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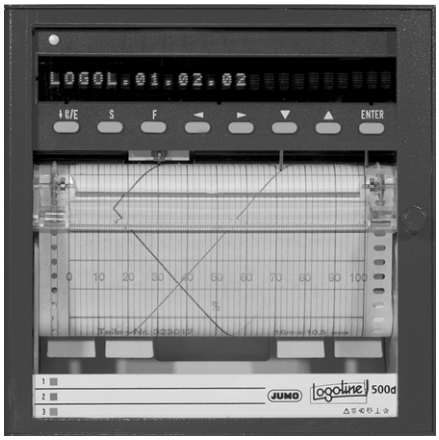
Logoline 500d

Pen recorder with text printing and LED dot-matrix display



Type 706021/…

Brief description

The pen recorder offers up to three measurement inputs for recording the measurements, which are isolated from each other by optocouplers. The measurements can be read by pointers against scales, or are shown on the display. Channel 1 can be used to output text in addition to the measurement trace.
All channels are zeroed using Hall sensors.
The watchdog monitors the pen recorder function and triggers a restart in the event of a fault. The configuration data are stored permanently in EEPROM. On a power failure, the real-time clock is buffered by the recorders.
The standard current and voltage signals as well as thermocouples, RTD temperature probes, resistance transmitters and potentiometers can be connected to the recorder. The necessary linerarization is performed automatically.
Optional expansions are available. Eight logic inputs are available for additional operating functions. In most cases, a math and logic module permits the recorder to be individually adapted to complex measurement tasks. An external relay module ER8 for rail mounting supplements the pen recorder by eight switching outputs. A 2-wire transmitter can be operated from an isolated supply.

Overview of functions

1, 2 or 3 analog inputs (configurable and electrically isolated)	Thermocouple, RTD temperature probe, Resistance transmitter, Potentiometer, Voltage, Current
8 logic inputs (available as an option)	for floating contacts or PLC level Functions: - External texts - Binary-linked text - External stop - External speed - Event counter - External scaling - External report
Outputs (available as an option)	- Interface for 8 relay outputs - Supply for 2-wire transmitter
Recording	- Measurement traces - Text printing
Setup interface	for configuration and parameter setting
RS422/RS485 interface (available as an option)	Data transfer from and to the recorder

Applications

- Failure and fault analysis
- Compliance with official regulations
- Reports for users and customers
- Monitoring of processes
- Optimization of procedures

Approvals/marks of conformity (see Technical data)

2010-06-21/00324162

Technical data

Thermocouple input

Designation			Range	Linearization accuracy[1]
Fe-Con	L	DIN 43710	-200 to +900°C	±0.1%
Fe-Con	J	EN 60584	-210 to +1200°C	±0.1% above -200°C
Cu-Con	U	DIN 43710	-200 to +600°C	±0.1% above -150°C
Cu-Con	T	EN 60584	-270 to +400°C	±0.1% above -150°C
NiCr-Ni	K	EN 60584	-270 to +1372°C	±0.1% above -80°C
NiCr-Con	E	EN 60584	-270 to +1000°C	±0.1% above -100°C
NiCrSi-NiSi	N	EN 60584	-270 to +1300°C	±0.1% above -100°C
Pt10Rh-Pt	S	EN 60584	-50 to +1768°C	±0.15% above 0°C
Pt13Rh-Pt	R	EN 60584	-50 to +1768°C	±0.15% above 0°C
Pt30Rh-Pt6Rh	B	EN 60584	0 — 1820°C	±0.15% above 400°C
Shortest span			Types L, J, U, T, K, E, N: Types S, R, B:	100°C 500°C
Range start/end			within the range limits, freely programmable in 0.1°C steps	
Cold junction			Pt 100 internal, external Pt 100 in 3-wire circuit or external cold junction thermostat	
Cold junction accuracy (internal)			± 1°C	
Cold junction temperature (external)			-20 to +100°C can be set via the setup program	
Measurement time			240msec for all three channels	
Input filter			second-order digital filter; filter constant adjustable from 0 — 10.0sec	
Special features			programmable also in °F; customer-specific linearization	

1. The linearization accuracy refers to the maximum measurement span.

RTD temperature probe input

Designation	Connection	Range	Linearization accuracy	Meas. current
Pt 100 DIN	2/3-wire	-200 to +100°C	±0.4°C	400µA
	2/3-wire	-200 to +850°C	±0.8°C	400µA
	4-wire	-200 to +100°C	±0.4°C	400µA
	4-wire	-200 to +850°C	±0.5°C	400µA
Pt 100 JIS	2/3-wire	-200 to +100°C	±0.4°C	400µA
	2/3-wire	-200 to +649°C	±0.8°C	400µA
	4-wire	-200 to +100°C	±0.4°C	400µA
	4-wire	-200 to +649°C	±0.5°C	400µA
Pt 500 DIN	2/3-wire	-200 to +100°C	±0.4°C	50µA
	2/3-wire	-200 to +850°C	±0.8°C	50µA
	4-wire	-200 to +100°C	±0.4°C	50µA
	4-wire	-200 to +850°C	±0.5°C	50µA
Pt 1000 DIN	2/3-wire	-200 to +100°C	±0.4°C	50µA
	2/3-wire	-200 to +850°C	±0.8°C	50µA
	4-wire	-200 to +100°C	±0.4°C	50µA
	4-wire	-200 to +850°C	±0.5°C	50µA
Ni 100	2/3-wire	-60 to +100°C	±0.4°C	400µA
	2/3-wire	-60 to +180°C	±0.8°C	400µA
	4-wire	-60 to +100°C	±0.4°C	400µA
	4-wire	-60 to +180°C	±0.5°C	400µA
Connection type	2-, 3- or 4-wire circuit			
Shortest span	15°C			
Sensor lead resistance	max. 30Ω per core in 3-wire circuit max. 15Ω per core in 2-wire circuit			
Range start/end	within the limits, freely programmable in 0.1°C steps			
Measurement time	240msec for all three channels			
Input filter	second-order digital filter; filter constant adjustable from 0 — 10sec			
Special features	programmable also in °F; customer-specific linearization			

Resistance transmitter and potentiometer input

Range	Accuracy	Measurement current
up to 130Ω up to 390Ω up to 1600Ω up to 3900Ω	±150mΩ ±300mΩ ±1.6Ω ±2 Ω	400µA 400µA 50µA 50µA
Connection type	resistance transmitter: 3-wire circuit potentiometer: 2-, 3- or 4-wire circuit	
Shortest span	6Ω	
Sensor lead resistance	max. 30Ω per core in 3-wire circuit max. 15Ω per core in 2-wire circuit	
Resistance values	within the limits, freely programmable in 0.1Ω steps	
Measurement time	240msec for all three channels	
Input filter	second-order digital filter; filter constant adjustable from 0 to 10.0sec	

DC voltage or current input

Basic range	Accuracy	Input resistance
-15 to +77mV 0 — 170mV -76 to + 76mV -162 to +880mV 0 — 1930mV -880 to +880mV -1.84 to +10V 0 — 22V -10 to +10V	±80µV ±120µV ±120µV ±1mV ±1mV ±1mV ±6mV ±12mV ±12mV	>1MΩ >1MΩ >1MΩ >500kΩ >500kΩ >500kΩ >500kΩ >500kΩ >500kΩ
Shortest span	5mV	
Range start/end	freely programmable within the limits (up to 999mV in 0.01mV steps, above 1V in 1mV steps)	
-4 to +21mA 0 — 45mA -20.5 to +20.5mA	±20µA ±40µA ±40µA	
Shortest span	0.5mA	
Range start/end	within the limits, freely programmable in 0.01mA steps	
Measurement time	240msec for all three channels	
Input filter	second-order digital filter; filter constant adjustable from 0 — 10.0sec	
Special features	adjustable linearization for thermocouples and RTD temperature probes (for connecting transmitters without linearization)	

Response on transducer short-circuit/break

	Short-circuit[1]	Break[1]
Thermocouple	recognized	recognized
RTD temperature probe	recognized	recognized
Resistance transmitter	not recognized	not recognized
Potentiometer	recognized	recognized
Voltage up to 170mV	recognized	recognized
Voltage above 170mV	not recognized	not recognized
Current	0mA is recognized	0mA is recognized

1. The fiber pens are positioned to 0%. “>>>>>>” appears in the LED dot matrix display.

Recording system

Zero adjustment	self-compensating system using Hall sensors
Drive	stepping motor
Sensitivity	0.2% or better referred to 100mm recording width
Reproducibility	0.25% or better referred to 100mm recording width
Response time	1sec referred to 100mm recording width
Indication and recording accuracy	Class 0.5 referred to range limits and basic ranges
Ink capacity	sufficient for approx. 1000m trace; on channel 1 depending on text printing
Color sequence	channel 1: blue, channel 2: red, channel 3: green
Pen offset	2mm; can be corrected by pen offset compensation

Overrun/underrun	electronically limited to 0 — 100mm writing width
Chart speed	programmable in the steps: 0, 5, 10, 20, 60, 120, 240, 300, 360, 600, 720, 1800, 3600, 7200mm/h; freely programmable in 1mm/h steps
Chart drive	by stepping motor and gearbox
Chart cassette	cassette for roll chart and fanfold chart (tear-off edge, chart-end switch)
Chart overall width / writing width pin spacing visible chart length overall length	roll or fanfold chart to DIN 16320 120mm / 100mm 110mm roll chart: 60mm; fanfold chart: 30 — 60mm roll chart: 16m or 32m; fanfold chart: 15.6m

Electrical data

Supply	110 — 240V AC 48 — 63Hz or 20 — 53V AC/DC 48 — 63Hz
Electrical safety Test voltages (type test) - Mains supply to measurement circuit - Mains supply to housing - Between measurement circuits - Measurement circuits to housing - Electrical isolation between the analog inputs	to EN 61010, Part 1 of March 1994 overvoltage category II, pollution degree 2 AC: 3.7kV 50Hz, 1min; AC/DC: 510V 50Hz, 1min AC: 2.3kV 50Hz, 1min; AC/DC: 510V 50Hz, 1min 510V 50Hz, 1min 510V 50 Hz, 1min up to 30V AC and 50V DC
Supply voltage error	less than 0.1% of range span
Power consumption	35VA max.
Data back-up	more than 4 years by lithium battery in RAM, or 2 days by storage capacitor at 15 — 25°C ambient temperature. Additional back-up in EEPROM.
Electrical connection	at the back through screw-clamp connectors, max. conductor cross-section 2.5mm^2 or 2x 1.5mm^2 with cable ferrules, setup connector at the front behind the flip-up dot-matrix display
EMC - Interference emission - Immunity to interference	EN 61326-1 Class B to industrial requirements

Housing

Housing type Housing door	Housing for flush-panel mounting to IEC 61554, galvanized steel zinc die-casting
Transport mechanism	in corrosion-resistant chrome-nickel steel
Chart cassette	in plastic (polycarbonate)
Bezel size	144mm x 144mm
Mounting depth	227mm
Panel cut-out	$138^{+1.0}$mm x $138^{+1.0}$mm
Housing mounting	in a control panel to DIN 43834
Ambient temperature range	-10 to +50°C
Ambient temperature error	0.3% per 10°C
Storage temperature range	-20 to +70°C
Climatic conditions	75% max. rel. humidity, no condensation
Operating position	NL 90 ± 30, DIN 16257 (vertical)
Protection	to EN 60529 Category 2, front IP54 (IP65 with extra code IP65); rear IP20
Weight	3.2kg max.

Approvals/marks of conformity

Mark of conformity	**Testing laboratory**	**Certificates / certification numbers**	**Test basis**	**valid for**
c UL us	Underwriters Laboratories	E 201387	UL 3111-1 CAN/CSA C22.2 No. 1010.1-92	the flush-mounted instrument; not in conjunction with any housing extra code

Operating modes

Chart speeds
The recorder can be programmed with four different operating modes for the chart speed.

1. Normal operation

2. Limit operation
If the measurement goes above/below the programmed limit values, the recorder switches to the speed which has been programmed under “limit operation”.

3. External operation
A signal on one of the logic inputs at the back of the recorder switches to the speed programmed under “external speed”.

4. Timed operation
Chart speed which is operative within a programmable time span.

Zoom (plot area)
In zoom operation, an enlarged recording is made of a section of the full range.

Presentation range (offset)
This parameter is used to define the presentation range of a trace on the chart.
This assists the evaluation of traces which are close together or overlapping.

Text printing

Text printing is used for comments on the recorded trace and for event recording.
Priorities can be assigned to the texts to serve as abort criteria during simultaneous text printing requests.
Text printing can be separately configured for each text, either time-optimized or during printing of the recording traces.
Text printing facilities:
- Time, date
- Scaling of the channels
- Change of chart speed
- Recording start/end text
- Eight external texts[1]
- 16 binary-linked external texts[1]
- Eight relay texts[1]
- Event counter[1]
- Report
- Print test
- Service print

1. extra code 259 is required.

Extra codes

Logic inputs (259)
The eight inputs can be operated through floating contacts or by the following voltage levels:
inactive 0 — 5V
active 20 — 35V
The voltages must be applied for 0.5sec.

Functions available:
- External start/stop
- Chart speed change to “external speed”
- Text printing
- Start/stop external report
- Start scaling print
- Event counter

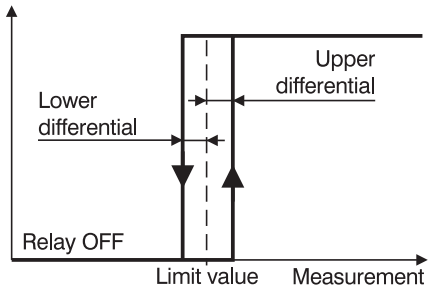
Supply for 2-wire transmitter (259)
An isolated supply for a 2-wire transmitter is available.
24V ± 5% DC 45mA

Serial interface for ER8 (259)
The external relay module ER8 can be operated using the serial interface.

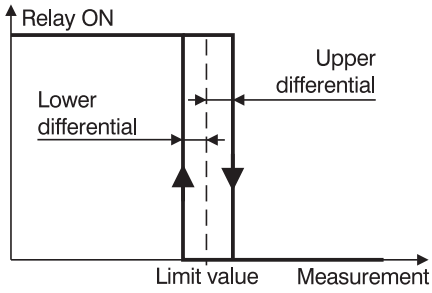
RS422/RS485 interface
This interface is intended for communication with higher-level systems
(e. g. bus system or PC).
It can be used to
- read out the measurements,
- monitor operating states and
- transmit text and values to the recorders.

Accessories

External relay module ER8
The recorder can be equipped with an external relay module ER8 (eight relay outputs) to monitor the infringement of upper or lower limits. The assignment of the relay outputs to the measurement channels is freely programmable. The limit values are set at the parameter level.
Relay function within the measurement range: lk7, lk8



lk7:
Function: relay is energized when:
Measurement > limit + upper differential.

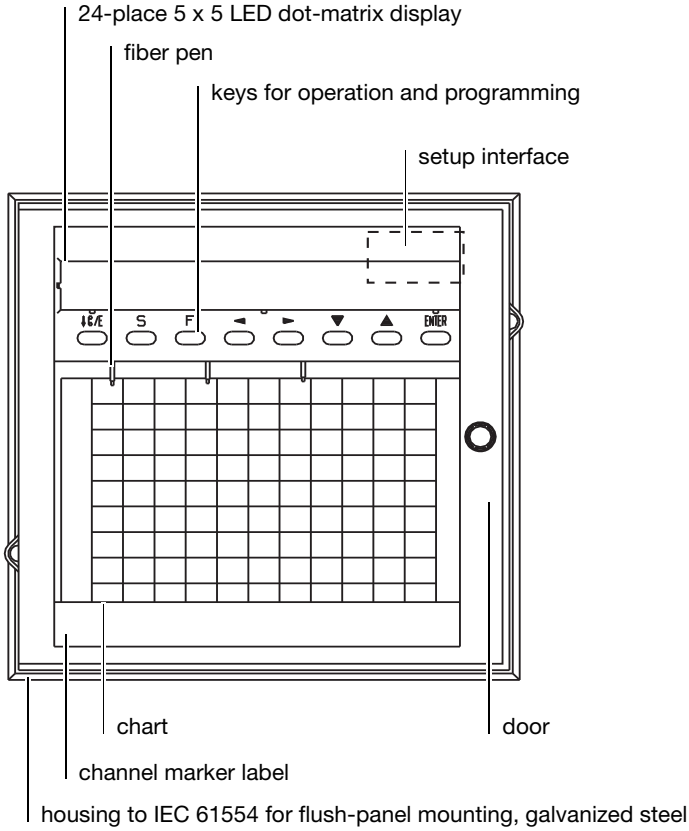


lk8:
As lk7, but relay function is reversed.

Position and width of the switching differential can be selected via the setup program.

Contact rating:
3A, 250V AC 50Hz
3A, 30V DC
resistive load

Indications and controls



Operation and configuration

On the recorder

All parameters can be programmed from the instrument keys. An LED dot-matrix display are available to monitor the parameters.

Via setup program for PC

More conveniently than by the instrument keys, all parameters can be configured via the setup program.
Additional functions are:

- Customer-specific linearization
- Setting the printing mode of texts (“Overwrite trace” or “Interrupt trace”)
- Different settings (also for several instruments) can be managed.
- Reading out and altering the setting of a configured instrument
- Archiving and printing the setting

Customer-specific linearization
In the setup program there is a choice between linear, square law and cube law linearization. There can be up to 41 calibration points for linear and square law linearization, and up to 61 calibration points for cube law linearization. These calibration points are used to determine the coefficients for polynomials which are defined for each section, so that even a few calibration points produce a smooth graph.
Accuracy: depends on the shape of the graph and the selected linearization.

Language

The language which was set (English, German, French) appears in the print-out and in the LED dot-matrix display.

Example of a recording with text print-out

The factory-setting provides for all the measurement traces to be printed in the range 0—100%, i.e. across the entire chart width.

(1) Print the time (with every fourth print-out, the current chart speed, the programmed instrument name or the date are printed alternately)

(2) Print-out at the start of the recording (begin text)

(3) Print-out at the end of the recording (end text)

(4) Relay text

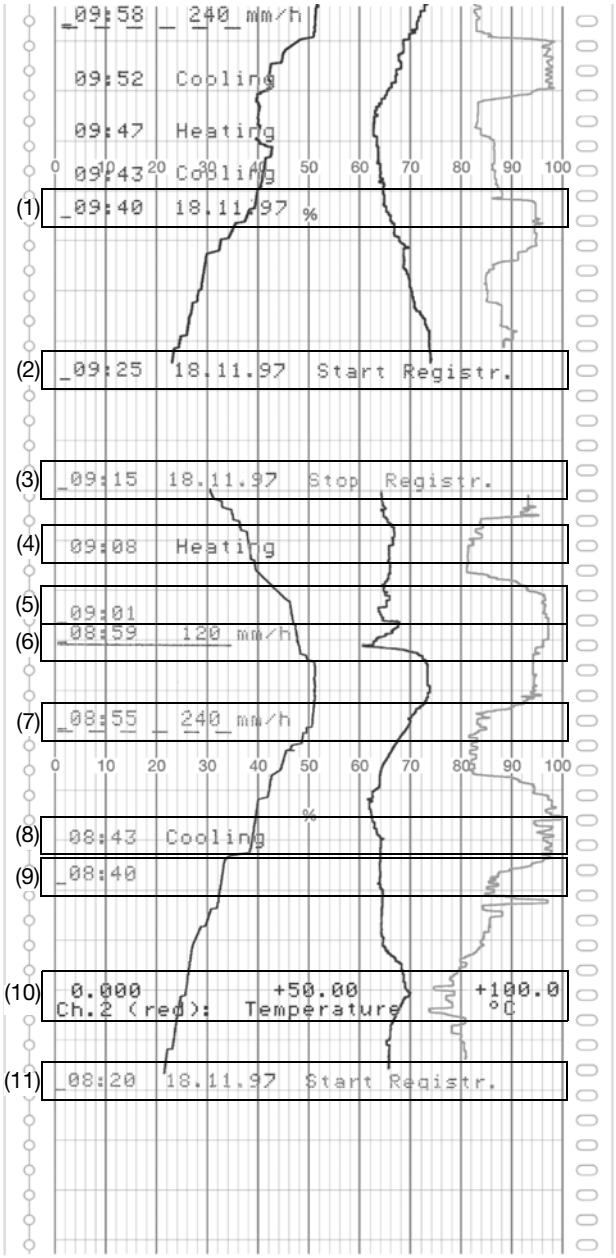
(5) Current time
(6) Speed change to normal operation

(7) Speed change to limit operation

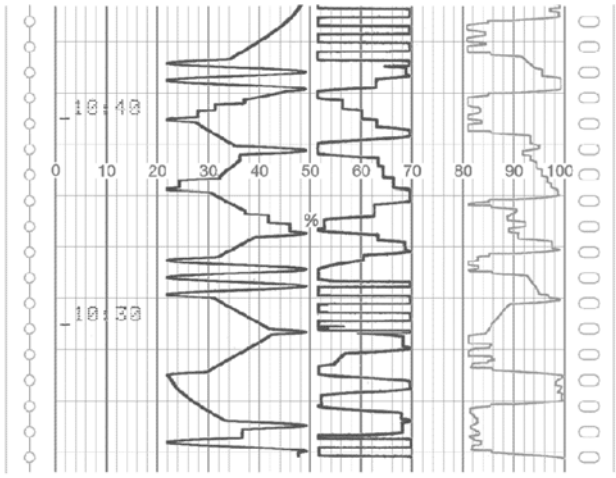
(8) Relay text on exceeding the limit
(9) Current time

(10) Print-out of scaling with channel number, pen color, channel name and unit.

(11) Begin text

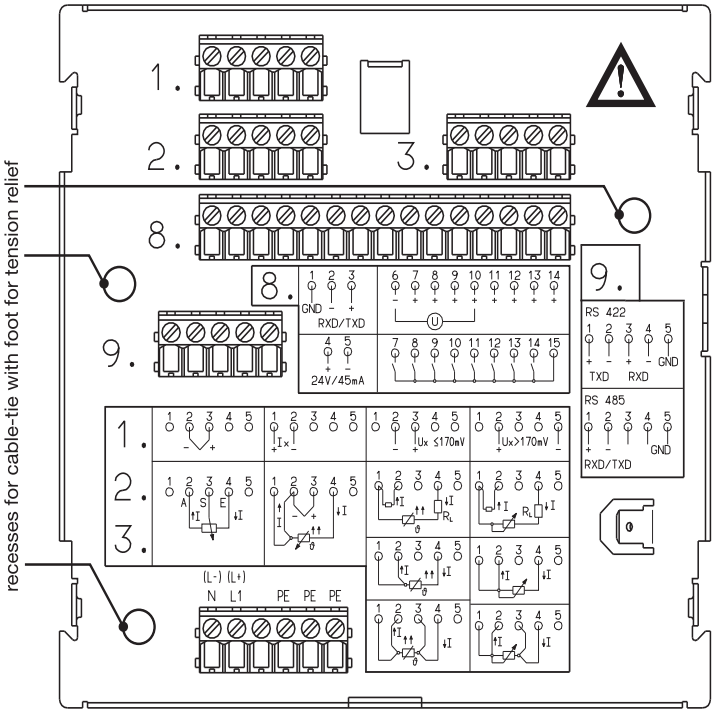


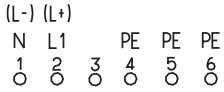
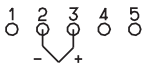
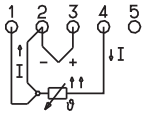
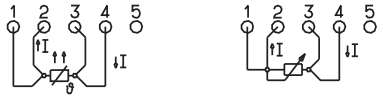
In the example above, the measurement traces are printed out in normal mode, i.e. all traces share the entire width of the chart (0 — 100mm). The presentation range can be selected freely on the chart for each trace. This assists the evaluation, in particular of traces which are close to each other or which overlap. The traces in the example on the right have thus been arranged over three sections of the chart.

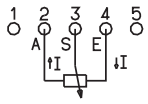
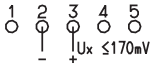
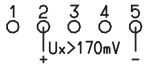
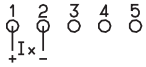


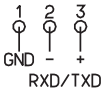
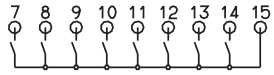
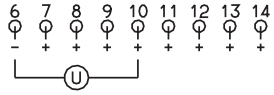
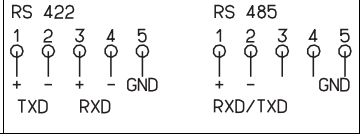
Connection diagram

Rear view with screw-clamp connectors



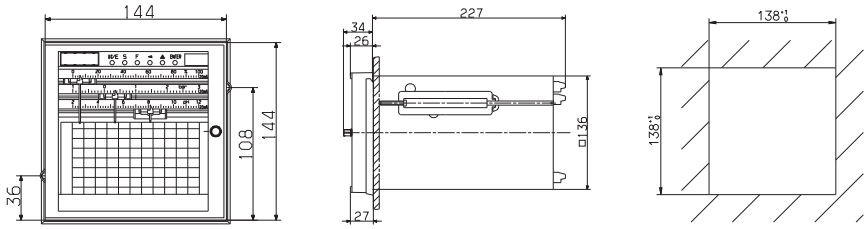
Connection				**Diagram**
Supply as on label	N neutral L1 line PE protective earth		N (L-) L1 (L+) PE	
Analog inputs	**Input 1**	**Input 2**	**Input 3**	
	Connector	Connector	Connector	
Thermocouple	1.	2.	3.	
Thermocouple with external Pt 100 cold junction				
RTD temperature probe/ potentiometer in 2-wire circuit				 *R_{comp} = R_{line}
RTD temperature probe/ potentiometer in 3-wire circuit				
RTD temperature probe/ potentiometer in 4-wire circuit				

Analog inputs	**Input 1**	**Input 2**	**Input 3**	
	Connector	Connector	Connector	
Resistance transmitter with 3-wire connection	1.	2.	3.	A = start S = slider E = end 
Voltage input up to 170 mV				
Voltage input above 170 mV				
Current input				

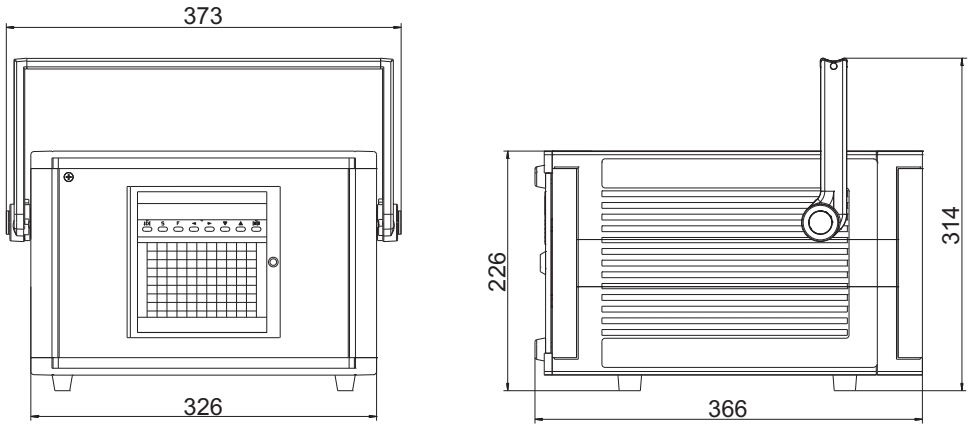
		Connector	
External relay module ER8	Communication with external relay module	8.	
Supply for external 2-wire transmitter	24 V ± 5 % 45 mA		
Digital operating inputs	Contact operation LOW = R_{OFF} 100 kΩ min. HIGH = R_{ON} 50 Ω max.		 contact no. 7 = logic input 1 . . . contact no. 14 = logic input 8
Min. pulse duration: HIGH 500 msec LOW 500 msec	Voltage operation LOW = 0 — 5 V DC (inactive) HIGH = 20 — 35 V DC (active)		 contact no. 7 = logic input 1 . . . contact no. 14 = logic input 8
Serial interface RS422/RS485	Communication with higher-level systems	9.	

Dimensions

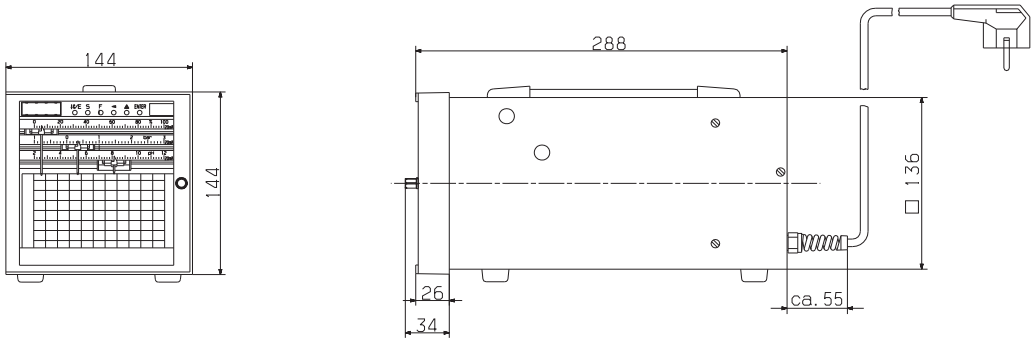
Housing for flush-panel mounting



Code 350
Portable recorder housing for varying applications in mobile use



Code 351
Housing with carrying handle, rubber feet and terminal cover, also 3m mains supply cable with SCHUKO plug



Order details

			(1)	**Basic version**
		706021		LOGOLINE 500d with 1 universal input and text output
		706022		LOGOLINE 500d with 2 universal inputs and text output (via channel 1)
		706023		LOGOLINE 500d with 3 universal inputs and text output (via channel 1)
			(2)	**Inputs 1 — 3 (programmable)**
x	x	x	8	factory-set
x	x	x	9	configuration to customer specification[1]
			(3)	**Interface**
x	x	x	00	not assigned
x	x	x	52	RS422, Jbus, Modbus
x	x	x	53	RS485, Jbus, Modbus
			(4)	**Supply**
x	x	x	22	20—53V AC/DC +0/-0% 48—63Hz
x	x	x	23	110—240V AC +10/-15% 48—63Hz
			(5)	**Extra codes**
x	x	x	020	lithium battery for RAM buffer (ex-factory)
x	x	x	021	storage capacitor for RAM buffer (instead of extra code 020)
x	x	x	259	8 logic inputs, interface for external relay module (ER8), voltage output 24V 50mA DC
x	x	x	265	door with lock (IP54)
x	x	x	266	IP65 seal, wide fixing brackets
x	x	x	350	universal carrying case TG-35[2]
x	x	x	351	housing with carrying handle[3]

	(1)		(2)		(3)		(4)		(5)	
Order code		/		-		-		/		, ...[4]
Order example	706023	/	8	-	00	-	23	/	020	

Accessories

	Sales No.
Setup program, multilingual	70/00355073
PC interface with TTL/RS232 converter	70/00301315
PC interface with USB/TTL converter, adapter (socket) and adapter (pins)	70/00456352
Type 703564/1-23 ER8 relay module, 110 — 240V AC	70/00405292
Type 703564/1-22 ER8 relay module, 20 — 53V AC	70/00405297

Consumables (Mindestbestellwert 100,00 EUR)

		Sales No.
Roll chart 16m	(5 rolls)	70/00331497
Roll chart 32m	(5 rolls)	70/00331499
Fanfold chart 15,6m	(5 packs)	70/00331490
Fiber pen blue	(2 pieces))	70/00331664
Fiber pen red	(2 pieces)	70/00331666
Fiber pen green	(2 pieces)	70/00331667

1. Please specify probe types and measurement ranges in plain text.
2. This extra code is available in combination with supply voltage 110—240V AC, not with low supply voltage. UL approval is not available. The protection type in the carrying case corresponds to IP20, outside IP20D.
3. UL approval is not available.
4. Extra codes are listed in sequence and separated by a comma.