Data Sheet

Electronic Heat Cost Allocator INDIV-5

Application

The INDIV-5 is an electronic device for heat cost allocation based on measuring the share of heat output by radiators.
The INDIV-5 can be used in the system **INDIV-5 basic** or through an internal communication interface in the system **INDIV-5 AMR**.
The INDIV-5 is available in versions with built-in sensor and with remote sensor.

Features

- Housing with pre-mounted lead factory seal
- Optional remote sensor (can be retrofitted)
- Automatic identification of Remote Sensor Mode
- AMR version with radio support
- Integrated detection of manipulation (e.g. unauthorised opening of device)
- Saving of min. and max. temperatures
- Saving of duration of exception reporting
- Display error messages
- Display battery warning
- Measuring mode inactive in sleep mode
- Programmable individual settings
- No zeroing on due date - roller type counter
- History memory for 15 months
- Summer switch-off

INDIV-5 is designed for decentralised use. Values are measured by one (radiator temperature) or two (radiator and room air temperature) sensors. The actual difference between ambient and radiator temperature is determined in 2-sensor mode, while a constant value is set for the ambient temperature in 1-sensor mode.
The measured values are used for calculation of the consumption.

The main area of application is in central heating systems where the heating energy is used individually by different consumers.
The electronic heat cost allocator can be operated as a 1-sensor or 2-sensor measuring system with product and unit scale.
Such systems are used in e.g. apartment buildings, offices and administration buildings.

Typical users are:

- Meter reading service companies
- Housing industry and housing associations
- Building service companies and property management

The heat cost allocator can be used for the following types of radiator:

- Ribbed radiators
- Tubular radiators
- Panel-type radiators with horizontal and vertical water flow
- Radiators with internal tube register
- Convectors

Restrictions of use

Electronic heat cost allocators cannot be used with steam heaters, fresh-air radiators, underfloor heating, ceiling heating elements or flap-controlled radiators.
In case of combined valve and flap-controlled radiators, measuring devices may only be installed if the flap control unit has been removed or disabled in the “open” position.
Convectors that can change their output through an electric blower and towel heaters with an electric heating cartridge must not be fitted with electronic heat cost allocators, unless the respective electric system has been removed or disabled.

For 1- and 2-sensor measuring system a joint use of different measuring device types is only allowed within a property as long as they all use a standard measuring system and a uniform measuring algorithm.

Installation types

New installation
During new installation a property is equipped completely with electronic heat cost allocators for the first time. No evaporators or other metering devices have been used before.

Conversion installation
A billing unit is completely re-equipped with electronic heat cost allocators.
The radiators were previously fitted with meters by other companies, which are removed completely. The existing welding bolts are kept, but the mounting plates are exchanged. Any colour deviations at the radiator can be masked by a snap-on panel with a neutral Kc-value.

Extension installation
This installation expands a billing unit equipped with Danfoss meters and additional meters, e.g. due to installation of additional radiators.

Repair replacement
Individual meters will be exchanged against new meters during a repair replacement. The reason for the exchange can be a defect of the meter.

System modules

INDIV-5 basic
The INDIV-5 basic system represents the entry level to reliable consumer data recording. It includes devices that can be readout visually. INDIV-5 is especially suited for tasks or systems that do not require complex data evaluations or particularly fast readout processes.

The time needed for classical on-site meter reading should be borne in mind when assessing whether this system is suitable.
Measuring results are noted manually.

INDIV-5 AMR
Readouts of devices in the INDIV-5 AMR system are radio-supported.
Data acquired by the meters are sent wirelessly to stationary network nodes. Each network node has all consumption information available on account of continual data exchange between the nodes. This data can be readout via the interface at the node, by radio from a (stationary) vehicle or via a gateway by modem or IP interface from a remote location.

The devices transmit current consumption data in cycles. The battery operated network nodes receive, check and store all data automatically. The data can now be read at any network node, either directly through the data interface, “from the outside” by radio or through a gateway from the office (e.g. through the GSM phone network or broadband cable networks).
INDIV-5 AMR is compatible with the KNX European standard for home automation.

Ordering

Device	Description	Code no.
INDIV-5 basic	1-sensor, battery warning on, summer switch-off between 06/01 and 08/31, due date 12/31	**088H2330**
INDIV-5 AMR	1-sensor, battery warning on, Summer switch-off between 06/01 and 08/31, due date 12/31	**088H2331**

Devices with other configurations are available on request. Please contact your local Danfoss sales company for further information.

Accessories

Description		Code no.
Attachment Parts	Threaded hoop (pipe 18 to 30 mm)	**088H2320**
	Threaded hoop (pipe up to 17 mm)	**088H2316**
	Shank nut M3 x 6	**088H2226**
	Clamping bracket (pipes TE 36 mm)	**088H2321**
	Clamping bracket (pipes TE 46 mm)	**088H2322**
	Clamping bracket shortened	**088H2317**
	Clamping bracket trapezoidal 35 mm	**088H2323**
	Clamping bracket trapezoidal 50 mm	**088H2324**
	Clamping bracket trapezoidal 65 mm	**088H2230**
	Square bolt 4.5 mm with cross pin	**088H2311**
	Square bolt 6 mm with cross pin	**088H2312**
	Square bolt 12 mm with cross pin	**088H2313**
Installation Parts	Spacer	**088H2240**
	Clamping piece (threaded hoop 17 mm)	**088H2314**
	Clamping piece (threaded hoop 18 to 30 mm)	**088H2315**
	Installation plate for remote sensor	**088H2309**
	Installation plate standard	**088H2211**
	Installation plate wide	**088H2212**
Standard Parts	Self-tapping screw B 2.9 x 13	**088H2247**
	Screw B 3.9 x 45	**088H2327**
	Cross-slot screw M4 x 40	**088H2233**
	Cross-slot screw M4 x 50	**088H2325**
	Cross-slot screw M4 x 70	**088H2326**
	Welded stud M3 x 8	**088H2319**
	Welded stud M3 x 12	**088H2222**
	Welded stud M3 x 15	**088H2318**
	Self-locking nut with serrated bearing M3	**088H2220**
Other Accessories	Dowel 6 mm	**088H2328**
	ERGO superglue	**088H2329**
	Lead seal blue	**088H2299**
	Snap-on panel	**088H2287**
	Installation template for holding against radiator	**088H2285**
	Programming adapter	**088H2341**
	Infrared read head with USB interface	**088H2295**

Radio system components

Description	Code no.
Pulse adapter Radio AMR	**088H2338**
Network node with battery, standard	**088H2332**
Gateway node, Ethernet	**088H2335**
PC-Radio modul	**088H2337**
Main battery for network node	**088H2263**
Back-up battery for Network node and Gateway	**088H2264**

Installation sets for remote sensors

Description	Code no.
Wall bracket P3	**088H2296**
Remote sensor complete, 1.5 m	**088H2297**
Remote sensor complete, 2.5 m	**088H2298**
Remote sensor complete, 5.0 m	**088H2310**
Sensor attachment for ribbed radiator, division > 40 mm	**088H2300**
Sensor attachment for ribbed radiator, division = < 40 mm	**088H2301**
Sensor attachment for cast radiator type SR	**088H2302**
Sensor attachment for cast radiator type RR, KR	**088H2303**
Sensor attachment for panel radiator	**088H2304**
Sensor attachment for aluminum ribbed radiator	**088H2305**
Sensor attachment for ribbed convectors	**088H2306**
Sensor attachment for window ledge radiators	**088H2307**
Sensor attachment for profile radiators	**088H2308**

Technology

Standard Scale Operation*

Evaluation factor $K_{CHFS} = 1.28$	Standard for the 1-sensor measuring system and for remote sensor metering devices
Evaluation factor $K_{C2FS} = 2.50$	Standard for the 2-sensor measuring system
Evaluation factor radiator capacity $K_{QS} = 1000$ W	Standard for the 1 and 2-sensor measuring system

** All metering devices in a system are programmed with the same evaluation factors.*

Display correction with standard scaling

If the metering device has been operated with standard scaling, the displayed value (AW) must be converted to the correct value (VW, billing value).
The basis for calculating consumption values, when Standard Scale is used, is the general equation:

$$VW = AW \times \frac{K_Q}{K_{QS}} \times \left(\frac{Kc}{Kc_S}\right)^{1.15}$$

i.e. equations for calculating the consumption value:

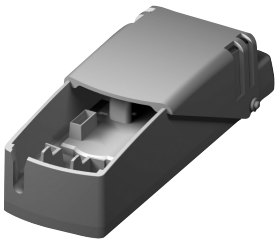
Equation	Applies to
$VW = AW \times 7.529 \times 10^{-4} \times K_Q \times K_C^{1.15}$	Compact metering device, 1-sensor, ($Kc_S = 1.28$)
	Remote sensor metering device, 1-sensor, ($Kc_S = 1.28$)
	Remote sensor metering device, 2-sensor, ($Kc_S = 1.28$)
$VW = AW \times 3.486 \times 10^{-4} \times K_Q \times K_C^{1.15}$	Compact metering device, 2-sensor, ($Kc_S = 2.50$)

The Kc value is given in the form of a ***Kc Value Database***.

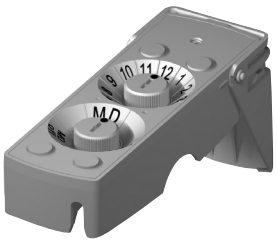
Programming accessories

Programming adapter

The programming adapter is used for communication with the devices. It can be used as an individual programming tool or as a combination adapter with the IrDA programming and readout head.



A movable cover on the head is used for protecting the contact pins during transport.

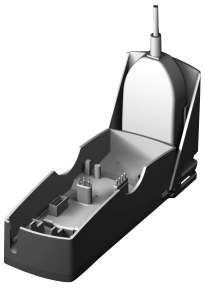


Two rotary buttons at the rear is used for programming.

During programming the device is placed in a tray. An acoustic signal tells you, when the programming is completed.

IrDA programming and readout head*

The IrDA programming and readout head is used as a combination tool between a PC/Netbook and the INDIV-5 device. The device can be programmed and read by using the Q suite 5 caloric.



The programming adapter has a flexible protective cover, which is used as a storage compartment.

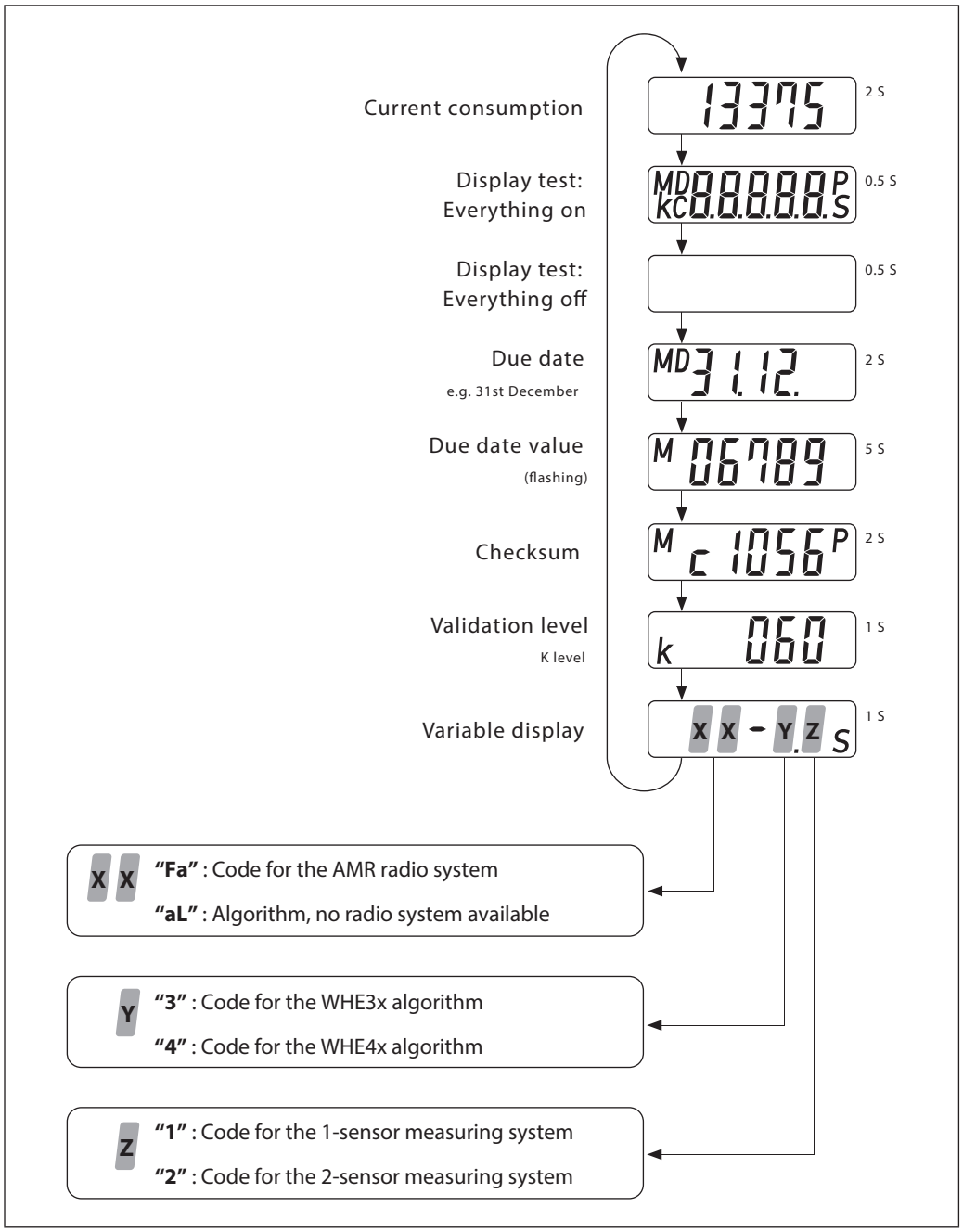
When inserted in the adapter the IrDA head will connect to the PC/Netbook.

The device must be placed in the tray during programming.

**Only required for meters without integrated close range interface.*

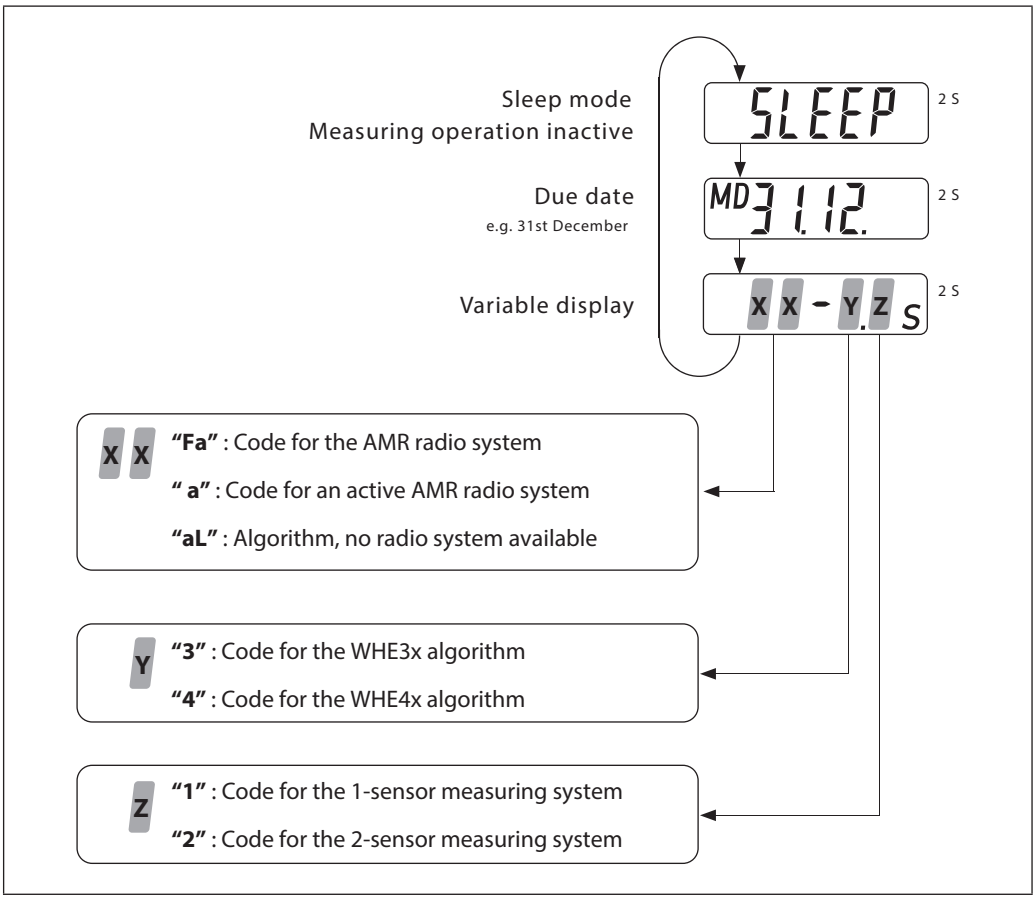
Display loops, Normal Mode

Equipment conditions, consumption values and metering system information are displayed on the LC display through a display loop.



Display loops, Sleep Mode

The meters are delivered from the factory in sleep mode. The metering mode is inactive.



Special displays

Error messages "Err 1" appears permanently. All other error messages are displayed in a fast sequence alternating with the consumption values.	Err 1	0.5 S alt.
Consumption display suppressed Is displayed in case of an error after programming instead of the invalid consumption values.	-----	0.5 S alt.
End of battery run time Depending on programming, will be displayed alternating with the consumption values after the operating time expired.	bAt00	0.5 S alt.
Manipulation or housing opening Will be displayed - in case of manipulation and depending on programming - either as plain text alternating with the consumption values or by the indicator "c" discretely on all displays. Example: Display "current value" with "c".	cOPEn Plain text c 13375 discrete	0.5 S 0.5 S
Data interface (Close range interface) This display signalises an active close-range interface.	-S-	10 S
Radio system activated (AMR) The transmission of installation telegrams is indicated on this display. Display sequence: InSt8, InSt7, ... InSt1.	InSt8	30 S
Commissioning This display appears following latching-on to the mounting plate. Then the display changes to the display loop of the normal mode.	cLOSE	3 S
Remote sensor identification The meter has detected a remote sensor and adjusts its measuring behaviour accordingly.	-FF-	3 S

Available data

Device number	The device number is laser printed, both as an 8-digit code and as a bar code on the front of the device.
Display	The display alternates between the following information: • Current consumption • Due date value • Due date • Checksum • Algorithm and sensor system • Data interface active . . . • Sleep mode • Error messages • End of battery run time • Manipulation or housing opening • Installation telegram . . .
Programming possibilities	The following information can be programmed before the measuring device is put into operation: **Standard parameters** • **Sensor type:** 1-sensor or 2-sensor measuring system • **KC / KQ:** Evaluation factors for the calculation of the heat output of a radiator (depending on the meter algorithm and the sensor type) • **Next due date:** Day on which the annual value is stored • **Equipment name/equipment code:** Equipment access data to prevent unauthorised equipment access **Special functions** • **Continuous counting (without zeroing):** The meter count will not be set to zero at the due date, but continues to count similar to a roller type counter. The annual value will be calculated based on the difference between the new and the old meter count. As a default, this options is set to “no” (meter count will be reset to “0” at the due date). • **Display battery warning:** The HCA includes runtime monitoring. “bat00” will be displayed on the HCA display as an optical information that the battery service life has expired. As a default, this option will be set to “no” (no display of the battery warning). • **Display meter readings in case of errors:** The HCA display shows the units accumulated until the failure of the HCA as the meter count. As a default, this option will be set to “no”, i.e. “----” will be displayed on the HCA display if the consumption values are unusable for a billing due to an equipment error. • **Start display as plain text:** An identified housing opening will be displayed as a plain text message on the HCA display as “c OPEn” alternating with the current value or the value of the previous year (old value). An identified housing opening can be identified by the display of the icon “c” on all displays (discrete display) if this option is set to “no”.

Technical features

Function control	The measuring device carries a self-test out every 4 minutes. An error message “Err x” will be displayed if an error occurred during five consecutive metering cycles (20 minutes). After the error has been registered and shown on the display, the measuring device stops the measuring operation. The data of the error occurrence is stored internally.
Radio system	Uni-directional radio 868.95 MHz according to current specification for AMR. Useful data content of the AMR telegrams: • Device number (8-digit) • Device type/software version • T ime/date • Error status • Error date • Current consumption • Due date • Due date value • Counter status at end of last month

Technical data

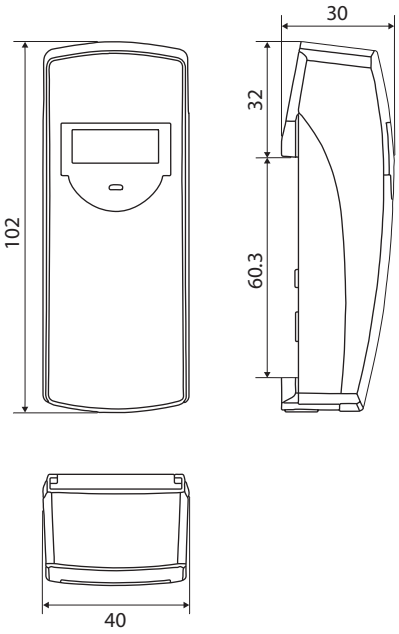
Measuring system	1-sensor with dynamic heating operating detection			
	2-sensor, for radiator and for room temperature			
Device versions	Compact device			
	Remote sensor device (compact device with inserted remote sensor)			
Power supply	3 V lithium battery, typical lifetime 10 years			
Display	Liquid Crystal display (LCD) with 5 digits (00000 ... 99999)			
Evaluation	1-sensor: 255 levels			
	2-sensor: 999 levels			
Radiator power range	21 - 9,999 W			
Sensor temperature range	0 to 105°C t_m-max: 105°C t_m-min: 35°C (2-sensor), 55°C (1-sensor)			
Temperature sensor	NTC, prematurely aged			
Radio	Frequency:	868,95 MHz with 1% duty cycle		
	Transmission power:	0 dB[1] (typical 3dBm)		
	Protocol:	Wireless M-Bus acc. to EN13757-4		
Measuring principle[2]	1- or 2-sensor			
	Area of application	1-sensor INDIV-5 algorithm		$t_{min,m}$ = 55°C $t_{max,m}$ = 105°C
		2-sensor INDIV-5 algorithm	Standard scale	$t_{min,m}$ = 48°C $t_{max,m}$ = 105°C
			Scaled	$t_{min,m}$ = 35°C $t_{max,m}$ = 105°C
		2-sensor INDIV-5 algorithm		$t_{min,m}$ = 35°C $t_{max,m}$ = 105°C
	Start of metering	1-sensor device	$t_z \geq$ 30°C (at t_L = 20°C) non-evaluated	
			$t_z \geq$ 28°C (at t_L = 20°C) evaluated	
		2-sensor device	$t_z - t_L \leq$ 5 K	
Protection data	Protection class		III acc. to EN61140	
	Protective rating for housing		IP32 acc. to EN60529	
Ambient conditions		Operation EN60721-3-3	Transport EN60721-3-2	Storage EN60721-3-1
	Climatic con.	3K4	2K3	1K3
	Temperature	5...70 °C	-25...70 °C	-5...45 °C
	Humidity	<95% rel.		
	Mechanical con.	3M2	2M2	1M2
Norms and standards	CE Conformity according to EMC guideline - Interference resistance, emissions		2004/108/EC	
			EN 61000-6-2, EN 61000-6-3	
	Low-voltage guideline - Electrical safety		2006/95/EC	
			EN 60950-1	
	RTTE (Radio & Telecom. Equipment) - Radio communication		1999/5/EC	
			EN 300 220-2	
	Heat cost allocator for acquiring consumption data for room heating		EN834	
Environmental compatibility	Product environment declaration CE2E2886de contains data about environmentally friendly product design and evaluation (RoHS conformity, substances used, packaging, environmental benefits, disposal)		ISO 14001 (environment)	
			ISO 9001 (quality)	
			GL 2002/95/EC (RoHS)	
			Directive (EC) 1907/2006 (REACH)	
Dimensions	W x H x D: 40 x 102 x 31 mm			
Weight	58 g (device packed with attachments)			
Remote sensor cable	Length: 150, 250 or 500 cm			
Housing	Material	PC-ABS		
	Colour	RAL 9016 (Traffic White)		

[1] *In connection with an AMR network node, a horizontal range of around 15 m and a vertical range of around 1 floor up or down are achieved in a typical building. The PC radio module (088H2337) is available for exact range calculation. The range specification is purely informative and does not represent any guaranteed system parameters.*

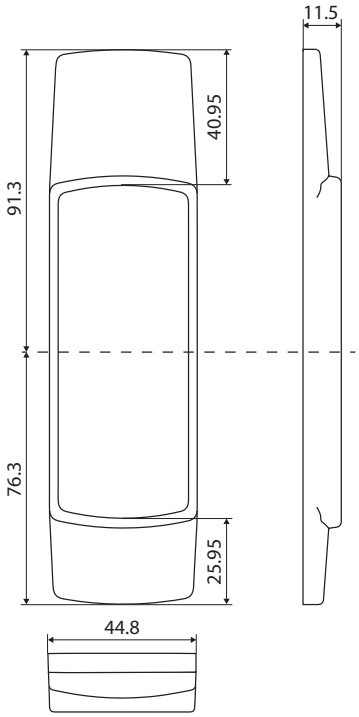
[2] *Definitions according to EN 834:*

- $t_{min,m}$ *Lowest mean design heating medium temperature at which the heat cost allocator may be used. With single-tube heating systems this is the mean design heating medium temperature of the last radiator in the strand.*
- $t_{max,m}$ *Highest mean design heating medium temperature at which the heat cost allocator may be used.*
- t_z *Mean heating medium temperature of the radiator at which the counter of the heat cost allocator starts up.*
- t_L *Reference air temperature.*
- t_m *Mean heating medium temperature.*

Dimensions



INDIV-5 device



Snap-on panel