User manual for IPU5-devices

Digital panel meter with universal measuring input:

Current, platinum thermometer, shunt, thermocouple, voltage

Features:

- 5-digit red display (-9999…99999 digits)
- min/max value survey
- 30 point linearization
- permanent wire breakage monitoring
- optical setpoint indication
- Hold-/Tara function via keypad or digital input
- totaliser function (summation function)

ICS Schneider Messtechnik GmbH
Briesestraße 59
D-16562 Hohen Neuendorf / OT Bergfelde

Tel.: 03303 / 504066
Fax: 03303 / 504068

info@ics-schneider.de
www.ics-schneider.de

Directory

1. Identification

STANDARD TYPES	ORDER NUMBER
Supply 100-240 VAC 50/60 Hz, DC ±10%	**IPU5.030X.1S70D**
Supply 10-40 VDC, galv. isolated, 18-30 VAC 50/60 Hz	**IPU5.030X.1W70D**

Options – decoding of the ordering code:

IP U 5. 0 3 0 X. 1 S 7 0 D

Standard type

Multi-function input U

Number of digits
5-digit 5

Interface
none 0
RS232 (galv. isolated) 3
RS485 (galv. isolated) 4

Sensor supply
24 V / 50 mA 3

Outputs
none 0
0-10 V, 0-20 mA, 4-20 mA X

Internal index
D Version D

Switching points
0 no switching points
2 2 relay outputs
4 4 relay outputs

Mechanical options
7 IP65, plastic foil keyboard, plug-in terminal

Supply voltage
S 100-240 VAC
W 10-40 VDC

Housing size
1 96x48 mm

Measuring input
X Multi-function input

Dimension signs on demand, please state with order, e.g. m/min.

2. Technical data

Housing				
Dimensions	96x48x120 mm (WxHxD)			
	96x48x139 mm (WxHxD) including plug-in terminal			
Assembly cut-out	$92.0^{+0.8}$ x $45.0^{+0.6}$ mm			
Wall thickness	up to 15 mm			
Fixing	screw elements			
Material	PC, black, UL94V-0			
Protection type	standard IP65 (front), IP00 (back)			
Weight	approx. 450 g			
Connection	plug-in terminal; line cross section up to 2.5 mm^2			
Display				
Digit height	14 mm			
Segment colour	red			
Display range	-9999 to 99999			
Setpoints	1 LED per setpoint			
Overflow	horizontal bars at top			
Underflow	horizontal bars at the bottom			
Indication time	0.1 to 10.0 second			
Input **Voltage / Current**	**Measuring range**	**R_I**	**Measuring fault** **T_U = 20…40°C (%) of Measuring range**	**Digit**
	-1…10 V	150 kΩ	0.01	±1
	-1…5 V	150 kΩ	0.02	±1
	0/4…20 mA	~ 50 Ω	0.02	±1
	0…5 mA	~ 50 Ω	0.02	±1
	0…2 mA	~ 50 Ω	0.02	±1
	-500…2500 mV	1 MΩ	0.03	±1
	-500…1250 mV	1 MΩ	0.03	±1
	-500…600 mV	1 MΩ	0.03	±1
	± 300 mV	1 MΩ	0.03	±1
	± 150 mV	1 MΩ	0.03	±1
	± 75 mV	1 MΩ	0.04	±1
	± 35 mV	1 MΩ	0.06	±1
	± 18 mV	1 MΩ	0.06	±1
Measuring range / Input resistance / Measuring fault at measuring time = 1 second				

Input **Pt100**	**Measuring range**	**R_I**	**Measuring fault** **T_U = 20…40°C (%) of Measuring range**	**Digit**
2- / 3- / 4-wire	-200.0…850.0°C	1 MΩ	0.04	±1

Measuring range / Input resistance / Measuring fault at measuring time = 1 second
Pt100: 3-/4-wire output resistance max. 10 Ω

Input **Thermocouple**	**Measuring range**	**R_I**	**Measuring fault** **T_U = 20…40°C (%) of Measuring range**	**Digit**
Type L	-200…900°C	1 MΩ	0.06 ± 1K	
Type J	-210…1200°C	1 MΩ	0.05 ± 1K	
Type K	-250…1271°C	1 MΩ	0.05 ± 1K	
Type B	-100…1810°C	1 MΩ	0.10 ± 1K	
Type S	0…1767°C	1 MΩ	0.06 ± 1K	
Type N	-250…1300°C	1 MΩ	0.06 ± 1K	
Type E	-260…1000°C	1 MΩ	0.06 ± 1K	
Type R	0…1767°C	1 MΩ	0.07 ± 1K	
Type T	-240…400°C	1 MΩ	0.07 ± 1K	

Measuring range / Input resistance / Measuring fault at measuring time = 1 second

Input **Resistance**	**Measuring range**	**R_I**	**Measuring fault** **T_U = 20…40°C (%) of Measuring range**	**Digit**
2- / 3- / 4-wire	100 Ω	1 MΩ	0.04	± 1
	1 kΩ	1 MΩ	0.04	± 1
	10 kΩ	1 MΩ	0.04	± 1

Measuring range / Input resistance / Measuring fault at measuring time = 1 second

Temperature drift with T_U < 20°C or > 40°C	**All measuring inputs**	**50 ppm / K**
Measuring time	Current / Voltage	0.02…10.00 seconds
	Pt100 2- / 4-wire	0.04…10.00 seconds
	Pt100 3-wire	0.06…10.00 seconds
	Thermocouple	0.04…10.00 seconds
	Resistance 2- / 4-wire	0.04…10.00 seconds
	Resistance 3-wire	0.06…10.00 seconds
Measuring principle	Sigma / Delta	
Resolution	24 Bit	
Totaliser time-error	max. 0.1% of totalizator value at integration time >1 min	
Digital input	< 2.4V OFF, > 10V ON, max. 30VDC, Ri ~ 5kΩ	

Output	
Relay	switch-over contact 250 VAC / 5A or 30 VDC / 5A with ohm resistive burden
Switching cycles	0.5 * 10^5 at max contact rating 5 * 10^6 mechanically Separation as per DIN EN 50178 / Characteristic data as per DIN EN 60255
Analogue output (galv. isolated)	0…20 mA / load ≤ 500 Ω, 0-10 VDC load ≥10 kΩ, 16 Bit
Error	0.1 % in the range TU= 20...40°C, beyond 50 ppm/K
Sensor supply (galvanic isolated)	24 VDC, 50 mA
Interface	
Protocol	manufacturer-specific ASCII
RS232 (optionally galvanic isolated)	9600 Baud, no parity, 8 data bits, 1 Stopbit
Lead length	max. 3 m
RS485	9600 Baud, no parity, 8 data bits, 1 Stopbit
Lead length	max. 1000 m
Power pack	
Sensor supply	100-240 VAC 50/60 Hz, DC ±10% (max. 15 VA) 10-40 VDC galv. isolated, 18-30 VAC 50/60 Hz (max. 15 VA)
Memory	Parameter memory EEPROM
Data life	> 100 years at 25°C
Ambient conditions	
Working temperature	0…50°C
Storage temperature	-20…80°C
Climatic density	relative humidity ≤ 75% on year average without dew
EMV	DIN 61326
CE-sign	Conformity to directive 2004/108/EG
Safety standard	According to low voltage directive 2006/95/EG EN 61010; EN 60664-1

3. Safety advices

Please read the users guide before installation and keep it for future reference.

Proper Use

The **IPU5** is designed for the evaluation and display of sensor signals. With the setpoints it is possible to perform simple control tasks.

Danger! Careless use or improper operation can result in personal injury and/or cause damage to the equipment!

Control of the device

The panel meters are checked before dispatch and sent out in perfect condition. Should there be any visible damage, we recommend close examination of the packaging. Please inform the supplier immediately of any damage.

Installation

The **IPU5** must be installed by a suitably **qualified specialist** (e.g. with a qualification in industrial electronics).

Notes on installation

• There must be no magnetic or electric fields in the vicinity of the device, e.g. due to transformers, mobile phones or electrostatic discharge.

• **The fuse rating of the supply voltage should not exceed a value of 0.5A N.B. fuse!**

• Do not install **inductive consumers** (relays, solenoid valves etc.) near the device and **suppress** any interference with the aid of RC spark extinguishing combinations or free-wheeling diodes.

• Keep input, output and supply lines separate from one another and do not lay them parallel with each other. Position “go” and “return lines” next to one another. Where possible use twisted pair. So, you receive best measuring results.

• Screen off and twist sensor lines. Do not lay current-carrying lines in the vicinity. Connect the **screening on one side** on a suitable potential equaliser (normally signal ground).

• The device is not suitable for installation in areas where there is a risk of explosion.

• Any electrical connection deviating from the connection diagram can endanger human life and/or can destroy the equipment.

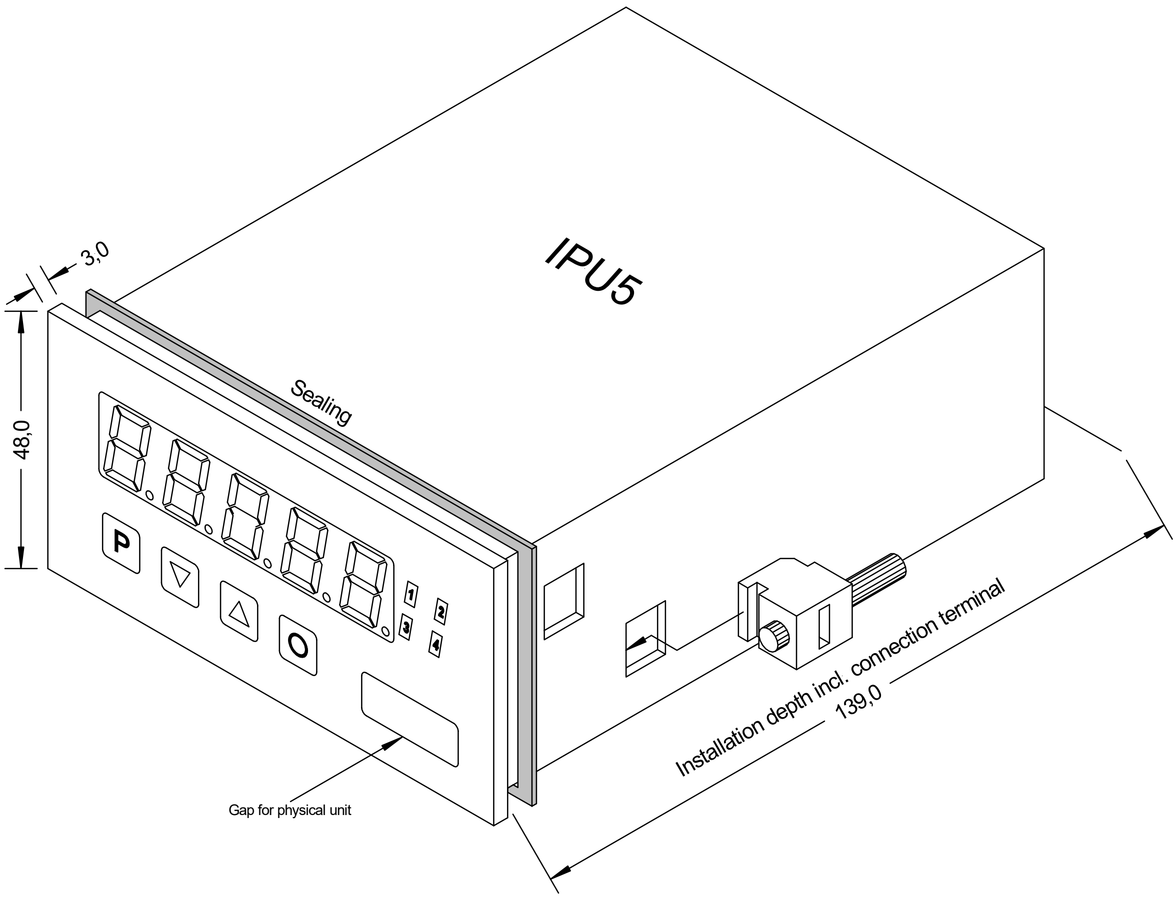
• Do not install several devices immediately above one another or in an extremely thermal isolated housing. Due to the internal heat dissipation of the decives, the recommended ambient temperature can be excessed.

• The terminal area of the devices is part of the service. Here electrostatic discharge needs to be avoided. Attention! High voltages can cause dangerous body currents.

• Galvanic isolated potentials within one complex need to be placed on a appropriate point (normally earth or machines ground). So, a lower disturbance sensibility against impacted energy can be reached and dangerous potentials, that can occur on long lines or due to faulty wiring, can be avoided.

4. Assembly

Please read the *Safety advices* on *page 6* before installation and keep this user manual for future reference.

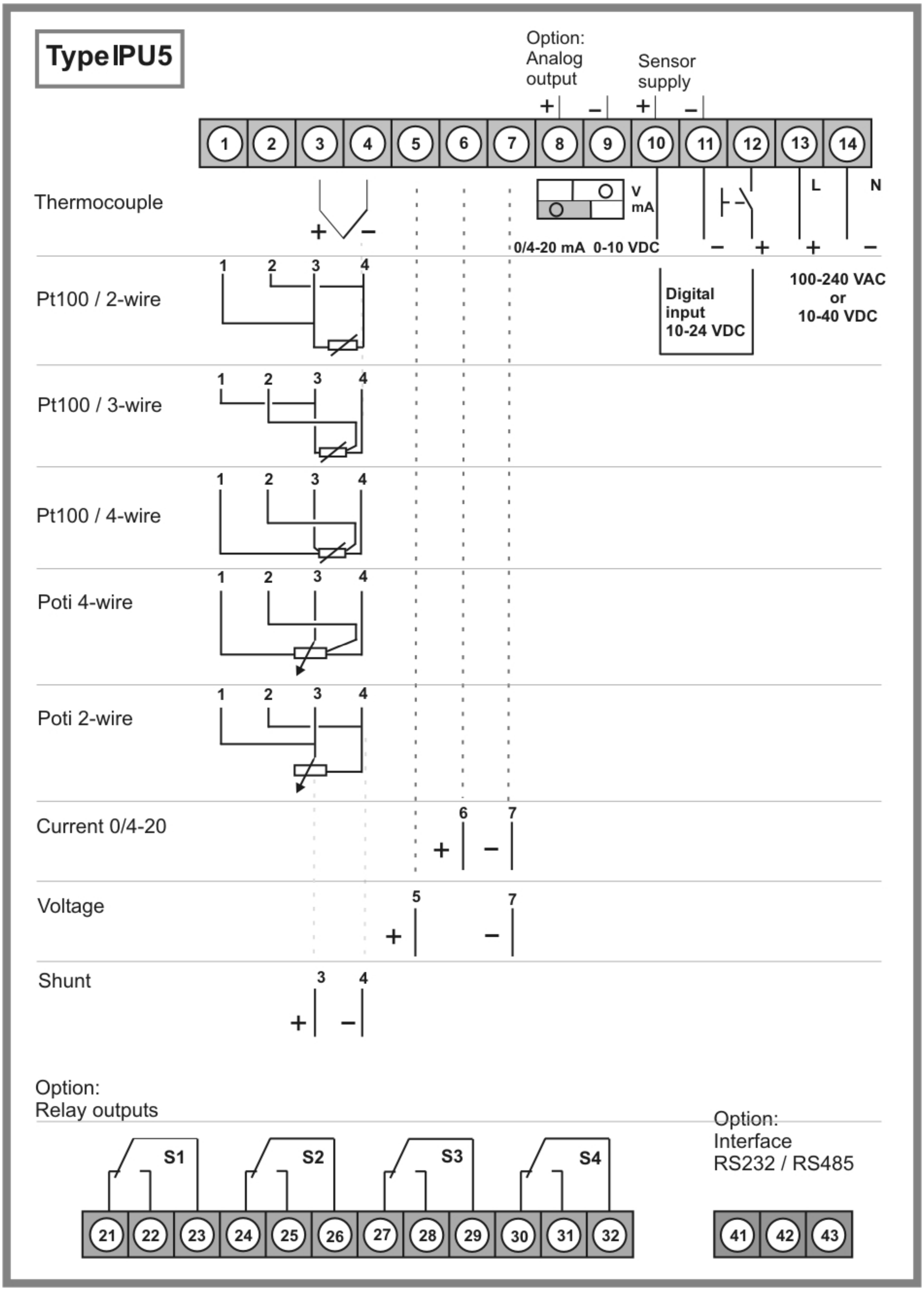


1. After removing the fixing elements, insert the device.
2. Check the seal to make sure it fits securely.
3. Click the fixing elements back into place and tighten the clamping screws by hand. Then use a screwdriver to tighten them another half a turn.

   CAUTION! The torque should not exceed 0.1 Nm!

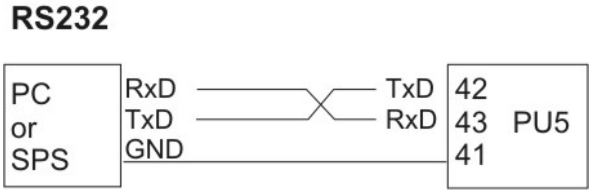
The dimension symbols can be exchanged before installation via a channel on the side!

5. Electrical connection



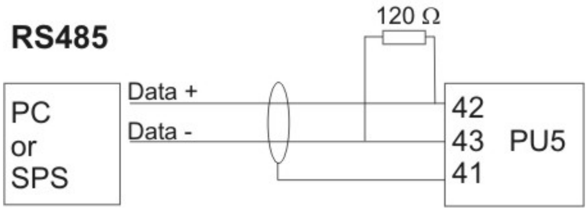
Connection of interfaces

The lines for the **RS232** interface must be connected 1:1, TxD to TxD und RxD to RxD.



Connection pattern PC or SPS ⮎ **IPU5**

The interface **RS485** is connected via a shielded data line with a twisted pair. At each end of the bus, a termination of the bus line must be connected. This is necessary to guarantee reliable data transmission on the bus. For this, a resistance of 120 Ω is inserted between the lines Data B (+) and Data A (–).



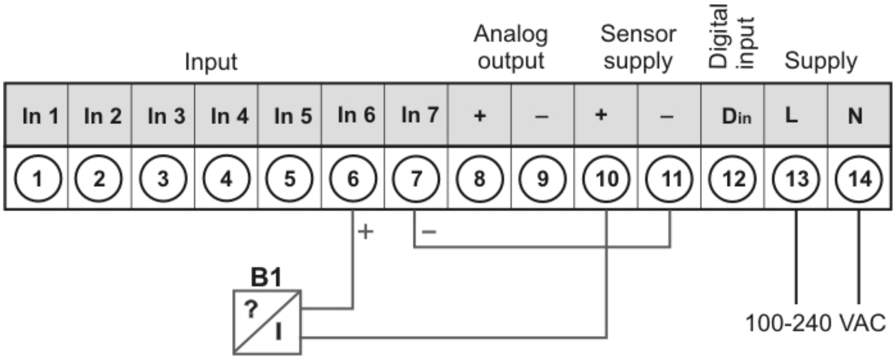
Caution!

The potential reference can lead to a compensating current (interface ⇔ measuring input) with a non-galvanic isolated interface and can thus affect the measuring signals.

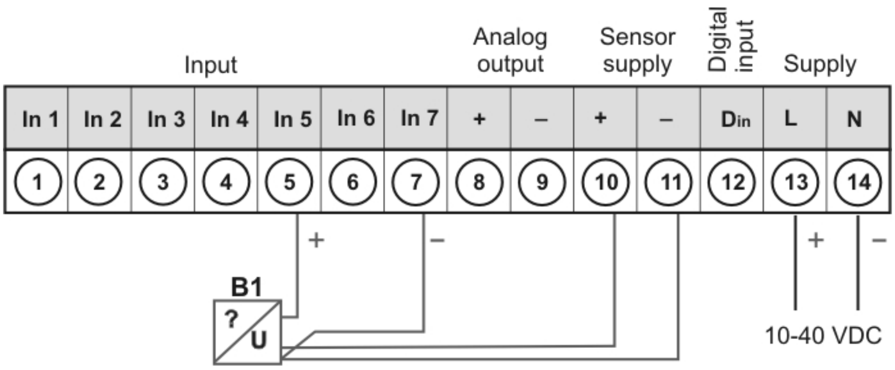
Connecting examples

This section gives a few examples of practical connections. Other connection options can be combined from the various examples.

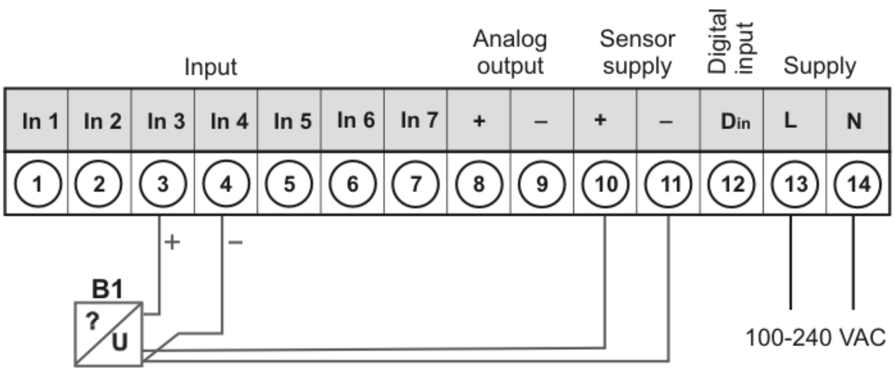
Measuring a **current signal** (4-20 mA) from a **2-line transmitter** using the sensor supply; supply voltage 100-240 VAC.



Measurement of a **voltage signal** (5 V or 10 V) from a **3-wire transmitter** using the sensor supply; supply voltage 10-40 VDC.

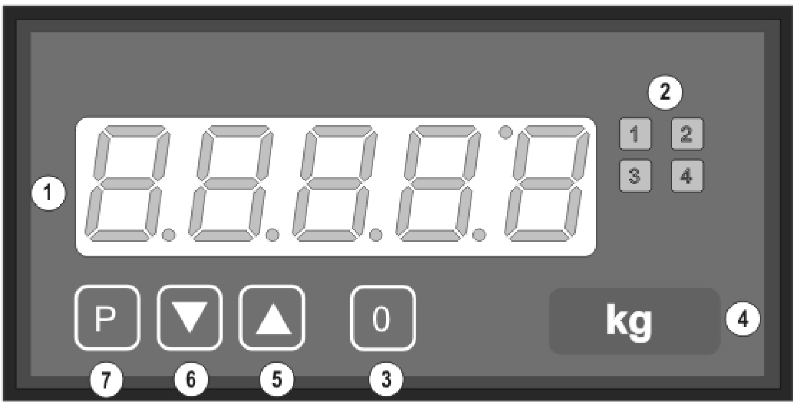


Measurement of a **voltage signal** (≤ 2.5 V) from a **3-wire transmitter** using the sensor supply; supply voltage 100-240 VAC.



6. Operation and functional characteristics

6.1. Operation



① 7-Segment display
② Switching point display 1-4
③ Zero key
④ Gap for physical unit
⑤ Plus-key
⑥ Minus-key
⑦ Programm-key

Display (1)	
7 segment display	5-digit, red
Digit height	14 mm
Display range	-9999…99999
Decimal points	none, 1, 2, 3, 4 (adjustable)
Physical unit	°C, °F, Pt100 / Thermocouple
Setpoint displays (2)	
Optical threshold message	4 LED, red
Keys (5), (6), (7), and (3)	
	Programming mode
	Increase of value range
	Decrease of value range
+	Address Next lower program number
+	Address Next higher program number
	Activation of TARA or HOLD, Reset for MIN/MAX permanent
Dimension gap (4) for physical unit	
Variable dimension strip	Dimension on demand e.g. kg, m³…

Switching on

Before switching on, check all the electrical connections to make sure they are correct. On completion of the installation, the device can be switched on by applying the supply voltage.

Starting sequence

During the switching-on process, a segment test is performed for approx. 1 second, whereby all LED on the front (including setpoint LED) are triggered. After this, the type of software is indicated for approx. 1 second and then, also for 1 second, the software version. After the starting procedure, the unit changes to operation/display mode.

MIN/MAX memory

The measured minimum and maximum values are saved in a volatile memory in the unit and get lost when the unit is switched off.
You can call up the contents of the memory by pushing (less than 1 second) the **[▲]** or **[▼]** key. The relevant value is indicated for approx. 7 seconds. By briefly pressing the same key again, you will return immediately to the display mode .

[▲] ⇒ Display of MAX value
[▼] ⇒ Display MIN value

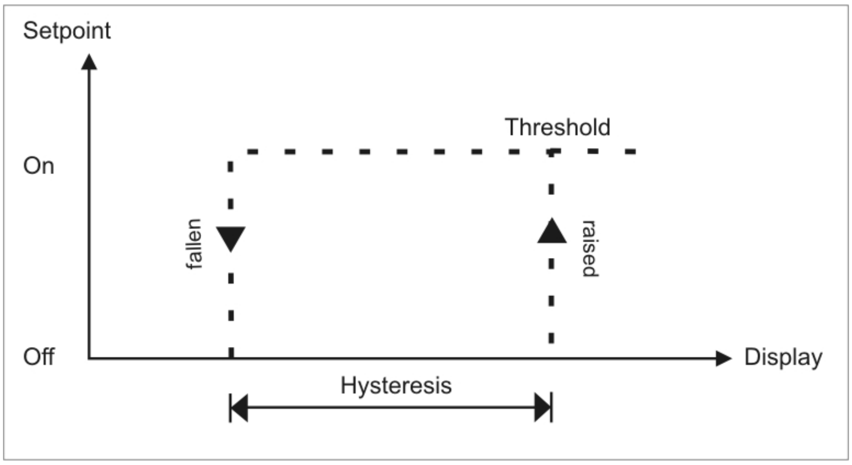
Erase the value shown in the display by simultaneously operating the **[▲]** and **[▼]** keys. The erasure is acknowledged by horizontal bars. The content of the memory will be lost with switching-off of the device.

Overflow / Underflow	
Overflow	An **overflow** of the display is indicated by horizontal bars at the top of the 7-segment display.
Underflow	An **underflow** of the display is indicated by horizontal bars at the bottom of the 7-segment display.

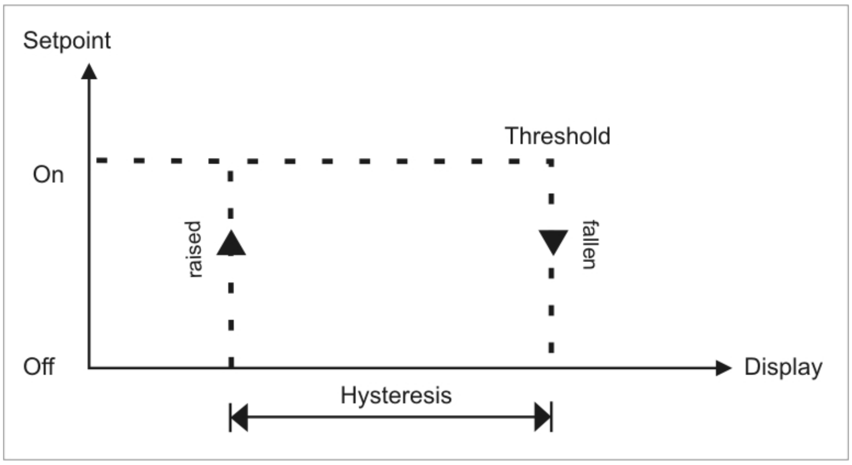
6.2 Alarms / Relays

With the aid of the LED next to the 7-segment display, you can view the switching state of the relays. An active relay is indicated by the relevant LED lighting up.

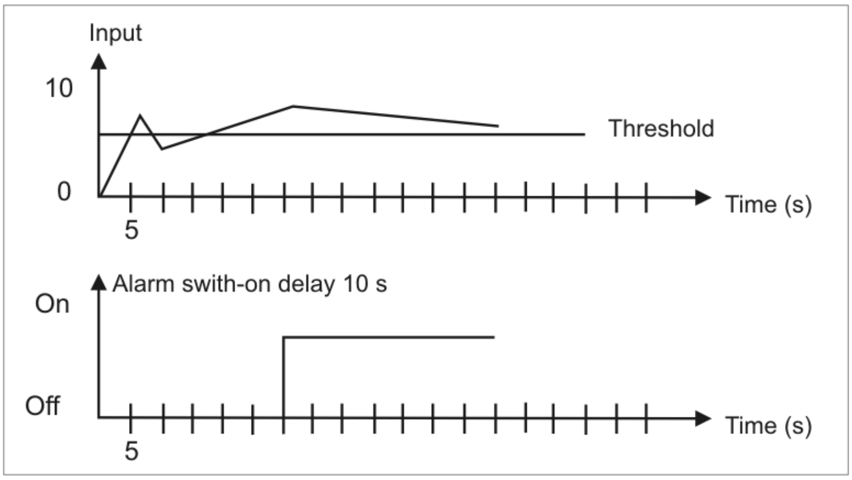
Functional principle of alarms / relays	
Alarm / Relay x	Deactiviated, instananeaous value, MIN value, MAX value, Hold value, sliding average value, totalizator value
Threshold	Threshold / Switch-over threshold
Hysteresis	Width of window between switching threshold
Working principle	Operating current / quiescent current
Switch-on delay	Time between reaching the threshold and the resultant switching on of the relay.
Swith-off delay	Time between reaching the threshold and the resultant switching off of the relay.
Alarm confirmation	Switch-on or switch-off interlock and rejection at activated digital input or zero key



Operating current
The setpoint is **off** below the threshold and **on** on reaching the threshold.



Quiescent current
The setpoint is **on** below the threshold and switched **off** on reaching the threshold.



Switching-on delay
The relays S1-S4 are on 10 seconds after reaching the threshold; briefly exceeding the threshold does not lead to the relay being switched on. The switch-off delay functions in a similar manner, in other words it keeps the set point switched on until the parameterised time has elapsed.

Allocation of the alarms to a certain actuate value

As it is not always desired that alarms follow the operating mode, the outputs can be assigned to the minimum/maximum value or any other value. Therefor the adjustable value range is assigned to the according program number (PN60, PN70, PN80 and PN90).

Alarms 1-4	
Mode	**Actuate value**
0	none
1	Instananeaous value
2	Minimal value
3	Maximal value
4	HOLD value
5	Sliding average value
6	Totaliser value

Alarm confirmation

If one wants to display interim occured alarms, the self-acting switching-on or switching-off can be blocked. Therefor the confirmation of the according setpoints 1-4 must be assigned to the digital input or the zero key under program numbers 67, 77, 87 and 97.

Caution!!! Alarm status will get lost by voltage drop!

Optical response, flashing display

If one or some thresholds are broken, the flashing of the alarm LED can amplify the optical response by assignment of the threshold PN59 to the 7 segment display.

Example:
The threshold for flashing of the display is set at setpoint 2.
If setpoint 1 is exceeded and set point 2 is not, the set point **LED 1** lights up permanently.
If setpoint 2 exceeds the threshold, the 7-segment display will start to flash, setpoint 1 will light up permanently and set point LED 2 will flash.
The flashing enhances the optical response and the operator sees immediately that an important threshold has been exceeded with this unit.

6.3 Analog output

The optional analog output is used for the transduction of a measuring value, supported by a standard signal of 0…10V or 0/4…20mA. The signal selection happens under program number 23. So, PN23=0 equates to the 0-10 V signal, PN23= 1 equates to the 0-20 mA signal and PN23=2 equates to the 4-20 mA signal. The analog output is parameterised via the two program numbers PN20 final value (fullscale) and PN21 initial value (Offset). At the initial value, the value is set where the analog output transmits the minimal value (0V or 0/4mA), and with "Full scale", the value at which the output transmits its maximum (10V or 20mA).
By this means it is possible to rescale the input signal of a transducer or even to convert it into another standard signal. The analog output can be deactivated via the actuate value PN22, as well as set on the active measuring value, MIN value, MAX value, HOLD value, sliding average value or totaliser value.
The analog output is updated within the cycle of the measuring time. At a high measuring rate, smaller cycle fluctuations of some milli-seconds are possible.

6.4. Digital input / Zero key

In combination with the digital input (via terminal) and/or the zero key at the front, functions like e.g. HOLD, TARA, MIN/MAX permanent or the totaliser function, can be actuated or set back. The digital input is available in combination with the option sensor supply or via an external 24 VDC signal. The zero key at the front of the device can be activated by keypress.

6.4.1 HOLD function

The HOLD function is a static signal and will be activated via the digital input or the zero key (see page 26, PN15=4). With activated HOLD the lastly given measuring value remains and is by deactivation permanently overwritten by the measuring value recording. With this function a test state can be recorded beyond a specific period, so that this device can be used for control in run production, too.

Advice: HOLD value gets lost with re-start!

6.4.2 TARA function

The TARA function can be activated by zero key, digital input or with boot-up, the display value is then on the tare value.
This function is only done once, after actuation of the desired trigger and has to be taken back bevor anew alignment.

6.4.3 MIN/MAX permanent

To measure a MIN/MAX value the display can be set back by the display mode (PN15) in a way, that it only shows the minimum or maximum measured value. The value can be reset by the zero key and/or the digital input.

Advice: MIN/MAX value get lost with restart!

6.4.4 Totaliser functions

With the totaliser, the measured display value can be integrated or accumulated over a time. The accumulated time-frame depends on the preset measuring time (PN14). With this function e.g. a volume over the current discharge can be recorded. So this function is qualified for the dose of fill-up quantities in conjunction with relays. The mileage section can be detected by the measured speed.
The cumulative value:

•can be parameterised on different time bases and dimensions (e.g. for volume, liter, m^3, km^3, …).
•can be directed to the display and outputs as a default display value.
•can be reset by a parameterised signal as counter reset (PN185) or by the counter value (PN184).
•is saved in the device even beyond a voltage drop by long-lasting memory. A data loss of max. 30 minutes can occur in case of a voltage drop.

6.5. Serial interface RS232 / RS485

All **IPU5**-devices can optionally be programmed or configurated via an interface. Devices of the basic type do not have an interface.

Operating mode

The interface can be operated in various modes that can be parameterised via the PN34.

PN34=0

Standard mode in which the unit only replies if called on to do so. This mode is used only for configuration. Furthermore the current measuring value can be recalled via commando "**A ↵**".

PN34=1

Transmission mode in which the measurements are transmitted via the serial interface cyclically with the set measuring time.

The transmission mode is interrupted on receipt of "**>** 🕓" and the unit changes to standard mode. To change back to transmission mode, the display must be restarted, either by entering the command "**S** 🕓" or by switching the device off and on.
With the transmission mode, the display value is transmitted via the interface in ASCII format. Minus signs and decimal points are also transmitted so that the output can be displayed directly on a terminal or processed by a SPS. Zeros at the front are suppressed during transmission. With an over or underflow, the display transmits horizontal bars (hyphens) "- - - - - 🕓".

Examples: "0.00 🕓" ; "-9.99 🕓" ; "999.99 🕓" ; "-123.45" ; "- - - - - 🕓"

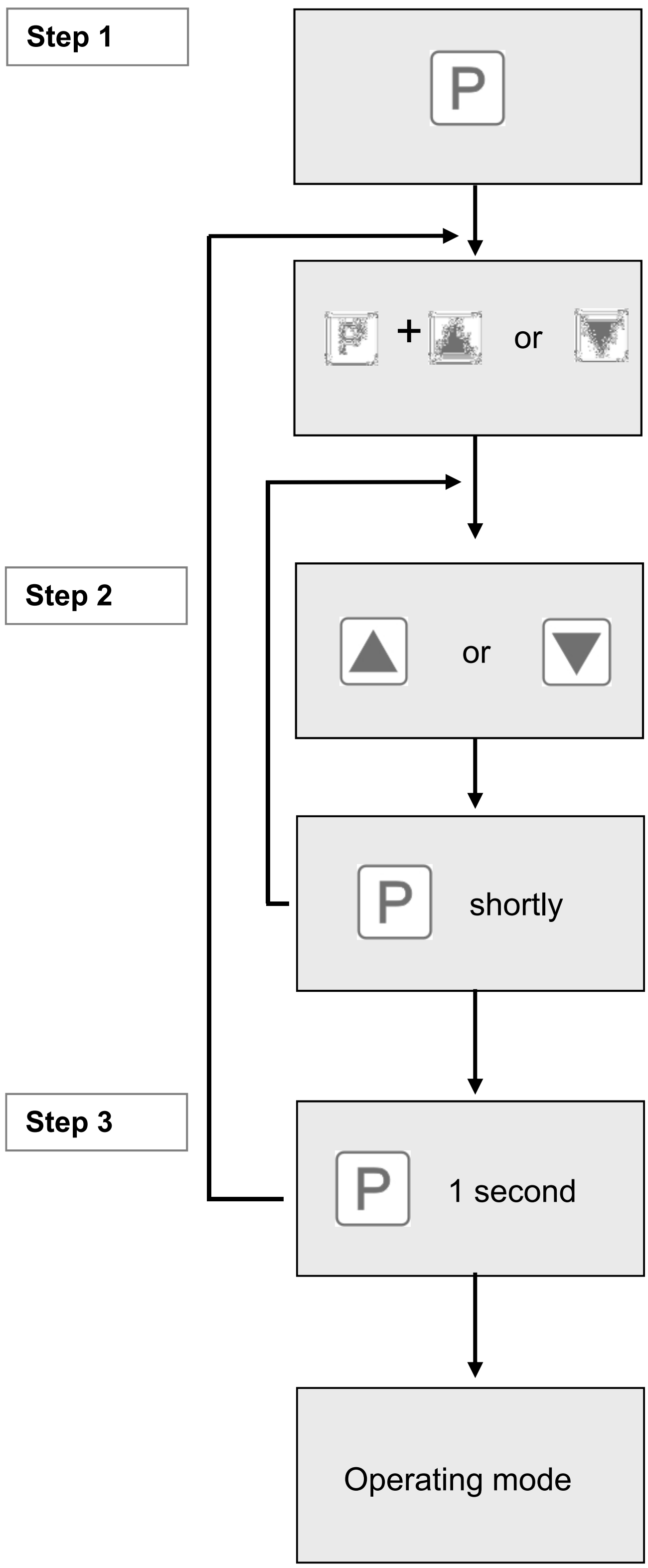
With the aid of this simple protocol structure, the display data can be transferred very easily to a PC etc. and further processed there. In the simplest case, a terminal program from the operating system is sufficient to store the received data in a file.

Configuration of the device via interface

For configuration the set-up tool **PM-Tool** can be used. As the communication is a straight point-to-point connection. The baud rate is set to 9600 baud, with 8 databits, without parity and one stopbit .
Configuration is performed by transmitting **ASCII symbols**.

7. Programming

Functional diagram of programming via key pad



Call for program mode
Device switches on the nervermost approved program number.

Change to the next program number
Program number is displayed.

Change/read the deposited parameters in the program
Flashing of the least significant digit.

Save parameter

Save the complete range of parameters

After 7 seconds without selection, the device changes autonomous in the operating mode.

Description of the program numbers

The program numbers (PN) are shown in the display, right-justified, as a 3-digit number with a **P** in front of them:

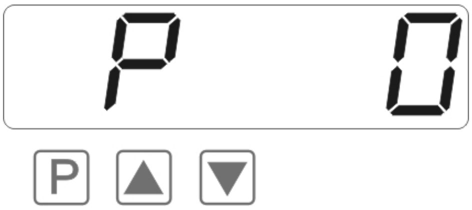
Display of e.g. program number 0

Programming procedure

The entire programming of the **IPU5** is done by the steps described below.

Change to programming mode

Push the **[P]** key to change into programming mode. The unit goes to the lowest available program number. If the programming lock is activated, the key must be pushed for at least 1 second.

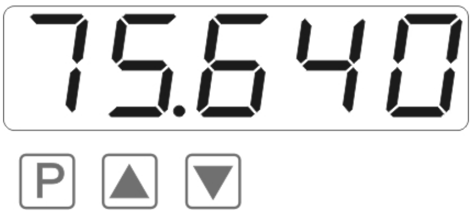


Change between program numbers

To change between individual program numbers, hold the **[P] key down** and push the **[▲]** key for changing to a higher program number or the **[▼]** key for changing to a lower number. By keeping the keys pushed, e.g. **[P] + [▲]**, the display will begin, after approx. 1 second, to automatically run through the program numbers.

Change to the parameter

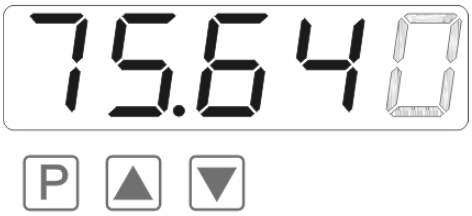
Once the program number appears in the display, you can push the **[▼] or [▲] key** to get to the parameters set for this program number. The currently stored parameters are displayed.



In this case, it is 75,640

Changing a parameter

After changing to the parameter, the lowest digit of the respective parameter flashes on the display. The value can be changed with the **[▲]** or **[▼]** key. To move to the next digit, the **[P] key** must be briefly pushed. Once the highest digit has been set and confirmed with **[P]**, the lowest digit will begin to flash again.



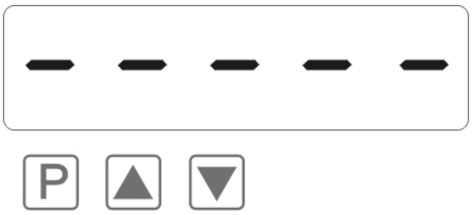
Example:
The 0 is flashing this is the lowest digit and asks if you want to change it. Let us assume the figure is to be changed from 75,640 to 75,000.
Briefly push the **[P]** key to move to the next digit. The 4 begins to flash. Change the figure by pushing **[▲]** or **[▼]** to change the digit from 4 to 0. Briefly push the **[P]** key to move on to the next digit. The 6 begins to flash. Change the digit by pushing **[▲]** or **[▼]** to move the 6 to a 0. Briefly push the **[P]** key to move to the next digit. The 5 and 7 do not need to be changed.

Saving of parameters

All parameters must be acknowledged by the user by pushing the **[P] key** for one second. The changed parameters are then taken over as the current operating parameters and saved in the EEPROM.

This is confirmed by horizontal bars lighting up in the display.

All the **newly entered data are confirmed** by the unit. If no confirmation is received, the relevant parameters have not been saved, e.g. confirmation of parameters:



Changing from programming to operating mode

If no key is pushed in the programming mode for about 7 seconds, the unit will return automatically to operating mode. Before SAVE will be displayed untill the next measuring value is displayed.

Universal measuring input

The **IPU5** is equipped with a universal measuring input that enables the signals from all kinds of different sensors to be measured direct. So that the unit can work according to the signal generated by the sensor, the input must be configured. The basic parameter is always set under **PN0** .

Caution! For the unit to function correctly, it is absolutely essential that the right sensor is parameterised under **program number 0**. If a wrong sensor is parameterised there, the operating behaviour may be impaired.

Setting / Calibration of the measuring input

All the units are calibrated in the factory, whereby offset and full scale have been saved for the various measuring ranges. Via terminal connections and the choice of the measuring input under PN0, different types of input signals can be worked up.

Factory calibration current / voltage under PN0 = 1…12

For these parameters, new scaled display values can be allocated which are used for scaling the measurement on the display. For the offset, an input signal of 0 is assumed and for full scale, the specific full scale of the parameterised measuring range.

For parameterisation, no sensor signal has to be applied because stored values are used. Because of the differing input signals, the corresponding input configuration must be parameterised via PN0.

For the sensor signal with 4...20 mA, for example, PN0=2 has to be parameterised.

Temperature measurement PN0 = 13…29

For the temperature measurement, the scaling cannot be changed by the user and is only determined from the standardized sensor range. Sensor-caused variations can be balanced by offset shift (PN5) on the characteristic line.

Sensor calibration for resistance / current / voltage PN0 ≥ 3

With the sensor calibration, the unit can be calibrated or set up directly via the sensor signal or via a calibrator. For this, the measuring signal must be connected to the input of the unit. The respective display value (*SCALE*) must then be saved under the program number PN1 (*FULL SCALE*) and PN2 (*OFFSET*). The sensor signal is measured via the factory parameter and displayed as current or voltage. A measurement must be started by shortly pushing the **[P]** key. Through this process with two calibration points, the unit is matched up with the measuring section. For more far-reaching adjustments to the characteristic line of the sensor, a linearization can be activated.
At the resistance measurement, only the display value (*SCALE*) is parameterised. The adjoining sensor signal (*INPUT*) will not be displayed, but directly absorbed unit-intern. For linearization of the parameter at least PN1 (final value) or PN2 (zero point) must be preset.

Linearization PN100

The **IPU5** offers the possibility to linearize, with up to 30 additional setpoints, non-linear sensors for the display of the measuring values and their subsequent processing (analog output).

The number of the desired setpoints is determined under PN100. Be aware of chosing the one that makes the most sense, as it can lead to a malfunction of the device in case of no adjustment.

Approach to sensor calibration PN0 => 33

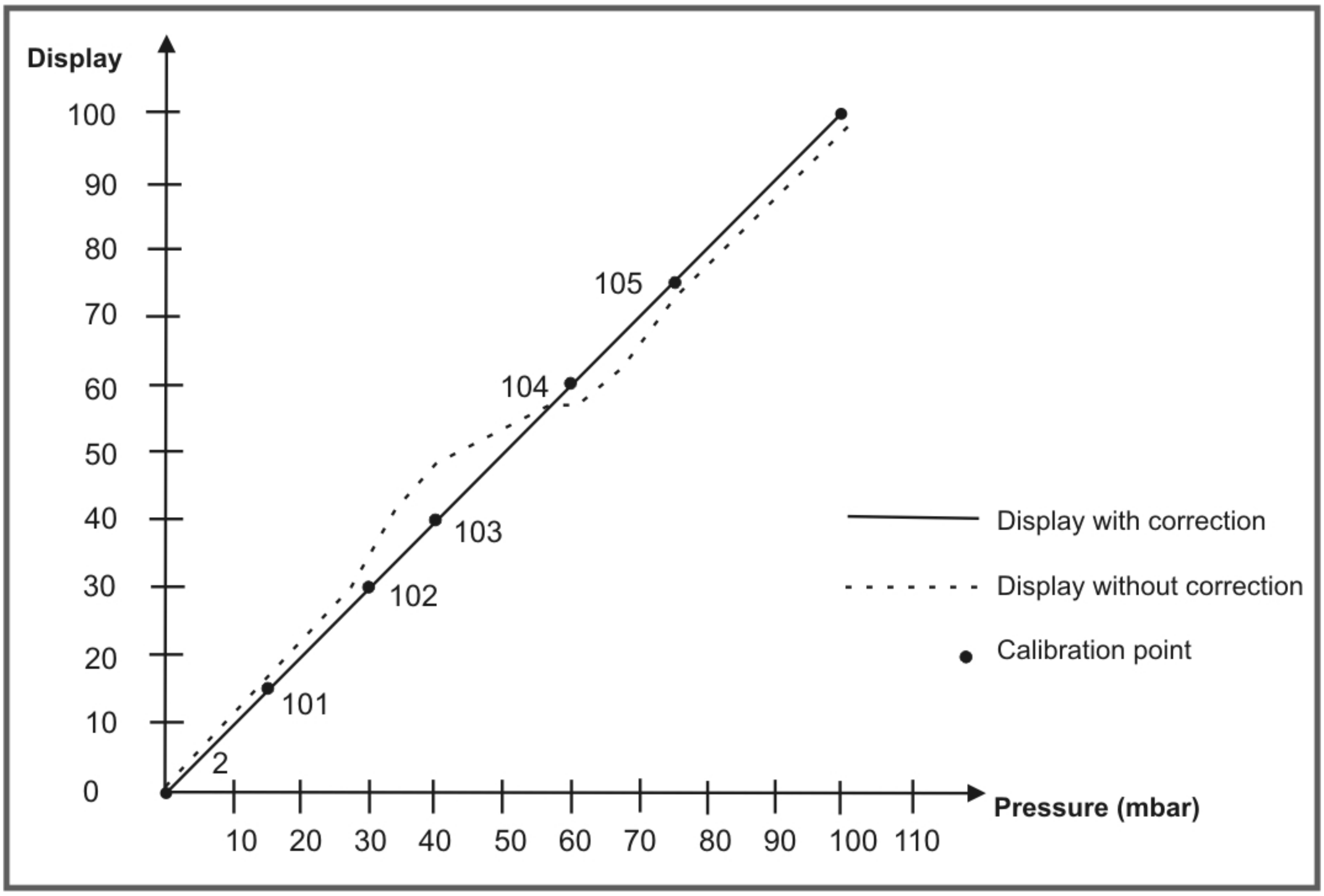
To program e.g. 5 additional calibration points, 5 must be entered under PN100. Subsequently, for each of the calibration points, the voltage/current must be applied to the unit and the respective display value programmed under the following program numbers PN101 – PN105.

The sensor signal must be consistently parameterised. A gap of at least +1 digit to the previous display value must be adhered to, otherwise the input will be refused and no confirmation of the saving will be given.

Linearization of a pressure transducer for 0...100 mbar with an output of 0...20 mA. The display value before correction can be either calculated from the known characteristic line of the transducer or be determined empirically.

The non-linear range between 0...75 mbar. For calibration point 101, this means: A pressure of 15 mbar, the transducer delivers 3.3 mbar instead of the optimum value of 3.0 mbar. As 20 mA in the display corresponds to 100.0 mbar, 3.3 mA in the display corresponds to 16.5 mA before the correction.

Calibration point (PN)	Pressure (mbar)	Output Transducer (mA)	Display before correction (IN)	Desired display (OUT)
2	0	0.5	2.5	0.0
101	15	3.3	16.5	15.0
102	30	6.2	31.0	30.0
103	40	9.2	46.0	40.0
104	60	11.4	57.0	60,.0
105	75	14.7	73.5	75.0
1	100	20.0	100.0	100.0



Proceeding with factory calibration PN0 ≤12

With adjusted factory calibration a linearisation without connection of the sensor signal can be presetted. Therefore the number of the desired setpoints needs to be filled in under PN100, to subsequently relate the display values to a certain measuring signal.

Starting on setpoint (PN101) the display value (SCALE) and subsequently the according measuring signal (INPUT) need to be programmed. Both inputs are saved by pushing the **[P]-key** (for approx. 1 sec).

8. Program number description

The **IPU5** device has a default configuration ex factory, where a 0…10 V input signal is changed into a display value of 0…10000. For devices, where the preconfiguration is unknown, a reset on the default parameter should be done (*see chapter 9*). Otherwise unwanted reactions of the device can occur due to foreign settings.

The devices do have a digital input, with which some functions like e.g. HOLD, TARA, or MIN/MAX can be actuated.

Measuring input PN0

For the basic configuration of the unit, you must parameterise the right measuring input for your application under PN0. There is a choice of various inputs in the program number table (*chapter 8.1)*.

Scaling PN1 and PN2

The two program numbers 1 and 2 serve to scale the display; with these two parameters, the offset and full scale are parameterised. For each setpoint there is a SCALE–value and a INPUT–value. The SCALE–value indicates the desired display value. The according measuring signal is detemined by the INPUT–value. In case of factory calibration the desired current or voltage value is preset. If a sensor calibration is demanded, a measurement can be actuated by a short pushing of the **[P]-key**. Before the saved current value/voltage value is visible. All inputs need to be confirmed by pushing the **[P]-key** for approx. 1 second; the device confirms the correct take-over with 5 vertically bars in the display.

Decimal point PN3

By changing this parameter, the position of the decimal point in the display is changed. With temperature measurements, the physical unit **°C** or **°F** can also be added.

Offset shift / Zero point shift PN5

With this parameter it is possible to carry out a parallel shift of the parameterised characteristic line. This may be necessary if, for example, a pressure sensor ages over the course of time and a shift in the zero point occurs. With the parallel shift, the sensor can be adjusted back to the zero point. Another application would be to parameterise a certain tank level to zero and have any deviation from this level displayed.

With the offset it does not matter whether the original characteristic line has been program-med by the user with PN1, PN2 or PN101...130 or whether it is the characteristic line of a temperature sensor. The value parameterised under PN5 is added to the original display value. If, for example, a temperature sensor shows approx. 3 °C instead of 0 °C, you can compensate for this deviation by changing the value under PN 5 from 0 to -3.

If the comparison metering point is turned off for the thermocouple, the comparison metering temperature can be preset manually. This parameter can be changed directly by taring, if it has been actuated by a configurated incident (see PN8).

Thermocouple reference junction PN6

The thermocouple reference junction is only available for thermocouples and can be activated or deactivated under PN6. Deactivation may be useful where the interchange point is kept at a very constant level or the temperature constitutes the direct relationship to the process. In this case the wiring to the measuring device can be conducted in simple wiring copper.

Setpoint value for taring PN7

By actuation of the taring, the display value is set on the taring value. This means the offset / zero point is shifted in a way that the display value is equivalent to the taring value.

Actuation for taring PN8

During taring, the instantaneaus value is set on a demanded setpoint value, which is configurated under PN7. The difference between setpoint value and actual value is saved as offset PN5 in the device. Following operational modes are known for taring, they are adjustable under PN8:

PN8 =	Actuation for taring
0	none
1	Digital input active, longer than 3 seconds
2	Zero key actuated for longer than 3 seconds
3	Digital input or zero key active for longer than 3 seconds
4	Taring at boot-up
5	Taring at boot-up and with digital input
6	Taring at boot-up and with zero key
7	Taring at boot-up, digital input and zero key
8	Taring with activated digital input for activation period
9	Fast taring on digital input
10	Fast taring on zero key
11	Fast taring on digital input or zery key

The taring can be called off by programming of the PN5 offset shift on the value zero.

A special form is taring PN8 = 8: the taring is not saved in PN5 offset shift, but charged temporarily for the duration of the activated digital input. The old tara value gets lost by a boot-up. The disply shows 00000 for approx. 1 second to confirm the taring. Taring is done only one time after actuation of the desired activator. For a anew calibration the signal for the activation of the taring musst be cancelled.

If the MIN/MAX value reset is programmed on the same activator as the taring, then after taring a MIN/MAX value reset takes place, too. Furthermore the taring can be watched very well as the instantaneous value is shown directly before and after taring.

Sliding average value PN12

The complete average time is a result of the product or a multiplication of time and recorded average value PN14 x PN12. If one wants to see this result in the display, the display mode PN15 needs to be programmed parallel on this result. This must be pointed out with an optional analog output or with the relays, too.

Display time PN13

The display time is the interval at which the display is updated. The longer the time between two display cycles, the calmer the display. The eye perceives a display time of 1 second as very pleasant.

Measuring time PN14

The **IPU5** performs an averaging process by calculating an average from several measurements taken during the measuring time (1/measuring time = Samples/s). For most applications, a measuring time of 0.20 to 1.00 seconds is suitable.

Caution: The update of other functional components (analog output and relay) is carried out cyclically with the set measuring time. If the measuring time is set very short, it is possible that there will be jumps in the analog output in case of a noisy signal or a brief switching of the relay. When selecting the measuring time, it should be borne in mind that the MIN/MAX memory receives its values on the basis of the set measuring time. Should the peaks of a turbulent signal be recorded, it may certainly be worthwhile to choose a very short measuring time.

Display mode PN15

The device supports several operational modes, which are seletcable under PN15.

Instantaneous value (PN15 = 1)

Operational mode „instantaneous value“ is equal to the standard display, where the last measured value is displayed.

Minimal value display (PN15 = 2)

In this operational mode, the smallest occured display value, since the last minimal value reset, is displayed. The minimal value reset is actuated by boot-up (switching-on) or by the digital input/zero key.

Maximal value display (PN15 = 3)

In this operational mode, the largest occured display value, since the last maximal value reset, is displayed. The maximal value reset is actuated by boot-up (switching-on) or by the digital input/zero key.

HOLD function (PN15 = 4)

If duty type HOLD was selected, the zero key and the digital input may not be occupied with other functions lige e.g. trigger for taring (PN8) or MIN/MAX value reset (PN16), trigger for counter reset (PN185) or display change onto totaliser value (PN186). With setpoint confirmation (PN67, 77, 87, 97) both functions will be carried out parallely.

Sliding average value (PN15 = 5)

The complete average time is a result of the product or a multiplication of time and recorded average value PN14 x PN12. If one wants to see this result in the display, the display mode PN15 needs to be programmed parallel on this result. This must be pointed out with an optional analog output or with the relays, too.

Totaliser value (PN15 = 6)

In operation mode „Totaliser value", the totaliser/sum value is displayed. With this value by means of an active flow rate, a volume about the time can be collected. As this time can be very long (approx. 1 year), the value needs to be displayed in a individual adjustable dimension.

Absolute value (PN15 = 7)

In operation mode „absolute value" the display shows the value that has been measured since voltage connection, without consideration of a previous taring.

Trigger mode (PN15 = 8)

In operation mode „trigger mode" the instantaneous value is only transmitted on the display by a increasing shoulder via the digital input or by activating of the zero key.

Activator for MIN/MAX value reset PN16

After boot-up the MIN/MAX values are automatically set back on the instantaneous value. To set back minimum/maximum values even during operation, 3 additional escapements are available.

PN16=	Activator for MIN/MAX value reset
0	None
1	Digital input active, for longer than 50 ms
2	Zero key pressed for longer than 50 ms
3	Digital input or zero key active, for longer than 50 ms
4	Taring function

The value reset is only shown shortly after actuation of the digital input or zero key by 5 horizontal bars (" - - - - - ") for 0.5 seconds. After that the instantaneous value is shown as long in operating mode MIN/MAX value display, as the activator is taken back. This way the instantaneous value can be watched for a longer time.

If the value reset ought to be done during taring, then there is no report in the display. During value reset only the MIN/MAX value that presently shown in the display is set back!

Zero point suppression PN18

The zero point suppression offers the possibility of masking an area around zero for displaying a value of zero. In the program number the amount is parameterised which is then effective in both the positive and the negative directions. This may be necessary if, for example, a number of revolutions is being measured by an analog sensor and has a drift around zero. If the signal changes slightly when the motor comes to a standstill, a speed of zero is still indicated. In addition, slightly negative rpms are suppressed.

Analog output PN20 and PN21, PN22 and PN23

The parameters of the analogue output refer to the scaling of the display and are cyclically updated with the measuring time. With PN22 = 0 the analog output can be deactivated, whereas it remains on its inital value after a restart of the device.

The analog output can be related to all possible values that are recorded in the device. For further information please see *chapter 6.3* or program number table *chapter 8.1*.

The inital and final value is always displayed without comma. The demonstration of the measuring value in the display is taken as base, so with a demonstration of e.g. 6.400 the final value can be parameterised by 6400 on this display value.

PN23 determines the output signal either 0-20 mA, 4-20 mA or 0-10 VDC.

Interface behaviour PN34

The current display value can be sent by the optional interface. In standard mode PN34 = 0 the display remains passive and expects data from the bus. This operation is used for the configuration of the display. For slower actions the instantaneous measuring value can be actively asked for by command. In sending mode PN34 = 1 the displays sends actively in cycle of the measuring time the current measuring value. For further information please see *chapter 7 „Operation mode“*.

Security setting, user level PN50 to PN52

With the parameters in the security settings, access to the program numbers is regulated through the setting of various user levels. The user levels divide the access into various levels. The user is only given access to the settings authorised by the system operator, such as the setting of thresholds. The lower the figure for the user level given under PN52, the lower the level of security of the unit parameters against user intervention .

Userlevel PN52 =		0	1	2	3	4	5	6	7	8
Access to:	**PN**									
Display brightness	19	X	X	X	X	X	X	X	X	X
Programming lock	50	X	X	X	X	X	X	X	X	X
Serial number	200	X	X	X	X	X	X	X	X	X
Setpoint threshold values	61, 71, 81, 91	X	X	X	X	X	X	X	X	
Setpoint parameters	59…95	X	X	X	X	X	X	X		
Interface parameters (option)	32…34	X	X	X	X	X				
Analog output parameter (option)	20…22	X	X	X	X	X				
Measuring input parameters	0…18	X	X	X						
Linearization parameters for measuring input	100…130	X	X	X						
Authorization code	51	X								
User level	52									

User levels 1, 3, 5 and 7 are reserved user levels for which the authorization is in each case the same as the next lower level.

The parameterised user level PN52 is active as long as the authorisation code PN51 and programming lock PN50 are different. On delivery both parameters are set to 0000, so that the programming lock is deactivated.

To activate the set user level, enter a 4-digit number under PN51 as a "locking code" and confirm it by pressing the **[P]**-key for approx. 1 second.

On changing to programming mode, the unit switches to the first authorised program number. If user level PN52 = 3, then, for example, the parameters of the set points can be changed, but changing the parameter of the measuring input (PN0) is not possible at this user level.

In order to obtain access to all program numbers later (equivalent to user level 0), you have to enter under PN50 the same code you used before under PN51. You must then acknowledge this by pressing the [**P**] key for approx. 1 second. After this you have access to all program numbers.

Caution! If the authorisation code becomes lost, the unit can be set to the default value 0000 at the manufacturer's without any data loss.

Servicing level PN53

Via this program numbers, a change between different user levels can be done. This function shall simplify the programming process, if there are no special requirements.

Simple servicing level (PN53=1, limited programming):

Designed for the standard adjustments of the device. Only program numbers which are needed to set a device into operation are displayed.

Professional servicing level (PN53=2, all PN (program numbers) are released): This level is preset in the delivery state and contains the complete functional range of the device. The functions that are available in this level are designed for a further parameterisation in the standard settings.

The programming level is needed for complexe applications, like e.g. the linkage of alarms, supporting point treatment, totaliser functions, etc..

Which program numbers are available in the simple servicing level and which are available in the professional servicing level is shown in chapter *8.1 „Program number table“,* in column „*Servicing level*“.

Attention should be paid to the follwing aspect:

For some program numbers, only the mostly used options are available in the simple servicing level (e.g. PN0 Input signal).

Setpoints / Relays PN59 to PN97

You can influence the behaviour of the setpoints with various program numbers. The figures refer to the scaled measurement and are updated with the set measuring time. A description of the various parameters is given in *chapter 6.2.Setpoints / Relays*.

Linearization PN100 to PN130

Through the linearization, the user has the possibility to linearize a non-linear sensor signal. A detailed description can be found in *chapter 8* on linearization PN100 $\geq$ 0.

Totaliser / summation function PN180

For the add of measuring values, 3 operation types are available:

PN180=0	Without summation function, the sum value is preallocated with „0" and does not change any more
PN180=1	Without permanent storage e.g. for dose procedures < 30 min the sum value is not stored in the devices memory, it could be damaged by being set back too often. In case of power failure all data get lost.
PN180=2	Permanent storage e.g. for the survey of quantities or distances or for longer spaces of time > 1h. Here a data loss in case of a power failure is avoided.

Totaliser calculation PN181, PN182 and PN183

To calculate a totaliser/sum value the time base and the unit are very important. The discharge is stated in **amount per time** and the speed in **distance per time**.

By parameterisation of the time base PN181 to **s**, **min** or **h** the device adds up the die totalisor value.If e.g. a sensors collects 1.200l/h, you only have to add up the 3.600th part of the total amount of liter at a measuring time of 1 second; in this case it would be 0.333 liter per measuring cycle. Despite of this small value, the totaliser value can add up itself to a quite high value during a period of one year. In this example it would be approx. 10,512,000 liter in a year. Here, a declaration in cubic metres would be reasonable. For the realization of this, you have to preset a factor, in this example PN182=3 (10 3), so the value can be divided and liters become cubic metres.

If you want to integrate the amount for only one month, the demonstration in cubic metres can be provided with a decimal place under PN183.

If you paramerterise now factor PN182=2 and the decimal place PN183=1, it would lead to a demonstration of 864.0 cubic metres at the end of the month.

Totaliser reset PN184, PN185

According to the demanded application the totaliser/sum value needs to be set back to a special point of time. This can be done directly by a parameterisation of the inital value PN184 on zero or by the under PN185 parameterised actuators (see program number table *chapter 8.1*). The most reasonable way is by the digital input, as it is not easy accessible for the operating personal.

Recall of the totaliser values PN186

The totaliser/sum value can be permanently or displayed by an actuator (zero key / digital input). Often the sum value has not the first priority, so its demonstration occurs as a coproduct.

Serial number PN200

Under PN200 you can call up the 5-digit serial number that allows allocation to the production process and the manufacturing procedure.

8.1 Program table

The program table lists all the program numbers (PN) with their function, range of values, default values, user level and servicing level.

PN	Function	Range of values	De-fault	User level	Servicing level
Channel 1					
0	Measuring input Parameters 1 to 29 make use of the **factory calibration**. At PN0 = 1-12 set points can be changed in the measuring range. The parameters ≥ 30 need **sensor calibration.**	**Current, voltage** 01 = 0…20 mA 02 = 4…20 mA 03 = 0…10 V 04 = 0…5 V 05 = 0…2500 mV 06 = 0…1250 mV 07 = 0…600 mV 08 = 0…300 mV 09 = 0…150 mV 10 = 0…75 mV 11 = 0…35 mV 12 = 0…18 mV **Temperature measurement** 13 = Pt100 (4/2 wire) 14 = Pt100 (3 wire) 15 = Pt200 (4/2 wire) 16 = Pt200 (3 wire) 17 = Pt500 (4/2 wire) 18 = Pt500 (3 wire) 19 = Pt1000 (4/2 wire) 20 = Pt1000 (3 wire) 21 = L 22 = J 23 = K 24 = B 25 = S 26 = N 27 = E 28 = T 29 = R **Resistance / Potentiometer** 30 = ≤ 100 Ω (4/2 wire) 31 = ≤ 1 kΩ (4/2 wire) 32 = ≤ 10 kΩ (4/2 wire) 33 = 0/4…20 mA 34 = -1…10 V 35 = -1…5 V 36 = -500…2500 mV 37 = -500…1250 mV 38 = -500…600 mV 39 = ± 300 mV 40 = ± 150 mV	3	2	1 (01..04, 13, 14, 19, 20, 22, 23) 2 (rest)

PN	Function	Range of values	De- fault	User level	Servicing level
0	Measuring input (continued)	**Sensor calibration** 40 = ± 150 mV 41 = ± 75 mV 42 = ± 35 mV 43 = ± 18 mV 44 = 0…5 mA 45 = 0…2 mA			
1	Final value / Fullscale PN20 ≤ 12 or PN0 ≥ 30	-9999…99999	1000 0	2	1
2	Zero point / Offset PN0 ≤ 12 and PN0 ≥ 30	-9999…99999	0	2	1
3	Decimal point **Voltage, current** With PN0 ≤ 12 and PN0 ≥ 30 **Ptxxx resistance thermometer** Physical unit and number after the decimal point; with PN0 = 13 to 20 0 or 1: the physical unit is not shown in the display 2 to 5: the unit is shown after the figure **Thermocouple** Physical unit and number after the decimal point; PN0 = 21 to 29 0 or 1: the physical unit is not shown in the display	00000…0.0000 0 = 8888.8 [°C] 1 = 8888.8 [°F] 2 = 8888°C [°C] 3 = 8888°F [°F] 4 = 888.8°C [°C] (-99.9…999.9) 5 = 888.8°F [°F] (-99.9…999.9) 0 = 8888.8 [°C] 1 = 8888.8 [°F] 2 = 8888°C [°C] 3 = 8888°F [°F]	none 2	2 2	1 2
5	Offset shift At analogue or resistance measurements and sensor calibration PN0 = 1 to 12 or 30 to 45, with temperature sensors, PN0 = 13 to 29	-9999…99999 Measuring range	0 0 / 0.0	2 2	2 2
6	With PN0 = 21 to 29 thermocouple reference junction (can only be parameterised with thermocouples)	0 = inactive 1 = active	1	2	2
7	Setpoints for taring	-9999…99999	0	2	2

PN	Function	Range of values	De-fault	User level	Servicing level
8	Activator for taring	0 = none 1 = digital input 2 = zero key 3 = digital input without key 4 = boot-up 5 = combination 1 with 4 6 = combination 2 with 4 7 = combination 3 with 4 8 = temporarily taring via digital input 9 = fast taring on digital input 10 = fast taring on zero key 11 = fast taring on digital input or zero key		**2**	**2**
General settings					
12	Sliding average value	0 = off 1…100 measuring values	0	2	2
13	Display time	0.1…10.0	1.0	2	2
14	Measuring time Voltage, current PN0 = 1…12; 33…45 Ptxxxx 2/4 wire Ptxxxx 3 wire Temperature measurement thermocouple Resistance 2/4 wire Resistance 3 wire	 0.02…10.00 0.04…10.00 0.06…10.00 0.04…10.00 0.04…10.00 0.06…10.00	 1.0 1.0 1.0 1.0 1.00 1.00	 2 2 2 2 2 2	2
15	Display mode	1 = instantaneous value 2 = MIN value 3 = MAX value 4 = HOLD value 5 = sliding average value 6 = totaliser value 7 = absolute value 8 = trigger mode	1	2	2
16	Activator for MIN/MAX value reset	0 = no reset activator 1 = digital input 2 = zero key 3 = digital input or zero key 4 = with taring function	2	2	2
18	Zero point suppression	0…99999	0	4	2
19	Display brightness	0…9 (0 = bright / 9 = dark)	3	8	2

PN	Function	Range of values	De-fault	User level	Servicing level
Analogue output (Option)					
20	Final value / Fullscale	-9999….99999	10000	4	2
21	Inital value / Offset	-9999…99999	0	4	2
22	Analog output	0 = deactivated 1 = instantaneous value 2 = MIN value 3 = MAX value 4 = HOLD value 5 = sliding average value 6 = totaliser value 7 = absolute value	1	4	2
23	Signal selection	0 = 0-10 V 1 = 0-20 mA 2 = 4-20 mA	2	4	1
Interface					
34	Interface behaviour	0 = standard operation 1 = transmission operation	0	4	2
Security settings					
50	Programming lock	0000…9999	0000	8	2
51	Authorization code	0000…9999	0000	0	2
52	User level	0…8	8	0	1
Servicing level					
53	Simple servicing level Professional servicing level	1 = limited programming 2 = all PN (program numbers) are released	2	2	2
Flashing of the LED display					
59	Display flashing (approx. 0.5 seconds) No flashing Flashing at set point 1 Flashing at set point 2 Flashing at set point 3 Flashing at set point 4 Flashing at set point 1 and 2 Flashing at set point 3 and 4 Flashing at set point 1, 2, 3 and 4	0 = no flashing 1 = flashes at 1 2 = flashes at 2 3 = flashes at 3 4 = flashes at 4 5 = flashes at 1 and 2 6 = flashes at 3 and 4 7 = flashes at 1, 2, 3 & 4	0	6	2

PN	Function	Range of values	De-fault	User level	Servicing level
Setpoint 1					
60	Setpoint 1 (Source / Trigger value)	0 = not activated 1 = instantaneous value 2 = MIN value 3 = MAX value 4 = HOLD value 5 = sliding average value 6 = totaliser value 7 = absolute value	1	6	1
61	Threshold	-9999…99999	1000	6	1
62	Hysteresis	1…99999	1	6	1
63	Active above / below SP value	0 = active below SP 1 = active above SP	1	6	1
64	Switch delay	0.0…10.0 seconds	0.0	6	1
65	Delay type	0 = none 1 = switch-on delay 2 = switch-off delay 3 = switch-on/-off delay 4 = suppression with activated digital input	1	6	1
67	Setpoint confirmation	0 = no locking 1 = switch-off locking by zero key 2 = switch-off locking by external input 3 = switch-off locking by both 4 = no locking 5 = switch-on locking by zero key 6 = switch-on locking by digital input 7 = switch-on locking by both	0	6	2

PN	Function	Range of values	De-fault	User level	Servicing level
Setpoint 2					
70	Setpoint 2 (Source / Trigger value)	0 = not activated 1 = instantaneous value 2 = MIN value 3 = MAX value 4 = HOLD value 5 = sliding average value 6 = totaliser value 7 = absolute value	1	6	1
71	Threshold	-9999…99999	1000	6	1
72	Hysteresis	1…99999	1	6	1
73	Active above / below SP value	0 = active below SP 1 = active above SP	1	6	1
74	Switch delay	0.0…10.0 seconds	0.0	6	1
75	Delay type	0 = none 1 = switch-on delay 2 = switch-off delay 3 = switch-on / -off delay 4 = suppression with activated digital input	1	6	1
77	Setpoint confirmation	0 = no locking 1 = switch-off locking by zero key 2 = switch-off locking by external input 3 = switch-off locking by both 4 = no locking 5 = switch-on locking by zero key 6 = switch-on locking by digital input 7 = switch-on locking by both	0	6	2

PN	Function	Range of values	De-fault	User level	Servicing level
Setpoint 3					
80	Setpoint 3 (Source / Trigger value)	0 = not activated 1 = instantaneous value 2 = MIN value 3 = MAX value 4 = HOLD value 5 = sliding average value 6 = totaliser value 7 = absolute value	1	6	1
81	Threshold	-9999…99999	1000	6	1
82	Hysteresis	1…99999	1	6	1
83	Active above / below SP value	0 = active below SP 1 = active above SP	1	6	1
84	Switch delay	0.0…10.0 seconds	0,0	6	1
85	Delay type	0 = none 1 = switch-on delay 2 = switch-off delay 3 = switch-on /-off delay 4 = suppression with activated digital input	1	6	1
87	Setpoint confirmation	0 = no locking 1 = switch-off locking by zero key 2 = switch-off locking by external input 3 = switch-off locking by both 4 = no locking 5 = switch-on locking by zero key 6 = switch-on locking by digital input 7 = switch-on locking by both	0	6	2

PN	Function	Range of values	De-fault	User level	Servicing level
Setpoint 4					
90	Setpoint 4 (Source / Trigger value)	0 = not activated 1 = instantaneous value 2 = MIN value 3 = MAX value 4 = HOLD value 5 = sliding average value 6 = totaliser value 7 = absolute value	1	6	1
91	Threshold	-9999…99999	1000	6	1
92	Hysteresis	1…99999	1	6	1
93	Active above / below SP value	0 = active below SP 1 = active above SP	1	6	1
94	Switch delay	0.0…10.0 seconds	0,0	6	1
95	Delay type	0 = none 1 = switch-on delay 2 = switch-off delay 3 = switch-on / -off delay 4 = suppression with activated digital input	1	6	1
97	Setpoint confirmation	0 = no locking 1 = switch-off locking by zero key 2 = switch-off locking by external input 3 = switch-off locking by both 4 = no locking 5 = switch-on locking by zero key 6 = switch-on locking by digital input 7 = switch-on locking by both	0	6	2

PN	Function	Range of values	De-fault	User level	Servicing level
Linearization					
100	Number of additional setpoints	0…30	0	2	2
101 … 130	Setpoints 1…30	-9999…99999		2	2
180	Totaliser function	0 = off 1 = totaliser without permanent saving (Reset by boot-up) 2 = totaliser with permant saving	0	3	2
181	Time base of display value for totalizator function	0 = second 1 = minute 2 = hour	0	3	2
182	Factor for totalizer value in powers of 10	0 = 1…6 = 1.000.000	0	3	2
183	Decimal point for totaliser value	00000…0,0000	0	3	2
184	Counter value in digit (for Reset through 0, too), inital value aswell	0…99999	0	3	2
185	Activator for counter reset on 0 (Zero key or digital input: push for at least 50 ms)	0 = no reset source 1 = by zero key 2 = by external input 3 = by zero key and digital input 4 = UP and DOWN while showing totaliser value	0	3	2
186	Change display on totaliser value	0 = no change 1 = by zero key 2 = by digital input	0	3	2
Information					
200	Serial number	0…99999	0	8	2

9. Error elimination

The following list gives the recommended procedure for dealing with faults and locating their possible cause.

	Error description	Measures
1.	The unit permanently indicates overflow.	• The input has a very high measurement, check the measuring circuit. • With a selected input with a low voltage signal, it is only connected on one side or the input is open. • Not all of the activated setpoints are parameterised. Check if the relevant parameter PN1, PN2, PN100…PN130 are adjusted correctly.
2.	The unit permanently shows underflow.	• The input has a very low measurement, check the measuring circuit . • With a selected input with a low voltage signal, it is only connected on one side or the input is open. • Not all of the activated setpoints are parameterised. Check if the relevant parameter PN1, PN2, PN100…PN130 are adjusted correctly.
3.	The word HELP lights up in the 7-segment display.	• The unit has found an error in the configuration memory. Perform a reset on the default values and reconfigure the unit according to your application.
4.	Program numbers for parameterising of the input are not accessible.	• The programming lock is set at a user level that does not allow access. • Under PN1, a different sensor type was parameterised so that the desired program number cannot be parameterised.
5.	ERR1 lights up in the 7-segment display.	• Please contact the manufacturer if errors of this kind occur.
6.	The addressed digital input does not react.	• Measure the current of the digital input with a multimeter. It should be between 1 mA and 3 mA.
7.	Program numbers for the analog output PN20…PN23 are not accessible.	• The analog output is an option of this device type. If it is not assembled, then the program numbers are not shown.
8.	The device does not react as expected.	• If you are not sure if the device has been parameterised before, then follow the steps as written in the next chapter and set it back to its delivery status.

10. Reset to default values

To return the unit to a defined basic state, a reset can be carried out to the default values.

The following procedure should be used:

• Switch off the power supply
• Press button **[P]**
• Switch on the power supply and press **[P]** for approx. further 2 seconds.

With reset, the default values of the program table are loaded and used for subsequent operation. This puts the unit back to the state in which it was supplied.

Caution!

•This is only possible when the programming lock PN50 allows access to all PNs or *HELP* is shown in the display.
•All application-related data are lost.

ICS Schneider Messtechnik GmbH
Briesestraße 59
D-16562 Hohen Neuendorf / OT Bergfelde
Tel.: 03303 / 504066
Fax: 03303 / 504068
info@ics-schneider.de
www.ics-schneider.de