Line and multipoint recorders SIREC

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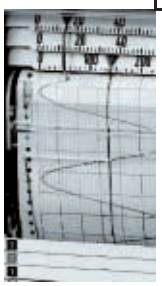

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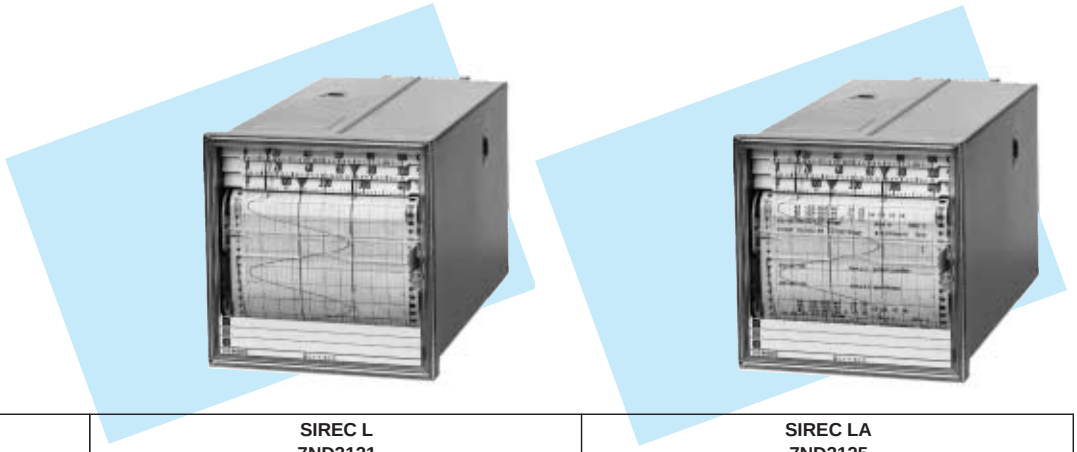
	SIMATIC PDM software for parameterizing of SIREC L/LA/P/PA/PU see catalog FI 01

Summary of line recorders



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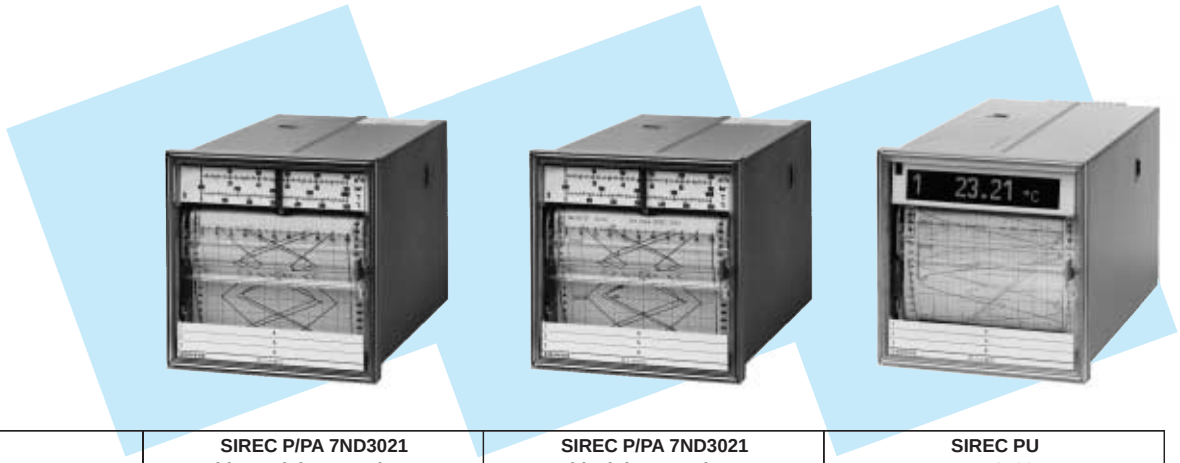
	SIREC L 7ND3121 Page 2/7	SIREC LA 7ND3125 Page 2/7
Format Class	144 x 144 0.5	
Microprocessor-based Analog inputs	■ 1, 2 or 3	
Digital inputs/outputs Measured variable	4/6 U/I DC, temperature (thermocouple, resistance thermometer), resistance (2- or 3-wire)	
Measuring ranges Operating modes	Freely-adjustable Curves	Curves, tables, texts, symbols
Recording method Chart paper	Fiber pen Roll or fanfold pack	
Recording width Number of colors	100 mm 3	3 and black (for alphanumeric text)
Text printout Date and time printout	– –	■ ■
Alarms Alarm text	6, freely-programmable –	■
24 V DC output Zooming	■ ■	
PC connection (software) Interface	PC interface at front Digital input/output	
Power supply Mounting	AC 24 V, 115 or 230 V, DC 24 V Sheet-steel panel, desk upright panel or cabinet, panel with 72 x 72 grid	
Installation without interspacing	■	

Summary of multipoint recorders



	SIREC P/PA 7ND3021 Without alphanumeric text Page 2/17	SIREC P/PA 7ND3021 With alphanumeric text Page 2/17	SIREC PU 7ND3523 Page 2/24
Format Class	144 x 144 0.5		
Microprocessor-based Analog inputs	■ 6		
Digital inputs/output Measured variables	4/6 U/I DC, temperature (thermocouple/resistance thermometer), resistance (2- or 3-wire)		4/6 U/I DC, temperature (thermocouple)
Measuring ranges Operating modes	Curves	Freely-programmable Curves, tables, texts	Display, curves, tables, texts
Recording method Chart paper	Fiber pen Roll or fanfold pack		
Recording width Number of colors	100 mm 6		
Text printout Scale printout	–	■ –	■ ■
Date and time printout Alarms	6, freely-programmable	■	2 per channel
Math. functions Alarm text	–	Per channel	■
Alarm linking Zooming	–	■	■
Zoning Remote operation	– –		■ ■
PC connection (software) Line recorder function	PC interface at front Dot-joining		
Interface Storage (short-term)	Digital input/output –		■
Power supply Operator prompting	AC 24 V, 115 or 230 V, DC 24 V ■		
Mounting Installation without interspacing	Sheet-steel panel, desk upright panel, cabinet, panel with 72 x 72 grid ■		

Technical explanations

The range of flush-mounted recorders comprises two line recorders and three multipoint recorders with a standardized format of 144 x 144 mm.

Fiber pens are used for recording. The recorders are characterized by a robust design and programmable parameters. The recording is largely independent of the position, and the recorders are easy to service.

Recording method

With the fiber pen recording, the reservoir and fiber tip are combined in one assembly. Violet, red, black, green, blue and brown pens are available for the multipoint recorders, and blue, red, green and black (for alphanumeric text) pens for the line recorders.

Design

Front door
  Plastic with catch or with
  catch and lock
Sheet-steel housing
  Color: RAL 7037, dust gray

Front dimensions to DIN 43 831. Dimensions and panel cutouts are specified with the respective recorders.

Error limits and interference suppression

The recorders comply with class 0.5 of the regulations for electrical measuring instruments. Any differences are listed in the Technical data.

The interference suppression St_U is specified in decibels. It is determined according to the following equation:

$$St_U = 20 \cdot \log_{10} \frac{U_{St}}{U_{Sig}} \text{ dB}$$

U_{St} Measured value of the interference signal
U_{Sig} Determined value of the wanted signal

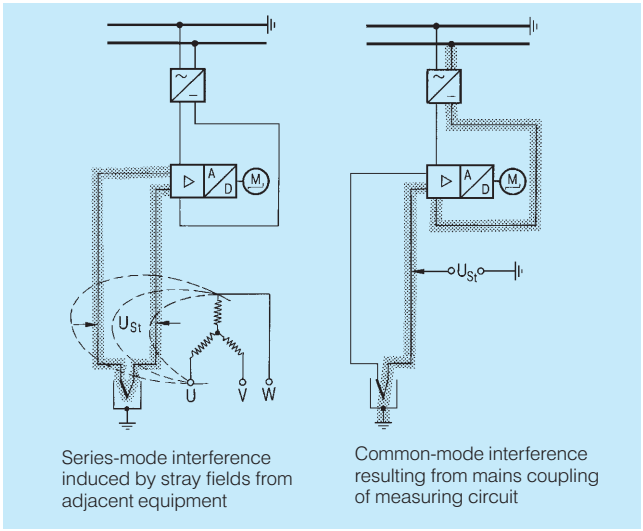


Fig. 2/1 Generation of interference signals

The worst condition is used in each case for the frequency and phase position of the interference. Since there are two manners in which the interference can affect the measuring circuit (common-mode or series-mode), two values in decibels are always required to completely specify the interference suppression.

The increasing energy density in modern plants means that it is advisable to suppress at least the induced series-mode interference at the point of occurrence (e.g. using commercially available contactors).

Limit monitoring

Limit monitoring functions output a binary signal when programmed limits are violated.

Up to 6 limits (opto isolator or relay outputs, freely-assignable) can be programmed.

Line recorders

The measured values are recorded as a continuous trace by fiber pens. Unsteady variables (e.g. pressure and flow) can be damped by a programmable filter (low-pass).

Multipoint recorders

The measured values for each channel are recorded as dots by a fiber pen (dotted line).

The individual measured values can be displayed as a continuous trace using a programmable dot-joining technique.

Input range

The input range is the electrical range of the instrument amplifier (measuring limits). The ranges are adapted using plug-in jumpers, and also by programming for certain ranges.

Example:
a): – 20 mA to + 20 mA for DC I as measured variable
b): – 100 mV to + 100 mV for TC, type J

The recording properties (measuring accuracy) of the instruments always refer to the input range.

Measuring range

Example:

a): For DC U/I as measured variable:
Measuring range = input range
e.g.: – 20 mA to + 20 mA

b): For direct connection of TC/RTD/R:
The measuring range is the range assigned to the input range (with linearization for TC and RTD).
e.g.: – 210 °C to + 1200 °C for TC, type J

Recording range

The recording range defines the part of the measuring range which is recorded over a width of 0 to 100 mm. The recording range is freely-programmable within the measuring range.

Example a) Measuring range: -20 to +20 mA
Recording range: +2 to +18 mA
b) Measuring range: 10 to 300 °C
Recording range: 20 to 180 °C

To permit easier operation, typical recording ranges are stored as "Fixed ranges".
Examples: 0/4 to 20 mA
0/2 to 10 V

Scale range

Easily-replaceable scales can be used to assign the scale range (graduation and dimension) to the recording range.

Standards

The recorders comply with the following standards:

- Housing: DIN 43 700, DIN 43 831
- Scales: DIN 43 790, 43 802
- Error limits: IEC 484 (DIN 43 782)
- Degree of protection: IEC 529 or EN 60 529
- Climate: IEC 68-2-1/2
- Mechanical stress: IEC 68-2-6
- Electric protection: IEC 1010-1 (EN 61 010-1, VDE 0411 Part 1)
- Electromagnetic compatibility: the protection objectives of the EMC guideline 89/336/EEC with respect to interference suppression to EN 50 081-1 and noise immunity to EN 50 082-2 of 03/95 are complied with.
- Interference suppression: VDE 0875 Part 11 (CISPR 11)
- Noise immunity: IEC 1000-4-...

Chart drive

A program-controlled stepping motor is responsible for the time-synchronous chart drive. The drive controls a sprocket wheel, and the sprockets engage in the perforations of the chart paper and thus transport the latter.

The chart paper is tightened in the longitudinal direction by a take-up spool driven by the drive via a slip coupling.

Time marking

For recorders without a text output, program-controlled time markers are recorded on the right edge of the chart every hour. The set chart speed can then be determined when evaluating the recording.

For recorders with a text output, the time is printed out at the left edge of the recording by means of the real-time scale clock.

Chart paper

Chart paper for line and multipoint recorders.

The absorptive capacity of the ink paper is optimally matched to fiber pens and recording heads. The paper has a very smooth surface so that the frictional resistance of the fiber pens is low.

Types of chart paper

Roll: low-price recording with greatest possible visible trace length.
Fanfold: fast access possible even to recordings made a long time earlier. Easy finding of specific positions by flipping through like in a book.

Chart paper graduations

(see Fig. 2/2 for example)

■ Range graduation
The recording width is divided linearly by longitudinal lines. Every fifth line is thicker than those in between.

Please contact us if you require chart paper with a non-linear range graduation or with printed text at regular intervals – e.g. range numbers, dimensions and measuring point names.

Blank chart paper can also be used for the SIREC LA and P/PA.

■ Time graduation
The line and multipoint recorders are supplied with chart paper with a time graduation, but without the printing of hours.

Blank chart paper can also be used for the SIREC LA and P/PA.

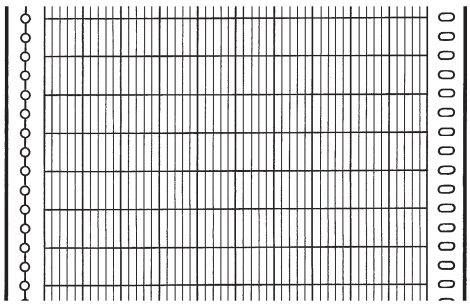


Fig. 2/2 Chart paper 120 mm wide, recording width 100 mm, 50 linear divisions (scale approx. 1:2)

Parameterization software

The SIMATIC PDM software permits you to use your PC for convenient dialog with the line and multipoint recorders.

Ordering information

Standard models are listed in the Ordering data. The technical data contain additional data for further designs, e.g. applications and power supply.

If designs are required for which no information is included in the technical data, please inquire whether the desired model is technically possible.

When ordering, please state:

- Order No.
- Order code, if applicable, according to table or as plain text (supplement Order No. with "-Z" in this case)
- Any plain text required for inscription of measuring point label or information on the recording ranges and scale graduations.

Recorders can also be delivered with measuring ranges other than those offered. However, the input ranges of these recorders must lie within the technical limits of the associated recorder.

Example for ordering:

Required recorder:

SIREC L line recorder 7ND3121
Format 144 x 144
For installation in sheet-steel panel
Power supply AC 50 Hz, 220 to 240 V

3 channels

Channel 1:	Recording range DC 0 to 1 V, scale 0 to 100 %, direct connection
Channel 2:	0 to 300 °C Sensor: Pt 100 resistance thermometer, connection via transmitter, output (recording range) DC 0 to 20 mA, temperature-linear
Channel 3:	Recording range DC 4 to 20 mA, scale 30 to 80 bar

6 electronic alarm outputs

Measuring point label inscribed "Water pump" (channel 1), "Inlet temperature" (channel 2), "Boiler pressure" (channel 3)

The Ordering data for this recorder must then be as follows (according to pages 2/13 and 2/15):

Order No.:	7ND3121-1CA21-3NA9-Z
Order codes:	R1Y + Y05 + Y01 + Y02
Plain text:	Scale graduation: Channel 1: 0 to 100 % Channel 2: 0 to 300 °C Channel 3: 30 to 80 bar Measuring point inscription: Channel 1: Water pump Channel 2: Inlet temperature Channel 3: Boiler pressure

Note:

The following designations are used in this section for the signal modules/measured variables:

DC U/I:	DC voltage/direct current
RTD:	Resistance temperature detector (resistance thermometer)
TC:	Thermocouple
R:	Resistance

Line recorder 144 x 144

Microprocessor-based line recorder 144 x 144 Single-channel, dual-channel or three-channel recorder, class 0.5 With fiber pen recording Input variables DC U/I/TC/RTD/R

SIREC L (7ND3121) Without text output

SIREC LA (7ND3125) With text output

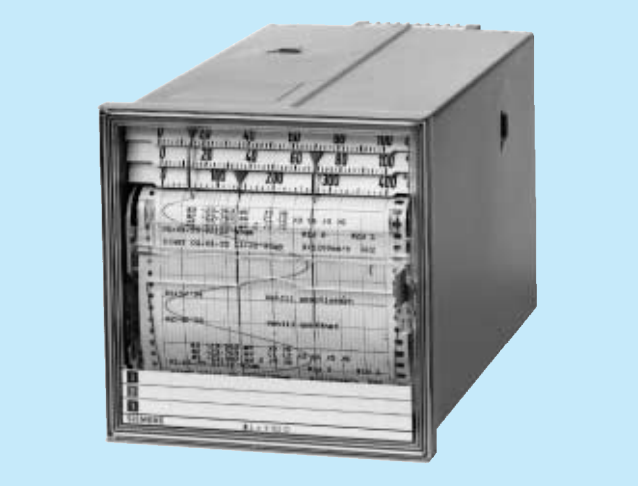


Fig. 2/3 SIREC LA

Features

General:

SIREC L/LA

- Operating modes:
  Measure, display (three scales), record
- Pen lift with pauses in operation, also in event of power failure
- Pens easily replaceable from the front
- Limit monitoring:
  Alarm identification and output with limit violations, freely-adjustable and freely-assignable to the channels
- Time marking
- Input/output module: 4 inputs, 6 outputs electrically isolated; electronic outputs or relays
- Floating DC 24 V output for supply of input/output module or transmitter
- CE symbol, NAMUR and KTA requirements complied with; permits use under all conditions
- Housing front with degree of protection IP 54
- Installation without interspacing possible
- Mounting depth including connections 260 mm

In addition with SIREC LA

- Real-time calendar/clock
- Summer time/winter time switchover
- Output of error messages, instrument text

Measure:

SIREC L/LA

- 1, 2, 3 analog channels and 2 digital channels
- Channel isolation: semiconductor relays, floating
- Measuring cycle 150/240 ms or 180/300 ms according to measuring ranges
- Measured variables (free selection possible):
  - Direct current, DC voltage
  - Temperature via thermocouple or resistance thermometer
  - Resistance transmitter (two-wire or three-wire system)
  - 2 digital channels (only with SIREC LA)
- Measuring ranges freely selectable with the range limits
- High measuring accuracy

Display:

- One scale plate and pointer for measured values for each channel, easy readability
- LED status display (NAMUR)

Record:

SIREC L/LA

- Recording with fiber pens, max. 3 colors
- Adjustable chart speed
- Curve display
- Zooming (scale expansion)
- Event marking
- Chart paper: roll or fanfold
- Formamide-free ink, large reservoir

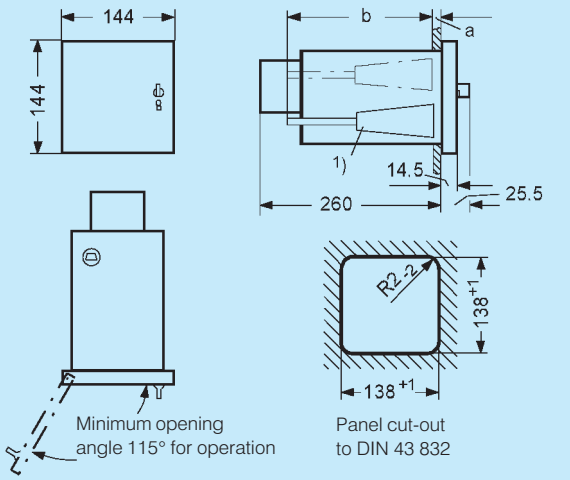
In addition with SIREC LA

- Alphanumeric output with additional fiber pen
- Chart paper: also grid-free chart, grid is generated (in 8 steps)
- Alphanumeric output:
  date, time, start/stop line, channel code, alarms, 6 event texts (with 16 characters each), measured-value table and parameter printout
- Limit lines assignable for every alarm

Adjustment/operation:

- All adjustments and operations using levers at front and via the PC interface (SIMATIC PDM software)
- Settings are saved by the non-volatile memory (EEPROM)

Line recorder 144 x 144



Distance between centers of adjacent instruments: ≥ 144 mm

Installation in	a	b
Sheet-steel panel or sheet-steel desk upright panel	2 to 42	230
Panel or desk upright panel with basic grid 72 x 72	39 to 81	195.5

1) The clamps can also be fitted at the top and bottom.

Fig. 2/4 Dimensions

Technical data

Note: Only values with tolerances or limits are guaranteed data. Values without tolerances are informative data. The defined error limits apply following a warming-up time of 30 minutes.

Measuring functions

General data		
Number of channels	analog	1, 2 or 3
	digital (only with LA)	2 (see digital input/output)
Channel isolation		Electrically isolated via semiconductors
Voltage endurance		See Table "Interference rejection" (page 2/10), protect. with varistors from protective earth conductor
Permissible potential		Max. DC 24 V compared to PE conductor; only measuring circuits with safe isolation from power supply are permissible
Input overload		Max. 10 % of full-scale value
Overload		Max. 24 V continuously in DC U range, max. 40 mA continuously in DC I range
A/D conversion		Dual-slope converter
Resolution		14 1/2 bits
Common-mode rejection		90 dB at 50 Hz
Series-mode rejection		60 dB at 50 Hz
Reference conditions		
Ambient temperature		23 ± 2 °C
Relative humidity		55 ± 10 %
Source resistance		≤ 1 kΩ
Potential difference		≤ 1 V
Adjustment interval		≤ 24 months; an additional error of 0.01 %/year must be expected with a longer interval
Measured value calibration		Class 0.5 to DIN 43 782 or IEC 484
Damping		1st order low-pass, 0, 1, 3, 10, 30, 100 s or automatic adaptation to chart speed

Measuring range/ linearization range 2)	Resolution Normal cycle 1)	Maximum electric measuring error 3) $F_{el} = F_{offset} + F_{rel} + F_{temp} + F_{terminal}$ (typ. 1/3 of max. measuring error)			
		F_{offset}	F_{rel}	F_{temp}	F_{term}
−40 to +40 mV	4 µV	16 µV	0.05	0.02 + 0 mV	–
−100 to +100 mV	10 µV	30 µV	0.05	0.02 + 0 mV	–
−400 to +400 mV	40 µV	120 µV	0.05	0.02 + 0 mV	–
−1000 to +1000 mV	100 µV	300 µV	0.05	0.02 + 0 mV	–
−1 to +1 V	0.1 mV	0.3 mV	0.05	0.02 + 0 mV	–
0 to +1 V	0.1 mV	0.3 mV	0.05	0.02 + 0 mV	–
+0.2 to +1 V	0.1 mV	0.3 mV	0.05	0.02 + 0 mV	–
−10 to +10 V	1 mV	3 mV	0.05	0.02 + 0 mV	–
0 to +10 V	1 mV	3 mV	0.05	0.02 + 0 mV	–
+2 to +10 V	1 mV	3 mV	0.05	0.02 + 0 mV	–
−20 to +20 mA	2 µA	6 µA	0.05	0.02 + 0 mA	–
0 to +20 mA	2 µA	6 µA	0.05	0.02 + 0 mA	–
+4 to +20 mA	2 µA	6 µA	0.05	0.02 + 0 mA	–
J (Fe/CuNi) −100 to +1200 °C/ −210 to +1200 °C	0.2 °C	0.6 °C	0.06	0.02 + 0 °C	0.8 °C
K (NiCr/Ni) −100 to +1370 °C/ −270 to +1370 °C	0.3 °C	0.8 °C	0.06	0.02 + 0 °C	0.8 °C
R (Pt13Rh/Pt) +100 to +1760 °C/ −50 to +1760 °C	0.5 °C	1.8 °C	0	0.01 + 0.2 °C	0.6 °C
T (Cu/CuNi) −100 to +400 °C/ −270 to +400 °C	0.2 °C	0.6 °C	0.07	0.02 + 0 °C	0.8 °C
S (Pt10Rh/Pt) +100 to +1760 °C/ −50 to +1760 °C	0.5 °C	1.8 °C	0	0.01 + 0.2 °C	0.6 °C
N (NiCrSi/NiSi) −100 to +1300 °C/ −200 to +1300 °C	0.4 °C	1 °C	0.05	0.02 + 0 °C	0.8 °C
E (NiCr/CuNi) −100 to +1000 °C/ −270 to +1000 °C	0.15 °C	0.5 °C	0.06	0.02 + 0 °C	0.8 °C
B (Pt30Rh/Pt6Rh) +600 to +1820 °C/ +100 to +1820 °C	0.6 °C	2 °C	0	0.01 + 0.2 °C	0.4 °C
L (FeCu/Ni) −100 to +900 °C/ −200 to +900 °C	0.2 °C	0.6 °C	0.06	0.02 + 0 °C	0.8 °C
U (Cu/CuNi) −100 to +560 °C/ −200 to +560 °C	0.2 °C	0.6 °C	0.07	0.02 + 0 °C	0.8 °C
0 to 300 Ω	0.03 Ω	0.2 Ω	0.07	0.02 + 0.02 Ω	–
0 to 1000 Ω	0.1 Ω	0.5 Ω	0.07	0.02 + 0.04 Ω	–
Pt 100 −200 to +800 °C/ −200 to +800 °C	0.08 °C	0.5 °C	0.05	0.02+0.05 °C	–
Ni 100 −60 to +180 °C/ −60 to +180 °C	0.05 °C	0.25 °C	0.07	0.02+0.025°C	–

Note:
A special calibration from a service place is recommended for a large stretching of the measuring ranges.

1) The specified values apply to the normal measuring cycle, they must be doubled for the fast cycle; the offset error F_{offset} becomes approx. 30 % larger.
2) Linearization range = measuring range with thermocouples with slightly increased error at start-of-scale including overload range.
3) Measuring error F_{offset} (zero error) = absolute value specified in table
F_{rel} (increasing error) = percentage specified in table multiplied by the value of the read measured value (% · |MV|)
F_{temp} (temperature error at an increased ambient temperature) = percentage specified in table multiplied by the value of the absolute measured value (% · |MV|) plus a constant specified as an absolute value, total multiplied by the value of the temperature difference between the reference value 23 ± 2 °C and the ambient temperature.
$F_{terminal}$ (error of terminal temperature measurement) = absolute value specified in table for additional error with direct connection of thermocouples.

Line recorder 144 x 144

Input resistance	10 MΩ in the TC/DC U range at ≤ 100 mV; 100 kΩ in the DC U range at 1 and 10 V; 50 Ω in the DC I range
Measuring mode	
Measuring cycle, adjustable	
– DC U/I	240 ms/150 ms
– DC U/I/TC/RTD/R	300 ms/180 ms
Measuring duration	40 ms (50 Hz), 33 1/3 ms (60 Hz)
Type of connection for resistance measurements	Two-wire or three-wire system
Signal connection (see Fig. 2/5)	2 or 3 screw terminals/channel
Terminal range	0.13 to 2.5 mm^2 solid conductor 0.13 to 1.5 mm^2 stranded conductor with sleeves; Terminal designations to DIN 45 140
Operation, displays	
Display	Scale and pointer for measured values, green LED for display of recorder readiness, red LED for display of programming and test status
Operation	2 levers for function settings, 2 levers for service (mechanical release)
PC interface	For all settings and measured-value scanning
Connection	2-pin plug at front, connection to PC via special cable (accessory)
Real-time clock (SIREC LA)	
Format	Year, month, day, hour, minute, second; 12/24-hour representation, summer/winter time switchover
Deviation	Max. $1 \cdot 10^{-5}$
Backup	Via capacitor in event of power failure (approx. 5 min) or via battery (approx. 36 months)
Recording	
Chart drive	Step motor
Chart speeds A, B	1 – 1.25 – 2.5 – 5 – 10 – 20 – 60 – 120 – 300 – 600 – 1200 mm/h
Analog recording system	
Recording system	Replaceable fiber pens
Pen spacing	1.5 mm (in chart direction)
Colors	Red, green, blue
Recording length	Approx. 1800 m
Service period	Approx. 6 months
Storage life	Approx. 24 months in closed packing, approx. 1 month in recorder with climate to DIN IEC 654-1
Pen assembly drive	Program-controlled step motor
Resolution	0.108 mm
Carriage speed	Max. 40 mm/s
Recording width	100 mm
Recording system error	$F_{mech} \leq 0.35$ %
Text recording system (SIREC LA)	
Recording system (can only be used up to 120 mm/h)	Replaceable fiber pen
Character height	Approx. 2.4 mm or 2.8 mm with descenders
Characters/line	51
Character set	ASCII standard with upper-case and lower-case letters, Greek alphabet, special characters, binary signals, limit lines etc.
Grid (for grid-free chart paper)	Adjustable in 8 steps
Color	Black
Recording length	Approx. 100 000 characters
Service period	Approx. 6 months
Storage life	Approx. 24 months in closed packing, app. 1 month in recorder with climate to DIN IEC 654-1
Pen assembly drive	Program-controlled step motor
Speed	Approx. 0.4 characters/s
Limit monitoring	6 alarms, free assignment of channels MIN or MAX can be set
Alarm output	Recording of a symbol in event of upward or downward violation of a limit
Limit hysteresis	2 % of recording range
Digital input/output	
Digital inputs	4, electrically isolated via opto isolators, passive
Switching level	Low: –3 to +5 V, High: +8 to +30 V
Signal duration	≥ 0.5 s
Input resistance	≥ 5 kΩ
Functions	2 digital channels, measuring mode "Normal/Fast" each with "On/Off", chart speeds A/B, chart feed 10 to 100 mm, time marker, interlocking With SIREC LA: clock synchronization, summer time/winter time, input interlocking, event text, measured-value tables With SIREC L: event marking on all channels (peak approx. 3 mm)
Digital outputs	6
Electronic version	Electrically isolated via opto isolators, semiconductor switches, short-circuit-proof, open collector, P-switching
Output current	Max. 150 mA
Switching level	High ext. voltage ≥ – 2 V
Ext. power supply	DC 18 to 30 V
Relay version	Electrically isolated via relays, floating switchover contacts
Switching voltage/current	50 V, 1 A (external voltage)
Switching capacity	30 W or 60 VA
Contact life	1 x 10^8 mechanical 3 x 10^6 at max. load
Permissible potential	50 V
Connections	Subminiature plug, 25-pin, lockable
Power supply	
AC power supply	
Mains voltage	AC 230/115 V +15 to –20 % AC 24 V +15 to –20 %
Frequency range	47 to 64 Hz
Power consumption	20 VA (with options) at rated voltage
DC power supply	
Rated voltage	DC 24 V +20 to –15 %
Power consumption	15 W (with options) at rated voltage
DC 24 V output	DC 24 V ±15 %, 75 mA, short-circuit-proof Capacitive load ≤ 33 µF
Ambient conditions	
Climate	To IEC 68/2-1/2/ DIN EN 60 068-2-1/2
Temperature of use	0 to 50 °C (max. 75 % rel. humidity at 25 °C, no condensation), change in temp. max. 10 K/h

2

Line recorder 144 x 144

Storage temperature range	–25 to +70 °C (max. 75 % rel. humidity at 25 °C, no condensation), change in temperature max. 20 K/h
Mechanical	
Vibrations during operation	To DIN IEC 68-2-6 5 to 9 Hz; 3.5 mm deflection 9 to 200 Hz; 10 m/s^2 acceleration
Vibrations during storage and transport	To DIN IEC 68-2-6 5 to 9 Hz; 3.5 mm deflection 9 to 500 Hz; 10 m/s^2 acceleration
Drop test for packed unit	To DIN EN 60 068-2-32, height < 0.8 m
Shock test during operation	To IEC 68-2-27/ DIN EN 60 068-2-27 Half-sine: 150 m/s^2 (15 g), 11 ms
Resistance to earthquakes during operation	Parameters to KWU AVS DD 7080.9; 5 to 35 Hz; max. 10 mm deflection, max. 15 m/s^2 acceleration

Electromagnetic compatibility

Emitted interference

The targets of the EMC guideline 89/336/EEC with respect to radio interference suppression to EN 50 081-1 and interference rejection to EN 50 082-2, as well as NAMUR recommendation NE 21 are observed.

Radio interference Power supply	Limit class B, measured according to VDE 0875 Part 11 (CISPR 11)

Interference rejection

Device-under-test	Influencing variable	Basic standard	Instrument	
			Test condition	Res [2]
Instrument	RF field AM	IEC 1000-4-3	10 V/m [1]	A
	RF field PM	IEC 1000-4-3	10 V/m	A
	Mag. field	IEC 1000-4-8	[3]	–
	Discharge	IEC 1000-4-2	6/8 kV	A
Process, measuring and control lines	RF conducted interference	IEC 1000-4-6	10 V	A
	Burst	IEC 1000-4-4	2 kV	A
	Surge	IEC 1000-4-5I	1/2 kV [4]	B
DC power inputs	RF conducted interference	IEC 1000-4-6	10 V	A
	Burst	IEC 1000-4-4	2 kV	A
	Surge	IEC 1000-4-5	1/2 kV [4]	A
	Interruption	IEC SC77BWG3	20 ms/100 %	A
	In-rush current	–	≤ 15 I_{rated}	–
AC power inputs	RF conducted interference	IEC 1000-4-6	10 V	A
	Burst	IEC 1000-4-4	2 kV	A
	Surge	IEC 1000-4-5	1/2 kV [4]	A
	Interruption	IEC SC77BWG3	20 ms/100 %	A
	In-rush current	IEC 1000-3-3	≤ 15 I_{rated}	–
	Overshoots	IEC 1000-3-2	Class D	–
Earth connection	RF conducted interference	IEC 1000-4-6	10 V	A

Mounting position	To DIN 16 257
Operation with roll	Vertical –30 to +15°
Operation with fanfold	Vertical –15 to +15°
Degree of protection	To IEC 529 or EN 60 529
Front with door	IP 54
Terminals, interfaces, plug connectors	IP 20

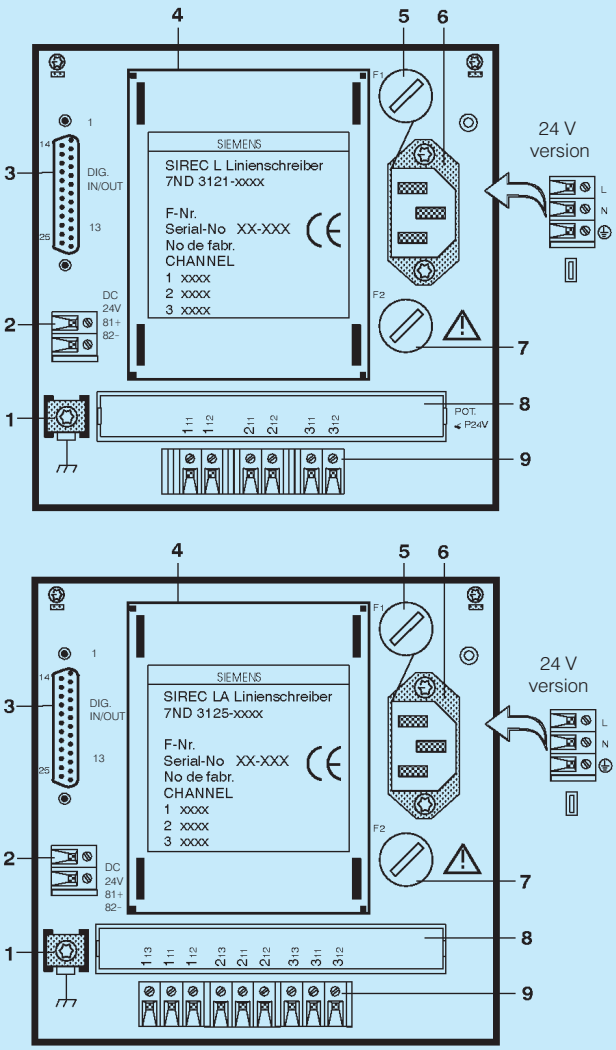
Electric safety

According to low-voltage guideline 73/23/EEC to EN 61010-1, overvoltage category II, degree of contamination 2 (IEC 1010-1, VDE 0411 Part 1)

Dimensions, mounting	
Dimensions	Front dimensions 144 x 144 to DIN 43 700 and DIN 43 831 (see Fig. 2/4)
Mounting	
Panel mounting	To DIN 43 834-A-340
Desk and cabinet mounting	To DIN 43 834-A-330
Front door	Plastic, spring-loaded latch
Weight	Approx. 4 kg

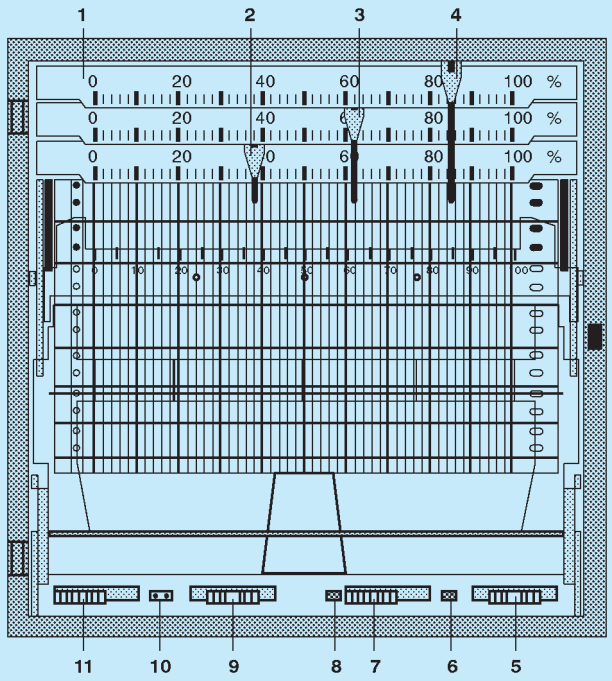
[1]) 3 V/m in the ranges 87 to 108, 174 to 230 and 470 to 790 MHz
[2]) Response A = class accuracy retained during effect
Response B = interference possible during effect
– = not relevant
[3]) Not relevant because of measuring and recording procedure used
[4]) 1 kV symmetric, 2 kV asymmetric

Line recorder 144 x 144



1 Ground connection
2 DC 24 V output
3 Digital input/output
4 Transformer with rating plate
5 Fuse F1
6 Power supply connection
7 Fuse F2
8 Window for measuring-point allocations with channel inscription for measuring ranges
9 Connection for analog channels

Fig. 2/5 Rear view of SIREC L (top) and LA (bottom)



1 Scale, channel 3
2 Pen, channel 1
3 Pen, channel 2
4 Pen, channel 3
5 Lever 3
6 LED, red
7 Lever 2
8 LED, green
9 Lever 1
10 PC interface
11 Service lever

Fig. 2/6 Front view of SIREC L/LA

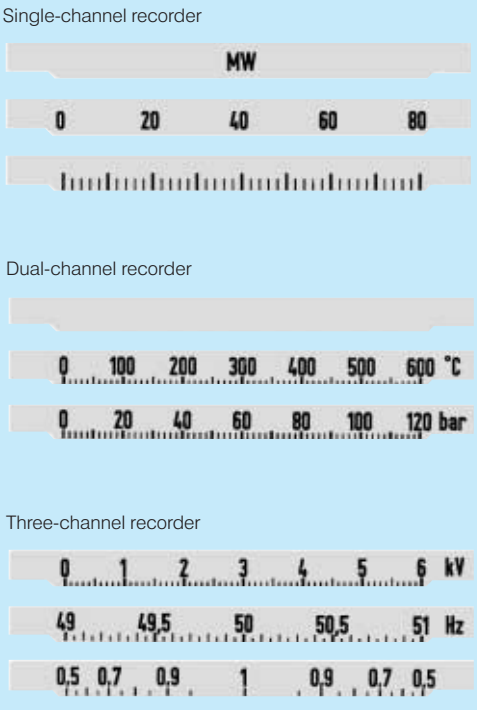


Fig. 2/7 Scale versions

Line recorder 144 x 144

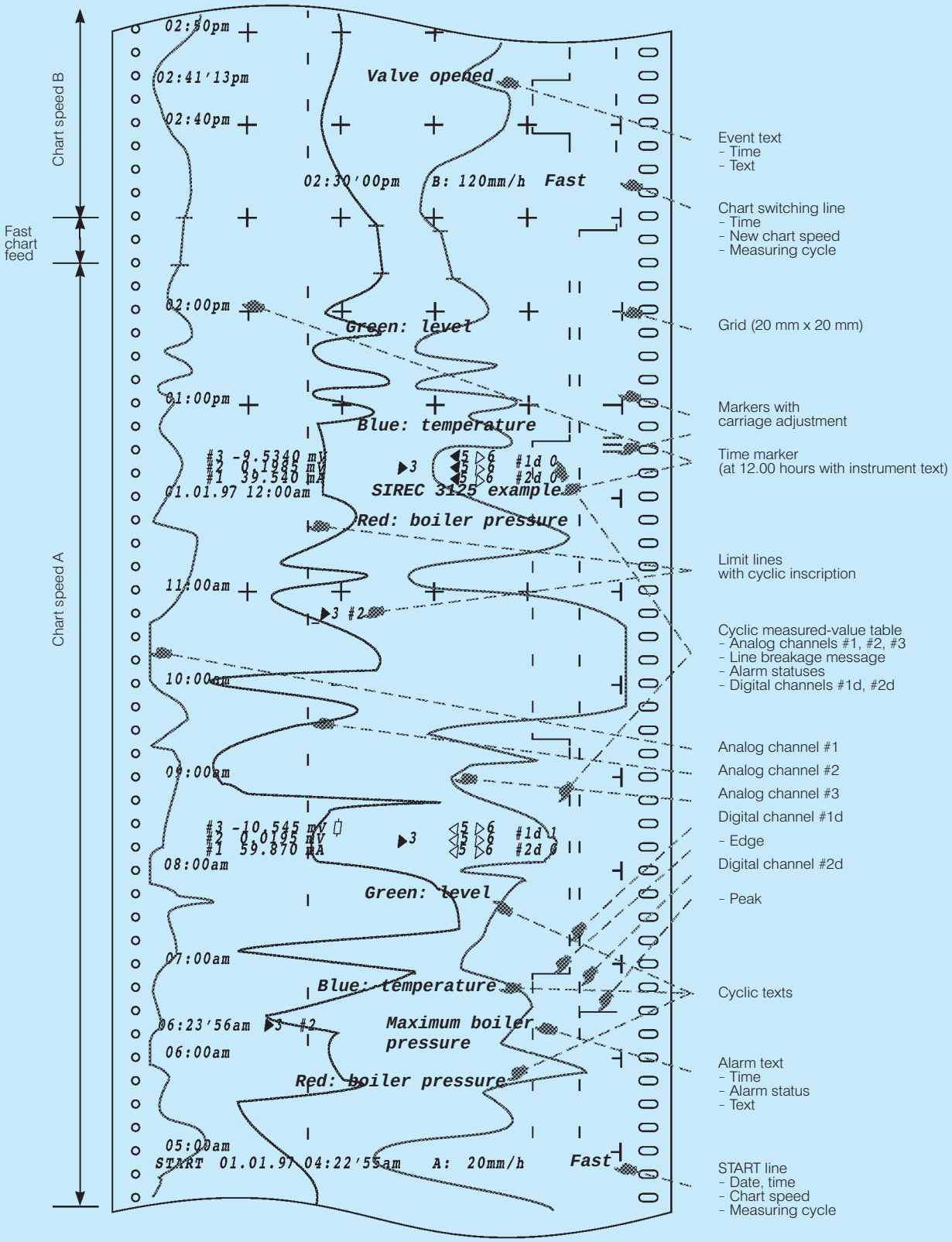


Fig. 2/8 Example of graphic recording with SIREC LA (80 % of original size)

Line recorder 144 x 144

Ordering data			Order No.	Order code	Price
Recorders available ex stock **SIREC L** Front dimensions 144 mm x 144 mm For installation in sheet-steel panel, cabinet or desk upright panel With recording unit for rolls or fanfold paper					
Single-channel line recorder [1] Dual-channel line recorder [1] Three-channel line recorder [1]			**7ND3121- 1 A A 1 1 - 1 N A 1** **7ND3121- 1 B A 1 1 - 1 N A 1** **7ND3121- 1 C A 1 1 - 1 N A 1**		
SIREC L Single-, dual- or three-channel line recorder [1], front dimensions 144 mm x 144 mm For installation in sheet-steel panel, cabinet or desk upright panel With recording unit for rolls or fanfold paper			**7ND3121-** ■ ■ ■ ■ ■ ■ **-** ■ **N A** ■ ■ ■ ■		
Power supply	AC 47 to 64 Hz AC 47 to 64 Hz AC 47 to 64 Hz DC 24 V	220 to 240 V 110 to 127 V 24 V	**1** **2** **3** **4**		
Number of channels	1, trace red 2, traces red and blue 3, traces red, blue and green		**A** **B** **C**		
Measured variables	DC U/I DC U/I/TC/RTD/R DC U/I, with DC 24 V output DC U/I/TC/RTD/R, with DC 24 V output		**A** **B** **C** **D**		
Digital input/output	Without With digital input, electronic output With digital input, relay output		**1** **2** **3**		
Installation	In sheet-steel panel, cabinet or sheet-steel desk upright panel, with 2 clamps C72165-A405-B176 In panel or desk upright panel with basic grid dimension 72 x 72, with one set of mounting parts C79453-A3011-D101		**1** **3**		
Recorder setting	All channels set to 4 to 20 mA, scale(s) 0 to 100 % According to Order code [2] (see page 2/15)		**1** **3**		
Measuring-point label	Unlabelled Labelled (max. 29 digits/channel); specify desired inscription in plain text:		**1** **9**	**-Z** **. . .** **R1Y**	

Further designs on request.

Accessories, consumable material and conversion parts on page 2/15 ff

Scope of delivery

SIREC L line recorder 7ND3121 as ordered, 1 roll of chart paper, 1 accessories bag (1 to 3 fiber pen assemblies as ordered, 2 fuses), 1 appliance plug (with AC 230 or 115 V version), 2 clamps, 1 plug connector (with digital input/output), 1 measuring-point label, 1 ruler per scale, unpacking instructions, installation instructions, instructions "Operation – a concise overview", instructions "Parameterization – a concise overview". When using several SIREC L recorders it is sometimes only necessary to have one Manual. This is therefore not included in the delivery and must be ordered separately.

[1] Basic setting when delivered:
The program interlock in the test menu is set such that all inputs are possible using the levers on the front of the instrument. The levers can be disabled at any time to permit customer-specific parameterization. The measured-value damping is set to "0 s" for all channels. The noise suppression is set for AC 50 Hz (switchable to AC 60 Hz).

[2] An order code is required for each channel (sequence: channel 1, 2, 3).
Example: Three-channel line recorder for mounting in cabinet, power supply AC 230 V, recording range DC 0 to 10 V for each channel, without digital input/output, all scales 0 to 5 t, measuring-point label inscribed.
Order as follows:
7ND3121-1CA11-3NA9-Z
R1Y + Y06 + Y06 + Y06
Each scale 0 to 5 t
In addition, plain text for inscription of measuring-point label (max. 29 digits/channel)

Line recorder 144 x 144

Ordering data			Order No.	Order code	Price
Recorders available ex stock **SIREC LA** with text output [3]) Front dimensions 144 mm x 144 mm With recording unit for rolls or fanfold paper Three-channel line recorder [1])			**7ND3125- 1 C B 1 1 - 1 N A 1**		
SIREC LA with text output Single-, dual- or three-channel line recorder [1]), front dimensions 144 mm x 144 mm For installation in sheet-steel panel, cabinet or desk upright panel With recording unit for rolls or fanfold paper			**7ND3125-** ■ ■ ■ ■ ■ ■ **-** ■ **N A** ■ ■ ■ ■		
Power supply	AC 47 to 64 Hz AC 47 to 64 Hz AC 47 to 64 Hz DC 24 V	220 to 240 V 110 to 127 V 24 V	**1** **2** **3** **4**		
Number of channels	1, trace red 2, traces red and blue 3, traces red, blue and green		**A** **B** **C**		
Measured variables	DC U/I/TC/RTD/R DC U/I/TC/RTD/R, with DC 24 V output		**B** **D**		
Digital input/output	Without With digital input, electronic output With digital input, relay output		**1** **2** **3**		
Installation	In sheet-steel panel, cabinet or sheet-steel desk upright panel, with 2 clamps C72165-A405-B176 In panel or desk upright panel with basic grid dimension 72 x 72, with one set of mounting parts C79453-A3011-D101		**1** **3**		
Recorder setting	All channels set to 4 to 20 mA, scale(s) 0 to 100 % According to Order code [2]) (see page 2/15)		**1** **4**		
Measuring-point label	Unlabelled Labelled (max. 29 digits/channel); specify desired inscription in plain text:		**1** **9**	**-Z** **. . .** **R1Y**	

Further designs on request.

Accessories, consumable material and conversion parts on page 2/15 ff

Scope of delivery

SIREC LA line recorder 7ND3125 as ordered, 1 roll of chart paper, 1 accessories bag (1 to 3 fiber pen assemblies as ordered, 1 fiber pen assembly for alphanumeric output, 2 fuses), 1 appliance plug (with AC 230 or 115 V version), 2 clamps, 1 plug connector (with digital input/output), 1 measuring-point label, 1 ruler per scale, unpacking instructions, installation instructions, instructions "Operation – a concise overview", instructions "Parameterization – a concise overview", 1 battery (fitted).
When using several SIREC LA recorders it is sometimes only necessary to have one Manual. This is therefore not included in the delivery and must be ordered separately.

[1]) Basic setting when delivered:
The program interlock in the test menu is set such that all inputs are possible using the levers on the front of the instrument. The levers can be disabled at any time to permit customer-specific parameterization.
The measured-value damping is set to "0 s" for all channels.
The noise suppression is set for AC 50 Hz (switchable to AC 60 Hz).

[2]) An order code is required for each channel (sequence: channel 1, 2, 3).
Example: Three-channel line recorder for mounting in cabinet, power supply AC 230 V, recording range DC 0 to 10 V for each channel, without digital input/output, all scales 0 to 5 t, measuring-point label inscribed
Order as follows:
7ND3125-1CB11-4NA9-Z
R1Y + Y06 + Y06 + Y06
Each scale 0 to 5 t
In addition, plain text for inscription of measuring-point label (max. 29 digits/channel)

[3]) Text output only recommended up to 120 mm paper feed.

Line recorder 144 x 144

Order codes

Recording range / Scales [4]	Measured variables: DC I (mA) 0 to 20	4 to 20	0 to 1	0 to 10	DC U (V) 0 to 1	0 to 10	0,2 to 1	2 to 10	Direct connection of sensor: Type of TC [3] J	L	T	U	K	N	E	S	B	R	RTD Pt 100 [2]	Ni 100 [2]	Acc. to plain text [1]	Price
According to plain text	**Y01**	**Y02**	**Y03**	**Y04**	**Y05**	**Y06**	**Y07**	**Y08**	**Y10**	**Y11**	**Y12**	**Y13**	**Y14**	**Y15**	**Y16**	**Y17**	**Y21**	**Y22**	**Y18**	**Y19**	**Y20**	

Ordering data

		Order No.	Price
Accessories			
Manual [5]	German	**C79000-G7300-C188**	
	English	**C79000-G7376-C188**	
	French	**C79000-G7377-C188**	
	Spanish	**C79000-G7378-C188**	
	Italian	**C79000-G7372-C188**	
Installation Instructions [5]		**C79000-M7364-C193**	
Instructions "Operation – a concise overview"			
	German	**C79000-M7300-C192**	
	English	**C79000-M7376-C192**	
	French	**C79000-M7377-C192**	
	Spanish	**C79000-M7378-C192**	
	Italian	**C79000-M7372-C192**	
Instructions "Parameterization – a concise overview"			
	German	**C79000-M7300-C191**	
	English	**C79000-M7376-C191**	
	French	**C79000-M7377-C191**	
	Spanish	**C79000-M7378-C191**	
	Italian	**C79000-M7372-C191**	
Transport housing			
– For AC 230 V version		**7ND9500-8AA3**	
– For DC 24 V version		**7ND9500-8AA4**	
SIMATIC PDM software from V5.2 onwards for parameterization of SIREC L and SIREC LA line recorders, with documentation (as help file)		**See catalog FI 01**	
Adapter cable for PC interface, with adapter (25 to 9)		**C79453-A3070-B104**	
Consumable material			
Chart paper 120 mm wide Recording width 100 mm 50 linear graduations			
• Roll, approx. 31 m long, approx. 0.15 kg			
Hours imprint			
For 10 mm/h		**C72452-A94-B208**	
20 mm/h		**C72452-A94-B209**	
60 mm/h		**C72452-A94-B210**	
120 mm/h		**C72452-A94-B211**	
Without		**C72452-A94-B212**	
Price per roll	20		
when ordering	60		
	100		
• Fanfold, approx. 16 m long, approx. 0.1 kg			
Hours imprint			
For 10 mm/h		**C72452-A94-B262**	
20 mm/h		**C72452-A94-B263**	
60 mm/h		**C72452-A94-B264**	
120 mm/h		**C72452-A94-B265**	
Without		**C72452-A94-B266**	
Price per pack	20		
when ordering	60		
	100		

		Order No.	Price
Chart paper 120 mm wide Recording width 100 mm Without graduations			
• Roll, approx. 31 m long, approx. 0.15 kg		**7ND9000-8EE**	
Price per roll	20		
when ordering	100		
• Fanfold, approx. 16 m long, approx. 0.1 kg		**7ND9000-1AE**	
Price per pack	20		
when ordering	100		
Fiber pen assembly			
Installation at top (channel 3)			
Green		**7ND9001-8AG**	
Installation in center (channel 2)			
Blue		**7ND9001-8AD**	
Red		**7ND9001-8AE**	
Installation at bottom (channel 1)			
Red		**7ND9001-8AA**	
Blue		**7ND9001-8AB**	
For alphanumeric output			
Black		**7ND9001-8DH**	
Lithium battery, 3 V (for the clock module)		**W79084-L1002-B1**	

Available ex stock

[1] Observe range limits in the technical data.

[2] Set to three-wire system.

[3] To DIN IEC 584
Type J: Fe/CuNi
Type K: NiCr/Ni
Type T: Cu/CuNi
Type S: Pt 10 % Rh/Pt
To DIN IEC 584
Type N: NiCrSi/NiSi
Type E: NiCr/CuNi
Type B: Pt30Rh/Pt6Rh
Type R: Pt13Rh/Pt
To DIN 43710
Type L: Fe-CuNi
Type U: Cu-CuNi

[4] Specify in addition: Order code(s) for the required recording range(s) including plain text(s) for the scale(s)

[5] Also available by downloading from the Internet (see page 5/10 bottom).

Line recorder 144 x 144

Ordering data (continued)	Order No.	Price
Conversion parts		
Digital input/output		
Electronic outputs	**7ND9400-8BF**	
Relay outputs	**7ND9400-8BE**	
DC 24 V output	**7ND9400-8BG**	
Recording unit		
For rolls or fanfold paper	**C72301-A20-A17**	
Take-up spool with rubber tongues	**C72301-A20-B110**	
Housing door with lock		
Normal	**C79165-A3029-B28**	
Low-reflection	**C79165-A3029-B30**	
Mounting set 72 x 72 for installation in panel or desk upright panel with basic grid dimensions 72 x 72	**C79453-A3011-D101**	
Measuring-point label		
Without inscription	**C79165-A3029-B367**	
With inscription (max. 29 digits per channel), specify in plain text: **Desired text: . . . . . .**	**C79165-A3029-B368-Z Y01**	
Ruler		
Without scale	**7ND9262**	
With one scale, Order code Y . . (see page 2/15)	**7ND9272-Z Y . .**	
Dummy pen required for channel not equipped with a pen assembly	**C79453-A3049-B522**	
Scales (see Fig. 2/7)		
• Without graduations (start and end are marked)	**7ND9300-8RA**	
• 1 scale for single-channel recorder (1 scale each for graduations, measured variable and dimension)	**7ND9300-8RB**	
• 1 scale for dual- and three-channel recorders (one scale is required for each channel)	**7ND9300-8RC**	

Multipoint recorder 144 x 144

Microprocessor-based multipoint recorder 144 x 144
Six-channel recorder, class 0.5
With fiber pen recording
Input variables DC U/I/TC/RTD/R
With or without text output

Fig. 2/9 SIREC P/PA (with alphanumeric text output)

Features

General:

- Operating modes:
  Measure, display, record
- Pen lift with pauses in operation and also in event of power failure
- Pens easily replaceable from the front
- Limit monitoring:
  Alarm identification and output with limit violations, freely-adjustable for every channel
- Time marking
- Input/output module: 4 inputs, 6 outputs electrically isolated; electronic outputs or relays
- Floating DC 24 V output for supply of input/output module or transmitter
- CE symbol, NAMUR and KTA requirements complied with; permits use under all conditions
- Housing front with degree of protection IP 54
- Installation without interspacing possible
- Mounting depth including connections 260 mm

In addition for recorders with alphanumeric text output

- Real-time calendar/clock
- Summer time/winter time switchover
- Output of error messages, instrument text

Measure:

- 6 analog channels and 2 digital channels
- Channel isolation: semiconductor relays, floating
- Measuring cycle 640/400 ms
- Measured variables (free selection possible):
  - Direct current, DC voltage
  - Temperature via thermocouple or resistance thermometer
  - Resistance transmitter (two-wire or three-wire system)
  - 2 digital channels
- Measuring ranges freely selectable with the range limits
- High measuring accuracy

Display:

- One scale plate (with max. 4 scales) and one pointer for measured values, easy readability
- LED status display (NAMUR)

Record:

- Recording with fiber recording head, 6 colors
- Freely-programmable recording ranges
- Adjustable chart speed
- Curve display (dotted line or dot-joining selectable)
- Zooming (scale expansion)
- Event marking
- Chart paper: roll or fanfold
- Formamide-free ink, large reservoir

In addition for recorders with alphanumeric text output

- Chart paper: also grid-free chart, grid is generated (in 8 steps)
- Alphanumeric output:
  date, time, start/stop line, channel code, alarms, 6 event texts (with 16 characters each), measured-value table and parameter printout

Adjustment/operation:

- All adjustments and operations using levers at front and via the PC interface (SIMATIC PDM software)
- Settings are saved by the non-volatile memory (EEPROM)

Technical data

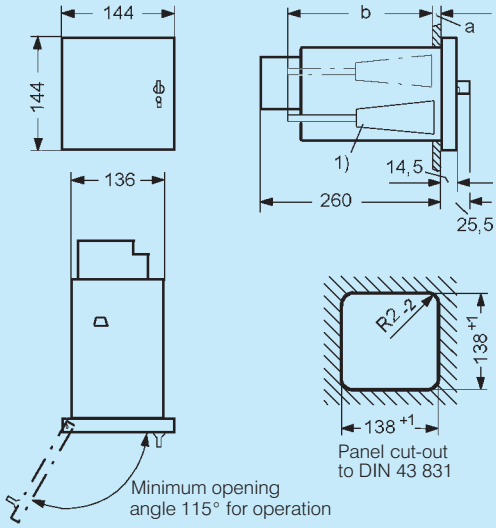
Note: Only values with tolerances or limits are guaranteed data. Values without tolerances are informative data. The defined error limits apply following a warming-up time of 30 minutes.

Measuring functions

General data

Number of channels	analog	6
	digital	2 (see digital input/output)
Channel isolation		Electrically isolated via semiconductors
Voltage endurance		See Table "Interference rejection" (page 2/20), protected with varistors from protective earth conductor

Multipoint recorder 144 x 144



Distance between centers
of 2 adjacent instruments or one above the other: ≥ 144 mm

Installation in	a	b
Sheet-steel panel or sheet-steel desk upright panel	2 to 42	230
Panel or desk upright panel with basic grid dimension 72 x 72	39 to 81	195.5

[1]) The clamps can also be fitted at the top and bottom.

Fig. 2/10 Dimensions

Permissible potential	Max. DC 24 V compared to PE conductor; only measuring circuits with safe isolation from power supply are permissible
Input overload	Max. 10 % of full-scale value
Overload	Max. 24 V continuously in DC U range, max. 40 mA continuously in DC I range
A/D conversion	Dual-slope converter
Resolution	14 1/2 bits
Common-mode rejection	90 dB at 50 Hz
Series-mode rejection	60 dB at 50 Hz
Reference conditions	
Ambient temperature	23 ± 2 °C
Relative humidity	55 ± 10 %
Source resistance	≤ 1 kΩ
Potential difference	≤ 1 V
Adjustment interval	≤ 24 months; an additional error of 0.01 %/year must be expected with a longer interval
Measured value calibration	Class 0.5 to DIN 43 782 or IEC 484
Damping	1st order low-pass, 0, 1, 3, 10, 30, 100 s or automatic adaptation to chart speed

Measuring range/ linearization range [3])	Resolution Normal cycle [1])	Maximum electric measuring error [2]) $F_{el} = F_{offset} + F_{rel} + F_{temp} + F_{terminal}$ (typ. 1/3 of max. measuring error)			
		F_{offset}	F_{rel}	F_{temp}	F_{term}
−40 to +40 mV	4 µV	16 µV	0.05	0.02 + 0 mV	–
−100 to +100 mV	10 µV	30 µV	0.05	0.02 + 0 mV	–
−400 to +400 mV	40 µV	120 µV	0.05	0.02 + 0 mV	–
−1000 to +1000 mV	100 µV	300 µA	0.05	0.02 + 0 mV	–
−1 to +1 V	0.1 mV	0.3 mV	0.05	0.02 + 0 mV	–
0 to +1 V	0.1 mV	0.3 mV	0.05	0.02 + 0 mV	–
+0.2 to +1 V	0.1 mV	0.3 mV	0.05	0.02 + 0 mV	–
−10 to +10 V	1 mV	3 mV	0.05	0.02 + 0 mV	–
0 to +10 V	1 mV	3 mV	0.05	0.02 + 0 mV	–
+2 to +10 V	1 mV	3 mV	0.05	0.02 + 0 mV	–
−20 to +20 mA	2 µA	6 µA	0.05	0.02 + 0 mA	–
0 to +20 mA	2 µA	6 µA	0.05	0.02 + 0 mA	–
+4 to +20 mA	2 µA	6 µA	0.05	0.02 + 0 mA	–
J (Fe/CuNi) −100 to +1200 °C/ −210 to +1200 °C	0.2 °C	0.6 °C	0.06	0.02 + 0 °C	0.8 °C
K (NiCr/Ni) −100 to +1370 °C/ −270 to +1370 °C	0.3 °C	0.8 °C	0.06	0.02 + 0 °C	0.8 °C
R (Pt13Rh/Pt) +100 to +1760 °C/ −50 to +1760 °C	0.5 °C	1.8 °C	0	0.01 + 0.2 °C	0.6 °C
T (Cu/CuNi) −100 to +400 °C/ −270 to +400 °C	0.2 °C	0.6 °C	0.07	0.02 + 0 °C	0.8 °C
S (Pt10Rh/Pt) +100 to +1760 °C/ −50 to +1760 °C	0.5 °C	1.8 °C	0	0.01 + 0.2 °C	0.6 °C
N (NiCrSi/NiSi) −100 to +1300 °C/ −200 to +1300 °C	0.4 °C	1 °C	0.05	0.02 + 0 °C	0.8 °C
E (NiCr/CuNi) −100 to +1000 °C/ −270 to +1000 °C	0.15 °C	0.5 °C	0.06	0.02 + 0 °C	0.8 °C
B (Pt30Rh/Pt6Rh) +600 to +1820 °C/ +100 to +1820 °C	0.6 °C	2 °C	0	0.01 + 0.2 °C	0.4 °C
L (FeCu/Ni) −100 to +900 °C/ −200 to +900 °C	0.2 °C	0.6 °C	0.06	0.02 + 0 °C	0.8 °C
U (Cu/CuNi) −100 to +560 °C/ −200 to +560 °C	0.2 °C	0.6 °C	0.07	0.02 + 0 °C	0.8 °C
0 to 300 Ω	0.03 Ω	0.2 Ω	0.07	0.02 + 0.02 Ω	–
0 to 1000 Ω	0.1 Ω	0.5 Ω	0.07	0.02 + 0.04 Ω	–
Pt 100 −200 to +800 °C/ −200 to +800 °C	0.08 °C	0.5 °C	0.05	0.02+0.05 °C	–
Ni 100 −60 to +180 °C/ −60 to +180 °C	0.05 °C	0.25 °C	0.07	0.02+0.025°C	–

Note:
A special calibration from a service place is recommended for a large stretching of the measuring ranges.

[1]) The specified values apply to the normal measuring cycle, they must be doubled for the fast cycle; the offset error F_{offset} becomes approx. 30 % larger.

[2]) Measuring error
F_{offset} (zero error) = absolute value specified in table
F_{rel} (increasing error) = percentage specified in table multiplied by the value of the read measured value (% · |MV|)
F_{temp} (temperature error at an increased ambient temperature) = percentage specified in table multiplied by the value of the absolute measured value (% · |MV|) plus a constant specified as an absolute value, total multiplied by the value of the temperature difference between the reference value 23 ± 2 °C and the ambient temperature.
$F_{terminal}$ (error of terminal temperature measurement) = absolute value specified in table for additional error with direct connection of thermocouples.

[3]) Linearization range = measuring range with thermocouples with slightly increased error at start-of-scale including overload range.

Multipoint recorder 144 x 144

Input resistance	10 MΩ in the TC/DC U range at ≤ 100 mV; 100 kΩ in the DC U range at 1 and 10 V; 50 Ω in the DC I range
Measuring mode	
Measuring cycle, adjustable	Normal 640 ms, fast 400 ms
Measuring duration	40 ms (50 Hz), 33 1/3 ms (60 Hz)
Type of connection for resistance measurements	Two-wire or three-wire system
Signal connection (see Fig. 2/11)	2 or 3 screw terminals per channel
Terminal range	0.13 to 2.5 mm^2 solid conductor 0.13 to 1.5 mm^2 stranded conductor with sleeves Terminal designations to DIN 45 140
Operation, displays	
Display	1 scale and 1 pointer for measured values, green LED for display of recorder readiness, red LED for display of programming and test status
Operation	2 levers for function settings, 2 levers for service (mechanical release)
PC interface	For all settings and measured-value scanning
Connection	2-pin plug at front, connection to PC via special cable (accessory)
Real-time clock (with alphanumeric text output)	
Format	Year, month, day, hour, minute, second; 12/24-hour representation, summer/winter time switchover
Deviation	Max. $1 \cdot 10^{-5}$
Backup	Via capacitor in event of power failure (approx. 5 min) or via battery (approx. 36 months)
Recording	
Operating modes	
Graphic recording	Dots or joined dots, programmable, time per dot programmable: 3, 6, 12, 24, 48 s or automatically adapted to selected chart speed
Alphanumeric printout (only recorders with alphanumeric text output)	Channel No., alarm symbols, date and time, measured-value table, 6 event texts (with 16 characters each), text with up to 20 characters; during pauses in operation: printout of measuring parameters
Recording range	"Value left" and "Value right" freely programmable
Recording system	
Pen assembly	Replaceable fiber pens
Colors	Violet, red, black, green, blue, brown
Recording length	Approx. 1800 m/color
Service period	Approx. 6 months
Storage life	Approx. 24 months in closed packing Approx. 1 month in recorder with climate to DIN IEC 654-1

Pen assembly drive	Program-controlled step motor
Resolution	0.125 mm
Carriage speed	Max. 125 mm/s
Recording system error	$F_{mech} \leq 0.3$ %
Chart drive	Program-controlled step motor class 0.005 DIN 43 782
Step length	0.02 mm
Chart speeds A and B (v1/v2) programmable	0 - 1 - 1.25 - 2.5 - 5 mm/h 10 - 20 - 60 - 120 mm/h (v1/v2 selectable via binary signal)
Chart paper	
Chart width	120 mm
Recording width	100 mm
Alphanumeric recording	
Character height	Approx. 2.2 mm
Characters/line	53
Character set	ASCII standard with upper-case and lower-case letters, Greek alphabet and special characters in 6 colors
Measured-value damping	
Filter	1st order low-pass
Time constant	0, 1, 3, 10, 30, 100 s per channel Adjustable or automatic adaptation to chart speed
Limit monitoring	6 alarms, free assignment of channels MIN or MAX can be set
Alarm output	Recording of a symbol in event of upward or downward violation of a limit
Limit hysteresis	2 % of recording range
Digital input/output	
Digital inputs	4, electrically isolated via opto isolators, passive
Switching level	Low: -3 to +5 V, High: +8 to +30 V
Signal duration	≥ 0.5 s
Input resistance	≥ 5 kΩ
Functions	2 digital channels, measuring mode "Normal/Fast" each with "On/Off", chart speeds A/B, chart feed 10 to 100 mm, clock synchronization, summer time/winter time, input interlocking, event text, measured-value tables
Digital outputs	6
Electronic version	Electrically isolated via opto isolators, semiconductor switches, short-circuit-proof, open collector, P-switching
Output current	Max. 150 mA
Switching level	High ext. voltage ≥ - 2 V
Ext. power supply	DC 18 to 30 V
Relay version	Electrically isolated via relays, floating switchover contacts
Switching voltage/current	50 V, 1 A (external voltage)
Switching capacity	30 W or 60 VA
Contact life	1 x 10^8 mechanical 3 x 10^6 at max. load
Permissible potential	50 V
Connections	Subminiature plug, 25-pin, lockable

Multipoint recorder 144 x 144

Power supply	
AC power supply	
Mains voltage	AC 230/115 V +15 to -20 % AC 24 V +15 to -20 %
Frequency range	47 to 64 Hz
Power consumption	20 VA (with options) at rated voltage
DC power supply	
Rated voltage	DC 24 V +20 to -15 %
Power consumption	15 W (with options) at rated voltage
DC 24 V output	DC 24 V ± 15 %, 75 mA, short-circuit-proof Capacitive load ≤ 33 µF
Ambient conditions	
Climate	To IEC 68/2-1/2/ DIN EN 60 068-2-1/2
Temperature of use	0 to 50 °C (max. 75 % rel. humidity at 25 °C, no condensation), change in temp. max. 10 K/h
Storage temperature range	-25 to +70 °C (max. 75 % rel. humidity at 25 °C, no condensation), change in temperature max. 20 K/h
Mechanical	
Vibrations during operation	To DIN IEC 68-2-6 5 to 9 Hz; 3.5 mm deflection 9 to 200 Hz; 10 m/s^2 acceleration
Vibrations during storage and transport	To DIN IEC 68-2-6 5 to 9 Hz; 3.5 mm deflection 9 to 500 Hz; 10 m/s^2 acceleration
Drop test for packed unit	To DIN EN 60 068-2-32, height < 0.8 m
Shock test during operation	To IEC 68-2-27/ DIN EN 60 068-2-27 Half-sine: 150 m/s^2 (15 g), 11 ms
Resistance to earthquakes during operation	Parameters to KWU AVS DD 7080.9; 5 to 35 Hz; max. 10 mm deflection, max. 15 m/s^2 acceleration
Mounting position	To DIN 16 257
Operation with roll	Vertical -30 to +15°
Operation with fanfold	Vertical -15 to +15°
Degree of protection	To IEC 529 or EN 60 529
Front with door	IP 54
Terminals, interfaces, plug connectors	IP 20

Electric safety
According to low-voltage guideline 73/23/EEC to EN 61010-1, overvoltage category II, degree of contamination 2 (IEC 1010-1, VDE 0411 Part 1)

Protection class	I

Electromagnetic compatibility
Emitted interference
The targets of the EMC guideline 89/336/EEC with respect to radio interference suppression to EN 50 081-1 and interference rejection to EN 50 082-2, as well as NAMUR recommendation NE 21 are observed.

Radio interference	
Power supply	Limit class B, measured according to VDE 0875 Part 11 (CISPR 11)

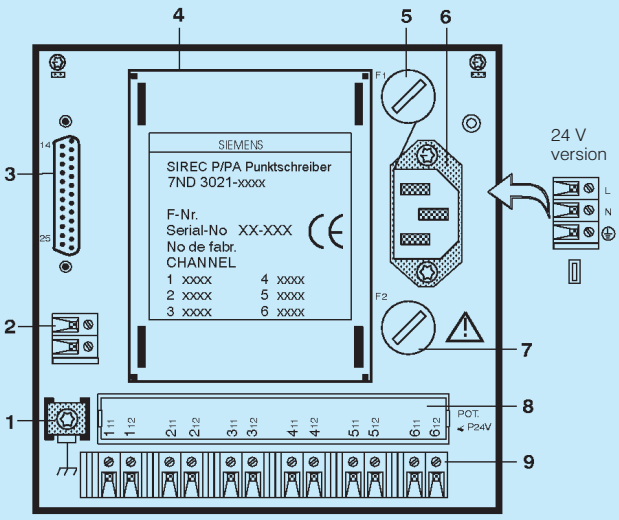
Interference rejection

Device-under-test	Influencing variable	Basic standard	Instrument	
			Test condition	Res [2]
Instrument	RF field AM	IEC 1000-4-3	10 V/m [1]	A
	RF field PM	IEC 1000-4-3	10 V/m	A
	Mag. field	IEC 1000-4-8	[3]	-
	Discharge	IEC 1000-4-2	6/8 kV	A
Process, measuring and control lines	RF conducted interference	IEC 1000-4-6	10 V	A
	Burst	IEC 1000-4-4	2 kV	A
	Surge	IEC 1000-4-5I	1/2 kV [4]	B
DC power inputs	RF conducted interference	IEC 1000-4-6	10 V	A
	Burst	IEC 1000-4-4	2 kV	A
	Surge	IEC 1000-4-5	1/2 kV [4]	A
	Interruption	IEC SC77BWG3	20 ms/100 % ≤ 15 I_{rated}	A
	In-rush current	-		-
AC power inputs	RF conducted interference	IEC 1000-4-6	10 V	A
	Burst	IEC 1000-4-4	2 kV	A
	Surge	IEC 1000-4-5	1/2 kV [4]	A
	Interruption	IEC SC77BWG3	20 ms/100 % ≤ 15 I_{rated}	A
	In-rush current	IEC 1000-3-3		-
	Overshoots	IEC 1000-3-2	Class D	-
Earth connection	RF conducted interference	IEC 1000-4-6	10 V	A

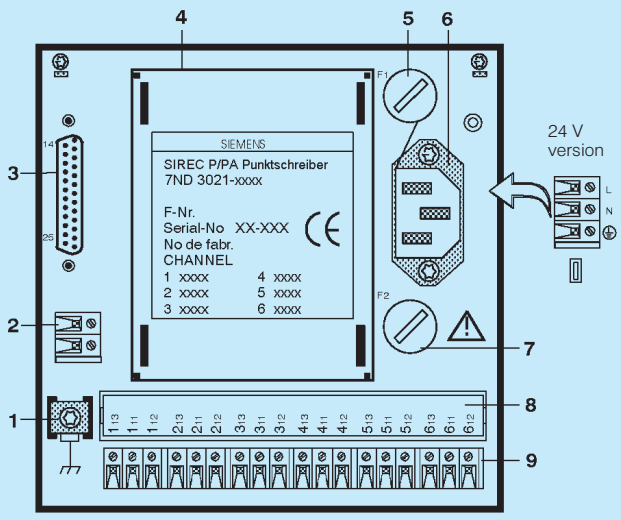
Dimensions, mounting	
Dimensions	Front dimensions 144 x 144 to DIN 43 700 and DIN 43 831 (see Fig. 2/10)
Mounting	
Panel mounting	To DIN 43 834-A-340
Desk and cabinet mounting	To DIN 43 834-A-330
Front door	Plastic, spring-loaded latch
Weight	Approx. 4 kg

[1]) 3 V/m in the ranges 87 to 108, 174 to 230 and 470 to 790 MHz
[2]) Response A = class accuracy retained during effect
Response B = interference possible during effect
- = not relevant
[3]) Not relevant because of measuring and recording procedure used
[4]) 1 kV symmetric, 2 kV asymmetric

Multipoint recorder 144 x 144



Version for DC U/I



Version for DC U/I/TC/RTD/R

"CHANNEL": inscription according to measuring ranges.

1 Ground connection
2 DC 24 V output
3 Digital input/output
4 Transformer with rating plate
5 Fuse F1
6 Power supply connection
7 Fuse F2
8 Window for measuring-point allocations with channel inscription for measuring ranges
9 Connection for analog channels

Fig. 2/11 Connection diagrams

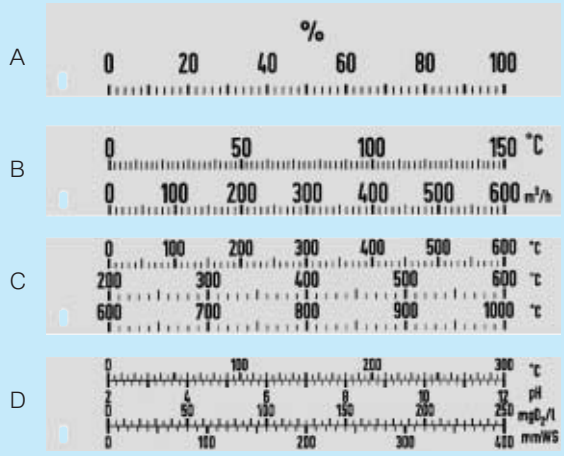


Fig. 2/12 Scale versions

Multipoint recorder 144 x 144

Ordering data			Order No.	Order code	Price
SIREC P/PA Six-channel multipoint recorder [1], front dimensions 144 mm x 144 mm, with recording unit for rolls or fanfold paper			7ND3021- ■■■■■■ - ■■■■ ■■■		
Power supply	AC 47 to 64 Hz AC 47 to 64 Hz AC 47 to 64 Hz DC 24 V	220 to 240 V 110 to 127 V 24 V	1 2 3 4		
Alphanumeric text	With Without		A B		
Measured variables	DC U/I DC U/I/TC/RTD/R DC U/I, with DC 24 V output DC U/I/TC/RTD/R, with DC 24 V output		A B C D		
Digital input/output	Without With digital input, electronic output With digital input, relay output		1 2 3		
Installation	In sheet-steel panel, cabinet or sheet-steel desk upright panel, with 2 clamps C72165-A405-B176 In panel or desk upright panel with basic grid dimension 72 x 72, with one set of mounting parts C79453-A3011-D101		1 3		
Instrument settings	Recording range 4 to 20 mA According to plain text	Scale(s) (max. 4) [3] 0 to 100 % (for all channels) According to plain text	1 4 [2]	-Z	. . .
Housing door in protection IP 54	Without lock With lock	Standard door Door with low-reflection glass Standard door Door with low-reflection glass	N A P A R A S A		
Measuring-point label	Unlabelled Labelled (max. 29 digits/channel); specify desired inscription in plain text:		1 9	R1Y	

Further designs on request.

Available ex stock

Accessories, consumable material and conversion parts on page 2/23

Scope of delivery

SIREC P/PA multipoint recorder as ordered, 1 ruler per scale, 1 measuring-point label, 2 blank labels (for inscription of signal input), 2 clamps or 1 set of mounting parts, 2 instrument fuses, appliance plug, 1 roll of chart paper, 1 pen, 1 battery (fitted in 7ND3021-.A...-....), installation instructions, instructions "Operation – a concise overview", instructions "Parameterization – a concise overview", 2 keys for housing door with lock, 1 plug connector for recorder with digital input/output and for recorder with alphanumeric text, 6 shorting jumpers.

When using several SIREC P/PA recorders it is sometimes only necessary to have one Manual. This is therefore not included in the delivery and must be ordered separately.

[1] Basic setting on delivery:
- The program interlock in the test menu is set such that only chart speed A (set to 20 mm/h) can be changed using the lever (enabling of lever is possible at any time).
- Dot joining for the graphic display of measured values.
- Color selected for output text: violet
- Channels with "Channel-specific parameters" are set to Measure ON and Recording ON. Channels without "Channel-specific parameters" are set to Measure OFF
- Noise suppression set for AC 50 Hz (switchable to AC 60 Hz).

[2] Plain text is required for each channel (sequence: channel 1 to 6) for the recording range and scale (max. 4 different scales are possible for the 6 channels).

Example: SIREC P/PA multipoint recorder, power supply AC 220 to 240 V, with text output, measured variables: DC U/I/TC/RTD, with digital input/output via opto isolator, for installation in panel, standard door without lock, measuring-point label inscribed.

Channel	Recording range	Scale	Label inscription
1	4 to 20 mA	0 to 10 bar, linear	Blower 1
2	0 to 20 mA	0 to 10 bar, linear	Blower 2
3	2 to 10 V	0 to 400 °C, linear	Furnace 1
4	Thermocouple J	400 to 800 °C, linear	Furnace 2
5	Thermocouple K	400 to 800 °C, linear	Furnace 3
6	Pt 100 (3-wire system)	0 to 200 °C, linear	Stack

Order as follows:
7ND3021-1AB21-4NA9-Z
R1Y + Y02 + Y01 + Y08 + Y10 + Y14 + Y18
Plus all data from the table of the example.

[3] All scales with the dimension °C are temperature-linear. Voltage- or resistance-linear temperature scales (only for older non-linearizing temperature transmitters) are available according to data in plain text.

Multipoint recorder 144 x 144

Order codes

Recording range / Scales [4]	Measured variables: DC I (mA) 0 to 20	4 to 20	0 to 1	0 to 10	DC U (V) 0 to 1	0 to 10	0,2 to 1	2 to 10	Direct connection of sensor: Type of TC [3] J	L	T	U	K	N	E	S	B	R	RTD Pt 100 [2]	Ni 100 [2]	Acc. to plain text [1]	Price
According to plain text	**Y01**	**Y02**	**Y03**	**Y04**	**Y05**	**Y06**	**Y07**	**Y08**	**Y10**	**Y11**	**Y12**	**Y13**	**Y14**	**Y15**	**Y16**	**Y17**	**Y21**	**Y22**	**Y18**	**Y19**	**Y20**	

Ordering data

		Order No.	Price
Accessories			
Manual [8]	German	**C79000-G7300-C188**	
	English	**C79000-G7376-C188**	
	French	**C79000-G7377-C188**	
	Spanish	**C79000-G7378-C188**	
	Italian	**C79000-G7372-C188**	
Installation Instructions [8]		**C79000-M7364-C193**	
Instructions "Operation – a concise overview"			
	German	**C79000-M7300-C192**	
	English	**C79000-M7376-C192**	
	French	**C79000-M7377-C192**	
	Spanish	**C79000-M7378-C192**	
	Italian	**C79000-M7372-C192**	
Instructions "Parameterization – a concise overview"			
	German	**C79000-M7300-C191**	
	English	**C79000-M7376-C191**	
	French	**C79000-M7377-C191**	
	Spanish	**C79000-M7378-C191**	
	Italian	**C79000-M7372-C191**	
Transport housing			
– For AC 230 V version		**7ND9500-8AA3**	
– For DC 24 V version		**7ND9500-8AA4**	
SIMATIC PDM software from V5.2 onwards for parameterization of SIREC P and SIREC PA multipoint recorders, with documentation (as help file)		**See catalog FI 01**	
Adapter cable for PC interface, with adapter (25 to 9)		**C79453-A3070-B104**	
Consumable material			
Chart paper 120 mm wide Recording width 100 mm 50 linear graduations			
• Roll,approx. 31 m long, approx. 0.15 kg			
Hours imprint			
For 10 mm/h		**C72452-A94-B208**	
20 mm/h		**C72452-A94-B209**	
60 mm/h		**C72452-A94-B210**	
120 mm/h		**C72452-A94-B211**	
Without		**C72452-A94-B212**	
Price per roll	20		
when ordering	60		
	100		
• Fanfold, approx. 16 m long, approx. 0.1 kg			
Hours imprint			
For 10 mm/h		**C72452-A94-B262**	
20 mm/h		**C72452-A94-B263**	
60 mm/h		**C72452-A94-B264**	
120 mm/h		**C72452-A94-B265**	
Without		**C72452-A94-B266**	
Price per pack	20		
when ordering	60		
	100		

	Order No.	Price
Consumable material (continued)		
Recording head (6 colors) violet, red, black, green, blue and brown	**7ND9001-8FB**	
Lithium battery, 3 V (for the clock module)	**W79084-L1002-B1**	
Conversion parts		
Digital input/output		
Electronic outputs	**7ND9400-8BF**	
Relay outputs	**7ND9400-8BE**	
DC 24 V output	**7ND9400-8BG**	
Recording unit		
For rolls or fanfold paper	**C72301-A20-A17**	
Take-up spool with rubber tongues	**C72301-A20-B110**	
Measuring-point label		
Without inscription	**C79165-A3029-B12**	
With inscription (max. 27 digits per channel), specify in plain text: **Desired text: . . .**	**C79165-A3029-B12-Z Y01**	

Scales

Type and arrangement of scales (Fig. 2/12)	Number of scales	Order No.
–	None [7]	**7ND9300-8QA**
A	One	**7ND9300-8QB** [5] [6]
B	Two	**7ND9300-8QC** [5] [6]
C	Three	**7ND9300-8QD** [5] [6]
D	Four	**7ND9300-8QE** [5] [6]

	Order No.
Ruler	
Without scale	**7ND9262**
With one scale	**7ND9272** [6]

Available ex stock

[1] Observe range limits in the technical data.

[2] Set to three-wire system.

[3] To DIN IEC 584
Type J: Fe/CuNi
Type K: NiCr/Ni
Type T: Cu/CuNi
Type S: Pt 10 % Rh/Pt
Type N: NiCrSi/NiSi
Type E: NiCr/CuNi
Type B: Pt30Rh/Pt6Rh
Type R: Pt13Rh/Pt
To DIN 43710
Type L: Fe-CuNi
Type U: Cu-CuNi

[4] Specify in addition: Order code(s) for the required recording range(s) including plain text(s) for the scale(s)

[5] A scale plate with one, two, three or four scales is required per recorder (Fig. 2/12: A, B, C or D); scale sequence from 1 at bottom to 4 at top according to sequence of Order codes 1 to 4.

[6] Specify in addition: Order code(s) for the required recording range(s) including plain text(s) for the scale(s) (see example for ordering on page 2/22).

[7] Start and end are marked.

[8] Also available by downloading from the Internet (see page 5/10 bottom).

SIREC PU

Multipoint recorder 144 x 144

7ND3523
Microprocessor-based multipoint recorder with display
Six-channel recorder, class 0.5
With fiber pen recording
Input variables DC U/I/TC

Features

General:

- Operating modes:
  - Measure
  - Display (as number and bar)
  - Record
- Limit monitoring:
  Alarm identification and output with limit violations, freely-adjustable for every channel
- Alarm linking
- Mathematical functions (cannot be retrofitted)
  - Fundamental operations
  - Statistical functions
  - Integration
  - Counter input
- Real-time calendar/clock
- Summer time/winter time switchover
- Output of error messages
- Input/output module: 4 inputs, 6 outputs via electronic outputs or relays
- Floating DC 24 V output for supply of input/output module or transmitter
- Housing front with degree of protection IP 54
- Installation without interspacing possible
- Mounting depth including connections 260 mm
- CE symbol, NAMUR/KTA requirements complied with

Measure:

- 6 analog channels and 2 digital channels
- Measuring cycle 0.3/0.5 s, depends on number of channels
- Measured variables (free selection possible):
  - Direct current, DC voltage
  - Temperature via thermocouples
- Channel isolation: semiconductor relays, floating
- Measured-value memory, thus no losses when replacing chart or during output of table (mixed mode)

Display:

- Display with background illumination, high contrast, large reading angle, background selectable as bright/black, brightness and contrast adjustable
- Display output of two measured values: numeric, analog bar display, mixed, including dimension, limit signals, alarm signals

Record:

- Recording with fiber recording head, max. 6 colors
- Curve display and printout as table
- Dot-joining technique
- Alphanumeric output: date, time, start/stop line, channel code, message text, alarms, event text, scale printout and measured-value table

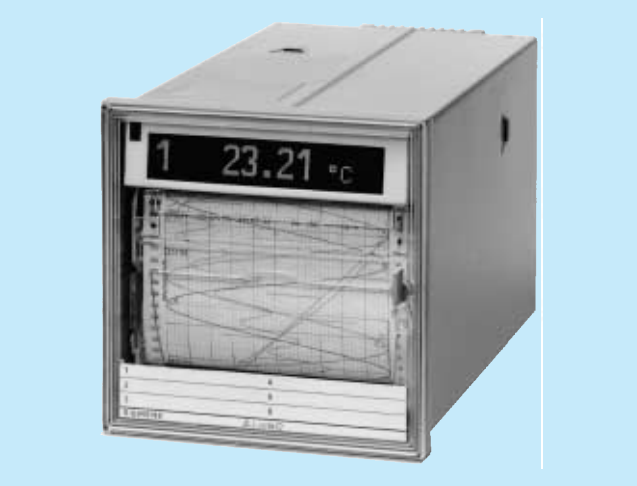
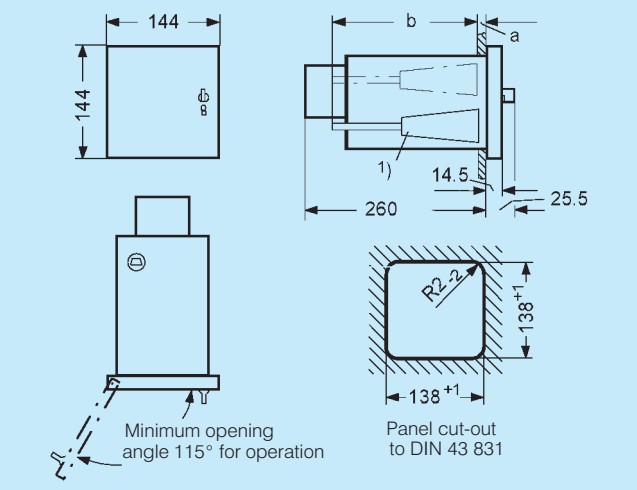


Fig. 2/13 SIREC PU

- Zooming and zoning (scale expansion and strip displays)
- Chart paper: roll or fanfold, also grid-free chart (grid is generated)

Adjustment/operation:

- Adjustments and operation using levers at front, the PC interface (SIMATIC PDM software) or the infrared remote control unit (is always required).
- Settings are saved by the non-volatile memory (EEPROM)



Distance between centers of adjacent instruments: ≥ 144 mm

Installation in	a	b
Sheet-steel panel or sheet-steel desk upright panel	2 to 42	230
Panel or desk upright pan. with basic grid dim. 72 x 72	39 to 81	195.5

[1]) The clamps can also be fitted at the top and bottom.

Fig. 2/14 Dimensions

Multipoint recorder 144 x 144

Technical data

Note: Only values with tolerances or limits are guaranteed data. Values without tolerances are informative data. The defined error limits apply following a warming-up time of 30 minutes.

Measuring functions	
Number of channels	6
Electric measuring ranges	Adjustable
Thermocouples	In °C or K
Functions $y = f(x)$	6 freely-programmable assignments between the input variable (x) (signal range) and the output variable (y) (measuring range), e.g. linearization with a maximum of 50 turning points each Dimension: 5 characters/dimension, freely-selectable/function Logic operations e.g. for control purposes
Channel isolation	Electrically isolated via semiconductor relays
Voltage endurance	Protected with varistors from PE conductor

Measuring range/ linearization range [1]	Resolution	Maximum electric measuring error [2] $F_{el} = F_{offset} + F_{rel} + F_{temp} + F_{terminal}$ (typ. 1/5 of max. measuring error)			
		F_{offset}	F_{rel}	F_{temp}	F_{term}
-10 to +60 mV	4 µV	15 µV	0.02	0.015 + 0 mV	-
-0.1 to +1 V	60 µV	0.2 mV	0.02	0.015 + 0 mV	-
-1 to +10 V	0.6 mV	2 mV	0.02	0.015 + 0 mV	-
-4 to +20 mA	1.2 µA	5 µA	0.03	0.015 + 0 mA	-
J (Fe/CuNi) -100 to +1000 °C/ -210 to +1000 °C	0.1 °C	0.4 °C	0.04	0.015 + 0 °C	0.8 °C
K (NiCr/Ni) -100 to +1370 °C/ -270 to +1370 °C	0.1 °C	0.4 °C	0.04	0.015 + 0 °C	0.8 °C
R (Pt13Rh/Pt) 100 to +1760 °C/ -50 to +1760 °C	0.5 °C	1.8 °C	0	0.01 + 0.2 °C	0.6 °C
T (Cu/CuNi) -100 to +400 °C/ -270 to +400 °C	0.2 °C	0.6 °C	0.04	0.015 + 0 °C	0.8 °C
S (Pt10Rh/Pt) 100 to 1760 °C/ -50 to 1760 °C	0.5 °C	1.8 °C	0	0.01 + 0.2 °C	0.6 °C
N (NiCrSi/NiSi) -100 to +1300 °C/ -200 to +1300 °C	0.2 °C	0.8 °C	0.04	0.015 + 0 °C	0.8 °C
E (NiCr/CuNi) -100 to +800 °C/ -270 to +800 °C	0.1 °C	0.4 °C	0.04	0.015 + 0 °C	0.8 °C
B (Pt30Rh/Pt6Rh) 600 to 1820 °C/ 100 to 1820 °C	0.6 °C	2 °C	0	0.01 + 0.2 °C	0.4 °C
L (FeCu/Ni) -100 to +900 °C/ -200 to +900 °C	0.1 °C	0.4 °C	0.04	0.015 + 0 °C	0.8 °C
U (Cu/CuNi) -100 to +560 °C/ -200 to +560 °C	0.2 °C	0.6 °C	0.04	0.015 + 0 °C	0.8 °C

Note:
A special calibration from a service place is recommended for a large stretching of the measuring ranges.

[1] Linearization range = measuring range with thermocouples with slightly increased error at start-of-scale including overload range.

[2] Measuring error
F_{offset} (zero error) = absolute value specified in table
F_{rel} (increasing error) = percentage specified in table multiplied by the value of the read measured value (% · |MV|)
F_{temp} (temperature error at an increased ambient temperature) = percentage specified in table multiplied by the value of the absolute measured value (% · |MV|) plus a constant specified as an absolute value, total multiplied by the value of the temperature difference between the reference value 23 ± 2 °C and the ambient temperature.
$F_{terminal}$ (error of terminal temp. measurement = absolute value specified in table for additional error with direct connection of thermocouples.

Permissible potential	Max. DC 24 V compared to PE conductor; only measuring circuits with safe isolation from power supply are permissible
Detection of line breakage	60 mV range and TC, source resistance ≤ 2 kΩ
Input resistance	≥ 100 kΩ in DC U range 10 MΩ in TC range 50 Ω in DC I range
Overload capacity	Max. 10 % of respective electric start-of-scale or full-scale value
Overload	Max. 24 V continuously (in DC U/TC range) Max. 40 mA continuously (in DC I range)
A/D conversion	One common dual-slope converter
Measuring cycle	0.3 s with ≤ 3 channels, 0.5 s with ≥ 4 channels
Measuring duration	20 ms with 50 Hz mains freq. 16 2/3 ms with 60 Hz mains freq.
Resolution	14 1/2 bits
Commom-mode rejection	≥ 90 dB for rated frequency
Series-mode rejection	≥ 60 dB for rated frequency
Reference conditions	
Ambient temperature	23 ± 2 °C
Relative humidity	55 ± 10 %
Source resistance	≤ 1 kΩ
Potential difference	≤ 1 V
Adjustment interval	≤ 12 months; an additional error of 0.01 %/year must be expected with a longer interval
Measured value calibration	Class 0.5 to DIN 43 782 or IEC 484
Damping	1st order low-pass, adjustable 0 to 120 s
Signal connection	2 screw terminals per channel
Terminal range	0.13 to 2.5 mm² solid conductor 0.13 to 1.5 mm² stranded conductor with sleeves Terminal designations to DIN 45 140
Mathematical functions	Addition, subtraction, multiplication, division, square-root, exponent, polynomial, Napierian log, common log, absolute value, minimum, maximum, mean value, equation editor, summation, F-value (sterilization), Digital counter inputs 2 Hz
Operation, displays	
Display	LCD with background illumination
Display modes	
Alphanumeric	Measured values, messages, settings
Bars	Measured values
Characters/line	16 or 11 (see Fig. 2/19)
Character height	6.5 or 13 mm (see Fig. 2/19)
Operation	4 levers for basic functions and servicing on recorder Infrared remote control unit for all setting data, menu-based PC interface on front, for all setting data and measured values
Real-time clock	
Format	Year, month, day, hour, minute, second; 12/24-hour representation, Summer/winter time switchover

2

Multipoint recorder 144 x 144

Error	Max. $1 \cdot 10^{-5}$
Backup	Via capacitor in event of power failure (approx. 5 min) or via battery (approx. 36 months)
Recording	
Recording method	Discontinuous with intermediate storage of measured value, compensation of pen offset
Chart drive	Step motor
Chart speed (2 speeds preselectable and switchable via control input)	1 - 1.25 - 2 - 2.5 - 5 - 10 - 15 -20 - 30 - 40 - 50 - 60 - 100 - 120 - 150 - 180 - 200 - 300 - 600 - 1200 mm/h
Recording system	
Pen assembly	Replaceable fiber pens
Colors	Violet, red, black, green, blue, brown
Recording length	Approx. 1800 m
Service period	Approx. 6 months
Storage life	Approx. 24 months in closed packing, approx. 1 month in recorder with climate to DIN IEC 654-1
Pen assembly drive	Program-controlled step motor
Resolution	0.125 mm
Carriage speed	Max. 125 mm/s
Recording system error	$F_{mech} \leq 0.3$ %
Recording width	100 mm
Alphanumeric recording	
Character height	Approx. 2.2 mm
Characters/line	53
Character set	ASCII standard with upper-case and lower-case letters, Greek alphabet and special characters in 6 colors
Limit monitoring	2 alarms per channel, free assignment of channels MIN or MAX adjustable
Alarm signalling	Recording of a symbol in event of upward or downward violation of a limit
Limit hysteresis	2 % of recording range
Digital input/output	
Digital inputs	4, electrically isolated via opto isolators, passive
Switching level	Low $\leq$ 0.3 V, High +8 V to +30 V
Input resistance	$\geq$ 5 kΩ
Digital outputs	6
Electronic version	Electrically isolated via opto isolators, semiconductor switches, short-circuit-proof, P-switching
Output current	Max. 150 mA
Switching level	High ext. voltage $\geq$ - 2 V
Ext. power supply	DC 18 to 30 V
Relay version	Electrically isolated via relays, floating switchover contacts
Switching voltage/current	50 V, 1 A (external voltage)
Switching capacity	30 W or 60 VA
Contact life	1 x 10^8 mechanical 3 x 10^6 at max. load
Permissible potential	50 V
Connections	Subminiature plug, 25-pin, lockable

Power supply	
AC power supply	
Mains voltage	AC 230/115 V +15 % to -20 % AC 24 V +15 % to -20 %
Frequency range	47 to 64 Hz
Power consumption	30 VA (with options) at rated voltage
DC power supply	
Rated voltage	DC 24 V +20 % to -15 %
Power consumption	18 W (with options) at rated voltage
DC 24 V output	DC 24 V ± 15 %, 75 mA, short-circuit-proof Capacitive load $\leq$ 33 µF
Ambient conditions	
Climate	To IEC 68-2-1/2/ DIN EN 60 068-2-1/2
Temperature of use	0 to 50 °C (max. 75 % rel. humidity, no condensation), change in temperature max. 10 K/h
Storage temperature range	-25 to +70 °C (max. 75 % rel. humidity at 25 °C, no condensation), change in temperature max. 20 K/h
Mechanical	
Vibrations during operation	To DIN IEC 68-2-6 5 to 9 Hz; 3.5 mm deflection 9 to 200 Hz; 10 m/s^2 acceleration
Vibrations during storage and transport	To DIN IEC 68-2-6 5 to 9 Hz; 3.5 mm deflection 9 to 500 Hz; 10 m/s^2 acceleration
Drop test for packed unit	To DIN EN 60 068-2-32, height < 0.8 m
Shock test during operation	To IEC 68-2-27/ DIN EN 60 068-2-27 Half-sine: 150 m/s^2 (15 g), 11 ms
Resistance to earthquakes during operation	Parameters to KWU AVS DD 7080.9; 5 to 35 Hz; max. 10 mm deflection, max. 15 m/s^2 acceleration
Mounting position	To DIN 16 257
Operation with roll	Vertical -30° to +15°
Operation with fanfold	Vertical -15° to +15°
Degree of protection	To IEC 529 or EN 60 529
Front with door	IP 54
Terminals, interfaces, plug connectors	IP 20

Electric safety
According to low-voltage guideline 73/23/EEC to EN 61010-1, overvoltage category II, degree of contamination 2 (IEC 1010-1, VDE 0411 Part 1)

Protection class	I

Multipoint recorder 144 x 144

Electromagnetic compatibility

Emitted interference

The targets of the EMC guideline 89/336/EEC with respect to radio interference suppression to EN 50 081-1 and interference rejection to EN 50 082-2, as well as NAMUR recommendation NE 21 are observed.

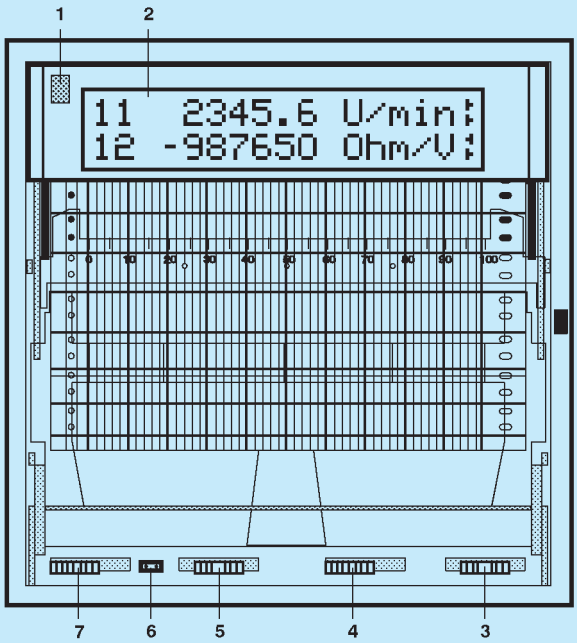
Radio interference Power supply	Limit class B, measured according to VDE 0875 Part 11 (CISPR 11)

Device-under-test	Influencing variable	Basic standard	Instrument	
			Test condition	Res [2]
Instrument	RF field AM	IEC 1000-4-3	10 V/m [1]	A
	RF field PM	IEC 1000-4-3	10 V/m	A
	Mag. field	IEC 1000-4-8	[3]	–
	Discharge	IEC 1000-4-2	6/8 kV	A
Process, measuring and control lines	RF conducted interference	IEC 1000-4-6	10 V	A
	Burst	IEC 1000-4-4	1/2 kV	A
	Surge	IEC 1000-4-5I	1/2 kV [4]	B

[1] 3 V/m in the ranges 87 to 108, 174 to 230 and 470 to 790 MHz
[2] Response A = class accuracy retained during effect
Response B = interference possible during effect
– = not relevant
[3] Not relevant because of measuring and recording procedure used
[4] 1 kV symmetric, 2 kV asymmetric

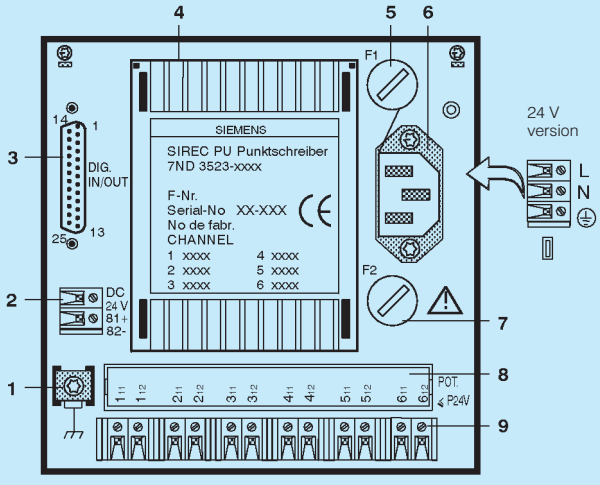
Device-under-test	Influencing variable	Basic standard	Instrument	
			Test condition	Res [2]
DC power inputs	RF conducted interference	IEC 1000-4-6	10 V	A
	Burst	IEC 1000-4-4	2 kV	A
	Surge	IEC 1000-4-5	1/2 kV [1]	A
	Interruption	IEC SC77BWG3	20 ms/100 %	A
	In-rush current	–	≤ 15 I_{rated}	–
AC power inputs	RF conducted interference	IEC 1000-4-6	10 V	A
	Burst	IEC 1000-4-4	2 kV	A
	Surge	IEC 1000-4-5	1/2 kV [1]	A
	Interruption	IEC SC77BWG3	20 ms/100 %	A
	In-rush current	IEC 1000-3-3	≤ 15 I_{rated}	–
	Overshoots	IEC 1000-3-2	Class D	–
Earth connection	RF conducted interference	IEC 1000-4-6	10 V	A

Dimensions, mounting	
Dimensions	Front dimensions 144 x 144 to DIN 43 700 and DIN 43 831 (see Fig. 2/15)
Mounting	
Panel mounting	To DIN 43 834-A-340
Desk and cabinet mounting	To DIN 43 834-A-330
Front door	Plastic with spring-loaded latch
Weight	Approx. 4.3 kg



1 Infrared receiver
2 Display
3 Lever 3
4 Lever 2
5 Lever 1
6 PC interface
7 Service lever

Fig. 2/15 Front view



1 Ground connection
2 DC 24 V output
3 Digital input/output
4 Transformer with rating plate
5 Fuse F1
6 Power supply connection
7 Fuse F2
8 Window for measuring-point allocations with channel inscription for measuring ranges
9 Connection for analog channels

Fig. 2/16 Rear view

Multipoint recorder 144 x 144

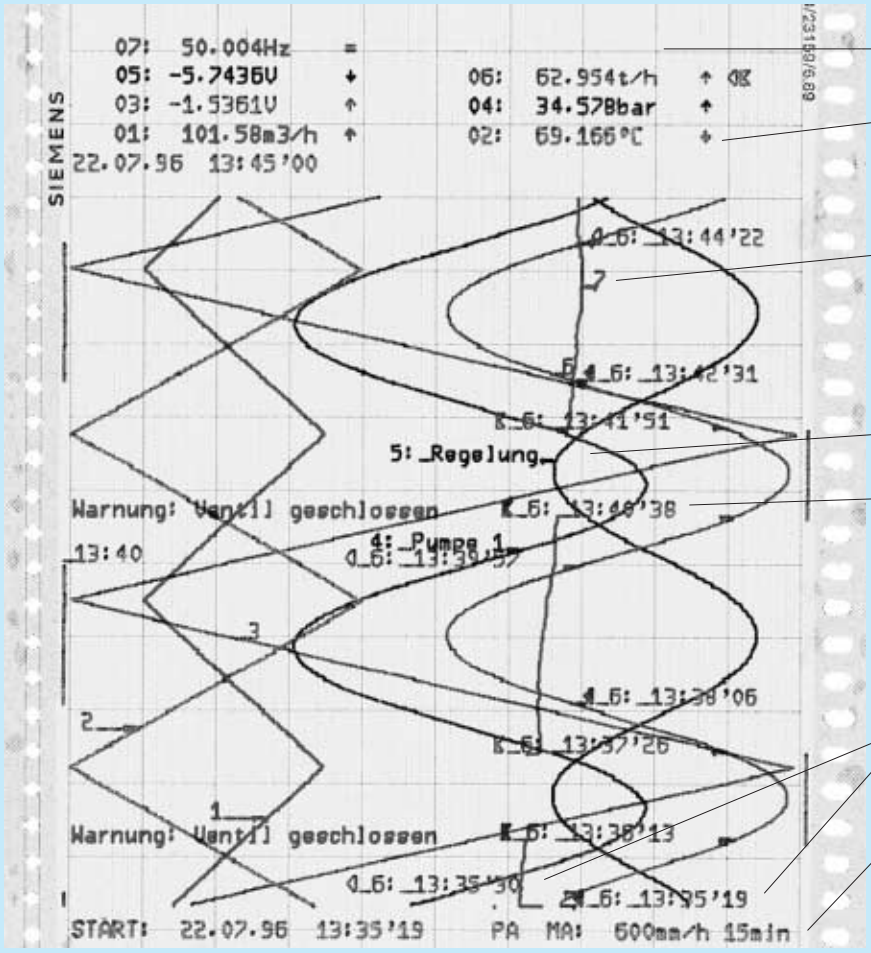
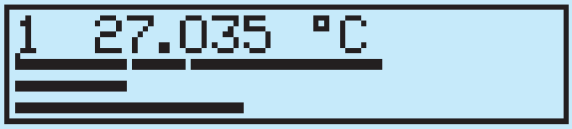


Fig. 2/17 Example of graphic recording (80 % of original size)

Measured-value display "Numeric (1)"

Measured-value display "Numeric/analog (1)"

Measured-value display "Numeric (2)"



Measured-value display "Numeric/analog (3)"

Fig. 2/18 Display examples

Multipoint recorder 144 x 144

Ordering data			Order No.	Order code	Price
Recorders available ex stock **SIREC PU** with display Six-channel multipoint recorder, front dimensions 144 mm x 144 mm For installation in sheet-steel panel, cabinet or desk upright panel With recording unit for rolls or fanfold paper			**7ND3523- 1 A B 1 1 - 1 N A 1**		
SIREC PU with display Six-channel multipoint recorder, front dimensions 144 mm x 144 mm For installation in sheet-steel panel, cabinet or desk upright panel With recording unit for rolls or fanfold paper			**7ND3523-** ■■■■■■ **- ■ N A ■** ■■■		
Power supply	AC 47 to 64 Hz AC 47 to 64 Hz AC 47 to 64 Hz DC 24 V	220 to 240 V 110 to 127 V 24 V	**1** **2** **3** **4**		
Number of channels	6 6, with mathematical functions [1]		**A** **B**		
Measured variables	DC U/I/TC DC U/I/TC, with DC 24 V output		**B** **D**		
Digital input/output	Without With digital input, electronic output With digital input, relay output		**1** **2** **3**		
Installation	In sheet-steel panel, cabinet or sheet-steel desk upright panel, with 2 clamps C72165-A405-B176 In panel or desk upright panel with basic grid dimension 72 x 72, with one set of mounting parts C79453-A3011-D101		**1** **3**		
Recorder setting	All 6 channels set to 4 to 20 mA Specify for all 6 channels in plain text . . . . . . (including built-in battery for clock module)		**1** **4**	**-Z**	**Y01**
Measuring-point label	Unlabelled Labelled (max. 29 digits/channel); specify desired inscription in plain text:		**1** **9**		**R1Y**

Further designs on request.

Note:
Operation always requires a remote control unit 7ND9190-8AA.

Accessories, consumable material and conversion parts on page 2/30

Scope of delivery

SIREC PU multipoint recorder 7ND3523 as ordered, 1 roll of chart paper, 1 accessories bag (1 recording head, 2 fuses), 1 appliance plug (with AC 230 or 115 V version), 2 clamps, 1 plug connector (with digital input/output), 1 measuring-point label, unpacking instructions, installation instructions, instructions "Operation – a concise overview", instructions "Parameterization – a concise overview", 1 battery (fitted).
When using several SIREC PU recorders it is sometimes only necessary to have one Manual. This is therefore not included in the delivery and must be ordered separately.

[1]) SIPROM R-PU required for parameterization.

Multipoint recorder 144 x 144

Ordering data	Order No.	Price
Accessories		
Manual (as file: Instruction Manual for recorder and PC interface) [1]		
German	C79000-G7300-C195	
English	C79000-G7376-C195	
French	C79000-G7377-C195	
Spanish	C79000-G7378-C195	
Italian	C79000-G7372-C195	
Installation Instructions, in 5 languages	C79000-M7364-C200	
Instructions "Operation – a concise overview"		
German	C79000-M7300-C199	
English	C79000-M7376-C199	
French	C79000-M7377-C199	
Spanish	C79000-M7378-C199	
Italian	C79000-M7372-C199	
"Parameterization – a concise overview"		
German	C79000-M7300-C198	
English	C79000-M7376-C198	
French	C79000-M7377-C198	
Spanish	C79000-M7378-C198	
Italian	C79000-M7372-C198	
Transport housing		
– For AC 230 V version	7ND9500-8AA3	
– For DC 24 V version	7ND9500-8AA4	
SIMATIC PDM software from V5.2 onwards for parameterization of SIREC PU multipoint recorders, with documentation (as help file)	See catalog FI 01	
Adapter cable for PC interface, with adapter (25 to 9)	C79453-A3070-B104	
Infrared remote control unit with 4 alkaline batteries each 1.5 V	7ND9190-8AA	
Consumable material		
Chart paper 120 mm wide Recording width 100 mm 50 linear graduations		
• Roll, approx. 31 m long, approx. 0.15 kg		
Hours imprint		
For 10 mm/h	C72452-A94-B208	
20 mm/h	C72452-A94-B209	
60 mm/h	C72452-A94-B210	
120 mm/h	C72452-A94-B211	
Without	C72452-A94-B212	
Price per roll when ordering 20		
60		
100		
• Fanfold, approx. 16 m long, approx. 0.1 kg		
Hours imprint		
For 10 mm/h	C72452-A94-B262	
20 mm/h	C72452-A94-B263	
60 mm/h	C72452-A94-B264	
120 mm/h	C72452-A94-B265	
Without	C72452-A94-B266	
Price per pack when ordering 20		
60		
100		

	Order No.	Price
Chart paper 120 mm wide Recording width 100 mm Without graduations		
• Roll, approx. 31 m long, approx. 0.15 kg	7ND9000-8EE	
Price per roll when ordering 20		
100		
• Fanfold, approx. 16 m long, approx. 0.1 kg	7ND9000-1AE	
Price per pack when ordering 20		
100		
Recording head (6 colors) violet, red, black, green, blue and brown	7ND9001-8FB	
Lithium battery, 3 V (for the clock module)	W79084-L1002-B1	
Conversion parts		
Digital input/output		
Electronic outputs	7ND9400-8BF	
Relay outputs	7ND9400-8BE	
DC 24 V output	7ND9400-8BG	
Recording unit		
For fanfold paper	C72301-A20-A6	
For rolls or fanfold paper	C72301-A20-A7	
Take-up spool with rubber tongues	C72301-A20-B110	
Housing door with lock		
Normal	C79165-A3029-B28	
Low-reflection	C79165-A3029-B30	
Mounting set 72 x 72 for installation in panel or desk upright panel with basic grid dimensions 72 x 72	C79453-A3011-D101	
Measuring-point label		
Without inscription	C79165-A3029-B382	
With inscription (max. 29 digits per channel), specify in plain text: **Desired text: . . . . . .**	C79165-A3029-B383-Z Y01	

Fig. 2/19 Infrared remote control unit

Available ex stock

[1] Also available by downloading from the Internet (see page 5/10 bottom).