

LineMaster 200

Continuous-line Recorder



1... 4 measuring channels

With text printout (optionally)

Format 144 mm x 144 mm, installed depth 250 mm

Combined chart unit

— For roll chart (32 m) or folded chart paper (16 m)

RS 485 interface for configuration and measuring data readout

Measuring channels electrically isolated and ungrounded

2 limit values per channel

2 event markers

The LineMaster 200 is a microprocessor-based continuous-line recorder. It is supplied in two different versions:

- 1 ... 4 measuring channels
- 2 ... 4 measuring channels with text printout

For version with text printout, the text is printed out on the violet channel. This measuring channel is excellently suitable for recording gradually changing variables such as temperature, level, etc. Recording is effected as a multipoint line with equidistant spacing.

The recorder is connected to a transmitter and/or directly to thermocouples or resistance thermometers.

The recorder is tailored to the given measuring task by means of the software. The parameter is defined using the internal key pad or the PC together with the parameterization program PARALINE 200 via the RS 485 interface.

Additional functions such as the text printout and event markings enhance the inflow of information on the logged process variables. Alarm signalling and remote control features contribute to make the LineMaster 200 a versatile device.

Technical data

Measurement component

Error limit acc. to IEC 484, referred to the nominal range

LineMaster 200	class 0.5
LineMaster 200P	class 0.5 for measuring channel blue, red and green class 1 for violet measuring channel

Where lower-range value and/or upper-range value shifted, additionally

$$\pm (0.1\% \times \frac{\text{nominal range}}{\text{scale span}} - 0.1)$$

Dead zone: 0.25 % of scale span

Response time: 2 s

Measured value damping

with 1st-order low-pass; time constant 0...60 s
per measuring channel, parameterizable

Measurement variable / nominal ranges

Standard version

Direct current

0...20 mA; R_i approx. 50 Ω
4...20 mA; R_i approx. 50 Ω
± 20 mA; R_i approx. 50 Ω

Direct voltage

± 10 V, $R_i = 1$ M Ω

Universal version

Direct current

0...20 mA; R_i approx. 50 Ω
4...20 mA; R_i approx. 50 Ω
± 20 mA; R_i approx. 50 Ω

Direct voltage

± 75 mV, $R_i \geq 2$ M Ω

± 20 V, $R_i > 200$ k Ω

Thermocouples, $R_i \geq 2$ M Ω

Type B 100...+1820 °C

Type E 0...+1000 °C

Type J 0...+1200 °C

Type K 0...+1372 °C

Type L 0...+ 900 °C

Type N 0...+1300 °C

Type R 0...+1769 °C

Type S 0...+1769 °C

Type T 0...+ 400 °C

Type U 0...+ 600 °C

Reference junction internally or externally parameterizable,
sensor monitoring parameterizable

Resistance thermometers

Pt 100 in 2- or 3-wire circuits

-50...+500 °C, -50...150 °C

Line resistance max. in 2-wire circuit: 10 Ω
3-wire circuit: 40 Ω

Measuring ranges

Lower-range value of 0...80 % of respective nominal range parameterizable

Span of 20...100 % of respective nominal range parameterizable

Root-extraction function in direct current and direct voltage nominal ranges parameterizable

Effects

Temperature

$$[\pm 0.2 + (0.05 \times \frac{\text{nominal range}}{\text{scale span}} - 0.05)] \% / 10 \text{ K}$$

± 1 °C / 10 K for internal reference junction correction

Reference temperature 25 °C

Supply voltage

0.1 % for 24 V, -25 % ... 85 V, +10 % UC

0.1 % for 95 V, -10 % ...240 V, +10 % UC

Parasitic voltage

0.5 % of measuring span

External magnetic field 1 mT

0.5 % of measuring span

Mechanical capability

during and after effect ± 0.5 % of measuring span

Recording

Scale

one graduation depending on measuring system

Scale plate width: 5 mm

Character size: 2 mm

Operating and display panel (only for parameter-setting)

Display

5-digit 7-segment display

Character size 4 x 7 mm

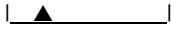

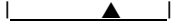
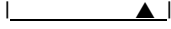
Operation with 3 keys

Recording


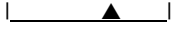
Arrangement of measuring elements and colour assignment:

Version without printer channel

LineMaster 200 Number of line channels

	1	2	3	4
 green			x	x
 red		x	x	x
 blue	x	x	x	x
 violet				x

LineMaster 200P Number of line channels

	1	2	3
 green			x
 red		x	x
 blue	x	x	x
 violet (text printout)			

Trend recording

Fibre-tip recording pen with reservoir,

distance between tips of fibre-tip recording pens 2 mm

capacity approx. 1.4 ml, trace length approx. 1300 m

Printing

In addition to trend recording, the violet measuring channel can be used to printout texts.

Trace spacing between the green, red and blue channels: 2 mm.

Trace spacing between the blue and violet channels: 6 mm.

The measured value of the violet channel is recorded in the form of a multipoint line with equidistant spacing.

Ink reserve of the print head is 1.5×10^6 dots approx.

Technical data

Text printing for:

1. Eight text lines with 16 characters each.
A time printout is appended to each text line. Initiation, cyclic, at parameterizable intervals or event-dependent by way of internal alarm values or external actuation (binary inputs).
2. Printout, paper feed, date and time
Initiation when recorder is switched on and on paper feed switchover.
3. Printout of time and date
Initiation cyclic, at parameterizable intervals or event-dependent by external actuation.
4. Printout of current measured values.
Initiation cyclic, at parameterizable intervals or event-dependent by internal/external actuation.
5. Printout of double lines allocated to measuring points.
First line: Scaling line with channel identification and printout of unit.
Second line: Measuring point-specific text with max. 32 characters.
6. Listing of all active parameters.
Initiation manual in parameter-setting mode.

Text printing

Only possible at paper feeds ≤ 240 mm/h

Font size

Approx. 1.5 x 2 mm

Chart speed

0/2.5/5/10/20/30/60/120/240/300/600/1200 mm/h
external changeover for optional speed

Charts

32 m roll chart or 16 m fouled chart

Visible chart length

60 mm

Recording width

100 mm (chart width 120 mm, DIN 16 230)

Chart feed-in (with continuous rollpaper)

via automatic take-up reel
(daily chart tear-off or take-up of 32 m possible)

Power supply

Power supply unit

95 V, -10 % ... 240 V, +10 % UC

24 V, -25 % ... 85 V, +10 % UC

Frequency range: 47.5...63 Hz

Power consumption:

at max. complement approx. 20 W / 25 VA

RS 485 interface

- a) for parameter-setting
- b) link to higher-order systems for bidirectional data transmission.
The data protocol is based on the PROFIBUS standard.

Options

Alarm value monitoring

- 2 alarm values per channel for absolute value monitoring
- 4 internal relays can be freely assigned to the alarm values

Output

Floating contact (the contacts are interconnected)

Contact load

30 VA/100 mA; $\cos\phi \geq 0.5$ (only permissible for connection of functional extra-low voltage circuits)

Event marking (only version with printer channel)

- 2 markers possible
- Recording at approx. 2 % and 5 % recording width
- Control voltage 24 V DC/6 mA external

External speed changeover

Control voltage: 24 V DC/6 mA external

Standby function

Control voltages: 24 V DC/6 mA external

General and safety data

Environmental capabilities

Climatic category 3K3 acc. to DIN IEC 721-3-3

Ambient temperature

0...25...50 °C

Transport and storage temperature

-40...+70 °C

Relative humidity

- ≤ 75 % annual average, max. 85 %
- Avoid condensation. Pay attention to air humidity on recording paper acc. to DIN 16 234

Mechanical capabilities

Tested acc. to DIN IEC 68-2-27 and DIN IEC 68-2-6

During transportation

Shoc 30 g/18 ms

Vibrations 2 g/5...150 Hz

In operation

Vibrations 0.5 g / ± 0.04 mm / 5...150 Hz / 3 x 2 cycles

Electromagnetic compatibility

The protection objectives of the EMC regulation 89/336/EEC on interference suppression acc. to EN 55 011 and regarding interference immunity acc. to EN 50 082-2 are met.

Radio interference suppression acc. to EN 55 011

Limit value class B

Postal Office Directive 243/92

Technical data

Interference immunity: Tested acc. to IEC 801

Type of test	Test intensity	Effect	Severity
Burst (5/50 ns) on mains line measuring line	2 kV	≤ 1 %	3
	1 kV	≤ 1 %	3
Surge (1.2/50 µs) on mains line common differential	2 kV	≤ 1 %	3
	1 kV	≤ 1 %	2
HF field radiated 80 MHz...1 GHz conducted 0.15...80 MHz	10 V/m	≤ 1 %	3
	10 V	≤ 1 %	3
1 MHz pulse on mains line common differential	2 kV	≤ 1 %	3
	1 kV	≤ 1 %	3
ESD (1/30 ns)	6 kV	≤ 1 %	3

The NAMUR industrial standard RMC are met.
(Interface lines shielded)

Permissible parasitic voltages

	Standard version	Universal version
Serial parasitic voltage Peak to peak	< 0.3 x span max. 3 V	≤ 3 x span max. 3 V
Normal mode rejection	35 dB	35 dB
Common mode parasitic voltage	60 V DC 250 V AC	60 V DC 250 V AC
Common mode suppression	83 dB for DC 96 dB for AC	83 dB for DC 96 dB for AC

Electrical safety

Tested to DIN EN 61 010-1 (classification VDE 0411)
or IEC 1010-1

Class of protection: I

Overvoltage category

III at mains input
II at inputs and outputs

Degree of pollution: 2 within the device and at the terminals

Test voltage

3.75 kV measuring channels against power supply
2.20 kV earthing conductor against power supply

Functional extra-low voltage (PELV)

between mains input – measuring channels, control lines,
interface lines

to VDE 0100 part 410 and VDE 0106 part 101

Connection, housing and mounting

Electrical connections

Degree of protection IP 20

Threaded-head terminals for measuring inputs,
control inputs and alarm value relay outputs.

Max. wire cross-section 2 x 1 mm²

Screw terminals for mains connection

Max. wire cross-section 1 x 4 mm²

RS 485 interface via 9-pin SUB-D connector

Housing

Moulded plastic for panel and mosaic panel field mounting
(dimensions see dimensional drawing)

Degree of case protection acc. to IEC 529

Front IP 54; Rear IP 20

Case colour

Pebble grey to RAL 7032 (H&B design)
or grey-white to RAL 9002 (ABB design)

Case door

Moulding material

Option: metal frame door with glass (H&B design)
or metal frame door with plastic window (ABB design)

Case mounting

with 2 fasteners (optionally for panel or mosaic panel field
mounting) for max. mosaic grid width of 40 mm,
centering brackets required for mosaic panel field mounting,
see Code-No. 605

Mounting orientation

lateral (-30°...0...+30°), inclination towards the back 20°,
towards the front 20°

Mounting distance

horizontal or vertical 0 mm, case door must open at 100°

Weight: approx. 3.5 kg

Setting basic parameters

If no individual parameter-setting is requested when a recorder is
ordered, the LineMaster 200 is supplied with the following parameter
setting:

All measuring channels with measuring range 0...20 mA

Speed 1: 20 mm/h

Speed 2: 120 mm/h

Speed 3: off

Alarm values are set at end positions (0 and 20 mA)

Measured value damping, zoom, printer and alarm value
functions are deactivated

No password assigned

These parameter settings can be initialized at any time with
the recorder in service mode

Basic standards**A) International standards**

IEC 484	DIN 43 782	Compensation recorders
IEC 1010-1	DIN EN 61 010-1	Electrical safety (Test voltages)
IEC 664	VDE 0110	Insulation class
IEC 68-2-6	DIN IEC 68-2-6	Mechanical capabilities (Vibrations)
IEC 68-2-27	DIN IEC 68-2-27	Mechanical capabilities (Shoc)
IEC 529	DIN 40 050	Degree of protection
IEC 801	DIN VDE 0843	Immunity to electro- magnetic interference against electromagnetic influences
EN 60 801		
IEC 721-3-3	DIN IEC 721-3-3	Environmental capabilities
IEC 742	DIN EN 60 742	VDE 0551 classification
		Safety transformer

Technical data

D) German standards

DIN 16 234	Recording paper
DIN 43 802	Scales
DIN 43 831	Cases

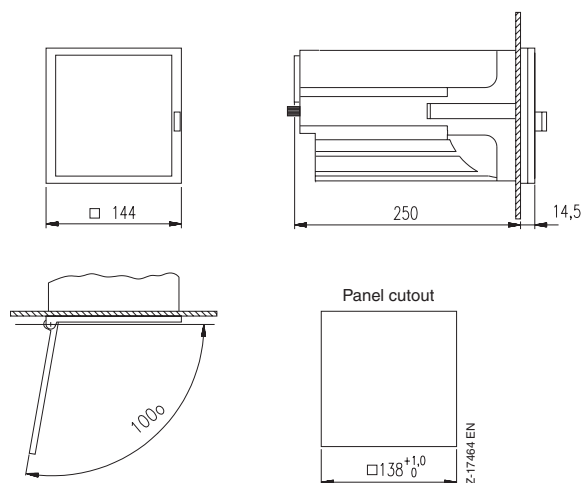
Basic supply (part of delivery scope)

- 1 Operating Manual
- 2 Fastening elements
- 1 Roll chart or folded package, already placed in unit
- 1 Fibre-tip recording pen per measuring channel
- 1 Ink head (for recorder version with printer channel)

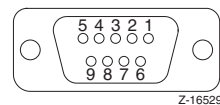
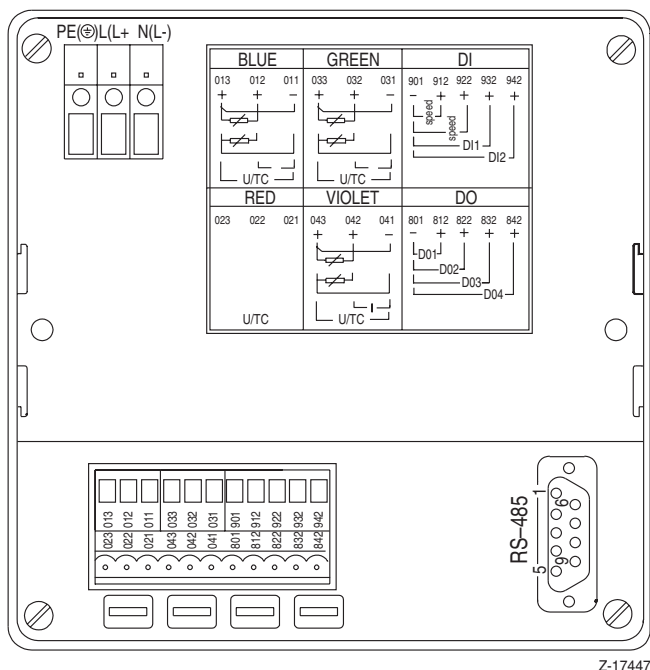
Additionally, according to order:

Centering brackets for mosaic panel field mounting, ruler(s)

Dimensional diagram (dimensions in mm)



Connection diagrams



RS 485 interface

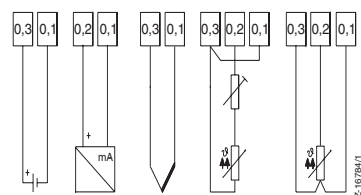
- Pin 1: Shield
- Pin 3: RXD (+)
- Pin 5: Gnd (reference potential)
- Pin 6: + 5 V
- Pin 8: RXD (-)

For bus operation:

The + 5 V voltage on Pin 6 is required when the LineMaster 200 is used as a bus terminal unit.

The shield is located against a blade-type terminal located on the recorder case.

Signal inputs



Limit alarm values

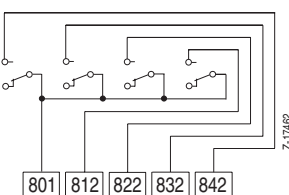
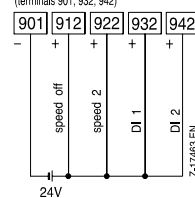


Chart speed changeover (terminals 901, 912, 922)
Binary inputs =
Depending on the parameter definition
for event markers – initiation text printout
(terminals 901, 932, 942)



Ordering information																		
							Catalog No.				Code							
Continuous-line Recorder LineMaster 200							V43011A-											
Standard colour RAL 7032 (pebble grey)																		
Version																		
LineMaster 201		1 measuring channel		1														
LineMaster 202		2 measuring channels		2														
LineMaster 203		3 measuring channels		3														
LineMaster 204		4 measuring channels		4														
LineMaster 202P with text printout		2 measuring channels		5														
LineMaster 203P with text printout		3 measuring channels		6														
LineMaster 204P with text printout		4 measuring channels		7														
Measuring range																		
Standard:				1														
0...20 mA; 4...20 mA; ± 20 mA and ±10 V for all channels																		
Universal:																		
Direct current, direct voltage, thermocouples, Pt 100																		
(2- and 3-wire circuit)																		
for 1 measuring channel				2														
for 2 measuring channels				3														
for 3 measuring channels				4														
for 4 measuring channels				5														
Power supply																		
95 V...240 V AC/DC				5														
24 V...85 V AC/DC				6														
Recording																		
on rolled chart paper (32 m)				1														
on folded chart paper (16 m)				2														
Case¹⁾																		
RAL 7032 with moulded door, H&B design				1														
RAL 7032 with metal frame door (glass window), H&B design				3														
RAL 9002 with metal frame door (plastic window), ABB design				4														
Large case format ³⁾ (W x H) 192 mm x 288 mm																		
Front bezel in RAL 9005 (black)				9														
Parameter definition²⁾																		
Standard				1														
as specified				2														
Alarm monitoring and binary inputs																		
without				0														
with				1														
Create the required Code No. for each channel																		
Line channel																		
for measuring channel blue				3														
for measuring channel red				4														
for measuring channel green				5														
for measuring channel violet				6														
Scale graduation (character height 2 mm, Scale height 5 mm)																		
without				4	0													
0...100				4	1													
as specified				4	2													
acc. to MVO specifications (in connection with Code No. 627)				4	4													
Ruler																		
as scale graduation				4	9													

The three-digit Code Numbers should be appended to the Catalog Number - separated by a slash

¹⁾ H&B design with CE-Approval

²⁾ If user-specific parameter definition: parameter definition software and adapter set see Data Sheet 41-2.15 EN

³⁾ Large case format only with roll paper. No design modifications possible.

Additional Ordering information					
			Code		
Labelling of the tag name plate					
Character height 3 mm (max. 64 characters per tag)					
for channel blue (clear text)			5	7	2
for channel red (clear text)			5	7	5
for channel green (clear text)			5	7	8
for channel violet (clear text)			5	8	1
Case colour (for H&B design only)					
RAL 7037 (pebble grey)			6	1	1
RAL 9005 (black)			6	1	2
Design					
prepared for upgrade to 4 measuring systems, standard version			6	1	8
prepared for upgrade to 4 measuring systems, universal version			6	1	9
with compact connector for main and measuring lines			6	2	0
Special versions					
version for heater plants acc. to MVO (German Milk Regulation)			6	2	7
MVO parameterization 1 (short-term heating)			D	E	1
MVO parameterization 2 (high temperature heating)			D	E	2
Accessories					
4 centering brackets (for rack mounting)			6	0	5
Surface mounting console for wall mounting			6	0	1
Case version					
Portable version:					
type of protection IP 54			6	2	4
type of protection IP 20 (with 2 m connection cable for power supply)			6	2	5
Clock buffering					
lithium battery			6	2	9
Operating Manual¹⁾					
German (pieces)			Z	2	D
English (pieces)			Z	2	E
French (pieces)			Z	2	F
Certificates					
Constructor's test certificate M acc. to DIN 55350-18-4.2.2					
and inspection certificate B acc. to EN 10204-3.1B			6	9	9

The three-digit Code Numbers should be appended to the Catalog Number - separated by a slash

¹⁾ 1 copy on german included in scope of delivery; No. specific order required; a charge will be made for additional copies of the Operating Manual (please specify number required)

Consumables			
	Catalog No.		
Fibre-tip insert for LineMaster 200			
violet	43482-0319134		
blue	43482-0319133		
red	43482-0319132		
green	43482-0319131		
Ink head (for printer channel)	43481-0319135		
Roll chart paper (only supplied in packs of 10)			
graduation 0...100, with hourly time imprint for 20 mm/h	V40920-3000505		
graduation 0...100, without time imprint; with baselines	V40920-3000150		
Folded chart paper (only supplied in packs of 10)			
graduation 0...100, with hourly time imprint for 20 mm/h	V40926-3000502		
graduation 0...100, without time imprint; with baselines	V40926-3000103		

Other chart paper see Data Sheet 49-9.10 EN

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