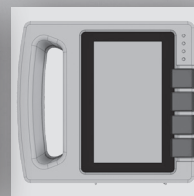
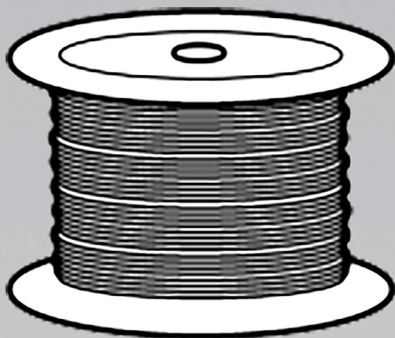


TEM0 Temperature Monitoring Data acquisition system

Installation and operating instructions – Version 1.2



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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)

Arrows in drawings



Arrow representing an action



Arrow representing a reaction of an action*



Arrow representing forces

* If not identical to the action arrow.

Warnings

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**.

Introduction

Target groups

Contractors

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 strike 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:
 - InSite Construction (main instructions)
 - PREMO pressure monitoring
 - PHONO Concrete Detection and Compaction Measurement

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.

The TEMO temperature sensor is used to measure the temperature of fresh concrete. The sensor data is collected and evaluated using the ISC data acquisition system.

The system may only be used in concrete construction for structural and civil engineering projects.

The information regarding the intended use of the system must be observed.

The temperature sensor is suitable for outdoor use.

Features of the temperature sensor

- Thermocouple with two insulated wires made of copper and copper-nickel for measuring temperature.
- No calibration required.
- Can be used in narrow, confined spaces.

Standards and guidelines

The sensor meets the requirements of the EU directives:

- 2011/65/EU & 2015/863/EU (RoHS)

International colour coding pursuant to IEC 60584-3.

Instructions for Use

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

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.

Safety instructions



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

General information

The contractor must ensure that the installation and operating instructions provided by the manufacturer 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 "Transport and storage" in the main manual of the data acquisition system.

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

Temperature sensor

Properties

Type	T _i surface thermocouple
Temperature range	-40 ... +100 °C (-40 ... 212 °F)
Limit deviation	± 0.5 °C
Tolerance class	1 pursuant to IEC 60584-1

Environmental conditions

Operating temperature	-15 ... 55 °C (5 ... 131 °F)
Storage temperature	15 ... 25 °C (59 ... 77 °F)
Ambient humidity	≤ 95 % rF non-condensing

Structure

Material	Copper and copper-nickel
Cabling	Twin cable, PVC insulated
Weight	3.6 kg (coil)
Cable length	100 m

Tab. 01

Unit description

Structure and function



The TEMO temperature sensor is a simple thermocouple (type T) consisting of two insulated wires.

The thermocouple consists of the same metal alloy over the entire length of the cable. The plus wire (brown) is made of copper. The minus wire (white) is made of copper-nickel.

In order for a temperature measurement to take place, the ends of the wires must be twisted together or soldered.

The difference in potential between the measuring point in the concrete and the reference point in the ISC node is measured.

The applied thermoelectric voltage is converted into a temperature value by means of a reference table.

The thermocouple can be fixed to the inner concrete formwork or the reinforcing steel.

The thermocouple cannot be removed and reused once the concrete has been poured in and cured.

Use

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 striking the formwork 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.

Installation and connection (construction site)

Safety instructions

The temperature sensor and the thermocouple may only be installed by instructed specialists, see section "Target groups" on page 5.

Observe the general safety instructions (Page 7) and the intended use (Page 6).



Risk of incorrect measurements or damage to the thermocouple!

- ⇒ Do not use binding wire, nails or staples to fasten the thermocouple.
- ⇒ Only establish or release connections when the node is switched off.
- ⇒ Only the thermocouple supplied and approved by the manufacturer may be used.
- ⇒ Do not extend the thermocouple with other cables or wires.

Attaching and connecting up the thermocouple

Place the thermocouple in a position inside the formwork that will be completely filled with concrete.

Preparation

- ▶ Check the thermocouple cable for damage.
- ▶ Have your choice of cable ties, adhesive base and adhesive tape to hand.

1. Find a suitable position in the formwork to use as the measuring point.
2. Position the thermocouple safely in the formwork and fix it with cable ties or adhesive tape.
3. Strip the insulation from the thermocouple at the measuring point in the formwork by at least 15 mm and twist. (Fig. 01)
The thermocouple only becomes functional when the wire ends make conductive contact.
4. Protect the twisted measuring end with a shrink sleeve or insulating tape.
5. Fit the ISC node (B1/ Fig. 03) close to the measuring points outside the formwork in a safe and secure manner.
6. Cut the thermocouple cable to length up to the node and route it over or through the formwork.
7. Split or strip the end of the cable with a knife and strip the insulation from the wires by at least 12 mm. (Fig. 02)

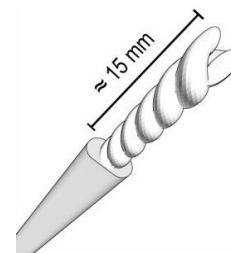


Fig. 01 Measuring point

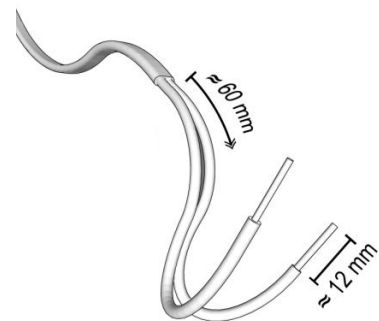


Fig. 02 Cable end at the node

8. Connect the wires to an analogue multifunction channel of the node. (Fig. 03)
 - Unscrew the pole terminal until the stripped wire end can be wrapped around the threaded bolt once.
 - Connect the brown wire to a brown terminal (+).
 - Connect the white wire to the white terminal (-) of the same channel.
 - Only ever connect one thermocouple to a pair of terminals or to a channel.
9. Screw the pole terminals back on until they are hand-tight.

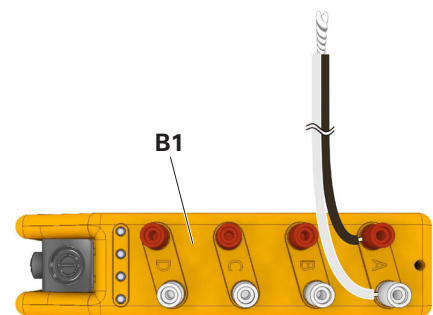


Fig. 03 Node connection



Make sure that the bare wires do not come into contact and short-circuit.

Installation and connection (construction site)

Attaching and connecting up the thermocouple (continued)

10. Switch on the node.

The measured data is received automatically from the connected sensors.

11. Switch on the ISC hub. (Fig. 04)

12. Document the node number and channel of each thermocouple.

- When measuring the core temperature and near-surface temperature in a concrete body (use case 3), document the exact position of each sensor.
- If the temperature in cooling or heating lines is measured (use case 4), document which thermocouple is attached to the input line and which to the output line.

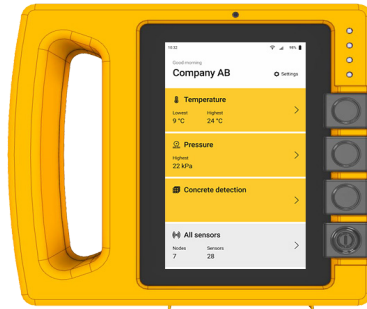


Fig. 04



It is also advisable to note the fixing locations of the nodes. On an ever changing construction site, it can be difficult to find the units again.

Checking the functional integrity

Check the functional integrity and data transmission before concreting. On the node, the four LEDs will flash simultaneously in blue when measured data is being transmitted to the hub. The hub's **temperature** screen displays the status and readings of the connected sensors. You can check there whether all the measured data is being received correctly. The current temperature is displayed in degrees Celsius.

Faults

Possible causes of unsuccessful testing:

- The thermocouple is not properly connected to the node, e.g. incorrect polarity
- The wires of the thermocouple are not twisted or soldered correctly at the measuring point
- The thermocouple is damaged (line break)
- Node not switched on or low battery
- Data transmission or the WLAN between the hub and the node is disrupted.



The thermocouple can be tested using the diode test function of a multimeter.

The operation of the ISC hub and the node as well as the web application is described in the "InSite Construction" installation and operating instructions.

Removal

1. Switch off the node.
2. Loosen the pole terminals and pull out the wires.
3. Cut the thermocouple cable flush with the concrete.

Cables or thermocouples that have not been cast into the concrete can be reused.

Check the cables for damage and functional integrity before they are used again.

Recycling and disposal

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



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

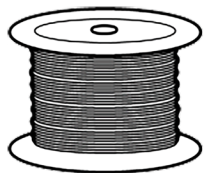


Spare parts and accessories

Article no.	Weight kg
135882	3.600

Thermocouple, 100 m coil

Thermocouple cable, 2-wire, type T, for temperature measurement



Article no.	Weight kg
135883	0.12

Peliers

For shortening and positioning the thermocouple cable



VEMAVENTURI AB

Johan På Gårdas gata 5A
412 50 Gothenburg
Sweden
Telephone +46(0)70-172 42 42
vemaventuri.io