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Logoline 500

Pen recorder with text printing and LED dot-matrix display

Brief description

The LOGOLINE 500 recorder family comprises three pen recorders:

Type LL.v-44u, Type LL.v-44uj and Type LL.v-44ud.

Each 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.

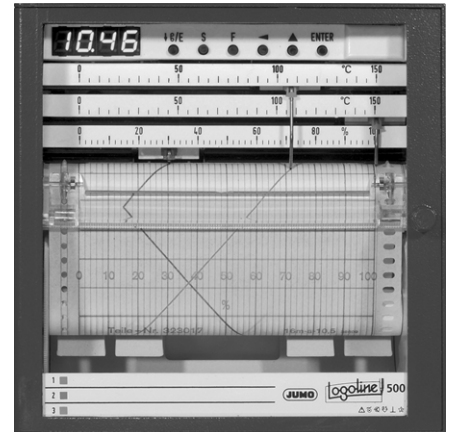
The standard current and voltage signals can be connected on all recorders. On types LL.v-44u and LL.v-44ud, input signals can additionally be from thermocouples, resistance thermometers, resistance transmitters and potentiometers. The necessary linearization is performed automatically.

Optional expansions are available for the types LL.v-44u and LL.v-44ud. 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 recorders by eight switching outputs. A 2-wire transmitter can be operated from an isolated supply.

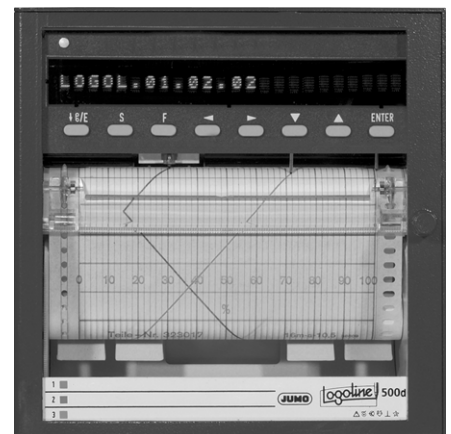
Overview of functions

	LL.v-44u	LL.v-44uj	LL.v-44ud
1/2/3 analog inputs (configurable and electrically isolated)	Thermocouples Resistance thermometer Resistance transmitter Potentiometer Voltage Current	Voltage Current	Thermocouples Resistance thermometer Resistance transmitter Potentiometer Voltage Current
8 logic inputs ¹	for floating contacts or PLC level Functions: - External texts - Binary-linked text - External stop - External speed - Event counter - External scaling - External report		for floating contacts or PLC level Functions: - External texts - Binary-linked text - External stop - External speed - Event counter - External scaling - External report
Outputs ¹	- Interface for 8 relay outputs - Supply for 2-wire transmitter		- Interface for 8 relay outputs - Supply for 2-wire transmitter
Recording	- Measurement traces - Text printing	- Meas. traces - Text printing (restricted)	- Measurement traces - Text printing
Setup interface	for configuration and parameter setting		for configuration and parameter setting
RS422/RS485 interface ¹	Data transfer from and to the recorder		Data transfer from and to the recorder

1. available as an option



Type LL3v-44u/ ...
Type LL3v-44uj/ ...



Type LL3v-44ud/ ...

Applications

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

Approvals



Technical data

Thermocouple input (LL.v-44u and LL.v-44ud)

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 software	
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.

Resistance thermometer input (LL.v-44u and LL.v-44ud)

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 (LL.v-44u and LL.v-44ud)

Range	Accuracy	Measurement current
up to 130Ω	±150mΩ	400μA
up to 390Ω	±300mΩ	400μA
up to 1600Ω	±1.6Ω	50μA
up to 3900Ω	±2 Ω	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	±80μV	>1MΩ
0 – 170mV	±120μV	>1MΩ
-76 to + 76mV	±120μV	>1MΩ
-162 to +880mV	±1mV	>500kΩ
0 – 1930mV	±1mV	>500kΩ
-880 to +880mV	±1mV	>500kΩ
-1.84 to +10V	±6mV	>500kΩ
0 – 22V	±12mV	>500kΩ
-10 to +10V	±12mV	>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	±20μA	
0 – 45mA	±40μA	
-20.5 to +20.5mA	±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 resistance thermometers (for connecting transmitters without linearization)	

Response on transducer short-circuit/break

	Short-circuit ¹	Break ¹
Thermocouple ²	recognized	recognized
Resistance thermometer ²	recognized	recognized
Resistance transmitter ²	not recognized	not recognized
Potentiometer ²	recognized	recognized
Voltage up to 170mV	recognized	recognized
Voltage above 170mV	not recognized	not recognized
Current	0mA is recognized	0mA is recognized

1. On the LL.v-44u and the LL.v-44uj, the fiber pens are positioned to 0%. No message is shown on the 7-segment display.
On the LL.v-44ud, the fiber pens are positioned to 0%. ">>>>>>" appears in the LED dot matrix display.

2. LL.v-44u and LL.v-44ud

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	1 sec 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	2 mm; LL.v-44u and LL.v-44ud: can be corrected by pen offset compensation
Overrun/underrun	electronically limited to 0 – 100 mm writing width
Chart speed	programmable in the steps: 0, 5, 10, 20, 60, 120, 240, 300, 360, 600, 720, 1800, 3600, 7200 mm/h; LL.v-44u and LL.v-44ud: freely programmable in 1 mm/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 120 mm / 100 mm 110 mm roll chart: 60 mm; fanfold chart: 30 – 60 mm roll chart: 16 m or 32 m; fanfold chart: 16 m
Scale	on LL.v-44u und LL.v-44uj, max. 3 scales, white, black figuring
Standard scale graduation	0 – 100%, for other scale graduations see code "sk"

Electrical data

Supply	93 – 263V AC 48 – 63Hz (standard) or 20 – 53V AC/DC 48 – 63Hz (optional)
Electrical safety	to EN 61010, Part 1 of March 1994 overvoltage category II, pollution degree 2
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	AC: 3.7kV 50Hz, 1 min; AC/DC: 510V 50Hz, 1 min AC: 2.3kV 50Hz, 1 min; AC/DC: 510V 50Hz, 1 min 510V 50Hz, 1 min 510V 50 Hz, 1 min 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 with Type LL.v-44ud at the front behind the flip-up dot-matrix display, with Type LL.v-44u, at the right above the measurement channels
EMC - Interference emission - Immunity to interference	EN 61326 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	144 mm x 144 mm
Mounting depth	227 mm
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	3.2 kg 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

LL.v-44u and LL.v-44ud

Chart speeds

The LL.v-44u and LL.v-44ud recorders 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 limits, 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.

LL.v-44uj

This recorder only features the operating mode "normal operation". Zoom and offset functions are not applicable.

Text printing

LL.v-44u and LL.v-44ud

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 texts¹
- 16 binary-linked external texts¹
- Eight relay texts¹
- Event counter¹
- Report
- Print test
- Service print

1. extra code zf is required.

LL.v-44uj

For LOGOLINE 500 junior, text printing is limited to

- Time, date
- Change of chart speed
- Text at recording start and end
- Print test
- Service print.

Printing priorities and the printing mode can not be set.

Extra codes

LL.v-44u and LL.v-44ud

Logic inputs (zf)

Both types can be equipped with eight logic inputs.

The 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 (zf)

An isolated supply for a 2-wire transmitter is available.

24V ± 5% DC 45mA

Serial interface for ER8 (zf)

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.

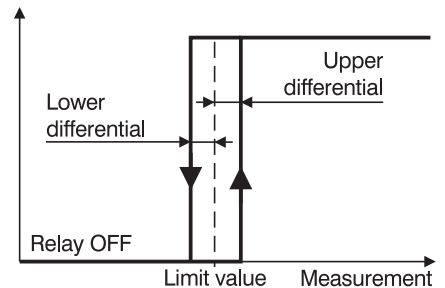
Accessories

LL.v-44u and LL.v-44ud

External relay module ER8

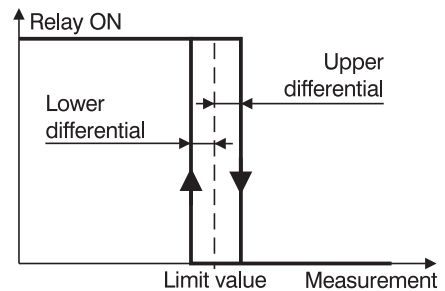
The Types LL. v-44u and LL.v-44ud can be equipped with an external relay module ER8 (eight relay outputs) to monitor the infringement of upper or lower limits. The assignment of the relay outputs to the measurement channels is freely programmable. The limits are set at the parameter level.

Relay function within the measurement range: Ik7, Ik8



Ik7:

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



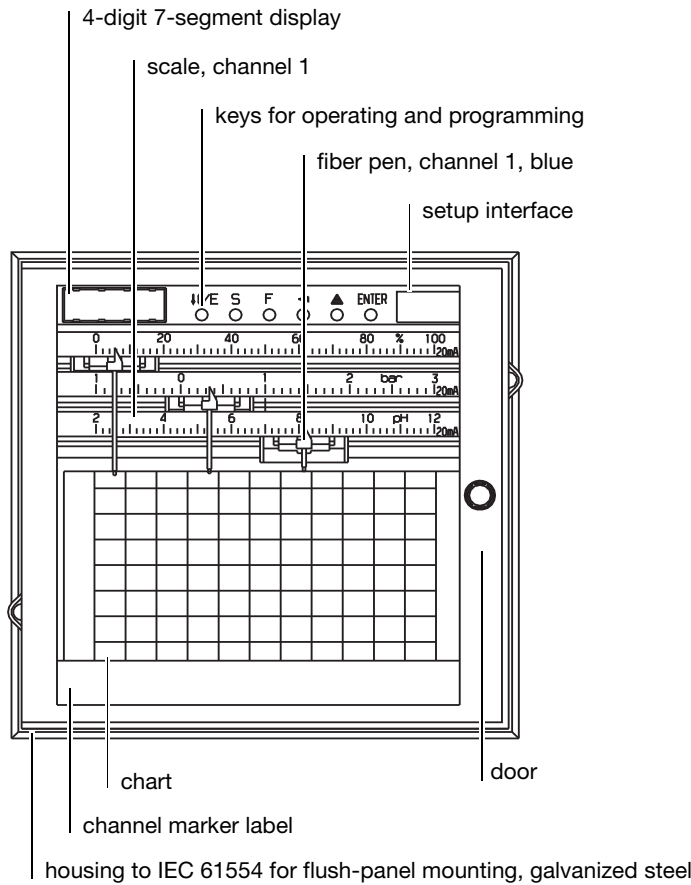
Ik8:

As Ik7, 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 LL.v-44u and LL.v-44uj



Operation and configuration

On the recorder

LL.v-44uj and LL.v-44ud

All parameters can be programmed from the instrument keys. A 7-segment or an LED dot-matrix display are available to monitor the parameters.

LL.v-44u

The following parameters can be altered from the keys:

- Language
- Date and time
- Summer time
- Relay limit settings
- Chart speed
- Print test
- Service print

Via setup program for PC

LL.v-44u and LL.v-44ud

More conveniently than by the instrument keys, all parameters can be configured via the PC 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

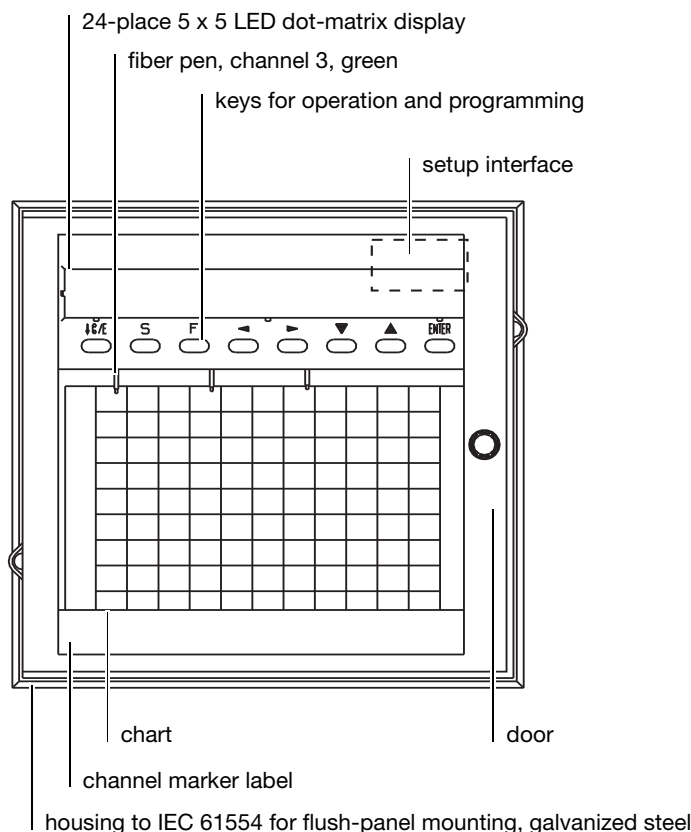
LL.v-44u and LL.v-44uj

The language setting (English, German, French) appears in the print-out only.

LL.v-44ud

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

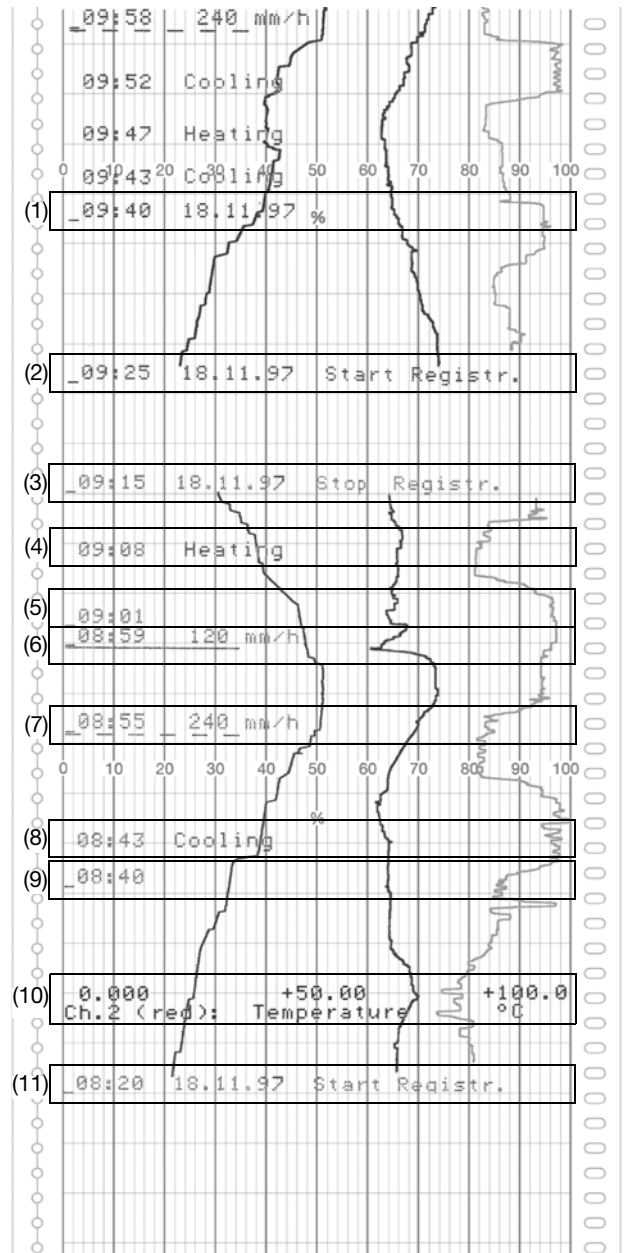
Indications and controls LL.v-44ud



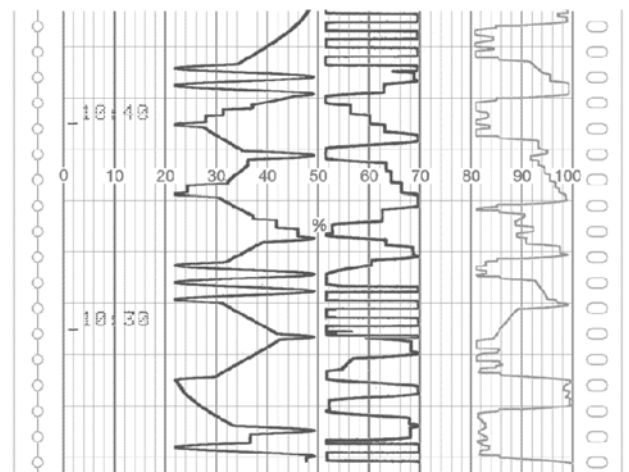
Example of a recording with text print-out for Type LLv-44u (ud)

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

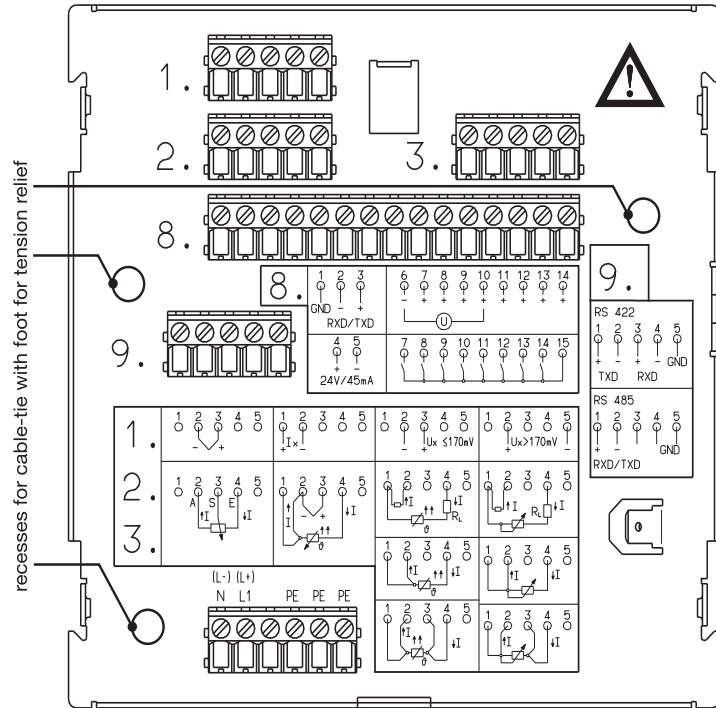


In the example above, the measurement traces are printed out in normal mode, i.e. all traces share the entire width of the chart (0 – 100mm). The presentation range can be selected freely on the chart for each trace. This assists the evaluation, in particular of traces which are close to each other or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



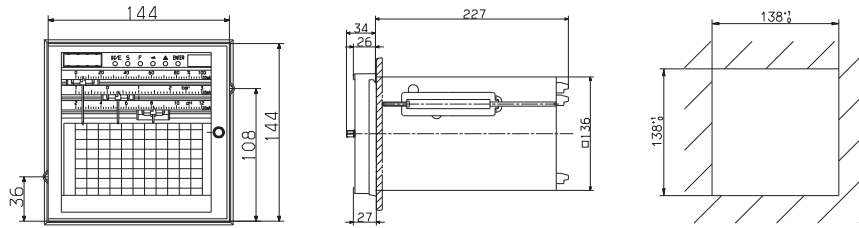
Connection				Diagram
Supply as on label	N neutral L1 line PE protective earth	N (L-) L1 (L+) PE		(L-) (L+) N L1 PE PE PE 1 2 3 4 5 6
Analog inputs	Input 1	Input 2	Input 3	
	Connector	Connector	Connector	
Thermocouple				
Thermocouple with external Pt 100 cold junction				
Resistance thermometer/potentiometer in 2-wire circuit	1.	2.	3.	<p>*$R_{comp} = R_{line}$</p>
Resistance thermometer/potentiometer in 3-wire circuit				
Resistance thermometer/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.	<p>A = start S = slider E = end</p>
Voltage input up to 170mV				
Voltage input above 170mV				
Current input				

		Connector	
External relay module ER8	Communication with external relay module	8.	
Supply for external 2-wire transmitter	24V ± 5% 45mA		
Digital operating inputs	<p>Contact operation LOW = R_{OFF} 100kΩ min. HIGH = R_{ON} 50Ω max.</p>		<p>contact no. 7 = logic input 1 . . contact no. 14 = logic input 8</p>
<p>Min. pulse duration: HIGH 500msec LOW 500msec</p>	<p>Voltage operation LOW = 0 – 5V DC (inactive) HIGH = 20 – 35V DC (active)</p>		<p>contact no. 7 = logic input 1 . . contact no. 14 = logic input 8</p>
Serial interface RS422/RS485	Communication with higher-level systems	9.	<p>RS 422 RS 485</p>

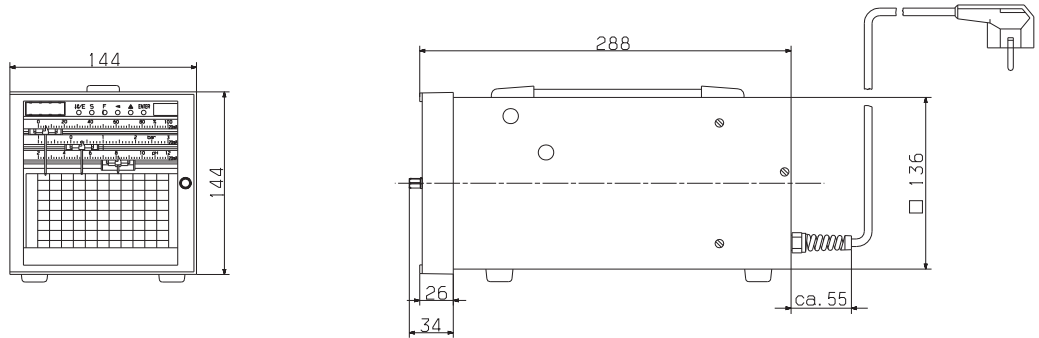
Dimensions

Housing for flush-panel mounting



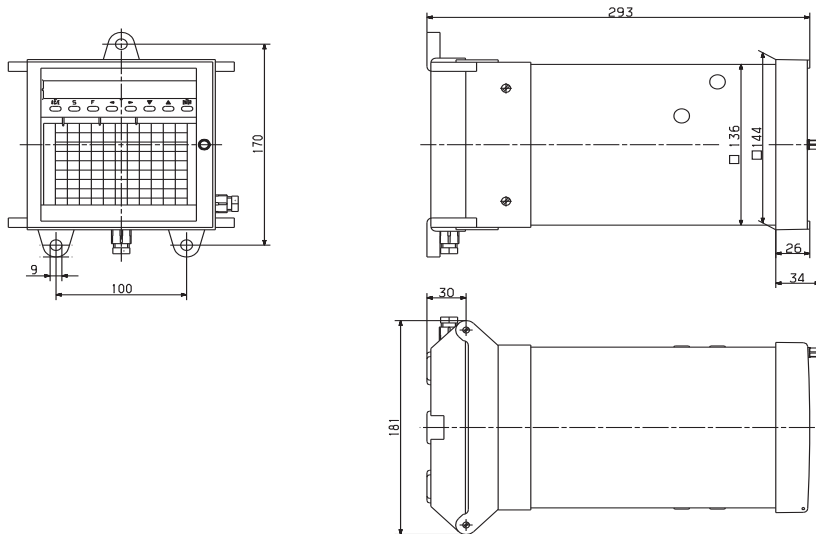
Code tm

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



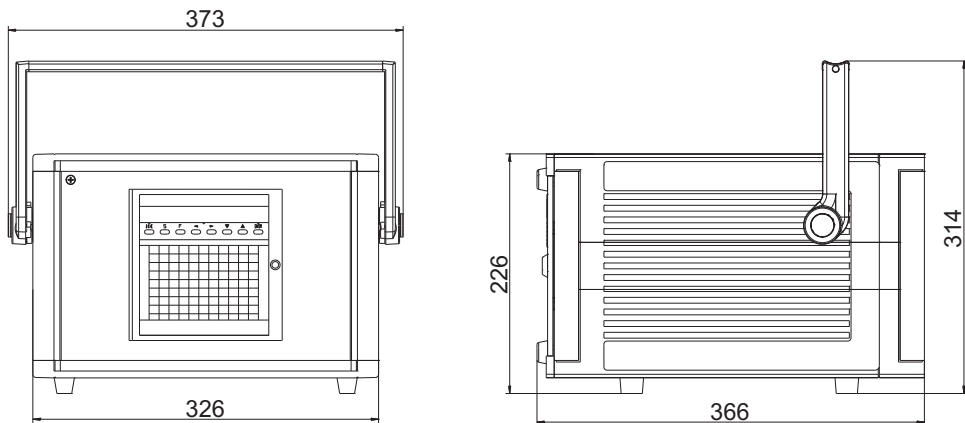
Code ab

Housing for wall mounting. The panel-mounting housing is fitted in a carrier and can be swung out through 90°.



Code TG-35

Portable recorder housing for varying applications in mobile use



Order details

(1) Basic version LOGOLINE 500

LL . v-44u/ ...	pen recorder with scales and universal inputs
1	Input 1 input with text output factory-set configuration to customer specification ¹
2	2 inputs (input 1 with text output) factory-set configuration to customer specification ¹
3	3 inputs (input 1 with text output) factory-set configuration to customer specification ¹

(1) Basic version LOGOLINE 500junior

LL . v-44uj/ ...	pen recorder with scales and inputs for standard signals
1	Input 1 input with text output factory-set
2	2 inputs (input 1 with text output) factory-set
3	3 inputs (input 1 with text output) factory-set

(1) Basic version LOGOLINE 500d

LL . v-44ud/ ...	pen recorder with display and universal inputs
1	Input 1 input with text output factory-set configuration to customer specification ¹
2	2 inputs (input 1 with text output) factory-set configuration to customer specification ¹
3	3 inputs (input 1 with text output) factory-set configuration to customer specification ¹

(2) Interface

x	x	RS422	for communication with higher-level systems
x	x	RS485	for communication with higher-level systems

(3) Extra codes

x	x	sk	special scales, e. g. m ³ /h, bar etc.	
x	x	zf	extra functions: 8 logic inputs, serial interface for external relay module ER8, electrically isolated 24V/50mA DC supply for 2-wire transmitter	
x	x	c	storage capacitor (ex-factory: lithium battery)	
x	x	x	fp	cassette for fanfold chart 16m long
x	x	x	r32	roll chart 32m long
x	x	x	ab	housing for wall mounting (the panel-mounting housing can be swung out through 90° in the carrier) ²
x	x	x	tm	housing with carrying handle, rubber feet and terminal cover, also 3m mains supply cable with SCHUKO plug ²
x	x	x	TG-35	portable case for recorder ³
x	x	x	ts	door with lock (IP54)
x	x	x	IP65	IP65 seal, wide mounting brackets

Order code

Order example



1. Please specify probe type and range in plain text.
 2. UL approval is not available.
 3. This extra code is available in combination with supply voltage 93—263V AC, not with low supply voltage. UL approval is not available. The protection type in the carrying case corresponds to IP20, outside IP20D.
 4. List extra codes in sequence, separated by commas.

Standard accessories

	LOGOLINE		
	500	500junior	500d
1 Operating Instructions	B 70.6001	B 70.6011	B 70.6021
2 mounting brackets	X	X	X
cable-tie with foot (can be released), for strain relief of the connected sensor leads	X	X	X
1 disposable fiber pen per channel	X	X	X
2 chart rolls 16m long or 1 chart roll 32m long (with code r32) or 1 fanfold chart pack 16m long (with code fp)	X	X	X

Accessories

	LOGOLINE		
	500	500junior	500d
PC interface with TTL/RS232 converter	X	—	X
Setup program on 3.5" diskette (2 items)	X	—	X
External relay module ER8 (code zf is required)	X	—	X

X = possible

— = not possible

Order examples

Order details	Description	LOGOLINE		
		500	500junior	500d
LL3v-44u/ts,fp,tm LL 3 v-44 u ts fp tm	pen recorder 3 channels amplifier and bezel size 144mm x 144mm version with scales and universal measurement inputs door with lock (IP54) cassette for fanfold chart house with carrying handle, rubber feet and mains supply cable	X		
LL1v-44uj/TG-35 LL 1 v-44 uj/ TG-35	pen recorder 1 channel amplifier and bezel size 144mm x 144mm version with scales and standard signal input (current/voltage) portable case		X	
LL2v-44ud/zf,RS485 LL 2 v-44 ud zf RS485	pen recorder 2 channels amplifier and bezel size 144mm x 144mm display version with universal measurement inputs 8 logic inputs, supply for 2-wire transmitter and interface for ER8 serial interface for communication with higher-level systems, such as bus system or PC			X