Digital indicators

2

Digital indicators

48 x 24 mm 3½-digits

Digital indicators 48 x 24

Overview

Input variables

- Direct voltage
- Direct current

Design

The digital indicator 48 x 24 comprises:

- Indicator with 8-mm high display unit
- Polycarbonate housing suitable for
  - Control panel according to DIN 43 700
  - Slots

Some control-room systems require additional mounting elements from the control-room manufacturer.

The unit is pressed onto the center of the device under the display, black 2.5 mm.

Electrical connection is over plug-in screw terminal blocks.

Functions

The indication is displayed on a 3½-digit (1999) 7-segment digital indicator. The display area can be expanded by one number (19990) which is hard-wired to the "zero".

The display area can be set over a potentiometer on the rear panel of the device. The decimal points are set over soldering jumpers on the display in accordance with the data on the type plate (ordering data).

The auxiliary power of 18 to 36 V DC or 24 V AC is isolated from the measuring circuit. The clearance and creepage distances are designed for test voltages of 500 V.

Technical specifications

Display	
Type	7-segment LED
Florescent color	Red or green
No. of digits	
• 3½-digit	-1999 to +1999
• 3½-digit with "zero"	-19990 to +19990
Height of digits	Approx. 8 mm
Polarity	"-" is displayed automatically
Decimal point	fixed
Off-scale indication	1... , if indication >1999
Input	Potential-free, DC measuring range corresponding to the ordering data (please heed specifications on the type plate)
Input resistance for voltage measurement	> 1 MΩ
Voltage drop for current measurement	approx. 200 mV
Overload	
Current	2-fold continuous
Voltage	10-fold, max. 50 V
Error limits	± (0.05 % + 2 digits)
Temperature coefficient	< 100 ppm/K
Offset drift	< 0.2 digit/K
Warming-up time	Approx. 1 min
Control commands (can be controlled externally)	Display storage, segment test or blanking
Measurement	
Conversion method	Dual slope
Measuring time	Approx. 100 ms
Measurements/s	Typically 3, depending on the filter at the measurement input, the setting time of the complete device may be longer. Approx. 1 second.
Power supply	24 V AC+ 10 %, 45 to 65 Hz or 18 to 36 V DC
Power consumption	Max. 1.6 W
Ambient conditions	
Service temperature range	0 to 50 °C
Storage temperature range	-20 to +70 °C
Relative humidity	Max. 85 %
Housing	Polycarbonate
Front dimensions	48 mm x 24 mm
Bezel, matt	Gray (RAL 7037), light gray (RAL 7035), pebble gray (RAL 7032), black (RAL 9005) or dark beige (SN 30 920 No. 104)
Front panel	Gray white (RAL 9002)
Front frame height	5 mm
Front frame width	3 mm
Mounting depth	Max. 93 mm
Panel cutout	$45^{+0.2}$ mm x $21^{+0.2}$ mm
Weight	Approx. 0.2 kg
Mounting	Tabs for all slots
Electric connection	plug-in screw terminal blocks

48 x 24 mm 3½-digits

Technical specifications

Regulations

Versions	according to IEC 1010-1.91
Degree of protection	
• Housing front	IP 40 according to EN 60 529
• Connections	IP 00 according to EN 60 529
Protective measures	Safety class III
Applied specifications	IEC 1010-1, EN 50 022, IEC 801-1 to IEC 801-5, DIN 40 040

Selection and ordering data

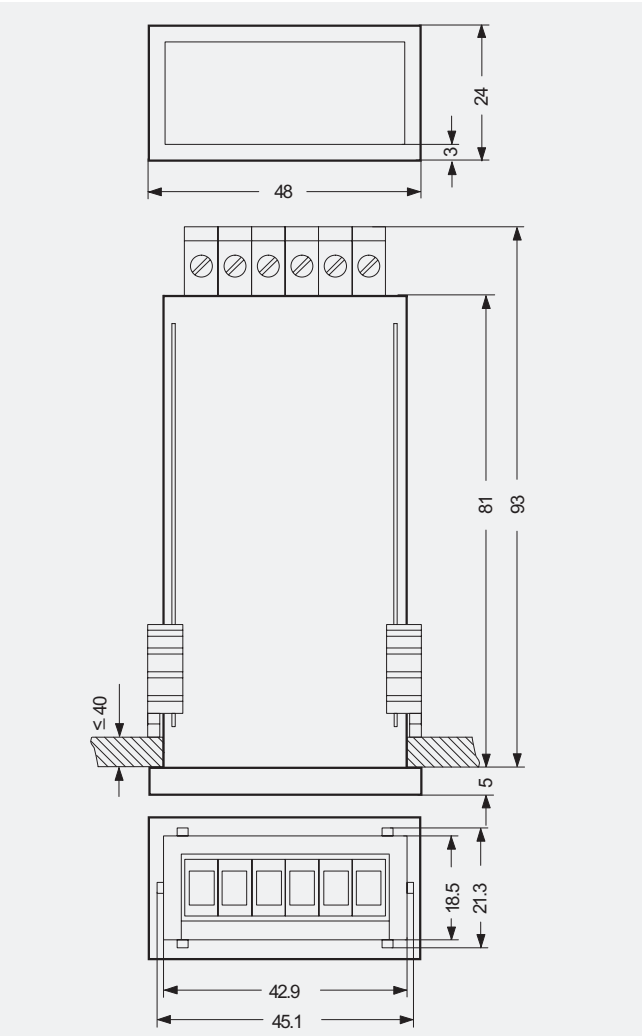
	Order No.	Order Code
Digital indicators 48 x 24, 3½-digits with operating instructions in German, English and French	**7NJ3001 -** ■■■■■ - ■■■■	■■■
Input variable Signal range set to		
• DC current		
- 4 to 20 mA	**1AA**	
- 0 to 20 mA	**1AB**	
- 0 to ... mA (min. 0.2 mA; max. 200 mA)	**1AC**	**-Z Y01** [1]
• DC voltage		
- 0 to 10 V	**1BA**	
- 0 to ... V (min. 60 mV; max. 50 V)	**1BB**	**-Z Y01** [1]
Display		
• Red	**1**	
• Green	**2**	
Auxiliary power 24 V DC or 24 V AC 60/50 Hz	**3**	
Color of bezel		
• Gray, RAL 7037	**1**	
• Light gray, RAL 7035	**2**	
• Pebble gray, RAL 7032	**3**	
• Black, RAL 9005	**4**	
• Dark beige, SN 30 920 no. 104	**5**	
Display range/unit		
• Corresponding to signal range (3½-digit)	**A**	
• ... to ... unit (3½-digit)	**C**	**-Z Y02** [1]
• ... 0 to ... 0 unit (3½-digit with zero)	**D**	**-Z Y02** [1]
Decimal point		
Corresponding to signal range	**A**	
3½-digit / 3½-digit with zero		
None / None	**B**	
xxx.x / xxx.x0	**C**	
xx.xx / xx.xx0	**D**	
x.xxx / x.xxx0	**E**	
- / xxxx.0	**F**	
Control input		
• Blanking	**1**	
• Display storage (hold)	**2**	
• Segment test	**3**	

1) Specifiy value in plain text, e.g. "7 to 13 mA".

Selection and ordering data

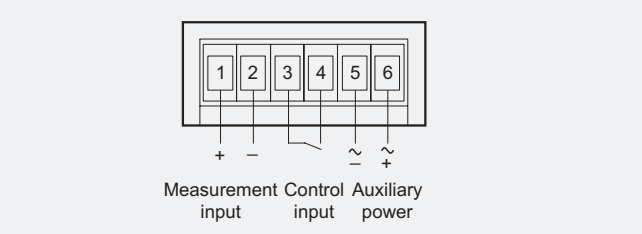
	Order No.	Order Code
Additional designs Available for all Order Nos. Supplement Order No. with -Z	**7NJ3001 -** ■■■■■ - ■■■■	■■■
Additional labeling on the front panel (specify in plain text)		**-Z Y04**
Additional labeling on the rear panel (specify in plain text)		**-Z Y07**

Dimension drawings



Digital indicator 48 x 24, dimensions in mm

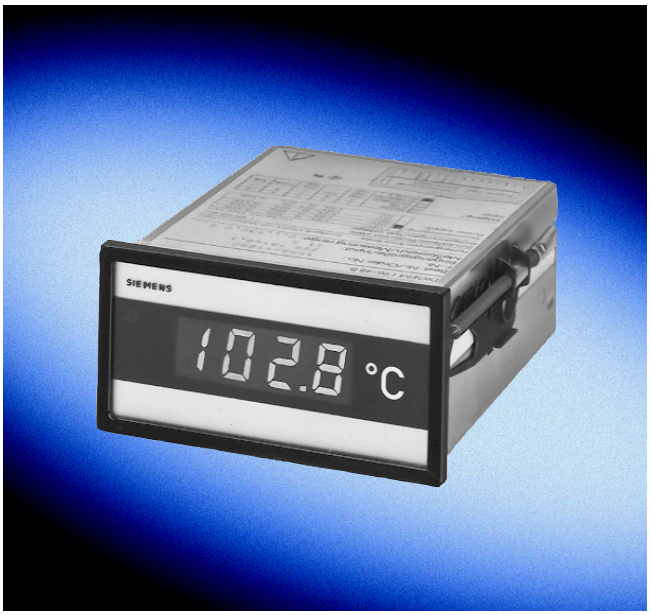
Circuit diagrams



Digital indicator 48 x 24, terminal diagram

Digital indicators

96 x 48 mm 3½-digits



Digital indicator 96 x 48

Overview

Input variables

- Direct voltage
- Direct current
- Alternating voltage
- Alternating current
- Temperature
- Frequency

Design

The digital indicator 96 x 48 comprises:

- Indicator with 14-mm high display unit
- Measuring ranges for
  - DC ranges (current or voltage)
  - AC ranges (current or voltage)
  - Pt 100 resistance thermometer
  - Thermoelements type J (Fe/CuNi) or type K (NiCr/Ni)
  - Frequency
- Split-shell metal housing suitable for
  - Control panel according to DIN 43 700
  - Slots

Some control-room systems require additional mounting elements from the control-room manufacturer.

Degree of protection of front of housing is IP 40.

Electrical connection is over plug-in screw terminal blocks.

Functions

The indication is displayed on a 3½-digit (1999) digital indicator.

This rugged compact device is simple to adust and calibrate. For the 4 to 20 mA model, complete calibration can be performed with a 4-mA standard signal.

The measuring range is selected over clearly arranged coding plugs inside the device. Removing the front panel gives easy access to the potentiometer for fine-tuning and the coding plugs for setting the decimal point.

The digital indicator for temperature or frequency measurement are factory-calibrated. The indicator for the other measuring ranges can be calibrated to the standard value or to a specified value.

The digital indicators are available for auxiliary power of 230 AC or 115 V and 24 V AC/DC. A coding plug in the device is used to set the auxiliary power to 230 or 115 V.

Technical specifications

Display	
Type	7-segment LED
Florescent color	Red or green
No. of digits	Max. ± 1999
Height of digits	14 mm
Polarity	"-" is displayed automatically
Decimal point	Can be set over the coding pin after removing the front panel
Off-scale indication	"1..."
Input	Potential-free, one measuring range corresponding to the ordering data
Input resistance	
• for AC voltage	≥ 2 MΩ
• for DC voltage	≥ 1 MΩ
• shunt resistors	Switching between 3 ranges possible using coding plugs in the device
60 mV	50 KΩ
150 mV	100 KΩ
300 mV	65 KΩ
Voltage drop for mA current measurements	Max. 1.6 V
Input voltage for frequency	80 to 700 V
Overload	
DC current	Max. 200 mA
AC current	2-fold, continuous, 60-fold for 1 s
AC/DC voltage	10-fold, max. 250 V except for AC 700 V range max. 1.2-fold
Shunt resistors	Max. 2 V
Error limits	with ref. to indication
• Intrinsic error	± (0.05 % + 2 digits)
Temperature coefficient	< 190 ppm/K
Zero-point drift	type 0.2 digit/K
Warm-up period	approx. 1 min
Series-mode rejection ratio (SMRR)	> 50 dB at 50 Hz
• Additional errors for	
- Alternating voltage and alternating current measuring ranges, arithmetic, 50 Hz to 60 Hz	± (0.2 % + 3 digits)
- Alternating voltage and alternating current measuring ranges, TRUE RMS, 50 Hz to 60 Hz	± (0.2 % + 3 digits)
for DC components	± 2 % additionally
- Temperature measuring range with Pt 100 in three and four-wire connection	± (0.3 % + 1 digit)
Cable influence for Pt 100 in three-wire connection	2.8 °C/ΔΩ
- Temperature measuring range with thermocouples	± (0.3 % + 1 digit)
Thermocouple or line interruption	Display "1..."

96 x 48 mm 3½-digits

Technical specifications

Control commands	
Display storage	Can be controlled externally
Segment test	Can be controlled externally
Measurements	
Conversion method	Dual slope, bipolar
Measuring time	Approx. 100 ms
Measurements/s	Typically 3, depending on the filter at the measurement input, the setting time of the complete device depends on the variable to be measured
Power supply	230 V AC (196 to 253 V), 45 to 65 Hz, can be switched over to 115 V (98 to 126 V), 45 to 65 Hz or 24 V ± 10 %, 45 to 65 Hz or 18 to 36 V DC
Power consumption	Max. 3.5 W
Ambient conditions	
Service temperature range	0 to 50 °C
Storage temperature range	-20 to +70 °C
Relative humidity	Max. 85 %
Housing	Split metal shell
Front dimensions	96 mm x 48 mm
Bezel, matt	Gray (RAL 7037), light gray (RAL 7035), pebble gray (RAL 7032), black (RAL 9005) or dark beige (SN 30 920 No. 104)
Front frame height	5 mm
Front frame width	4 mm
Mounting depth	Max. 125 mm
Panel cutout	$92^{+0.8}$ mm x $45^{+0.6}$ mm
Weight	Max. 0.4 kg
Mounting	Screw brackets B
Electric connection	Plug-in screw terminals
Regulations	
Degree of protection	IP 40, front panel according to EN 60 529
Protective measures	Safety class I according to DIN VDE 0411 Part 1 and Part 100
Applied specifications	IEC 1010-1
Interference suppression	EN 5022 Class B

Selection and ordering data

	Order No.	Order Code
Digital indicator 96 x 48, 3½-digits with operating instructions in German and English	**7NJ3003 -** ■■■■ - ■■■■	■■■
Input variable Signal range set to		
• DC current		
- 4 to 20 mA	**1AA**	
- 0 to 20 mA	**1AB**	
- 0 to ... mA (min. 0.2 mA; max. 200 mA)	**1AC**	**-Z Y01** [1]
- 4 to 20 mA with supply voltage for two-wire transducer 24 V/20 mA (only for auxiliary power, 230 V)	**1AD**	
• DC voltage		
- 0 to 10 V	**1BA**	
- 0 to ... V (min. 200 mV; max. 200 V)	**1BB**	**-Z Y01** [1]
- ± 60 mV, connection over shunt resistors	**1BC**	
- ± 150 mV, connection over shunt resistors	**1BD**	
- ± 300 mV, connection over shunt resistors	**1BE**	
• AC arithmetic current/voltage		
- 199.9 V	**1DD**	
- 700 V	**1DE**	
- .../1 A, connection over current transformer	**1DB**	**-Z Y01** [1]
- .../5 A, connection over current transformer	**1DC**	**-Z Y01** [1]
• AC-RMS current/voltage		
- 100 V	**1ED**	
- 700 V	**1EE**	
- .../1 A, connection over current transformer	**1EB**	**-Z Y01** [1]
- .../5 A, connection over current transformer	**1EC**	**-Z Y01** [1]
• Pt 100, three-wire connection		
- 0 to 199.9 °C	**1FA**	
- -190 to +800 °C	**1FB**	
• Pt 100, four-wire connection		
- 0 to 199.9 °C	**1FC**	
- -190 to +800 °C	**1FD**	
• Thermocouple (with reference junction)		
- Type J (Fe/CuNi), 0 to 760 °C	**1GA**	
- Type K (NiCr/Ni), 0 to 1260 °C	**1GB**	
• Frequency (power supply), 80 to 700 V, 12 to 199.9 Hz	**1HD**	
Display		
• Red	**1**	
• Green	**2**	

1) Specifiy value in plain text, e.g. "7 to 13 mA".

Digital indicators

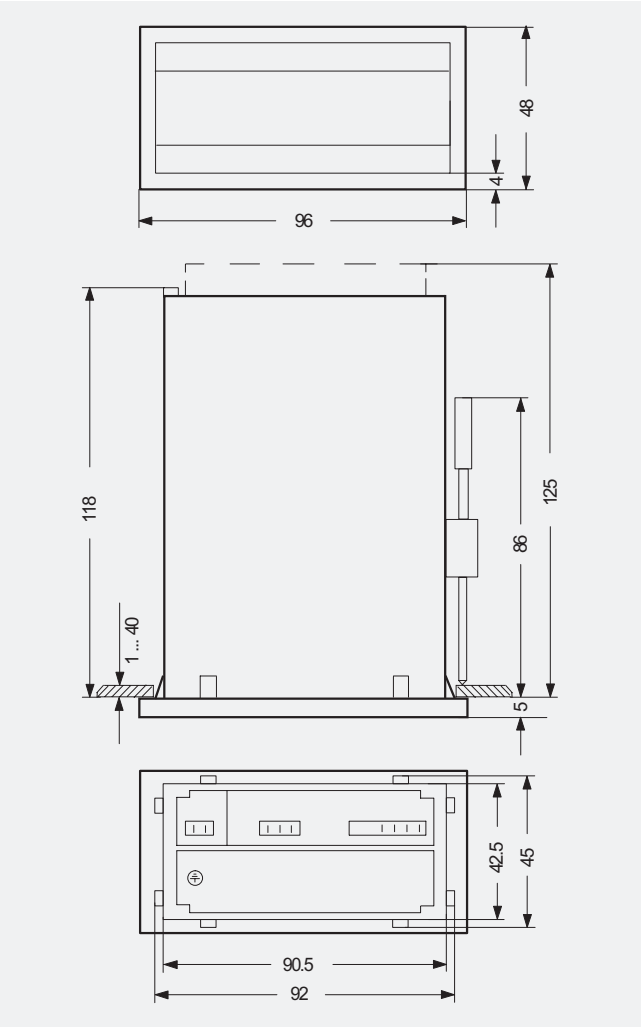
96 x 48 mm 3½-digits

Selection and ordering data

	Order No.	Order Code
Digital indicator 96 x 48, 3½-digits with operating instructions in German and English	**7NJ3003 -** ■■■■■ - ■■■■	■■■
Power supply		
• 230 V AC, 60/50 Hz	**1**	
• 115 V AC, 60/50 Hz	**2**	
• 24 V DC or 24 V AC, 60/50 Hz	**3**	
Color of bezel		
• Gray, RAL 7037	**1**	
• Light gray, RAL 7035	**2**	
• Pebble gray, RAL 7032	**3**	
• Black, RAL 9005	**4**	
• Dark beige, SN 30 920 no. 104	**5**	
Display range/unit		
• Corresponding to signal range	**A**	
• Standard calibration (set to 0 to 1000)	**B**	
• ... to ... unit (uniform zero point position or 4 to 20 mA (signal range))	**C**	**- Z** **Y02** [1]
• ... to ... unit (non-uniform zero point position without 4 to 20 mA)	**D**	**- Z** **Y02** [1]
Decimal point		
• Without	**A1**	
• xxx.x	**B1**	
• xx.xx	**C1**	
• x.xxx	**D1**	
Additional designs Available for all Order Nos. Supplement Order No. with -Z	**7NJ3003 -** ■■■■■ - ■■■■	■■■
Additional labeling on the front panel (specify in plain text)	**- Z**	**Y04**
Additional labeling on the rear panel (specify in plain text)	**- Z**	**Y07**

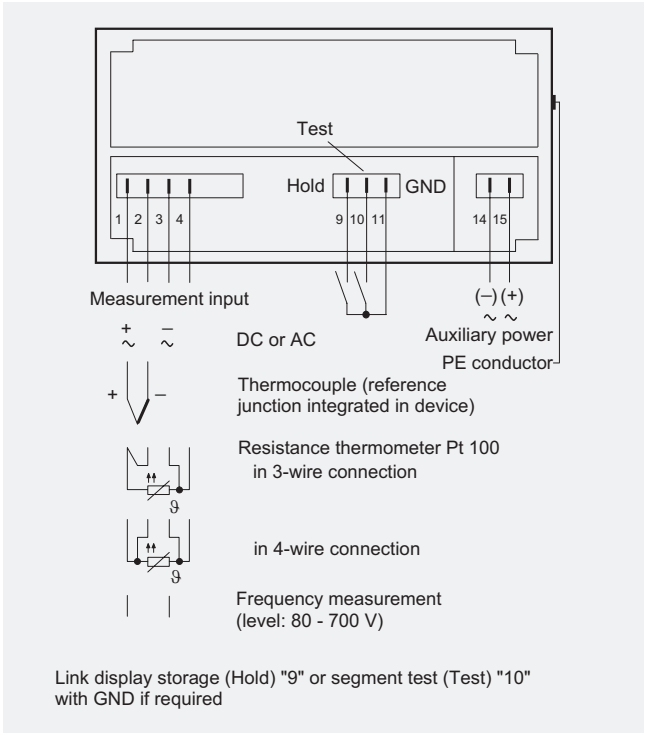
1) Specifiy value in plain text, e.g. "7 to 13 mA".

Dimension drawings



Digital indicator 96 x 48, dimensions in mm

Circuit diagrams



Digital indicator 96 x 48, terminal diagram

Digital indicators

PROLUX G 96 x 48 mm 4½-digits, programmable

PROLUX G digital indicator, 96 x 48

Overview

Input variables

- Direct voltage
- Direct current
- Alternating voltage
- Alternating current
- Temperature
- Frequency
- Speed
- Sensor for strain gauge
- Impulse counter

Special features

- 4 limit values
- Serial interface
- Analog output
- Display in cos φ

Design

The PROLUX G digital indicator with 2 limit values comprises:

- Indicator with pushbutton unit and 14-mm high display unit
- Plug-in measuring range module for
  - DC ranges (current or voltage)
  - AC ranges (current or voltage)
  - Pt 100 resistance thermometer
  - Thermoelements J, K, R and S
  - Speed/frequency
  - Impulse counter
  - Sensor for strain gauge
  - 2 additional limit values
  - Serial interface RS-232 or RS-485
  - Analog output
- Split-shell metal housing suitable for
  - Control panel according to DIN 43 700
  - Slots

Some control-room systems require additional mounting elements from the control-room manufacturer.

Degree of protection of front of housing is IP 40.

Electrical connection is over plug-in screw terminal blocks.

Functions

The PROLUX G digital indicator is a programmable flush-mounting measuring instrument with an extremely high resolution.

The basic device is a precise DC voltmeter. Each device is adapted to specific measuring tasks using modules in the measurement input. For temperature measurements, linearization is carried out digitally through the implemented microcomputer.

The menu-assisted programming over the front panel keys enables the following settings:

- Display range -19999 to +32765
  (expandable through multiplicator factor 10 - 99990)
- Choice of decimal point positions
- Mean-value generation from 2, 4, 8, 16 or 32 measurements
- Rounding up of last digit in 2, 5 or 10 steps
- Measuring speed, analog 3 or 16 measurements/second
- Adaptation of a non-linear curve through 10 break points
- Auto-tare
- Cos φ of indication
- Trend display over LEDs
- For Pt 100: Two, three, or four-wire connection
- For frequency: 2, 20 or 200-kHz range
- Min./Max. value storage

Also available for limit values:

- Setting of 2 or 4 limit values
- Operating mode for signaling relay
- Switching hysteresis (with ± 1 to 127 digits)
- Time delay for limit values (1 to 120 s)
- Storage of alarm signal
- Flashing display if value falls below or exceeds the limit values

It is possible to protect the set values against unauthorized changes over a switch behind the front panel (factory installed) or over an external contact.

The programmed data are also retained in the event of a failure of the auxiliary power.

The digital indicator can also be expanded by an isolated analog output and a serial interface RS-232 or RS-485.

Setting the display range

The display range can be adapted to the input variable in two ways:

- By digitally setting an offset variable and a scaling factor
- By creating an upper and lower range value at the measurement input and directly setting the corresponding display.

Simple adaptation of the display range to a non-linear input signal through 10 break points.

Storage of the min. and max. values

Three different versions can be programmed:

- Min. max. memory
  Display of current indication with storage of minimum and maximum values
- Maximum value indicator
  Display of maximum value with storage of minimum value
- Minimum value indicator
  Display of minimum value with storage of maximum value

The stored values can be called up by pressing the buttons.

Auto-tare

An input variable is measured and stored by pressing the "Prog." pushbutton. The measuring instrument displays the difference of current indication minus stored input variable.

Addition and subtraction of indications

In the case of DC measuring ranges, the measuring instrument can be factory-equipped with 2 measurement inputs. In this version, the device shows the sum, the difference or both indications, depending on the set options.

Multiplication and division of indications

The measuring instrument can multiply or divide 2 values of the DC measuring ranges. In this option, the measuring instrument is factory equipped with 2 measurement inputs.

For multiplication, the measuring instrument displays the value U1 x U2 / 20 000.

For division, it displays the value U1 x 20 000 / U2.

Rounding and mean-value generation

If an irregular input variable makes it difficult to read the display, the measuring instrument can round up the last digit in steps of 2, 5 or 10. In addition, a mean-value generation out of 2 to 32 measurements can be set through the program.

Trend display

In order to recognize an upward or downward trend in slowly changing indications (e.g. temperature), the LEDs can be disabled in their function as alarm signal and instead display the indication trend.

Automatic calibration at strain gauge sensor

At the touch of a button, the strain gauge sensor is automatically calibrated. After pressing the "Prog." button, the measuring instrument calibrates the measuring range start (e.g. zero). If this button is repeatedly pressed, the device then automatically calibrates the measuring span. The new values are stored and are retained even in the event of power failure.

Limit values

- Each measuring instrument optionally has 2 or 4 limit values. For alarm ouput there is 1 changeover contact each respectively for the limit values LOL1 and HIL1. The other two limit values LOL2 und HIL2 each have 1 NO contact. The contact LOL2 is linked to the contact LOL1 as illustrated in the figure "Relay logic" page 2/12. The same applies for the contacts HIL2 and HIL1.
  The relays can operate either according to the open-circuit or closed-circuit principle.
  If the indication is in the alarm range, the alarm signal is output by the corresponding relay. At the same time, any violation of the limit values is also uniquely displayed through the LEDs. If the indication then leaves the alarm range, the alarm signal goes out automatically. However, it is also possible to set an alarm storage if preferred. With this function, even if the indication leaves the alarm range, the alarm signal is retained until it has been acknowledged by pressing the pushbutton or over an external signal at the hold input.
- The switching hysteresis of the contact marks can be set in individual steps from ± 1 digit to ± 127 digits. Alternatively to the switching hysteresis, it is possible to set a delay time from 1 to 120 s. During this time, the mean value of the indications is calculated and compared to the limit values.

Technical specifications

Display	
Type	7-segment LED
Florescent color	Red or green
No. of digits	-19999 to +32765
Height of digits	14 mm
Polarity	"-" is displayed automatically
Decimal point	Programmable
Off-scale indication	"----"
Input	Potential-free, one measuring range corresponding to the installed measuring range module
Input resistance for voltage measurement	> 1 MΩ at > 2 V > 70 kΩ at < 2 V
Voltage drop for current measurement	Max. 2 V
Temperature measurement Pt 100 Current through the sensor	2 mA
Sensor for strain gauge	
• Supply voltage	5 V DC at 20 mV/V 10 V DC at 2 or 3.3 mV/V
• Current	40 mA
• Measuring-circuit voltage	2, 3.3 or 20 mV/V
• Calibration	Automatic, at the touch of a pushbutton
• Min. resistance of the jumper	150 Ω for 2/3.3 mV/V 100 Ω for 20 mV/V
Voltage between measurement input and housing	U_{eff} ≤ 380 V, U_{eff} ≤ 1000 V at AC range 700 V
Overload	
Current to 200 mA at 1 and 5 A	2-fold, max. 300 mA 30-fold for 1 s
Voltage	10-fold, (but max. U_{eff} = 380 V, max. 1000 V at AC range 700 V)

Digital indicators

PROLUX G 96 x 48 mm 4½-digits, programmable

Technical specifications

Error limits for the basic device (without measuring range module)	
Temperature coefficient	< 15 ppm/K
Zero-point drift	0.005 %
Linearity error	< 0.005 %
Error limits of the measuring range module	
• Direct voltage and direct current measuring ranges	± (0.05 % + 1 digit)
- Temperature coefficient	< 80 ppm/K
- Series-mode rejection ratio (SMRR)	> 35 dB at 50 Hz
- Common-mode rejection ratio (CMRR)	> 120 dB with ref. to measuring range 200.00 mV at 50 Hz
• Alternating voltage and alternating current measuring ranges, arithmetic	
- 45 to 65 Hz	± (0.2 % + 0.2 % of measuring range)
30 Hz to 1 kHz	in addition ± (0.5 % + 0.2 % of measuring range)
- Temperature coefficient	(0.01 % + 0.01 mV)/K
• Alternating voltage and alternating current measuring ranges, RMS	
- 45 to 65 Hz	± (0.2 % + 0.2 % of measuring range)
20 Hz to 10 kHz	in addition ± (0.2 % + 0.2 % of measuring range)
- Crest factor	6 (additional 0.5 %)
- Temperature coefficient	(0.01 % + 0.01 mV)/K
• Frequency and speed measuring ranges	
- ≤ 500.0 Hz Resolution Measuring time	Measurement of period 0.1 Hz < 300 ms
- > 500 Hz time base	Measurement of period ± 50 ppm
- Temperature coefficient	± 1.5 ppm/K
• Temperature measuring range with Pt 100 according to DIN IEC 751 in two, three and four-wire connection	
- -200 to +800 °C	± (0.3 % + 2 digits)
- Temperature coefficient	< 150 ppm/K
- Offset drift	< 0.1 digit/K
• Temperature measuring range with thermocouples	
- Linearization errors	< 1 K
- Temperature coefficient	< 150 ppm/K, except type S
- Temperature coefficient type S	20 % upwards of measuring range < 2 K
- Offset drift	< 0.1 digit/K
- Cold spot compensation errors (10 to 50 °C)	< 1 K
- Thermocouple or line interruption	Display "---"
Control commands	without electrical isolation
Display storage	Can be controlled externally
Reset (blanking and segment test after release)	Can be controlled externally
Lock (locking of settings)	Can be controlled externally

Outputs	
• Relay contacts	
- For LOL1 and HIL1	1 changeover contact each respectively
- For LOL2 and HIL2	each 1 contact as NO contact
- Switching time	Max. 400 ms for 3 measurements/s, max. 100 ms for 16 measurements/s
- Switching hysteresis	Adjustable from ± 1 digit to ± 127 digits
- Delay time	Adjustable from 1 s to 120 s
- Switching capacity	5 A/240 V
• Serial interface	RS-232 or RS-485, electrically isolated from other circuits
- Max. voltage to other circuits	70 V
- Transmission protocol	DIN draft 19 244
• Analog output	Electrically isolated from other circuits
- Max. voltage to other circuits	70 V
- Resolution	16 bit, but max. resolution of digital indicator
- Ranges	0 to 20 mA; 4 to 20 mA/500 W or 0 to 10 V
- Calibration	Digitally over front-panel pushbuttons, Detail range also adjustable
Measurements	
Conversion method	Dual slope, bipolar
Measuring time	Approx. 100 ms, programmable to 20 s
Measurements/s	Typically 3, progammable to 16
Power supply	230/115 V AC ± 10 %, 45 to 65 Hz and 90 to 260 V DC or 12/24 V AC ± 10 %, 45 to 65 Hz and 10 to 50 V DC
Power consumption	Max. 5 VA
Ambient conditions	
Service temperature range	0 to 50 °C
Storage temperature range	-20 to +70 °C
Relative humidity	Max. 85 %
Housing	Split metal shell
Front dimensions	96 mm x 48 mm
Bezel, matt	Gray (RAL 7037), light gray (RAL 7035), pebble gray (RAL 7032), black (RAL 9005) or dark beige (SN 30 920 No. 104)
Front frame height	5 mm
Front frame width	4 mm
Mounting depth	Max. 135 mm
Panel cutout	$92^{+0.8}$ mm x $45^{+0.6}$ mm
Weight	Max. 0.6 kg
Mounting	Screw brackets B
Electric connection	Plug-in screw terminal blocks (except interface)
Regulations	
Degree of protection	IP 40, front panel according to EN 60 529
Protective measures	Safety class I according to EN 61010-1/VDE 0411-1
Applied specifications	IEC 1010-1, EN 50 022, IEC 801-2 to 801-5, DIN 40 040

PROLUX G 96 x 48 mm 4½-digits, programmable

Selection and ordering data

	Order No.	Order Code
PROLUX G digital indicator 96 x 48, 4½-digits, programmable with operating instructions in German, English and French	7NJ3016-	
Design		
• Digital indicator with 2 limit values	1	
• Digital indicator with 4 limit values	2	
Input variable over measuring range module Signal range set to		
• DC current		
- 4 to 20 mA	AA	
- 0 to 20 mA	AB	
- 0 to ... mA (min. 0 mA; max. 200 mA)	AC	-Z Y01 [1]
- 4 to 20 mA with supply voltage for two-wire transducer > 20 V at 20 mA	AD	
• DC voltage		
- 0 to 10 V	BA	
- 0 to ... V (min. 2 V; max. 250 V (for versions with analog output max. 50 V))	BB	-Z Y01 [1]
- ± 60 mV, connection over shunt resistors (max. display 6000)	BC	
- ± 150 mV, connection over shunt resistors (max. display 15000)	BD	
• DC current/voltage, 2 indications		
- 2 x 4 to 20 mA	AE	
- I1: ± ... mA, I2: ± ... mA (min. 2 mA; max. 20 mA)	AF	-Z Y01 [1]
- U1: ± ... V, U2: ± ... V (min. 2 V; max. 20 V)	BF	-Z Y01 [1]
• AC arithmetic current/voltage		
- 0 to ... mA (min. 0 mA; max. 200 mA)	DA	-Z Y01 [1]
- 0 to 1 A	DB	
- 0 to 5 A	DC	
- 0 to ... V (min. 2 V; max. 250 V (for versions with analog output max. 50 V))	DF	-Z Y01 [1]
- 0 to 200 V	DG	
- 0 to 700 V	DE	
• AC-RMS current/voltage		
- 0 to ... mA (min. 0 mA; max. 200 mA)	EA	-Z Y01 [1]
- 0 to 1 A	EB	
- 0 to 5 A	EC	
- 0 to ... V (min. 2 V; max. 200 V (for versions with analog output max. 50 V))	EF	-Z Y01 [1]
• Pt 100, programmed for three-wire connection, resolution 0.1 K, sensor power 2 mA		
- -200 to +800 °C	FB	

1) Specifiy value in plain text, e.g. "7 to 13 mA".

Selection and ordering data

	Order No.	Order Code
PROLUX G digital indicator 96 x 48, 4½-digits, programmable with operating instructions in German, English and French	7NJ3016-	
• Thermocouple (with reference junction)		
- Type J (Fe/CuNi), 0 to 760 °C	GA	
- Type K (NiCr/Ni), -190 to +1300 °C	GB	
- Type R (Pt13Rh/Pt), 0 to 1600 °C	GC	
- Type S (Pt10Rh/Pt), 0 to 1600 °C	GC	
• Frequency, voltage level 5 to 30 V		
- 5.0 to 500.0 Hz	HA	
- 0 bis 2.000 kHz	HC	
• Sensor for strain gauge, standard display range 0 to 20000		
- 2 mV/V	HD	
- 3.3 mV/V	HE	
- 20 mV/V	HF	
• Impulse counter, voltage level 5 to 30 V, 5 to 2000 Hz		
- Upcounter, ... pulses per digit	HG	-Z Y01 [1]
- Down-counter, ... pulses per digit	HH	-Z Y01 [1]
Display		
• Red	1	
• Green	2	
Power supply		
• 230/115 V AC/DC	4	
• 24 V AC/DC	3	
Color of bezel		
• Gray, RAL 7037	1	
• Light gray, RAL 7035	2	
• Pebble gray, RAL 7032	3	
• Black, RAL 9005	4	
• Dark beige, SN 30 920 no. 104	5	
Display range/unit		
• Corresponding to signal range	A	
• Set to 0 to 10000	B	
• ... to ... unit	C	-Z Y02 [1]
Analog output		
• Without	A	
• Analog output 0 to 20 mA	B	
• Analog output 4 to 20 mA	C	
• Analog output ... to ... mA (max. 20 mA)	E	-Z Y05 [1]
• Analog output 0 to 10 V	D	
• Analog output 1 to 5 V	H	
Serial interface		
• Without	1	
• Serial interface RS-232	2	
• Serial interface RS-485 (2-wire)	3	

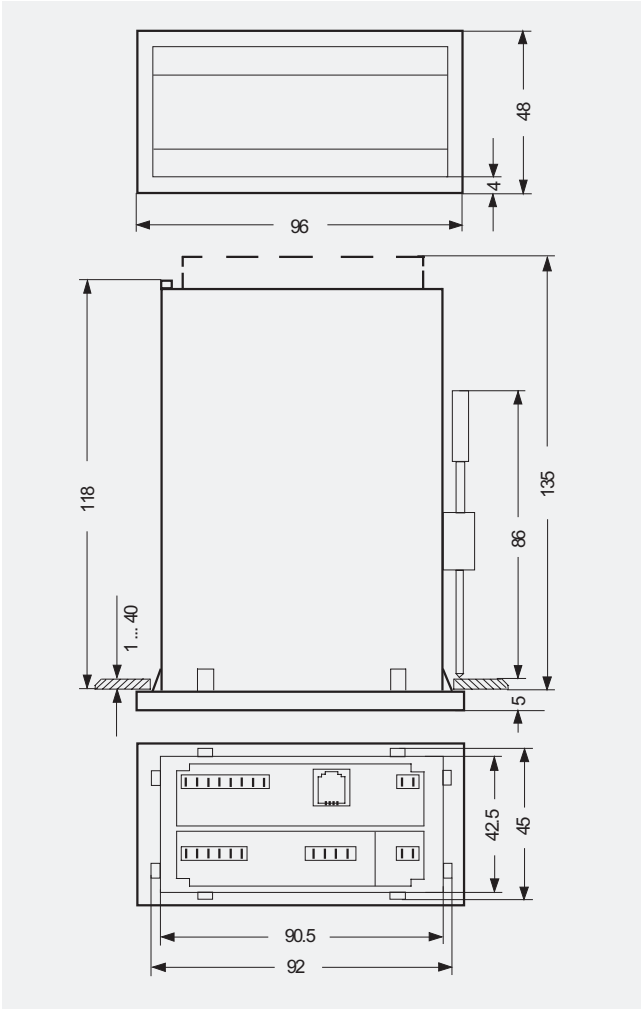
Digital indicators

PROLUX G 96 x 48 mm 4½-digits, programmable

Selection and ordering data

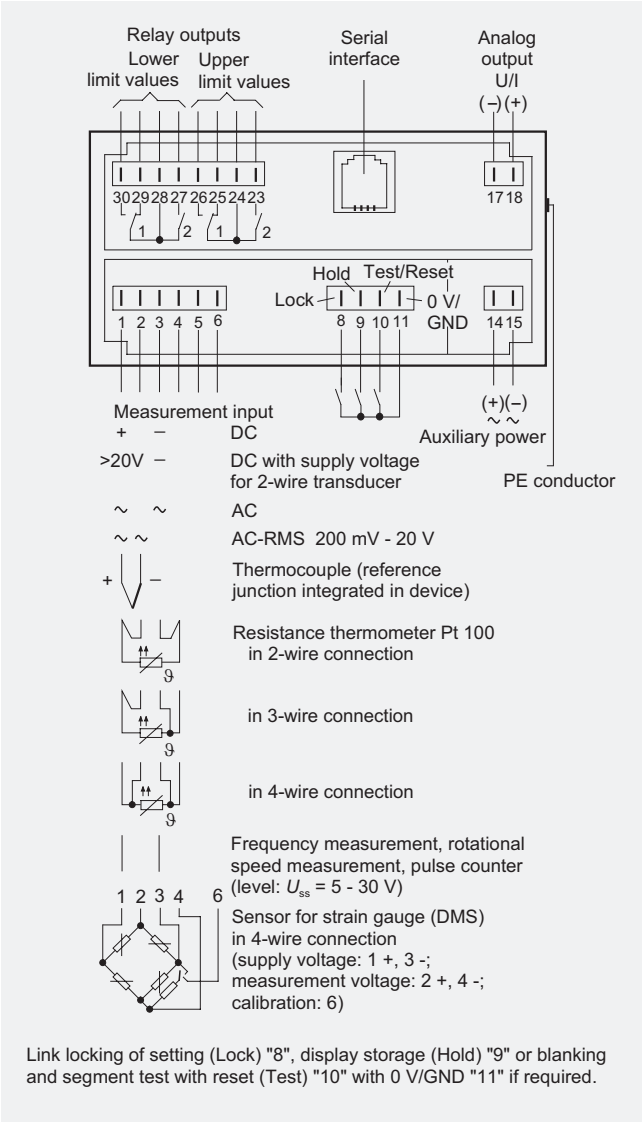
	Order No.	Order Code
Additional designs Available for all Order Nos. Supplement Order No. with -Z	**7NJ3016-** ■■■■■-■■■■	■■■
Additional labeling on the front panel max. 15 characters (specify in plain text)	**-Z**	**Y04**
Additional labeling on the rear panel (specify in plain text)	**-Z**	**Y07**
Mauell slot fastening (leaf-spring)	**-Z**	**A06**
Display range with 10 break points (specify in plain text)	**-Z**	**Y08**

Dimension drawings



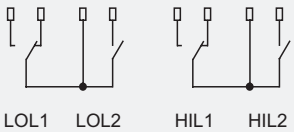
Digital indicator 96 x 48, dimensions in mm

Circuit diagrams



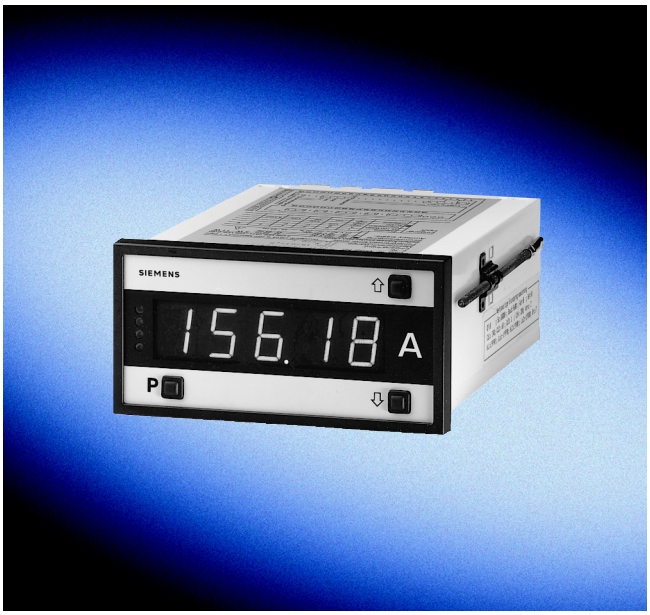
Link locking of setting (Lock) "8", display storage (Hold) "9" or blanking and segment test with reset (Test) "10" with 0 V/GND "11" if required.

Digital indicator 96 x 48, terminal diagram



Relay logic

PROLUX 144 x 72 mm 4½-digits, programmable



PROLUX digital indicator 144 x 72

Overview

Input variables

- Direct voltage
- Direct current
- Alternating voltage
- Alternating current
- Temperature
- Frequency
- Speed

Special features

- 4 limit values
- Serial interface
- Analog output
- BCD data output
- Display in cos φ

Design

The PROLUX digital indicator comprises:

- Indicator with pushbutton unit and 20-mm high display unit
- Plug-in measuring range module for
  - DC ranges (current or voltage)
  - AC ranges (current or voltage)
  - Pt 100 resistance thermometer
  - Thermoelements J, K, R and S
  - Speed/frequency
  - 4 limit values
  - Serial interface RS-232 or RS-485
  - Analog output
  - BCD data output
- Polycarbonate housing suitable for
  - Control panel according to DIN 43 700
  - Slots

Some control-room systems require additional mounting elements from the control-room manufacturer.

Degree of protection of front of housing is IP 54.

Electrical connection is over plug-in screw terminal blocks.

Functions

In its basic configuration, the indication is displayed on a 4½-digit digital indicator. The device is of modular design and is therefore easy to adapt to the relevant measuring task.

The integral microcomputer enables - after a password is input - menu-assisted programming over the front-panel pushbuttons.

All devices support the following settings:

- Display range ± 19999
  except for AC-arithmetic, Pt 100, thermocouples: ± 1999
- Choice of decimal point positions
- Mean-value generation from 2, 4, 8, 16, 32, 64 or 128 measurements
- Rounding up of last digit in 2, 5 or 10 steps
- Measuring speed, analog 3 or 30 measurements/second
- Adaptation of a non-linear curve through 10 break points
- Setpoint/actual-value comparison, Auto-tare
- Cos φ of indication
- Trend display over LEDs
- For Pt 100: Two, three, or four-wire connection
- For frequency: 2, 20 or 200-kHz range
- Min./Max. value storage (digital indicators without limit value)

For digital indicators with limit values, the following additional settings are possible:

- Setting of 4 limit values
- Operating mode for signaling relay
  2 Max./2 Min., 2 Min./2 Max.,
  4 Max. or 4 Min. monitoring in open or closed-circuit connection
- Switching hysteresis (with ± 1 to 127 digits)
- Time delay for limit values
- Storage of alarm signal
- Flashing display if value falls below or exceeds the limit values

The programmed data are also retained in the event of a failure of the auxiliary power.

In addition, the digital indicator can be expanded with an isolated analog output, with a serial interface RS-232 or RS-485 or a BCD data output.

All devices have the following functions:

Setting the display range

The display range can be adapted to the input variable in two ways:

- By digitally setting an offset variable and a scaling factor
- By creating an upper and lower range value at the measurement input and directly setting the corresponding display.

Simple adaptation of the display range to a non-linear input signal through 10 break points.

Digital indicators

PROLUX 144 x 72 mm 4½-digits, programmable

Storage of the min. and max.values for measuring instruments without limit values

Three different versions can be programmed:

- Min. max. memory
  Display of current indication with storage of minimum and maximum values
- Maximum value indicator
  Display of maximum value with storage of minimum value
- Minimum value indicator
  Display of minimum value with storage of maximum value

The stored values can be called up by pressing the buttons.

Differential measurement

Two versions are possible:

- Actual-value comparison with storable setpoint
  A measured variable (setpoint value) is digitally adjusted and remains stored.
  The difference between the current indication minus the set measured variable (setpoint value) is displayed.
- Auto-tare
  An input variable is measured and can be stored by pressing the "Prog." pushbutton (tare value - e.g. offset variables). This value is then subtracted from the resulting measurements. The measuring instrument therefore shows the ddifference between the measured value and the tare value.

Rounding and mean-value generation

If an irregular input variable makes it difficult to read the display, the measuring instrument can round up the last digit in 2, 5 or 10 steps. In addition, a mean-value generation out of 1 to 128 measurements can be set through the program.

Trend display

In order to recognize an upward or downward trend of slowly changing indications (e.g. temperature), two LEDs can act as a trend display.
(In the case of devices with limit values, these 2 LEDs are then no longer available for alarm signaling.)

For digital indicators with limit values, the following additional function is available:

Limit contacts

Two limit contacts serve as main contacts and each have a relay with changeover contact for alarm input. Each main contact is allocated a primary arcing contact with one NO contact respectively.

Switching hysteresis and low-pass function

The switching hysteresis of the contact marks can be set in individual steps from ± 1 digit to ± 127 digits. As an alternative to the switching hysteresis, it is possible to select a low-pass function with adjustable time constants from 1 to 120 s. During the set time constant, the mean value of the indications is calculated and compared to the limit value.

Alarm output and alarm storage

The limit values can be programmed as either an open-circuit or closed-circuit version. If the indication is in the alarm range, the alarm signal is output by the corresponding relays. At the same time, each alarm is uniquely visually indicated over additional LEDs.
If the indication then leaves the alarm range, the alarm signal goes out automatically. However, it is also possible to set an alarm storage if this is preferred. With this function, even if the indication leaves the alarm range, the alarm signal is retained until it has been acknowledged by pressing the pushbutton and/or over external hold input.

Technical specifications

Display	
Type	7-segment LED
Florescent color	Red or green
No. of digits	Max. ± 19 999
Height of digits	20 mm
Polarity	"-" is displayed automatically
Decimal point	Programmable
Off-scale indication	"----"
Input	Potential-free, one measuring range corresponding to the installed measuring range module
Input resistance for voltage measurement	> 1 MΩ
Voltage drop for current measurement	approx. 200 mV
Perm. voltage between auxiliary power and "-"-measurement	≤ 250 V AC
Overload	
Current	2-fold, continuous
Voltage	10-fold, max. 600 V
Error limits	with ref. to measuring range
• Direct voltage and direct current measuring ranges	± (0.05 % + 1 digit)
- Temperature coefficient	< 80 ppm/K
- Series-mode rejection ratio (SMRR)	> 35 dB at 50 Hz
- Common-mode rejection ratio (CMRR)	> 120 dB (with ref. to the measuring range 200 mV at 50 Hz)
• Alternating voltage and alternating current measuring ranges, arithmetic	
- 45 to 65 Hz	± (0.2 % + 3 digits)
30 Hz to 1 kHz	additionally ± (0.1 % + 2 digits)
- Temperature coefficient	± (0.01 % + 0.01 mV)/K
• Alternating voltage and alternating current measuring ranges, RMS	
- 45 to 65 Hz	± (0.1 % of indication + 0.1 % of measuring range)
20 Hz to 10 kHz	in addition ± (0.1 % of indication + 0.15 % of measuring range)
- Crest factor	6 (additional 0.5 %)
- Temperature coefficient	± (0.01 % of indication + 0.01 mV)/K

PROLUX 144 x 72 mm 4½-digits, programmable

Technical specifications

Error limits

• Frequency and speed measuring ranges	
- 5.0 to 100.0 Hz	
Error limits	(1/T [ms] -1/{T [ms] + 0.01}) x 1000 Hz
Max. resolution	0.1 Hz
Time base	± 50 ppm
Temperature coefficient	± 1.5 ppm/K
Display	(10 x frequency [Hz]/ (scaling factor + offset)) ± 1 digit
- Only for frequency measurements for frequencies with a voltage level of 90 to 450 V (programmable)	
0 to 2000.0 Hz	
measuring time	10 s
max. resolution	0.1 Hz
0 to 20.000 kHz	
measuring time	1 s
max. resolution	1 Hz
0 to 200.00 kHz	
measuring time	0.2 s
max. resolution	10 Hz
- Time base	± 50 ppm
- Temperature coefficient	± 1.5 ppm/K
- Display	Frequency x scaling factor + offset
• Temperature measuring range with Pt 100 according to DIN IEC 751 in two, three and four-wire connection	
- 0 to 200 °C	± 0.5 K
- -200 to +800 °C	± 2 K
- Temperature coefficient	< 150 ppm/K
- Offset drift	< 0.1 digit/K
• Temperature measuring range with thermocouples	± (0.2 % + 2 digits)
- Linearization errors	< 1 K
- Temperature coefficient	≤ 150 ppm/K
- Offset drift	< 0.1 digit/K
- Cold spot compensation error	≤ 1 K (at 10 to 50 °C)
- Thermocouple or line interruption	Display "---"

Control commands

Display storage	Can be controlled externally
Reset (blanking and segment test after release)	Can be controlled externally

Outputs

• 4 relay contacts	2 changeover contacts, 2 contacts as NO contact, potential-free
- Switching capacity	1 A /max. 260 V AC 1 A /max. 30 V DC
- Switching time	Max. 400 ms
- Switching hysteresis	Adjustable from ± 1 digit to ± 127 digits
- Delay time	Adjustable from 1 s to 120 s
• Serial interface	RS-232 or RS-485, protocol according to DIN draft 19 244
• Analog output	According to specifications (max. 0 to 20 mA, 4 to 20 mA or 0 to 10 V), potential-free U: ± (0.5 % + 10 mV) I: ± (0.5 % + 20 µA)
• BCD data output Level	5 V (TTL) or 24 V (open collector with 4.7-kΩ-pull-up resistors)

Measurements

Conversion method	Dual slope, bipolar
Measuring time	Approx. 100 ms, programmable to 10 ms
Measurements/s	Typically 3, progammable to 30

Power supply

	230 V AC (190 to 264 V), 45 to 65 Hz or 115 V (90 to 132 V), 45 to 65 Hz, or 24 V ± 10 %, 60/50 Hz or 18 bis 36 V DC
Power consumption	Max. 18 VA/14 W

Ambient conditions

Service temperature range	0 to 50 °C
Storage temperature range	-20 to +70 °C
Relative humidity	Max. 85 %

Housing

	Polycarbonate blend
Front dimensions	144 mm x 72 mm
Bezel, matt	Gray (RAL 7037), light gray (RAL 7035), pebble gray (RAL 7032), black (RAL 9005) or dark beige (SN 30 920 No. 104)
Front frame height	8 mm
Front frame width	5 mm
Mounting depth	Max. 150 mm
Panel cutout	138^{+1} mm x $68^{+0.7}$ mm
Weight	Max. 0.8 kg
Mounting	Screw brackets
Electric connection	Plug-in screw terminal blocks, for interface sub-miniature-D-connector (serial 9-pole, parallel 25-pole)

Regulations

Degree of protection	IP 54, front panel according to EN 60 529
Protective measures	Safety class II according to DIN VDE 0411 Part 1 and Part 100, for limit values also DIN VDE 0160

Digital indicators

PROLUX 144 x 72 mm 4½-digits, programmable

Selection and ordering data

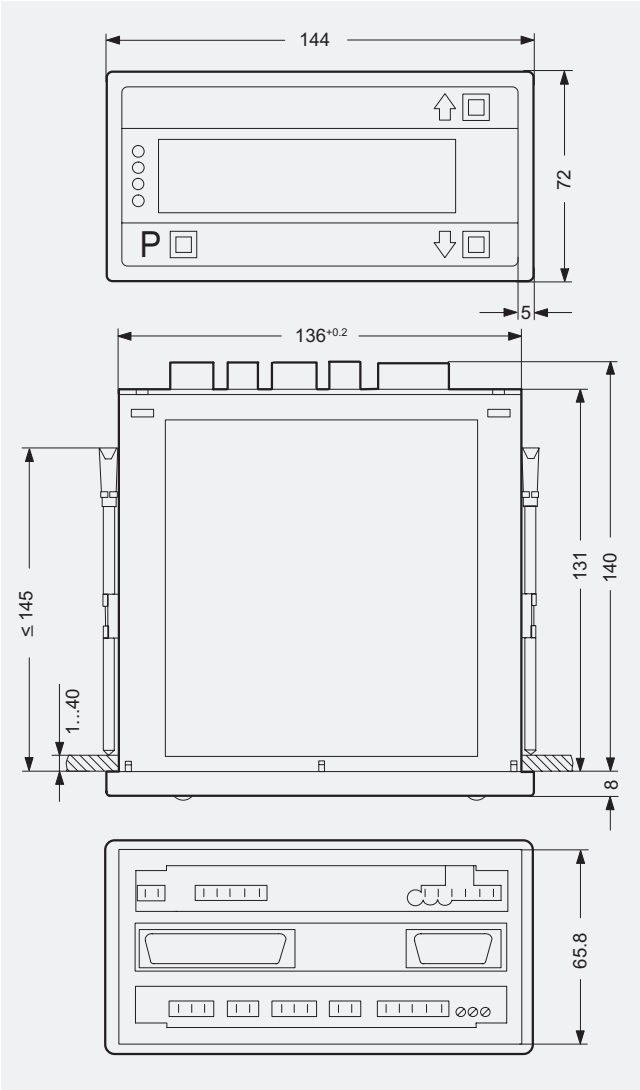
	Order No.	Order Code
PROLUX digital indicator 144 x 72, 4½-digits, programmable with operating instructions in German and English	7NJ3014- ■■■■■-■■■■	■■■
Design		
• Digital indicators	1	
• Digital indicator with 4 limit values	2	
Input variable over measuring range module Signal range set to		
• DC current		
- 4 to 20 mA	AA	
- 0 to 20 mA	AB	
- 0 to ... mA (min. 5 mA; max. 1 A)	AC	-Z Y01 [1]
• DC voltage		
- 0 to 10 V	BA	
- 0 to ... V (min. 5 V; max. 500 V)	BB	-Z Y01 [1]
• mV DC voltage		
- 0 to ... mV (min. 200 mV; max. 2 V)	CA	-Z Y01 [1]
• AC arithmetic current/voltage (3½-digit)		
- 0 to ... mA (min. 0 mA; max. 200 mA)	DA	-Z Y01 [1]
- 0 to ... V (min. 0 V; max. 500 V)	DA	-Z Y01 [1]
• AC-RMS current/voltage		
- 0 to ... A (min. 0 A; max. 5 A)	EA	-Z Y01 [1]
- 0 to ... V (min. 0 V; max. 500 V)	EA	-Z Y01 [1]
• Pt 100, programmed for three-wire connection (3½-digit)		
- Resolution 0.1 K, sensor power 5 mA, 0 to 200 °C	FA	
- Resolution 1 K, sensor power 2 mA, -200 to +800 °C	FB	
• Thermocouple (with reference junction) (3½-digit)		
- Type J (Fe/CuNi), -100 to +900 °C	GA	
- Type K (NiCr/Ni), -190 to +1300 °C	GB	
- Type R (Pt13Rh/Pt), 0 to 1600 °C	GC	
- Type S (Pt10Rh/Pt), 0 to 1600 °C	GC	
• Speed/frequency		
- Voltage level 5 to 30 V, 5 to 500 Hz	HA	
- Voltage level 2 to 16 V, 5 to 500 Hz	HB	
- Voltage level 90 to 350 V, 2 to 200 kHz	HC	
Display		
• Red	1	
• Green	2	

1) Specifiy value in plain text, e.g. "7 to 13 mA".

Selection and ordering data

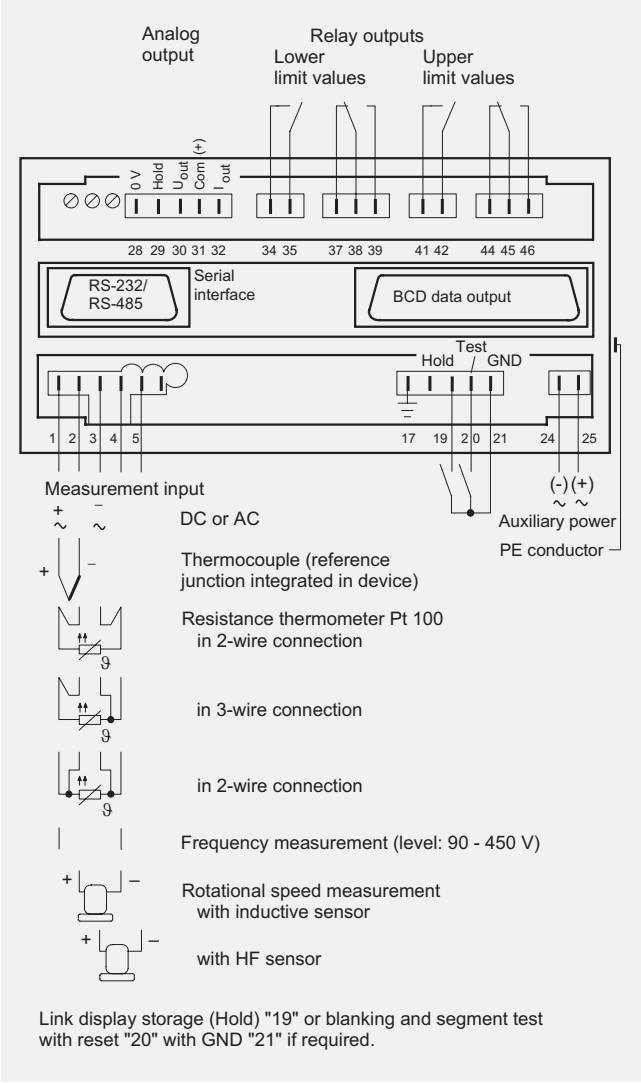
	Order No.	Order Code
PROLUX digital indicator 144 x 72, 4½-digits, programmable with operating instructions in German and English	7NJ3014- ■■■■■-■■■■	■■■
Power supply		
• 230 V AC, 60/50Hz	1	
• 115 V AC, 60/50Hz	2	
• 24 V DC or 24 V AC, 60/50 Hz	3	
Color of bezel		
• Gray, RAL 7037	1	
• Light gray, RAL 7035	2	
• Pebble gray, RAL 7032	3	
• Black, RAL 9005	4	
• Dark beige, SN 30 920 no. 104	5	
Display range/unit		
• Corresponding to signal range	A	
• ... to ... unit	C	-Z Y02 [1]
Analog and BCD output		
• Without	A	
• Analog output 0 to 20 mA	B	
• Analog output 4 to 20 mA	C	
• Analog output 0 to 10 V	D	
• Analog output ... to ... unit	E	-Z Y05 [1]
• BCD data output 5 V (TTL)	F1	
• BCD data output 24 V (open collector)	G1	
Serial interface		
• Without	1	
• Serial interface RS-232/V.24 (not in conjunction with BCD data output)	2	
• Serial interface RS-485 (not in conjunction with BCD data output)	3	
Additional designs Available for all Order Nos. Supplement Order No. with -Z	7NJ3014- ■■■■■-■■■■	■■■
Additional labeling on the front panel max. 15 characters (specify in plain text)		-Z Y04
Additional labeling on the rear panel (specify in plain text)		-Z Y07
Operating instructions, French		-Z A01

Dimension drawings



Digital indicator 144 x 72, dimensions in mm

Circuit diagrams



Digital indicator 144 x 72, terminal diagram