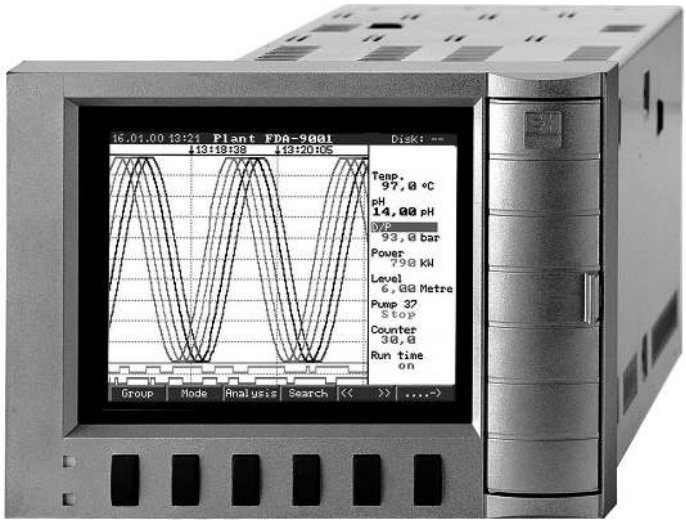
Technical Information
TI 054R/09/en
50085432

Visual Data Manager
memo-graph

The videographic recorder that saves, displays, analyses and stores 8 to 16 analogue or 7 to 37 digital inputs. Clearly displays sequences. Available with PROFIBUS connection.



Application areas

Memo-Graph is both a state-of-the-art videographic recorder and a compact measured values acquisition system.

- Time saving due to easy handling.
- Energy saving as it provides the functions of more than one unit.
- Economical as it operates without paper and pens.

It plots signals, monitors alarm limit points, analyses measurement points, stores the data internally and archives them on diskettes, ATA flash memory cards and computer.

It operates as a stand-alone system, or as a powerful alternative to normal recorders and is therefore the ideal solution meeting many requirements e.g.

- Process technology
- Power stations and energy suppliers
- Chemical and OEM applications
- Environmental and air conditioning
- Quality assurance and production
- Test equipment and laboratories
- Plant and panel manufacturer
- Milk pasteurising unit

Features and benefits

- Multi channel: 8 or16 universal, 37 digital inputs, 8 mathematics channels and 8 digital input combinations.
- Maintenance-free: No wear and tear, no pens or paper required.
- Universal: Individual selection of signal display mode.
- Secure: Total data saving concept.
- Reliable: Alarm limit and self-monitoring functions.
- Informative: Event search, automatic signal analysis.
- Practical: Understandable grouping of channels.
- Communicative: Interface for set-up and serially data transmission or via Ethernet.
- Compact: Installation depth of 211 mm, stainless steel casing, metal door, IP54 metal bezel.

Endress+Hauser
The Power of Know How

Operation and system construction

Measurement principle

Electronic monitoring, recording and archiving of analogue and digital input signals.

Measurement system

The connected analogue measurement points are measured parallel every 125 ms.
Galvanic isolation channel to channel is: 60 V_P.
Damping filter presettable from 0 to 999.9 seconds per analogue input, system basic damping can be ignored. Data storage is in the internal memory (power failure secure FLASH technology) and in the integrated diskette or ATA flash card drive. Long term archiving is done on a PC, whereby the data is transmitted to the PC using either the data carrier or the serial interface. Using the PC software the units can be set up, read out and the measured data can be stored and displayed.

Input values

Measurement size/ measurement range

Each channel has preselectable measurement ranges:

Description	Measurement range	Signal resolution/accuracy
Current Input impedance 50 Ohm, max. 100 mA	4 to 20 mA	1 µA (with swichable open circuit monitor < 2 mA, event message on display) / 0.25 % of measurement range
	0 to 20 mA	1 µA / 0.25 % of measurement range
	± 1 mA	0.05 µA / 0.25 % of measurement range
	± 2 mA	0.1 µA / 0.25 % of measurement range
	± 4 mA	0.2 µA / 0.25 % of measurement range
	± 20 mA	1 µA / 0.25 % of measurement range
	± 40 mA	2 µA / 0.25 % of measurement range
Voltage Input impedance 1 MOhm, max. 50 Vp	0 to 1 V	0.05 mV / 0.25 % of measurement range
	0 to 10 V	0.5 mV / 0.25 % of measurement range
	± 20 mV	1 µV / 0.25 % of measurement range
	± 50 mV	2.5 µV / 0.25 % of measurement range
	± 100 mV	5 µV / 0.25 % of measurement range
	± 200 mV	10 µV / 0.25 % of measurement range
	± 1 V	0.05 mV / 0.25 % of measurement range
	± 2 V	0.1 mV / 0.25 % of measurement range
	± 5V	0.5 mV / 0.25 % of measurement range
	± 10 V	0.5 mV / 0.25 % of measurement range
Thermocouple	Type B (Pt30Rh-Pt6Rh): 0 to +1820 °C	0.2 K / 0.25 % of measurement range from 600 °C
	Type J (Fe-CuNi): -210 to 999.9 °C	0.2 K / 0.25 % of measurement range from -100 °C
	Type K (NiCr-Ni): -200 to +1372 °C	0.1 K / 0.25 % of measurement range from -130 °C
	Type L (Fe-CuNi): -200 to +900 °C	0.1 K / 0.25 % of measurement range
	Type N (NiCrSi-NiSi): -270 to +1300 °C	0.1 K / 0.25 % of measurement range from -100 °C
	Type R (Pt13Rh-Pt): -50 to +1800 °C	0.1 K / 0.25 % of measurement range from +50 °C
	Type S (Pt10Rh-Pt): 0 to +1800 °C	0.1 K / 0.25 % of measurement range from +50 °C
	Type T (Cu-CuNi): -270 to +400 °C	0.05 K / 0.25 % of measurement range from -200 °C
	Type U (Cu-CuNi): -200 to +600°C	0.1 K / 0.25 % of measurement range from 0 °C

Description	Measurement range	Signal resolution/accuracy
Thermocouple	Type W3 (W3Re/W25Re): 0 to +2315 °C	0.2 K / 0.25 % from measurement range
	Type W5 (W5Re/W26Re): 0 to +2315 °C	0.2 K / 0.25 % from measurement range
Selectable cold junction compensation (DIN IEC 584): internal compensation of the terminal temperature (incl. max. error: ± 2 K; front end calibration), or external: 0°C, 20°C, 50°C, 60°C, 70°C, 80°C Cable open circuit monitor, can be switched off (> approx. 20 kOhm, display "-----" on screen) Input impedance 1 MOhm (DIN IEC 584)		
Resistance thermometer	Pt100, Pt500, Pt1000: -100 to +600 °C	0.05 K / 0.25 % from measurement range DIN EN 60751
	Ni100: -60 to +180 °C	0.05 K (DIN 43760 / DIN IEC 751) / 0.25 % from measurement range.
2- or 3-wire connection screened (cable compensation ≤ 50 Ohm) Measurement current: < 1 mA Cable open and short circuit monitor: Display "-----" on screen		
PROFIBUS DP Measurement range	Dependent on connected PROFIBUS components	
Scan cycle	125 ms/channel; 8 or 16 channels in 1 s	
Maximum allowable potential difference	Channel to channel: DC 60 V, AC 60 Vp (only safe low voltages) Channel to ground: DC 60 V, AC 60 Vp (only safe low voltages)	
Damping	Presettable time constant: 0...999.9 seconds, per analogue input, System base damping can be ignored	

Digital inputs

Digital I/O on power supply board (option)

7 digital inputs:
To DIN 19240: Logic "0" equals -3 to +5 V,
Active at logic "1" equals +12 to +30 V,
max. 25 Hz, max. 32 V, input current max. 2 mA
Selectable function per input: Control input (time synchronisation, set-up lock, text display, group display selection, display switch off), impulse counter, on/off events, operation time counter, combination event + operation time counter

Digital I/O PCB (option)

Either 1 or 2 digital I/O boards can be plugged in. Each of these will substitute one universal analogue input board. One digital I/O board contains 15 digital inputs. For technical data see "Digital I/O on power supply board"

Output values

Relay outputs

Common relay

1 relay, changeover contact, 230 V / 3 A, for alarm limit values/power failure

Digital I/O on power supply board (option)

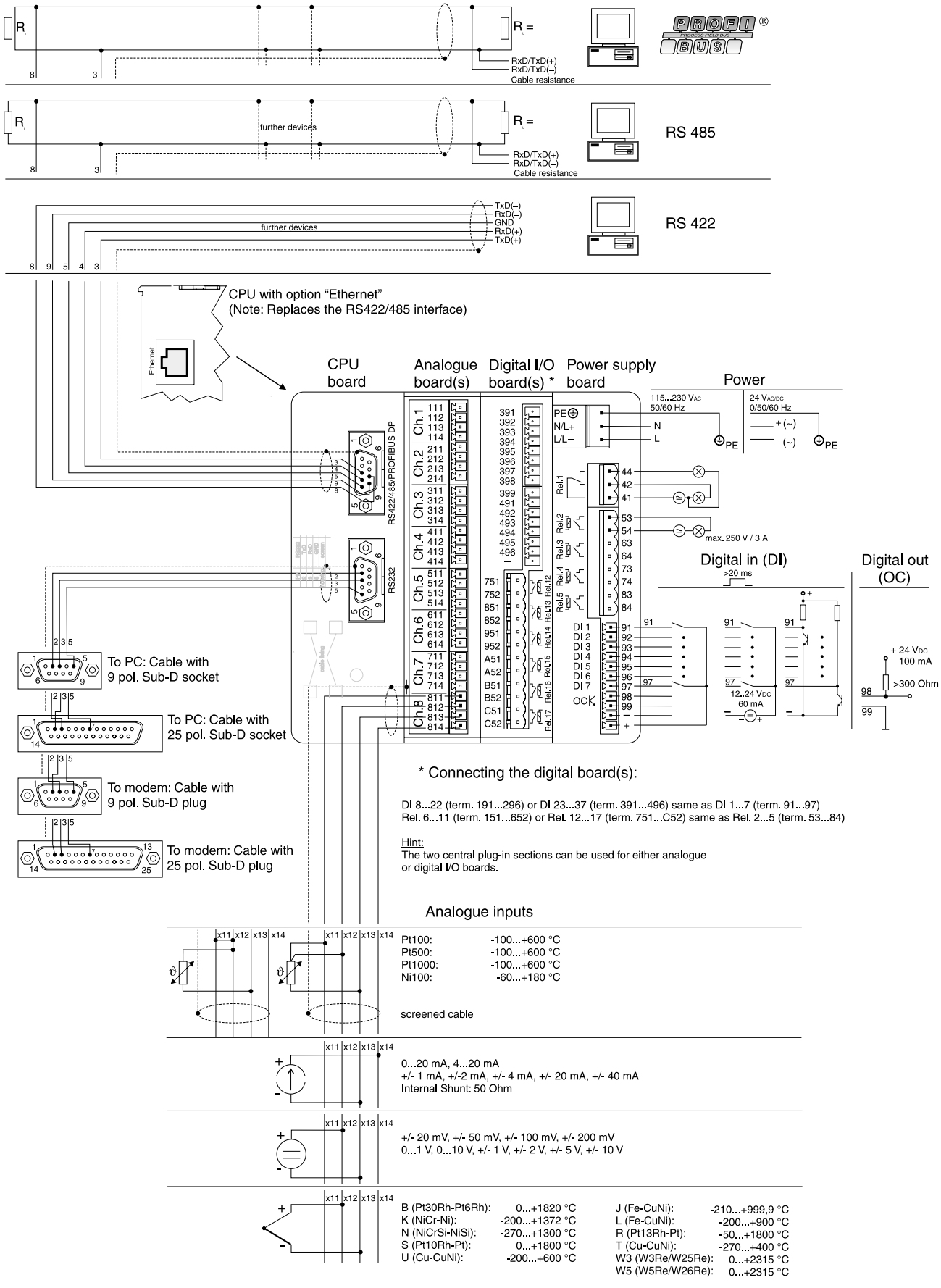
Auxiliary voltage for digital input control when using potential free contacts, ca. 24 V_{DC}, max. 150 mA, short circuit protected, unstabilised
Outputs (not SELV circuits): 4 relays, closing contacts, 230 V / 3 A, for alarm limit infringements, can also be set as opening contacts
1 open collector output (max. 100 mA / 25 V)

Digital I/O PCB (option)

Either 1 or 2 digital I/O boards can be plugged in. Each of these will substitute one universal analogue input board. One digital I/O board contains 6 relay outputs. For technical data see "Digital I/O on power supply board"

Power supply / electrical connections

Electrical connections (wiring diagram)



Power supply/ power consumption

Normal voltage power supply board: 115 to 230 V_{AC}; (+10% -15%); 50/60 Hz
Low voltage power supply board: 24 $V_{AC/DC}$; (+20% -15%); 0/50/60 Hz, max. 25 VA (complete unit)

Electrical safety

EN 61010-1, protection class I, overvoltage category II

Cable specification/ connections

Keyed screw plug-in terminal strips,
Wire cross section on analogue inputs/digital I/O max. 1.5 mm^2,
Power supply/relays max. 2.5 mm^2 (each with ferrules)

Interface connections

Front mounted RS 232 interface (3.5 mm stereo jack plug)
Rear mounted RS 232 interface (9 pin, Sub-D, socket)

Serial interface (option)

RS 485 alternatively RS 422 (rear mounted), unit address presettable;
Cable length max. 1000 m screened cable

PROFIBUS DP connection (option)

Function "Bus monitor"
(Without influence on the PROFIBUS system) as with conventionally connected components.
(Serial interface, rear mounted, alternative to the RS 485 interface)
Physical peak: RS 485, cable length 1000 m (0.62 mi) screened cable
Baudrate: 93.75 kBaud, fixed, alternative 45.45 kBaud
Presettable slave address
Data formats (DP/ V1 formats): Integer 8, Integer 16, Integer 32, Unsigned 8, Unsigned 16, Unsigned 32, Floating-Point (IEEE 754)
PROFIBUS measurement point functionality is identical to conventional analogue inputs.
The combined use of PROFIBUS and conventional measurement points is possible (max. 16 measurement points/unit).
PROFIBUS PA measurement point connection using a PA/DP segment coupler.

Function "Profibus slave"
Slave function combined with a PROFIBUS coupler (accessories: RSG10A-P1). Applied for bi-directional communication in cyclic data transfer.
Baudrate: 12 Mbaud, presettable

Ethernet interface (option)

Internal Ethernet interface 10BaseT, connector type RJ45, screened cable, allocation of the IP address in the Memo-Graph setup menu.

Accuracy

Reference conditions

Reference conditions	
Power supply	230 V_{AC} ± 10%, 50 Hz ± 0.5 Hz
Warm-up time	> 1/2 hour
Ambient temperature	25 °C ± 5 °C
Humidity	55 ± 10 % r. F.

Ambient temperature influence

0.025% / K of measurement range

Base accuracy

See input signals

Application conditions

Installation conditions

Installation	**Installation area** Panel mounting or desk top version
Installation angle	Installation to DIN 16257: NL90 ±30°

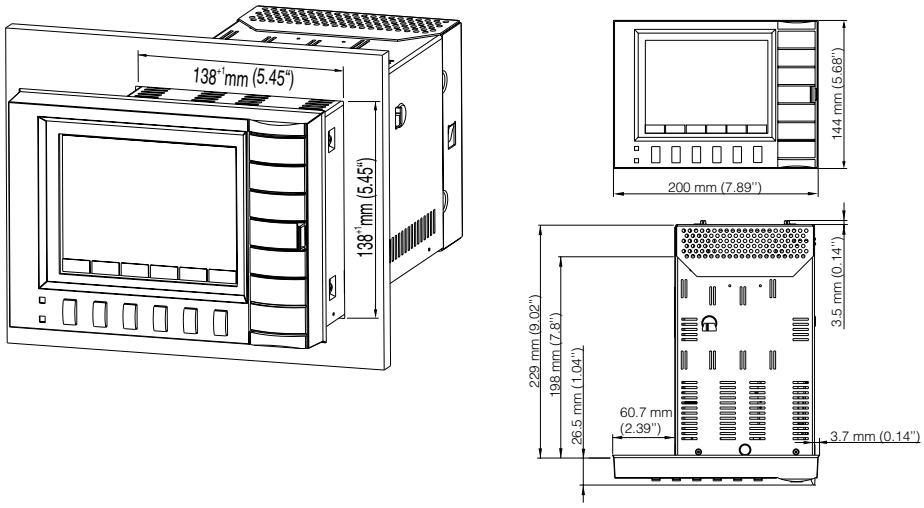
Environmental conditions

Ambient temperature	0 to +50°C
Storage temperature	-20 to +70°C
Climatic classification	To EN 60654-1: B1 (10% to 75% r. F., without condensation)
Ingress protection class	Front ingress protection: IP 54 (EN 60529, Cat. 2) Rear ingress protection: IP 20 (EN 60529, Cat. 2)
Vibration protection	Seismic test to IEEE 344 and KTA
EMC/immunity	EN 61326 NAMUR recommendation NE21: – ESD (electrostatic discharge): EN 61000-4-2, level 3 (6/8 kV) – electromagnetic fields: ENV 50140 / ENV 50204: level 3 (10 V/m) for standard inputs; level 2 (3 V/m) for measurement ranges < 1V or resistive thermometers (RTD)/thermocouples – Burst (fast transients): EN 61000-4-4 level4 (2/4 kV) – Surge on power supply: EN 61000-4-5: 2 kV asymmetrical, 1 kV symmetrical – Surge on signal: EN 61000-4-5: 1 kV via external protection unit – HF on cables: EN 61000-4-6: 10 V for standard inputs; 3 V for measurement ranges < 1 V or resistive thermometers (RTD)/thermocouples – 50 Hz magnet fields EN 61000-4-8: 30 A/m – Power failures EN 61000-4-11: < = 20 ms – Emmission: EN 61326 Class A (industrial environment)
Normal mode noise rejection EN 61298-3	40 dB at measurement range/10 (50/60 Hz ± 0.5 Hz), not on resistance measurements of RTDs
Common mode noise rejection EN 61298-3	80 dB at 60 Vp (50/60 Hz ± 0.5 Hz)

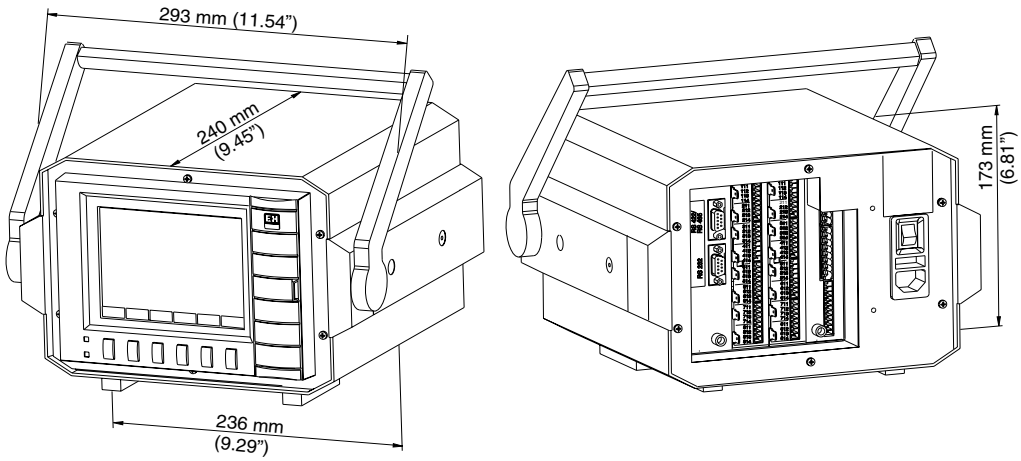
Mechanical construction

Model, dimensions

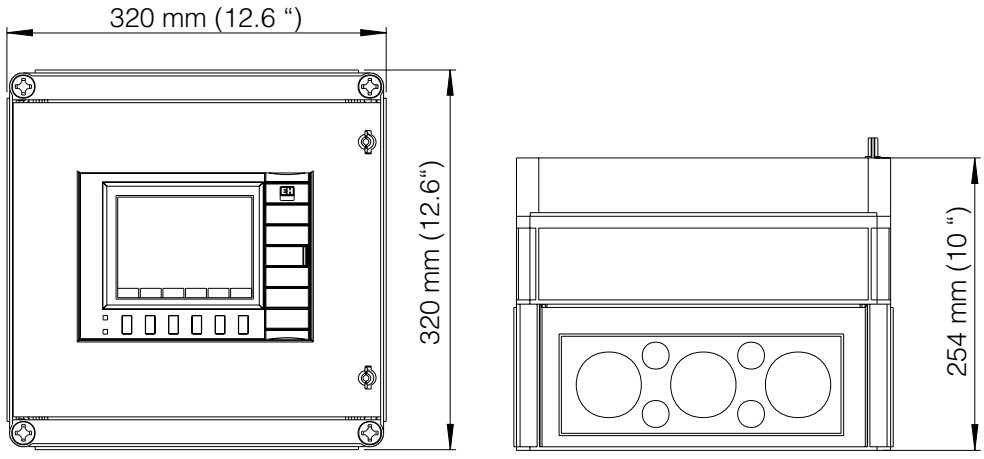
Dimensions for panel mounting



Dimensions desk top housing



Dimensions field housing



Installation depth

Approx. 211 mm incl. terminal strips

Panel cut-out

138+1 x 138+1 mm

Panel strength	2 to 40 mm, fixing to DIN 43834
Weight	Memo-Graph with bezel: approx. 3.5 kg / 7.72 lb Memo-Graph with desktop housing: approx. 6.4 kg / 14.1 lb
Materials	Front bezel/door in pressure die cast metal, sintered matt chrome coating (colour similar to RAL 9006), Stainless steel casing Protective glass in front of screen

Display and operating system

Display elements	Display: STN 145 mm (5.7") screen diagonal colour graphic display, 76,800 dots (320 x 240 Pixel) Display modes: Curves/plot sequences, curves in zones, columns/bargraph, digital display, events list (alarm set points/power failures), condition display, historical display as curves with digital measured value display, date and time, signal analysis (min., max., average, quantities, times) Coloured channel identification and individual text measurement point tag name. Signal groups: 8 groups with 8 channels (analogue, calculated mathematics and digital inputs)
Operating elements	Push buttons: Selectable operation from the front using 6 push buttons in interactive dialogue with the screen (push button functions are displayed on the screen).
Remote operation	PC with the ReadWin®2000 PC software: Remote set-up using the front mounted RS232 serial interface, the rear mounted RS 232 interface (e.g. modem), the RS422/485 interface or via Ethernet (option).
Clock	Automatic switchable summer/normal time buffer > = 4 years (ambient temperature 15 to 25°C)
Mathematics package (option)	8 additional, calculated channles; can be cascaded Mathematical calculation of analogue channels, basic mathematics functions (+, -, *, /), constants, integration (quantity totalisation from analogue inputs) and mathematical functions: log, ln, exp, abs, sqrt, quad, sin, cos, tan, asin, acos, atan. Formula: f = (g (y1)*a) ? (y2*b)+c; g = Mathematical function y1/y2 = Analogue or mathematics channels a/b = Factors c = Constants

Data storage

Selectable memory cycle per group (standard or event storage)	1s/2s/3s/5s/10s/15s/30s/1min/2min/3min/6min buffer >= 4 years for programme/measured value storage (internal memory chip: 2048 k SRAM) using integrated Lithium battery (ambient temperature 15 to 25°C); Cyclic copy of measured data for archiving to 1.44 MB, 3 1/2" diskette, or ATA flash memory card (max. 128 MB), selectable as barrel or ring memory; Resolution dependent on the selected storage cycle. Permanent storage of all unit set-up parameters on a FLASH RAM (non volatile).

Typical memory availability

Requirements for the following tables:
- No alarm set point condition/event storage
- Digital inputs are not used
- Signal analysis inactive

Internal memory 2048 kB

Analogue inputs	Memory cycle 6 min.	Memory cycle 1 min.	Memory cycle 30 s.	Memory cycle 10 s.	Memory cycle 1 s.
1	1304 days, 21 h	217 days 11 h	108 days 17 h	36 days 5 h	3 days 14 h
4	652 days 11 h	108 days 17 h	54 days 8 h	18 days 2 h	1 day 19 h
8	391 days 11 h	65 days 5 h	32 days 14 h	10 days 20 h	1 day 2 h
16	195 days 17 h	32 days 14 h	16 days 7 h	5 days 10 h	13 h

Memory availability on diskette

Analogue inputs	Memory cycle 6 min.	Memory cycle 1 min.	Memory cycle 30 s.	Memory cycle 10 s.	Memory cycle 1 s.
1	1016 days, 23 h	169 days, 11 h	84 days, 17 h	28 days, 5 h	2 days, 19 h
4	508 days, 11 h	84 days, 17 h	42 days, 8 h	14 days, 20 h	1 day, 9 h
8	305 days, 2 h	50 days, 20 h	25 days, 10 h	8 days, 11 h	20 h
16	152 days, 13 h	25 days, 10 h	12 days, 17 h	4 days, 5 h	10 h

ATA flash 16 MB

Analogue inputs	Memory cycle 6 min.	Memory cycle 1 min.	Memory cycle 30 s.	Memory cycle 10 s.	Memory cycle 1 s.
1	11375 days	1895 days, 20 h	947 days, 22 h	315 days, 23 h	31 days, 14 h
4	5687 days, 12 h	947 days, 22 h	473 days, 23 h	157 days, 23 h	15 days, 19 h
8	3412 days, 12 h	568 days, 18 h	284 days, 9 h	94 days, 19 h	9 days, 11 h
16	1706 days, 6 h	284 days, 9 h	142 days, 4 h	47 days, 9 h	4 days, 17 h

ATA flash 32 MB

Analogue inputs	Memory cycle 6 min.	Memory cycle 1 min.	Memory cycle 30 s.	Memory cycle 10 s.	Memory cycle 1 s.
1	22752 days, 19 h	3792 days, 3 h	1896 days, 1 h	632 days	63 days, 4 h
4	11376 days,9 h	1896 days, 1 h	948 days	316 days	31 days, 14 h
8	6825 days,20 h	137 days, 15 h	568 days, 19 h	189 days, 14 h	18 days, 23 h
16	3412 days,22 h	568 days, 19 h	284 days, 9 h	94 days, 19 h	9 days, 11 h

ATA flash 64 MB

Analogue inputs	Memory cycle 6 min.	Memory cycle 1 min.	Memory cycle 30 s.	Memory cycle 10 s.	Memory cycle 1 s.
1	45508 days, 8 h	7584 days, 17 h	3792 days, 8 h	1264 days, 2 h	126 days, 9 h
4	22754 days, 4 h	3792 days, 8 h	1896 days, 4 h	632 days, 1 h	63 days, 4 h
8	13652 days, 12 h	2275 days, 10 h	1134 days, 17 h	379 days, 5 h	37 days, 22 h
16	6826 days, 6 h	1137 days, 17 h	568 days, 20 h	189 days, 14 h	18 days, 23 h

ATA flash 128 MB

Analogue inputs	Memory cycle 6 min.	Memory cycle 1 min.	Memory cycle 30 s.	Memory cycle 10 s.	Memory cycle 1 s.
1	91019 days, 11 h	15169 days, 21 h	7584 days, 22 h	2528 days, 7 h	252 days, 19 h
4	45509 days, 17 h	7584 days, 22 h	3792 days, 11 h	1264 days, 3 h	126 days, 9 h
8	27305 days, 20 h	4550 days, 23 h	2275 days,11 h	758 days, 11 h	75 days, 20 h
16	13652 days, 22 h	2275 days, 11 h	1137 days, 17 h	379 days, 5 h	37 days, 22 h

Certification

CE mark	The measurement system fulfils the legal requirements of the EU guidelines. Endress+Hauser acknowledges a successful test of the unit by applying the CE mark.
Seismic test	KTM, IEEE344
Milk pasteurisation certificate	In accordance with the German milk research authority.

How to order

Visual Data Manager Memo-Graph

Input signals

A	8 universal inputs (U, I, TC, RTD)
B	16 universal inputs (U, I, TC, RTD)
E	PROFIBUS DP Monitor (93,75kB) for 16 measuring points
F	PROFIBUS DP Monitor (93,75kB) +1 to 8 universal inputs = max. 16 measuring points
G	PROFIBUS DP Monitor (93,75kB) +1 to 16 universal inputs = max. 16 measuring points
M	no analogue inputs
N	no analogue inputs +ext. PROFIBUS DP Slave Modul
O	8 universal inputs (U, I, TC, RTD) +ext. PROFIBUS DP Slave Modul
P	16 universal inputs (U, I, TC, RTD) +ext. PROFIBUS DP Slave Modul

Power supply

1	115 to 230 V AC, 50/60 Hz
2	24V AC/DC, 0/50/60 Hz

Interface, Ethernet, RS 232 cable

1	no RS485 / 422, cable not provided
4	no RS485 / 422, cable provided
2	with RS485, cable not provided, not possible at PROFIBUS DP Monitor
3	with RS422, cable not provided, not possible at PROFIBUS DP Monitor
5	no RS485 / 422, with Ethernet interface, cable not provided
6	no RS485 / 422, with Ethernet interface, cable provided

Additional digital in-/outputs

1	no digital inputs without additional relay outputs
2	7 digital inputs (max. 25 Hz), 1 Open-Collector-, 4 add. relay outputs
3	15 digital inputs (max. 25 Hz), 6 add. relay outputs
4	22 digital inputs (max. 25 Hz), 10 add. relay outputs, 1 Open-Collector output
5	30 digital inputs (max. 25 Hz), 12 add. relay outputs
6	37 digital inputs (max. 25 Hz), 16 add. relay outputs, 1 Open-Collector output

Internal Memory / Works calibration certificate

C	2048 KByte, secure on power failure
N	Works calibration certificate / 2048 KByte, secure on power failure

Exchangeable memory

1	Exchangeable memory/drive not required
2	Diskette drive 3.5 inch, 1.44 MB, without lock
3	Drive for ATA Flash, without card
8	Drive for ATA Flash, with 16 MB card
5	Drive for ATA Flash, with 32 MB card
7	Drive for ATA Flash, with 64 MB card
6	Diskette drive 3.5 Zoll, 1.44 MB, with lock
A	Drive for ATA Flash, with 128 MB card

Model

A	Field housing IP65, neutral version
B	Desk top housing, neutral version, with 2pin plug
1	Front bezel
2	Desk top housing with 2pin plug
3	Desk top housing with US plug
4	Desk top housing with swiss plug
5	Front bezel, neutral version
7	Field housing IP65

Visual Data Manager Memo-Graph										
							8	Panel mounting with sealed back ATA-Flash, Ethernet not possible		
								Operating language		
								A	German	
								B	English	
								C	French	
								D	Italian	
								E	Spanish	
								F	Dutsh	
								G	Danish	
								H	American	
								I	Polish	
								J	Russian	
									Unit software	
									A	Standard software
									B	Standard software+math. package (8 virt. chanels)
									C	Batch programme, with F0-calculation, mathematic package, sterilization/pasteurization *3
									D	Waste water software, incl. mathematic package *3
									E	Tele-Alarm, +linearisation, incl. math. package, without modem *3
									G	Steam-/ calorimetric calculator, 8 mathematic channels
									H	Software to control samplers and display the last 15 days (*3 = additional digital I/O card necessary)
RSG10-										⇐ **Order code**

Accessories

The following is included in the delivery

1 operating manual, 2 panel fixing jack screws, screw plug-on terminals for power supply, relays and input signals; PC operating and ReadWin®2000 set-up software

Accessories

Description	Order code
Ethernet module, RS485, 230 V_{AC} for DIN top hat rail mounting incl. interface cable	RSG10A-E4
Ethernet module, RS485,115 V_{AC} for DIN top hat rail mounting incl. interface cable	RSG10A-E5
IP65 field housing	RSG10A-H1
PROFIBUS-DP module, “slave“ operating mode for DIN top hat rail mounting	RSG10A-P1
Interface cable for PC connection	RSG10A-S1
Interface cable for modem connection	RSG10A-S2
Adapter set RS232 to RS485 for DIN top hat rail mounting, 230 V_{AC}	RSG10A-S6
Adapter set RS232 to RS485 in compact housing, 230 V_{AC}	RSG10A-S3
Adapter set RS232 to RS485 for DIN top hat rail mounting, 115 V_{AC}	RSG10A-S7
Adapter set RS232 to RS485 in compact housing, 115 V_{AC}	RSG10A-S5
RS232 interface cable, 3.5 mm / 0.138” jack plug for PC connection	RSG10A-VK
ATA flash card 16 MB	51004142
ATA flash card 32 MB	51002270
ATA flash card 64 MB	51003857
ATA flash card 128 MB	51004163

Further documentation

- ❑ Product Group brochure “Recorders“ (PG 002R/09/en)
- ❑ System Information “Memo-Graph“ (SI 011R/09/en)
- ❑ Operating Manual “Memo-Graph“ (BA 078R/09/)
- ❑ System Information “ReadWin®2000“ (SI 012R/09/en)

Technical Alterations reserved

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