







Technical Information

# Ecograph T

Multi Channel Recorder Display, record, communicate



### Applications

The instrument can be used in many processes and industries:

- Quality and quantity monitoring in the water/ wastewater industry
- Monitoring of processes in power stations
- Food and dairy industry processes
- Displaying and recording critical parameters in production cycles
- Tank and level monitoring
- Temperature monitoring in metal working
- Cold storage and transportation monitoring



### Your benefits

- Economical: electronic recording replaces strip chart recorder, saves on consumables
- Versatile: up to 6 universal inputs record all measuring signals
- Clear layout: multi-coloured display, digital, bargraph and curve display
- Compact: low installation depth, saves space and money
- Safe: reliable data archiving with internal memory and separate CompactFlash card (mechanically locked). No data loss even in event of power failure!
- System-enabled: network integration and remote data transmission via Ethernet, RS232/RS485 (modem) and USB
- Available worldwide: integrated Web server function for remote monitoring e.g. with E+H Fieldgate Viewer<sup>®</sup>
- Reliable: inputs are galvanically isolated from the system
- Complete: ReadWin<sup>®</sup> 2000 PC software package contained in scope of supply for professional, tamperproof data processing
- Flexible: direct access to archived data also with MS<sup>®</sup> Excel or in ReadWin<sup>®</sup> 2000 for example



# Function and system design

Measuring principleElectronic acquisition, display, recording, analysis, remote transmission and archiving of analog and digital<br/>input signals.Measuring systemMulti-channel data recording system with multi-coloured LCD display (120 mm / 4.7" screen size),<br/>galvanically isolated universal inputs (U, I, TC, RTD), digital input, transmitter power supply, limit relay,<br/>communication interfaces (USB, Ethernet, RS232/485), internal Flash memory and CompactFlash card. 100<br/>ms scan rate for all channels. ReadWin<sup>®</sup> 2000 PC software for comprehensive offline device configuration and<br/>data analysis.

### Block diagram



This block diagram is only indicative of the functionality.

# Input

Analog multi-function input	Measured variable, measuring range
channel 1-6	To IEC 60873-1: An additional display error of -/+ 1 digit is permitted for every measured value. Measuring ranges which can be selected per channel:

Measured variable	Measuring range	Maximum measured error of measuring range (oMR)	Input impedance
Current	020 mA 05 mA 420 mA Overrange: up to 22 mA	± 0.10 %	Load: = 50 Ohm
Voltage > 1 V	010 V 05 V ± 10 V ± 30 V	± 0.10 %	≃ 980 kOhm

Measured variable	Measuring range	Maximum measured error of measuring range (oMR)	Input impedance
Voltage $\leq 1 V$	± 1 V ± 150 mV	± 0.10 %	≃ 2.7 MOhm
Resistance thermometer (RTD)	Pt100: -200 to 850 °C (-328 to 1562 °F) (IEC751, JIS1604, GOST) Pt500: -200 to 850 °C (-328 to 1562 °F) (IEC751, JIS1604) Pt1000: -200 to 600 °C (-328 to 1112 °F) (IEC751, JIS1604)	4-wire: ± 0.10 % oMR 3-wire: ± (0.10 % oMR + 0.8 K) 2-wire: ± (0.10 % oMR + 1.5 K)	
	Cu100: -200 to 200 °C (-328 to 392 °F) (GOST) Cu50: -200 to 200 °C (-328 to 392 °F) (GOST) Pt50: -200 to 850 °C (-328 to 1562 °F) (GOST)	4-wire: ± 0.20 % oMR 3-wire: ± (0.20 % oMR + 0.8 K) 2-wire: ± (0.20 % oMR + 1.5 K)	
Thermocouples (TC)	Type J (Fe-CuNi): -210 to 999.9 °C (-346 to 1832 °F) (IEC581-1) Type K (NiCr-Ni): -200 to 1372 °C (-328 to 2501.6 °F) (IEC581-1) Type T (Cu-CuNi): -270 to 400 °C (-454 to 752 °F) (IEC581-1) Type N (NiCrSi-NiSi): -270 to 1300 °C (-454 to 2372 °F) (IEC581-1) Type L (Fe-CuNi): -200 to 900 °C (-328 to 1652 °F) (DIN43710, GOST)	± 0.10 % oMR from -100 °C (-148 °F) ± 0.10 % oMR from -130 °C (-202 °F) ± 0.10 % oMR from -200 °C (-328 °F) ± 0.10 % oMR from -100 °C (-148 °F) ± 0.10 % oMR from -100 °C (-148 °F)	≃ 2.7 MOhm
	Type D (W3Re-W25Re): 0 to 2315 °C (32 to 4199 °F) (ASTME998) Type C (W5Re-W26Re): 0 to 2315 °C (32 to 4199 °F) (ASTME998) Type B (Pt30Rh-Pt6Rh): 0 to 1820 °C (32 to 3308 °F) (IEC581-1) Type S (Pt10Rh-Pt): 0 to 1768 °C (32 to 3214 °F) (IEC581-1) Type R (Pt13Rh-Pt): -50 to 1768 °C (-58 to 3214 °F) (IEC581-1)	± 0.15 % oMR from 500 °C (932 °F) ± 0.15 % oMR from 500 °C (932 °F) ± 0.15 % oMR from 600 °C (1112 °F) ± 0.15 % oMR from 100 °C (212 °F) ± 0.15 % oMR from 100 °C (212 °F)	≃ 2.7 MOhm

### Limit values

Limit values for input voltage and current as well as cable open circuit detection/line influence/temperature compensation  $\$ 

Measured variable	Limit values (steady-state, without destroying input)	Cable open circuit detection/line influence/temperature compensation
Current	Maximum permitted input voltage: 2.5 V Maximum permitted input current: 50 mA	<ul> <li>420 mA range with cable open circuit monitoring to NAMUR NE43.</li> <li>Activate/deactivate the 420 mA loop monitoring as per NAMUR recomendation NE43.</li> <li>On activation:</li> <li>≤ 3.8 mA: Under range (indicate: vvvvvv)</li> <li>≥ 20.5 mA: Over range (indicate: ^^^^^)</li> <li>≤ 3.6 mA or ≥ 21.0 mA: Open Circuit (indicate:)</li> </ul>
Voltage > 1 V	Maximum permitted input voltage: 35 V	
$\textit{Voltage} \leq 1~\textit{V}$	Maximum permitted input voltage: 12 V	
Resistance thermometer (RTD)	Measuring current: ≤ 1 mA	Disengageable cable open circuit detection Maximum barrier resistance (or line resistance): Max. 200 Ohm (4-wire) Max. 40 Ohm (3-wire) Maximum influence of barrier resistance (or line resistance) for Pt100, Pt500 and Pt1000: 4-wire: ±0.0002%/Ohm, 3-wire: ±0.002%/Ohm Maximum influence of barrier resistance (or line resistance) for Pt50, Cu100 and Cu50: 4-wire: ±0.0006%/Ohm, 3-wire: ±0.006%/Ohm
Thermocouples (TC)	Maximum permitted input voltage: 12 V	Disengageable cable open circuit detection from 50 kOhm Error, internal temperature compensation: ≤ 2 K

### Channel isolation

All analog inputs are galvanically isolated from one another. The testing voltage between the channels is 500 V (no safety isolation)  $\,$ 

### Scan rate

All channels are scanned within 100 ms.

### Resolution

For all ranges:  $\geq$  18 bit

### Integration (option)

It is possible to calculate an intermediate, daily, monthly, yearly or total value (13-digit, 64 bit).

### Digital inputs

### Number

1 digital input

### Input level

To IEC 61131-2: Logical "0" (corresponds to -3 to +5 V), activation with logical "1" (corresponds to +12 to +30 V)

### Input frequency

Max. 25 Hz

### Pulse length

Min. 20 ms

### Input current

Max. 2 mA

### Input voltage

Max. 32 V (steady-state, without destroying input)

### Selectable functions

Control input, ON/OFF message, pulse counter (13-digit, 64 bit), operating time, message+operating time. Functions of the control input: start recording, background illumination OFF, operating lock, time synchronization.

	Output
Auxiliary voltage output	The auxiliary voltage is provided to activate the digital input (or sensors) with floating contacts and is galvanically isolated from the system and the inputs (testing voltage 500 V). The ground of the auxiliary voltage and the ground of the digital input are electrically interconnected.
	Output voltage: Approx. 24 V, max. 28 V
	Output current: Maximum 250 mA, short-circuit proof, not stabilised
Auxiliary voltage output	The auxiliary voltage is provided to activate the digital input (or the sensors) with floating contacts and is galvanically isolated from the system and the inputs (testing voltage 500 V). The ground of the auxiliary voltage and the ground of the digital input are electrically interconnected.

### Output voltage:

Approx. 24 V, max.  $\leq$  28 V

### Output current:

Maximum 250 mA, short-circuit proof, not stabilized

### **Relay outputs**

### Alarm relay:

1 Alarm relay with changeover contact

### Standard relay:

3 relays with NO contact for limit value messages (can be configured as NC contact).



It is not permitted to mix low voltage and safety extra low voltage (do not mix SELV circuits and low voltage).

### **Response time:**

 $\leq 1 \text{ s}$ 

Note!

### Maximum DC contact load:

50 V / 300 mA (steady-state, without destroying input)

### Maximum AC contact load:

230 V / 3 A (steady-state, without destroying input)



# Power supply / terminal diagram

Supply voltage	Normal voltage power supply board: 115 / 230 $V_{AC}$ Low voltage power supply board: 24 $V_{AC/DC}$
Frequency	Nominal frequency: 50 / 60 Hz
Cable specification	Screw or spring terminal blocks with reverse polarity protection: Digital I/O wire cross-section, RS485 and analog inputs: max. 1.5 mm <sup>2</sup> (14 AWG) (spring terminals) Power wire cross-section: max. 2.5 mm <sup>2</sup> (13 AWG) (screw terminals) Relay wire cross-section: max. 2.5 mm <sup>2</sup> (13 AWG) (spring terminals)
Power consumption	115 / 230 V: max. 30 VA 24 V: max. 24 VA
Connection data interface,	USB port (standard):
communication	Front-mounted USB-B socket (V1.1) for connecting a laptop or computer using a shielded USB cable. The USB port can be used for program transmission and device configuration (printers or modems cannot be connected here).
	Ethernet interface (option):
	Rear-mounted Ethernet interface $10/100BaseT$ , plug type RJ45, connection via screened cable, allocation of IP address via setup menu in device. The device can be connected to devices in an office environment with this interface. For safe spacing distances, observe the office equipment standard IEC 60950-1. Direct connection to a PC is possible with a "crossover" cable. The device can be used in the network as a "Web server". Two Ethernet function LEDs on the rear of the device.
	Serial RS232/RS485 interface (option):
	Rear-mounted RS232 SUB-D9 socket or RS485 interface (terminal connection) for data/program transmission or as modem connection. The following baudrates are supported: 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200 Max. line length with screened cable: 2 m (6.6 ft) (RS232), or 1000 m (3281 ft) (RS485) Both interfaces are galvanically isolated from the system. The RS232/RS485 interfaces cannot be used simultaneously.

# Performance characteristics

Reference operating conditions	Ambient temperature: 25 °C $\pm$ 5 K (77 °F $\pm$ 9 °F) Air humidity: 55 % $\pm$ 10 % r.h.
Maximum measured error	(See Input)
Temperature drift	Cu100, Cu50 and Pt50: max. $\pm$ 0.02 %/K (of measuring range) All other ranges: max. $\pm$ 0.01 %/K (of measuring range)
Long-term drift	To IEC 61298-2: max. ± 0.01 %/month (of measuring range)

### 🗌 144 mm 5.67 888 00000 □ 144 mm 5.67" C () E ්ඔ E <u>86.5 mm</u> 3.4" 21 mm 0.83" 🗌 137.9 mm 888888888 886 <u>138 mm</u> 5.43 5.43" " ũ 11111 e III b0000000 000000d 00000000 00000000 00000000 00000000 150 mm 5.9" Х 20000000 000000 0000000 0000000 <u>36.1 mm</u> 1.42" **1**0000000 000000 E P Æ 0000000 0000000 Y

# Installation conditions

Orientation

Position of use as per DIN 16 257, NL 90  $\pm$  30°

Installation instructions

### Panel cutout and installation / design, dimensions:

Installation depth: approx. 171 mm (6.73") (incl. terminals and fastening clips) Panel cutout:  $138^{+1} \times 138^{+1} \text{ mm} (5.43^{+0.04} \times 5.43^{+0.04"})$ Panel thickness: 2 to 40 mm (0.08 to 1.58") Securing to DIN 43 834



### Note!

A distance of min. 15 mm (0.59") between the devices has to be observed if aligning the devices in the Ydirection (vertically above one another).

The devices can be arranged horizontally beside one another in the X direction without any spacing between the devices.

Ambient temperature range	0 to 50 °C (32 to 122 °F)
Storage temperature	-20 to +60 °C (-4 to 140 °F)
Relative air humidity	0 to 50 °C (32 to 122 °F), max. 75% without condensation
Climate class	As per IEC 60654-1: B1
Degree of protection	Front-panel IP 54 (IEC 60529, Cat. 2) NEMA 2 rear-panel IP 20 (IEC 60529, Cat. 2)

# **Environment**

Electrical safety	IEC 61010-1, protection class I low voltage: overvoltage category II Environment < 3000 m (< 9843 ft) above MSL (mean sea level)
Electromagnetic compatibility (EMC)	Interference immunity:
	As per IEC 61326 (industry) and NAMUR NE21:
	<ul> <li>ESD (electrostatic discharge): IEC 61000-4-2 severity 3 (6/8 kV)</li> <li>HF field (electromagnetic interference fields): IEC 61000-4-3: severity 3 (10 V/m)</li> <li>Burst (quick transient disturbance variables): IEC 61000-4-4 severity 3 (1 kV signal, 2 kV mains)</li> <li>Surge on power line: IEC 61000-4-5: 2 kV asymmetrical, 1 kV symmetrical</li> <li>Surge on signal line: IEC 61000-4-5: 1 kV asymmetrical (with external protection element)</li> <li>Conducted HF: IEC 61000-4-6: 150 kHz80 MHz, 10 V</li> <li>Power failure IEC 61000-4-11 (&gt; 20 ms/0%)</li> <li>Voltage variation: IEC 61000-4-11 (40% / 0%)</li> </ul>
	Emission:
	To IEC 61326: Class A (operation in industrial environment)
	Interference voltage:
	Mains line: To CISPR 16-1/-2: Class A
	Interference current:
	Ethernet line: To EN 50022: Class A
	Interference field intensity:
	Housing/all connections: to CISPR 16: Class A
	Interference voltage suppression:
	$\blacksquare$ Common mode interference voltage suppression: IEC 61298-3: analog inputs 80 dB at 60 V and 50 Hz $/$ 60 Hz
	<ul> <li>Push-pull interference voltage suppression: IEC 61298-3: analog inputs 40 dB at 50 Hz / 60 Hz, for measuring range/10</li> </ul>
	Machanical construction

Design, dimensions	See Installation conditions
Weight	<ul> <li>Panel-mounted instrument: approx. 700 g (1.54 lb)</li> </ul>
Materials	Front frame / removable media door: plastic (ABS) Housing: fibre-glass reinforced plastic (PC) Protective cover in front of display: plastic (PC)

# Human interface

Display elements	<b>Type:</b> LC colour graphic display
	Size (screen size, measured diagonally): 120 mm (4.7")
	Resolution: 76,800 pixels (320 x 240 pixels)

### Background illumination:

50,000 h half value time (= half brightness)

### Number of colours:

64 colours

### Display modes:

Curves/load curves, curves in separate section, digital display, bargraph display, events list (limit value/power failure), status display, history display in curve form with display of digital measured values, date and time

### Operating elements

Keyboard:

Operation and configuration via 7 push buttons on the front side in interactive dialogue mode with the on screen menu or using PC software. Integrated operating instructions displayed on screen at the push of a button.

Saving data

### Memory cycle:

Selectable memory cycle: 1s / 2s / 3s / 4s / 5s / 10s / 15s / 20s / 30s / 1min / 2min / 3min / 4min / 5min / 10min / 30min / 1h / 6h / 12h

### Internal memory:

- Program memory: 2 MB Flash (non-volatile)
- Setup data memory, measured data memory: permanent back-up of setup data and measured data in internal Flash memory (non-volatile)
- Main memory: 2 MB SRAM Data buffering and RTC buffering with lithium cell (replace after 10 years)

### External memory:

- Cyclic copying of the measured data for archiving on CompactFlash card (CompactFlash base: type I)
- Supported CF memory cards: 32 MB, 64 MB, 128 MB, 256 MB and 512 MB. Please use genuine CF-cards from the manufacturer! (see Accessories)
- If no CF memory card is present in the slot, internal data storage of approx. one day is ensured
- A yellow LED beside the CF slot indicates data access. During this process, the CF card must not be removed. Risk of losing data!

### Typical recording lengths:

Prerequisites for following tables:

- No limit value violation/event storage
- Digital input not used
- Signal analysis deactivated

### 🗞 Note!

Frequent entries in the event list reduce the memory availability!

### Internal memory:

Analog inputs	Memory cycle 5 min.	Memory cycle 1 min.	Memory cycle 30 s.	Memory cycle 10 s.	Memory cycle 1 s.
1	481 days	106 days, 23 h	53 days, 11 h	17 days, 19 h	1 day, 18 h
3	240 days, 12 h	50 days, 20 h	25 days, 10 h	8 days, 11 h	20 h
6	137 days, 10 h	28 days, 11 h	14 days, 5 h	4 days, 17 h	11 h

Analog inputs	Memory cycle 5 min.	Memory cycle 1 min.	Memory cycle 30 s.	Memory cycle 10 s.	Memory cycle 1 s.
1	19973 days, 21h	4443 days, 3 h	2221 days, 13 h	740 days, 12 h	74 days, 1 h
3	9987 days, 8 h	2111 days, 8 h	1055 days, 16 h	351 days, 21 h	35 days, 4 h
6	5707 days, 9 h	1182 days, 5 h	591 days, 2 h	197 days	19 days, 16 h

### CompactFlash 64 MB:

### CompactFlash 256 MB:

Analog inputs	Memory cycle 5 min.	Memory cycle 1 min.	Memory cycle 30 s.	Memory cycle 10 s.	Memory cycle 1 s.
1	82275 days, 2 h	18301 days, 22 h	9150 days, 23 h	3050 days, 7 h	305 days
3	41139 days, 4 h	8696 days, 21 h	4348 days, 10 h	1449 days, 11 h	144 days, 22 h
6	23509 days, 12 h	4869 days, 19 h	2434 days, 21 h	811 days, 15 h	81 days, 3 h

### Calculation of recording duration:

 $\label{eq:calculation} Calculation of recording duration using "memcalc.xls" (can be found on the CD-ROM of the PC software supplied).$ 

Real time clock (RTC)	Switchable summer time/normal time automated system Power reserve: buffering via lithium battery Deviation: < 10 min./year Time synch possible
Remote operation	Configuring and archiving the device settings with CompactFlash or with PC software via rear-mounted serial

interface RS232/RS485 (e.g. modem), Ethernet, or front-mounted USB port.

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CE mark	The measuring system meets the legal requirements of the EC directives. The manufacturer confirms successful testing of the device by affixing the CE mark.					
UL listed for Canada and USA	The device was examined by Underwriters Laboratories Inc. (UL) in accordance with the standards UL 61010B-1 and CSA C22.2 No. 1010.1-92.					
Other standards and guideli- nes	CSA 1010.1 Safety requirements for electrical equipment for measurement, control, and laboratory use – General require- ments (pending).					

# Certificates and approvals

# Ordering information

Product structure	Basic features:         4.7" LC colour graphic display (320 x 240 pixels)         Analog inputs, 1 digital input, 4 relays         Interactive dialogue operation with 7 push buttons         24 V auxiliary output voltage         USB connection incl. connecting cable         14 limit values, can be freely defined         PC software package         CompactFlash (CF) slot								
	ln ·	put s	igna	11 1 /77	LTOP				
	A B	5 ui 6 ui	nvers	sal (U, sal (U,	I, IC, R I, TC, R	TD)			
		Pov	wer	supp	ly				
		1	115	/230	V AC, 50	)/60 I	Hz		
		2	24 \	/ AC/	DC, 50/	60 Hz	Z		
			Int	erfac	e				
			Α	USB					
			В	USB	+ RS232	/485	+ Ethernet		
				Mer	nory m	ediu	ım		
				1	without	CF ca	ard		
				2	CF card	64 N	ЛВ		
				3	CF card	rd, 256 MB			
					Housi	ıg			
	A Panel 144x144 mm (5.67 x 5.67"), IP54, NEMA 2								
	<b>B</b> Panel 144x144 mm (5.67 x 5.67"), IP54, neutral, NEMA 2						4x144 mm (5.67 x 5.67"), IP54, neutral, NEMA 2		
					Op	erat	ion language		
					Α	Star	ndard (German, English)		
					В	Cer	ntral/western Europe (German, English, French, Spanish, Italian)		
					C	No1	rthern Europe (German, English, Danish, Swedish)		
					D	Eas	stern Europe (German, English, Polish, Kussian, Gzech, Slovak)		
					E	Am Ian	an (Cerman, English, French, Spänish, American)		
					G	Chi	ina (German, English, Chinese)		
						Δd	ditional option		
						Standard			
						В	Integration + Analysis		
						К	Standard model, North American region		
						L	Integration + Analysis, North American region		
							Approval		
							1 Non-hazardous area		
	RSG30-						1 $\leftarrow$ Order code		

# Scope of delivery • Device (with terminals, as per your order) • 4 fastening clips • USB cable • Optional CompactFlash CF card • PC operating and configuration software on CD-ROM • Delivery note • Multi-language Brief Operating Instructions as hard copy • Operating Instructions on CD-ROM • Lock plate Anything missing? Then please inform your supplier.

### Accessory parts

The following accessories are available:

**Accessories** 

Order code	Accessory					
50078843	Terminal, pluggable, 3-pole, for power supply					
51009211	Terminal, pluggable, 6-pole, for analog input					
51009214	Terminal, pluggable, 3-pole, for relay					
51009215	Terminal, pluggable, 6-pole, for relay					
51009210	Terminal, pluggable, 3-pole, for digital I/O					
51007892	CompactFlash (CF) memory card 64 MB					
51009640	CompactFlash (CF) memory card 256 MB					
RSG30A-S1	RS232 interface cable, 9pol. to PC connection					
RSG30A-S2	RS232 interface cable to modem connection					
RSG30A-S3	RS232/RS485 adapter set 230 VAC compact housing, without galv. isolation					
RSG30A-S5	RS232/485 adapter set 115 VAC compact housing, without galv. isolation					
RSG30A-S6	RS232/RS485 adapter set, DIN rail, 230 VAC with galv. isolation and interface cable for PC/ modem					
RSG30A-S7	RS232/RS485 adapter set, DIN rail, 115 VAC with galv. isolation and interface cable for PC/ modem					
RSG30A-H1	Field housing IP65					
	320 mm (12.6") 320 mm (17.6") 320 mm (17.6")					

# Documentation

 $\Box$  Brochure with overview of recording technology (FA014R/09/en)

□ Operating Instructions Ecograph T (BA194R/09/en)

Brief Operating Instructions Ecograph T (KA199R/09/)

□Innovation brochure Ecograph T (IN001R/09/en)

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