Digital Indication and Evaluation Device DDM-400 Aquacont / ECO-400

for 0..20 mA, 4..20 mA, 0..10 V, PT-100 or mV-differential signals with sensor feeding and 4 limit values

DDM – 400 Aquacont / ECO – 400

DDF- 400 Aquacont

+ LCD-graphic display with negative-red indication
+ Variable illumination intensity
+ Free scaling: input - display / display - analog output
+ Sensor feeding 24V and 5V intrinsically save
+ Damping up to 99 sec. possible
+ 4 free programmable relay outputs
+ Alternating relay function or limit function
+ With high quality of reading
+ Cleartextprogramming German and English
+ Different input signals, intrinsically save possible
+ Galvanically separated analog output
+ Saving static (without battery)
+ Fault indicator relay
+ Front panel mounting (48 x 144 mm / 144 x 48 mm)

For DDM-400 Aquacont / DDF-400 Aquacont additional:

+ Linearization with 25 points possible
+ Additional relay function for rain overflow basins with cleaning unit
+ Programmable tendency, switchable on two relay outputs
+ DDF-400 Aquacont in a housing for wall mounting IP66 type F with air filter and integrated over voltage protection for measurement inputs and sensor feeding

Using:

The devices DDM-400 Aquacont and ECO-400 and the version DDF-400 Aquacont in the housing for wall mounting are made for evaluation, mathematical function, indication, evaluation at 4 relays and converting into standardised galvanically separated analog output. The input can be connected to as well as current 0..20mA and voltage 0..10V. Optionally the device can evaluate mV-differential signals from ±30 mV_{diff}. The different analog output signals are currents 0..20 mA, 4..20 mA, 20..0 mA, 20..4 mA or voltages 0..10V, 10..0V.
It is possible to put free programmable switch points with separate programmable hysteresis on the inputs or the mathematic function channel. A use of the relays for alternating relay function is possible.
In the device DDM-400 or DDF-400 Aquacont is a function of the relays for rain overflow basins with cleaning units integrated.
The device has two integrated current limited sensor feedings with 5V DC and 24V DC.
The measurement value is displayed as bar graph and as digital value. An additional status window can be displayed when using the device DDM-400 or DDF-400 Aquacont.
You can free scale the convert: input on display or: display on analog output. Because of scaling input on display the filling of a tank can be measured for e. g. in litres. With the integrated linearization (max. 25 linearity points) it is possible to linear the input and output signals, e. g. for calculation of volume in conical or lying cylindrical tanks.
On the input signals can be programmed an integration time from 0...99 sec., for blanking out wave movements in the tank. The device DDM-400 or DDF-400 Aquacont possesses a tendency evaluation in form of an indication on the display (with arrows) and as relay outputs (1 relay for tendency increasing, 1 relay for tendency decreasing).
The programming happens in cleartext process in german or english language through the membrane keyboard on the front in connection with the LCD-display. All functions and adjustments are made from a micro-processor in connection with the LCD-display, because of that the cleartext processing is very easy. The programming of parameter and configuration values with programming interface is possible by using the programming tool. The programmed data will be saved durable in an EEPROM.

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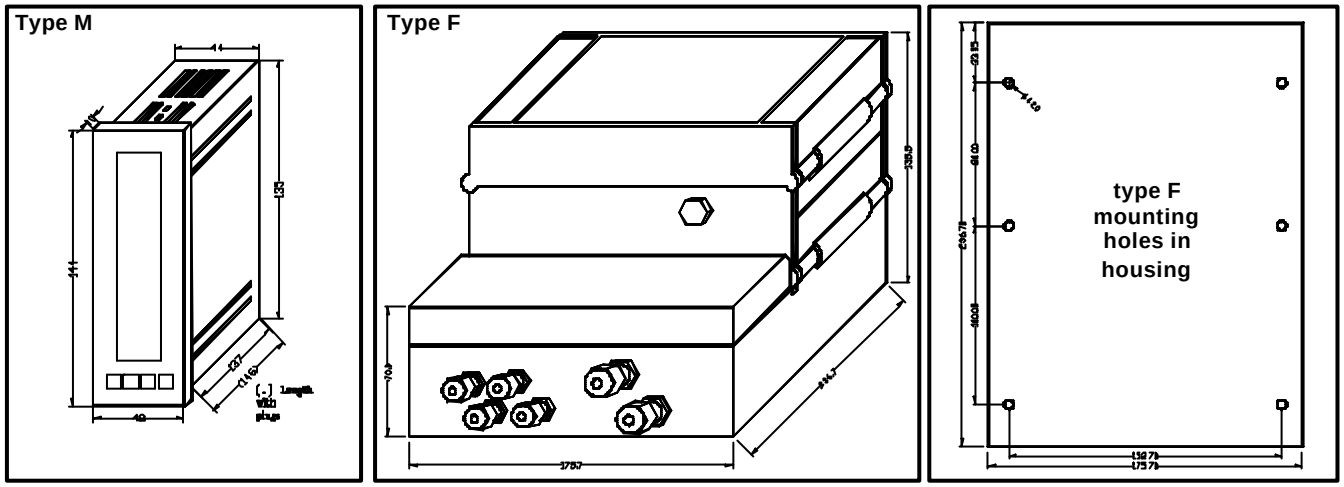
Technical data

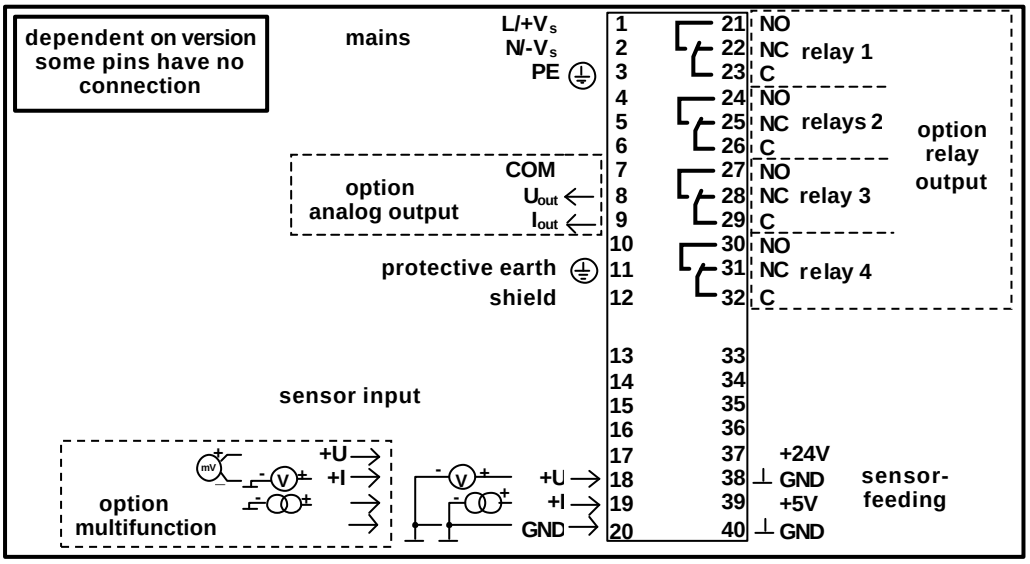
Auxiliary power:	230V AC +/-10%, 50 - 60Hz,	power input < 9 VA, dependent on version and options
	24V DC +/-10%,	power input < 9 W, dependent on version and options
Inputs:	voltage input	measure span 0 to 10,5V, max. +/-14V, Burd > 250kΩ
	current input	measure span 0 to 21 mA, max. +/- 50 mA, Burd = 59Ω ± 1%
	mV input	measure span +/- 31,5 mV_{diff} (not available for ECO-400)
Scale:	Zoom (turn-down)	max. 1:30 = min. measure span 3,3%
	increase of zero shift	max. 96,5%
Correctness:	resolution of input signals	16 bit, equals 65536 steps
	deviation of linearity	<0,02% from the measurement end value
	deviation of temperature	<0,03%/10K from the measurement end value
	basis differ	<0,05% from the measurement end value
Sensor supply:	all two sensor supplies together with max. current 23 mA	
Supply Standard:	sensor supply	24 V DC +/-7%, max. 23 mA, current limited
	sensor supply	5 V DC +/-0,5%, max. 23 mA, current limited
Supply intrinsically save	sensor supply	20,4V +/-5%, max. –90 mV every 1 mA load
	sensor supply	5V +/-0,5%, max. -0,4 mV every 1 mA load
Outputs:	voltage output, can be inverted	0..10V min. Burd 5 kΩ
	current output, can be inverted	0..20 mA / 4..20 mA max. Burd 800 Ohm
Scale:	zoom (turn-down)	max. 1:30 = min. measure span 3,3%
	increase of zero shift	max. 96,5%
Correctness:	resolution of output signals	16 bit, equals 65536 steps
	deviation of linearity	<0,02% from the measurement end value
	deviation of temperature	<0,03%/10K from the measurement end value
	basis differ	<0,05% from the measurement end value
Relay outputs:	switching outputs	4 x relays (changer)
	max. capacity	440 V AC / 300 V DC / 5A / 2000 VA / 50 to 220W
	operation mode	working or quiescent current (programmable)
	hysteresis	free programmable
Indication:	LCD-graphic display 42x200 dot's, negative-red indication, backlight can be adjusted in 5 steps (0 = dark over 1, 3, 7 to F = bright) by rotary encoding switch at the top of housing (type M) or under frontpanel (type F).	
Operating:	Parametration and configuration happens via 4 keys on the front.	
ambient conditions:	ambient temperature	-20...65°C
	storage temperature	-20...70°C
EMV-Norms:	emission	appropriate EN 50081-1
	imission	appropriate EN 50082-2
Over voltage protection:	only for housing for wall mounting, every pin from analog input and sensor feeding to PA -pins (31,32)	
(only type F)	max. signal voltage	30V (peak value)
	nominal discharge peak current	2500A (wave 8/20µs)
Housing:		
Front panel mounting (type M):	protection	front IP54, housing IP20, clamps IP00
	dimension type V (HxWxD)	144 mm x 48 mm x 137 mm (without clamps)
		144 mm x 48 mm x 146 mm (with clamps)
	dimension	144 mm x 48 mm x 175 mm
	weight:	230 V AC - version: 800g
		24 V DC - version: 580g
	material:	PVC and ABS
For wall mounting (type F):	kind of protection	IP66
	dimension without PG (HxWxD)	236,7 mm x 185 mm x 136,5 mm
	dimension with PG (HxWxD)	265,7 mm x 185 mm x 136,5 mm
	weight:	230 V AC - version: 2050g
		24 V DC - version: 1850g
	material	ABS and Polycarbonat
Connection:		
Front panel mounting:	screw connector, plugable, 6-/4 pin	0,2 till 2,5 mm^2, rigid or flexible
Housing for wall mounting:	pins 1 to 30, 33 to 38	0,2 till 2,5 mm^2, rigid or flexible
	pins 31, 32	0,2 till 4,0 mm^2, rigid or flexible
Data intrinsically save:	certificate	II (2) G D [EEx ib] IIC or IIB
	sensor feeding 24V	U_o = 23,1V / I_o = 34 mA / P_o = 780 mW / C_i < 1 nF
	sensor feeding 5V	U_o = 5,9V / I_o = 34 mA / P_o = 200 mW / C_i = 230 nF
	sensor measurement current	U_o = 5,9V / I_o = 3 mA / P_o = 10 mW / C_i < 1 nF / L_i < 1 mH
	supply 24V + sensor measurement current	U_o = 23,1V / I_o = 37 mA / P_o = 850 mW / C_i < 1 nF / L_i < 1 mH
	supply 5V + sensor measurement current	U_o = 5,9V / I_o = 37 mA / P_o = 210 mW / C_i = 230 nF / L_i < 1 mH
	max. extern voltage	U_m = 253 V AC
	max. extern temperature	$T_a \leq$ 65°C

dimension / connection verifying

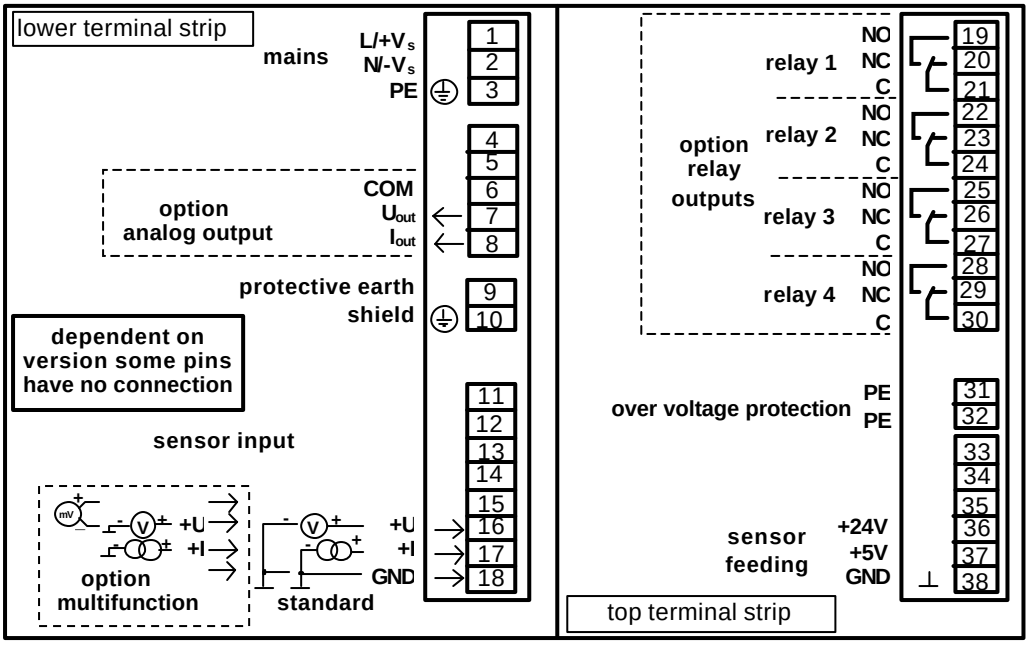


DDM – 400 Aquacont

ECO – 400



DDF – 400 Aquacont



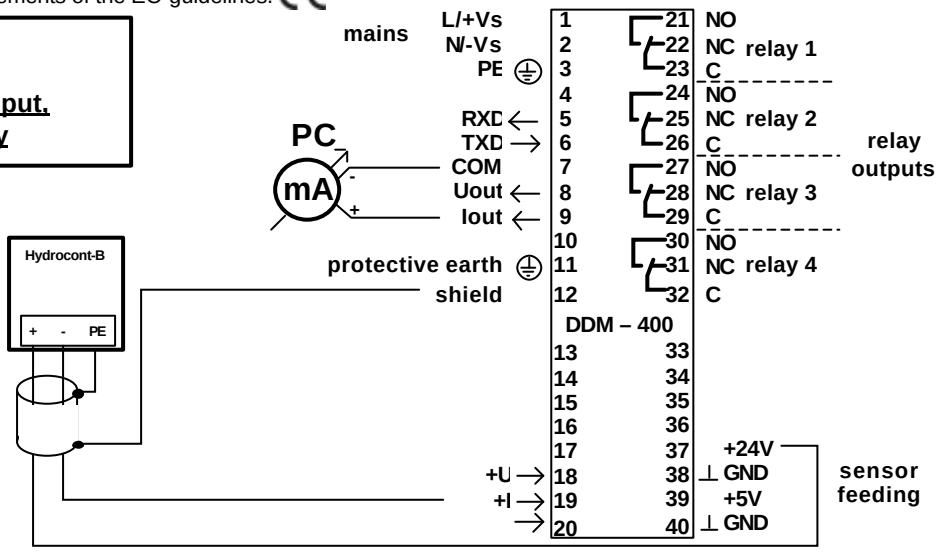
Assembly, electrical installation and inauguration, maintenance:

Assembly, electrical installation, inauguration, operation and maintenance of the device must be carried out by an qualified employee.
The electrical installation of the device must be carried out according to the respective country specific standards.
An incorrect assembly or adjustment could cause applicationally conditioned risks. The device is maintenance free.

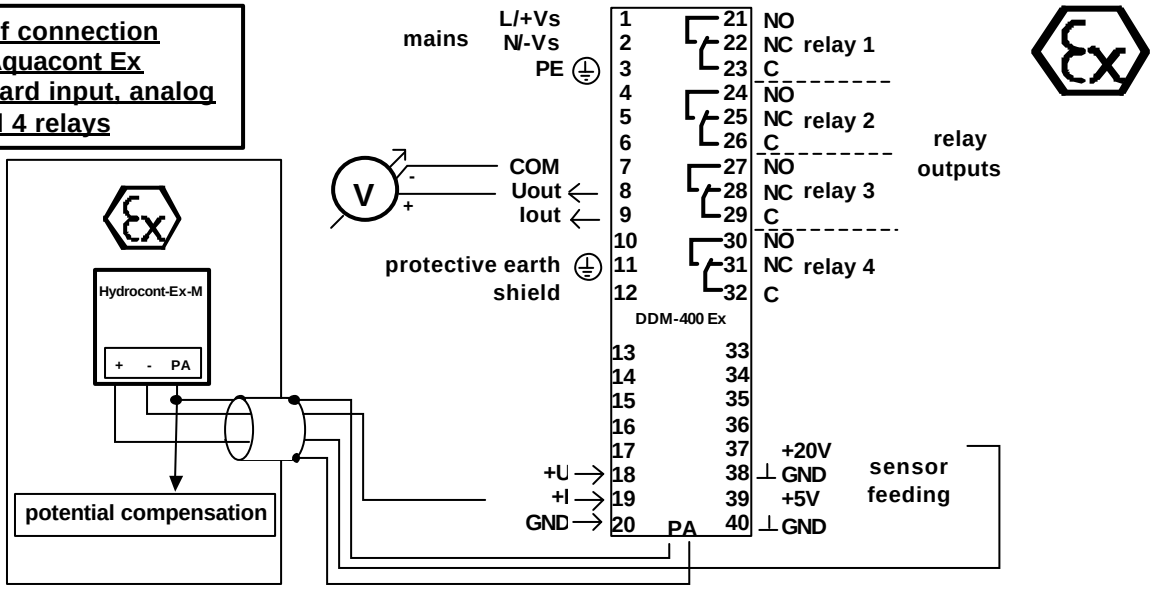
Use only shielded, single side earthed, signal and measurement wires and install these wires separated from power leading wires (mains and relay connection wires). The protective earth at clamp 11 (type DDM or ECO) or 10 (type DDF) should be positioned separately from the protective earth connection of mains and leaded as short as possible to protection earth. Do so also with the PE clamps 31 / 32 of the overvoltage protection (only type DDF). If inductive loads, e.g. contractors are connected to the relay output, an RC protection circuit must be used to avoid high voltage peaks, because they could influence the properly function of the device.

The device meets the legal requirements of the EC-guidelines. CE 0032

Example of connection
DDM-400 Aquacont
DXM-400 with standard input, analog output and 4 relay



Example of connection
DDM-400 Aquacont Ex
with standard input, analog output and 4 relays



Safety notes:

If a device is installed and operated in a hazardous area, the general Ex construction standards (EN60079-14, VDE0165), this safety notes and the enclosed EC conformity certificate must be observed. The assembly of an Ex system must be carried out principally by specialist staff. Keep the relevant safety instructions for the explosion protection.

The devices meets **II (2) G D [EEx ib] IIC or IIB Ta £ +65°C**

If the intrinsically save circuit is leaded to a dust explosion dangerous area zone 21, insure that the devices that are connected to this circuit fulfils the instructions for category 2D and are already certified.

The two clamps PA at the bottom of the device at type DDM /ECO or the two clamps 31 / 32 at the type DDF must be connected to the potential compensation of the Ex-area.

All intrinsically save clamps at type DDM (17-20 / 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

meaning of display parts and keys / different views of the display

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.

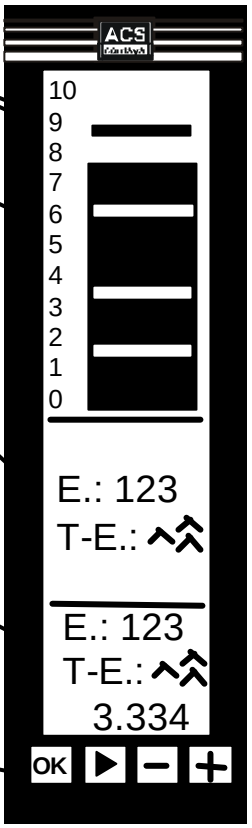
state field (if activated):
In the upper row the activated relays are shown.

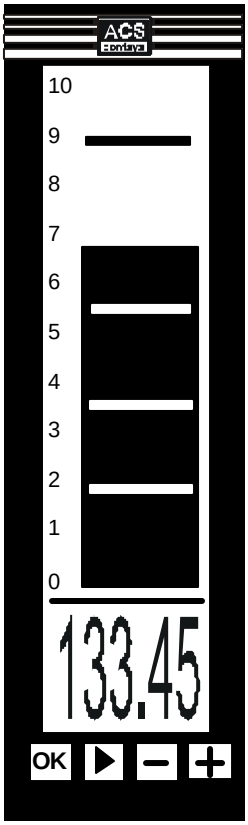
In the next row the tendency with the allocated channel is displayed.
arrows up ➔ rising tendency / arrows down ➔ decreasing tendency
one arrow: tendency value exceeded / double arrow: double tendency value exceeded.
If no channel or if a stroke is displayed, the tendency evaluation is deactivated.

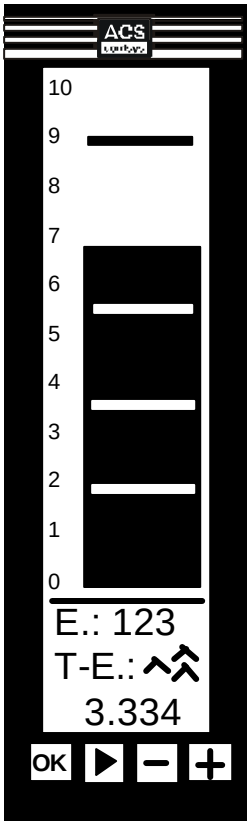
digital value
displayed in the chosen scale. Dependent on configuration a little digital value and the status information's or a large digital value. The device ECO-400 can only display a large digital value.

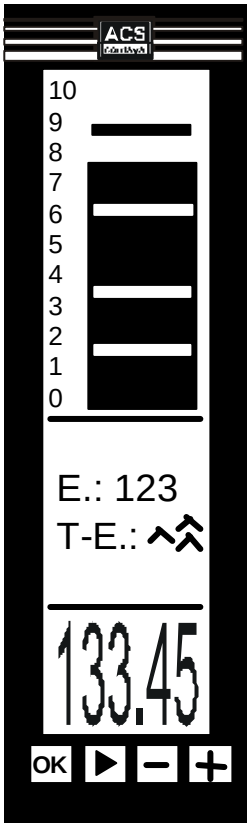
If the value that should be displayed is lower than –29999 or higher than 29999, e.g. if the chosen scale is unfavourable (independent of the decimal places), than the device shows
"....EEE...."
instead of the allocated value.

keyboard:
key "OK": jump into menues / 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



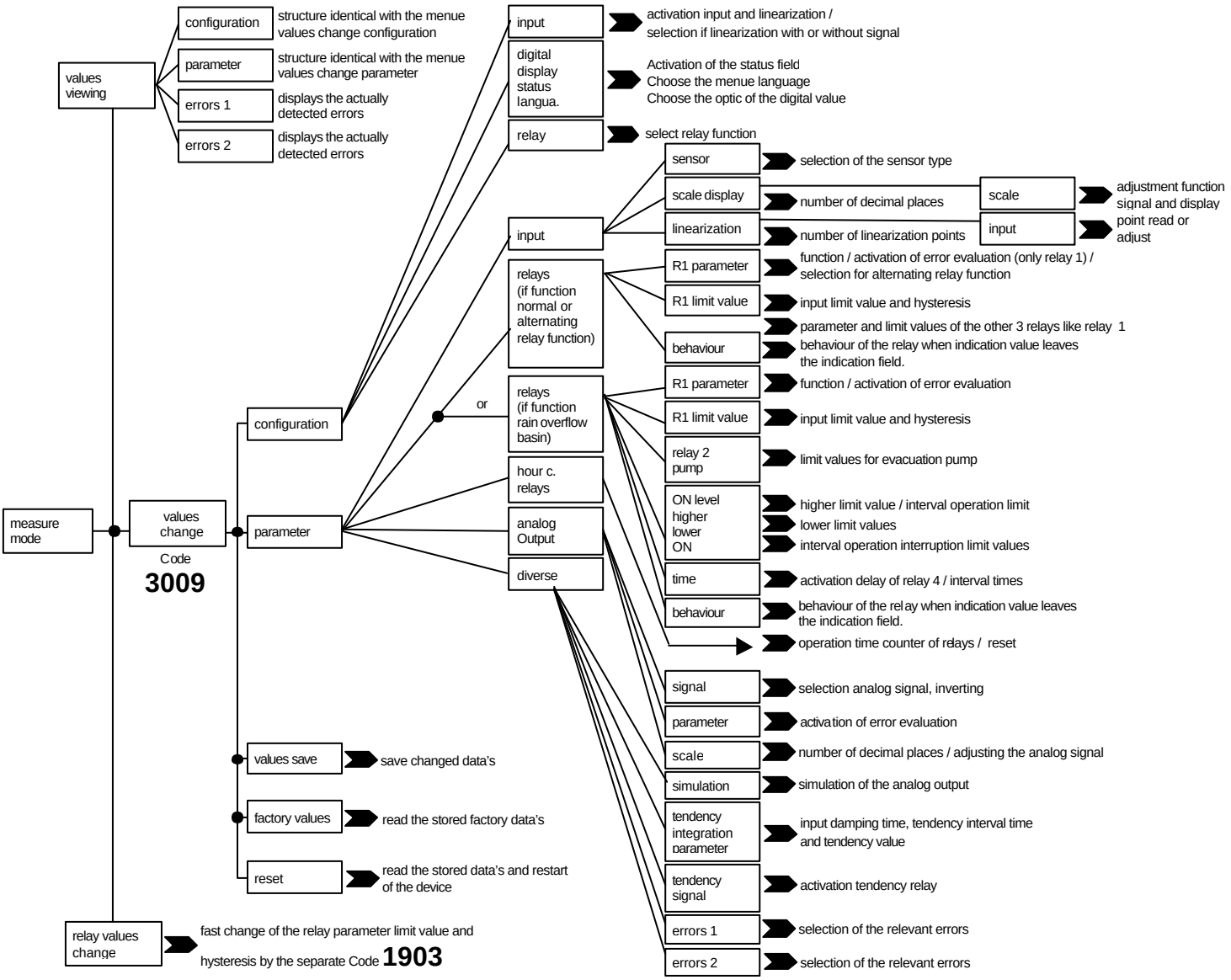






menue short structure / using menue

Dependent on version and options, some of the following described functions are not chooseable.



Use the key **„OK“** to enter the **main menue**. From here **each menue** can be selected, using the keys **„+“** or **„-“** and entered, using the key **„OK“**. Changings can only be made in the menue structure „values change“, but the relay data's also, using the menue „relay values change“.
In each menue you can find the button <-OK Activating this button, using the key **„OK“** switches to the menue **before**.
Configuration and **parametration** 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 **„+“** or **„-“,** 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 menue „**save**“ in the menue „values change“ the changed data's will be saved **durable**.

adjusting inputs

select sensor: values change ➔ parameter ➔ input ➔ sensor input

Select here the desired sensor (0..10 V / 0..20 mA / mV_{diff} / PT100). Only one sensor can be activated.

decimal places: values change ➔ parameter ➔ input ➔ scale input display

Select here in the field **display** the number of decimal places (max.3) that should be indicated at the display

tip: 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 menue.
Dependent on the chosen sensor, this value changes automatically. You can't change this value.

adjustment: values change ➔ parameter ➔ input ➔ scale input display ➔ 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, V or mV), 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 menues displayes 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 menues displayes the same value as in the field **display 100%**.

display

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

Choose here, if the additional state field should be displayed.
A description of the state field is shown within the description of the display elements at the page 5..

menue language: values change ➔ configuration ➔ digital display status language

Choose here the language of the menue.
You can choose between german and english

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

Choose here, if the digital value should be displayed as large or as small value. When selecting normal the status information's will be displayed additionally in the lower part of the display, although the status field is not activated. (compare with side 5).
In the ECO-400 only the large value can be displayed

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

linearization

(not selectable in ECO-400)

activation: values change ➔ configuration ➔ input

Switch here the linearization calculation on the input 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 ➔ linearization rising (or decreasing)

Input here the number of linearization points.
You can use maximal 25 points.

adjustment: values change ➔ parameter ➔ input ➔ linearization rising (or decreasing) ➔ channel select (next) ➔ input

You can here either visualise 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**.
You can **not** change these values.
On linearization **without signal**, input the **desired sensor signal value**, **not** the indicator value 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.
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**.

tendency evaluation

(not selectable in ECO-400)

selection: values change ➔ parameter ➔ diverse ➔ tendency signal

Activate here the tendency evaluation.
normal relay function:
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..
alternating relay function:
Only the relay 2 can be used to signal a rising and/or decreasing tendency
rain overflow basin relay function:
a tendency evaluation signalled at a separate relay is not possible

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.

analog output

signal selection: values change ➔ parameter ➔ analog output ➔ signal

Choose here the requested analog 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 ➔ analog output ➔ parameter

Activate here the analog output.

Choose her, if the analog 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 ➔ analog output ➔ scale

Input here the area of the indication field of the chosen channel that should be signalled by the analog 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 analog 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 analog output to signal 10 V or 20 mA.

simulation: values change ➔ parameter ➔ diverse ➔ simulation 0..10 V (or simulation 0..20 mA)

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

error evaluation

Error selection: values change ➔ parameter ➔ diverse ➔ errors 1 (or errors 2)

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

The sensor signal can be supervised on exceeding by more than 3% or fall under the nominal measure range (0..10 V, 0..20 mA, ±30 mV) and the current analog output on wire break down. In addition to this, the indication field of the input and the chosen field for the analog output can be supervised on exceeding or falling down.
The actually detected errors are visualised in the following menue:

values viewing ➔ DXM state errors 1 (or errors 2)

relay – limit function

Basic function: values change ➔ configuration ➔ relays

Choose here the relay function **normal function.** Choose **RESET**.

selection: values change ➔ parameter ➔ relays

➔ R1parameter (or R2parameter, R3parameter, R4parameter

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)

Choose here, only for relay 1, 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 1 for the error evaluation, it will no more longer work in limit value function.

adjustment: values change ➔ parameter ➔ relays

➔ R1parameter (or R2parameter, R3parameter, R4parameter

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

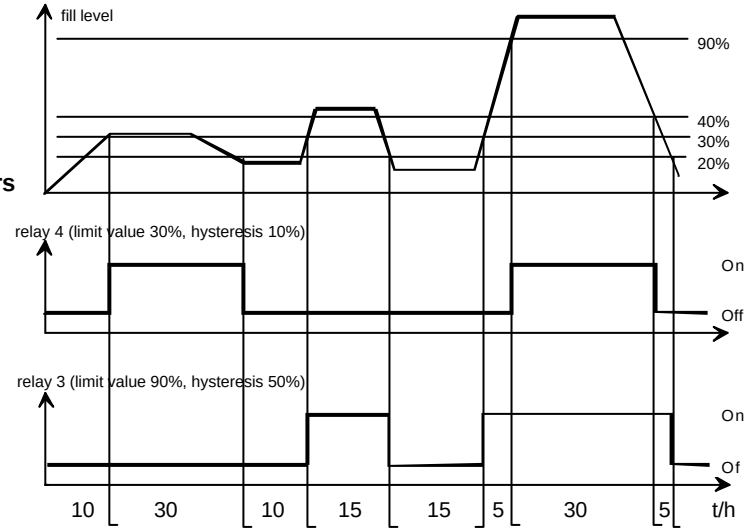
Input here in the field **hysteresis** the value, by which the indication value must be decreased to switch off the relay

behaviour: values change ➔ parameter ➔ relays ➔ behaviour

Choose here the reaction of each relay, if the indication value leaves the selected indication field.
If for one relay nothing is choose, the relay keeps it's status.
If **ON** is chosen, the relay switches on, if **OFF** is chosen, the relay switches off.
Do not choose **ON** and **OFF** together.

relay – alternating function

Dependent on the chosen limit values and the actual activation time of the relevant relay the will be between 2 and 4 relay activated by that way that their activation time is equal in the middle value. There will be more relays activated (emptying) or deactivated (filling) than more the measurement value increases. This function results in a considerable increasing of the life time of the connected units (e.g. pumps). There can be controlled an rising (for emptying) but also a falling (for filling) measurement value. To choose this kind of function the relay 4 must set for rising measurement values (emptying) to working current principle an for falling measurement values (filling) to quiescent current principle.
If e.g. for rising measurement value (emptying) the limit value of relay 4 is exceeded, that one relay, dependent on the activation time of all relevant relays, will be activated, that has the lowest activation.
If the limit value of the relay 3 is also exceeded, that one of the remaining deactivated relay will be activated, that has the lowest activation time.
The limit values of the relays 2 and 1 functions equal, if they are also activated for alternating relay function.
If a point for switch off is achieved, that relay with the highest activation time will be switched off first.
The time criterion for choosing one relay are **full hours** corresponding to the values of the activation time counter. The activation time counter however calculates **exactly by seconds**.
If the relay 1 or 2 are activated for alternating relay function, relay 1 can't be used for error indication and relay 2 can't be used for tendency indication.
If one relay is **not** activated for alternating relay function, it will work in normal limit function.



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relay – alternating function

function: values change ➔ configuration ➔ relays

Choose here the relay function **alternating function.**

selection: values change ➔ parameter ➔ relays

➔ R1parameter (or R2parameter, R3parameter, R4parameter

Choose here in the menue of relay 4 if the alternating function should work for rising of falling measurement value. The settings of the other for the alternating function used relays are adjusted automatically.
working current principle = relay switches on when the signal exceeds the limit value. (rising value = emptying).
quiescent current principle = relay switches off when the signal exceeds the limit value. (falling value = filling).

Choose here, only for relay 1, 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 1 for the error evaluation, it will no more longer work in limit value function. If the alternating function of relay 1 is activated, the fault detection function will be deactivated.

Select here if the respective relay should work in alternating function. The relays 3 and 4 are automatically activated for this function and could not be used for limit function. If you need more than 2 relays for alternating function, activate at first relay 2 and at last relay 1.

adjustment: values change ➔ parameter ➔ relays

➔ R1parameter (or R2parameter, R3parameter, R4parameter

If you use two or more relay for alternating function, input the limit values of the relay as **display values of the input** in correct order. The points for switching off result by using the respective hysteresis
limit value 4 ➔ one relay activated limit value 3 ➔ two relays activated
limit value 2 ➔ three relays activated limit value 1 ➔ four relays activated

If you use the relays 2 or 1 for limit function and not for alternating function than input here:

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

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

behaviour: values change ➔ parameter ➔ relays ➔ behaviour

Choose here the reaction of each relay, if the indication value leaves the selected indication field of the input.
If for one relay nothing is choose, the relay keeps it's status.
If **ON** is chosen, the relay switches on, if **OFF** is chosen, the relay switches off.
Do not choose **ON** and **OFF** together.

activation time counter: values change ➔ parameter ➔ hour c. relays

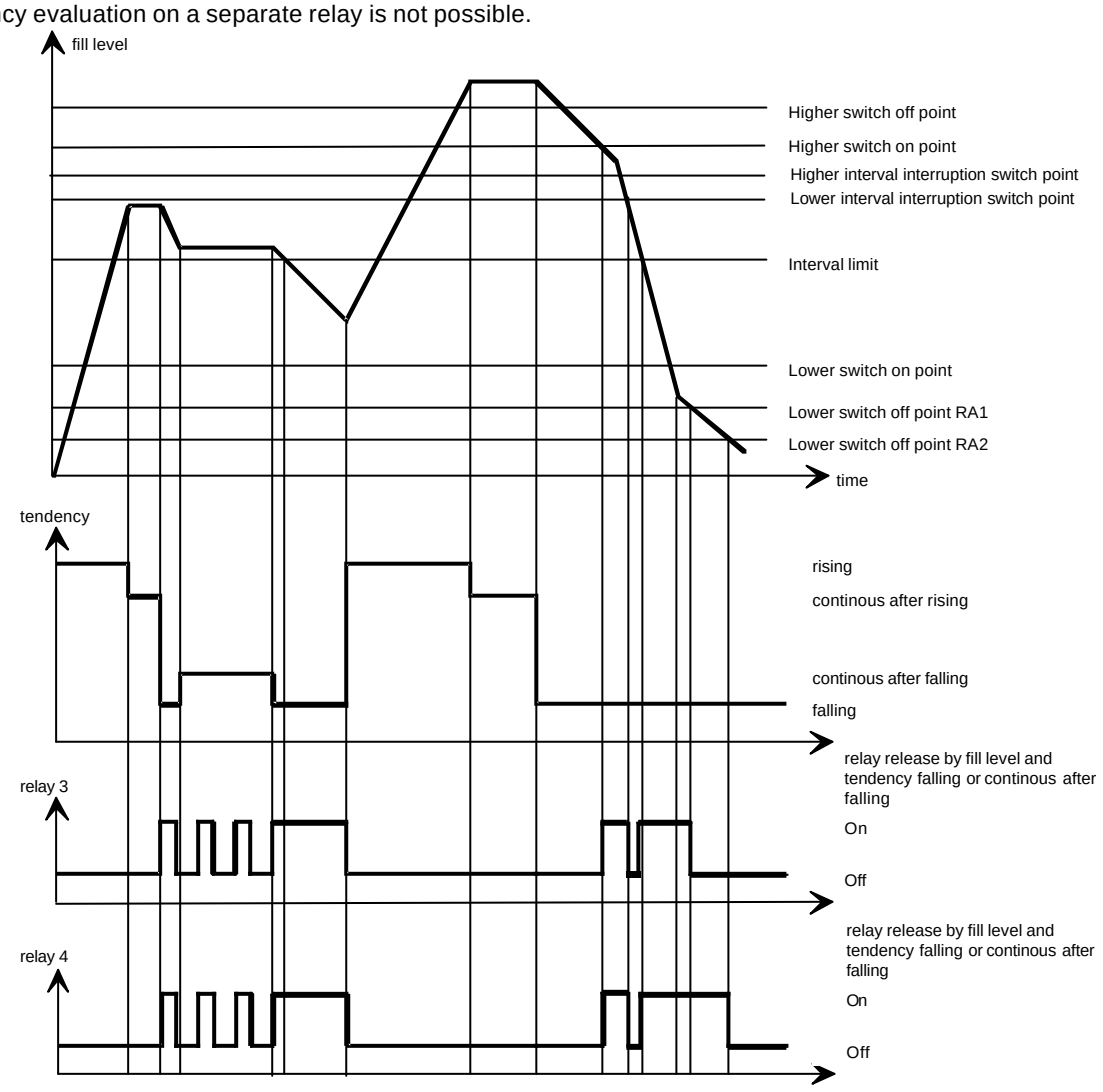
The activation time of each relay is displayed here in hours. This value can be changed or presetted.
Every hour the activation times are stored onetimes and are kept in the case of disconnecting the auxiliary voltage.
If the maximal value of 29952 hours is exceeded all four counters are set to 00000 hours automatically.
By the button **reset** you can manually clear all activation time counters.

restart: values change ➔ reset

Make a RESET, that means a restart of the device, to surely execute all changed and stored settings.

relay – rain overflow basin function

The two **cleaning units** [RA1] (on relay 3) and [RA2] (on relay 4) are controlled by the ensemble acting of an higher and an lower pair of switch on and switch off points, an tendency evaluation and an interval limit. The switch points with the exception of the lower switch off points are relevant for all two cleaning units.
The **tendency enable signal** is given **only after an falling of a continuous after falling filling level**. In the case of rising or continuous after rising filling level the cleaning units **are always switched off**.
Above the interval limit the two cleaning units are activated in pulse mode. By using two interval interruption switch points, this interval function can be interrupted dependent on the measurement value by continuous function. Below the interval limit the relays are activated in continuous mode until the tendency rises or the measurement value underrun the lower switch off points [RA1] (on relay 3) or [RA2] (on relay 4). If the tendency evaluation detects an rising measurement value the relay 3 and 4 are switched off immediately. The on and off times of the relays in interval function can be separately adjusted from 1…99 min. To avoid current peaks the second cleaning unit can be performed with an adjustable switch on delay (0..99 sec.).
Relay 1 can work independent from the rain overflow function in limit function of in fault detection function.
A tendency evaluation on a separate relay is not possible.

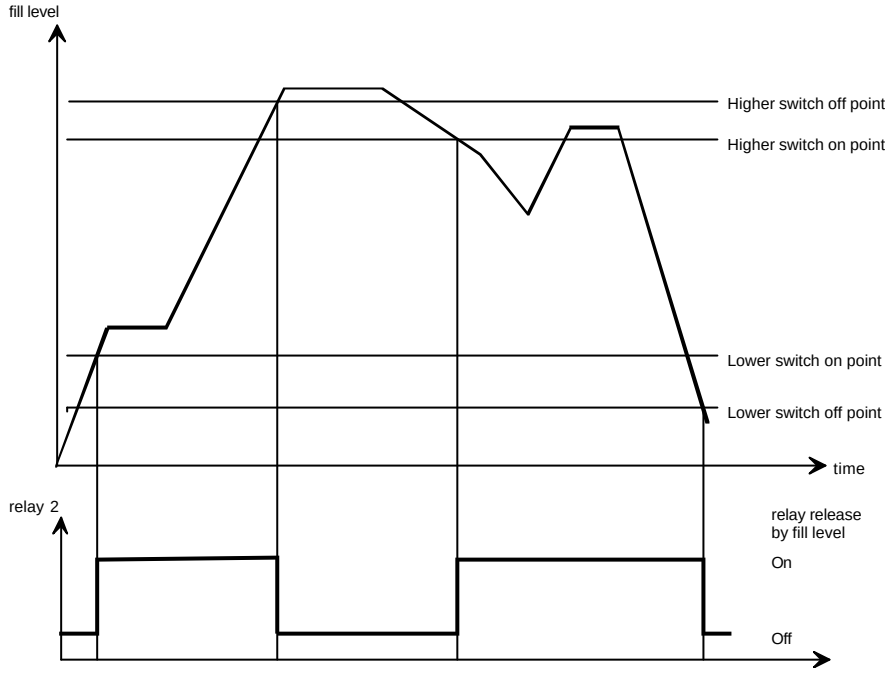


Precondition:

Higher switch off point	**>**	**Higher switch on point**
Higher switch on point	**>**	**Higher interval interruption switch point**
Higher interval interruption switch point	**>**	**Lower interval interruption switch point**
Lower interval interruption switch point	**>**	**Interval limit**
Interval limit	**>**	**Lower switch on point**
Lower switch on point	**>**	**Lower switch off point RA1**
Lower switch on point	**>**	**Lower switch off point RA2**

relay – rain overflow basin function

An **evacuation pump**, connected at **relay 2**, is switched on if the measurement value exceeds the lower switch on point. If the measurement value exceeds the higher or lower switch off points the pump is turned off. If the measurement value after exceeding the higher switch off point and switching off relay 2 fall under the higher switch on point the relay is switched on as long as the measurement value fall under the lower switch off point or rise above the higher switch off point.



function: **values change** ➔ **configuration** ➔ **relays**

Choose here the relay function **rain overflow basin function** and if desired the interval interruption function

evacuation pump: **values change** ➔ **parameter** ➔ **relays** ➔ **relay 2 pump**

Input here the lower and upper pair of switch points according to the **indicated values of the input** by witch the evacuation pump is controlled.
Attention: Higher switch off point > Higher switch on point > Lower switch on point > Lower switch off point

cleaning unit: **values change** ➔ **parameter** ➔ **relays** ➔ **ON level higher**

Input here in the field **OFF Limit** the higher switch off point of all two cleaning units according to **the indicated value of the input. Attention: Higher switch off point > Higher switch on point**
Input here in the field **ON Limit** the upper switch on point of all two cleaning units according to **the indicated value of the input. Attention: Higher switch on point > higher interval interruption switch point.**

values change ➔ **parameter** ➔ **relays** ➔ **ON level lower**

Input here in the field **ON Limit** the lower switch on point of all two cleaning units according to **the indicated value of the input. Attention: Lower switch on point > Lower switch off points [RA1] and [RA2]**
Input here in the field **OFF-RA1 Limit** the lower switch off point of the cleaning unit [RA1] according to **the indicated value of the input.**
Input here in the field **OFF-RA2 Limit** the lower switch off point of the cleaning unit [RA1] according to **the indicated value of the input.**

values change ➔ **parameter** ➔ **relays** ➔ **time**

Input here in the field **relay 4 delay** the time in seconds (till 99), by that the relay 4 is switched on later than relay 3 to avoid current peaks.

relay – rain overflow basin function

interval function: values change ➔ parameter ➔ relays ➔ ON level higher

Input here the interval limit according to **the indicated value of the input**, above that the two cleaning units are activated in pulse mode. **Attention: Interval limit > Lower switch on point**

values change ➔ parameter ➔ relays ➔ ON level ON

Input here the interval interruption switch points according to **the indicated value of the input**, between that the pulse mode of the two cleaning units [RA1] and [RA2] is interrupted by continuous mode
Attention: Higher interval interruption switch point > Lower interval interruption switch point
Lower interval interruption switch point > Interval limit

values change ➔ parameter ➔ relays ➔ time

Input here in the field **Interval ON** the time for that the two cleaning units are switched on in interval mode.
Input here in the field **Interval OFF** the time for that the two cleaning units are switched off in interval mode.

When using the rain overflow basin function, the relay 2 can be nevertheless for normal limit function of for fault detection function.

adjustment: values change ➔ parameter ➔ relays ➔ R1parameter

Choose here, if the relay 1 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)

Choose here, only for relay 1, 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 1 for the error evaluation, it will no more longer work in limit value function.

adjustment: values change ➔ parameter ➔ relays ➔ R1 limit

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

Input here in the field **hysteresis** the value, by which the indication value of the input must be decreased to switch off the relay 1

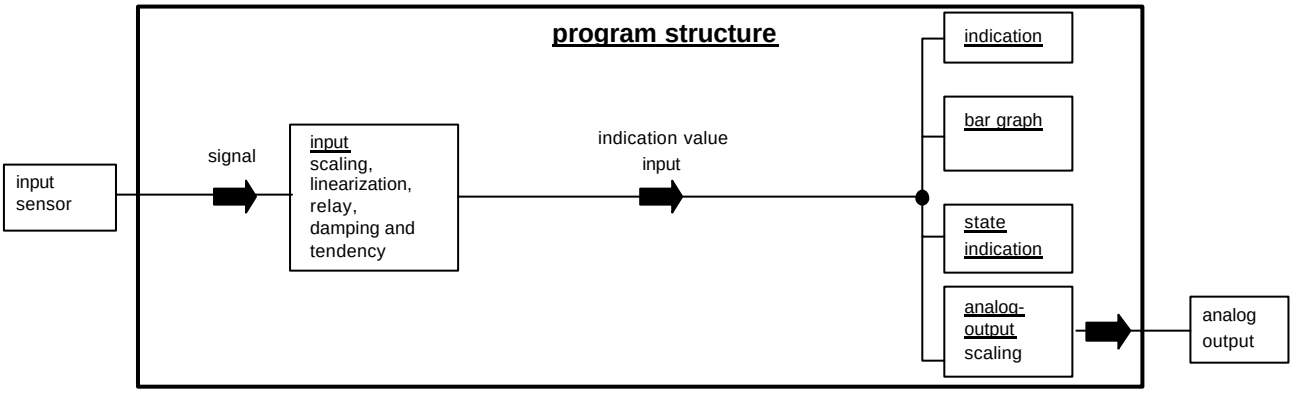
behaviour: values change ➔ parameter ➔ relays ➔ behaviour

Choose here the reaction of each relay, if the indication value leaves the selected indication field of the input.
If for one relay nothing is choose, the relay keeps it's status.
If **ON** is chosen, the relay switches on, if **OFF** is chosen, the relay switches off.
Do not choose **ON** and **OFF** together.

restart: values change ➔ reset

Make a RESET, that means a restart of the device, to surely execute all changed and stored settings.

internal signal schematic diagram / factory data



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

Input:	active, sensor 0...20mA, signal 04.000 = indication 000.00 and signal 20.000 = indication 100.00 linearization not active, linearization with or without signal not active	
Analog output:	active, signal 4...20mA from 000.00 to 100.00, error evaluation not active	
Relay:	all active for limit value function with working current principle, limit values relay 1 = 020.00, relay 2 = 040.00, relay 3 = 060.00, relay 4 = 080.00, hysteresis: all relay 005.00, behaviour at measuring range exceeding: state will not be changed	
Tendency evaluation:	active on digital display, not active on relay, tendency interval time 00005 seconds, signal changing value 0100	
Damping:	01 seconds	
Indication:	DDM / DDF : indication of the small digital value / ECO : indication of the big digital value	
State field:	deactivated	
Language:	german	
Error evaluation:	fault indicator relay R1 not active, indicator on analog output not active, all errors deactivated	
Relay function:	normal function with limit value function	
Rain overflow basin:	Higher switch off point of evacuation pump	= 090.00
	Higher switch on point of evacuation pump	= 080.00
	Lower switch on point of evacuation pump	= 020.00
	Lower switch off point of evacuation pump	= 010.00
	Higher switch off point of cleaning unit 1 and 2	= 090.00
	Higher switch on point of cleaning unit 1 and 2	= 080.00
	Interval limit	= 050.00
	Higer interval interruption switch point	= 070.00
	Lower interval interruption switch point	= 060.00
	Lower switch on point of cleaning unit 1 and 2	= 020.00
	Lower switch off point of cleaning unit 1	= 010.00
	Lower switch off point of cleaning unit 2	= 010.00
	Switch on delay relay 4	= 05 sec.
	On time for interval	= 01 min.
	Off time for interval	= 01 min.

Order code DDM – 400 Aquacont / DDF – 400 Aquacont

Indication and evaluation device with LCD-display and sensor feeding 5V and 24V

certificate
- with certificate
Ex certified according to ATEX100a: II (2) G D [EEx ib] IIC suited for zone 1***

type (for DDF-400 direction of the display)
V vertical 144 x 48 x 137 mm
H horizontal 48 x 144 x 137 mm *

power supply
0 230V AC
1 24V DC

function input
1 standard input ➔ voltage (0-10 V), current (0-20 mA)
4 standard input & +/-30 mV *

function output
1 4 relay outputs
3 4 relay outputs + voltage / current output

overvoltage protection
0 without overvoltage protection
1 with overvoltage protection

DDM-400	___	___	___	___	___	A	
DDF-400	___	___	___	___	___	A	___

* on inquiry
*** for DDF-400 on inquiry

Order Code ECO – 400

Indication and evaluation device with LCD-display and sensor feeding 5V and 24V

certificate
- without certificate
Ex certified according to ATEX100a: II (2) G D [EEx ib] IIC suited for zone 1

relay output
0 without relay output
2 2 relays with change contacts
4 4 relays with change contacts

power supply
1 230V AC
2 24V DC

ECO-400	___	V	___	___

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