



PRODIS[®]-INC

Digital Process Meter

for incremental position sensors

Instruction Manual



Please read carefully before installation and operation!

PRODIS®-INC
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Specifications	Display	6-digit, 7-segment LED, height 14 mm, decimal point programmable
	Counting frequency	250 kHz max., 1 MHz edge frequency
	Excitation voltage/current	24 V DC \pm 10%/150 mA, residual ripple 1% _{SS} ; 85-250 V AC, 50-60 Hz/180 mA max.
	Sensor excitation	24 V DC/300 mA or 5V DC/500 mA
	Inputs	A, B, Z, T (reference signal)
	Comparator outputs (option)	
	Relay	250 V AC/5 A, 30 V DC/5 A
	NPN	24 V max./50 mA to GND
	Connection	Terminal strip 12-pole, excitation 3-pole
	Operating temperature	-10 ... +40 °C
	Storage temperature	-20 ... +85 °C
	Weight	24 V DC: approx. 250 g; 230 V AC: approx. 400 g
	Protection class	Front IP60, rear IP40
	Humidity	Max. 80 % R.H., non condensing
Safety of equipment	EN 61010-1:2010	
EMC	EN 61326-1:2013	

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Safety instructions



Do not use PRODIS®-INC process meters in safety critical applications where malfunction or total failure of the sensor may cause danger for man or machine.

For safety related applications additional mechanisms (devices) are necessary to maintain safety and to avoid damage.

Disregard of this advice releases the manufacturer from product liability.

The meter must be operated only within values specified in the data sheet.

Connection to power supply must be performed in accordance with safety instructions for electrical facilities and performed only by trained staff.

Danger of Destruction!

It has to be guaranteed that the excitation voltage agrees with the indicated value on the type label.

Do not open the process meter.

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Mechanical mounting

Mounting clamps



Hook in the rear notch and push the end down until the front notch is locked



Turn the set screw with a slotted screwdriver until stop at the front plate.



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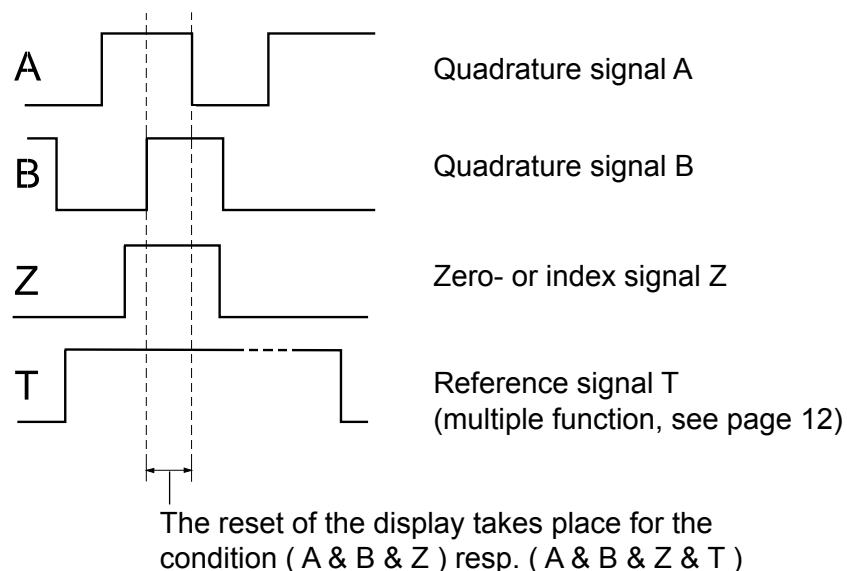
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Description

The process meter PRODIS®-INC is designed for use with incremental position sensors to display angles and displacements. The fast counter processes 90° phase shifted A,B signals (quadrature signals) for direction and counting information. When using ASM sensors resolutions up to 5 µm resp. 2 angular minutes are possible. The sensor excitation voltage is supplied from the meter.

With four membrane keys all parameters can be programmed for the special application. An index pulse and a reference switch can be used for calibration of the measurement system. Optional comparator function with two relays and four NPN open-collector outputs are available. With the RS-232 interface data can be transmitted easily to a PC, printer or PLC.



The **Zero signal** is a pulse signal unique within the measurement range and explicit to the phase of the quadrature signal to reset the PRODIS®-INC meter.

The **Index signal** is a multiple periodical pulse signal within the measurement range and explicit to the phase of the quadrature signal, e.g. the zero signal of an incremental encoder that appears at every single turn.

The **Reference signal** is a pulse signal unique within the measurement range to enable the reset of the PRODIS®-INC meter, e.g. mechanical reference contact for end position recognition.

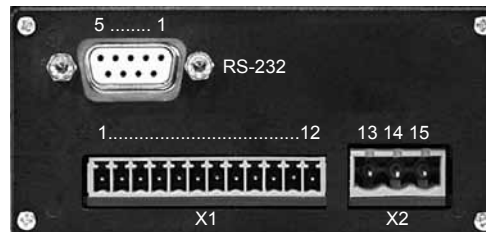
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Wiring basic unit	Signals	Connector X1 pin no.	Connector X2 pin no.
	Sensor +U _B (* see footer)	1	
	Sensor 0 V (GND)	2	
	Signal A	4	
	Signal \bar{A}	5	
	Signal B	6	
	Signal \bar{B}	7	
	Signal Z (zero signal)	8	
	Signal \bar{Z} (zero signal)	9	
	Signal T (reference signal)	10	
	Signal \bar{T} (reference signal)	11	
	GND	12	
	PD-INC-24VDC (** see footer)		
	Excitation +24 V		13
	Excitation 0 V (GND)		14
	PD-INC-230VAC (** see footer)		
	Excitation		13, 15
	Protective ground		14

- (*) Check the sensor excitation: PD-INC-X-**G24V**-X : 24 V sensor excitation
 PD-INC-X-**G5V**-X : 5 V sensor excitation
- (**) Check the meter excitation: PD-INC-**24VDC**-X-X: 24 V DC meter excitation
 PD-INC-**230VAC**-X-X: 230 V AC meter excitation

Rear view without
comparator function

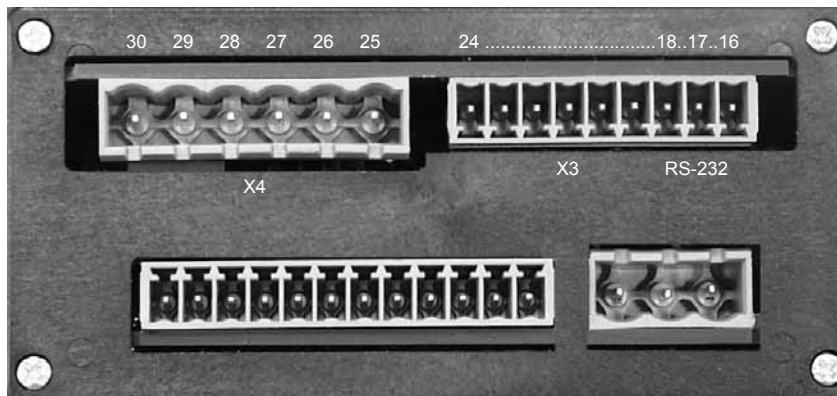


RS-232 interface (w/o comparator function)	Level	RS-232: ±8 V, galvanically isolated
	Data format	1 start bit, 8 data bits, 1 stop bit, no parity
	Transmission rate	9600 Baud
	Signals	D-Sub, Pin No.
	TxD	2
	RxD	3
	GND	5
(with comparator function)	Signals	Connector X3, Pin No.
	TxD	17
	RxD	16
	GND	18

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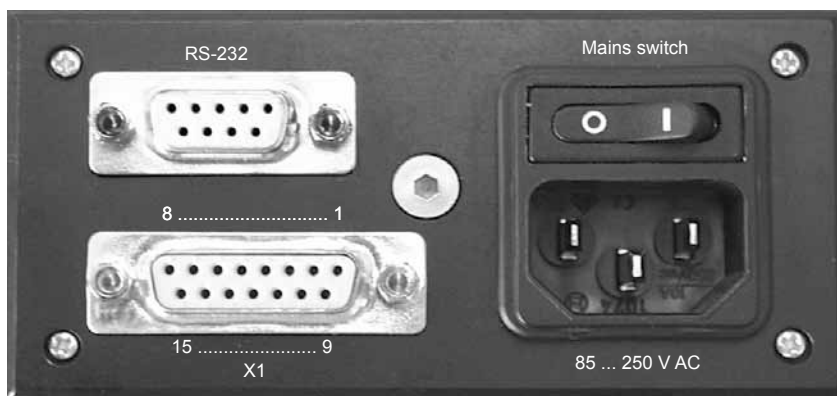


Rear view with comparator Output



Comparator function (option)	Comparator	Comparator output				LED
		NPN Collector	Connector X3 pin no.	Relay	Connector X4 pin no.	
Comparator 1	NPN1	20	Relay 1 NO NC Common	25 27 26	LED1	
Comparator 2	NPN2	21	Relay 2 NO NC Common	28 30 29	LED2	
Comparator 3	NPN3	22				
Comparator 4	NPN4	23				
	NPN GND	24				
	NPN U _B (+24V)	19				

Desktop version (option)

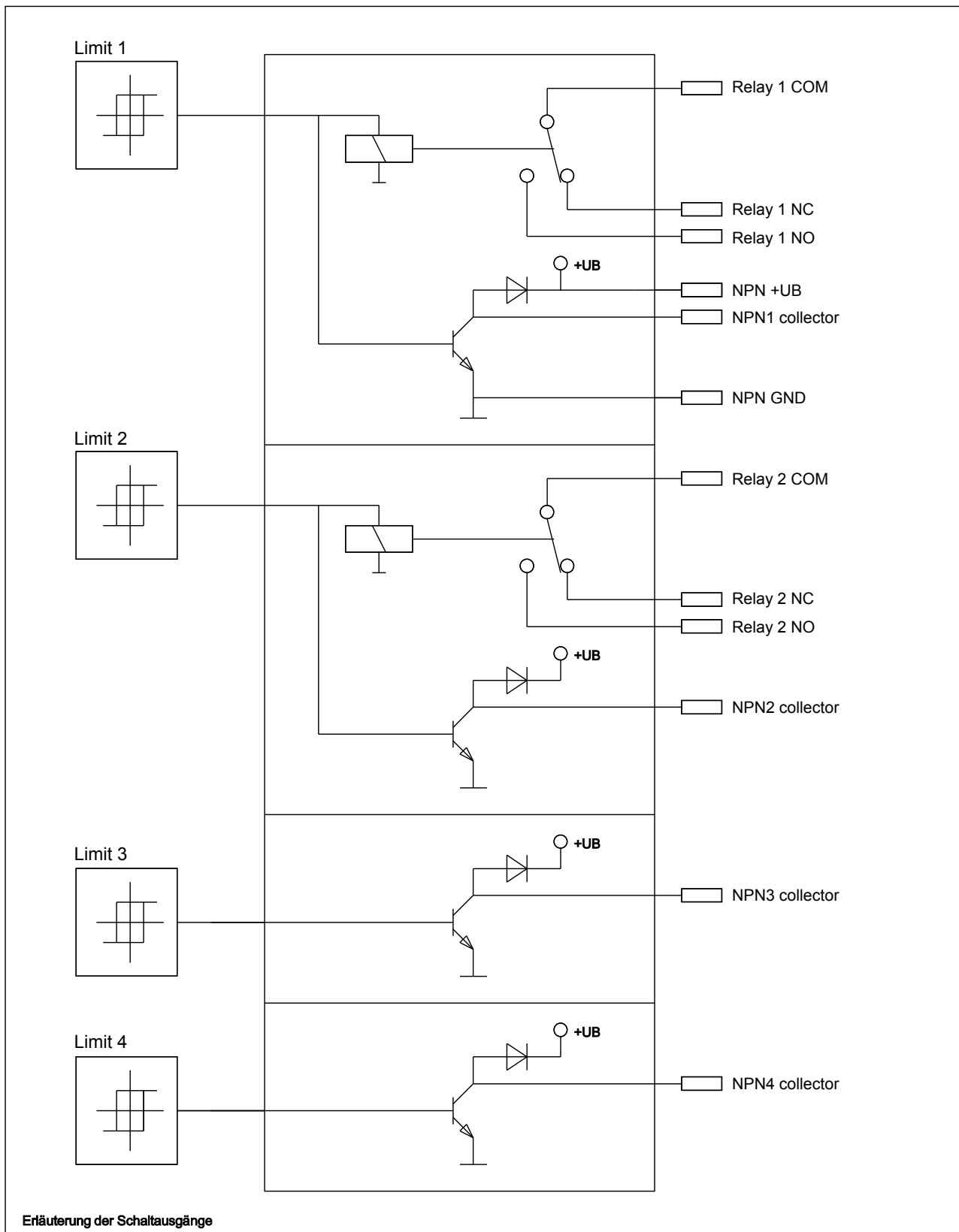


Wiring of connector X1 see table at page 6.

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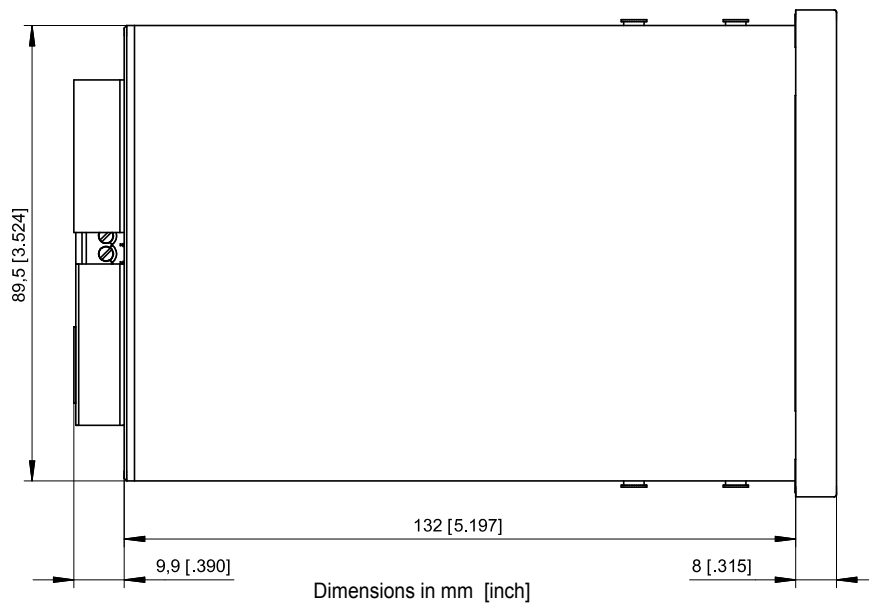
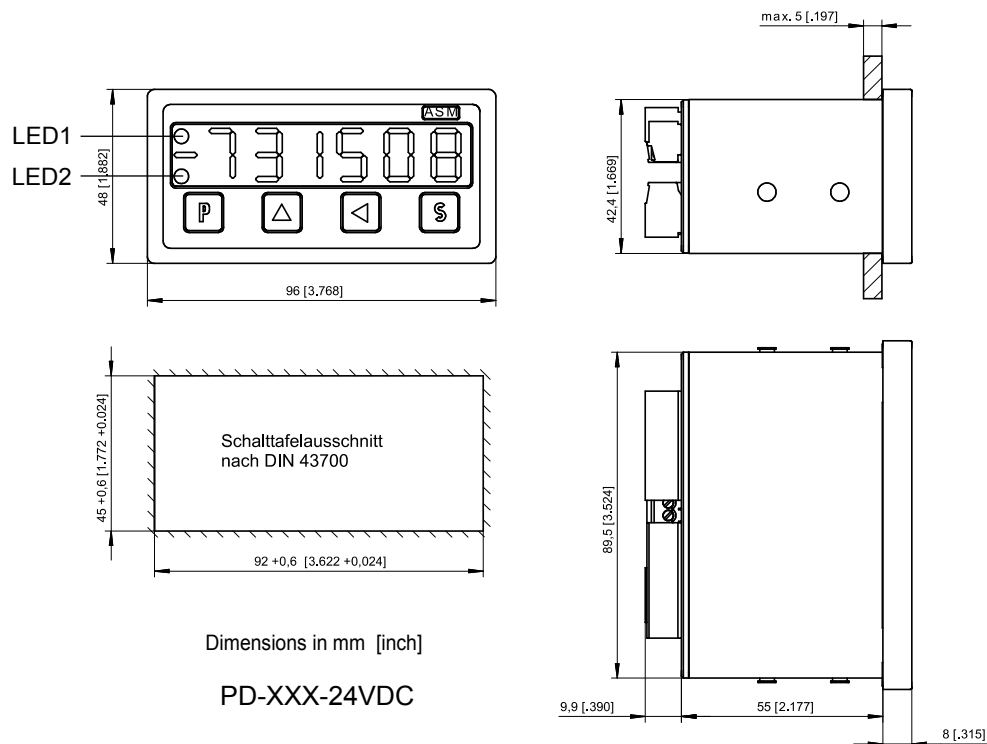
Comparator outputs (diagram)



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Outline drawing



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Operation



Check all lines, connections and excitation voltages before switching on the equipment!

When the meter is switched on a short self test sequence will start with all LED segments on and then the version of the process meter will be displayed. After that procedure PRODIS®-INC is in the normal mode.

Operation keys and display

Explanation of the operation keys and display elements:



P : Key to control the programming menus

▲ : Multifunction keys
◀ for parameter settings

S : Multifunction key to reset the display and to store the parameters in a non-volatile memory

Note:

P + **S** means: hold key **P** and press **S** .

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Explanation and operation of the functions

Normal mode, displaying the position value

The displayed measurement value will be calculated as

$$\text{Reading} = \frac{\text{Measurement value} \cdot \text{Multiplier}}{\text{Divisor}} + \text{Offset value}$$

Multiplier, divisor, decimal divisor and offset are user definable parameters (for calculation examples see appendix). When the display range is exceeded, the display shows *oFrAnGE*. PRODIS®-INC counts every pulse edge of the quadrature signal (times 4 counting mode).

Relative measurement

In addition to the normal mode display PRODIS®-INC can display a second position value, a relative measurement mode with an independent zero to be set by the reset key manually. The normal mode measurement value remains in the background and will be displayed again after returning to the normal mode.

With the parameter **CHnul** (-> CHnul=1) the display will be set to zero when relative measurement is activated.

Offset function

The offset function allows setting and changing of the offset value directly in the normal mode.

Comparator function

(for versions with comparator function only)

Up to four comparator functions can be defined by programming of limit value, hysteresis and operating direction. Outputs are two isolated relays with C/O contacts and four ground related NPN open-collector outputs. The operating condition of the comparators will be indicated by LED1 for relay1, NPN1, NPN3 and LED2 for relay2, NPN2, NPN4. With the parameter measurement mode (rx) the comparator function will be assigned to the normal measurement or to relative measurement.

Last-value memory

When the last-value memory function is activated by **ISt=1** (see table page 13) the current measurement value will be stored into memory when PRODIS®-INC is switched off. In the switched off condition, input pulses are not recognized. When the display is switched on again, the stored measurement value will be displayed.

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Explanation and operation of the functions (continuation)

T signal, functions

- oFF*: The T signal has no effect.
- CS*: The T signal activates the relative measurement mode.
- CF*: No function.
- Hn*: The T signal resets the display in normal and relative measurement mode.
- AF*: The T signal holds the current measurement value.
The counting operation will not be interrupted.
- tL*: The T signal locks the front key access (key lock)
- brEF*: The T signal activates the signal "Z" reset function
- Ctr3*: SEND The displayed value will be sent via the RS-232 interface
- Ctr4*: SEND-CYC The displayed value will be sent periodically every 10 ms via RS-232

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Explanation and operation of the functions

(continuation)

Parameter settings

The Parameter settings are effected in a programming menu.

- Activate programming mode
- Change the parameter by decimal steps
- Reset activated parameter
- Change the sign of signed parameters

- Store in non-volatile memory
- Proceed and return to normal mode

New settings become effective immediately

Submenus	Parameter	Display	Value range	Factory setting
	Decimal point	<i>dp</i>	1 of 5, AUS (off)	AUS (off)
	Z signal active/inactive	<i>rEF</i>	1 / 0	0
	Reset button active/inactive	<i>nuL</i>	1 / 0	1
	Automatic relative measurement reset	<i>CHnul</i>	1 / 0	1
	Multiplier	<i>ZAEHL</i>	0 ... +999999	1
	Divisor	<i>nEnnEr</i>	0 ... +999999	1
	Counting direction	<i>drEh L/r</i>	left / right	left
	T signal	<i>t</i>	oFF/CS/Hn/AF/tl/ brEF/Ctr3/Ctr4	oFF
	Last value memory	<i>lSt</i>	1 / 0	0
	Display brightness	<i>db</i>	1 ... 15	15
	Transmission rate	<i>bA</i>	4.8, 9.6 ... 115.2	9.6
	Relative measurement mode	Flashing decimal point		0
	Reset			
	Offset	<i>oFFSEt</i>	-999999 ... +999999	0
	Limit value	<i>rELx</i>	+/- 999.999	+999.999
	Hysteresis	<i>Hμ rELx</i>	+/- 999.999	1
	Operating direction	<i>rx</i>	oEF, SCH	SCH (no)
	Measurement mode	<i>rx</i>	HAU / CHA	HAU (normal)
	Reset to factory default value	000000 for 2 s		

* Disconnect device from excitation, wait 5 seconds, press and together and hold. Connect excitation, the display shows "000000", then release + .

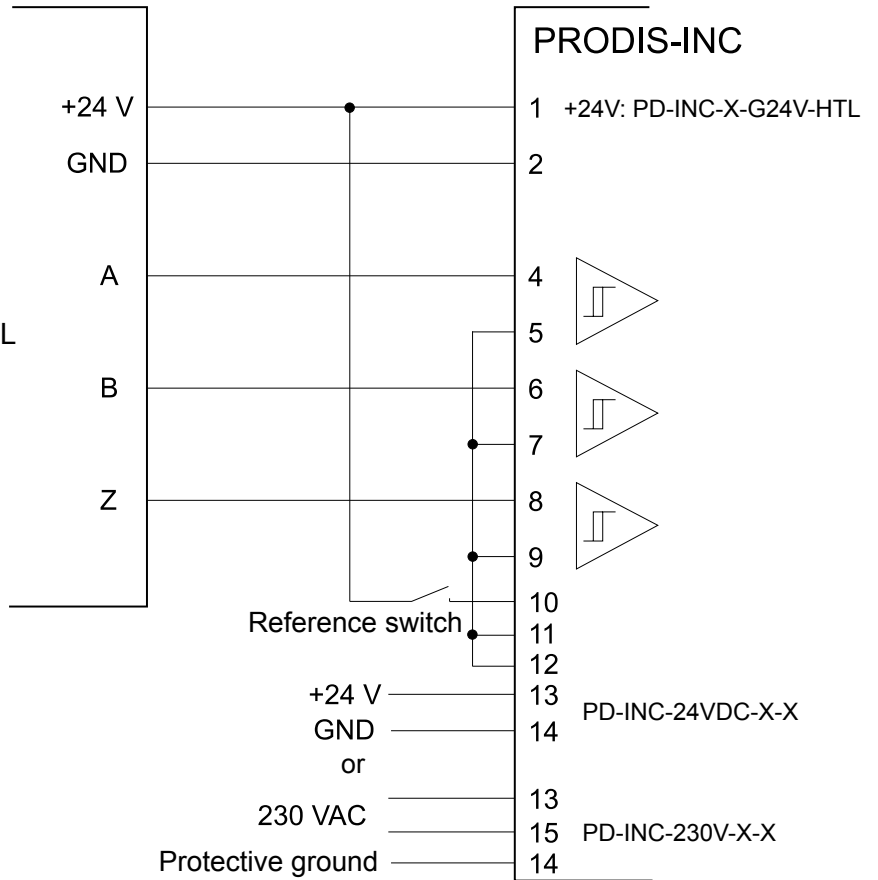
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Examples for signal wiring

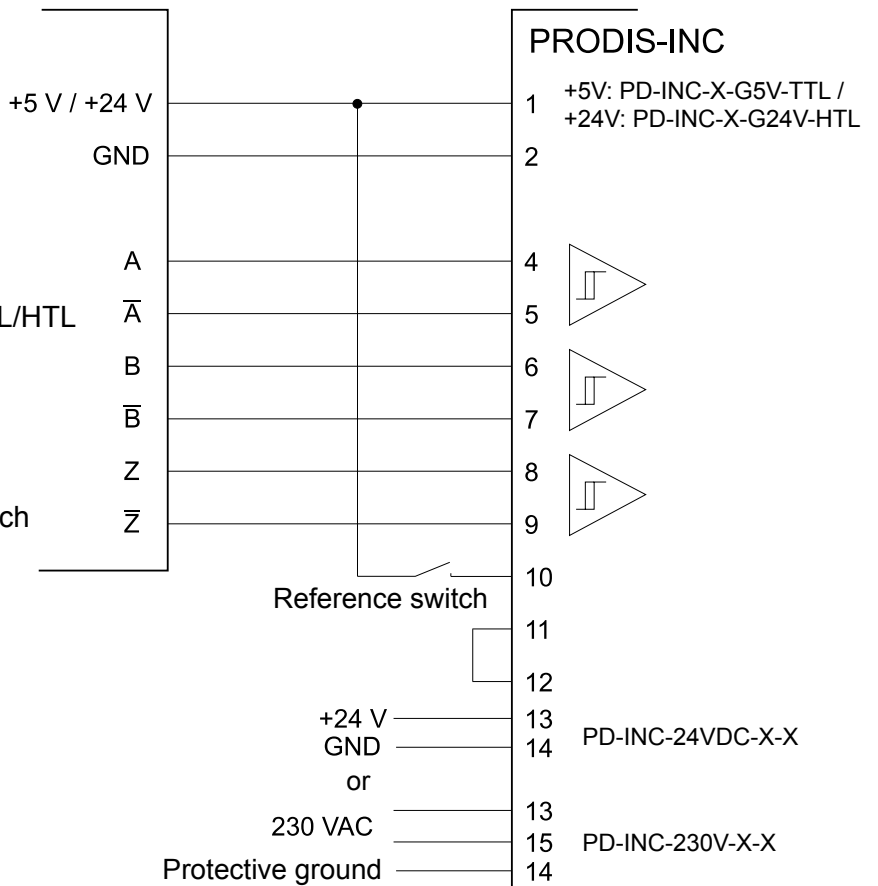
Wiring single ended

POSIMAG HTL
or
WS-X-PP530
WS-X-PP24V



Wiring differential

POSIMAG TTL/HTL
Sensor with
Line driver
5V differential
or RS485,
reference switch





Determination of the scaling parameters

- Determine the resolution of the position sensor 'dX' (displacement per counting edge) and calculate it to the unit to be displayed
- Define the resolution of the meter 'dA' (same unit as dx)
- Multiplier' = dX, Divisor' = dA
- Insert and transform multiplier and divisor by extension or reduction
- Set decimal point
- With the decimal divisor an additional shift right can be made.

As an alternative to the resolution parameters dX and dA the scaling parameters can be calculated by the measurement range parameters DX (display value for end of range) and DA (counting pulses for end of range).

Calculating examples for the scaling

1a. Meter for cable actuated position sensor model WS10 – 1000 – 25 – PP530

Least significant Digit (LSD) of the display has to be equivalent to 0.1 mm

The resolution with times 4 counting mode is $25 \cdot 4 = 100$ pulse edges
Resolution of the position sensor: 100 pulse edges per mm: $dX = 0.01 \text{ mm}$
Resolution of the meter: $dA = 0.1 \text{ mm}$

Multiplier' = $dX = 0.01$
Divisor' = $dA = 0.1$

Insert the values and extend / reduce:

Multiplier = 1
Divisor = 10

Set decimal point between the first and the second digit from the right hand side

1b. Alternative calculation of example 1a

The display value for end of range has to be 10000

Display value for end of range $DX=10000$
Counting pulses for end of range
 $DA=1000 \text{ mm} \cdot (25 \cdot 4) \text{ pulses/mm}$

Insert the values and extend / reduce:

Multiplier = 1
Divisor = 10

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Determination of the scaling parameters

2. Meter for POSIMAG position sensor PMIS2 – 10 – 5 – PP530

LSD of the display has to be equivalent to 0.01 in

Resolution of the position sensor: $dX = 5 \mu m = 0.005 mm = 0.005/25.4 in$

Resolution of the meter: $dA = 0.01 inch$

$$Multiplier' = dX = \frac{0.005}{25.4}$$

$$Divisor' = dA = 0.01$$

Insert the values and extend / reduce:

$$Multiplier = 5$$

$$Divisor = 254$$

Set decimal point between the second and the third digit from the right hand side

3. Meter for incremental encoder with 2500 pulses per revolution

LSD of the display has to be equivalent to 0.1 degrees

Resolution of the sensor with times 4 counting mode: $dX = 4 \cdot 2500 pulses / revolution$ corresponding to $360^\circ / 4 \cdot 2500 pulses$

Resolution of the meter: $dA = 0.025^\circ$

$$Multiplier' = dX = \frac{360}{2500 \cdot 4}$$

$$Divisor = dA = 0.1$$

Insert the values and extend / reduce:

$$Multiplier = 9$$

$$Divisor = 25$$

Set decimal point between the first and the second digit from the right hand side

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RS-232 interface Transmission of a position value

Send to PRODIS®: "r"
Response of PRODIS®: CR, sign, n5, n4, n3, n2, n1, n0
with ni: ASCII characters, leading digits
filled with "0"
Sign: positive sign = Space " "

Reset of the display value

Send to PRODIS®: "n"
PRODIS® function: Reset counter

Data format

1 start bit, 8 data bits, 1 stop bit, no parity
Baud rate: 9600 Bd, programmable via menu

Net transmission rate

Max. 50/s approx.

PRODIS®-INC Declaration of Conformity



EU Declaration of Conformity



The Process Meter

Manufacturer: ASM GmbH
Am Bleichbach 18-24
85452 Moosinning / Germany

Model: **PRODIS®-INC**
Options: -24VDC, -230VAC, -REL2

complies with the following standards and directives:

Security: Low voltage directive: 2014/35/EU
Harmonised standards: EN 61010-1:2010

EMC: EMC directive: 2014/30/EU
Harmonised standards: EN 61326-1:2013

Note: When using the comparator option -REL2/NPN4 ensure that the connected circuit complies also with the EMC directive.

Moosinning, 22nd February 2016

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PRODIS®-INC

Notes



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