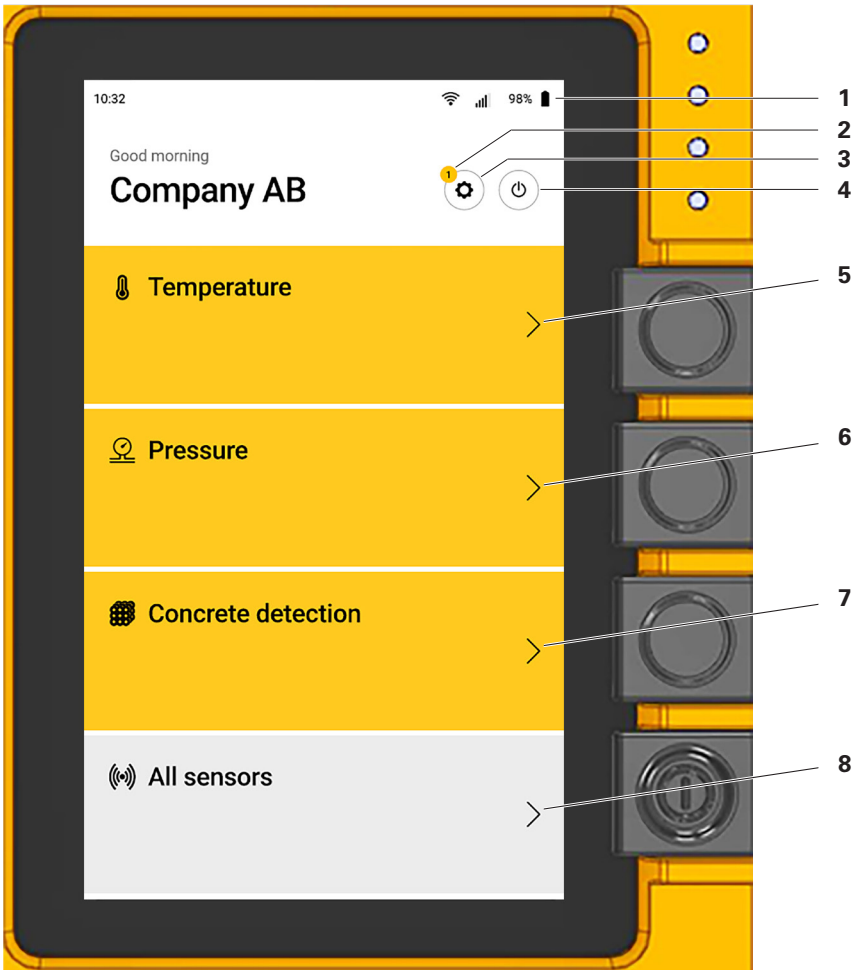


Fig. 10

1 Status bar
2 Firmware update available
3 System settings
4 Switch off screen / shut down system
5 Temperature measurement status screen
6 Pressure measurement status screen
7 Concrete detection and compaction measurement status screen
8 Overview screen of all connected nodes and sensors

The sensor screens can be opened by tapping the relevant buttons or by pressing the mechanical buttons opposite.

The status bar (**1**) displays warning messages and other system information. The WLAN and LTE signal strength as well as the battery charge are also displayed.

The system settings can be opened by tapping on the cogwheel symbol (**3**). The pinned number (**2**) indicates that firmware updates are available.

Operation

Temperature measurement status screen

The screen displays the status of the four analogue multifunction channels of the connected nodes. Each field represents a node. The screen buttons (**4**) and (**5**) can be used to scroll up or down through fields.

► To display the recorded readings of the respective node, tap **View history** (**7**).

Example (Fig. 11):
The hub is connected to a node (**1**) via WLAN.
Channels 01-A to 01-D (**2**) are connected to temperature sensors. The current temperature in the concrete is displayed.

Further information:
“Temperature measurement” on page 32

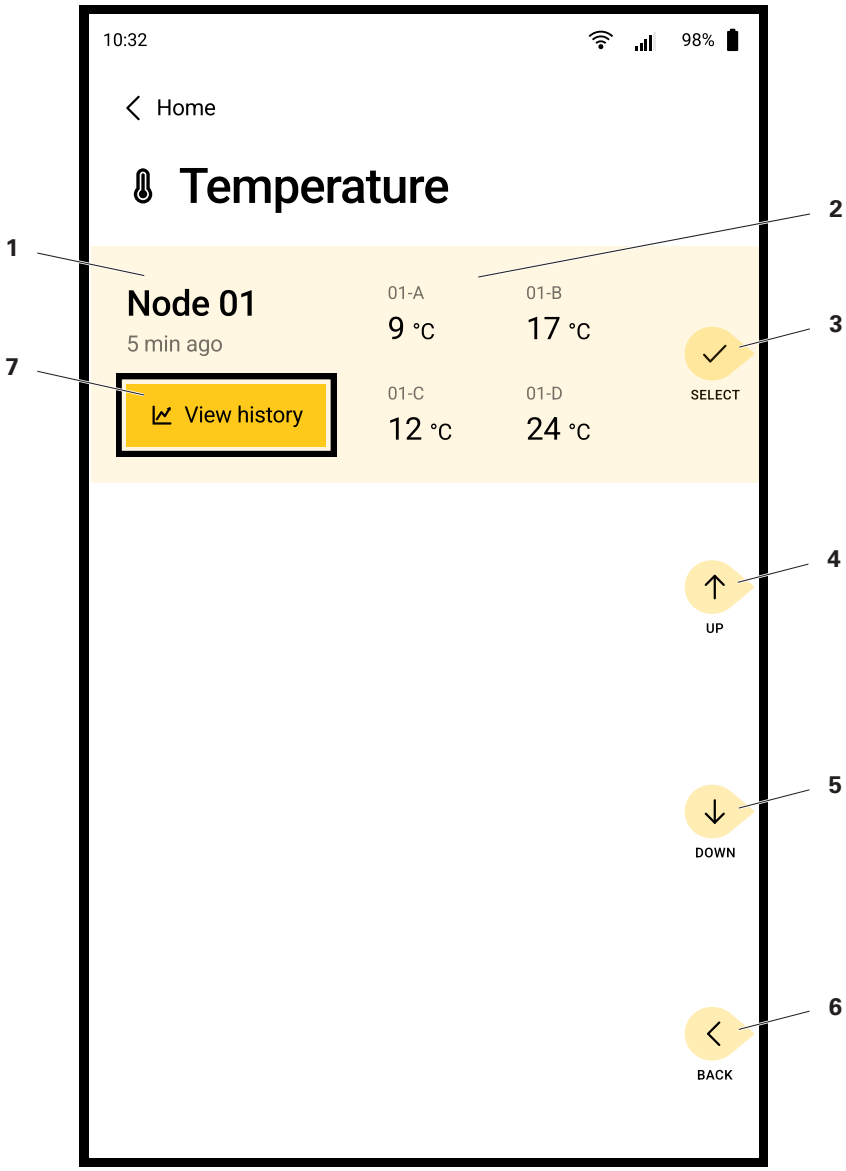


Fig. 11

1 Node ID
2 Measuring channels A to D
3 Display historical measured values
4 Scroll up in the window
5 Scroll down in the window
6 Back to main menu
7 Display historical measured values

Operation

Historical temperature values

All measured values for the current measuring session are displayed on the screen.
In the upper section, the most recently received measured values for all channels are displayed.
The middle section shows the temperature curve per channel since the start of the measurement session.
The lower section shows the temperature difference per channel since the start of the measurement session.
The temperature curves of the individual channels are displayed graphically in different ways. The legend is found under the measured values in the top field.

Example (Fig. 12):
Channels 01-A to 01-D (**2**) are connected to temperature sensors and are active. The current temperature in the concrete is displayed.

Temperature over time
The line graph shows the temperature profile over the course of a week.

Delta-T over time
The line graph shows the temperature difference per channel.

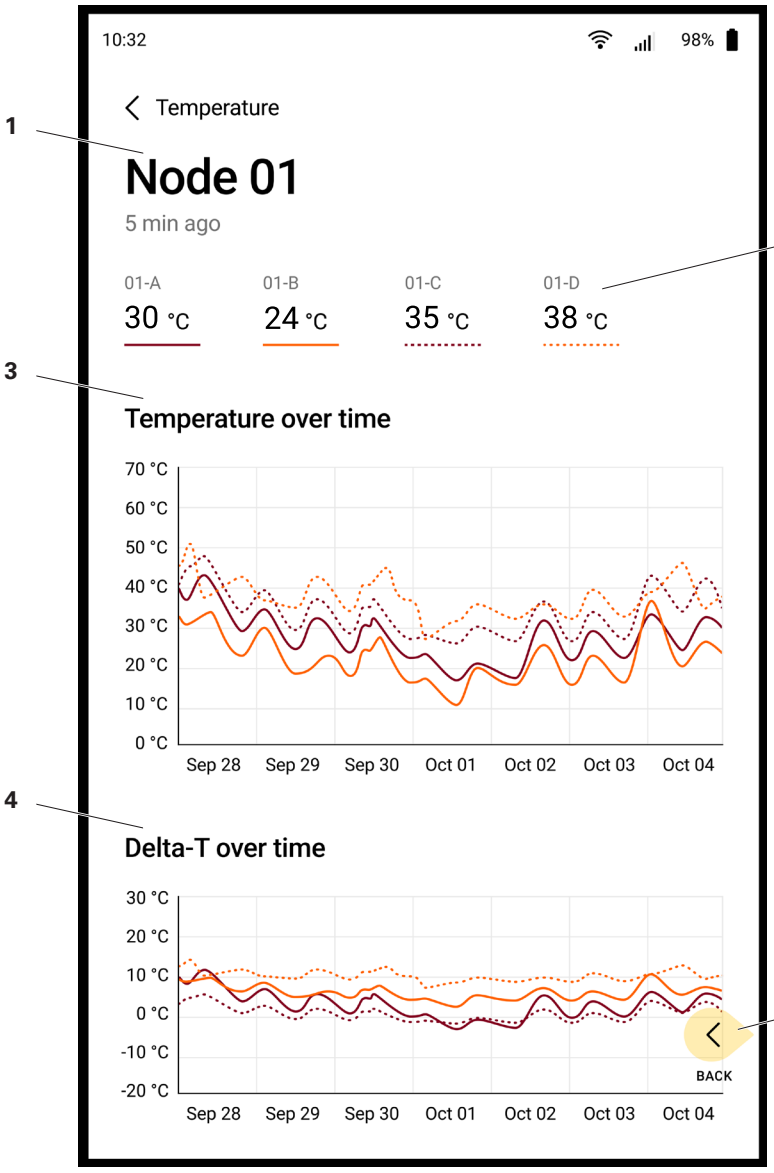


Fig. 12

1 Node ID
2 Measuring channels A to D
3 Temperature profile [T/t]
4 Temperature difference [ΔT/t]
5 Back to main menu

Pressure measurement status screen

This screen displays the status of the four digital channels of the connected nodes. Each field represents a node. The screen buttons (**4**) and (**5**) can be used to scroll up or down through fields.

► To display the recorded readings of the respective node, tap **View history** (**7**).

Example (Fig. 13):
The hub is connected to several nodes (**1**) via WLAN.
Channels 0x-A to 0x-D (**2**) are connected to pressure sensors.
The current concrete pressure acting on the formwork at the level of the sensor is displayed.

Further information:
“Concrete pressure monitoring” on page 32

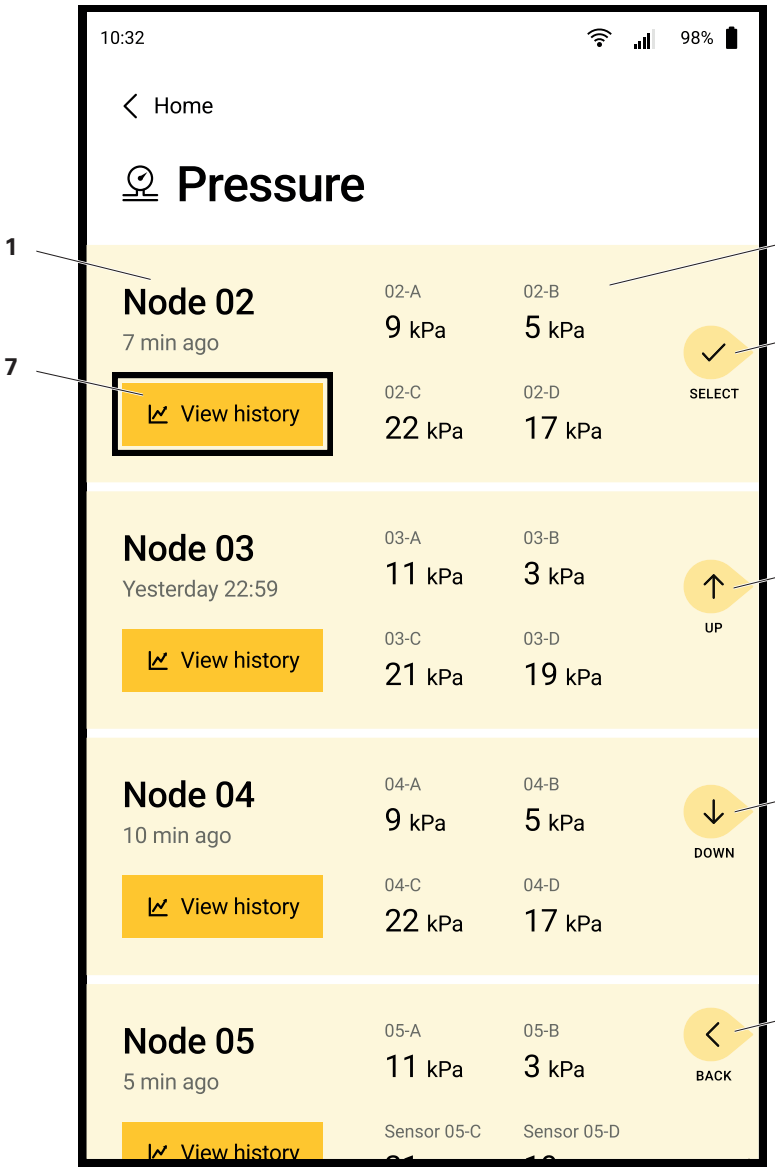


Fig. 13

1 Node ID
2 Measuring channels A to D
3 Display historical measured values
4 Scroll up in the window
5 Scroll down in the window
6 Back to main menu
7 Display historical measured values

Historical pressure values

All measured values for the current measuring session are displayed on this screen.
In the upper section, the most recently received measured values for all channels are displayed.
The lower section shows the pressure profile per channel since the start of the measurement session.
The pressure curves of the individual channels are displayed graphically in different ways. The legend is found under the measured values in the top field.

Example (Fig. 14):
Channels 02-A to 02-D (**2**) are connected to pressure sensors and are active. The current concrete pressure acting on the formwork at the level of the sensor is displayed.

Pressure over time
The line graph shows the pressure profile over the course of a week.

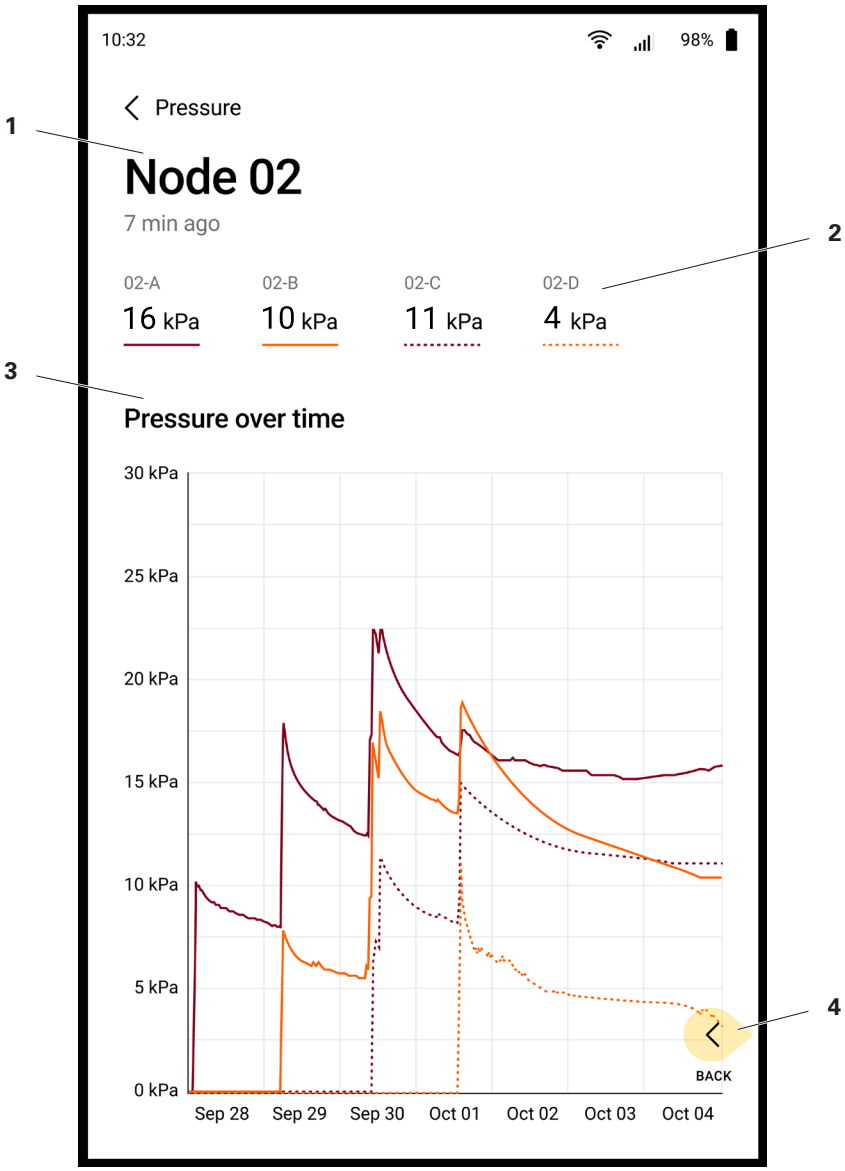


Fig. 14

1 Node ID
2 Measuring channels A to D
3 Pressure profile [T/t]
4 Back to main menu

Concrete detection and compaction measurement status screen

This screen displays the status of the four analogue multifunction channels of the connected nodes. Each field represents a connected node. The screen buttons (**6**) and (**7**) can be used to scroll up or down through fields.

► To display the recorded readings of the respective node, tap **View history** (**9**).

Example (Fig. 15):
The hub is connected to several nodes (**1**) via WLAN.
Channels 06-A to 06-D (**2**) of node 06 are connected to vibration sensors.
The current covering and compaction of the fresh concrete is displayed.
Symbols (**5**) indicate which medium surrounds the sensor:
- 06-A: Air
- 06-B: Water or concrete slurry
- 06-C: Concrete mass
- 06-D: State not detectable (no sensor connected)

A traffic light system (**3**) indicates the compaction level of the concrete.
Stage 0: Concrete not yet compacted.
Stage 1: Concrete is 33 % compacted.
Stage 2: Concrete is 66 % compacted.
Stage 3: Maximum compaction (100 %) achieved.

Setting the vibration acceleration (G-Force) and the filling time, see section “Settings” on page 36

Further information:
“Concrete detection” on page 33

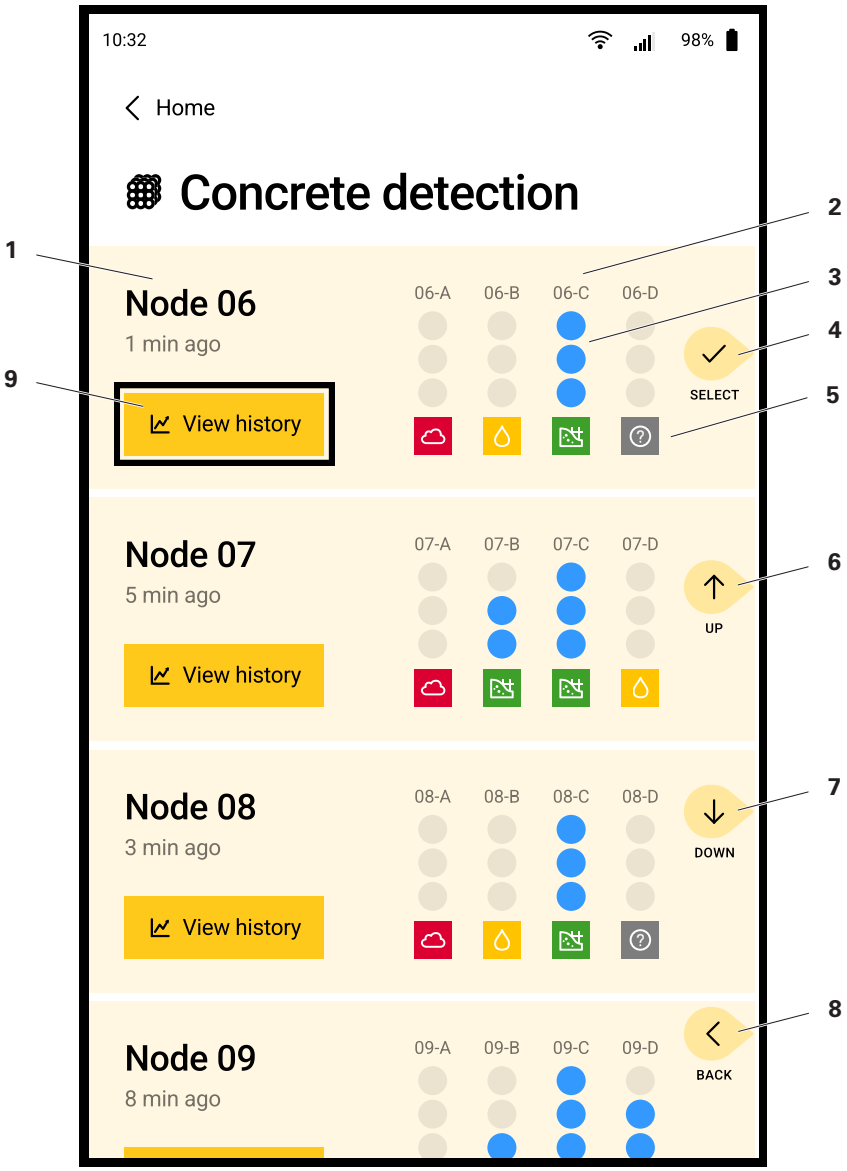


Fig. 15

1 Node ID
2 Measuring channels A to D
3 Compaction indicator
4 Display historical measured values
5 Covering symbols
6 Scroll up in the window
7 Scroll down in the window
8 Back to main menu
9 Display historical measured values

Historical covering and compaction states

This screen displays the recorded covering and compaction states of a measurement session. The times at which the respective states change are recorded.
The display area is divided from top to bottom into the four analogue channels of the node.
Symbols indicate the temporal progression of covering or concrete detection. Above this, the compaction progress is displayed in the form of a traffic light.

Example (Fig. 16):
Channels 06-A to 06-D (**3**) are connected to vibration sensors and are active.

Compaction over time
The table shows the temporal progression of covering and compaction of the concrete over the course of several hours.
At 15:17, the desired concrete mass or covering was achieved.
At 17:59, the desired compaction was achieved.

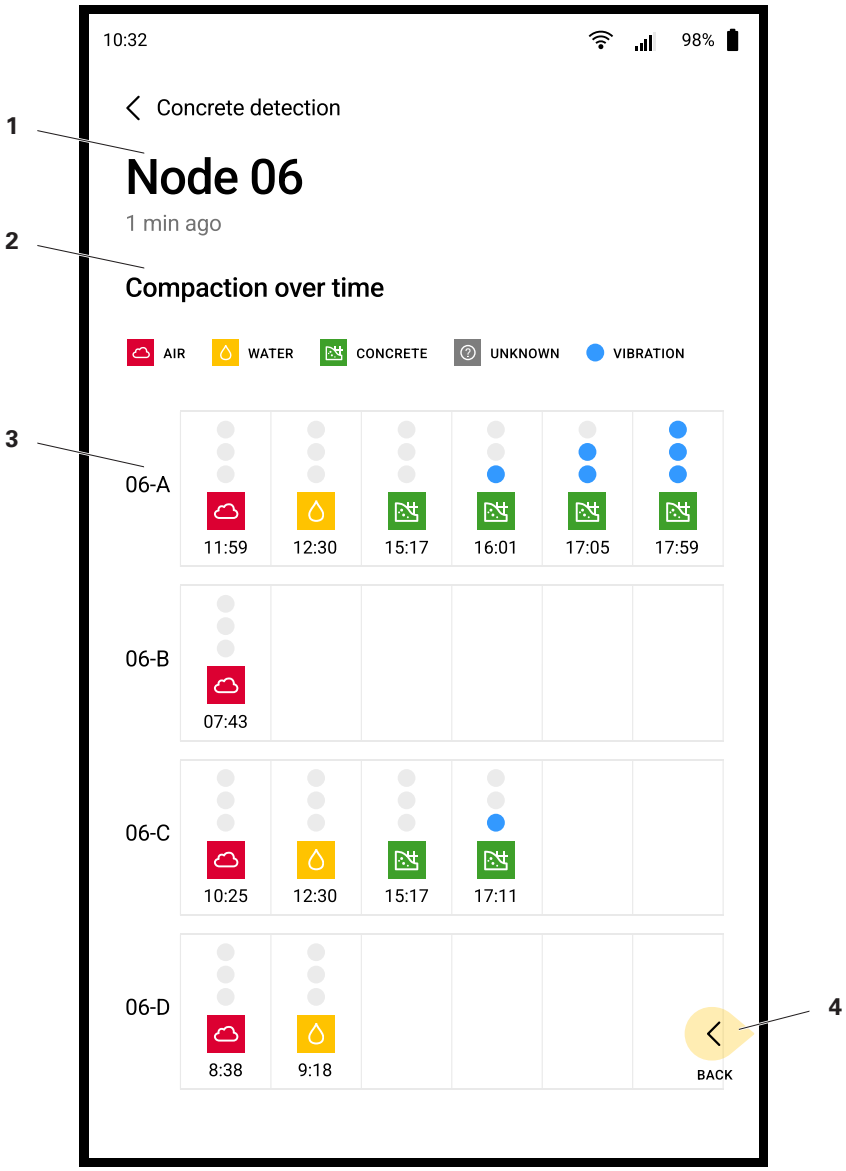


Fig. 16

1 Node ID
2 Measuring channels A to D
3 Temporal progression of covering and compaction
4 Back to main menu

Operation

Overview screen of all connected nodes and sensors

The screen shows the nodes that are paired with the hub.

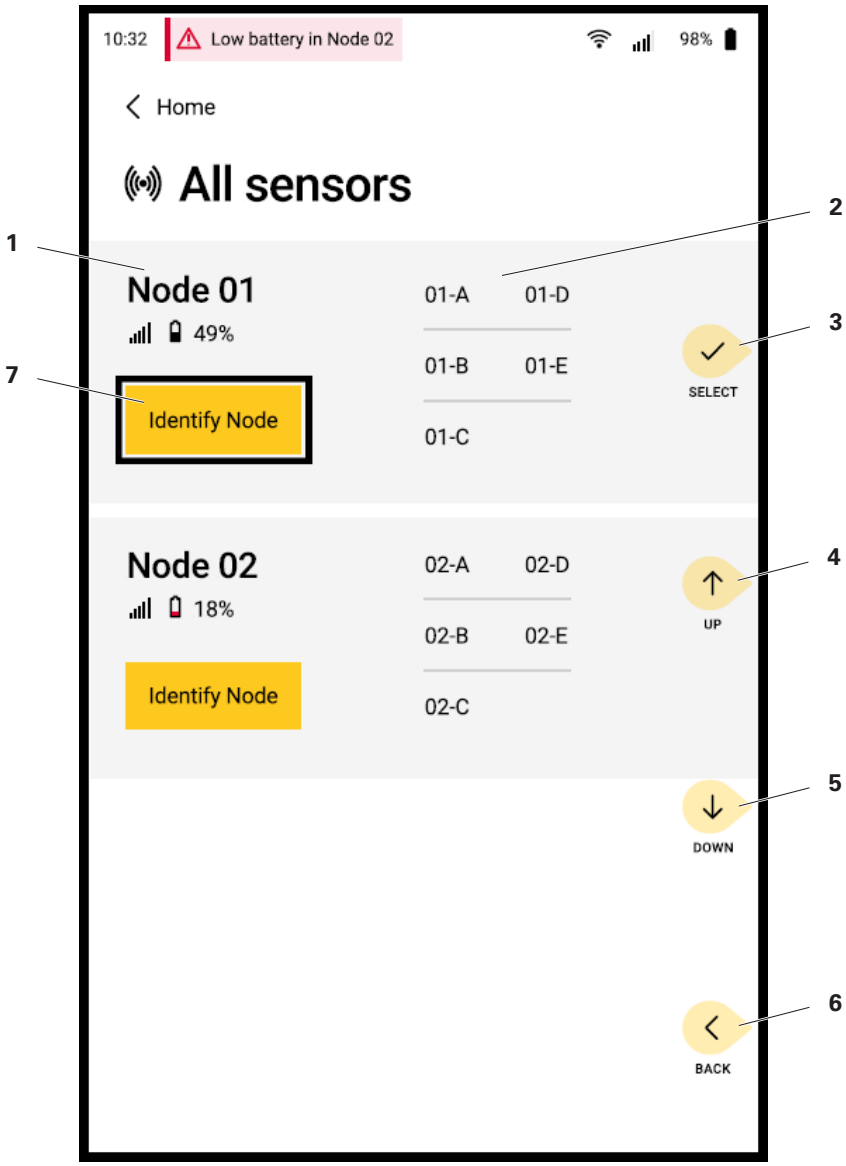


Fig. 17

1 Node ID
2 Measuring channels A to D
3 Display historical measured values
4 Scroll up in the window
5 Scroll down in the window
6 Back to main menu
7 Identify node

Operation

Temperature measurement

Sensor type
Thermocouple (cable sensor type T, article no.: 135882)

Case 1
The temperature of liquid concrete or fresh concrete is being measured.
The concrete curing time can be calculated and monitored.
If the properties of the concrete mix are known, the ideal time for safe deshuttering can be determined from the curing process.

Case 2
The temperature of winter concrete is being measured.
The temperature profile can be used to determine when the concrete can be exposed to frost.

Case 3
The temperature of mass concrete is being measured.
The temperature difference between the concrete core and the outer layers can be monitored.

Case 4
The temperature in cooling or heating lines is being measured.
The temperature difference between the inlet and outlet lines can be calculated.

Preparation
1. Attach thermocouples to the reinforcement or to the cooling or heating lines before concreting.
2. Connect the cable ends to the analogue measuring channels (A ... D) of the node.
3. Document the node number, channel and position of the thermocouple in the formwork.
4. Check the functional integrity and whether measured data is being received before concreting.

For detailed information, see the installation and operating instructions "TEMO Temperature Monitoring".

Starting the temperature measurement
1. Switch on the node.
2. Switch on the hub.
3. On the **Temperature** status screen, check that all measured data is being received correctly.

The following is displayed:
- Current temperature [°C/°F] per channel

On the start screen:
- Lowest measured temperature [°C/°F] across all channels
- Highest measured temperature [°C/°F] across all channels

Concrete pressure monitoring

Sensor type
PREMO Concrete Pressure Sensor

Case
The pressure of fresh concrete acting on the formwork is being measured.

Preparation
1. Drill open the formwork.
2. Screw the sensor to the formwork structure.
3. Connect the PERI bus cable of the sensor to the node or to the ISC hub directly.
4. Document the node number, quantity and positions or installation heights of the pressure sensors in the formwork.
5. Check the functional integrity and whether measured data is being received before concreting.

For detailed information, see the installation and operating instructions "PREMO Concrete Pressure Monitoring".

Starting concrete pressure monitoring
1. Switch on the node.
2. Switch on the hub.
3. On the **Pressure** status screen, check that all measured data is being received correctly.

The following is displayed:
- Current pressure [kPa] per channel

On the start screen:
- Highest measured pressure [kPa] across all channels

Operation

Concrete detection

Sensor type
PHONO vibration sensor

Case
The covering of the concrete behind formwork that cannot be seen with the naked eye is detected.
The sensor determines whether there is air, water, concrete slurry or concrete mass directly in front of the sensor.

Preparation
1. Before concreting, attach the vibration sensor to the reinforcement or to the internal formwork.
2. Connect the cable ends to the analogue measuring channels (A ... D) of the node.
3. Document the node number, channel and position of the sensor in the formwork.
4. Check the functional integrity and whether measured data is being received before concreting.

For detailed information, see the installation and operating instructions "PHONO Concrete Detection and Compaction Measurement".

Starting concrete detection
1. Switch on the node.
2. Switch on the hub.
3. On the **Concrete detection** status screen, check that the "Air" status is displayed correctly before concreting.

Displayed in the form of symbols:
- Air
- Water or concrete slurry
- Concrete mass
- State not detectable (no sensor signal)

Compaction measurement

Sensor type
PHONO vibration sensor

Case
During the filling process, the compaction of the concrete is recorded.

Preparation
1. Before concreting, attach the vibration sensor to the reinforcement or to the formwork.
2. Connect the cable ends to the analogue measuring channels (A ... D) of the node.
3. Document the node number, channel and position of the sensor in the formwork.
4. Check the functional integrity and whether measured data is being received before concreting.

For detailed information, see the installation and operating instructions "PHONO Concrete Detection and Compaction Measurement".

Starting the compaction measurement
1. Switch on the node.
2. Switch on the hub.
3. On the **Concrete detection** status screen, check that the traffic light correctly indicates the status "Concrete not yet compacted" (level 0).

A traffic light with three colour circles is displayed.
Stage 0: Concrete not yet compacted.
Stage 1: Concrete is 33 % compacted.
Stage 2: Concrete is 66 % compacted.
Stage 3: Maximum compaction (100 %) achieved.

Operation

InSite Construction web application

On the web app, the sensors that are connected to the ISC hub or the node can be accessed in real time.
The measured data is displayed graphically in widgets on timelines.
Measurement reports can be downloaded in csv format.
The following information and instructions relate to the web app version 0.9.13.
The sensor-specific information can be found in the separate instructions for use for the manufacturer's sensors.

Logging onto the web app

1. In the browser, open the following page: https://insite.peri.app/login
2. Click on **SIGN IN WITH PERI**.
3. Log on with your user name and password.
4. If you do not have an account yet, click on **Register now** and create an account.

→ After logging on, the **My Projects** screen will open.

Creating a project

To create projects and start measurement sessions, you must have administrator rights.
Contact your sales representative if you cannot manage your projects and hardware using the web application.

1. Click on the **CREATE NEW PROJECT** button.
2. Enter the project name and project address in the input mask.
   The project name should include the location and name of the construction site.
3. If available, select the customer from the **Select customer** list box.
4. Click on **CREATE PROJECT**.

→ A project with an empty dashboard is created.

A project can contain multiple dashboards with several measurements transferred from more than one ISC hub.

Watching tutorials

Several short tutorials are provided to help you set up and manage measurement projects.

1. Click on the ≡ symbol on the left side of the status bar.
2. Open the **Help** menu.
3. Click on **Tutorials**.
4. Click on your chosen tutorial and start the video.

Vemaventuri AB also offers training sessions for the app. Please contact your Vemaventuri AB sales representative in this regard.

Changing project settings

► Click on the cogwheel next to the project name.

In the **Project info** area, it is possible to change the project name and address. Additional information, such as the project number and time zone, can be added.

Assigning an ISC hub to a project

1. Put the hub into pairing mode.
2. Scan the displayed QR code with your mobile phone or open the link https://insite.peri.app/claim in a web browser.
3. Enter the WSID and SecretKey displayed on the hub.
4. Select a project or create a new one.
5. Click on **Assign unit to project**.
6. Click on **NEXT**.

→ The application tries to connect to the hub. If the connection is successful, the status changes from **REQUESTED** to **AVAILABLE**:

7. Click on **CLAIM**.

→ The claim status is displayed as **DONE** and the window can be closed.

Creating a dashboard

On the dashboard, the sensor data of the hubs and nodes assigned to the project are displayed as widgets after they have been set up accordingly.

1. In the **Create new dashboard** tile, enter a name in the **New dashboard name** field.
   – It is not possible to create a new dashboard without making the entry.
2. Click on the plus sign.

→ The dashboard is created.

Creating and setting up a widget for sensors

Widgets show the channels and measured data of individual or multiple nodes and sensors in graphical form.

1. From the **toolbox** in the dashboard, drag an element **widget** into a section.
2. Select a diagram or sensor type.
3. Add one or more channels or sensors (**+ ADD CHANNEL**).
4. In the channel settings, name the channels (**Name of this measurement**).
5. Select the start date and time and the end date and time of the measurement session.
   – The data can also be entered or changed in the widget at a later time.
   – If no end date is entered, the measured data is collected until the session is stopped manually.
6. Click on **END**.

→ The widget is created.

7. In the **Sources** tab under **CHANNEL SETTINGS**, further settings can be made depending on the sensor type, e.g. channel name, limits (min./max.), installation height, connection intervals, etc.

Creating a widget for the hub (main unit)

An ISC hub can be linked directly to a widget.

1. Drag and drop a main unit from the **toolbox** into a node field on the dashboard.

→ A unit widget opens.

2. In the **Name of this measurement** field, give the widget a name.
3. Select a diagram or sensor type.
4. Add one or more channels.
5. Select the start date and time and the end date and time of the measurement session.
   – If no end date is entered, the measured data is collected until the session is stopped manually.

Operation

Creating a widget for the node
A node module can be linked directly to a widget.
1. From the **toolbox** in the dashboard, drag and drop a node into a node field.
→ A unit widget opens.
2. In the **Name of this measurement** field, give the widget a name.
3. Select a diagram or sensor type.
4. Add one or more channels.
5. Select the start date and time and the end date and time of the measurement session.
   – If no end date is entered, the measured data is collected until the session is stopped manually.

Setting up the widget for hub/node
The toolbar on the left side of the unit widget can be used to display the characteristic curves of the connected sensors.
Moreover, the signal strength of the hub/node, the charge level of the battery and the internal unit temperature can be displayed.
► To display or remove a characteristic curve, click on the corresponding symbol.
► Click on the cogwheel for further settings and commands.
► To determine the start and end of a measurement session, click on the calendar icon.

Changing the widget size
► Place the mouse pointer on the lower edge of the widget and drag the widget to the desired size while holding down the left mouse button.

Exporting data
1. To download the measured data of one or more sensors, click on the arrow [⇩] in the widget.
2. Select one or more measuring channels.
3. Name the file or accept the suggested name.
4. Click on **DOWNLOAD**.
→ A csv file with the sensor data will be generated and saved on your computer.

Creating a report
1. Open a project and a dashboard.
2. Click on the page icon 🗎 in the dashboard menu.
3. Select a language.
4. Click on the circuit icon.
→ All available nodes and sensors are displayed as a list.
   Or:
   Click on the page icon 🗎 in the header bar of a widget.
→ The linked node will be included in the report list with the connected sensors.
   – The nodes can be re-sorted or moved within the list.
5. Click on **CREATE REPORT**.
→ A multi-page PDF report in DIN A4 format is generated and displayed.
The report contains all of the project information and measurement results. The report can be saved and printed.

Ending the project, releasing the hub
An ISC hub can only be assigned to one project at a time.
To release a hub for another project, it is necessary to close the active project. The measured data and measurement sessions saved on the app are retained.
► In the project settings, select Finished in the Project Status area and save the change.

In addition to the hardware widgets, there are also tool widgets.

Settings

► To open the settings, tap the cog-wheel symbol ⚙ in the main menu.
The settings are divided into five sections:
1. System settings
2. Node settings
3. Settings for pressure measurement
4. Settings for concrete detection and compaction measurement
5. Interface settings

1. System settings

Firmware version/update (**Firmware version**)
Indication in the main menu when an update is available.
Installed version and date of update displayed.
If an update is available, it can be installed by clicking on the **Install update** button.

Unit memory status (**Memory status**)
Indication of the memory space used in the hub, on the SD card and in the paired nodes.
If more than 70 % of any memory is used, a warning message is displayed.
If more than 80 % of any memory is used, a button for deleting the existing measured data is displayed.

2. Node settings

Unit pairing (**Pairing**)
This setting allows the hub to be paired with a maximum of four nodes that are within range of the WLAN.
The system checks whether a firmware update is available for the node.
The paired node is displayed with its model and version number.

Battery status
Charging status indicator.

Signal quality
Signal quality indicator.

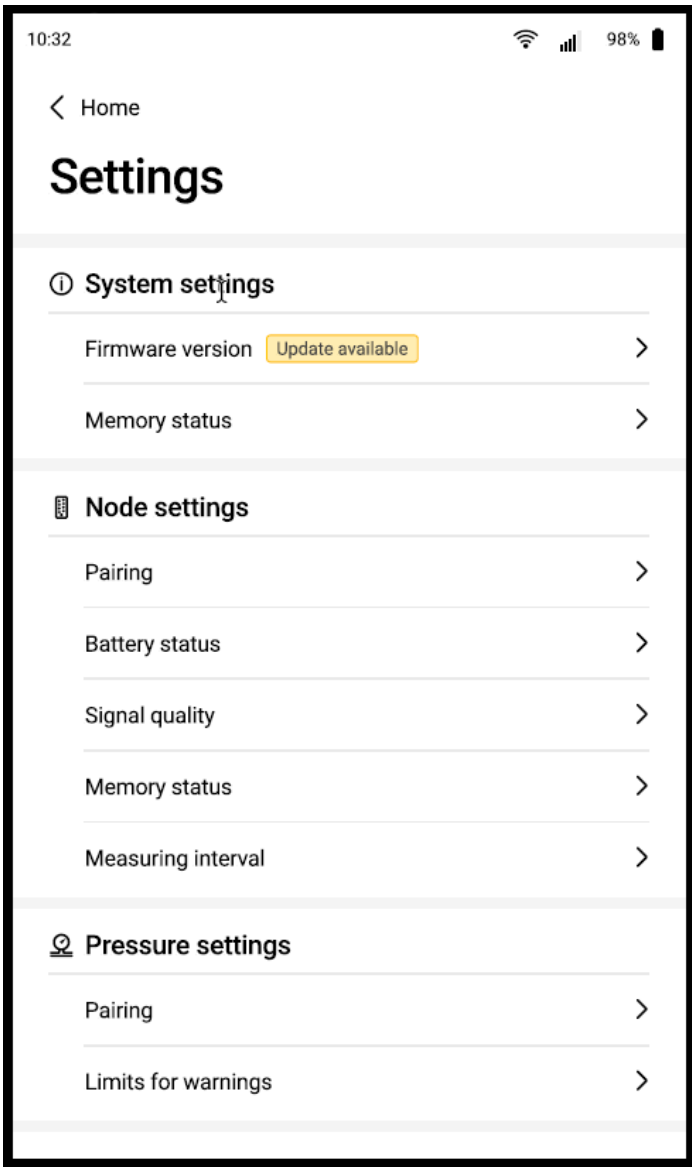


Fig. 18

Unit memory status (**Memory status**)
Indication of the used memory locations in the paired nodes.

Measuring interval
For setting the frequency with which measured data is sent to the cloud.

3. Settings for pressure measurement

Unit pairing (**Pairing**)
This setting allows the hub to be paired with a maximum of four nodes that are connected to pressure sensors.

Limits for warnings
If pressure acting on the formwork should not exceed certain values, then these values can be set as limits here.

Settings

4. Settings for concrete detection and compaction measurement

Set vibration acceleration (G-Force) and time (**Set g-force and time**)

View history

5. Interface settings

User interface colour theme (**Color theme**)

Notifications

Sound

Tactile feedback from the touchscreen (**Tactile feedback**)

Change language
Selection of display language.

Firmware update

It is possible to update the operating software (firmware) via Ethernet or LTE.
The existing settings are preserved during a firmware update.
The hub sends the new firmware from the cloud to the connected nodes.

Performing a firmware update
1. Open settings ⚙.
2. Open **Firmware version** in the **System settings** area.
3. Tap on **Install update**.

→ The system downloads and installs the update.

The unit must not be switched off during the firmware update.

Cleaning, maintenance and repairs

Cleaning

- ► Wipe down the plastic housing with a damp (not wet) cloth. Water must not be allowed to get into the connections.
- ► Clean the screen with a soft cloth and commercially available glass cleaner.
- ► Immediately remove any concrete contamination before it hardens.

- ⇒ Do not use abrasive or aggressive cleaning agents or solvents (e.g. scouring powder, thinner or gasoline).
- ⇒ Do not remove stubborn dirt with sharp-edged objects.
- ⇒ Do not wash units under running water or immerse them in water.
- ⇒ Do not use a high-pressure cleaner.

Maintenance

The ISC hub and node are virtually maintenance-free.
Regular inspections ensure operational safety and functional integrity.
The units must not be opened.

Before each use

- ► Check the charger's mains cable for external damage.
- ► Check the housing and screen for damage.
- ► Check the connection sockets for damage and dirt.

Annually and after a long period of storage

- ► Function test and electrical measurement. In Germany, the DGUV inspection is mandatory.
- ► Check the type plate, inscriptions and symbols on the housing to ensure that they are legible.

Battery

Battery life depends on usage and the number of charge and discharge cycles as well as the ambient temperature, see section "Charging the batteries" on page 18.

Have used and defective batteries replaced by a service workshop designated by the manufacturer. Only batteries that have been tested and approved by the manufacturer may be installed.

Repairs

Specific skills and knowledge of the unit are required to carry out repairs. Therefore, this work may only be carried out by qualified specialists after consultation with the manufacturer.

- ⇒ Take defective or damaged units out of operation immediately.

Troubleshooting

ISC hub and node

Fault	Possible cause	Remedy
Nothing happens when the unit is switched on, LED 1 does not flash	■ Battery flat	▶ Charge the battery
	■ Charger/power supply unit defective	▶ Check charger and replace if necessary
Screen remains dark after switching on, LED 1 flashes	■ The hub is in "Dark" operating mode	▶ Press any button or tap the screen. The hub switches to the operating mode "Fully active" and the screen switches on
	■ System fault	▶ Press the button (**A3.4**) for up to 20 seconds. The system is reset and rebooted
	■ Screen defective	▶ Contact the manufacturer's service department ▶ Return the unit
No measured data is received from the node	■ The node and hub are not paired	▶ Pair the node and hub, see section "Coupling the node and hub" on page 20
	■ Node is outside the radio range of the hub	▶ Reduce the distance between the node and the hub or insert an additional node as a repeater in the radio link
	■ The node is switched off	▶ Switch on the node using the function button, see section "Switching on the node" on page 20
No measured data is received from the connected sensors	■ The sensor is not connected correctly	▶ Check that the connections and cables are intact, see the instruction manual of the sensor concerned
	■ A sensor or connection cable is damaged	▶ Check the connections and cables for damage ▶ Do not use damaged sensors and cables ▶ Contact the manufacturer's service department ▶ Return the sensor and cable
	■ The node is switched off or out of radio range	▶ See above
No measured data is being sent to the cloud	■ The hub or node are switched off	▶ Check that both units are switched on and paired
	■ No mobile radio connection	▶ Check the signal quality at the hub in the status bar. If there is no signal, change location ▶ If a mobile radio connection cannot be established despite a change of location, connect the hub to the cloud via LAN

Recycling and disposal

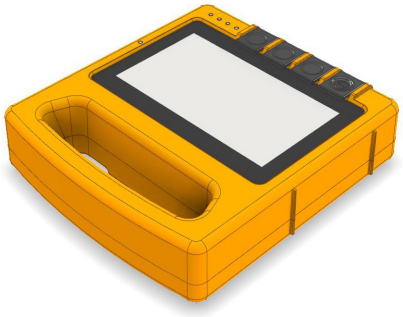
The units must be disposed of and recycled in accordance with local environmental protection regulations.

⇒ Do not dispose of batteries and electronic components with household waste.
⇒ In the European Union, comply with Directive 2012/19/EU on Waste Electrical and Electronic Equipment (WEEE).

Spare parts and accessories

Article no.	Weight in kg
137069	1.460

ISC hub
For recording and displaying the measured data.



Technical details
For technical details, see “ISC hub” on page 9

Article no.	Weight in kg
137074	0.400

ISC node
For local acquisition and transfer of measured data to the ISC hub.

Technical details
For technical details, see “ISC node” on page 11

Article no.	Weight in kg
139004	0.310

Charger/power supply unit
AC/DC adaptor for hub and node

Technical details
Input: 100 … 240 V AC, 50/60 Hz, 1.2 A
Output: 12 V DC, max. 4.2 A, 50.4 W
Dimensions (H×L×W): 38 × 115 × 53 mm

Article no.
1) 137095 2) 137094 3) 137096

Mains cable for charger
1) ISC mains cable, connector type E+F (EU)
2) ISC mains cable, connector type G (UK)
3) ISC mains cable, connector type B (USA/Japan)

1)

2)

3)

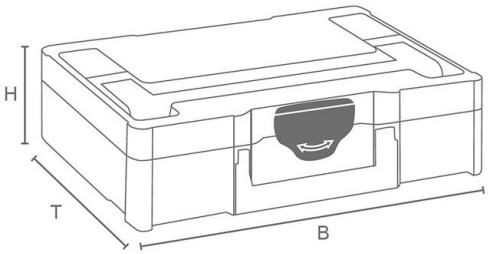
Technical details
Length: approx. 1.8 m (6 ft)
Colour: Black
Cable type EU/UK: H05VV F3G, 1 mm (18 AWG)
Cable type USA/Japan: VCTF, 1 mm (18 AWG)

Spare parts and accessories

Article no.	Weight in kg
137091	1.500

System case for ISC hub
For safe transport and protected storage of the ISC hub.
Sturdy, lockable plastic box with carry handle and foam inlays

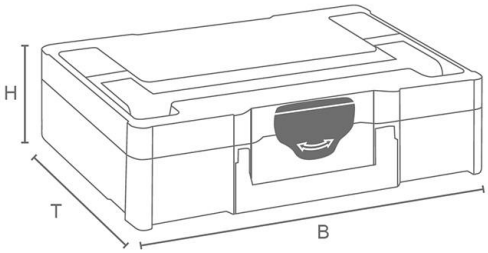
Technical details
Outer dimensions (H×B×T): 130 × 396 × 296 mm
Internal volume: 10.4 litres



Article no.	Weight in kg
137092	1.700

System case for ISC nodes
For safe transport and protected storage of up to 3 nodes.
Sturdy, lockable plastic box with carry handle and foam inlays

Technical details
Outer dimensions (H×B×T): 180 × 396 × 296 mm
Internal volume: 15.9 litres



Article no.
137076

ISC web application / month & unit
User licence for one month and one unit

Article no.
137077

ISC web application / year & unit
User licence for one year and one unit

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