Digital indicator model DI35-M

GB

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Digital indicator model DI35

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Prior to starting any work, read the operating instructions!

Keep for later use!

Contents

Declarations of conformity can be found online at www.wika.com.

1   General information

- The instrument described in the operating instructions has been designed and manufactured using state-of-the-art technology.
  All components are subject to stringent quality and environmental criteria during production. Our management systems are certified to ISO 9001.

- These operating instructions contain important information on handling the instrument. Working safely requires that all safety instructions and work instructions are observed.

- Observe the relevant local accident prevention regulations and general safety regulations for the instrument's range of use.

- The operating instructions are part of the instrument and must be kept in the immediate vicinity of the instrument and readily accessible to skilled personnel at any time.

- Skilled personnel must have carefully read and understood the operating instructions, prior to beginning any work.

- The manufacturer's liability is void in the case of any damage caused by using the product contrary to its intended use, non-compliance with these operating instructions, assignment of insufficiently qualified skilled personnel or unauthorised modifications to the instrument.

- The general terms and conditions, contained in the sales documentation, shall apply.

- Subject to technical modifications.

- Further information:

  - Internet address: www.wika.de / www.wika.com
  - Relevant data sheet: AC 80.03
  - Application consultant: Tel.: (+49) 9372/132-0
                              Fax: (+49) 9372/132-406
                              E-Mail: info@wika.de

Explanation of symbols

WARNING!
... indicates a potentially dangerous situation that can result in serious injury or death, if not avoided.

Information
... points out useful tips, recommendations and information for efficient and trouble-free operation.

DANGER!
...identifies hazards caused by electric power. Should the safety instructions not be observed, there is a risk of serious or fatal injury.

2 Safety

WARNING!
Before installation, commissioning and operation, ensure that the appropriate instrument has been selected in terms of measuring range, design and specific measuring conditions. Non-observance can result in serious injury and/or damage to equipment.

Further important safety instructions can be found in the individual chapters of these operating instructions.

2.1 Intended use

The digital indicator DI35-M is used for measurement and indication of sensor signals, thermocouples and RTDs. Signals can be put out via an analogue output for further processing.

The instrument has been designed and built solely for the intended use described here, and may only be used accordingly.

Please read the following safety advice and the assembly before installation and keep it for future reference.

If the instrument is transported from a cold into a warm environment, the formation of condensation may result in the instrument malfunctioning. Before putting it back into operation, wait for the instrument temperature and the room temperature to equalise.

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.
- 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).
- Do not install several devices immediately above one another or in an extremely thermal isolated housing. Due to the internal heat dissipation of the devices, the recommended ambient temperature can be excessed.
- 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.
- 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 insulated 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.
- The fuse rating of the supply voltage should not exceed a value of 6A N.B. fuse.

The manufacturer shall not be liable for claims of any type based on operation contrary to the intended use.

2.2 Personnel qualification

WARNING!
Risk of injury should qualification be insufficient!
Improper handling can result in considerable injury and damage to equipment.

- The activities described in these operating instructions may only be carried out by skilled personnel who have the qualifications described below.
- Keep unqualified personnel away from hazardous areas.

Skilled electrical personnel
Skilled electrical personnel are understood to be personnel who, based on their technical training, knowledge of measurement and control technology and on their experience and knowledge of country-specific regulations, current standards and directives, are capable of carrying out work on electrical systems and independently recognising and avoiding potential hazards.
The skilled electrical personnel have been specifically trained for the work environment they are working in and know the relevant standards and regulations.
The skilled electrical personnel must comply with current legal accident prevention regulations.

2.3 Special hazards

DANGER!
Danger of death caused by electric current.
Upon contact with live parts, there is a direct danger of death.

- Electrical instruments may only be installed and mounted by skilled electrical personnel.
- Operation using a defective power supply unit (e.g. short circuit from the mains voltage to the output voltage) can result in life-threatening voltages at the instrument!

WARNING!
Do NOT use this product as safety or emergency stopping device, or in any other application where failure of the product could result in personal injury or material damage. Failure to comply with these instructions could result in death or serious injury and material damage.

2.4 Labelling / Safety marks

Product label
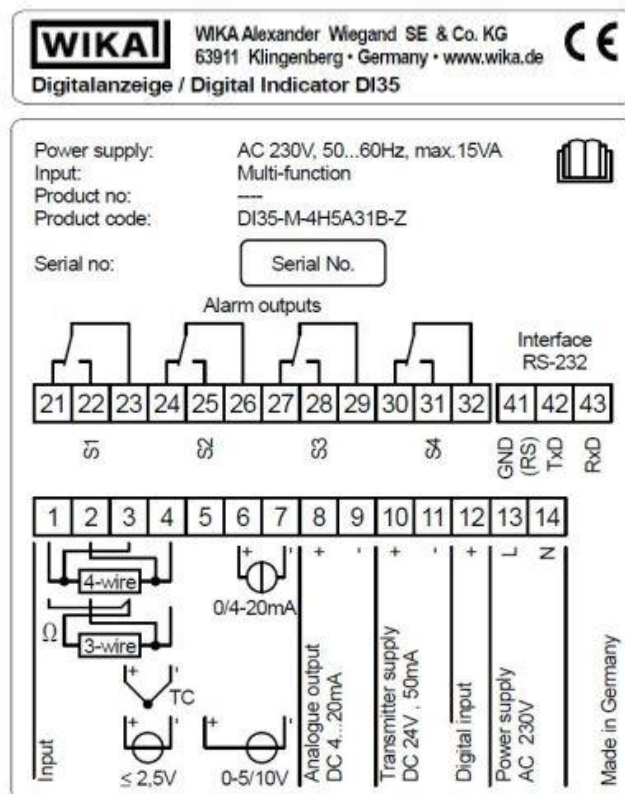
Explanation of symbols

Before mounting and commissioning the instrument, ensure you read the operating instructions!

CE, Communauté Européenne
Instruments bearing this mark comply with the relevant European directives.

3   Specifications

Specifications

Display	
Principle	7-segment LED, red, 5-digit, brightness adjustable in 10 steps
Character size	14 mm
Indication range	-9999 … +99999
Indication time	0.1…10.0 seconds
Memory	EEPROM (independent of power supply), data retension > 100 years
Input	
Number and type	1 multi-function input
Input configuration	Selectable via terminal configuration and programming
Accuracy	*see following table*
Temperature error	50 ppm/K, at ambient temperature T < 20 °C or > 40 °C
Measuring principle	Sigma/Delta
Resolution	24 bit, (at measuring time 1 second)
Measuring time	0.02…10.0 sec
Totalizator time-error	max. 0.1% of totalizator value at integration time > 1 min
Transmitter supply	DC 24 V, 50 mA
Power supply	AC 100...240V, 50/60 Hz, ± 10 % or {DC 10...40V, AC 18...30V, 50/60 Hz} Power supply galvanic insulated
Power consumption	max. 15 VA
Electrical connection	plug-in terminal, wire cross-section up to 2.5 mm²
{Analogue output}	
Number and type	1 analogue output (galvanic insulated): 4 ... 20 mA (12-bit), load ≤ 500 Ω, 0 ... 20 mA (12-bit), load ≤ 500 Ω, 0 ... 10 V (12-bit), load ≥ 10 kΩ switchable (via programming or DIP-Switch on back)
Error	0.1% in the range 20 °C ≤ Tu ≤ 40 °C, beyond this value temperature error 50 ppm/K
Internal resistance	100 Ω (at measuring input 0…10 V)

3   Specifications

{Switching outputs}

number and type	2 or 4 change-over contacts (relays), fully programmable
Load	AC 230 V, 5 A (ohmic load) or DC 30 V, 2 A (ohmic load)
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
{Serial Interface}	RS 232, selectable with or without galvanic isolation or RS 485 (only for point-to-point connection), selectable with or without galvanic isolation
Protocol	manufacturer-specific ASCII
communication	9600 Baud, no parity, 8 data bits, 1 stop bit
Lead length	RS 232: max. 3 m RS 485: max. 1000 m

Case

Material	Glass fibre reinforced polycarbonate, black
Ingress protection	Front: IP 65; Back: IP 00 (per IEC 60529 / EN 60529)
Dimensions	96 x 48 x 139 mm (w x h x d) including plug-in terminals
Weight	Approx. 450 g
Mounting	snap-in screw element for wall thickness up to 50 mm

{Desktop case}*

Material	Front, back and side panel aluminium powder-coated black, top and baseplate synthetic resin bonded paper (Pertinax)
Ingress protection	IP40
Dimensions	170 x 82 x 250 mm (w x h x d)
Weight	Ca. 1600 g

* only available for DI35-D

Permissible ambient conditions

Operating temperature	0…60 °C
Storage temperature	-20…80 °C
Humidity	0…75 % relative humidity, non-condensing

3 Specifications

CE conformity	
EMC directive	2004/108/EC, EN 61326 emission (group 1, class B) and interference immunity (industrial application)
Low voltage directive	2006/95/EG, EN 61010-1

{ } Items in curved brackets are optional extras for additional price.

Accuracy of input signals

Input signals	Measuring span	Measuring error in % of the span	Inner resistance
Current signals			
	0…20 mA	± 0.02 % ± 1 Digit	50 Ω
	4…20 mA	± 0.02 % ± 1 Digit	50 Ω
	0…5 mA	± 0.02 % ± 1 Digit	50 Ω
	0…2 mA	± 0.02 % ± 1 Digit	50 Ω
Voltage signals			
	-1…10 V	± 0.01 % ± 1 Digit	150 kΩ
	-1…5 V	± 0.02 % ± 1 Digit	150 kΩ
	-500…2500 mV	± 0.03 % ± 1 Digit	1 MΩ
	-500…1250 mV	± 0.03 % ± 1 Digit	1 MΩ
	-500…600 mV	± 0.03 % ± 1 Digit	1 MΩ
	-300…300 mV	± 0.03 % ± 1 Digit	1 MΩ
	-150…150 mV	± 0.03 % ± 1 Digit	1 MΩ
	-75…75 mV	± 0.04 % ± 1 Digit	1 MΩ
	-35…35 mV	± 0.06 % ± 1 Digit	1 MΩ
	-18…18 mV	± 0.03 % ± 1 Digit	1 MΩ
PT100 (2-/3-/4-wire)			
	-200,0…850,0 °C	± 0.04 % ± 1 Digit	1 MΩ
Thermocouple			
Typ L	-200…900 °C	± 0.06 % ± 1 K	1 MΩ
Typ J	-210…1200 °C	± 0.05 % ± 1 K	1 MΩ
Typ K	-250…1271 °C	± 0.05 % ± 1 K	1 MΩ
Typ B	-100…1810 °C	± 0.10 % ± 1 K	1 MΩ
Typ S	0…1767 °C	± 0.06 % ± 1 K	1 MΩ
Typ N	-250…1300 °C	± 0.06 % ± 1 K	1 MΩ
Typ E	-260…1000 °C	± 0.06 % ± 1 K	1 MΩ
Typ R	0…1767 °C	± 0.07 % ± 1 K	1 MΩ
Typ T	-240…400 °C	± 0.07 % ± 1 K	1 MΩ
Resistance (2-/3-/4-wire)			
	100 Ω	± 0.04 % ± 1 Digit	1 MΩ
	1 kΩ	± 0.04 % ± 1 Digit	1 MΩ
	10 kΩ	± 0.04 % ± 1 Digit	1 MΩ

3   Specifications

The measuring errors are valid for ambient temperatures of 20…40 °C and a measuring time of 1 second.

The datas for PT100 3-/4-wire are valid for a max. resistance of wire of 10 Ω.

Adjustable measuring times

Input signal	Measuring time in seconds
Current signals	0.02…10.00
Voltage signals	0.02…10.00
PT100 (2-/4-wire)	0.04…10.00
PT100 (3-wire)	0.06…10.00
Thermocouple	0.04…10.00
Resistance (2-/4-wire)	0.04…10.00
Resistance (3-wire)	0.06…10.00

For further specifications see WIKA data sheet AC 80.03 and the order documentation.

Operating elements
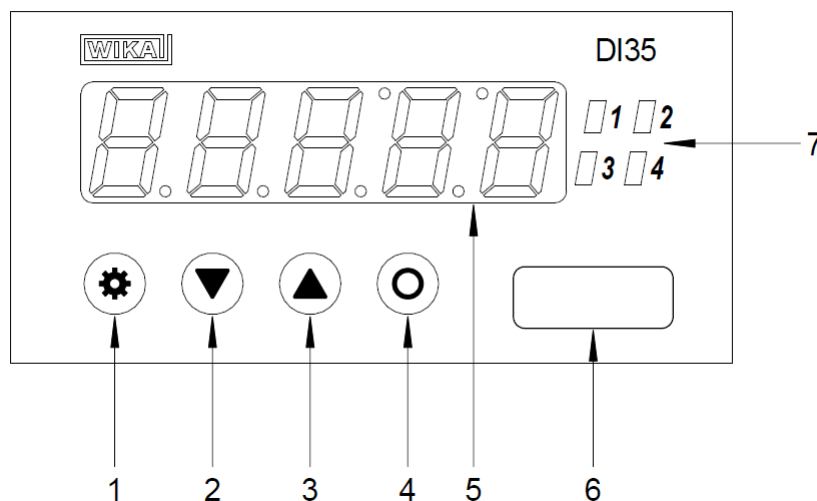
1: Program key
2: DOWN key
3: UP key
4: Multi-function key
5: 7 segment display
6: Slot for sign marking the dimension
7: LEDs for alarm output

4   Design and function

4.1 Short description

The digital indicator DI35-M is a multi-function and highly accurate digital indicator. It has a multi-function input with 29 different calibrated input configurations, which can be selected via the terminal configuration and by the selection of the input signal in the instrument configuration. Furthermore the possibility of sensor calibration and linearisation with up to 30 points is offered.
The standard features are completed by an integrated transmitter power supply, the adjustable sampling rate and display time as well as the input offset for the correction of zero offsets or sensor drifts and TARA and HOLD function. The measured value or one of the functions can be indicated and used as output signal.

As an option up to 4 fully programmable alarm outputs, an analogue output signal and a serial interface are available.

4.2 Scope of delivery

The scope of delivery is:

- Indicator
- 2 fixing elements
- Seal
- Operating instructions

Cross-check scope of delivery with delivery note.

5   Transport, packaging and storage

5.1 Transport

Check instrument for any damage that may have been caused by transport. Obvious damage must be reported immediately.

5.2 Packaging

Do not remove packaging until just before mounting. Keep the packaging as it will provide optimum protection during transport (e.g. change in installation site, sending for repair).

5.3 Storage

Permissible conditions at the place of storage:

- Storage temperature: -20 ... +80 °C
- Humidity: 0 ... 75 % relative humidity (no condensation)

Avoid exposure to the following factors:

- Direct sunlight or proximity to hot objects
- Mechanical vibration, mechanical shock (putting it down hard)
- Soot, vapour, dust and corrosive gases
- Potentially explosive environments, flammable atmospheres

Store the instrument in its original packaging in a location that fulfils the conditions listed above. If the original packaging is not available, pack and store the instrument as described below:

1. Wrap the instrument in an antistatic plastic film.
2. Place the instrument, along with shock-absorbent material, in the packaging.
3. If stored for a prolonged period of time (more than 30 days), place a bag, containing a desiccant, inside the packaging.

WARNING!
Before storing the instrument (following operation), remove any residual media. This is of particular importance if the medium is hazardous to health, e.g. caustic, toxic, carcinogenic, radioactive, etc.

6   Commissoning, operation

Please read the safety instructions and installation instructions in chapter 2 before installation and keep this user manual for future reference.

6.1 Mounting

Panel cut out: $92,0^{+0,8}$ mm x $45,0^{+0,6}$ mm
Assembly grid: 120 mm horizontal, 96 mm vertical (recommended)
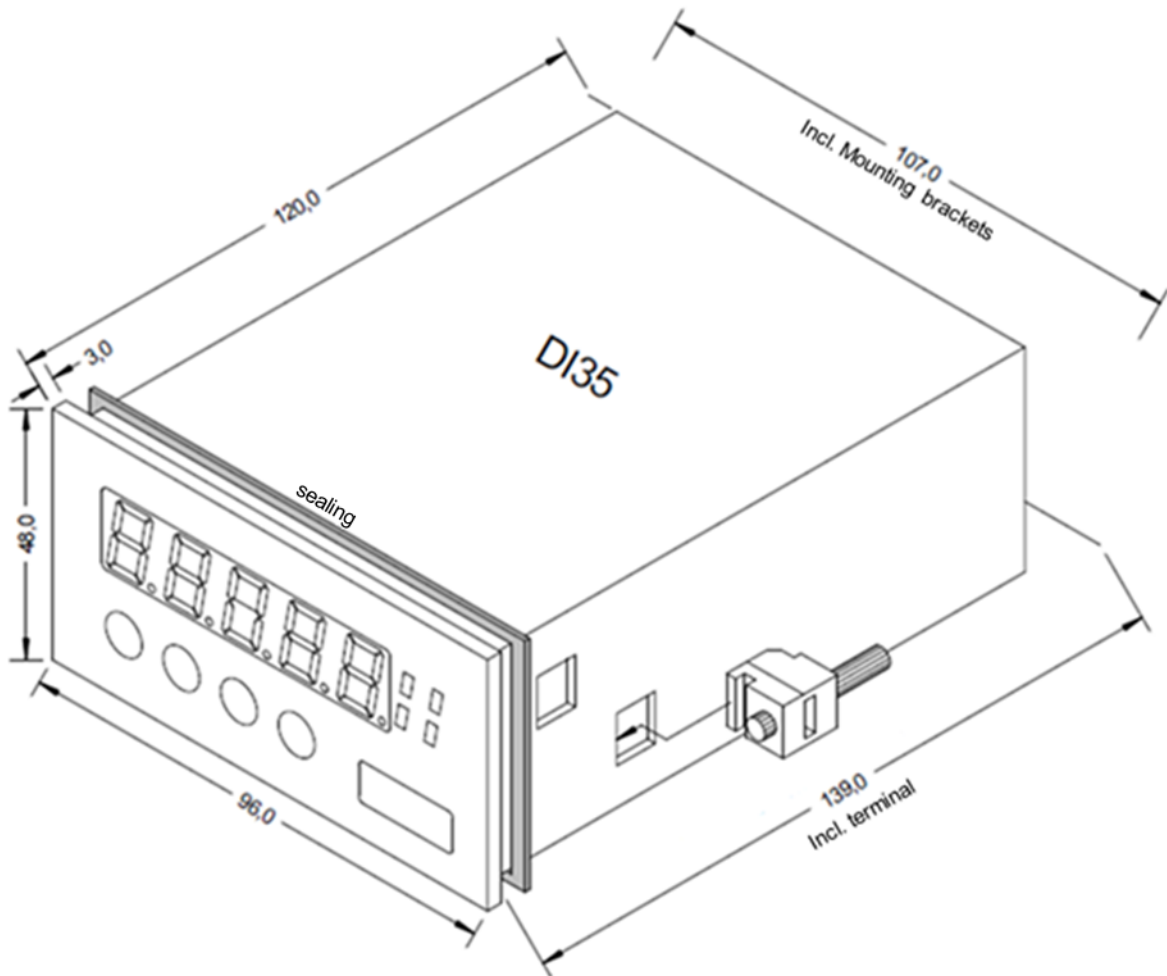
1. After removing the fixing elements, insert the device.
2. Check the seal to make sure it fits securely.
3. Click the fixing elements back into place and tighten the clamping screws by hand.

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

6.2 Electrical connection

All the necessary signals for operation are connected to the rear terminals. The connecting terminals are designed as removable screw-type terminals with a grid pitch of 5.08 mm. This makes it possible to connect wires of up to 2.5 mm².

6.2.1 Terminal configuration

Lower terminal connector
The power supply, the input signal, the transmitter supply and the analogue output signal have to be connected to the lower terminal connector.
The mounting screws for the transmitter supply and the analogue output signal are only available if these options have been chosen.
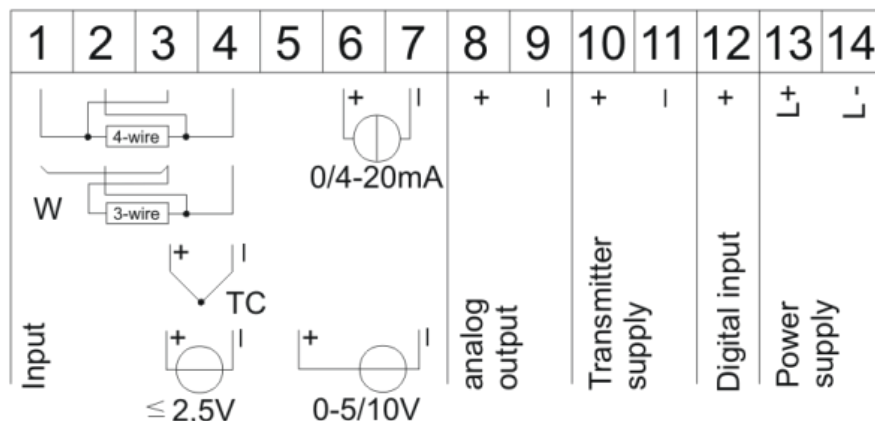
At devices with analogue output signal there is a switch located above the lower terminal connection. Via this switch it needs to be set, if the output signal is a milliampere (mA) signal (left switch position, default value) or a volt (V) signal (right switch position).

The requested output signal needs to be chosen via programming (see chapter 6.7 Description of the program numbers, „PN20, PN21, PN22 and PN23: Analogue output ", p. 38)

Upper terminal connector
The switching contacts (relays) and the serial interface have to be connected to the upper terminal connector.
The mounting screws for the switching contacts and the interface are only available if these options have been choosen.
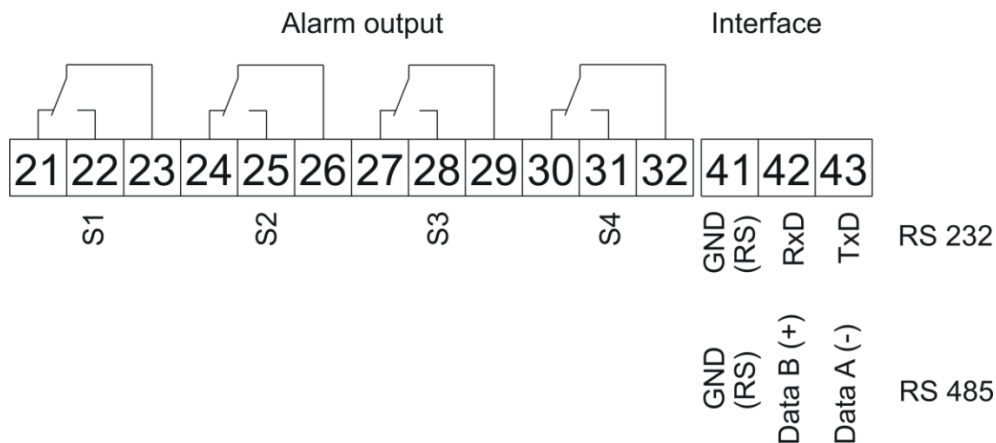
	Relay 1 (S1)	Relay 2 (S2)	Relay 3 (S3)	Relay 4 (S4)
Normally closed	21	24	27	30
Normally open	22	25	28	31
Com	23	26	29	32

Serial interface
RS 232:
The lines for the RS 232 interface must be connected 1:1, TxD to TxD and RxD to RxD.
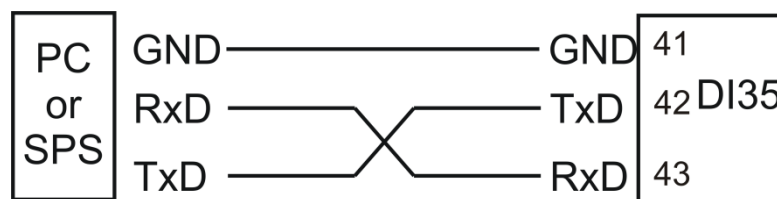
RS 485:
The RS 485 interface is connected via a shielded data line with a twisted pair. At each end of the bus, a termination of the bus lines must be connected. This is necessary to guarantee reliable data transmission on the bus. For this, a resistance of 120 Ohm is inserted between the lines Data B(+) and Data A(–).
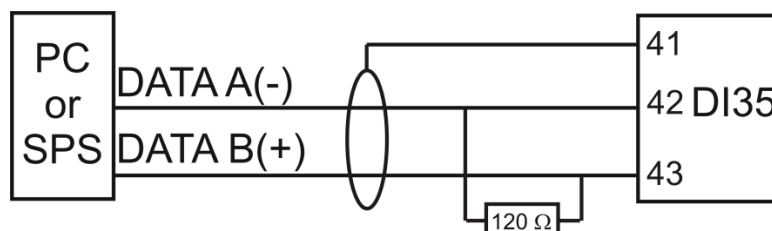
CAUTION!
The potential reference can lead to a compensating current (interface ⇔ measuring input) with a non-galvanic insulated interface and can thus affect the measuring signals

6.2.2 Connection examples

This section gives a few examples of practical connections. The different examples can be combined.

a) 4…20 mA signal, 2-wire transmitter

Input							Analogue output		Transmitter supply		Digital Input	Power supply	
In 1	In 2	In 3	In 4	In 5	In 6	In 7	+	-	+	-	Din	L	N
1	2	3	4	5	6	7	8	9	10	11	12	13	14

B1 ? / I   +   -   AC 230V
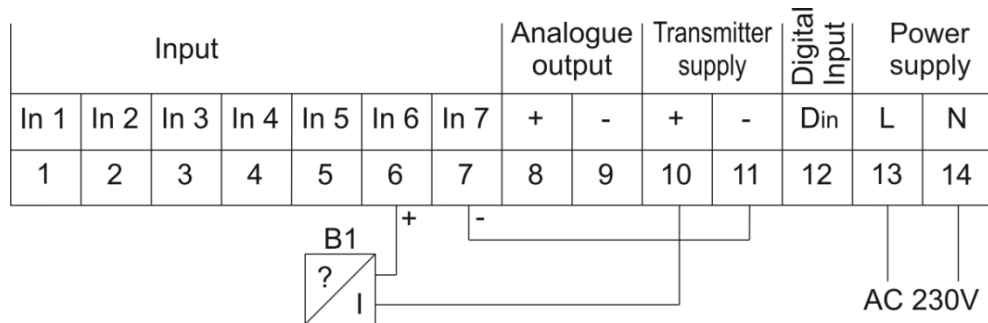
b) 0…5 V/0…10 V signal, 3-wire transmitter
The voltage drop on the transmitter supply wire is irrelevant, which is why this can also be bridged directly on the indicator.

Input							Analogue output		Transmitter supply		Digital Input	Power supply	
In 1	In 2	In 3	In 4	In 5	In 6	In 7	+	-	+	-	Din	L	N
1	2	3	4	5	6	7	8	9	10	11	12	13	14

B1 ? / U   +   -   +   -   DC 24 V
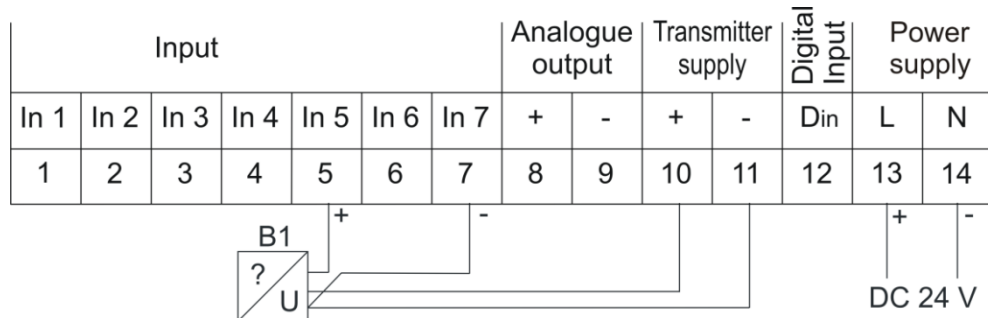
c) Voltage signal ≤ 2,5 V, 3 wire transmitter

Input							Analogue output		Transmitter supply		Digital Input	Power supply	
In 1	In 2	In 3	In 4	In 5	In 6	In 7	+	-	+	-	Din	L	N
1	2	3	4	5	6	7	8	9	10	11	12	13	14

B1 ? / U   +   -   AC 230 V
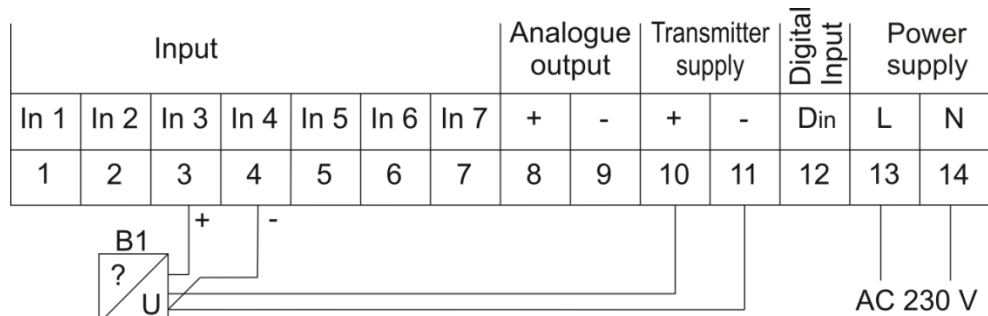
d) Resistance thermometer (eg. Pt100) or resistance, 2 wire

Input							Analogue output		Transmitter supply		Digital Input	Power supply	
In 1	In 2	In 3	In 4	In 5	In 6	In 7	+	-	+	-	Din	L	N
1	2	3	4	5	6	7	8	9	10	11	12	13	14

AC 230 V
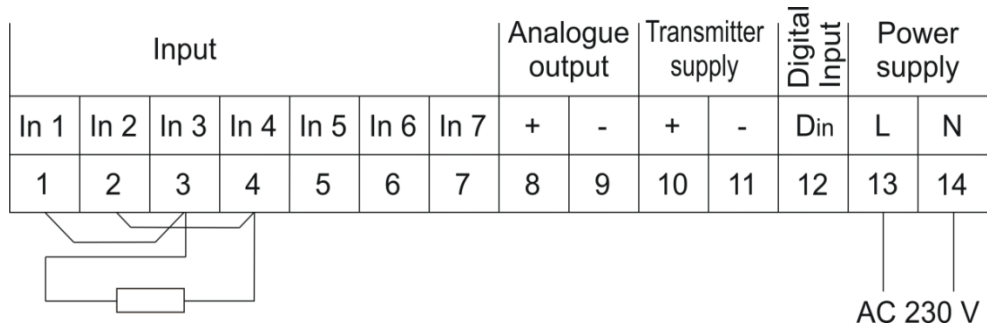
e) Resistance thermometer (eg. Pt100) or resistance, 3 wire

Input							Analogue output		Transmitter supply		Digital Input	Power supply	
In 1	In 2	In 3	In 4	In 5	In 6	In 7	+	-	+	-	Din	L	N
1	2	3	4	5	6	7	8	9	10	11	12	13	14

DC 24 V
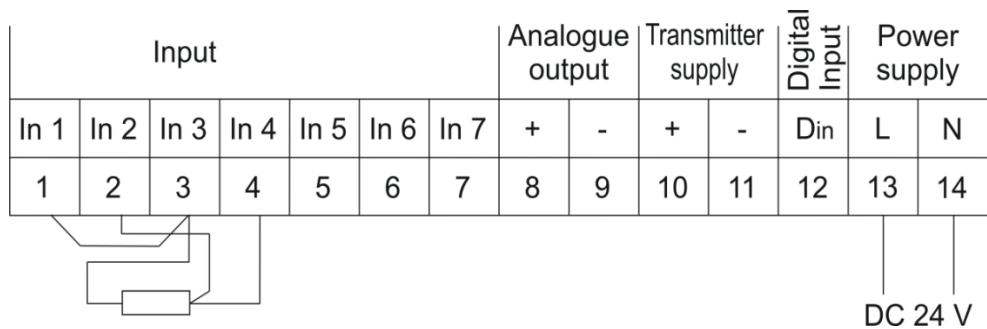
f) Resistance thermometer (eg. Pt100) or resistance, 4 wire

Input							Analogue output		Transmitter supply		Digital Input	Power supply	
In 1	In 2	In 3	In 4	In 5	In 6	In 7	+	-	+	-	Din	L	N
1	2	3	4	5	6	7	8	9	10	11	12	13	14

AC 230 V
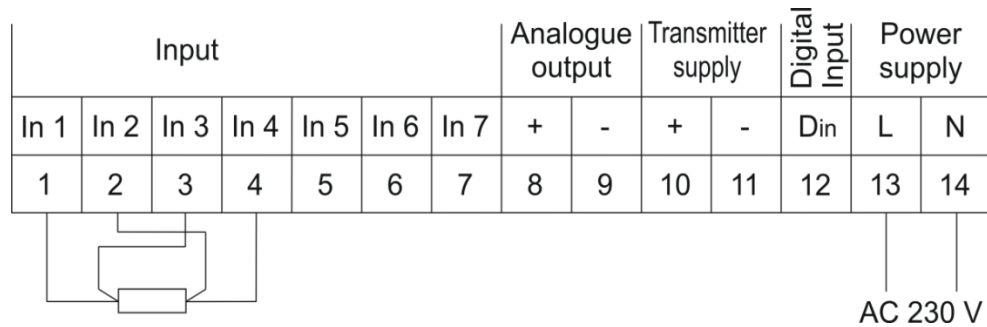
g) Thermocouple & digital input

Input							Analogue output		Transmitter supply		Digital Input	Power supply	
In 1	In 2	In 3	In 4	In 5	In 6	In 7	+	-	+	-	Din	L	N
1	2	3	4	5	6	7	8	9	10	11	12	13	14

+ -   + -   S1   AC 230 V
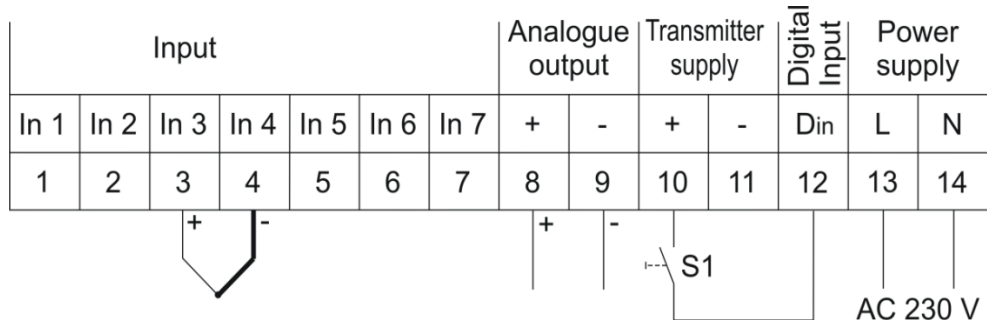
6.3 Function and operation description

6.3.1 Operation

The DI35-M has 4 keys ([☼], [▲], [▼], [O]), with which you can parameterise and call up various functions during operation.
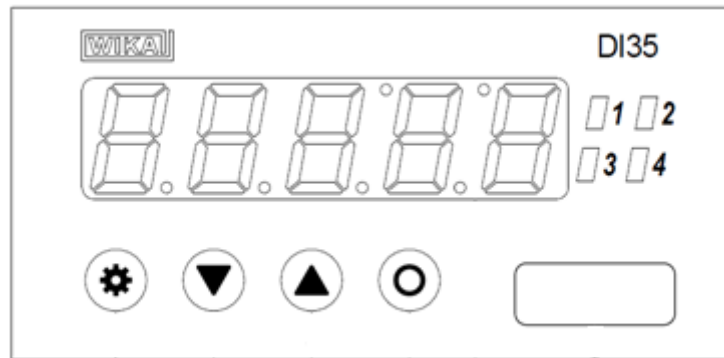
Name	Description
Program key [☼]	With the program key, you can call up the programming mode or perform various functions in the programming mode.
DOWN key [▼]	With the DOWN (decrease) key, you can call up the MIN memory or alter parameters in the programming mode.
UP key [▲]	With the UP (increase) key, you can call up the MAX memory or alter parameters in the programming mode.
Multi-function [O]	Multi-function for activating TARA function and HOLD function; reset for MIN/MAX permanent

6.3.2 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.

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.

6.3.3 General functions

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.

[▲]   displaying of MAX value
[▼]   displaying of MIN value

You can erase the value shown in the display by simultaneously operating the **[▲]** and **[▼]** keys. The erasure is acknowledged by horizontal bars.

Information
The content of the memory will be lost with switching-off of the device.

6.3.4 Description of the alarm outputs

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.

Working principle
The alarm outputs have the following properties with regard to their switching properties:

Parameter	Description
Alarm / Relay x	De-activiated, 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.
Switch-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 multi-function key

Operating current
The alarm is off below the threshold and on when reaching the threshold.
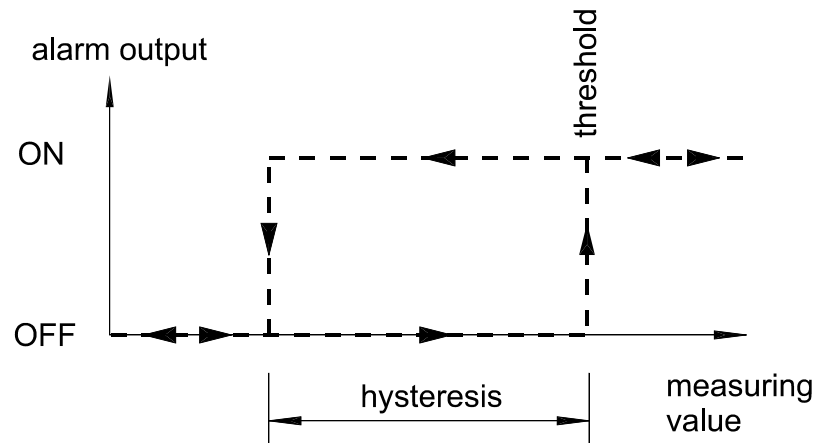
Quiescent current
The alarm is on below the threshold and switched off on reaching the threshold.
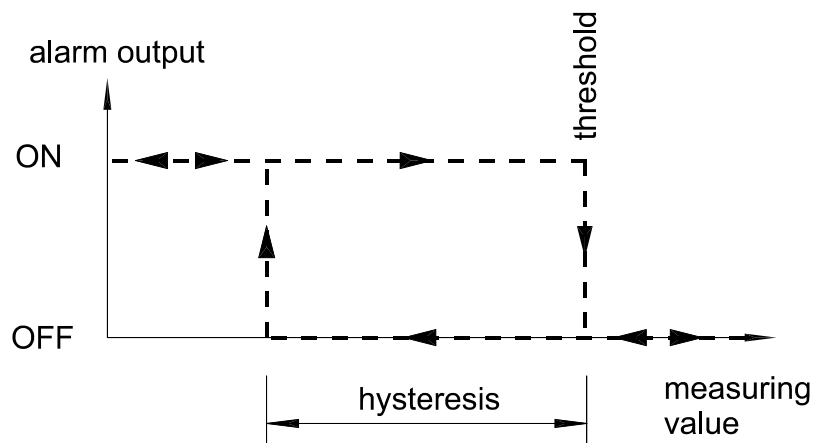
Switch-on delay
The relay is on e.g. 10 seconds after reaching the threshold. Briefly exceeding the threshold does not lead to the relay being switched on.
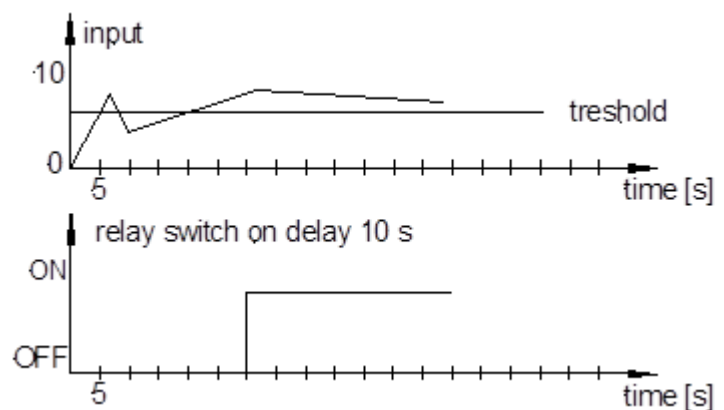
The switch-off delay functions in a similar manner, in other words it keeps the alarm output switched on until the parameterised time has elapsed.

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 minimal-/maximal value or any other value. Therefor the adjustable value range is assigned to the according program number (PN60, PN70, PN80 and PN90).

Modus	Actuate value
0	none
1	Instaneaous value
2	Minimal value
3	Maximal value
4	HOLD value
5	Sliding average value
6	Totalizator value

Alarm confirmation

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

Information
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.

6.3.5 Analog output

The optional analogue output is used for the transduction of a measuring value, supported by a standard signal of 0…10 V or 0/4…20 mA.
The analogue 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 at which the analogue output transmits the minimal value (0 V or 0/4 mA), and with "Full scale", the value at which the output transmits its maximum (10 V or 20 mA).
By this means it is possible to re-scale the input signal of a transducer or even to convert it into another standard signal. The analogue output can be de-activated via the actuate value PN22, as well as set on the active measuring value, MIN value, MAX value, HOLD value, sliding average value or totalizator value.
The analogue output is updated within the cycle of the measuring time. At a high measuring rate, smaller cycle fluctuations of some milli-seconds are possible.

6.3.6 Digital input / multi-function key

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

HOLD function
The HOLD function is a static signal and will be activated via the digital input or the multi-function key. 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.

Information
HOLD value gets lost with re-start!

TARA function

The TARA-Function can be activated by multi-function 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 before a new alignment.

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 minimal or maximal measured value. The value can be reset by the multi-function key and/or the digital input.

Information
MIN/MAX value get lost with re-start!

Totalizator functions

With the totalizator, 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 parameterized on different time bases and dimensions (e.g. for volume, liter, m³, km³, …).
- can be directed to the display and outputs as a default display value.
- can be reset by a parameterized 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.

6.3.7 Serial interface RS232 / RS485

If the DI35-M has an serial interface, the device can be programmed via this interface. The interface is available as an option, the basic version is without an interface.

Operating mode:

The interface can be operated in various modes which can be parameterized via the PN34 (interface behavior).

Parameter	Description
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) "- - - - - ↵".
If there is a broken wire detected at temperature measurement "Lbr ↵ " will be sended. A choosen dimension ("°C" / "°F") will be ignored at transmission.

Examples: "0.00 ↵" ; "-9.99 ↵" ; "999.99 ↵" ; "-123.45" ; "- - - - - ↵" ; "Lbr ↵"

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.
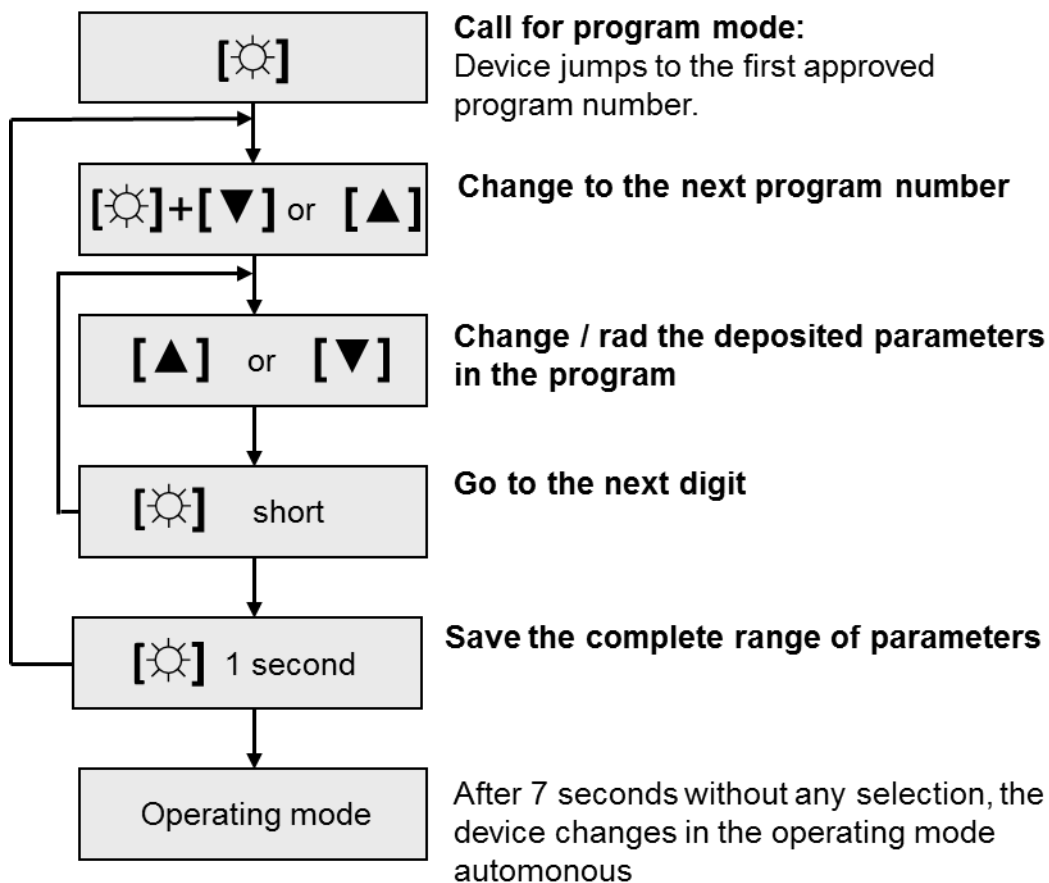
6.4 Configuration of the indicator

The indicator has two programming levels.
The preconfigured simple programming level is intended to configure the basic functions of the indicator. The listed program numbers are sufficient to put the device into operation.
For the use of the complete range of functions a professional programming mode is available.
The change between the two levels is done via program number PN53 (further explanation see p.)

Functional diagram of programming via key pad:

[☼]	**Call for program mode:** Device jumps to the first approved program number.
[☼]+[▼] or **[▲]**	**Change to the next program number**
[▲] or **[▼]**	**Change / rad the deposited parameters in the program**
[☼] short	**Go to the next digit**
[☼] 1 second	**Save the complete range of parameters**
Operating mode	After 7 seconds without any selection, the device changes in the operating mode automonous

Description of the program numbers
In the display, the program numbers (PN) are shown, right-justified, as a 3-digit number with a P in front of them:
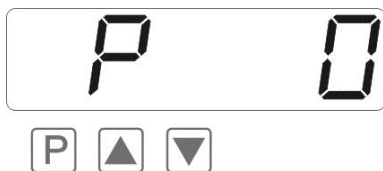
Programming procedure
The entire programming of the DI35 is done by the steps described below.

Change to programming mode

Push the **[☼]** 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.

```
 _____
|           |
|  P     0  |
|_____|
 [P] [▲] [▼]
```

Example:
Displaying of program number 0, after pushing the **[☼]** key.

Change between program numbers

To change between individual program numbers, hold the **[☼]** 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. **[☼]** & **[▲]**, 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. Es erscheint für einen kurzen Moment „SCALE" in der Anzeige. The currently stored parameters are displayed.

```
 _____
|           |
|  75.640   |
|_____|
 [P] [▲] [▼]
```

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 **[☼]** key must be briefly pushed. Once the highest digit has been set and confirmed with **[☼]**, the lowest digit will begin to flash again.

```
 _____
|           |
|  75.640   |
|_____|
 [P] [▲] [▼]
```

```
 _____
|           |
|  75.000   |
|_____|
 [P] [▲] [▼]
```

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 **[☼]** 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 **[☼]** 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 **[☼]** key to move to the next digit. The 5 and 7 do not need to be changed.

Information
If a minus shall be displayed for negative values, the leftest digit of the 7 segment display has to be activated (it blinks). The minus can be activated with the **[▼]** key.

Saving of parameters
All parameters must be acknowledged by the user by pushing the **[☼]** 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:

▬   ▬   ▬   ▬   ▬

P ▲ ▼
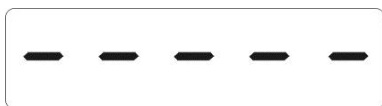
Changing from programming to operating mode
If no key is pushed in the programming mode for about 7 seconds, the unit will return automatically to operating mode. Before „SAVE" will be displayed until the next measuring value is displayed.

6.5 Description of the measuring input

Universal measuring input
The DI35-M 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 parameterized under program number 0. If a wrong sensor is parameterized there, the operating behavior 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 parameterized measuring range.
For parameterization, no sensor signal has to be applied because stored values are used. Because of the differing input signals, the corresponding input configuration must be parameterized via PN0.
For the sensor signal with 4...20 mA, for example, PN0 = 3 has to be parameterized.

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 ≥ 30
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 [☼] 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 DI35-M 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 choosing 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 parameterized. 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.

Example: 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 is 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. To correct this error, enter "15.0" at PN101.

Calibration point (PN)	Pressure (mbar)	Output transmitter (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	100.0	100.0
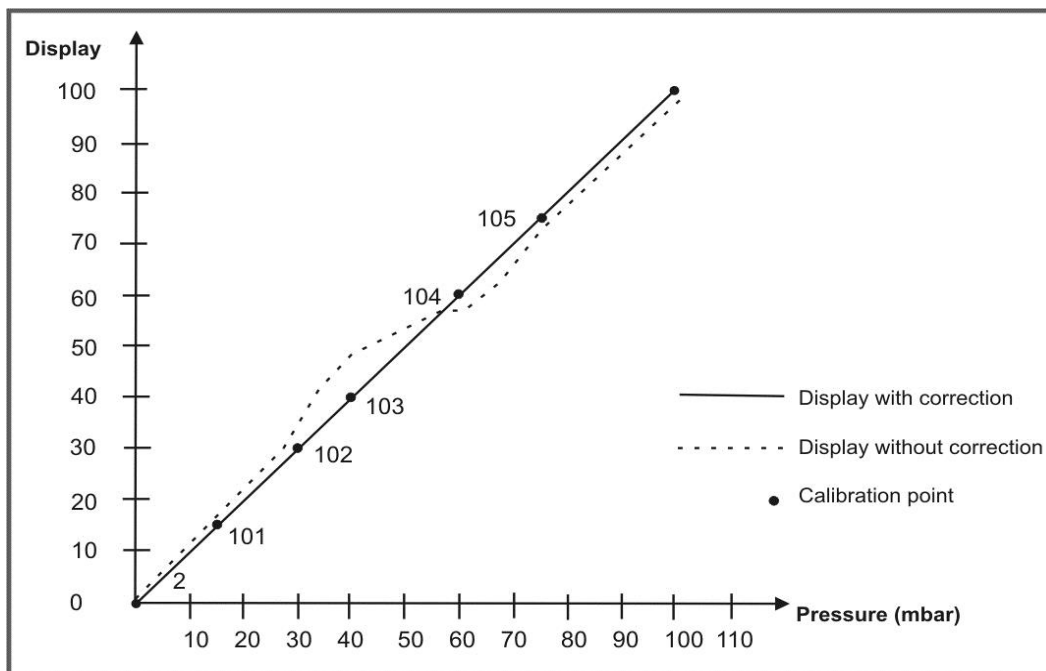
Proceeding with factory calibration PN0 ≤12

With adjusted factory calibration a linearization 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).

6.6 Description of the program numbers

The DI35-M 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 pre-configuration is unknown, a reset on the default parameter should be
done (see chapter "6.8 Default values"). 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.

PN0: Measuring input
For the basic configuration of the unit, you must parameterize the right
measuring input for your application under PN0. There is a choice of various
inputs in the program number table (chapter „6.7 Program number table").

PN1 and PN2: Scaling
The two program numbers 1 and 2 serve to scale the display; with these two parameters, the offset and full scale are parameterized . 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 determined 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 [☼]-key. Before the saved current / voltage value is visible. All inputs need to be confirmed by pushing the [☼]-key for approx. 1 second; the device confirms the correct take-over with 5 vertically bars in the display.

PN3: Decimal point
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.

PN5: Offset shift / Zero point shift
With this parameter it is possible to carry out a parallel shift of the parameterized 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 parameterize 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 programmed by the user with PN1, PN2 or PN101...130 or whether it is the characteristic line of a temperature sensor. The value parameterized under PN5 is added to the original display value.

Example: 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 configured incident (see PN8).

PN6: Thermocouple reference junction
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.

PN7: Setpoint value for taring
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.

PN8: Actuation for taring
During taring, the instantaneaus value is set on a demanded setpoint value, which is configured under PN7. The difference between setpoint value and actual value is safed as Offset PN5 in the device.
The following operating modes, which are adjustable at PN8, are available:

PN8 =	Actuation for taring
0	none
1	Digital input active, longer than 3 seconds
2	Multi-function key actuated for longer than 3 seconds
3	Digital input or multi-function 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 multi-function key
7	Taring at boot-up, digital input and multi-function key
8	Taring with activated digital input for activation period
9	Fast taring on digital input
10	Fast taring on multi-function key
11	Fast taring on digital input or multi-function 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 display shows „ooooo" 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 must 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.

PN12: Sliding average value
The complete average time is a results 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 analogue output or with the relays, too.

PN13: Display time
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.

PN14: Measuring time
The DI35-M 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 updating of other functional components (analogue 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 analogue output in the 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.

PN15: Display mode
The device supports several operational modes, which are selectable under PN15.

PN15=	Description
1	**Instantaneous value:** Operational mode „instantaneous value" is equal to the standard display, where the last measured value is displayed.
2	**Minimal value display:** In this operational mode, the smallest occurred 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/ multi-function key.
3	**Maximal value display:** In this operational mode, the largest occurred 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/ multi-function key.
5	**Sliding average value:** The complete average time is a results 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 analogue output or with the relays, too.
6	**Totalisator value:** In operation mode „Totalisator value", the totalisator- / 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.
7	**Absolute value:** In operation mode „absolute value" the display shows the value that has been measured since voltage connection, without consideration of a previous taring.
8	**Trigger mode:** 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 multi-function key.

PN16: Activator for MIN / MAX value reset
After boot-up the MIN / MAX values are automatically set back on the instantaneous value. To set back minimal- /maximal 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	Multi-function key pressed for longer than 50 ms
3	Digital input or multi-function key active, for longer than 50 ms
4	Taring function

The value reset is only shown shortly after actuation of the digital input or multi-function 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!

PN18: Zero point suppression

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 parameterized 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 analogue 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.

PN20, PN21, PN22 and PN23: Analogue output

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 analogue output can be de-activated, whereas it remains on its initial value after a re-start of the device.

The analogue output can be related to all possible values that are recorded in the device. For further information please see chapter „6.3.5 Analogue output" or chapter "6.7 program number table".

Via PN23 the requested output signal can be chosen (1 = 0…10 V, 2 = 0…20 mA, 3 = 4…20 mA). Additionally the DIP-switch on the back of the device, which is located above terminals 8 and 9 of the lower terminal connector, needs to be set to the right position, depending on the choice of the output signal. For mA-Signals (0…20 mA, 4…20 mA) the switch needs to be in the left position, for the V-Signal (0…10V) in the right position. As default value the output signal is preset with 4…20 mA and the corresponding switch position.
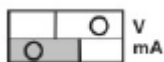
The initial and final value is always displayed without comma. The demonstration of the measuring value in the display is taken as base, so with a demonstration of e.g. 6.400 the final value can be parameterized by 6400 on this display value.

PN34: Interface behavior

The current display value can be sent by the optional interface. In standard mode PN34 = 0 the display stays 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 „6.3.7 Serial Interface RS232/ RS485".

PN50 to PN52: Security setting , user level

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

- *Userlevel contains program number x*

The user level 1,3, and 5 are reserved. With rising userlevel, the number of for the user unlocked parameters decreases, according to the above shown table.

The parameterized user level PN52 is active as long as the authorization 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, you must enter a four-digit number under PN51 as a "locking code" and confirm it by pressing the **[☼]** key for approx. 1 second.

On changing to programming mode, the unit jumps to the first authorized 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 **[☼]** key for approx. 1 second. After this you have access to all program numbers.

> **Information**
> If the authorization code becomes lost, the unit can be set to the default value 0000 at the manufacturer's without any data loss.

PN 53: Bedienebenen
Via these program number you can change between two different programming levels. This function is intended to simplify the programming process if there are no special requirements
Simple programming level (PN53=1, limited programming):
This is preconfigured in the factory settings and is intended to configure the basic functions of the indicator.
Only programming numbers are displayed, which are necessary to put the device into operation.
Professional programming level (PN53=2, all PN accessible):
These programming level includes the complete range of functions. Here functions are available which allow an extended configuration of settings. These level is necessary for special input signals or complex applications, e.g. with correlation of alarms, linearisaton of sensor signals, totalisator functions etc.
Which program numbers are accessible in the simple programming mode and which only in the professional is shown in chapter „6.3.5 Analogue output" or chapter "6.7 program number table", column "progr. level".
Please note the following:
For some program numbers only the most common options are accessible in the simple programming level (e.g. PN0 measuring input).
The setting of final value und zero point via PN1 and PN2 (accessible in simple programming level) is automatically is assigned to the corresponding program numbers characterizing the analog output signal via PN20 and PN21 (only accessible in professional programming level).

PN59 to PN97: Setpoints / Relays
You can influence the behavior 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 „6.3.4 Description of the alarm outputs".

PN100 to PN130: Linearization
Through the linearization, the user has the possibility to linearize a non-linear sensor signal. A detailed description can be found in chapter „6.5 Description of the measuring input", part „Linearization" PN100 ≥ 0.

PN180: Totalizer / summation function
For the add of measuring values, 3 operation types are available:

PN180 =	Activator for MIN/MAX value reset
0	Without summation function, the sum value is pre-allocated with „0" and does not change any more.
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.
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.

PN181, PN182 and PN183: Totaliser calculation
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 parameterization of the time base PN181 to s, min or h the device adds up the die totalisor value.

If e.g. a sensor 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 meters 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 meters.
If you want to integrate the amount for only one month, the demonstration in cubic meters can be provided with a decimal place under PN183.
If you parameterize now factor PN182=2 and the decimal place PN183=1, it would lead to a demonstration of 864.0 cubic meters at the end of the month.

PN184, PN185: Totaliser-Reset
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 parameterization of the initial value PN184 on multi-function or by the under PN185 parameterized actuators (see program number table chapter 6.7). The most reasonable way is by the digital input, as it is not easy accessible for the operating personal.

PN186: Recall of the totalisator values
The totaliser- / sum value can be permanently or displayed by an actuator (multi-function key / digital input). Often the sum value has not the first priority, so its demonstration occurs as a coproduct.

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

6.7 Program number table

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

PN	Function	Range of values	De-fault	User-level	Progr. level
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) **Sensor calibration** 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	Progr. level
		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	10000	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*	00000…0,0000	none	2	1

	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
		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)
			2	2	2

	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*	0 = 8888.8 [°C] 1 = 8888.8 [°F] 2 = 8888°C [°C] 3 = 8888°F [°F]			
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	**thermocouple reference junction** *With PN0 = 21 to 29 (can* *only be parameterised* *with thermocouples)*	0 = inactive 1 = active	1	2	2
7	**Setpoint for taring**	-9999…99999	0	2	2
8	**Activator for taring**	0 = none 1 = digital input 2 = multi-function key 3 = digital input without key 4 = boot-up 5 = combination 1 with 4 6 = combination 2 with 4	0	2	2

PN	Function	Range of values	De-fault	User-level	Progr. level
		7 = combination 3 with 4 8 = temporarily taring via digital input 9 = fast taring on digital input 10 = fast taring on multi-function key 11 = fast taring on digital input or multi-function key			
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-Leiter Resistance 3-Leiter	 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 = totalizer 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 = multi-function key 3 = digital input or multi-function key 4 = with taring function	2	2	2
18	**Zero point suppression**	0…99999	10000	4	2
19	**Display brightness**	0…9 (0 = bright / 9 = dark)	3	8	2

PN	Function	Range of values	De-fault	User-level	Progr. level
Analogue output (Option)					
20	**Final value / Fullscale**	-9999….99999	Value PN1	4	2
21	**Inital value / Offset**	-9999…99999	Vlaue PN2	4	2
22	**Analog output**	0 = de-activated 1 = instantaneous value 2 = MIN value 3 = MAX value 4 = HOLD value 5 = sliding average value 6 = totalizator value 7 = absolute value	1	4	2
23	**Analog output signal**	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	**Userlevel**	0…8	8	0	2
53	**Programming level**	1 = Simple programming level (limited programming) 2 = Professional programming level (all PN accessible)	1	2	1
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 and 4	0	6	2

PN	Function	Range of values	De-fault	User-level	Progr. 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 = totalizer 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
		   multi-function key
		2 = switch-off locking by
		   external input
		3 = switch-off locking by both
		4 = no locking
		5 = switch-on locking by
		   multi-function key
		6 = switch-on locking by
		   digital input
		7 = switch-on locking by both
			0	6	2

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 = totalizator 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	1	6	1

PN	Function	Range of values	De-fault	User-level	Progr. level
		3 = switch-on / -off delay 4 = suppression with activated digital input			
77	**Setpoint confirmation**	0 = no locking 1 = switch-off locking by multi-function key 2 = switch-off locking by external input 3 = switch-off locking by both 4 = no locking 5 = switch-on locking by multi-function key 6 = switch-on locking by digital input 7 = switch-on locking by both	0	6	2
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 = totalizator 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 multi-function key 2 = switch-off locking by external input 3 = switch-off locking by both 4 = no locking 5 = switch-on locking by multi-function 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	Progr. 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 = totalizator 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 multi-function key 2 = switch-off locking by external input 3 = switch-off locking by both 4 = no locking 5 = switch-on locking by multi-function key 6 = switch-on locking by digital input 7 = switch-on locking by both	0	6	2
Linearization					
100	**Number of additional setpoints**	0…30	0	2	2
101.. 130	**Setpoints 1…30**	-9999…99999		2	2
180	**Totalizer function**	0 = off 1 = Totalizer without permanent saving (Reset by boot-up) 2 = Totalizer with permant saving	0	3	2
181	**Time base of display value for totalizer 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

PN	Function	Range of values	De-fault	User-level	Progr. level
183	**Decimal point for totalizer 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** *(multi-function key or digital input: push for at least 50 ms)*	0 = no reset source 1 = by multi-function key 2 = by external input 3 = by multi-function key and digital input 4 = UP and DOWN while showing totalisator value	0	3	2
186	**Change display on totalizator value**	0 = no change 1 = by multi-function key 2 = by digital input	0	3	2
Information					
200	**Serial number**	0…99999	0	8	2

6.8 Default values

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 **[☼]**
- Switch on the power supply and press **[☼]** for further approx. 2 seconds until „- - - - -" is shown in the display.

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.

Caution!   All application-related data are lost

7   Maintenance and cleaning

7.1 Maintenance

This instrument is maintenance-free.
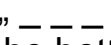Repairs must only be carried out by the manufacturer.

7.2 Cleaning
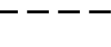
CAUTION!
- Before cleaning, correctly disconnect the instrument from the mains.
- Clean the instrument with a moist cloth.
- Electrical connections must not come into contact with moisture.

For information on returning the instrument see chapter "9.2 Return".

8 Faults

Error description	Measures/Solutions
The unit permanently indicates overflow „ ¯ ¯ ¯ ¯ ¯ ". (5 bars at the top of the 7 segment display)	▪ 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.
The unit permanently shows underflow „ _ _ _ _ _ ". (5 bars at the bottom of the 7 segment display)	▪ 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.
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.
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.
"**Err1**" lights up in the 7-segment display	▪ Please contact the manufaturer if errors of this kind occur.
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.
Program numbers for the analog output PN20…PN22 are not	▪ The analog output is an option of this device type. If it is not

accessible.	assembled, then the program numbers are not shown.
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.

CAUTION!
If faults cannot be eliminated by means of the measures listed above, the instrument must be shut down immediately, and it must be ensured that pressure and/or signal are no longer present, and it must be prevented from being inadvertently put back into service.
In this case, contact the manufacturer.

If a return is needed, please follow the instructions given in chapter "9.2 Return".

9   Dismounting, return and disposal

> ⚠️ **WARNING!**
> Residual media in dismounted instruments can result in a risk to persons, the environment and equipment. Take sufficient precautionary measures.

9.1 Dismounting

To dismount the instrument, do the following steps:

1. Open the clamping screws and remove the fixing elements.
2. Remove the instrument and seal from panel cutout.

9.2 Return

> ⚠️ **WARNING!**
> **Strictly observe when shipping the instrument:**
> All instruments delivered to WIKA must be free from any kind of hazardous substances (acids, bases, solutions, etc.).

When returning the instrument, use the original packaging or a suitable transport package.

Enclose the completed return form with the instrument.

> ℹ️ The return form is available on the internet:
> **www.wika.de / Service / Return**

9.3 Disposal

Incorrect disposal can put the environment at risk.

Dispose of instrument components and packaging materials in an environmentally compatible way and in accordance with the country-specific waste disposal regulations.

10 Appendix: Declaration of conformity

WIKA

EG-Konformitätserklärung	EC Declaration of Conformity
Dokument Nr.:	Document No.:
11534109.02	11534109.02
Wir erklären in alleiniger Verantwortung, dass die mit CE gekennzeichneten Produkte	We declare under our sole responsibility that the CE marked products
Typ:	Model:
DI35	DI35
Beschreibung:	Description:
Digital Anzeige	Digital Indicator
gemäß gültigem Datenblatt:	according to the valid data sheet:
AC 80.03	AC 80.03
die grundlegenden Schutzanforderungen der folgenden Richtlinie(n) erfüllen:	are in conformity with the essential protection requirements of the directive(s)
2006/95/EG (NSR) 2004/108/EG (EMV)	2006/95/EC (LVD) 2004/108/EC (EMC)
Die Geräte wurden entsprechend den folgenden Normen geprüft:	The devices have been tested according to the following standards:
EN 61010-1:2001 EN 61326-1:2006	EN 61010-1:2001 EN 61326-1:2006

Unterzeichnet für und im Namen von / Signed for and on behalf of

WIKA Alexander Wiegand SE & Co. KG

Klingenberg, 2012-10-05

Geschäftsbereich / Company division:	MP-CT	Qualitätsmanagement / Quality management :	MP-CT

Alfred Häfner   Harald Hartl

Unterschrift, autorisiert durch das Unternehmen / Signature authorized by the company

WIKA subsidiaries worldwide can be found online at www.wika.com.

WIKA Alexander Wiegand SE & Co. KG
Alexander-Wiegand-Straße 30
63911 Klingenberg • Germany
Tel. (+49) 9372/132-0
Fax (+49) 9372/132-406
E-Mail info@wika.de
www.wika.de