Instruction Manual

PMD02

Digital pressure gauge

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SECTION A - Model without limit switch

A 1.0 Installation and Commissioning

The pressure tapping points should be prepared in accordance with the indications given for the sockets. For more details, see e.g. regulation VDE/VDI 3511 and 3512, sheet 3, also DIN 837-1/2. Suitable for sealing are sealing washers to DIN 16258. The correct tighening torque is depending on material and shape of the used seal. It shold not exceed 80 Nm. The mounting position should not be subject to strong vibration and radiation heat. The transmitters with digital display are immediately ready for service after the pressure and electrical connections have been made.

A 2.0 Electrical Connection

Electrical connection is made by shielded cable and means of the cable box. Precise wiring schemes can be seen in the drawings. In addition, wiring details and required power supply are given on the rating plate.

Significance of applied terminal designations:

Ub+ / 0V	supply voltage
S+ / S-	output signal
Protection / PE	cable shield

A 2.1 Current Output

Output signal:	4 ... 20 mA / 2 wire system
	0 ... 20 mA / 3 wire system
Power supply:	Ub = 17 ... 30 V DC
Maximum load:	Ra = (Ub - 17V) / 20 mA

If current output not used, please connect terminal 2 and 3.

A 2.2 Voltage Output

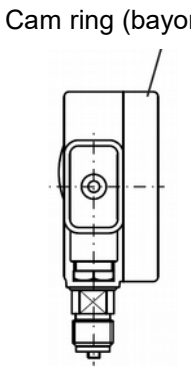
Output signal:	0 ... 10 V / 3 wire system
Power Supply:	Ub = 17 ... 30 V DC
Maximum load:	Ra ≥ 10 kΩ

A 3.0 Service and Maintenance

The transmitter with digital display described hereunder is maintenance free. It incorporates no components which have to be repaired or replaced on the site. Repairs will exclusively be carried out at the factory. Depending on working conditions, the pressure transmiter should be checked about once a year to ensure that they are within their specifications and be adjusted if necessary. The calibration procedure is as follows: As reference for checking and adjusting the measuring span, an adequately accurate pressure standard is required.

- For readjustment, loosen, with a left-hand rotation, the cam ring (bayonet type), and remove from casing with the window.
- Set zero point by potentiometer „ZERO“.
- Set span by potentiometer „SPAN“.

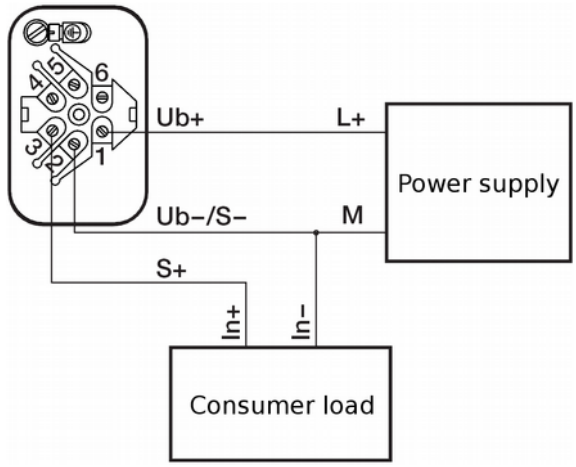
- After having carried out service and maintenance work, lock tightly the instrument with the cam ring (bayonet type), the window and the sealing.



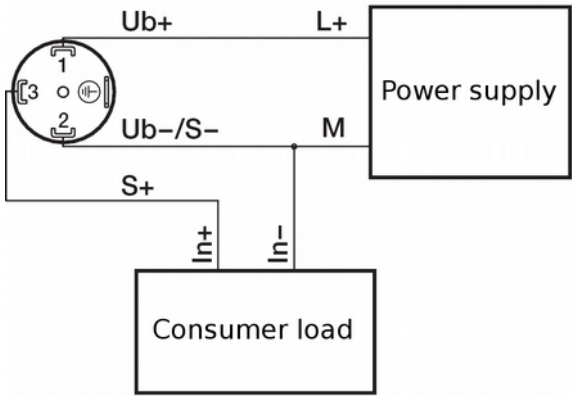
A 4.0 Wiring and Pin Layout

0...10 V, 0...20 mA, LED versions

Terminal box, 3 wire

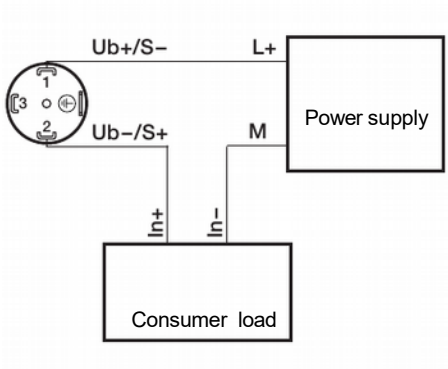


L-plug, 3 wire

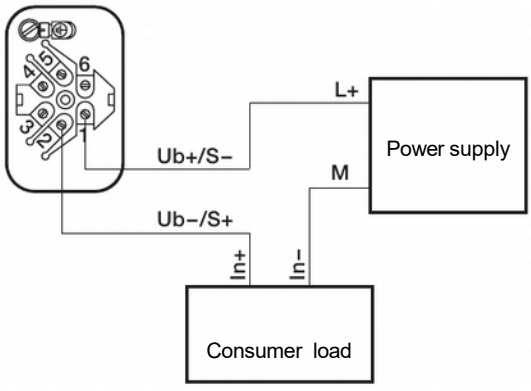


4...20 mA, LCD version

L-plug, 2 wire



Terminal box, 2 wire



SECTION B - Model with rechargeable battery

B 1.0 Installation and Commissioning

The pressure tapping points should be prepared in accordance with the indications given for the sockets. For more details, see e.g. regulation VDE/VDI 3511 and 3512, sheet 3, also DIN 837-1/2. Suitable for sealing are sealing washers to DIN 16258. The correct tighening torque is depending on material and shape of the used seal. It shold not exceed 80 Nm. The mounting position should not be subject to strong vibration and radiation heat. The transmitters with digital display are immediately ready for service after the pressure and electrical connections have been made.

B 2.0 Service and Maintenance

The transmitter with digital display described here under is maintenance free. It incorporates no components which have to be repaired or replaced on the site. Repairs will exclusively be carried out at the factory. Depending on working conditions, the pressure transmiter should be checked about once a year to ensure that they are within their specifications and be adjusted if necessary. The calibration procedure is as follows:

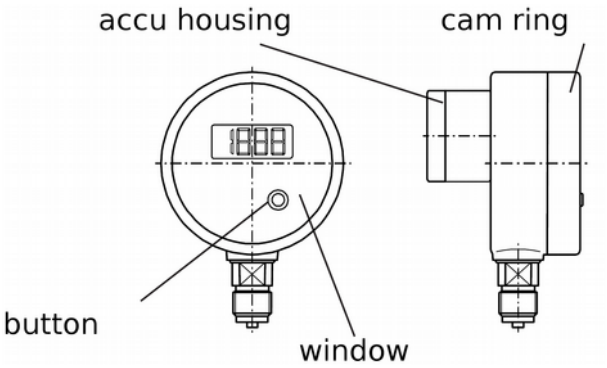
- For readjustment, loosen, with a left-hand rotation, the cam ring (bayonet type), and remove from casing with the window.
- Set zero point by potentiometer „ZERO“.
- Set span by potentiometer „SPAN“.
- After having carried out service and maintenance work, lock tightly the instrument with the cam ring (bayonet type), the window and the sealing.

B 2.1 Power Supply

The rechargeable battery, Order -No.: PMD02-E.EB, has a service life off approx. 500 active hours. In case the display shows "lowbat" continuously, the battery has to be replaced.

B 2.2 Operation

After activating the key, the measured value is displayed during 70 sec.



Section C - Version with limit switches

C 1.0 Installation and commissioning

1.1 Mounting

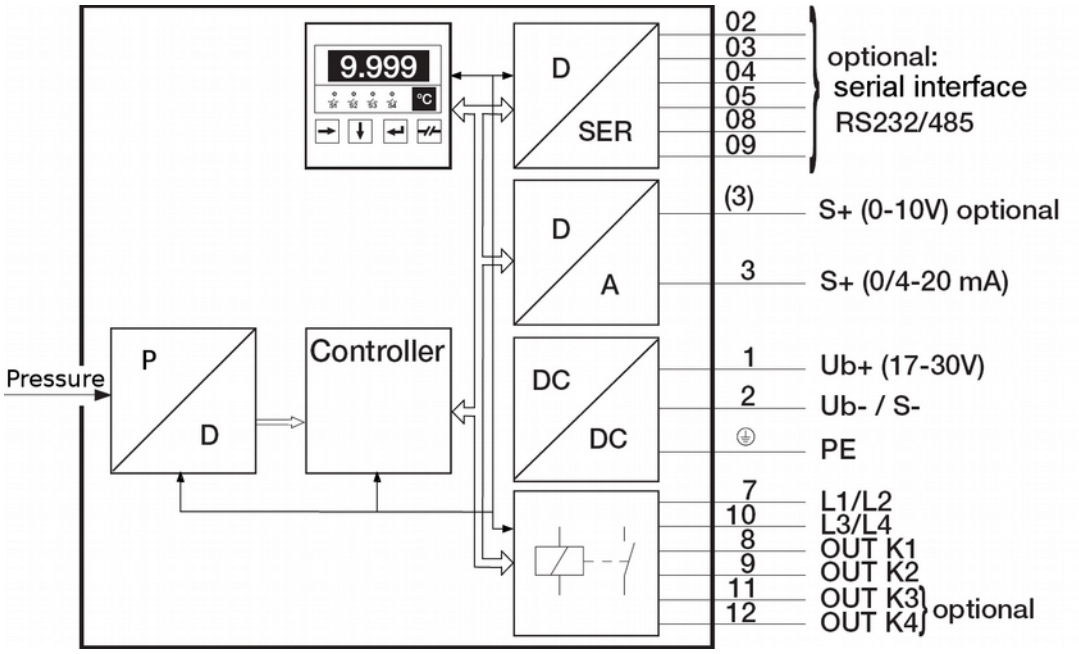
The pressure tapping points should be prepared in accordance with the indications given for the sockets. For more details, see e.g. regulation VDE/VDI 3511 and 3512, sheet 3, also DIN 837-1/2. Suitable for sealing are sealing washers to DIN 16258. The correct tightening torque is depending on material and shape of the used seal. It should not exceed 80 Nm. The mounting position should not be subject to strong vibrations and radiation heat. The mounting position, which the measuring instrument is adjusted for, is indicated on the rating plate. If the device is installed in a different position, the zero point may be offset. In this case, the zero point is readjusted as described in the menu point 10 on page 12.

1.2 Electrical connection

Electrical wiring is made by means of a plug. The wiring schemes can be seen in the drawings. In addition, wiring details and required power supply are given in chapter C 4.0. For the connection and application of the mesuring instruments, the VDE regulations on working with high voltage as well as the rules and regulations of the professional associations concerning working with electrical devices and installations have to be observed.

1.3 Electrical Data

Power supply :	Ub = 17 ... 30 V DC
Analogue output signal :	0/4 ... 20 mA / 3 wire / load ≤ 400 Ohm
	0 ... 10 V / 3 wire / load ≥ 10 kOhm (optional)
Limit switch :	2x 24 V / 50 VA / 50 W / 2 A, (4x optional)
Serial interface :	RS 232 / RS485



1.4 Wiring schemes

Ub+ / Ub-	Power supply
S+ / S-	Analogue output signal
L1 / L2, K1, K2	Limit signals 1 und 2
L3 / L4, K3, K4	Limit signals 3 und 4
RxD, TxD, SGND	Serial interface RS232
A, B, SGND	Serial interface RS485 half-duplex
-RxD, +RxD, -TxD, +TxD, SGND	Serial interface RS485 full-duplex
PE	earth of thread / flange connection

Analogue input signal:

mA+ / mA-	[I] Current
V+ / V-	[U] Voltage

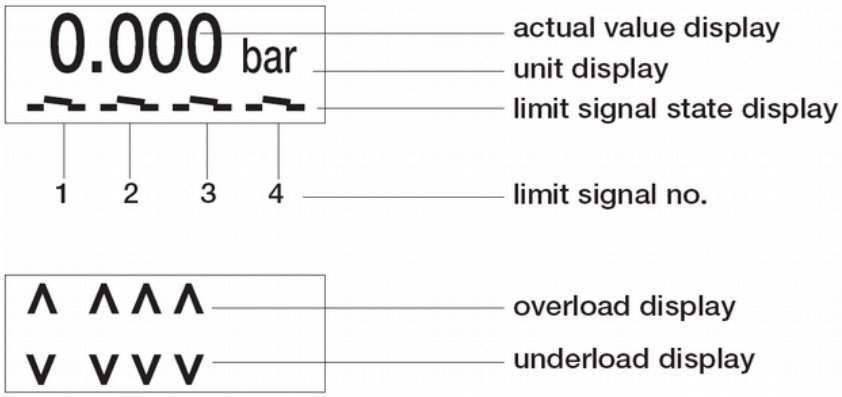
Round Connector	
PIN	Signal
1	Ub+
2	Ub- / S-
3	S+
4	V+ / mA +
5	V- / mA-
6	
7	L1 / L2
8	Out K1
9	Out K2
10	L3 / L4
11	Out K3
12	Out K4
13	
14	PE

D Sub Connector			
PIN	RS232	RS485 Half-Duplex	RS485 Full-Duplex
1			
2	TxD		
3	RxD	A	+ TxD
4			+ RxD
5	SGND	SGND	SGND
6			
7			
8		B	- TxD
9			+ RxD

1.5 System start-up

The measuring instrument is immediately ready for service after its installation into the measuring point and after the electrical connections have been made. At the first commissioning, the display, in a pressureless state, indicates on the last digit 0, 0.0, 0.00 or 0.000, ±1.

The four limit switches are open (⎽╲⎽ ⎽╲⎽ ⎽╲⎽ ⎽╲⎽). The limit signal numbering 1 - 4 is defined from the left to the right.



2.0 Parameter display and input

Display or input of a parameter are made by the four keys below the display. When the device is switched on, actual value and switching states of the limit signal are displayed (⎽╲⎽ = open, ⎽⎽⎽ = closed).
By pressing the correspondent button one of the following menus can be started:

Key	Function in the actual value display
→	start menu help
↓	start display menu limit signals
↵	start input menu
-/+	-

The key functions overview is called up via help menu.
The display menu indicates in succession the lower and upper switching points of the limit signal.
The parameters are set via input menu.
In the display and input menu, the lower quarter of the display shows the menu text. By the keys, the desired parameter is selected as follows:

Key	Function in the actual value display
→	to the previous menu point
↓	to the next menu point
↵	submenu / start parameter input
-/+	end submenu

The selected parameter is displayed in the upper part of the display. the digit/sign, which can be changed, is presented in inverse order (cursor). When entering the parameters, the key function is as follows:

Key	Function in the actual value display
→	change cursor position
↓	change parameter at cursor position
↵	take over parameter / end input
-/-	reject parameter / end input

Parameter display or input will be ended by activating key -/- once or repeatedly, or automatically 20s after the last activation of one of the four keys.

Example:

The maximum limit value of limit switch 2 is to be changed

Key	Value		Menu text	Menu
	XX.XX	bar	(limit switch display)	actual value display
↵			display min./max.	1
2x ↓			adjust limit switch	3
↵	0000	PIN	adjust limit switch	input
↓ →	XXXX	PIN	adjust limit switch	input
↵			adjust 1. limit switch	3.1
↓			adjust 2. limit switch	3.2
↵			limit switch enable	3.2.1
3x ↓			high limit	3.2.4
↵	XX.XX	bar	high limit	input
↓ →	XX.XX	bar	high limit	input
↵			high limit	3.2.4
-/-			adjust 2. limit switch	3.2
-/-			adjust limit switch	3
-/-	XX.XX	bar	(limit switch display)	actual value display

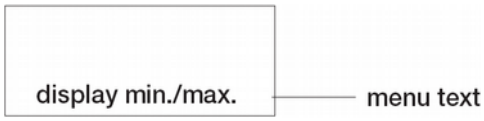
Menu layout and parameter range

Menu	Parameter
1	**display min./max. value**
1.1	display min. value
1.2	display max. value
2	**delete min./max. value**
3	**adjust limit switch**
3.1	adjust 1st limit switch
3.2	adjust 2nd limit switch
3.3	adjust 3rd limit switch

Menu	Parameter
3.4	adjust 4th limit switch
3.x.1	limit switch enable: [redacted] contact always open; ⎽╲⎽ contact is switching
3.x.2	contact function: ⎽┤╲⎽ maximum opens circuit; ⎽╲⎽ maximum closes circuit
3.x.3	low limit: -9999 ... 9999
3.x.4	upper limit: -9999 ... 9999
3.x.5	low limit delay: 00,0 ... 19,9 s
3.x.6	upper limit delay: 00,0 ... 19,9 s
4	**integration time**
	00,0 ... 19,9 s
5	**datalogger**
5.1	interval: 1 s ... 24 h
5.2	year: 2000 ... 2099
5.3	date: 01.01 ... 31.12.
5.4	time: 00:00 ... 23:59
6	**display unit**
6.1	choose unit: mbar, bar, Pa, hPa, kPa, at, kg/cm^2, kp/cm^2, mmH_2O, mH_2O, mmWs, atm, mWs, Torr, mmHg, mmQs, psi, lb/in^2, inH_2O, ftH_2O, inHg, or customized unit
6.2	unit input: (customized unit)
6.2.1	text input: 2 x 5 characters
6.2.2	decimal point position: 9.999 ... 9999
6.2.3	zero input: -9999 9999
6.2.4	endpoint input: -9999 9999
7	**adjust output**
7.1	range zero: -9999 9999
7.2	range endpoint: -9999 9999
8	**Serial interface**
8.1	baud rate: 1200, 2400, 4800, 9600, 19200, 38400 oder 76800
8.2	data bits: 7 or 8
8.3	parity: - (none), 0, EVEN or ODD
8.4	stop bits: 1 or 2
9	**change language**
	German, English or French
10	**sensor calibration**
10.1	decimal point position: 9.999 ... 9999
10.2	zero input: -9999 9999
10.3	endpoint input: -9999 9999
10.4	calibrate zero
10.5	calibrate endpoint
11	**calibrate analogue output**
11.1	unit input: V or mA
11.2	zero input: 00.00 ... 99.99
11.3	endpoint input: 00.00 ... 99.99
11.4	minimum input: 00.00 ... 99.99
11.5	maximum input: 00.00 ... 99.99
11.6	calibrate zero: 0000 ... 9999
11.7	calibrate endpoint: 0000 ... 9999
12	**change PIN**
12.1	delete min./max.: 0000 ... 9999
12.2	adjust limit switch: 0000 ... 9999
12.3	integration time: 0000 ... 9999
12.4	Datalogger: 0000 ... 9999
12.5	display unit: 0000 ... 9999
12.6	adjust output: 0000 ... 9999
12.7	serial interface: 0000 ... 9999
12.8	change language: 0000 ... 9999
12.9	calibrate sensor: 0001 ... 9999
12.10	calibrate output: 0001 ... 9999

3.0 Input menu

The input menu is being started by pressing key ↵. Instead of the limit signal state, the display is showing the menu text. The upper part of the display is empty.



The starting point for the selection of a parameter in the description hereunder is the actual value display. Some of the measuring instrument functions are optional. The indications concerning multiple activations of a key (e.g. 5x ↓) refer to instruments with all options. Menus 2 to 10 are protected through a four-digit PIN each (see menu 11 „enter PIN“). After selection of the menu, the PIN is to be confirmed. The upper part of the display shows value
„0000“ followed by „PIN“. The digit that can be changed by activating key ↓ , is marked by the cursor (inverse display). The cursor position is shifted to the left by 1 digit by key →

Enter PIN by pressing buttons ↓ and, and → acknowledge by pressing button ↵.
(In the event the existing PIN = „0000“, this inquiry is not applicable).
A parameter is displayed and input in the same way as the PIN.

3.1 Menu 1, Display min./max. value (maximum pointer function)

The instrument features a maximum pointer function. The minimum and maximum value are displayed.

Key	Value	Menu text
↵		display min./max.
↵	XX.XX bar	minimum
↵	XX.XX bar	maximum
↵		display min./max.
↵	(actual value display)	(limit signal display)

3.2 Menu 2, Delete min./max. value (maximum pointer function)

Instrument features a maximum pointer function. The minimum and maximum values are set onto the actual value.

Key	Value	Menu text
↵		display min./max.
↓		display min./max.
↵	0000 PIN	delete min./max. *)
enter PIN by ↓ and → *)		
↵		min./max. erased
↵		delete min./max.
↵	(actual value display)	(limit signal display)

*) If the PIN for this menu = „0000“, no request is made

3.3 Menu 3, Adjust limit switch

The measuring instrument features 4 limit switchs. For each limit switch, the following parameters can be defined:

Key	Value	Menu text
↵		display min./max.
2x ↓		adjust limit switch
↵	0000 PIN	adjust limit switch *)
enter PIN by ↓ and → *)		
↵		adjust 1. limit switch
select limit signal by ↓		
↵		limit switch enable
↵	■	limit switch enable
by ↓ turn release on or off		
↵		limit switch enable
↓		contact function
↵	⊣	contact function
by ↓ select close or open circuit		
↵		contact function
↓		lower limit
↵	0.00 bar	upper limit
by ↓ and → enter switching point		

Key	Value	Menu text
↵		lower limit
↓		upper limit
↵	00.00 bar	upper limit
by ↓ and → enter switching point		
↵		upper limit
↓		lower limit delay
↵	00.0 s	lower limit delay
by ↓ and → enter time		
↵		lower limit delay
↓		upper limit delay
↵	00.0 s	upper limit delay
by ↓ and → enter time		
↵		upper limit delay
3x ⇄	(actual value display)	(limit switch display)

*) If the PIN for this menu = „0000“, no request is made

3.4 Menu 4, Integration time (damping)

The measuring instrument features a damping function. The mean value will be obtained during the integration time, displayed as actual value and interpreted for the output signal. Setting on delivery 0.0 (damping off).

Key	Value	Menu text
↵		display min./max.
3x ↓		integration time
↵	0000 PIN	integration time *)
enter PIN by ↓ and → *)		
↵	00.0 s	integration time
by ↓ and → enter time		
↵		integration time
⇄	(actual value display)	(limit switch display)

*) If the PIN for this menu = „0000“, no request is made

3.5 Menu 5, Datalogger

By means of the data logger function, the measuring value will be stored in an adjustable time intervall. The stored measuring values can be read-out via PC. Date, hour, mean value, minimum and maximum values of the measuring value evaluated during the time intervall, are

displayed for each time interval. Date and hour are set on the actual time at the time of delivery. Attention: After missing power supply you have to adjust the real time clock again.

Key	Value	Menu text
↵		display min./max.
4x ↓		data logger / clock
↵	0000 PIN	data logger / clock *)
by ↓ and → enter PIN *)		
↵		interval
↵	XXXX s	choose intervall unit
by ↓ select unit **s**, **min** or **h**		
↵		interval
↓		interval
↵	XX:XX X	time
by ↓ and → set up measuring interval; 0 = event control		
↵		interval
↓		time
↵	XX:XX	time
by ↓ and → set up time		
↵		time
↓		date
↵	XX.XX	date
by ↓ and → set up date		
↵		date
↓		year
↵	20XX	year
by ↓ and → set up year		
↵		year
2x ↵	(actual value display)	(limit signal display)

*) If the PIN for this menu = „0000“, no request is made

3.6 Menu 6, Display unit

For displaying the measuring value, units such as SI, ANSI, BS and technical units are on hand, as well as a unit to be defined by the user (see 3.6.2).

3.6.1 Select unit

Key	Value	Menu text
↵		display min./max.
5x ↓		display unit
↵	0000 PIN	display unit *)
by ↓ and → enter PIN *)		
↵		display unit
↵	XX.XX bar	choose unit
by ↓ select unit		
↵		choose unit
2x ⇄	(actual value display)	(limit signal display)

*) If the PIN for this menu = „0000“, no request is made

3.6.2 Establish custom unit

The measured value can be converted into other dimensions. For the conversion, the unit with 2 x 5 signs maximum has to be entered, as well as those values that correspond to the zero point and the end point of the measuring range (see menu 9). Setting on delivery is 0.0 to 100.0 %.

Key	Value	Menu text
↵		display min./max.
5x ↓		display unit
↵	0000 PIN	display unit *)
by ↓ and → enter PIN *)		
↵		choose unit
↓		input unit
↵		input text
↵	XX.XX %	input text
by ↓ and → enter unit text		
↵		input text
↓		decimal point position
↵	99.99 xxxxx	decimal point position

Key	Value	Menu text
by → set position of decimal point		
↵		decimal point position
↓		input zero
↵	000.0 xxxxx	input zero
by ↓ and → enter zero point		
↵		input zero
↓		input finish
↵	100.0 xxxxx	input finish
by ↓ and → enter endpoint		
↵		input finish
3x ⇄	(actual value display)	(limit signal display)

*) If the PIN for this menu = „0000“, no request is made

3.7 Menu 7, Setting of the analog output

By means of this menu, the relation between the analog output and the measuring range is defined. For that, one measuring point each is assigned to the zero point and endpoint of the analog output (see menu 11). On delivery range of analogue and measuring range are equal.

Key	Value	Menu text
↵		display min./max.
6x ↓		adjust output
↵	0000 PIN	adjust output *)
by ↓ and → PIN eingeben *)		
↵		measuring range zero
↵	XX.XX bar	measuring range zero
by ↓ and → enter value for range zero		
↵		measuring range zero
↓		measuring range finish
↵	XX.XX bar	measuring range finish
by ↓ and → enter value for endpoint		
↵		measuring range finish
2x ⇄	(actual value display)	(limit signal display)

*) If the PIN for this menu = „0000“, no request is made

3.8 Menue 8, Serial interface

This menu defines the data transmission format of the serial interface. Set-up on delivery: 1200 baud, 8 data bits, no parity, and 1 stop bit. The display value is sent as ASCII characters two times per second.

Key	Value	Menu text
↵		display min./max.
7x ↓		serial interface
↵	0000 PIN	serial interface *)
by ↓ and → enter pin *)		
↵		baudrate
↵	1200	baudrate
by ↓ select baudrate		
↵		baudrate
↓		parity
↵	–	parity
by ↓ select parity		
↵		parity
↓		stopbits
↵	1	stopbits
by ↓ select stopbits		
↵		stopbits
2x ⇥	(actual value display)	(limit signal display)

*) If the PIN for this menu = „0000“, no request is made

3.9 Menu 9, Changing the language

The menu text can optionally be displayed in German, English or French. Display setup on delivery is German language.

Key	Value	Menu text
↵		display min./max.
8x ↓		change language
↵	0000 PIN	change language *)
by ↓ and → enter PIN *)		
↵		deutsch
by ↓ select language, German, English, French		

Key	Value	Menu text
↵		change language
↵	(actual value display)	(limit switch display)

*) If the PIN for this menu = „0000“, no request is made

3.10 Menu 10, Calibrating the sensor

By means of this menu, the measuring range of the sensor will be adjusted, and the output signal of the sensor at the zero and endpoint of the range will be measured and setup. The settings will be made at the factory by using appropriate pressure standards. Wrong inputs into this menu cause malfunctions of the measuring instrument.

Key	Value	Menu text
↵		display min./max.
9x ↓		calibrate sensor
↵	0000 PIN	calibrate sensor *)
by ↓ and → enter PIN *)		
↵		decimal point position
↵	99.99 bar	decimal point position
by → enter position of decimal point		
↵		decimal point position
↓		input zero
↵	0.00 bar	input zero
by ↓ and → enter zero point of sensor		
↵		input zero
↓		input finish
↵	10.00 bar	input finish
by ↓ and → enter endpoint of sensor		
↵		input finish
↓		calibrate zero
↵	0.00 bar	calibrate zero
Connect the measuring instrument to a sufficiently precise pressure standard. At the measuring point, generate the value shown in the display of the instrument and store by ↵.		
↵		calibrate zero
↓		calibrate finish
↵	10.00 bar	calibrate finish
Connect the measuring instrument to a sufficiently precise pressure standard. At the measuring point, generate the value shown in the display of the instrument and store by ↵.		

Key	Value	Menu text
↵		calibrate finish
2x ⇆	(actual value display)	(limit switch display)

*) A PIN of "0000" is not allowed hier, to change see 3.12

3.11 Menu 11, Calibrating the analog output (optional)

Via this menu, zero point, end point, minimum and maximum value of the analog output are being input, and the output signal will be set on zero and end point input. The settings will be made at the factory by using appropriate pressure standards.

Key	Value	Menu text
↵		display min./max.
10x ↓		calibrate output
↵	0000 PIN	calibrate output *)
by ↓ and → enter PIN *)		
↵		input unit
↵		input unit
by ↓ select unit V or mA **)		
↵		input unit
↓		input zero
↵	04.00 mA	input zero
by ↓ and → enter output zero point, see rating plate		
↵		input zero
↓		input finish
↵	20.00 mA	input finish
by ↓ and → enter output endpoint, see rating plate		
↵		input finish
↓		input minimum
↵	02.00 mA	input minimum
by ↓ and → enter minimum output value		
↵		input minimum
↓		input maximum
↵	22.00 mA	input maximum
by ↓ and → enter maximum output value		
↵		input maximum

Key	Value	Menu text
↓		calibrate zero
↵	0000 mA	calibrate zero
Connect the analog output to a sufficiently precise pressure standard. Type in the number in such a way that the pressure standard shows the value indicated for the zero point.		
↵		calibrate zero
↓		calibrate finish
↵	0000 mA	calibrate finish
Connect the analog output to a sufficiently precise pressure standard. Type in the number in such a way that the pressure standard shows the value indicated for the endpoint.		
↵		calibrate finish
2x ⇄	(actual value display)	(limit signal display)

*) A PIN of "0000" is not allowed hier, to change see 3.12
**) According to factory setting, see rating plate

3.12 Menu 12, setting up PINs

Menus 2 to 10 are protected by means of a 4-digit PIN each.
On delivery the values will be set as follows:

Key	PIN	Menu text
2		delete min./max.
3		adjust limit switch
4		integration time
5		Datalogger
6		display unit
7		adjust output
8		serial interface
9		change language
10		calibrate sensor
11		calibrate output

Menus 2...8: PIN "0000" will not be requested
Menus 9...10: A PIN of "0000" is not allowed to change these parameters

Each PIN can be set individually via menu „enter PIN“. The menu call-up is made by the following key combination:

Key	Value	Menu text
↵		display min./max.

Key	Value	Menu text
11x ↓		change PIN
↵	PIN	change PIN
↵ change PIN ↓ to next PIN → to previous PIN ⇥ escape from PIN menu		
		change PIN
⇥	(actual value display)	(limit signal display)

After selecting the menu, the existing PIN has to be confirmed. In the upper part of the display the value „0000“ is indicated followed by „PIN“. The place that can be changed by key ↓ is marked by the cursor (inverse display). By key → , the cursor position is shifted to the left by one digit.

Type the existing PIN by keys ↓ and → and confirm by ↵ In the case of "0000" this confirmation is ommitted. In the upper part of the display, the value „0000“ is shown followed by „new PIN“.

Type the desired new PIN by pressing the keys ↓ and → and confirm by ↵

4.0 Wiring and Pin Layout

pin	signal direction and wiring
1	⇦ Ub +
2	⇦ Ub - / S -
3	⇨ S +
4	
5	
6	
7	⇦ L1 / L2
8	⇨ K1 output
9	⇨ K2 output
10	⇦ L3 / L4
11	⇨ K3 output
12	⇨ K4 output
13	
14	⇦ PE

14 pin plug