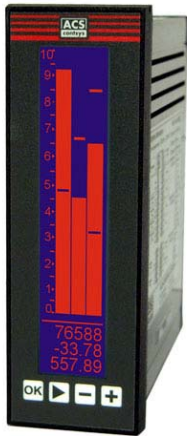Visualization

DDM / DDF / DXM / DXF
Display and evaluation device

for indication, processing, conversion and
galvanic isolation of electrical standard signals

Evaluable input signals
- 1 resp. 2x direct voltage 0...10V
- 1 resp. 2x direct current 0...20mA

Output signals
- 1x direct voltage 0…10V
- 1x direct current 0…20mA
- 4 relay outputs

Signal adjustment, linearization and signal calculation

Integrated measurand transducer supply

Galvanically safe isolation with 4kV~

ATEX II (2) G Ex ib IIC
Certification for the connection of signal transmitter in explosion hazardous areas

LCD display for digital value and bar graph indication

Programming interface with operation software GM-400

Index

1. Application

The device **DDM / DDF / DXM / DXF** is a multifunctional display and evaluation device for indication, processing, conversion and galvanic isolation of electrical standard signals also from explosive hazardous areas.

2. Function

The device is intended for the installation into a front panel, variants DDM resp. DXM, resp for field installation, variant DDF resp. DXF.

Operation principle

The connected electrical standard signal in the range 0..10V resp. 0..20mA is measured by the evaluation circuit, adjusted according to the programmed settings and transmitted galvanically isolated to the output signal 0...10V or 0...20mA.

The integrated measurand transducer supply allows the direct connection and thus the supply of 2-wire and 3-wire transmitter.

Freely programmable relay switching levels can be assigned to the input signals or the calculation result.

The conversion input to display as well as display to analogue output can be freely scaled. This allows e.g. the indication of the filling level of a container in litre.

Due to the possible input of 25 linearization points nonlinear input signals, e.g. from lying cylindrical container, can be linearized for further processing.

In some applications it is necessary to compensate heavy signal fluctuations that may be produced by mixing machines or at fill-in resp. emptying of containers, to avoid spurious switching actions.
By this a signal damping of up 99 seconds can be adjusted.

A freely programmable tendency evaluation, indicated at the display with arrows, can control two relays, one for tendency increasing and one for tendency decreasing.

The indication of the measuring value is made as analogue bar and as digital value. An additional informative state window can be displayed.

The programming of the device is done by the front-sided membrane keyboard in combination with the LCD display. The input of the configuration and parameter values can be also done by a PC interface in combination with the programming software GM-400.

The programmed settings are stored durable in an internal non-volatile memory.

3. Safety notes

Each person that is engaged with inauguration and operation of this device, must have read and understood this technical manual and especially the safety notes.

Installation, electrical connection, inauguration and operation of the device must be made by a qualified employee according to the informations in this technical manual and the relevant standards and rules.

The device may only be used within the permitted operation limits that are listed in this technical manual. Every use besides these limits as agreed can lead to serious dangers.

The device meets the legal requirements of all relevant EC directives. $\mathsf{C}\mathsf{E}$ **0158**

Safety notes for electrical operating supplies for explosive hazardous areas

If a device is installed and operated in explosive hazardous areas, the general Ex construction standards (EN60079-14, VDE0165), this safety notes and the enclosed EC conformity certificate must be observed. The installation of explosive hazardous systems must be carried out principally by specialist staff.

The device meets the classification: **II (2) G [Ex ib] IIC**

The device is a affiliated operating supply and may only be used outside explosion hazardous areas.

The installation class of the installed device must be at minimum IP20 acc. to EN 60529..

The two clamps PA at the bottom of the device at type DDM / DXM must be connected to the potential compensation of the Ex-area.

All intrinsically save clamps at type DDM / DXM (13-16 / 17-20 / 33-36 / 37-40) must be covered with the enclosed clamp housings. These clamps may only be plugged by their clamp numbers (placed already on the back of the housing). Because of wrong plugging of the clamps (intrinsically save and not intrinsically save clamps) there is the danger of removing intrinsically safety.

The intrinsically save input circuits are galvanically connected with earthing potential. Due to this there must be a potential compensation in the complete area of the installed intrinsically safe circuits.

4. Installation

The device type DDM / DXM is intended for the installation into a front panel with a mounting opening 48x144mm.

The device must be installed protected, e.g. in control stations or in a suitable protection housing with a minimum protection classification IP55 acc. to DIN EN 60529.

The device Type DDF / DXF is intended for field installation.

The devices must be installed wheather and stroke protected, ideally at places without direct solar radiation. This is especially important in warm climatic regions.

DDM / DXM   **DDF / DXF**

(...) Length with plugs
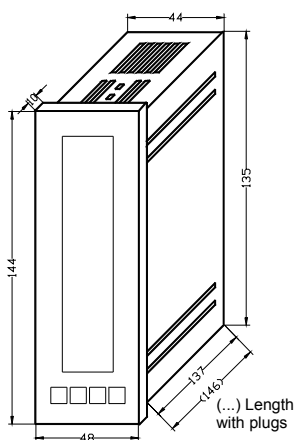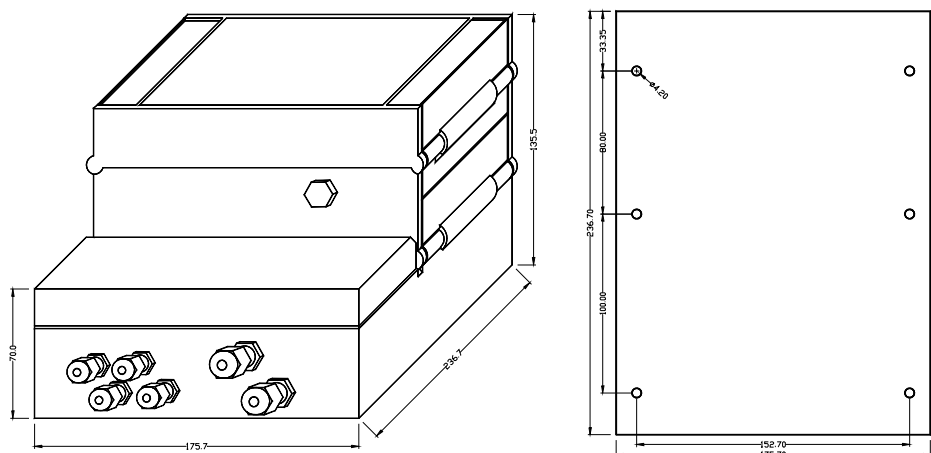
5. Electrical connection

The electrical connection of the device must be carried out according to the respective country specific standards. Incorrect installation or adjustment could cause applicationally conditioned risks.

Power supply input, measuring input, analogue output and relay output channels are safe galvanically isolated from each other. This is also valid for four relay output channels among each other.

The potential compensation must be connected by the shortest way at the devices DDM / DXM to the connections pins 3 and 11 resp. at the types DDF / DXF to the connection pins 3, 11, 31 and 32.

The protective earth at the types DDM / DXM on terminal 11 or at the types DDF/ DXF on terminal 10 should be connected separated from the protective earth connection of mains – terminal 3 – and leaded as short as possible to protection earth. Do so also with the PE terminals 31 / 32 of the over voltage protection.

Connection of the signalling transmitter resp. measuring transducer – measuring inputs

For the two or three-wire connection cable between the evaluation device and the signalling transmitter resp. measuring transducer a standard installation cable or multi-wire cable for measuring intends with a maximum of 25 Ω per wire can be used.

The use of a shielded signal cable is recommended, if strong electromagnetic influences could happens, e.g. due to machines or radio equipment. In that case the shielding of the cable should be connected to earth only at the side of signalling transmitter resp. measuring transducer.
The signal cable should be installed separated from power leading wires.

The connected signalling transmitter resp. measuring transducer can be powered by the integrated measuring transducer supply. The supply is overload and short circuit protected.

The maximum values of the inputs of the device (current input maximum 50mA - 6V / voltage input 14V) may not be transgressed.

Connection of the output

For the two-wire connection cable between the evaluation device and the connected devices a standard installation cable or multi-wire cable for measuring intends with a maximum of 25 Ω per wire can be used.

The use of a shielded signal cable is recommended, if strong electromagnetic influences could happens, e.g. due to machines or radio equipment. In that case the shielding of the cable should be connected to earth only at the side of the connected device. When connecting a SPS input stage there must be paid attention that mostly the signal circuit must be connected to earth by connection the minus terminal with measuring earth.
The signal cable should be installed separated from power leading wires.

For inauguration it is suggested, to deactivate all connected control devices, to avoid unwanted control reactions.

Connection of the signalling and control equipments – relay outputs

Inductive loads at the relay contacts, e.g. auxiliary contactors or magnetic vents may only be used with a free-wheeling diode or a RC protection circuit to avoid high voltage peaks.

For inauguration it is suggested, to deactivate all connected control devices, to avoid unwanted control reactions.

Connection of the power supply voltage

A switch, that is marked as separator as well as a over current protection switch (nominal current $\leq$ 10 A) must be installed near the device into the supply lead.

Pin assignment DDM – 400

The illustration shows the view of the device to the back side of the device.
Depending of the options contact pins, e.g. relay, pc interface or analogue output, can be not connected.
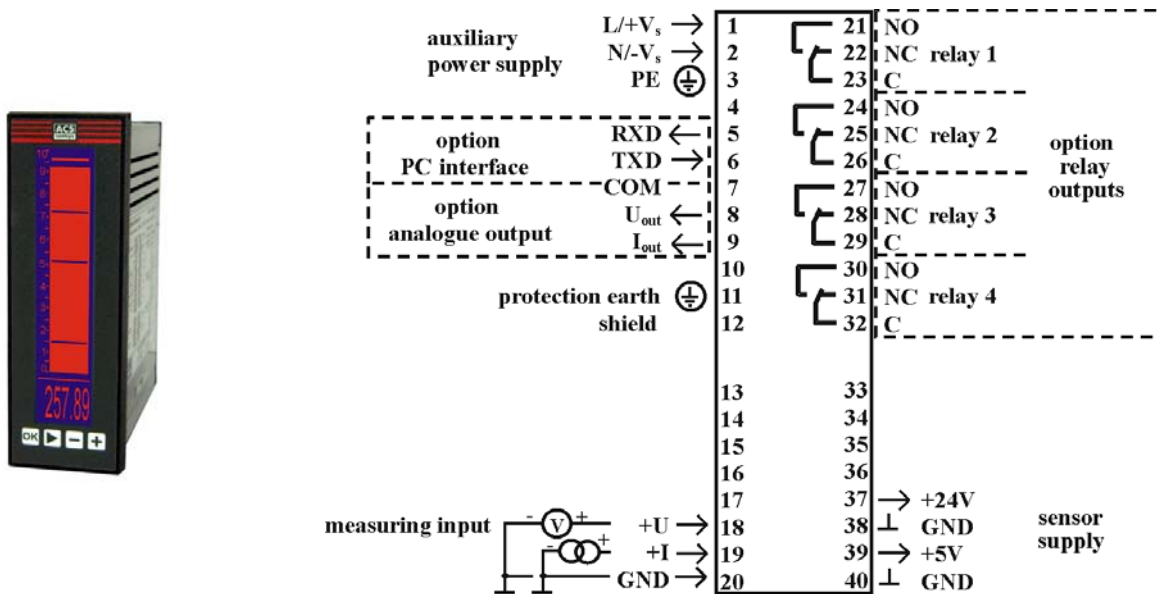
Pin assignment DDM – 420 resp. DXM – 400

The illustration shows the view of the device to the back side of the device.
Depending of the options contact pins, e.g. relay, pc interface or analogue output, can be not connected.
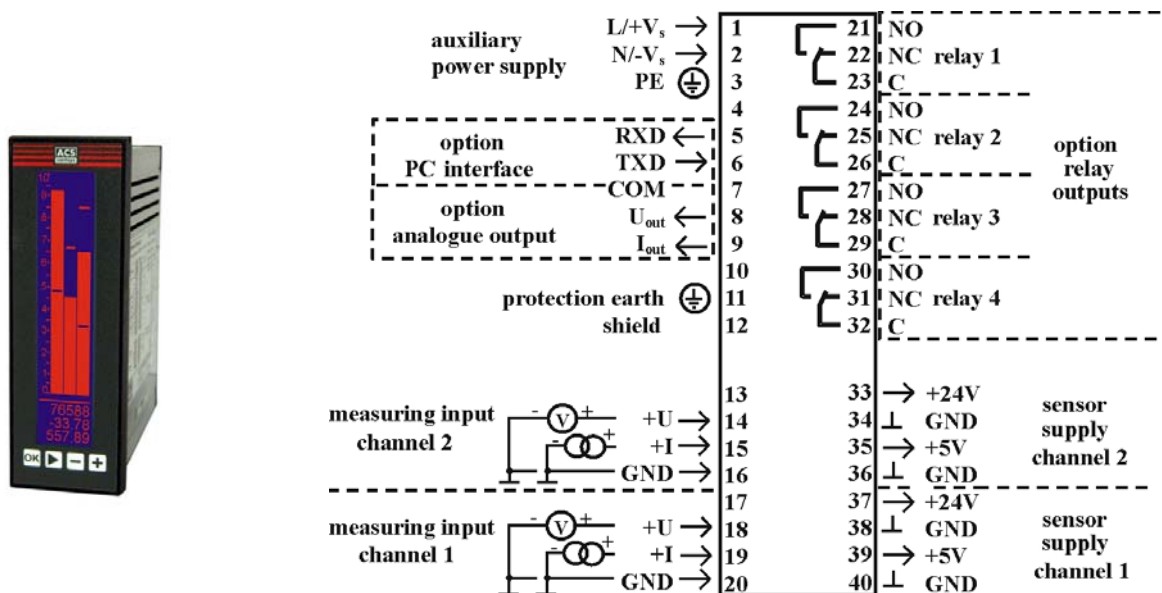
Pin assignment DDF – 400

Depending of the options contact pins, e.g. relay, pc interface or analogue output, can be not connected.

Lower terminal row (DDF – 400):

	Signal	Terminal
auxiliary power supply	L/+V$_s$ →	1
	N/-V$_s$ →	2
	PE ⏚	3
option interface	RXD ←	4
	TXD →	5
	COM	6
option analogue output	U$_{out}$ ←	7
	I$_{out}$ ←	8
shield protection earth	⏚	9
		10
		11
		12
		13
		14
		15
measuring input	+U →	16
	+I →	17
	GND →	18

Upper terminal row (DDF – 400):

	Signal	Terminal
relay 1	NO	19
	NC	20
	C	21
relay 2	NO	22
	NC	23
	C	24
relay 3	NO	25
	NC	26
	C	27
relay 4	NO	28
	NC	29
	C	30
over voltage protection	PE	31
	PE	32
		33
		34
		35
sensor supply	+24V ←	36
	+5V ←	37
	GND ⊥	38
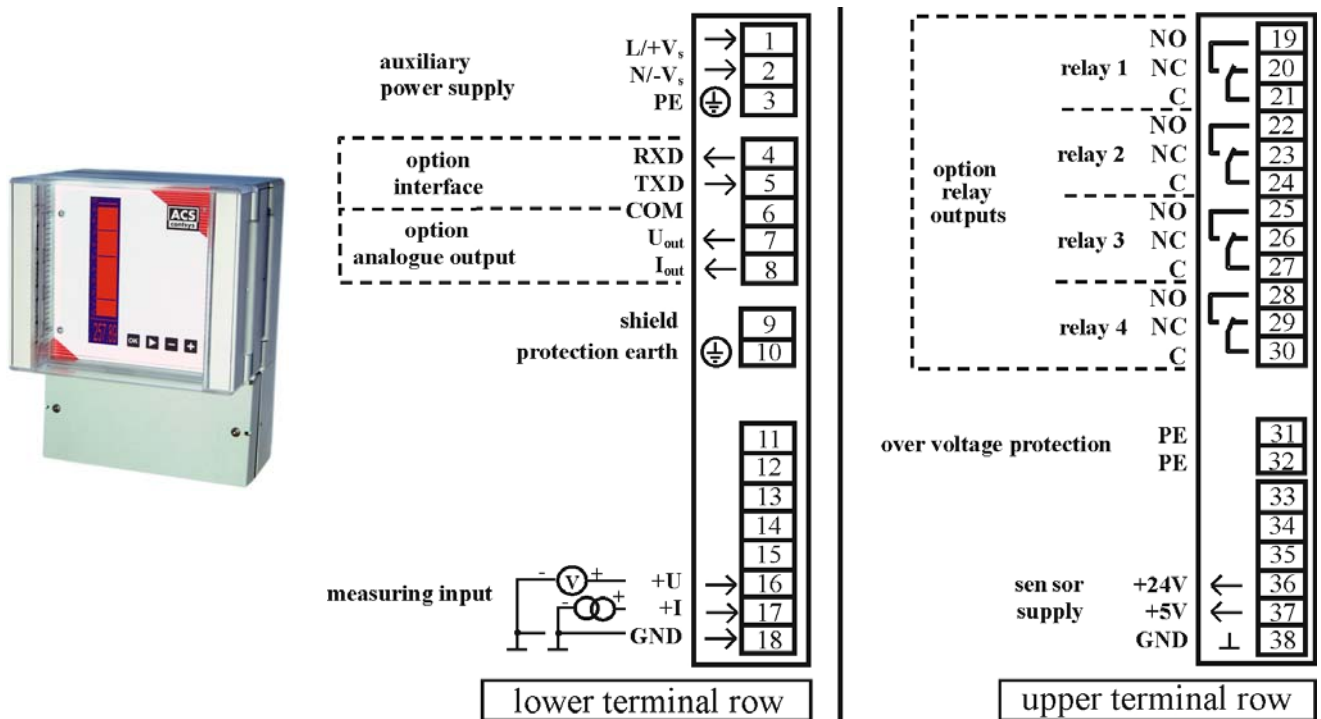
Pin assignment DDF – 420 resp. DXF – 400

Depending of the options contact pins, e.g. relay, pc interface or analogue output, can be not connected.

Lower terminal row (DDF – 420 / DXF – 400):

	Signal	Terminal
auxiliary power supply	L/+V$_s$ →	1
	N/-V$_s$ →	2
	PE ⏚	3
option interface	RXD ←	4
	TXD →	5
	COM	6
option analogue output	U$_{out}$ ←	7
	I$_{out}$ ←	8
shield protection earth	⏚	9
		10
		11
measuring input channel 2	+U →	12
	+I →	13
	GND →	14
		15
measuring input channel 1	+U →	16
	+I →	17
	GND →	18

Upper terminal row (DDF – 420 / DXF – 400):

	Signal	Terminal
relay 1	NO	19
	NC	20
	C	21
relay 2	NO	22
	NC	23
	C	24
relay 3	NO	25
	NC	26
	C	27
relay 4	NO	28
	NC	29
	C	30
over voltage protection	PE	31
	PE	32
sensor supply channel 2	+24V ←	33
	+5V ←	34
	GND ⊥	35
sensor supply channel 1	+24V ←	36
	+5V ←	37
	GND ⊥	38

Connection example DDM – 400

Input   2 wire sensor 4...20mA
Output   current 0...20mA / 4...20mA

auxiliary power supply	L/+Vs	1		21	NO	
	N/-Vs	2		22	NC relay 1	
	PE ⏚	3		23	C	
		4		24	NO	
PC interface	RXD ←	5		25	NC relay 2	
	TXD →	6		26	C	relay outputs
current 0...20mA/4...20mA	COM	7		27	NO	
	Uout ←	8		28	NC relay 3	
	Iout ←	9		29	C	
		10		30	NO	
	protection earth ⏚	11		31	NC relay 4	
	shield	12		32	C	
2 wire sensor 4...20mA		13	33			
		14	34			
		15	35			
		16	36			
		17	37	+24V	sensor supply	
	+U →	18	38	⊥ GND		
	+I →	19	39	+5V		
	GND →	20	40	⊥ GND		

Connection example DDM – 400

Input   2 wire sensor 4...20mA
Output   voltage 0...10V

auxiliary power supply	L/+Vs	1		21	NO	
	N/-Vs	2		22	NC relay 1	
	PE ⏚	3		23	C	
		4		24	NO	
PC interface	RXD ←	5		25	NC relay 2	
	TXD →	6		26	C	relay outputs
voltage 0...10V	COM	7		27	NO	
	Uout ←	8		28	NC relay 3	
	Iout ←	9		29	C	
3 wire sensor 0...10V		10		30	NO	
	protection earth ⏚	11		31	NC relay 4	
	shield	12		32	C	
		13	33			
		14	34			
		15	35			
		16	36			
		17	37	+24V	sensor supply	
	+U →	18	38	⊥ GND		
	+I →	19	39	+5V		
	GND →	20	40	⊥ GND		
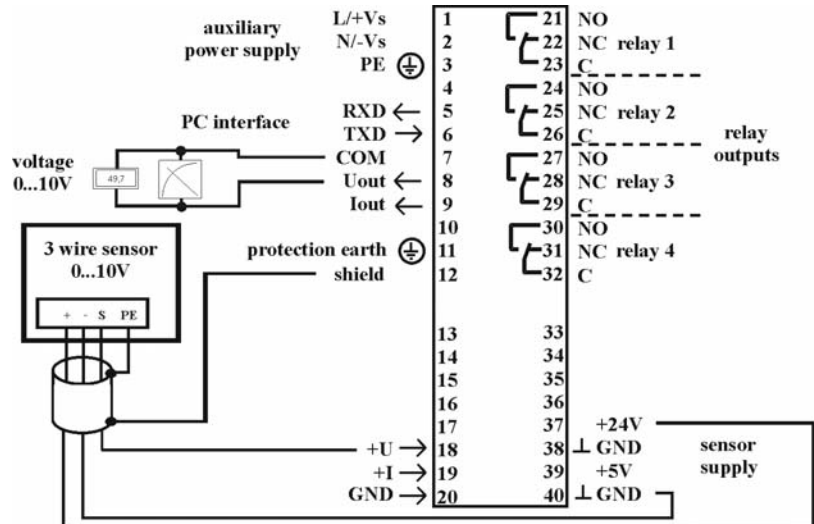
Connection example DXM - 400 Ex

Input   2x 2 wire sensor 4...20mA
Output   current 0...20mA / 4...20mA

auxiliary power supply	L/+Vs	1		21	NO	
	N/-Vs	2		22	NC relay 1	
	PE ⏚	3		23	C	
		4		24	NO	
PC interface	RXD ←	5		25	NC relay 2	
	TXD →	6		26	C	relay outputs
current 0...20mA/4...20mA	COM	7		27	NO	
	Uout ←	8		28	NC relay 3	
	Iout ←	9		29	C	
		10		30	NO	
	protection earth ⏚	11		31	NC relay 4	
	shield	12		32	C	
2 wire sensor 4...20mA / 2 wire sensor 4...20mA		13	33	+24V	sensor supply channel 2	
	+U →	14	34	⊥ GND		
	+I →	15	35	+5V		
	GND →	16	36	⊥ GND		
		17	37	+24V	sensor supply channel 1	
	+U →	18	38	⊥ GND		
	+I →	19	39	+5V		
	GND →	20 PA PA	40	⊥ GND		

potential compensation

6. Operation

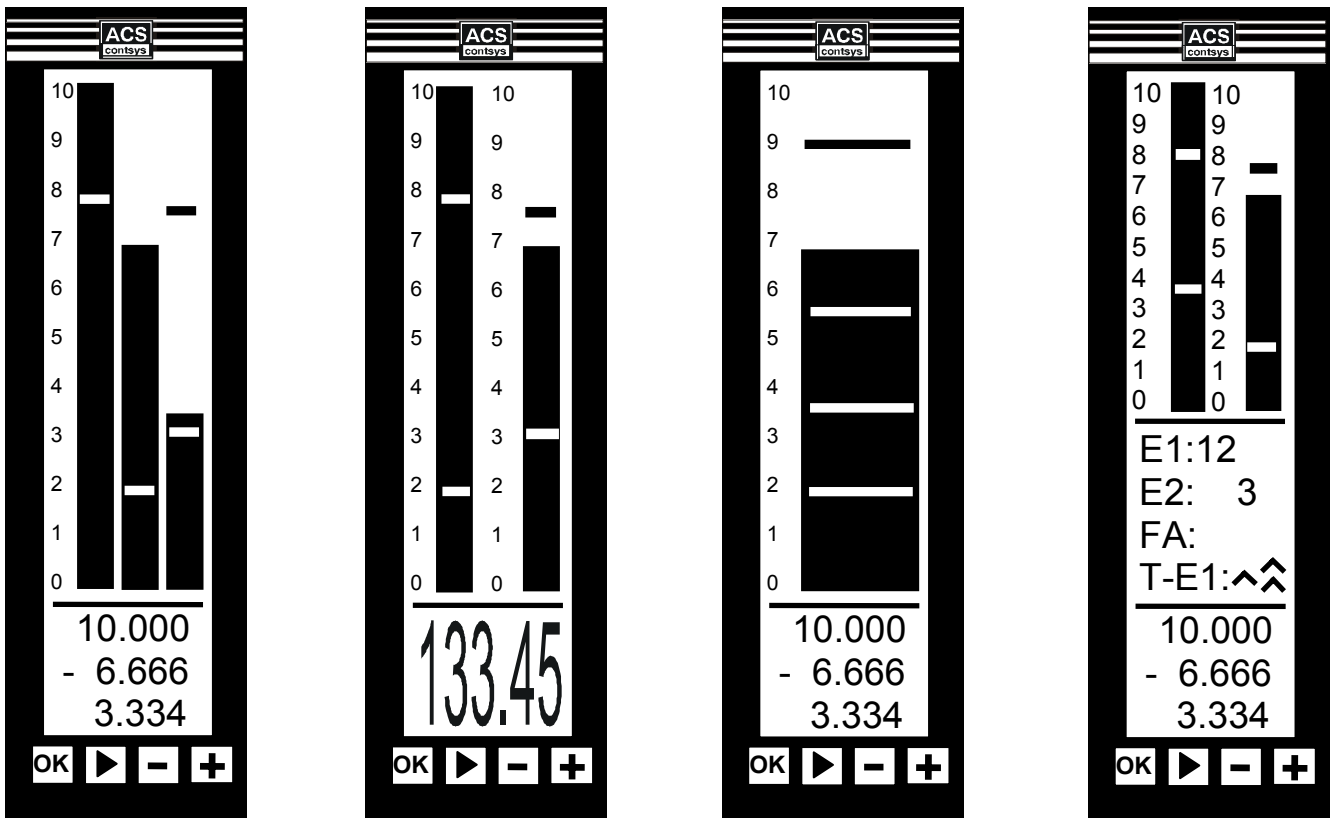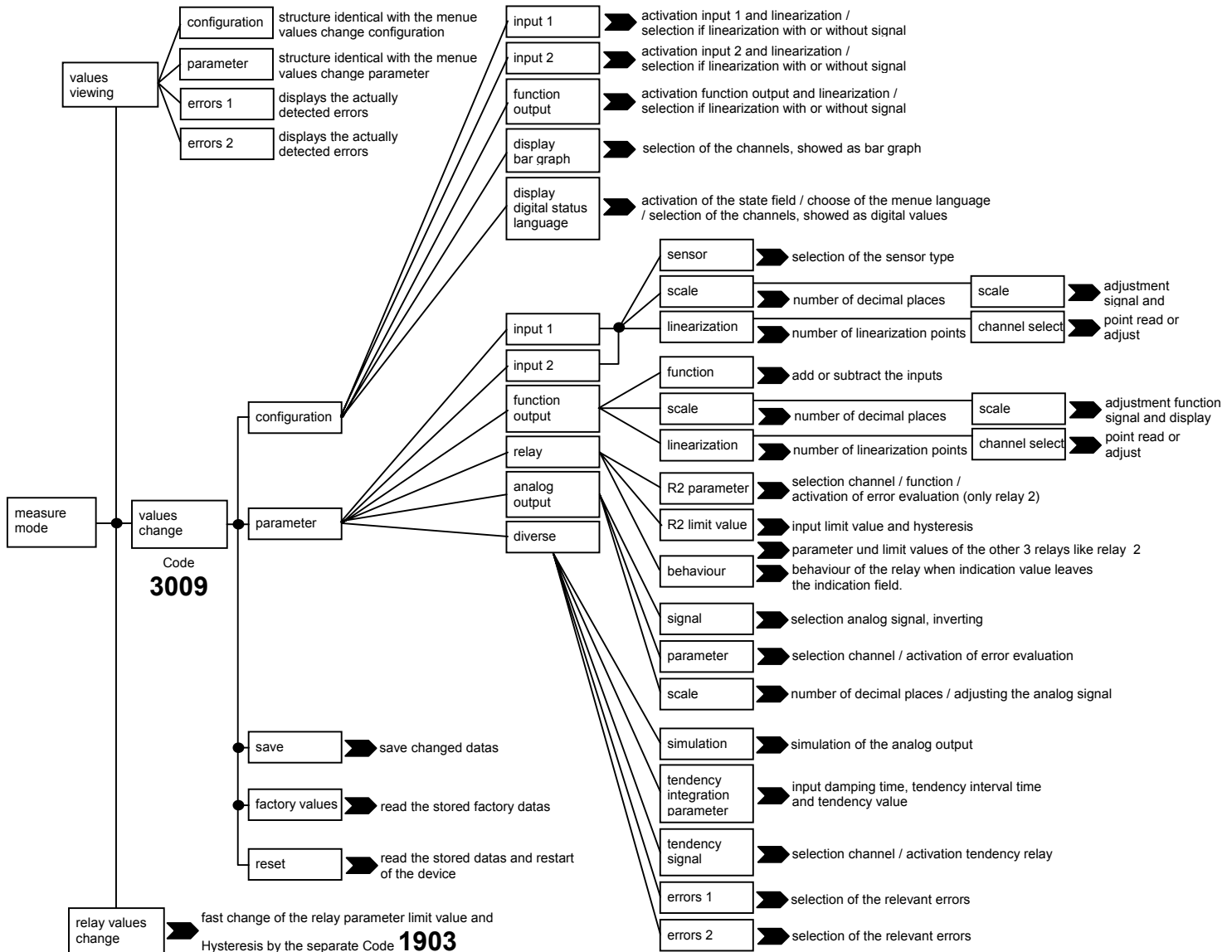### Display elements and keys

limit values:
The limit values are shown as strokes in the allocated bar graph.

bar graph:
When the display is configured without state field, the bar graph (incl. limit values) is shown with 160 segments, when using the state field only 100 segments.
Dependent on the configuration one, two or three bar graphs.

state field (if activated):
In the upper three rows the activated relays of the allocated channel are shown.

In the next row the tendency with the allocated channel is displayed.
arrows up ➔ rising tendency / arrows down ➔ decreasing tendency
one arrow: tendency value exceeded / double arrow: double tendency value exceeded.
If no channel or if a stroke is displayed, the tendency evaluation is deactivated.

digital value
displayed in the chosen scale. Dependent on configuration one, two or three values.
upper value ➔ input 1 / middle value ➔ input 2 / lower value ➔ function output

If the value that should be displayed is lower than –29999 or higher than 29999, e.g. if the chosen scale is unfavorable (independent of the decimal places), than the device shows

                    "....EEE...."

instead of the allocated value.

keyboard:
key "OK": jump into menus / leaving the change mode
key " ▶ start change mode / step from number to number in change mode for values
key "-": cursor up / decreasing value in change mode
key "+": cursor down / increasing value in change mode

Different display views

menu short structure / using menu

Note: Dependent on version and options, some of the following described functions can not be chosen.

configuration	structure identical with the menue values change configuration
parameter	structure identical with the menue values change parameter
errors 1	displays the actually detected errors
errors 2	displays the actually detected errors

values viewing

input 1	activation input 1 and linearization / selection if linearization with or without signal
input 2	activation input 2 and linearization / selection if linearization with or without signal
function output	activation function output and linearization / selection if linearization with or without signal
display bar graph	selection of the channels, showed as bar graph
display digital status language	activation of the state field / choose of the menue language / selection of the channels, showed as digital values

measure mode

values change

Code **3009**

configuration

parameter

input 1	
input 2	

sensor	selection of the sensor type
scale	number of decimal places
linearization	number of linearization points

scale	adjustment signal and
channel select	point read or adjust

function output

function	add or subtract the inputs
scale	number of decimal places
linearization	number of linearization points

scale	adjustment function signal and display
channel select	point read or adjust

relay

R2 parameter	selection channel / function / activation of error evaluation (only relay 2)
R2 limit value	input limit value and hysteresis
	parameter und limit values of the other 3 relays like relay 2
behaviour	behaviour of the relay when indication value leaves the indication field.

analog output

signal	selection analog signal, inverting
parameter	selection channel / activation of error evaluation
scale	number of decimal places / adjusting the analog signal
simulation	simulation of the analog output

diverse

tendency integration parameter	input damping time, tendency interval time and tendency value
tendency signal	selection channel / activation tendency relay
errors 1	selection of the relevant errors
errors 2	selection of the relevant errors

save	save changed datas
factory values	read the stored factory datas
reset	read the stored datas and restart of the device

relay values change — fast change of the relay parameter limit value and Hysteresis by the separate Code **1903**

Use the key **„OK"** to enter the **main menu**. From here **each menu** can be selected, using the keys **„+"** or **„-"** and entered, using the key **„OK"**.

Changing's can only be made in the menu structure „values change", but the relay data also, using the menu „relay values change".

In each menu you can find the button ⬛. Activating this button, using the key **„OK"** switches to the menu **before**.

Configuration and **parameter setting** are executed by two ways. Either activation or deactivation of an option by a square or the adjustment of a changeable value.

To activate an option, select at first this option with the keys **„+"** or **„-"** and **activate** the **change mode**, using the key **„>"**. Now by using the keys **„+"** bzw. **„-",** the option can be activated or deactivated or the value can be increased or decreased number by number.

In the case of a **multiple option selection** it is necessary to deactivate at first the actual option before activating an option positioned under the actual option.

When adjusting an value, you can step from **number to number**, using the key **„>"**. If you want to change the **polarity sign**, step to the place left of the value by **multiple** using the key **„>"**. Now the polarity sign can be changed, using the keys **„+"** or **„-".**

By using the key **„OK"** you can **leave** now the **change mode**.

All changes are **taken over** by the device **at once** but they are **not** jet stored.

Only by activating the menu „**save**" in the menu „values change" the changed data will be saved **durable**.

Signal flow schematic
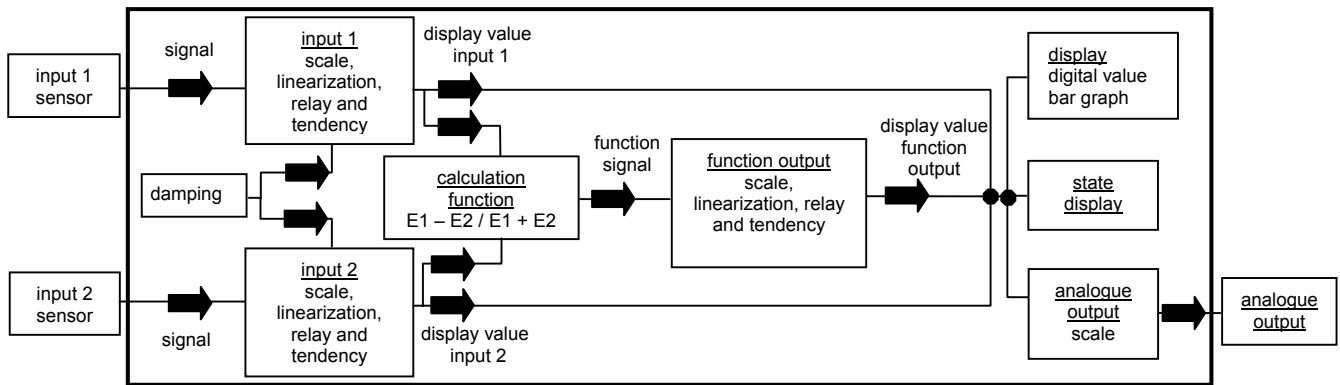
Adjustment display

bar graph   **values change ➔ configuration ➔ display graphic bar**

Choose here, which channel should be indicated as bar graph.
The length of the bar graph is automatically adjusted on the indication field of the related channel. The order of the bar graphs is from left to right: input 1, input 2 and function output.

Choose here the direction of the indicated scale besides the bar graph. If deactivated, the 0-marking of the scale will be placed at the top and the 10-marking at the bottom of the display. Only the scale, not the bar graph is inverted.

digital value   **values change ➔ configuration ➔ display digital status language**

Choose here, which channel should be indicated as digital value at the bottom of the display. The order of the digital values from top to bottom is: input 1, input 2 and function output
If only one channel is chosen, it's indication value is shown as big digital value.

menu language   **values change ➔ configuration ➔ display digital status language**

Choose here the language of the menu.
The languages german and english are available.

state field   **values change ➔ configuration ➔ display digital status language**

Choose here, if the additional state field should be displayed.
A description of the state field is noted at the description of the display elements.

Adjustment input / inputs

activation   **values change ➔ configuration ➔ input 1 (or input 2)**

Activate here the allocated input. Input 1 is always active and can't switched off.

select sensor   **values change ➔ parameter ➔ input 1 (or input 2) ➔ sensor**

Select here the desired sensor (0..10 V / 0..20 mA).

decimal places   **values change ➔ parameter ➔ input 1 (or input 2) ➔ scale**

Select here in the field **display** the number of decimal places (max.3) that should be indicated at the display
The number of decimal places in the field **signal** belongs to the sensor signal and shows the accuracy of the measurement value in the following scaling menu.
Dependent on the chosen sensor, this value changes automatically. You can't change this value.

Adjustment   **values change ➔ parameter ➔ input 1 (or input 2) ➔ scale ➔ scale**

Input here the desired sensor signal field and the allocated indication value field.

Input the sensor signal in the fields **signal 0% and 100%** in correct physical unit (mA or V), e.g. for a desired sensor signal from 6..15 mA in the field signal 0% 06.000 and in the field signal 100% 15.000.
Input the indication values in the fields **display 0% and 100%** that should be displayed at the selected sensor signals 0% and 100%.
If you want to adjust the input with a connected sensor, than input at first the desired indicator values in the fields **display 0% and 100%**. Than set the sensor zero signal at the connected sensor and adjust the value in the field **signal 0%** as long as the allocated value below the menus displays the same value as in the field **display 0%**.
Than set the sensor end signal at the connected sensor and adjust the value in the field **signal 100%** as long as the allocated value below the menus displays the same value as in the field **display 100%**.

Adjustment linearization

activation   **values change ➔ configuration ➔ input 1 (or input 2, function output)**

Switch here the linearization calculation of the allocated channel active.

Choose here, if you want to execute the linearization with or without a connected sensor
If you want to display an existing linearization point switch on **without signal**.

number of points **values change ➔ parameter ➔ input 1 (or input 2, function output)**

      ➔ linearization rising (of decreasing)

Input here the number of linearization points for each channel. You can share 25 points among the three channels

select channel **values change ➔ parameter ➔ input 1 (or input 2, function output)**

      ➔ linearization rising (of decreasing) ➔ channel select (next)

Choose here the channel, to which the next linearization point belongs to.

adjustment   **values change ➔ parameter ➔ input 1 (or input 2, function output)**

      ➔ linearization rising (of decreasing) ➔ channel select (next)

      ➔ input 1 (or input 2, function output)

You can here either visualize existing linearization points by activating the field **read** or you can adjust and save any one of the points.

If the linearization is executed rising, the first point shown in the field **point number** is 01, the next 02, etc. till the last allocated point. If the linearization is executed decreasing the last point is shown here first and will be automatically decreased by one till 01.
You can already input any point here for a separate adjustment.

On linearization **with signal**, the **actual sensor signal value** is shown in the field **signal**.
On linearization of the function output **with signal**, the **actual calculation value** is shown in the field **signal**.
You can **not** change these values.
On linearization **without signal**, input the **desired sensor signal value**, **not** the indicator value in the field **signal**.
On linearization of the function output **without signal**, input the desired calculation value of the two inputs in the field **signal**.

Input the desired value of the allocated channel that should be shown in the digital indicator area at this linearization point in the field **display values**.

The linearization points should lay within but can also lay besides the sensor signal field of the allocated channel.
Don't choose a linearization point that is equal to the 0% and 100% value of the sensor signal

Save at least the data of the linearization points by activating the field **save**.

Adjustment signal damping

adjustment **values change ➔ parameter ➔ diverse ➔ tendency integration parameter**

In many applications it's necessary to damp the input signals, e.g. strongly wave movements caused by a stirring engine.
By increasing the value in the field **signal integration** (to maximal 99) the signal gets more and more artificially damped.
After the selected time in seconds, a step of the input signal is also carried out to the indication value.

Adjustment function output – only available for DXM – 400 resp. DXF – 400

function   values change ➜ configuration ➜ function output ➜ function

Choose here, if input 2 should be **subtracted (difference)** from input 1➜ **E1-E2** or if the two inputs should be **added** ➜**E1+E2**. Choose only one function.

decimal places   values change ➜ parameter ➜ function output ➜ scale

Input here in the field **signal** the number of decimal places (max. 3) with which the calculation result is produced and processed.
Input here in the field display the number of decimal places (max. 3) which should be shown at the display.

adjustment   values change ➜ parameter ➜ function output ➜ scale ➜ scale

Input here the calculating result field and the concerning indicator value field.

Input in the fields **function signal 0% and 100%** this values, between which the **calculated result** (E1-E2 or E1+E2) can lie. This values can be discovered by computing or because of experience.
The device calculates the indicator values (incl. decimal places) of the inputs.
Input the indication values in the fields **display 0% and 100%** that should be displayed at the selected function signals 0% and 100%.
If you want to adjust the function output with connected sensors, than input at first the desired indicator values in the fields **display 0% and 100%**. Than set this signal at the connected sensor those difference or sum is equal to the desired zero difference or zero sum and adjust the value in the field **function signal 0%** as long as the allocated value below the menus displays the same value as in the field **display 0%**.
Than set this signal at the connected sensor those difference or sum is equal to the desired end difference or end sum and adjust the value in the field **function signal 100%** as long as the allocated value below the menus displays the same value as in the field **display 100%**.

Adjustment relays

selection   values change ➜ parameter ➜ relay

                 ➜ **R1parameter (or R2parameter, R3parameter, R4parameter**

Choose here to which channel the relay refers. Choose only one channel.

Choose here, if the allocated relay should work in quiescent or working current principle.
    working current principle = relay switches on when the referred signal exceeds the limit value.
    quiescent current principle = relay switches off when the referred signal exceeds the limit value. (INVERSE-function)
    Before deactivating a relay (no channel chosen), switch off the referred INVERSE-function, because if not, the actual state of the relay is kept.

Choose here, only for relay 2, if it should work as fault detection relays. This means that it will be activated if any one of the selected errors in the error evaluation occurs.
If you choose relay 2 for the error evaluation, it will no more longer work in limit value function.

adjustment   values change ➜ parameter ➜ relay

                 ➜ **R1parameter (or R2parameter, R3parameter, R4parameter**

Input here in the field **limit value** the **indication value of the allocated channel**, where the relay should be activated.

Input here in the field **hysteresis** the value, by which the indication value of the allocated channel must be decreased to switch off the relay

behaviour   values change ➜ parameter ➜ relay ➜ behaviour

Choose here the reaction of each relay, if the indication value leaves the selected indication field of the allocated channel.
If **ON** is chosen, the relay switches on, if **OFF** is chosen, the relay switches off.
Do not choose **ON** and **OFF** together.

Adjustment analogue output

signal selection   **values change ➜ parameter ➜ analogue output ➜ signal**

Choose here the requested analogue signal.
Possible is 0..20 mA, 4..20 mA, 20..0 mA, 20..4 mA, 0..10V, 10..0 V. Choose only one signal.

selection   **values change ➜ parameter ➜ analogue output ➜ parameter**

Choose here, to which channel the analogue output allocates. Choose only one signal.

Choose her, if the respective analogue output should work as fault indicator output. In that case, the voltage output signals 11 V or the current output signals 22 mA if one of the chosen errors in the error evaluation occurs.

adjustment   **values change ➜ parameter ➜ analogue output 1 resp. 2 ➜ scale**

Input here the area of the indication field of the chosen channel that should be signalled by the analogue output.

Input here in the field **decimal** the number of decimal places with which the values below should be indicated.

Input here in the field **0%** the indication value of the allocated channel that forces the analogue output to signal 0 V, 0 mA o 4 mA . This value has to be lower than the value in the field **100%**.

Input here in the field **100%** the indication value of the allocated channel that forces the analogue output to signal 10 V or 20 mA.

simulation   **values change ➜ parameter ➜ diverse ➜ simulation 0..10 V (or 0..20 mA)**

You can force the analogue output to signal the selected value independent from the running measurement.
Dependent on the menu used to enter the simulation, the desired value is constantly provided in volt or milliampere.

Adjustment tendency evaluation

selection   **values change ➜ parameter ➜ diverse ➜ tendency signal**

Choose here, which channel should be supervised by the tendency evaluation. Choose only one channel.

Choose here, if relay 3 should be activated if an upward tendency, or if relay 4 should be activated if a downward tendency is detected.
Relay 3 and 4 can also work in INVERSE-function.
If you choose relay 3 or 4 for the tendency evaluation, they will no more longer work in limit value function.

adjustment   **values change ➜ parameter ➜ diverse ➜ tendency integration parameter**

Input here in the field **tendency time** the time interval in seconds (5 to 29999s), in which the indication value of the supervised channel have to change by a chosen value to achieve a reaction of one of the tendency relays.

Input here in the field **tendency change** the value, by which the indication value of the supervised channel have to change within a chosen time to achieve a reaction of one of the tendency relays.

Adjustment error evaluation

Error selection   **values change ➜ parameter ➜ diverse ➜ error 1 (resp. error 2)**

Choose here, which errors should result in a message on the display, relay 2 or on the analogue output.

The sensor signal can be supervised on exceeding by more than 3% or fall below 18% (equivalent to 3,6 mA when using 4..20 mA – sensors) of the nominal measure range (0..10 V, 0..20 mA) and the current analogue output on wire break down. In addition to this, the indication fields of the inputs, the function signal field of the function output and the chosen field for the analogue output can be supervised on exceeding or falling down.
The actually detected errors are visualized in the following menu:

values viewing ➜ DXM state error 1 (resp. error 2)

Factory settings

The device, depending on version and options, is provided with special factory data.

Input 1:   active, sensor 0...20 mA
signal 04.000 = indication 000.00 and signal 20.000 = indication 100.00
linearization not active, linearization with or without signal not active

Input 2:   active, sensor 0...20 mA
signal 04.000 = indication 000.00 and signal 20.000 = indication 100.00
linearization not active, linearization with or without signal not active

Function output: active, function E1-E2
function signal from 000.00 to 100.00, scaled from 000.00 to 100.00
linearization not active, linearization with or without signal not active

Analogue output: active, input 1, signal 4...20 mA from 000.00 to 100.00, error evaluation not active

Relays: all active on input 1 for limit value function with working current principle,
relay 1: limit value = 020.00, hysteresis = 005.00
relay 2: limit value = 040.00, hysteresis = 005.00
relay 3: limit value = 060.00, hysteresis = 005.00
relay 4: limit value = 080.00, hysteresis = 005.00
behaviour at measuring range exceeding: state will not be changed

Tendency evaluation: not active, tendency interval time 00005 seconds, signal changing value 0100

Damping: 01 seconds

Display: indication of all available channels as bar graph and digital value
0% scale below

State field: deactivated

Language: german

Error evaluation: fault indicator relay R2 not active, output to analogue output not active,
all errors deactivated

PC communication interface

The input of the configuration and parameter values can be made by an optional PC programming interface RS232 in combination with the programming tool GM-400.

The connection plug is positioned at the back sided terminal row.

At the data transmission the analogue output keeps the last analogue value.

For the processing of the transmitted values and for the reactivation of the analogue output a RESET of the device must be proceeded. This RESET must be made by the button >>> **device and program RESET** <<< of the programming tool GM-400.
The RESET will be also proceeded if the power supply of the device will be switched off.

LCD illumination brightness

The illumination brightness of the LCD display can be adjusted in a wide range by a rotary switch, e.g. to achieve a more pleasant readability in dark environment.
The adjustment can be set in 5 steps, from 0 = dark to 1, 3, 7 to F = bright.

At the front panel version, type DDM resp. DXM, the rotary switch is placed at the top side of the device.
At the field installation housing, type DDF resp. DXF, the rotary switch is placed below the display panel. To change the setting the device must be opened by using the lock system at the right side.

7. Maintenance

The device is free of maintenance.

8. Repair

A repair may only be carried out by the manufacturer. When sending back the device, add a note with the description of the error and the application.

9. Technical Data

Auxiliary power supply

Permitted supply voltage:	230V AC +/-10%	48...62 Hz
	24V DC +/-10%	reverse polarity protected
	maximum permitted external voltage	U_m = 253 V AC
Power consumption:	$\leq$ 9 VA / 9 W	depending on version
Overvoltage category:	II	acc. to DIN EN 61010-1
Protection classification:	II	double or reinforced insulation
Isolation voltage:	4kV~	Auxiliary power to signal inputs to signal outputs
Galvanic isolation:	All supply, analogue input, analogue output and relay output channels among each other as well as the four relay outputs from each other are safe galvanically isolated. The analogue input channels are not galvanically isolated from each other.	

Signal input / signal inputs

Direct voltage:	0…10,5 V / max. 14V / input resistor 250kΩ
Direct current:	0…21mA / max. 50mA at 30V / input resistor 59Ω $\pm$ 1%
Adjustment range:	Amplification maximum 1:30 = minimum measuring range 3,3%
	Maximum zero value increasement 96,5%
Characteristic deviation:	<0,05% of measuring range end value
Nonlinearity:	<0,02% of measuring range end value
Temperature deviation:	<0,03%/10K of measuring range end value
Long term deviation:	$\leq$ $\pm$0,1% of measuring range end value / year
Measurand transducer supply:	overload and short circuit protected

- D_ _ – 4_0-V   24V+/-7%   max. 23 mA
                           5V +/-0,5%   max. 23 mA

- D_ _ – 4_0ExV   20,4V +/-5%   -(90mV per 1mA)   >=18,6V at 20mA
                           U_o = 23,1V / I_o = 37 mA / P_o = 850 mW / C_i < 1 nF / L_i < 1 mH
                           5V +/-0,5%   -(0,4 mV per 1mA)
                           U_o = 5,9V / I_o = 37 mA / P_o = 210 mW / C_i = 230 nF / L_i < 1 mH

Analogue output

Direct voltage:	0…10 V, max. 11V, minimum load 5kΩ
Direct current:	0…20mA / max. 22mA, maximum load 800Ω
Characteristic deviation:	$\leq$ 0,05% of respective nominal output signal range
Nonlinearity:	<0,02% of respective nominal output signal range
Temperature deviation:	$\leq$ 0,05% / 10 K of respective nominal output signal range
Long term deviation:	$\leq$ $\pm$0,1% of respective nominal output signal range / year
Influence output load:	$\leq$ 0,05% of respective nominal output signal range

Over voltage protection

Max. signal voltage:	30V, peak value
	Measuring input and sensor supply voltage to PE (Terminal 31, 32)
Nominal discharge current:	2500A / wave 8/20µs

Relay outputs

Function: 4x potential-free changeover contact

Switching power of the contacts: U~   maximum 250 V AC
                                   I~   maximum 10 A AC
                                   P~   maximum2500 VA at ohmic load / 500 VA at cos φ ≥ 0,7

at U-	maximum I-	maximum P-
30 V	10 A	300 W
110 V	0,3 A	33 W
220 V	0,12 A	26,4 W

Switching cycles: ≥ 100.000 switching cycles at maximum contact load

Materials

Connection housing: PVC – polyvinylchloride / ABS / PC - polycarbonate
Front panel: PE – polyester

Connection terminals

Type: *Front panel installation housing type DDM resp. DXM*
                                   Screw terminal plug 6-/4pin   0,2 to 2,5 mm^2, solid and stranded
                                   Terminals PA   0,4 to 4,0 mm^2, solid and stranded

                                   Field installation housing type DDF resp. DXF
                                   Screw terminals 1 to 30, 33 to 38   0,2 to 2,5 mm^2, solid and stranded
                                   Screw terminals 31, 32   0,2 to 4,0 mm^2, solid and stranded

Housing style

Type DDM resp. DXM
Housing: Front panel installation housing for mounting opening 48 x 144mm
Weight: Version supply 230V AC 800 g
                                   Version supply 24V DC   580 g

Type DDF resp. DXF
Housing: Field installation housing for wall mounting
Weight: Version supply 230V AC 2050 g
                                   Version supply 24V DC   1850 g

Environmental conditions

Environmental temperature: – 20°C...+65°C
Climatic classification: 3K3 bzw. 3M2   DIN EN 60721-3-3
Protection classification: *Front panel installation housing type DDM resp. DXM*
                                   Front side   IP54   DIN EN 60529
                                   Housing   IP20   DIN EN 60529
                                   Terminals   IP00   DIN EN 60529

                                   Field installation housing type DDF resp. DXF
                                   Full device   IP66   DIN EN 60529
EM – compatibility: emission   DIN EN 61326-1   operation device class B
                                   immunity   DIN EN 61326-1   industrial range

10. Order code DDM – 400 resp. DDF – 400

Single channel display and evaluation device

Type
M   Front panel housing type
F   Field installation housing type

   Certification
   -   Standard
   Ex   ATEX II (2) G [Ex ib] IIC (not possible for type DDF)

     Version
     V   Display orientation vertical

      Supply voltage
      0   230V AC
      1   24V DC
      2   24V AC

       Signal input
       1   Voltage (0-10 V), current (0-20 mA)

        Function / output
        0   Standard indicator
        1   4 relay outputs
        2   current / voltage output
        3   4 relay outputs + current / voltage output
        5   Standard indicator with PC interface
        6   4 relay outputs and PC interface
        7   4 relay outputs + current / voltage output + PC interface
        8   current / voltage output with PC interface

         S   Standard version
         Y   Special version

          Over voltage protection
          -    without over voltage protection
          1   with over voltage protection (not possible for type DDM)

```
DD_ - 400 _ V _ 1 _ _ _
```

11. Order code DDM – 420 resp. DDF – 420

Double channel display and evaluation device

Type
M   Front panel housing type
F   Field installation housing type

   Certification
   -   Standard
   Ex   ATEX II (2) G [Ex ib] IIC (not possible for type DDF)

     Version
     V   Display orientation vertical

      Supply voltage
      0   230V AC
      1   24V DC
      2   24V AC

       Signal input
       2   2x voltage (0-10 V) / current (0-20 mA)

        Function / output
        0   Standard indicator
        1   4 relay outputs
        5   Standard indicator with PC interface
        6   4 relay outputs and PC interface

         S   Standard version
         Y   Special version

          Over voltage protection
          -    without over voltage protection
          1   with over voltage protection (not possible for type DDM)

```
DD_ - 420 _ V _ 2 _ _ _
```

12. Order code DXM – 400 resp. DXF – 400

Double channel display and evaluation device with calculation function

Type
M Front panel housing type
F Field installation housing type

Certification
- Standard
Ex ATEX II (2) G [Ex ib] IIC (not possible for type DDF)

Version
V Display orientation vertical

Supply voltage
0 230V AC
1 24V DC
2 24V AC

Signal input
2 2x voltage (0-10 V) / current (0-20 mA)

Function / output
0 Standard indicator
1 4 relay outputs
2 current / voltage output
3 4 relay outputs + current / voltage output
5 Standard indicator with PC interface
6 4 relay outputs and PC interface
7 4 relay outputs + current / voltage output + PC interface
8 current / voltage output with PC interface

S Standard version
Y Special version

Over voltage protection
- without over voltage protection
1 with over voltage protection (not possible for type DDM)

```
DX_ - 400 _ V _ 2 _ _ _
```