TEMPERATURE

ALL YOU NEED TO MEASURE TEMPERATURE

The range of ROTRONIC temperature measuring equipment comprises of Pt100 probes and instruments such as transmitters, handhelds and data loggers.

PROBES

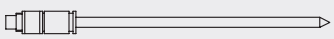
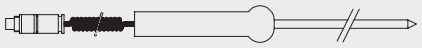
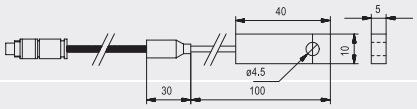
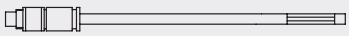
TRANSMITTERS

DATA LOGGER

HANDHELD INSTRUMENT

Pt100 probes

All Pt100 probes are Class A sensors 4-wire with a 4-pin Binder connector plug.
Steckertyp: Binder 4-pol Stecker.
τ90: Response time to reach 90 % of an actual temperature change (air/water) with an air flow velocity of 2 m/s.

Specifications			
Order code	Probe type	Cable	
AC1900	Fixed probe 100 x 3 mm DIN 1.4404 -70...500 °C, τ90: 80 / 6 s	Without cable	
AC1902	Insertion probe with handle DIN 1.4404 -70...500 °C, τ90: 80 / 6 s	1 m, PUR cable Max. 80 °C Min. -40 °C	
AC1903	Cable probe 200 x 6 mm Not waterproof, DIN 1.4404 -70...500 °C, τ90: 170 / 15 s	2 m, thermoplastic cable Max. 110 °C Min. -50 °C	
AC1904	Cable probe 50 x 6 mm Waterproof, DIN 1.4301 -50...110 °C, τ90: 185 / 20 s	2 m, thermoplastic cable Max. 110 °C Min. -50 °C	
AC1905	Surface probe 40 x 10 x 5 mm DIN 1.4301 -70...500 °C, τ90: 90 s	2 m, silicon cable Max. 180 °C Min. -55 °C	
AC1909	Fixed probe for measurements in air 100 x 4 mm, DIN 1.4401 -50...120 °C, τ90: 20 / s	Without cable	
AC1913-A	Kapton foil probe 20 x 15 x 2 mm -50...120 °C, τ90: 7 s	1 m, four PFA wires Max. 200 °C Min. -190 °C	
AC1916-A-T	Cable probe 60 x 6 mm Waterproof DIN 1.4571 -100...180 °C, τ90: 185 / 20 s	2 m PTFE cable Max. 180 °C Min. -100 °C	

AC1900

AC1904

AC1902

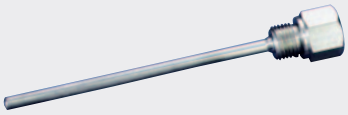
AC1909

Compatible

• Handheld instrument	TP22
• Transmitters	TF5, PF4
• Docking stations	HL-DS

Included

- Temperature probe

Accessories		
Order code	**Probe type**	
HC2-PT100-B4	Adapter for Pt100 probes for HP22-A, HP23-A, and HL-NT	
AC1960-50	Screw-in measuring sleeve for 3 mm probes Thread 1/4" G Immersion depth 50 mm	
AC1960-100	Screw-in measuring sleeve for 3 mm probes Thread 1/4" G Immersion depth 100 mm	
AC1607/2	Extension cable for Pt100 probes, 4-pin Binder male/female connectors Max. 85 °C, min. -40 °C	2 m
AC1607/3	Extension cable for Pt100 probes, 4-pin Binder male/female connectors Max. 85 °C, min. -40 °C	3 m
AC1607/5	Extension cable for Pt100 probes, 4-pin Binder male/female connectors Max. 85 °C, min. -40 °C	5 m
AC1607/10	Extension cable for Pt100 probes, 4-pin Binder male/female connectors Max. 85 °C, min. -40 °C	10 m

Pt100 temperature sensors

A Pt100 sensor changes its electrical resistance with changes in temperature. Its resistance value is 100 Ohms at 0 °C.
This characteristic is used in a bridge circuit to generate a signal suitable for further processing.

There are five quality classes with the following tolerances at 0 °C.

Class B: ±0.3 K
Class A: ±0.15 K
Class B 1/3: ±0.1 K
Class B 1/5: ±0.06 K
Class B 1/10: ±0.03 K

The table illustrates the tolerances for each Pt100 sensor class at different temperatures.

Tolerance										
	Class A		Class B		1/3 Class B		1/5 Class B		1/10 Class B	
Temp. °C	± K	± Ω	± K	± Ω	± K	± Ω	± K	± Ω	± K	± Ω
-200	0.55	0.24	1.3	0.56	0.44	0.19	0.26	0.11	0.13	0.06
-100	0.35	0.14	0.8	0.32	0.27	0.11	0.16	0.06	0.08	0.03
0	0.15	0.06	0.3	0.12	0.10	0.04	0.06	0.02	0.03	0.01
100	0.35	0.13	0.8	0.30	0.27	0.10	0.16	0.05	0.08	0.03
200	0.55	0.20	1.3	0.48	0.44	0.16	0.26	0.10	0.13	0.05
300	0.75	0.27	1.8	0.64	0.60	0.21	0.36	0.13	0.18	0.06
400	0.95	0.33	2.3	0.79	0.77	0.26	0.46	0.16	0.23	0.08
500	1.15	0.38	2.8	0.93	0.94	0.31	0.56	0.19	0.28	0.09
600	1.35	0.43	3.3	1.06	1.10	0.35	0.66	0.21	0.33	0.10
650	1.45	0.46	3.6	1.13	1.20	0.38	0.72	0.23	0.36	0.11

New standard

The manufacturing tolerances were formerly sub-divided into the accuracy Classes A and B (see above). The new standard contains the additional classes AA and C. Within the validity range of every class for wire-wound resistors and film resistors, the limit deviations tl are given in dependence on the temperature t in Celsius:

Class AA: $t_l = 0.1\ K + 0.0017 \cdot t$
Class A: $t_l = 0.15\ K + 0.002 \cdot t$
Class B: $t_l = 0.30\ K + 0.005 \cdot t$
Class C: $t_l = 0.6\ K + 0.01 \cdot t$

Example for Class B: At 200 °C deviations in the measured value of up to ± 1.3 K are allowed.

TF1 SERIES

Features

- Accuracy: ±0.3 K at 23 °C ±5 K
- Range of application: -20...50 °C / 0...100 %RH
- Small size
- Easy mechanical installation
- USB service interface

Power supply

- Low voltage: 2 or 3/4-wire

Signal output

- Current output
- Voltage output

Version

- Space mount version with integrated probe
- Wall version
- Duct version

Output parameter

- Temperature

Output scaling

- Temperature: range selectable, standard: 0...50 °C

Display

- Display with or without backlight
- Without display

TF1 DUCT AND WALL VERSIONS

Applications

Measures temperature in HVAC applications.

2-wire

	TF120
Output signal	4...20 mA
Supply voltage	10...28 VDC
Display	Optional (without backlight)

3/4-wire

	TF13x
Output signals	0...1 V 0...5 V 0...10 V 0...20 mA 4...20 mA Customer rescaling possible
Supply voltage	15...40 VDC / 12...28 VAC
Display	Optional (with backlight)

Temperature range	Scalable
Probe	Fixed
Filter type	Polyethylene

Compatible

- Software 21, page 155

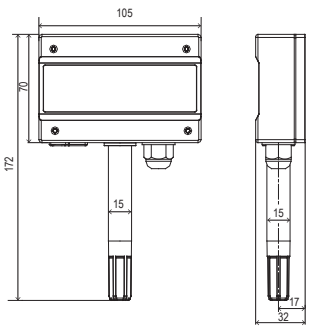
Included

- Factory adjustment certificate

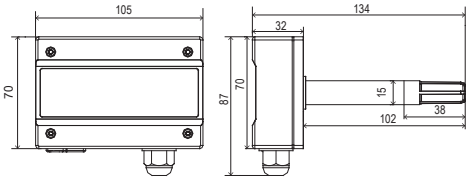
Recommended accessories

• Service cable:	AC0003
• Calibration device:	ER-15
• Mounting gland:	AC5005

Wall version

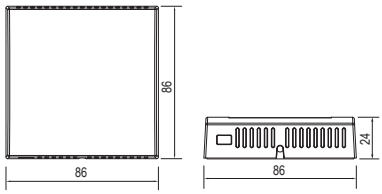


Duct version



Type S

Type L



TF1 SPACE MOUNT VERSION

Applications

Measures temperature in offices and rooms where design is important.

2-wire

	TF120
Output signal	4...20 mA
Supply voltage	10...28 VDC
Display	Optional (without backlight)

3/4-wire

	TF13x
Output signal	0...1 V / 0...5 V / 0...10 V / 4...20 mA Customer rescaling possible
Supply voltage	15...40 VDC / 12...28 VAC
Display	Optional (with backlight)

Specifications	TF120 Analog 2-wire	TF13x Analog 3/4-wire
General		
Parameters	Temperature	
Housing material / Protection	ABS / IP65 (space mount version IP20)	
Dimensions	Wall version: 105 x 172 x 32 mm Duct version: 105 x 87 x 134(334) mm Space mount version: 86 x 86 x 24 mm	
Weight	140 g	
Probe connection	Fixed	
Filter material	Polyethylene	
Display	LCD, 1 or 2 decimals, without backlight	LCD, 1 or 2 decimals, with backlight
Electrical connections	Type D/W: screw terminals inside, M16 cable gland	
Power supply	10...28 VDC	15...40 VDC / 12...28 VAC
Current consumption	2x20 mA max.	‹55 mA (current output) ‹15 mA (voltage output)
Range of application	-20...50 °C / 0...100 %RH (non-condensing)	
Service interface	USB Mini	
CE / EMC compatibility	EMC Directive 2004/108/EC	
Temperature measurement		
Sensor	NTC	
Measurement range	-20...50 °C / 0...100 °F	
Accuracy at 23°C ±5 K	±0.3 K	
Response time	4 s	
Analog output		
Number	1	
Current	4...20 mA	
Voltage	N/A	0...1/5/10 V

TF5 SERIES

Features

- Interchangeable Pt100 probes
- Accuracy: see chapter Probes on page 94
- Temperature limit at probe: see chapter «Probes» on page 94
- Range of application electronics: -40...60 °C / 0...100 %RH
  -10...60 °C with LCD
- Temperature measurement with Pt100 probe, 4-pin Binder connection
- Service interface

POWER SUPPLY

- Low voltage: 2 or 3/4-wire

SIGNAL OUTPUT

- Current output
- Voltage output

VERSION

- Wall version
- Cable version

OUTPUT PARAMETER

- Temperature

OUTPUT SCALING

- Temperature: range selectable

DISPLAY

- Display with backlight
  (excl. 2-wire), trend indicators and keypad
- Without display

Order code on request.

TF5 WALL VERSION

Applications

Measures temperature in production processes, storage areas and drying processes.

2-wire

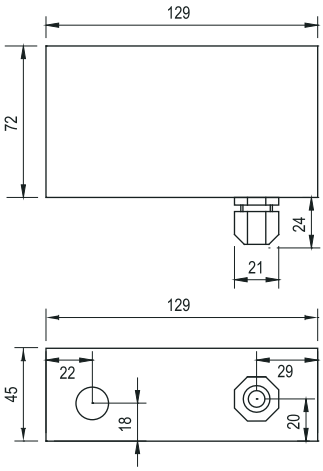
	TF520 Type W
Output signal	4...20 mA
Supply voltage	10...28 VDC
Display	Optional (without backlight)

3/4-wire

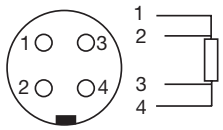
	TF53x Type W
Output signals	0...1 V 0...5 V 0...10 V 0...20 mA 4...20 mA Customer rescaling possible
Supply voltage	15...40 VDC / 12...28 VAC
Display	Optional (with backlight)

Temperature range	Scalable*
Probe	Interchangeable (-100...200 °C)

Wall version, type W



Pt100 input



4-wire Pt100

Compatible

- Pt100 probes, page 94
- Fundamentally, however, all 4-wire Pt100 probes can be used
- HW4 software, page 148

Included

- Product qualification
- Short instruction manual
- Screws and plugs for mounting
- Connector for third-party probe

Recommended accessories

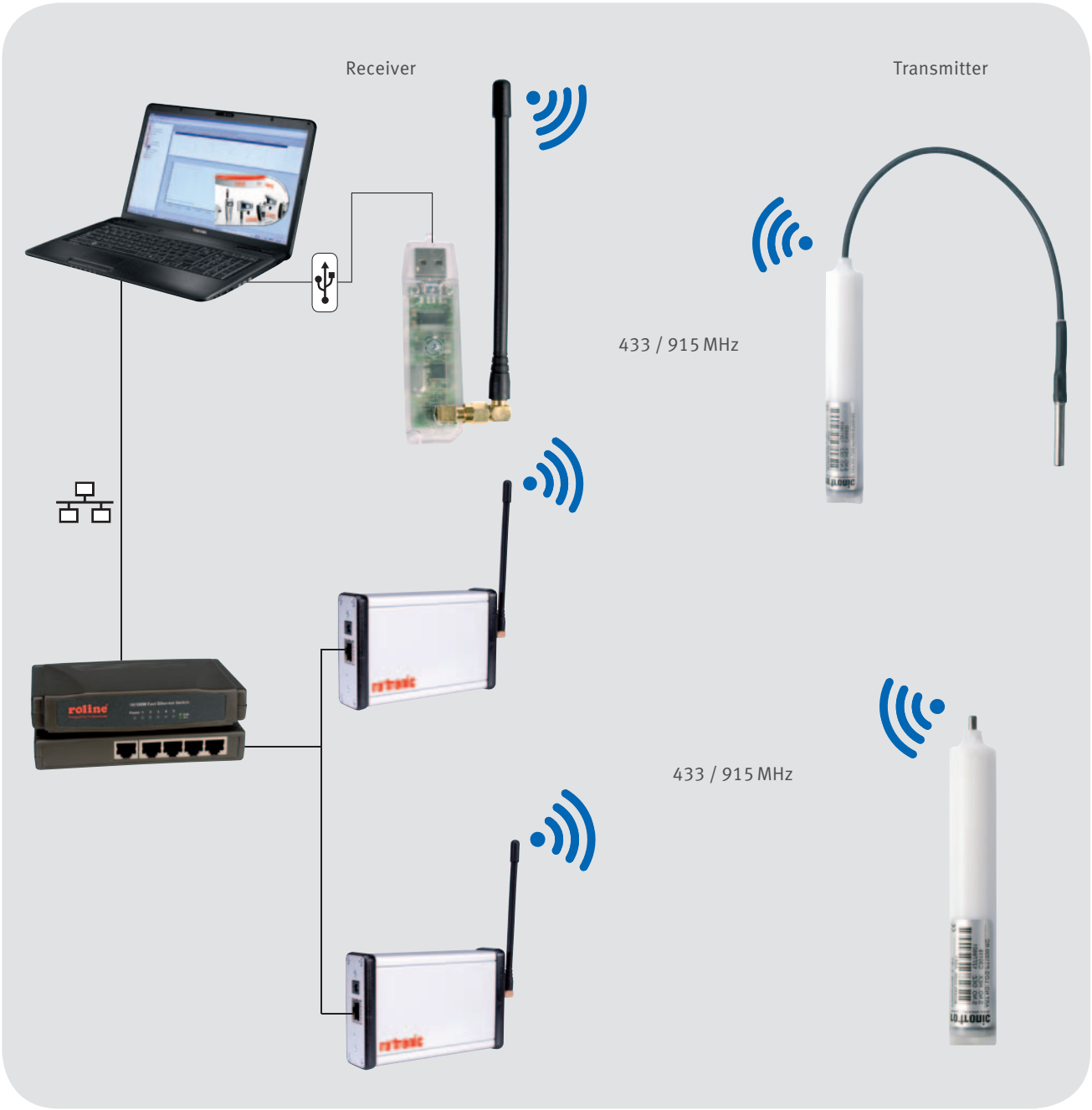
• Service cable:	AC3006 / AC3009*, page 86
• Fixed probe 100 x 3 mm:	AC1900
• Cable probe 50 x 6 mm, waterproof, 2 m cable:	AC1904
• Extension cable 2 m:	AC1607/2
• Extension cable 5 m:	AC1607/5
• Mounting kit DIN top-hat rail	AC5002

References

* Requires optional HW4 software and service cable

Specifications	TF520 2-wire	TF53x 3/4-wire
General		
Parameters	Temperature	
Housing material / Protection	ABS / IP65	
Dimensions	129 x 72 x 45 mm	
Weight	220 g	
Probe connection	4-pin Binder, threaded coupling	
Display	LCD, 1 or 2 decimals without backlight, menu navigation, 4 keys	LCD, 1 or 2 decimals with backlight, menu navigation, 4 keys
Electrical connections	Screw terminals inside, M16 cable gland Socket (USB/Ethernet)	
Power supply	10…28 VDC	15…40 VDC / 12…28 VDC
Current consumption	20 mA	25 mA max.
Application temp. housing / electronics	-40…60 °C / -10…60 °C (with LCD), 0…100 %RH	
Temperature scaling	Max. -100…200 °C	
Firmware upgrade	Via HW4 software	
Service interface	UART service interface (Universal Asynchronous Receiver Transmitter)	
CE / EMC compatibility	EMC Directive 2004/108/EC	
Fire protection class	Corresponds to UL94-HB	
FDA / GMP compatibility	Conforms to 21 CFR Part 11 and GAMP5	
Analog output		
Number	1	
Current	4…20 mA	0(4)…20 mA
Voltage	N/A	0…1/5/10 V
Maximum load	500 Ω	≤500 Ω (current output) ≥1 kΩ/V (voltage output)
Digital output		
RS-485	No digital outputs	RS-485
USB		USB & RS-485
Ethernet		Ethernet RJ45 & RS-485

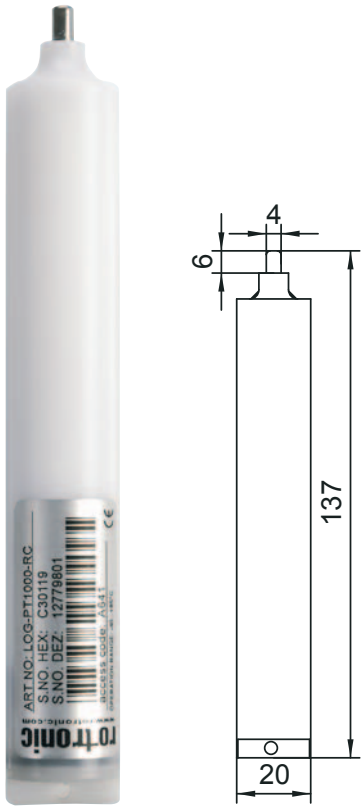
Wireless data loggers



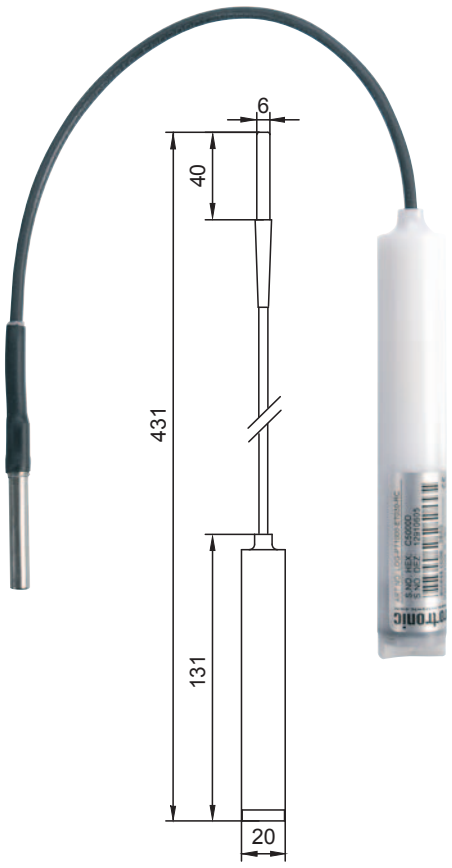
Wireless temperature data loggers

Features

- Pt1000 integrated temperature probe or remote with 30 cm cable
- Accuracy: ±0.2 °C at 23 °C
- Radio frequency: 433.92 or 915 MHz for best penetration through brickwork and walls
- High storage capacity: up to 500,000 measured values with serial number, time and date
- Flash memory for data security in the case of power failures
- Long-term recording up to 6 years without battery replacement possible
- Transmission distance with USB wireless adapter: up to 100 m with internal probe, up to 300 m with external probe (free field)
- Data security: PIN (for activation and data access)
- Temperature application range: -40 to +85 °C
- Plastic housing, white, IP68 (submersible)



Order code	Device type
LOG-PT1000-RC	Stainless steel sensor tip at housing standard version (433.92 MHz)
LOG-PT1000-RC-US	Stainless steel sensor tip at housing USA version (915 MHz)
LOG-PT1000-ET030-RC	Remote sensor with 30 cm cable (other cable lengths available on request) standard version (433.92 MHz)
LOG-PT1000-30-RC-US	Remote sensor with 30 cm cable (other cable lengths available on request) USA version (915 MHz)



Compatible

- LAN interface
- USB wireless adapter

Included

- Short instruction manual
- Battery

Note:
See the chapter «Humidity data loggers»
on page 62 for suitable receivers and accessories.

ThermoPalm TP22

The TP22 is the ideal instrument for temperature measurements. With interchangeable Pt100 probes, it can be equipped for every application.

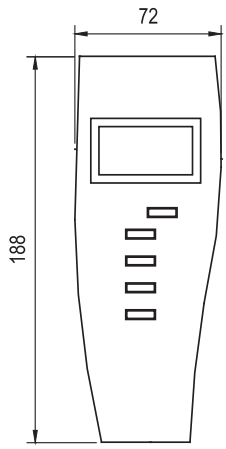
Applications

Portable inspections in HVAC, spot tests in the pharmaceutical industry, building management systems, museums and warehouses.

Features

- Interchangeable Pt100 probes
- Range of application handheld: -10...60 °C / 0...100 %RH
- Service interface (UART)

Order code	TP22
Probe type	Freely selectable from the complete product range, 4-wire connection, page 94
Range of application	-10...60 °C, electronics / up to 600 °C at probe
Housing material	ABS
Power supply	9 V battery
Weight	200 g



Compatible

- All ROTRONIC temperature probes, page 94
- All Pt100 probes with 4-wire connection
- HW4 software

Included

- Short instruction manual
- Battery

Recommended accessories

• Temperature probes, page 94	AC19xx
• Extension cable for probe, 2 m	AC1607/2
• Service cable	AC3006

Specifications handheld instruments	
Features	**TP22**
Probe type	Pt100 probes
Probe interchangeable	Yes
Temperature sensor	Pt100 4-wire
Number of probe inputs	1
Measurement range (probe)	Probe dependent (max. -100...200 °C)
Initialization time	‹2 s
Range of application instrument	-10...60 °C / 0...100 %RH
Display resolution	2 decimals
Illuminated display	Yes
Alarm indicators	Yes
Battery indicator	«Battery Low» indicator
Functions	
Trend indicator	Yes
Probe adjustment per software	Single & multi-point with service cable AC3006
Adjustment per keypad	Single-point
User information	Via service cable & HW4 software
Password protection	Via service cable & HW4 software
Electrical specifications	
Power supply	9 V battery or rechargeable battery
Rechargeable battery charge	No
Current consumption (without backlight)	‹10 mA
Communication interfaces	UART, service cable AC3006
Mechanical specifications	
Housing material	ABS (housing)
Dimensions	196 x 72 x 35 mm
Weight	180 g
CE / EMC directives	EMC 2004/108/EC
FDA/GAMP compatibility	Conforms to 21 CFR Part 11 and GAMP5
IP protection	IP40