RLMAG

Electromagnetic Flowmeter.

SGM LEKTRA

INDIX

     www.sgm-lektra.com

1-WARRANTY

Products supplied by SGM LEKTRA are guaranteed for a period of 12 (twelve) months from delivery date according to the conditions specified in our sale conditions document.

SGM LEKTRA can choose to repair or replace the Product.

If the Product is repaired it will maintain the original term of guarantee, whereas if the Product is replaced it will have 12 (twelve) months of guarantee.

The warranty will be null if the Client modifies, repair or uses the Products for other purposes than the normal conditions foreseen by instructions or Contract.

In no circumstances shall SGM LEKTRA be liable for direct, indirect or consequential or other loss or damage whether caused by negligence on the part of the company or its employees or otherwise howsoever arising out of defective goods

2-TECHNICAL INFORMATION

Measurement process:	electromagnetic
Range:	see order details
Media:	conductive fluids
Minimum conductivity:	≥20 µS/cm
Max. medium viscosity:	70 mm2/s
Max. pressure:	16 bar
Accuracy:	<±(0.8% of reading+ 0.5% of full scale)*
Repeatability:	±0.2% of full scale
Temperature measurement of media:	PT1000, range -20 °C …+70 °C
Response time flow t90 (alarm output /pulse output):	<250 ms
Response time temperature t90 (signal output):	<20 s
Mounting position:	in all directions
In-/outlet:	3 x DN/2 x DN
Handling:	4 optical touch fields,useable with hand gloves
Housing:	stainless steel 1.4404,display screen PMMA

Wetted parts

|	
Connection fitting and housing:	stainless steel 1.4404
Insulation parts:	PEEK
Elektrodes:	stainless steel 1.4404
Seals:	FKM
Protection:	IP 67
Media temperature:	-20°C … +70°C
Ambient temperature:	-20°C … +60°C

Electrical data

Supply voltage:	119 - 30 VDC, internal power consumption max. 100 mA (without outputs)
Display:	TFT display, 128 x 128 pixels,1.4" display orientation in 90° steps adjustable
Display repetition rate:	0.5 ... 10 s, adjustable
Pulse output:	Push-Pull, freely scaleable, configurable for partial or accumulated totalizer
Frequency output:	Push-Pull, freely scaleable, Overflow frequency adjustable
Alarm output:	NPN, PNP, Push-Pull, configurable max. 30 VDC, max. 200 mA short-circuit proof
Analogue output:	active, 3 wire, 0(4)-20 mA, max. load 500 Ω or 0-10 VDC, (Ri = 500 Ω)
Electrical connection:	plug M12x1, 4-pin

Dosing Function

Dosing value:	0.1 …9999.9 [Unit]
Dosing output:	OUT2
Push-Pull, High attivo Ingresso comando:	OUT1, High attivo, PushPull, High active
Control input:	OUT1, High active 0 < ULow < 10 VDC 15 VDC < UHigh < Vs
START/STOP pulse:	0.5 s < thigh < 4 s
RESET pulse:	thigh > 5 s
* Under reference conditions: media temperature:	15 °C ... 30 °C, 1 cSt, 500 µS/cm, 1 bar
ambience temperature:	15 °C ... 30 °C

3-DIMENSIONS

G
½
¾
1

72

108

G

68

68

M12 x 1
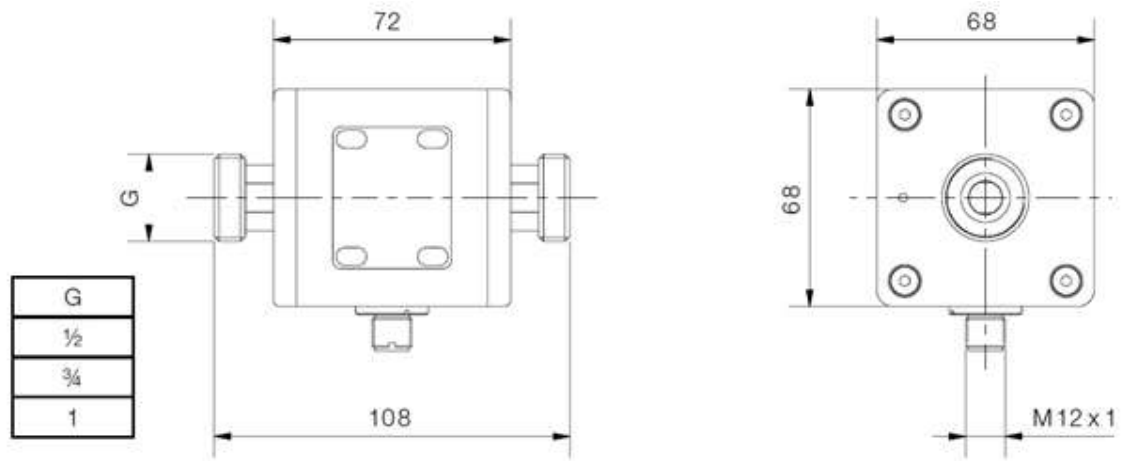
4. NOTE

Please read these operating instructions before unpacking and putting the unit into operation.
Follow the instructions precisely as described herein.
The devices are only to be used, maintained and serviced by persons familiar with these operating instructions and in accordance with local regulations applying to Health & Safety and prevention of accidents.
When used in machines, the measuring unit should be used only when the machines fulfil the EC-machine guidelines.

as per PED 2014/68/EU
In acc. with Article 4 Paragraph (3), "Sound Engineering Practice", of the PED 2014/68/EU no CE mark.
Diagram 8, Pipe, Group 1 dangerous fluids

4.1   Overview of the device functionality

Depending on the installed device firmware, the RLMAG device may havedifferent functionalities.
The functional extensions are shown in the following table.

Function extension	Additional parameters	Available from firmware version
Dosing function		REV180118
Menu languages Simulation function User function keys Analogue output 2-10 Vdc Analogue output behavior acc. to NAMUR NE43	Menu Timeout	REV180514

The installed software version is displayed after starting the device below the manufacturer logo in the form REVxxxxxx for approx. 2 sec.

5. INSTRUMENT INSPECTION

Instruments are inspected before shipping and sent out in perfect condition.
Should damage to a device be visible, we recommend a thorough inspection of the delivery packaging.
In case of damage, please inform your parcel service / forwarding agent immediately, since they are responsible for damages during transit.

Scope of delivery:
The standard delivery includes:
• Electromagnetic Flowmeter   model: RLMAG
• Operating Instructions

6. REGULATION USE

The RLMAG flowmeter has been specially developed for the measurement, display and transmission of both, flow rates and temperature of conductive liquids. The instrument has a graphic TFT display, rotatable in 90 ° steps and can display flow rate, temperature, daily volume counter (resettable) and total volume counter in the units of measurement selected by the operator. A clear menu guides the user through the parameterization of the device, which largely eliminates the need to look into the operating instructions.
Any use of the magnetic flowmeter, model: RLMAG, which exceeds the manufacturer's specification, may invalidate its warranty. Therefore, any resulting damage is not the responsibility of the manufacturer.
The user assumes all risk for such usage.

7. ENVIRONMENT

The RLMAG device with stainless steel housing and stainless steel electrodes is weatherproof and conforms to protection class IP67. The meter is designed for harsh indoor or outdoor environments and complies with Directive 2014/30/EU (Electromagnetic Compatibility).

8. OPERATING PRINCIPLE

8.1　General

The new RLMAG Flowmeter is designed to measure and monitor small and medium flows of conductive fluids in piping. The device works on the magnetic-inductive measuring principle. According to Faraday's law of induction, a voltage is induced in a conductor moving in a magnetic field. The electrically conductive measuring medium corresponds to the moving conductor in the process. The voltage induced by the measuring medium is proportional to the flow rate and thus a measure of the volume throughput. Prerequisite is a minimum electrical conductivity of the flowing medium. The induced voltage is fed to a measuring amplifier via two electrodes, which are in conductive contact with the medium. The volume flow is calculated via the defined pipe diameter. The measurement is independent of the medium and its physical properties such as density, viscosity and temperature. The device can be configured via the display. There are two outputs available, which can each be configured as alarm, frequency, pulse, voltage, and current outputs. The device also provides a dosing function. The dosing function can be activated in measuring mode via the four buttons. The dosing function controls simple filling tasks and also measures flow rate and partial amount.

8.2　Minimum electrical conductivity / gas bubbles

For the correct function of the instrument, it is necessary that the flow channel is always completely filled with medium. From a minimum electrical conductivity of 20 µS / cm, the RLMAG operates within the specified error limits. The conductivity of the medium is constantly monitored by the device electronics. If the electronics detects that the minimum conductivity has fallen below min. value, this is signaled by displaying the error message 'Empty pipe' and the flow rate reading is set to '0'. Air bubbles in the flowing medium or media with varying conductivity in the range of the minimum conductivity can disturb the measuring function and reduce the measuring accuracy of the RLMAG. Gases contained in the liquid are also measured as a volume flow and lead to measurement errors. If necessary, install appropriate vents in the flow of the unit.

8.3　Deposits

Minor deposits on the measuring tube generally do not affect the measuring accuracy unless their conductivity deviates significantly from the liquid. For liquids that have a tendency to deposit, periodically inspect the meter tube and, if necessary, clean it.

8.4　Measuring electrodes

The RLMAG uses electrodes with galvanic tapping. They are in direct contact withthe medium.
The standard electrodes are made of stainless steel 1.4404.

9. MECHANICAL CONNECTION

9.1   Check operating conditions

• flow rate
• max. operating pressure
• max. operating temperature

In general, RLMAG is subjected to the same loads as the piping into which it is installed.
The RLMAG should therefore be kept away from extreme loads, such as pressure surges with strong, dynamic pipe movements, vibrations in the proximity of centrifugal pumps, high temperature media, flooding etc.
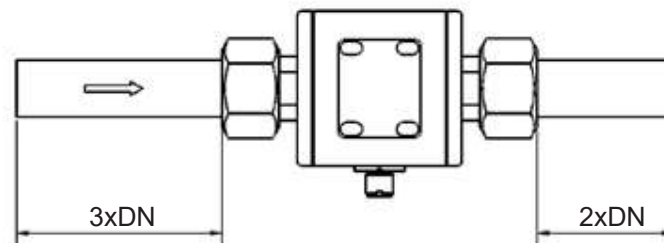
9.2   Installation

• Remove all packing materials and transport retainers and ensure that no such materials remain in the device.
• It can be installed in vertical, horizontal or rising pipes. Flow in direction of the arrow.
• Avoid pressure and tensile load.
• Mechanically secure the inlet and outlet pipe at a distance of 50 mm from the connections.
• Avoid valves or large reduction on the inlet section (this increases the inaccuracy of measurements).
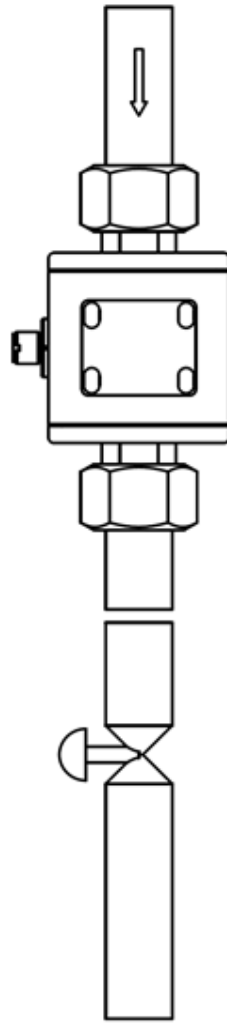• Check the leak tightness of the connections.

While mounting RLMAG hold the flowmeter from spanner surface (not from the housing) with the help of spanner. Take into account the tightening torque.

Nominal size	Tightening torque
½"	Da 22 a 24 Nm
¾"	Da 28 a 30 Nm
1"	Da 28 a 30 Nm

Inlet and outlet run

Installation from top to bottom

avoid these installation locations

Gas bubbles, particle

Free outlet

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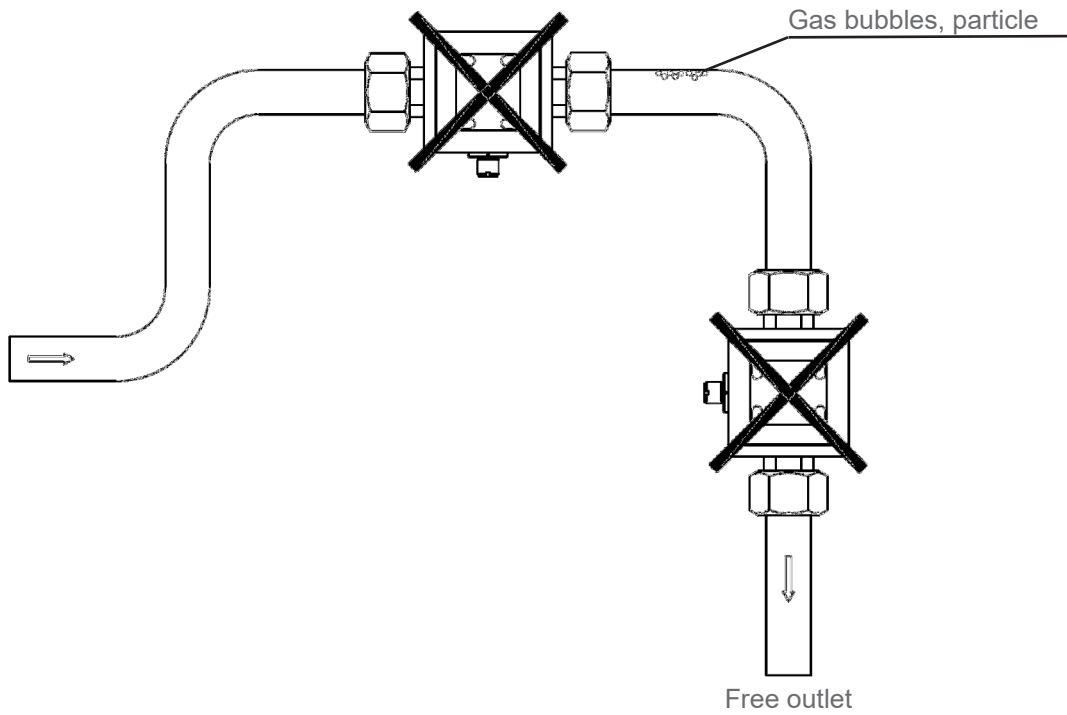
10. ELECTRICAL CONNECTION

10.1 General

Attention!
Make sure that the voltage values of your system correspond with the voltage values of the measuring unit.

• Make sure that the supply wires are de-energised.
• Connect the supply voltage and the output signal to the plug PIN's as stated below.
• We recommend the use of wires with cross sectional area of min. 0.25 mm².

Attention! The measuring electrodes are galvanically connected with the reference potential of the supply voltage and the signal output.

10.2 Pin assignment
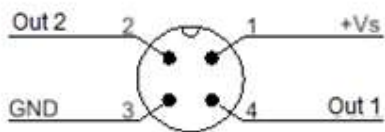
Configurable output functions:

Out 1	Out 2
analogue output 4-20 mA	analogue output 4-20 mA
analogue output 0-20 mA	analogue output 0-20 mA
analogue output 0-10 V	analogue output 0-10 V
alarm output	alarm output
pulse output	pulse output
frequency output	frequency output
communication mode M12COM	
control input dosing function	dosing output

Connection example:

OUT2: analogue output 4-20 mA
OUT1: analogue output 0-10 V
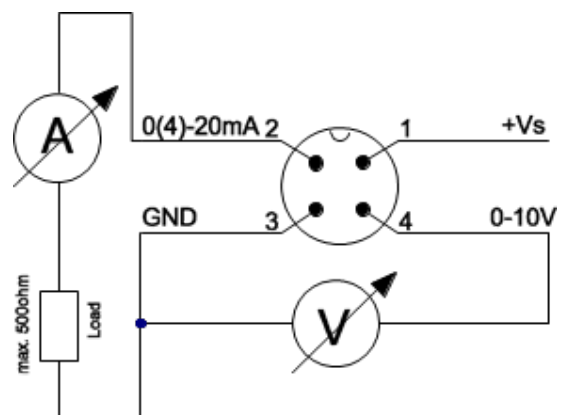
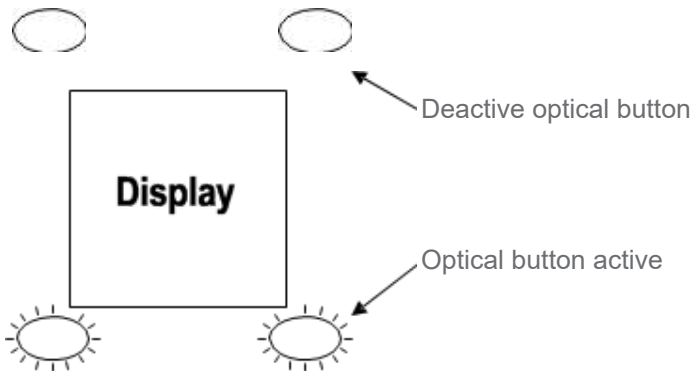## 10.3   Connector version with pre-wired cable (optional)

Refer to the below table for the correspondence between cable colours and connector pin.

Colore	Pin
brown	1
white	2
blu	3
black	4

11. OPERATION AND MENU STRUCTURE

11.1 General

11.1.1 Operation of the optical buttons

Deactive optical button

Display

Optical button active

An optical button is located at each corner of the TFT display. The operability of the respective buttons is signaled by blue backlighting; therefore non-backlit buttons are disabled and cannot be operated. To operate the keys, the finger must be placed on the key-dome and raised again. The orange background of the button symbols is briefly displayed in blue as visual feedback for a detected key press.

To avoid accidental operation in measuring mode, the operator must hold down the menu button for 3-5 seconds to activate the function. If the menu button is held down for more than 3 seconds, the blue backlighting will begin to flash to alert the user to release the button.

The operation of the optical buttons can also be done with gloves or other optically reflective objects, light dirt on the surface usually does not interfere with the key function.

11.1.2 Function of the control buttons

The function of each control key can be recognized by the respective symbol displayed in the corners of the TFT display.

key symbol	designation	function	
		Measuring mode	menu mode
≡	menu mode	Activate menu mode hold 3-5 sec.	-
▼	info display	opens the infomenu	-
STATO	down	-	Scroll down menu / decrease numeric value when entering numeric value
▲	up	-	Menu scroll up / Increase the number value for numeric value input
▶▶▶▶	forward	-	Menu level lower / forward (last menu level: Save value)
◀◀◀◀	backward	-	Menu function: menu level higher / back (last step: exit menu)

inactive buttons

Soft key symbol "MENU"

Soft key symbol "Status"

active buttons
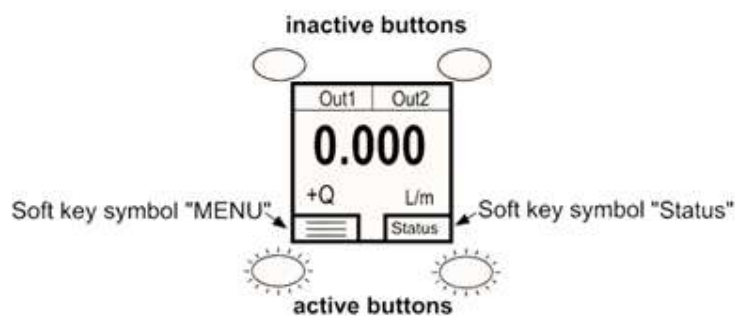
11.2 Measuring mode

After applying the supply voltage, the device starts in measuring mode. In this mode, the measured values of the respective measuring variables are continuously recorded; the current instantaneous flow values, temperature values and the volume counter readings are cyclically calculated and displayed according to the type of display.
In addition to the main display, the states and configuration of the outputs are shown in the display.
If the corresponding output is configured as an alarm output, the status is also displayed with a green or red background color.
If the background color is green, the set threshold value is exceeded; if it is red, the current value is still under threshold.

Measurement Mode Display Layout 'Single'
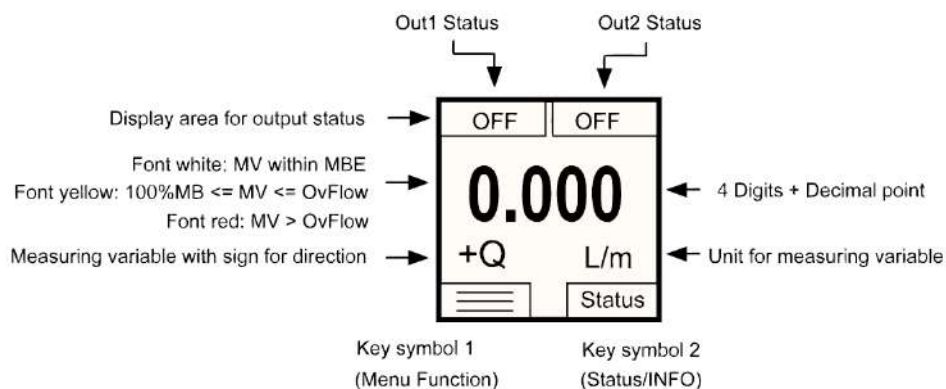
The measurement variables are represented by their corresponding symbols:

Measuring variables

Menu entry	Symbol	Description
Flow	Q	Flow rate
Volume	AC	Accumulated totalizer
Temperature	T	Medium temperature
Part volume	PT	Partitial totalizer

The outputs and their status are shown on the display as follows:

Output function OUT1/2	Symbol	Representation
Diable	OFF	
Analog output 4-20mA	4-20mA	
Analog output 0-20mA	0-20mA	
Analog output 0-10V	0-10V	
Analog output 2-10V	2-10V	
Alarm output Push-Pull	SW+	Background grey/ green
Alarm output PNP	SW+	Background grey/ green
Alarm output NPN	SW-	Background grey/ green
Pulse output	PLS	
Frequency output	FRQ	
Comunication mode	COM	

The measured variables flow, temperature and volume counter can in principle be assigned to each output function.
The assignment of the respective output is indicated by the display of the symbol of the measuring variable.
The representation of the assignment is independent of the set display layout (single, dual).

11.2 Measurement Mode

Measurement Mode Display Layout 'Dual'
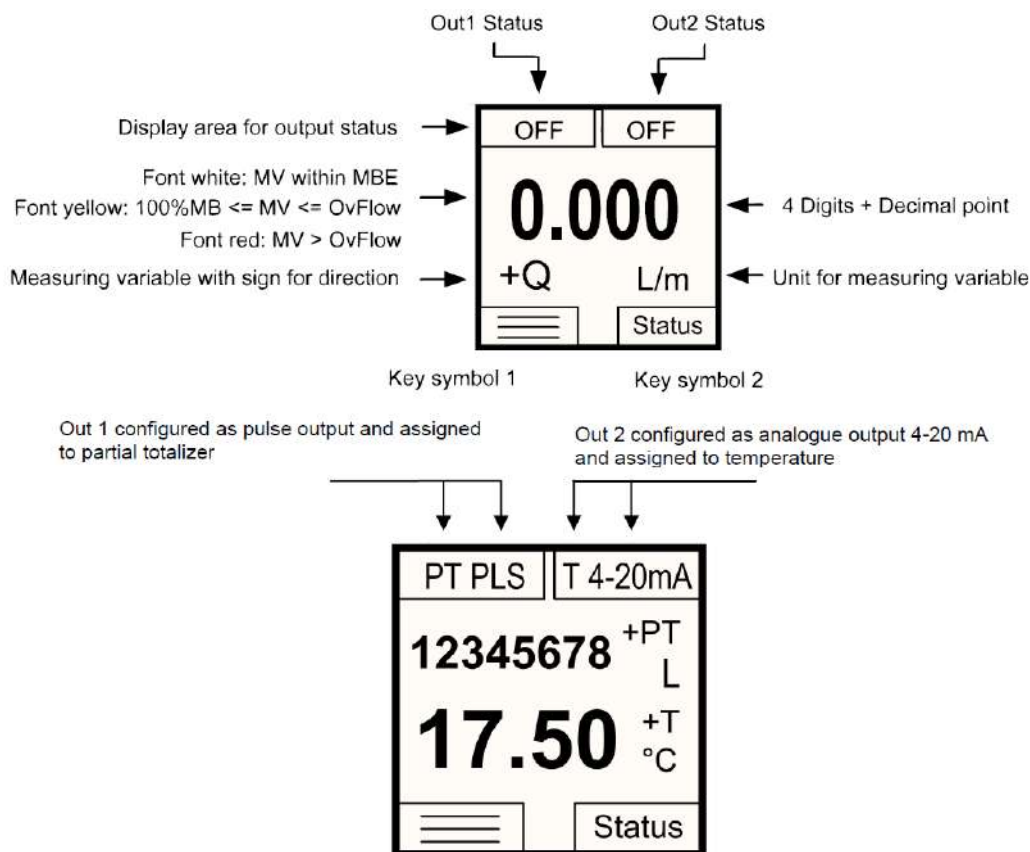
11.2.1 Display area of the flow meters

The number of digits displayed on the volume counter display (partial and total volumetric counters) is limited to max. 8 digits. The partial and total volumetric meters therefore have a smaller font size than the flow and temperature display.
If the 8-digit display range of the meter is exceeded, this is indicated by the display of 8 minus characters (--------). In this case, the meter reading can no longer be read.
The user now has the option of bringing the counter reading back into the display area by changing the volume counter unit.

11.3 Menu Mode

In menu mode, all device parameters can be set. The individual parameters are arranged in menu groups by function.
While the menu mode is activated, the signal processing and the outputs are still active in the background.
However, all display parameters and outputs are updated after exiting the menu mode or in the measuring mode.
Note: The menu mode will exit automatically after a certain time without using the buttons, if the parameter
"Menu Timeout" is set not equal to "0".

11.3.1 Parameter setting

11.3.1.1 List Selection

Parameters with predefined selection values are defined by means of list

selection. The currently selected menu item is displayed in orange text.

The selection can be moved with the [▼] [▲] keys, the [▶▶▶▶] key is used to accept the selection.

To activate the menu mode, press the button [≡] for 3-5 seconds. The parameters are divided into main
groups and subgroups.

The buttons [▼] [▲] are used to select the main groups. In the main menu not all menu groups can
be shown on the display at the same time, the list of individual menu items then scrolls up or down when the
selection has reached the top or bottom. To choose the selection, the key is pressed [▶▶▶▶]; and the

device jumps to the corresponding submenu or parameter setting level.

For selection of predefined parameter values and are [▼] [▲] [▶▶▶▶] used.

After changing the value of the parameter and confirming with the [▶▶▶▶],

parameter is saved and the return to the higher menu level.

To return to the main menu or to exit the menu mode, press (repeatedly) . [◀◀◀◀].
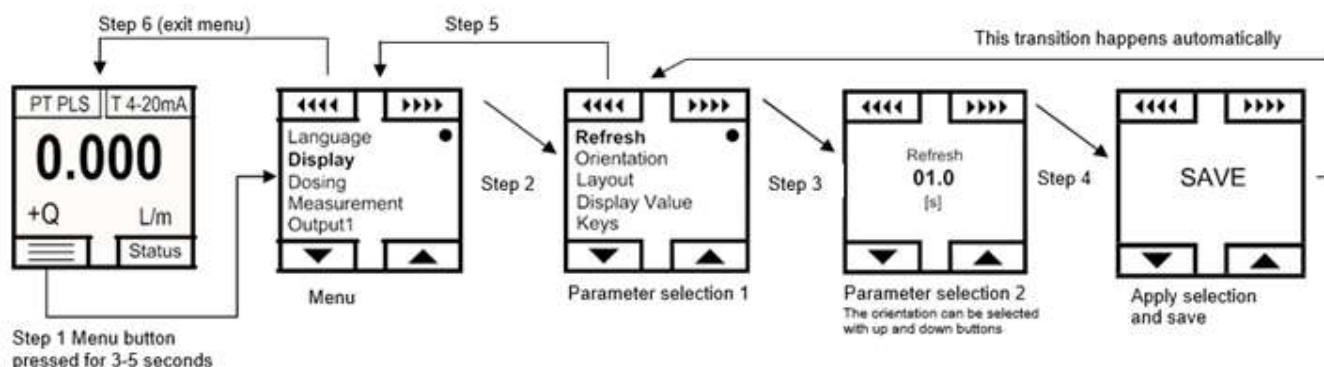
11.3.1.2 Numerical value input

When setting parameters with a numerical value, the assigned unit is always displayed below the input field in square brackets in the input function.

The maximum size and the number of decimal places are fixed and cannot be changed.

After calling the input function, first the left, outer digit is displayed in orange.

This position can now be adjusted either with the keys [▼] [▲] in the value from 0 to 9.

By pressing the key [▶▶▶], the entry point moves to the right and the next digit can be changed.

By pressing the key , [◀◀◀] the editing point can be moved to the left again.

If the editing point is on the far right, the set value is saved by pressing the key again [▶▶▶] and switched to the higherlevel menu function.

12. DEVICE CONFIGURATION

12.1 Sequence of device parameterization

The flowmeter RLMAG is pre-configured in factory.
Changing the parameters "Measuring range" and "Sensor constant" or "K factor" is therefore not permitted.
The adjustment of these parameters is only possible on the part of SGM-LEKTRA.
In the event of subsequent changes to volume or throughput units, the dependent parameters are converted and adjusted accordingly. However, the limit parameters of the switching outputs must always be checked and adjusted manually when adjusting volume or throughput units - these are not automatically converted.
An accidental change of the parameterization can be revised by the function "Reset factory setting" in the menu Service / User menu / Factory setting.

12.2 Language

In this menu item the menu language can be changed in English, German, French or Spanish (standard: English).

Menu level	Sublevel	Parameter level	Subparameter level 1	Subparameter level 2	Subparameter level 3	Description	Value range / value list	Default value for LPM version	Default value for GPM version
Language	English					Sets menue language to English		English	
	Deutsch					Sets menue language to Deutsch			
	Francais					Sets menue language to Francais			
	Espanol					Sets menue language to Espanol			
Display	Refresh	List selection				Sets display refresh rate	0,5-10	0.5 sec	
	Orientation	rotate CW				rotates the display 90° clockwise			
		rotate CCW				rotates the display 90° counter clockwise			
	Layout	Single				shows only one input variable on the main display			
		Dual				shows two input variables on the main display			
	Display value	Upper display	List selection			variable to be displayed on main or upper display		Flow	
		Lower display	List selection			variable to be displayed on lower display		Temperature	
	Keys	Hotkeys	Left	Flow / Volume / Temperature / Part Volume	List selection	Selects the measuring value and the function for left Hotkey	Off, Value, Min/Max	Off	
			Right	Flow / Volume / Temperature / Part Volume	List selection	Selects the measuring value and the function for right Hotkey	Off, Value, Min/Max		
	Sensivity	List selection				Selects the Sensivity of the optical key buttons (High is recommended for handshoe usage)	Low, Medium, High	Low	
	Menue Timeout	numerical input				Defines menue timeout (0 = disabled)	0, 5 to 60 s	15 s	

Menu level	Sublevel	Parameter level	Subparameter level 1	Subparameter level 2	Subparameter level 3	Description	Value range / value list	Default value for LPM version	Default value for GPM version
Dosing	Activation	disabled				Dosing function disbaled		disabled	
		enabled	Activation			Activates dosing function			
			Value	numerical input			0 Value , unit	0	
			Correction value	numerical input			-, Value , unit	0	
			Unit	List selection			ml, L, m3, galUS, galUK, User	L	galUs
			Time out	numerical input			0,5 - 10 sec	0,5 sec.	
Measurement	Flow	Unit	List selection			sets flow units	ml/m, L/m, L/h, m3/h, galUS/m, galUS/h, galUK/m, galUK/h, User	L/m	galUs/m
		Cut off	numerical input			suppresses flow below this value	0 **Value** M. range start	0.04	
		Simulatinmode	See separate Parameter Table						
	Volume	Counting type	absolute/bidirectional			sets the counting method for accumulated totalizer		absolute	
		Unit	List selection			sets volume units	ml, L, m3, galUS, galUK, User	L	L
	Temperature	Unit	List selection			sets temperature units	°C, °F, User	°C	°C
		Simulatinmode	See separate Parameter Table						
	Part Volume	Counting type	absolute/bidirectional			sets the counting method for partial totalizer		absolute	
		Unit	List selection			sets volume units	ml, L, m3, galUS, galUK, User	L	galUs
		Memory reset	Yes/No			resets partial totalizer		n.A	
		Simulatinmode	See separate Parameter Table						

Menu level	Sublevel	Parameter level	Subparameter level 1	Subparameter level 2	Subparameter level 3	Description	Value range / value list	Default value for LPM version	Default value for GPM version
Output 1 / Output 2	The user is supposed to select the variable he wants to give out as output	Flow	Disabled			Output disabled		Disabled	
			Alarm Output	Function	List selection	sets function of alarm output	Limit/Window	Limit	
				Output Type		sets characteristic of output	NPN/PNP/PP	NPN	
				Switch Function		sets switching function	NO/NC	NO	
				Threshold	numerical input	sets threshold	M. range start Value FS	1	
				Hysteresis		sets hysteresis	-9999,0 Value +9999,0	1	
				Suppressionfactor		switching delay factor x100ms	0 Value 60	0	
			4-20mA	Value for 4mA		sets variable value for 4mA	M. range start Value for 20mA	0	
				Value for 20mA		sets variable value for 20mA	Value for 4mA < Value FS	100	
			0-20mA	Value for 0mA		sets variable value for 0mA	M. range start Value for 20mA	0	
				Value for 20mA		sets variable value for 20mA	Value for 0mA < Value FS	100	
			2-10V	Value for 2V		sets variable value for 2V	M. range start Value < Value for 10V	0	
				Value for 10V		sets variable value for 10V	Value for 0V < Value FS	100	
			0-10V	Value for 0V		sets variable value for 0V	M. range start Value < Value for 10V	0	
				Value for 10V		sets variable value for 10V	Value for 0V < Value FS	100	
			Frequency output	max. Frequency		sets max. frequency to be given out at Full scale	50-1000 Hz	500 Hz	
				Overflow		sets overflow in % of max.freq	1-100	1%	
				Value for 0Hz		sets variable value for 0Hz	M. range start Value < Value for 0Hz	0	
				Value for max		sets variable value for max Hz	Value for 0Hz < Value FS	100	
			Communication			This mode is available for Output 1 and is reserved for factory calibration			
		Volume	Disabled			Output disabled		Disabled	
			Pulse output	Pulse unit	List selection	sets volume units for Pulse volume	ml, L, m3, galUS, galUK, User	L	galUS
				Pulse volume	numerical input	sets volume represented by one pulse	0-999	1	
				Pulse width		sets width of each pulse	1-20.000	1ms	
			Communication			This mode is available for Output 1 and is reserved for factory calibration			

Menu level	Sublevel	Parameter level	Subparameter level 1	Subparameter level 2	Subparameter level 3	Description	Value range / value list	Default value for LPM version	Default value for GPM version
Output 1 / Output 2	The user is supposed to select the variable he wants to give out as output	Temperature	Disabled			Output disabled		Disabled	
			Alarm Output	Function	List selection	sets function of alarm output	Limit/Window	Limit	
				Output Type		sets characteristic of output	NPN/PNP/PP	NPN	
				Switch Function		sets switching function	NO/NC	NO	
				Threshold	numerical input	sets threshold	M. range start $Value$ FS	1	
				Hysteresis		sets hysteresis	-9999,0 $Value$ +9999,0	1	
				Suppressionfactor		switching delay factor	0 $Value$ 60	0	
			4-20mA	Value for 4mA		sets variable value for 4mA	M. range start $Value$ < $Value$ for 20mA	0	
				Value for 20mA		sets variable value for 20mA	Value for 4mA < $Value$ FS	100	
			0-20mA	Value for 0mA		sets variable value for 0mA	M. range start $Value$ < $Value$ for 20mA	0	
				Value for 20mA		sets variable value for 20mA	Value for 0mA < $Value$ FS	100	
			2-10V	Value for 2V		sets variable value for 2V	M. range start $Value$ < $Value$ for 10V	0	
				Value for 10V		sets variable value for 10V	Value for 0V < $Value$ FS	100	
			0-10V	Value for 0V		sets variable value for 0V	M. range start $Value$ < $Value$ for 10V	0	
				Value for 10V		sets variable value for 10V	Value for 0V < $Value$ FS	100	
			Frequency output	max. Frequency		sets max. frequency to be given out at Full scale	50-1000 Hz	500 Hz	
				Overflow		sets overflow in % of max.freq	1-100	1%	
				Value for 0Hz		sets variable value for 0Hz	M. range start $Value$ < $Value$ for 10V	0	
				Value for max		sets variable value for max Hz	Value for 0Hz < $Value$ FS	100	
			Communication			This mode is available for Output 1 and is reserved for factory calibration			
		Part volume	Disabled			Output disabled		Disabled	
			Pulse output	Pulse unit	List selection	sets volume units for Pulse volume	ml, L, m3, galUS, galUK, User	L	gal/US
				Pulse volume	numerical input	sets volume represented by one pulse	0-999	1	
				Pulse width		sets width of each pulse	1-20.000	1ms	
			Communication			This mode is available for Output 1 and is reserved for factory calibration			

Menu level	Sublevel	Parameter level	Subparameter level 1	Subparameter level 2	Subparameter level 3	Description	Value range / value list	Default value for LPM version	Default value for GPM version
User Service	Password	numerical input				protects user service with password if it is set other than 00000	00000-99999	00000	
	Factory reset	Yes/No				sets all the settings to factory settings			
	Lock Menu	Lock/Unlock				locks the menu entry using same password as set under 'Change Password'		Unlock	
	Sim Autostop	numerical input				Sets the simulation mode autostop time	1 - 31 min.	10 min.	
Factory Service	Access only to authorized persons, Password protected								
Info	Version					Shows the 'firmware version'			
	Manual					Shos an QR-Code for downloading			

Menu level	Sublevel	Parameter level	Subparameter level 1	Subparameter level 2	Subparameter level 3	Description	Value range / value list	Default value for LPM version	Default value for GPM version
Measurement	The user is supposed to select the variable he wants to give out as output	Simulationmodus	Activation	disabled		Disables the simulation mode	Enable / Disable	Disable	
				enabled		Enables the simulation mode			
			Mode	Static		Sets the static mode		Static mode	
				Triangle		Sets the triangle mode			
				Monotonic		Sets the monotonic mode			
			Value	numerical input		Start value	0 - 9999,9 [unit]	0	
			Inc Value			increment value	0 - 999,99 [unit]	10	
			Intervals			no. Of intervals	1 - 65000 x	20	
			Interval time			Interval time between two steps	50 - 5000 ms	50 ms	

12.4 Display

12.4.1 Refresh

Parameter "Refresh" defines the time interval within which the measuring variables are displayed.

The state of the outputs (current output, voltage output, frequency output) is also recalculated after the measuring time has expired.

The "Refreshrate" can be increased in steps of 0.5 sec. to 10 sec. An increase in the refresh rate time causes on one hand an increased "filtering" of the input signals, but also an increased reaction time for the outputs.

12.4.2 Orientation

With the menu item "Orientation" the display can be rotated either clockwise or counterclockwise in 90 ° increments. As the display rotates, both the display contents and the function of the 4 control buttons are turned.

12.4.3 Layout

This parameter can be used to configure the display to either show one measurement variable or two measurement variables.

12.4.4 Display value

With the aid of this parameter, the measurement variables provided by the transmitter can be displayed. Depending on the 'Layout' display, either one or two measuring variables can be displayed.

12.4.5 Keys HOTKEYs

Two independent user keys are available, which can be individually assigned with different display functions. The 2 user keys are available in measurement mode top right and left. If the buttons are activated, they are backlit in blue and the programmed function can be executed by touching.
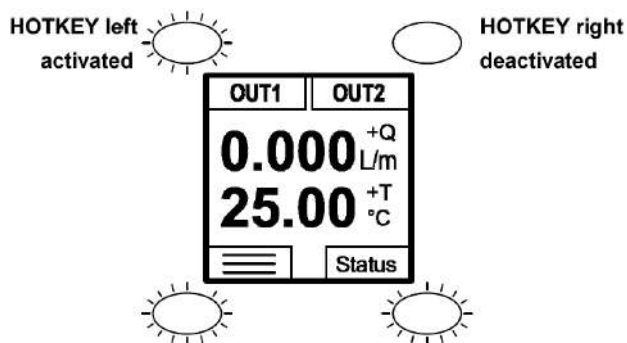

The following functions are available:

Reading	MIN/MAX / Reset	Value display / Reset
flow	Yes / Yes	Yes / No
Temperature	Yes / Yes	Yes / No
Partial quantity counter	Not available	Yes / Yes
Totalizer	Not available	Yes / No

The called hotkey function remains permanently activated and can only be left by pressing the key ◀◀◀◀ .
A direct reset function is available for the MIN / MAX measured value function and the partial quantity counter.
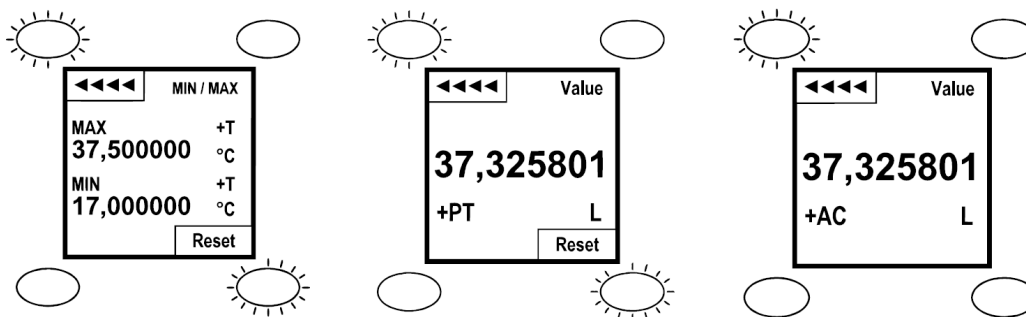
12.4.6 Key sensitivity

The sensitivity of the keys can be adjusted by setting the key sensitivity.
The default setting "Low" is the optimal one when using the device with a finger.
When operating with gloves, it is essential to select the "High" setting.

12.4.7 Menu Timeout

The menu timeout time defines the time after which the menu function is automatically exited without pressing a key. In the setting "0 s" this function is deactivated and the menu function can only be left by hand by pressing the back key several times.

12.5 Measurement

The Measurement menu lists the measurement variables that the transmitter provides.
For magnetic inductive flowmeter, these are:

- Flow
- Volume (total volume counter)
- Temperature
- Part volume

Each measurement variable is still divided into its own submenu.
In the submenu, all parameters relating to the respective measuring variables can be adjusted.

12.5.1 Flow

12.5.1.1 Unit

The displayed unit for the flow measurement can be selected from various predefined standard units.
It is also possible to define a user-defined unit ("user"), here the "user unit" must be in liters / min. be programmed.
e.g. Unit User = 100 LPM, if Q = 500 LPM then the display shows 5 users.

12.5.2 Volume

12.5.2.1 Counter type

Absolute:
Regardless of the flow direction, the calculated partial volume is added to the counters.
Bidirectional:
Depending on the flow direction, the calculated partial volume is added or subtracted to the counters.
If the measured flow value is negative, the volume value goes down from measurement to measurement (possibly into the negative range).

Volume measurement by different totalizer types
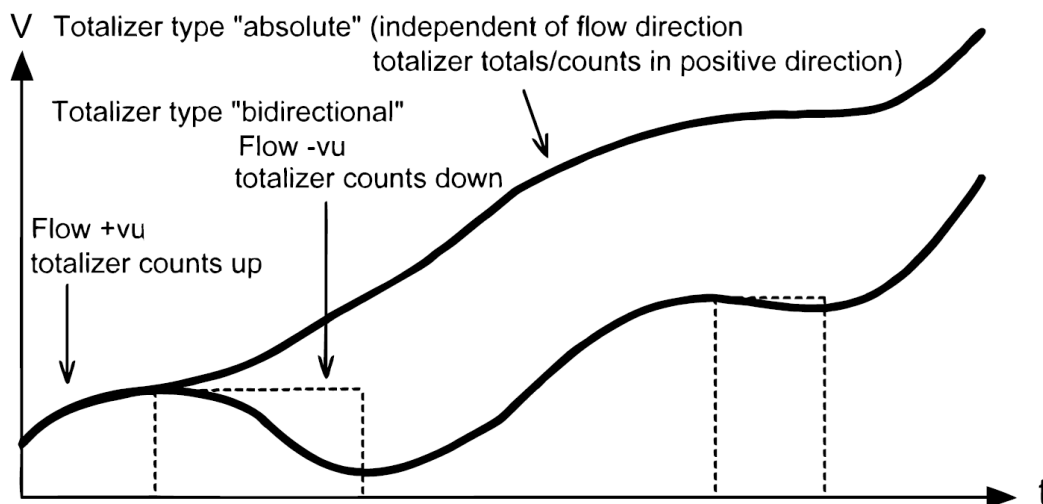
12.5.2.2 Volume unit

The parameter "Volume unit" defines the volume unit of all volume meters.
Thelisted volume units are available.
When changing the volume unit, the current counter readings are converted to the new volume unit.

12.5.2.3 Temperature Unit

The displayed unit for the temperature measurement can be selected from various default units. It is also possible to define a user-defined unit ("user"), in which case the "user unit" must be programmed in ° C.
e.g. Unit user = 50 ° C, if T = 50 ° C then the display shows 1 user.

12.5.3 Part Volume

12.5.3.1 Counter type

Absolute:
Regardless of the flow direction, the calculated partial volume is added to thecounters.
Bidirectional:
Depending on the flow direction, the calculated partial volume is added or subtracted to the counters.
If the measured flow value is negative, the volume value goes down from measurement to measurement
(possibly into the negative range).

12.5.3.2 Volume unit

The parameter "Volume unit" defines the volume unit of all volume meters. The listed volume units are available.
When changing the volume unit, the current counter readings are converted to the new volume unit.

12.5.3.3 Memory reset

In this menu, the part quantity counter can be reset.

12.5.4 Simulation function

With the simulation function, all available measured values can be simulated independently of each other for a
limited time. The simulated measured values have full effect on the displays and outputs.
Each simulation started is automatically stopped after the time set in the "Sim Auto Stop Time" (user menu)
parameter (1 to 30 min.) or after the programmed intervals have expired.
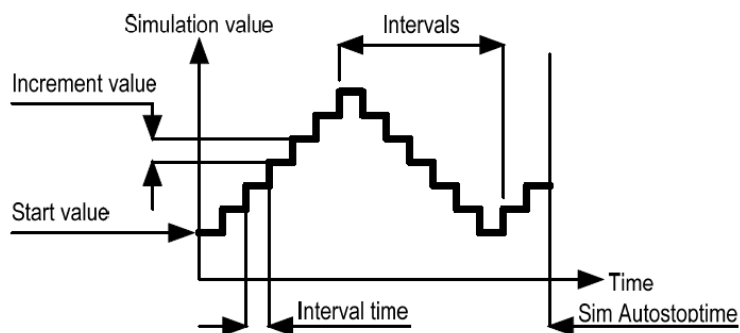The following measured values can be simulated:
Volume flow, temperature and part quantity counter.
The simulation starts as soon as the simulation is activated and the setting menu is exited.
The simulation is interrupted or stopped, if the setting menu is called up.
There are 3 different simulation types available for each purpose:
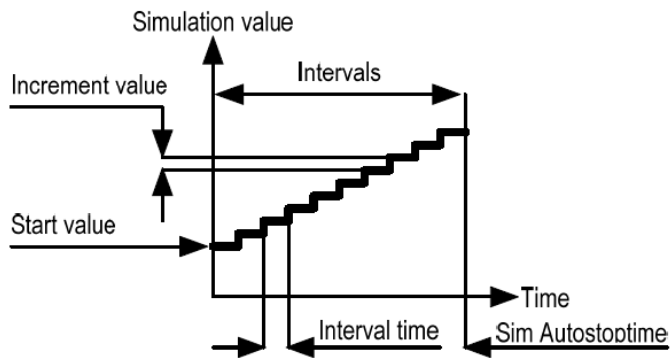
a) "Triangle" mode

In "Triangle" mode, the simulation value increases continuously in the increment of the parameter
"Increment value" and in the interval "Interval time" with the "Start value".
After the amount of the parameter "intervals", the simulation value decreases again in the same way, in
order to increase again.
This process is repeated continuously until the set time "Sim Auto Stop Time" has expired and the simulation
ends.

b) "Monotonic" mode

In "Monotonic" mode, the simulation value increases continuously in the step size of the parameter "Increment value" and in the interval "Interval time" with the "Start value". After the amount of "Intervals" or the expiration of "Sim Auto Stop Time", the simulation ends.

c) "Static" mode
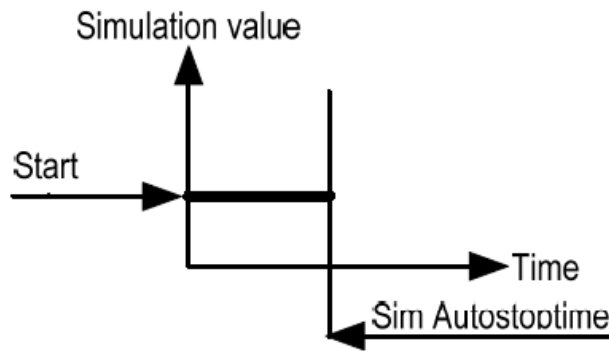
In the "Static" mode, a constant value is output for the measured values volume flow and temperature. The simulation ends after the set simulation time.
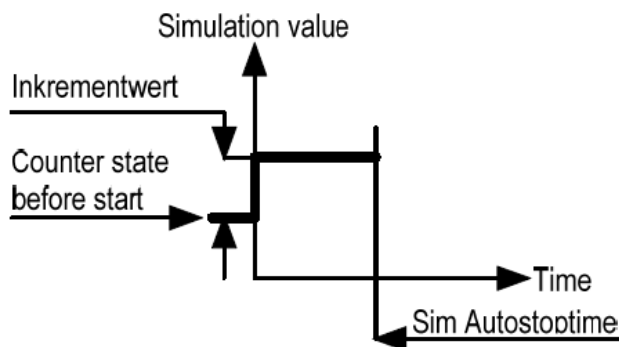
In the "static" simulation for the part quantity counter, the counter is only changed once by the set "increment value" after the start.

When simulating the subset counter, note that in triangle mode, the submenu counter must be in bidirectional mode to achieve the expected effect.

12.6 Outputs

The RLMAG flowmeter provides a total of 2 outputs that are freely configurable.
The configuration of the outputs (output 1 and output 2) is done via a wizard function.
The wizard function guides the user step by step through all necessary settings..

Steps:
- Select output
- Selection of the source or the measurement variable to be output (Flow, Volume, Temperature, Part volume)
- Selection of an output type (4-20 mA, 0-20 mA, 0-10 V, alarm, pulse, frequency output)
- Setting the output (scaling, thresholds)
- Save the configuration

12.6.1 Alarm output

The alarm outputs can be parameterized with a limit value function or a window function.

12.6.1.1 Function

The parameter "Function" defines the basic function. Limit value function and window function are available.
Limit value function: The switching output is active if the current flow rate value is above the switching threshold.
It remains active until the measured value has fallen below the switching threshold minus the hysteresis.
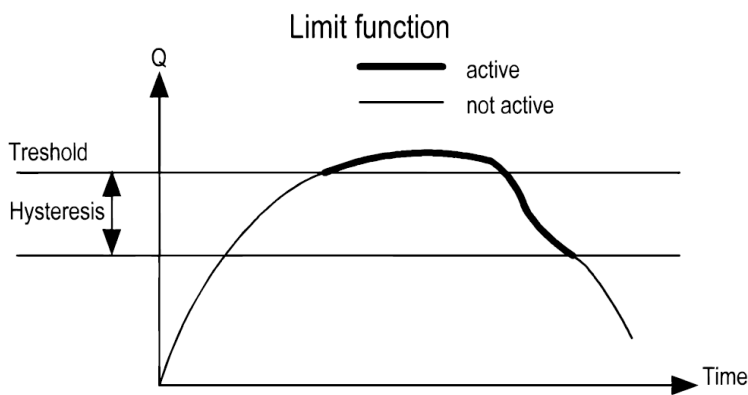
Window function: The switching output is active if the current flow measured value is outside a window, which is formed by the "switching threshold" and the "lower threshold". The monitored window decreases in each case by the amount of the "hysteresis". If the switching output is to be active within the window, the parameter "switching function" must be changed from N/O to N/C.
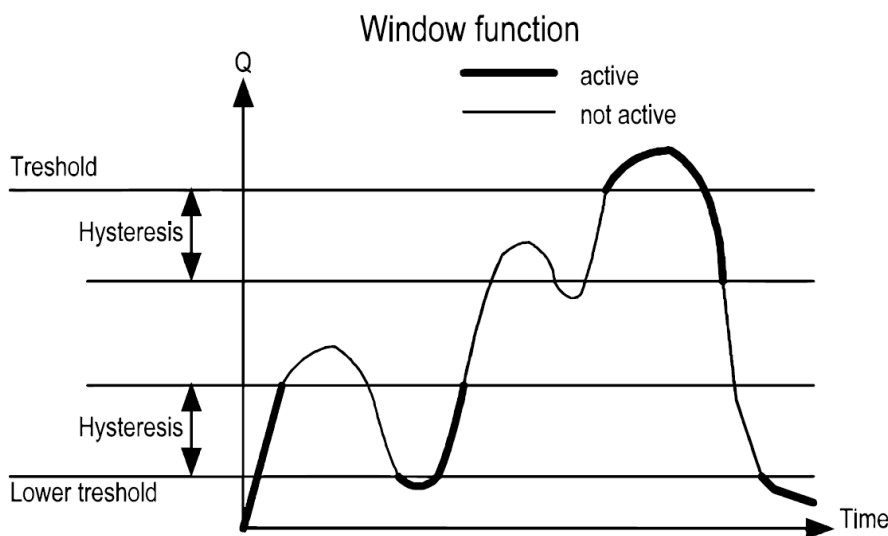
12.6.1.2 Output type

The parameter "Output type" defines the function of the transistor output. NPN, PNP or PP (push-pull) output types are available.
The push-pull type combines NPN and PNP and is therefore the best choice for most circuits.
All outputs are short circuit and overload protected.

12.6.1.3 Switching function

The "switching function" defines the mode of operation of the outputs. In the default setting "normally open", the output becomes active (switched) when the measured value exceeds the switching threshold. This feature is also referred to as N.O.
In the "Normally closed" setting, the output below the switching threshold is already active and is deactivated when the measured value exceeds the switching threshold. This function is also referred to as N.C.

12.6.1.4 Threshold

Threshold for limit value function and upper window point for window function.

12.6.1.5 Lower threshold

The "lower threshold" defines the lower limit when using the window function.
When using the limit value function, this parameter remains ineffective.
The switching thresholds can be set both positive and negative. The setting of the negative switching thresholds is used for "A-B" function, whereby the flow indicator can be negative.
When changing the input type, the switching thresholds must be checked again and corrected if necessary.

12.6.1.6 Hysterese

The appropriate setting of the "hysteresis" parameter ensures that the switching outputs do not switch on and off continuously when the current measured value fluctuates around the switching threshold.
The hysteresis value should therefore always be greater than the real measured value fluctuations.
As a result, a targeted suppression can be achieved.

12.6.1.7 Interference suppression factor

Further suppression of the switching outputs of fluctuating measuring signals can be achieved by setting the parameter "Suppressor factor".
If this parameter is selected greater than one, then the switching threshold must be exceeded in succession with the frequency of the set value before the corresponding switching output is activated.
With this function, sporadic limit overruns can be safely suppressed. However, the response time increases according to the level of the "suppression factor".
It is also possible to use the switch outputs with "limit function" for "direction detection".
To do this, the "Input type" in the "Signal input" menu must be set to "Direction detection". In this case, both the "switching threshold" and the "hysteresis" must be set to '0'.
When changing direction, the switching output switches depending on the "switching function".

12.6.2 Analogue outputs

12.6.2.1 Current output 0(4)-20 mA

The current output gives a measured variable (flow or temperature) in scaled form as a 0 (4) -20 mA current signal. Flow rate for 20 mA.
The current output is scaled via the "Value for 20 mA "and" Value for 4 mA "(with current output 0-20 mA" Value for 0mA "). By default, the "Value for 20mA" parameter is set to the value for the end of the measuring range, but can be parameterized as desired within the measuring range, but always >> as the measuring range start value. The parameters "Value for 4 mA" / "Value for 0mA" define the measured values for the starting current value, which may also be set freely in the measuring range.
Note 1: If the value is set smaller than the end of the measuring range, the resolution and accuracy of the output voltage value are reduced.

12.6.2.2 Voltage output 0-10 V / 2-10 V

The voltage output outputs a measurement variable (flow or temperature) in scaled form as a 0-10 V / 2-10 V voltage signal.
The scaling of the voltage output is done via the parameter "Value for 10 V "and" Value for 0 V "By default, the" Value for 10V "parameter is set to the value for the end of the measuring range, but can be parameterized as desired within the measuring range, but must always be >> as the measuring range start value.
The parameters "Value for 0 V / 2 V" define the measured values for the output of 0 V, which may also be freely set in the measuring range.

Note 1: If the value is set smaller than the end of the measuring range, the resolution and accuracy of the output voltage value are reduced.
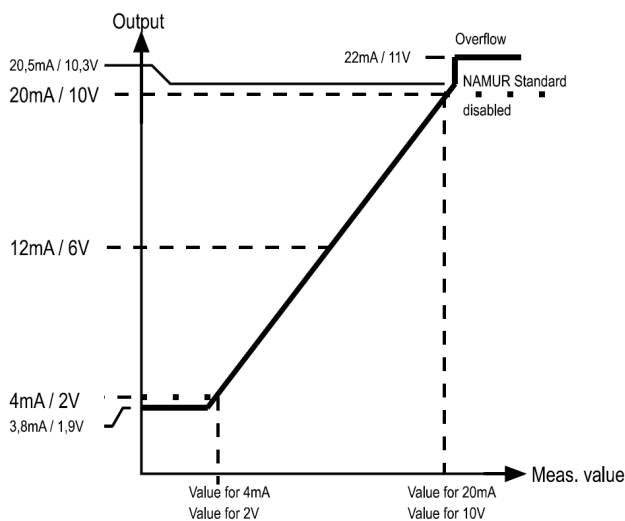
Output behavior 4-20 mA and 2-10 V
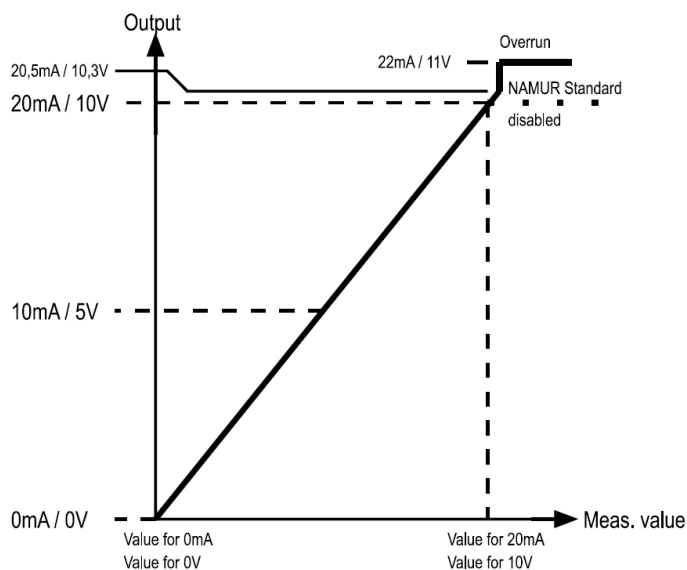
Output behaviour 0-20 mA and 0-10 V

12.6.3 Pulse output

The RLMAG flowmeter provides a scalable pulse output.
When the pulse output is activated, the incoming volume is converted to the output pulse train.
The pulse width of the output pulse is adjustable in the range of 1 ms to 20,000 ms.
The electrical output type of the pulse output is push-pull, therefore HIGH and LOW are actively switched through at the output.
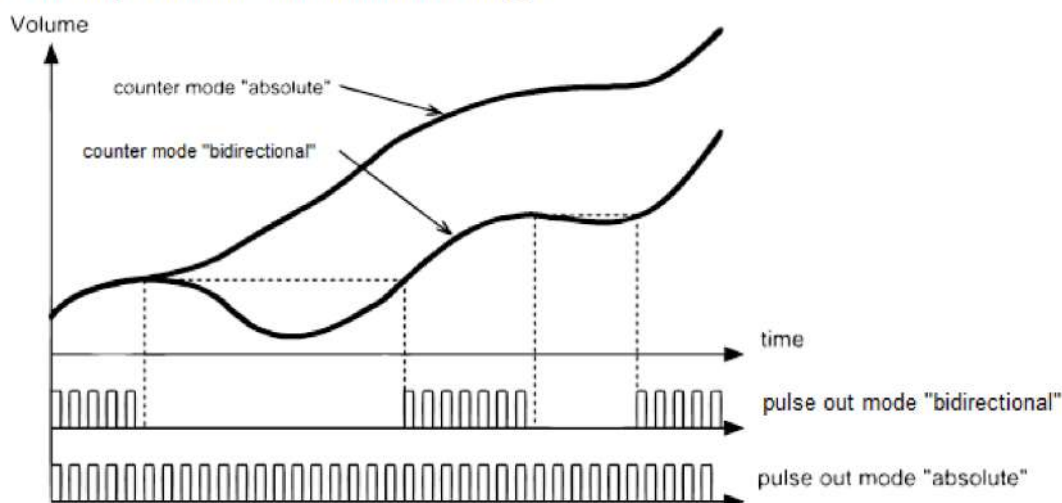
Behavior on OVERFLOW:
If the volumetric flow measurement is in the OVERFLOW range, the pulse output is switched off and a constant HIGH level is applied to the output.
Generation of the output pulse train:
The maximum adjustable pulse rate at the pulse output is 1000 pulses per liter.
That the minimum pulse volume that can be represented with the pulse output is 0.001 L per pulse.
Furthermore, the set pulse volume must fulfill the following condition:

$$\frac{ME\ [L/min] * Pulsbreite\ [ms]}{Pulsvolumen\ [L]} \leq 30.000$$

oder

$$Pulsvolumen\ [L] \geq \frac{ME\ [L/min] * Pulsbreite\ [ms]}{30.000}$$

If the condition is not met, there may be a time lag of the pulse output.
This is particularly undesirable if dosing tasks are to be performed with the pulse signal.
The following table shows the different combinations of pulse volume and pulse width for the different measuring ranges, in which the above limiting condition is fulfilled.

Measuring range [LPM]	pulse width[ms]	min. pulsevolume [L]	max. pulse rate [pulse/L]
100	20	0,08889	11,25
	10	0,04444	22,50
	5	0,02222	45,00
	1	0,00444	225,00
50	20	0,04444	22,50
	10	0,02222	45,00
	5	0,01111	90,00
	1	0,00222	450,00
25	20	0,02222	45,00
	10	0,01111	90,00
	5	0,00556	180,00
	1	0,00111	900,00
10	20	0,00889	112,50
	10	0,00444	225,00
	5	0,00222	450,00
	1	0,00044	2250,00

The pulse output only takes place in measuring mode, while the menu mode is active no pulses are given.
The pulses accumulated in the menu mode are output as soon as the measuring mode is active again.
Depending on the situation, this can also lead to a longer pulse lag.

12.6.3.1 Pulse volume

The parameter "Pulse volume" is defined as volume quantity for the output of a pulse; the unit is corresponding to [volume quantity / pulse].
The likewise common pulse rate [pulse / volume unit] corresponds to the reciprocal of the pulse volume.
Example: Desired pulse rate at the output 10 pulses / liter => pulse volume = 1 / pulse rate = 1/10 L = 0.1 L

12.6.3.2 Volume unit

The volume unit to be set is the input unit for the "Pulse volume" parameter.
The definition of a user-defined unit ("user") is also possible and can be programmed in "liters".
Example:
Unit "user" = 10 [L], pulse volume = 2 [user]
The total pulse volume would be 2 * 10 = 20 [L]. After 20 liters, a pulse is output..

12.6.3.3 Pulse width

The pulse width of the pulse output is flexibly adjustable from 1 to 20,000 ms.
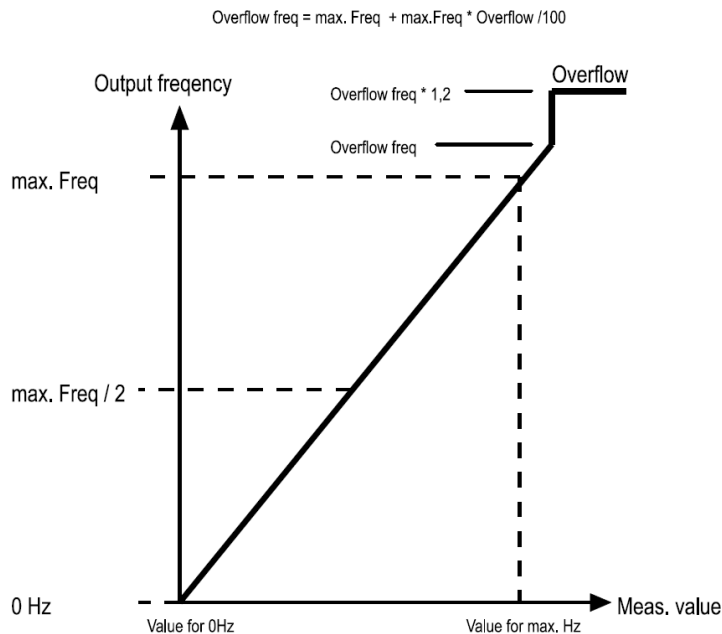
12.6.3.4 Frequency output

The RLMAG flowmeter provides a scalable frequency output.
When this output is activated, the measurement variable (flow or temperature) associated with the frequency output is output proportionally as a frequency with a 1: 1 pulse / pause duration.
The output frequency at the end of the measuring range can be set (parameter "maximum frequency"). With the two parameters "Value for 0 Hz" and "Value for max Hz", the frequency output in the measuring range can be freely scaled.
Behavior on OVERFLOW:
If the measured value is in the overflow range, a constant frequency is output.

Overflow freq = max. Freq + max.Freq * Overflow /100

Output behavior Frequency output

12.7 User service

The user service provides the user with a reset function and password setting.
Together with the activation of a user password, therefore, the menu access for the user on the part of a master user can be blocked.

12.7.1 User service / change password

In the factory setting the user password is set to "00000", the user functions are thus freely accessible.
If the user password is changed to other than "00000", the password prompt becomes active the next time the user menu is entered.
If the set password is no longer known, a master password can be requested from SGM-LEKTRA.

12.7.2 User service / factory setting

By activating this function, the user can reset the device to the factory settings.
Any user settings will then be lost and the device will be back in delivery condition.

12.8 Service / Factory service

The factory service function is password protected and not accessible to the user.

12.9 Info

12.9.1 Firmware version

The firmware version is displayed at the device test below the manufacturer logo.

12.9.2 QR code Link to the user manual

A QR code is displayed in the "Info" menu, "Instructions" submenu. With a suitable smartphone, the code can be scanned and the user manual in English language downloaded directly as a PDF and opened.
The smartphone must have a QR code scanning app and a PDF reader app installed, as well as an internet connection.

12.10 Device default settings

The flowmeter-RLMAG is delivered from the factory with following settings:
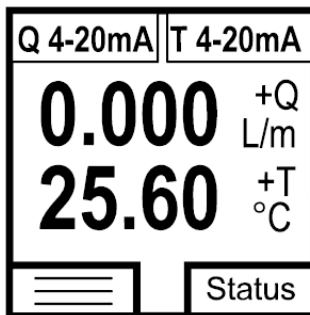
Display – Dual
Upper display – Flow
Lower display – Temperature
Out 1: Q 4-20 mA
Out 2: T 4-20 mA

13. STATUS

The electromagnetic flowmeter can detect and display various device or application errors.
If there is a status or error message, the STATUS symbol in the display alternately flashes orange / red.
To call up the status / error information, the status key must be pressed, then the status window that appears then lists all the messages that have accumulated up to this point in time.

By pressing the ◀◀◀◀ key, the user confirms the knowledge of the displayed errors, the status memory is cleared and the status window is closed. If one of the displayed errors persists, it will be reported again by flashing the status icon.
The following status / error messages are generated:

Display text	Description	Debugging
Empty Pipe	Measuring tube is not completely filled with medium or medium with too low conductivity is used.	Check the filling of themeasuring circuit orconductivity of the medium (>20 µs / cm)
Temp Sens Error	Error in the temperature measuring circuit	Repair by SGM-LEKTRA Service necessary
Meas saturated	Flow measuring circuit overdriven	Reduce flow rate
No Subslave	Internal hardware error	Repair by SGM-LEKTRA Service necessary
Simulation	Simulation function active	-

14. DOSING FUNCTION

The standard RLMAG provides a simple dosing function.
This can be permanently activated or deactivated in the settings menu under the menu item "dosing".
If the dosing function is activated, fixed functions are assigned to the 2 outputs which cannot be changed as long as the dosing function is activated:

OUT2 (Pin 2):   Dosing output in push pull configuration
OUT1 (Pin 4):   Control input for START/STOP/RESET function

If the dosing function is deactivated, both outputs are switched to OFF (deactivated) by default, but can then be freely configured again.
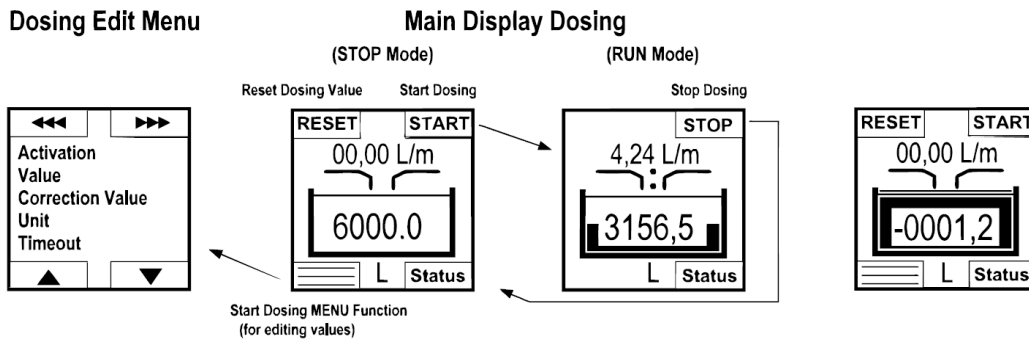
In the main display of the dosing function, the quantity to be dosed in a preselectable unit and the current flow value are displayed on the one hand.
The progress of the dosing process is additionally represented by a graphic animation in which the container shown fills in percent and also overfill is shown.

Softkey buttons: All softkey buttons in dosing mode must be held down by the user for at least 2 seconds and then released again for the corresponding function to be triggered. This is to avoid accidental operation.

Control input: Connection OUT1 can be used as a control input for the functions Start / Stop / Reset when the dosing function is activated.

Function	Conditions	Control pulsetime
START	Stop Modus	0,5s < thigh < 4s
STOP	Run Modus	0,5s < thigh < 4s
RESET	Stop Modus	thigh > 5s

If the control input is not used, then OUT1 (connection pin 4) must be connected to PIN3 (GND), the control input must not be left open!

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START of dosing:
Dosing can be started either by triggering the "START" softkey or by applying a high pulse to the control input.
After the START function has been triggered, the dosing output is switched to active (High) and the dosing counter is counted down in the standard direction when flow is present.
If the dosing process is stopped incompletely by hand, it can be restarted by the START function.

STOP of dosing
If the dosing process is started, it can be stopped or interrupted by the STOP function.
Resumption of dosing to reach the total dosing quantity is possible by START.
Like the START function, the STOP function can be remotely controlled by the control input.

RESETTING the dosing value
If the dosing process is finished or stopped, the dosing quantity can be reset to the default value by the function RESET.
This function can also be triggered at the control input.
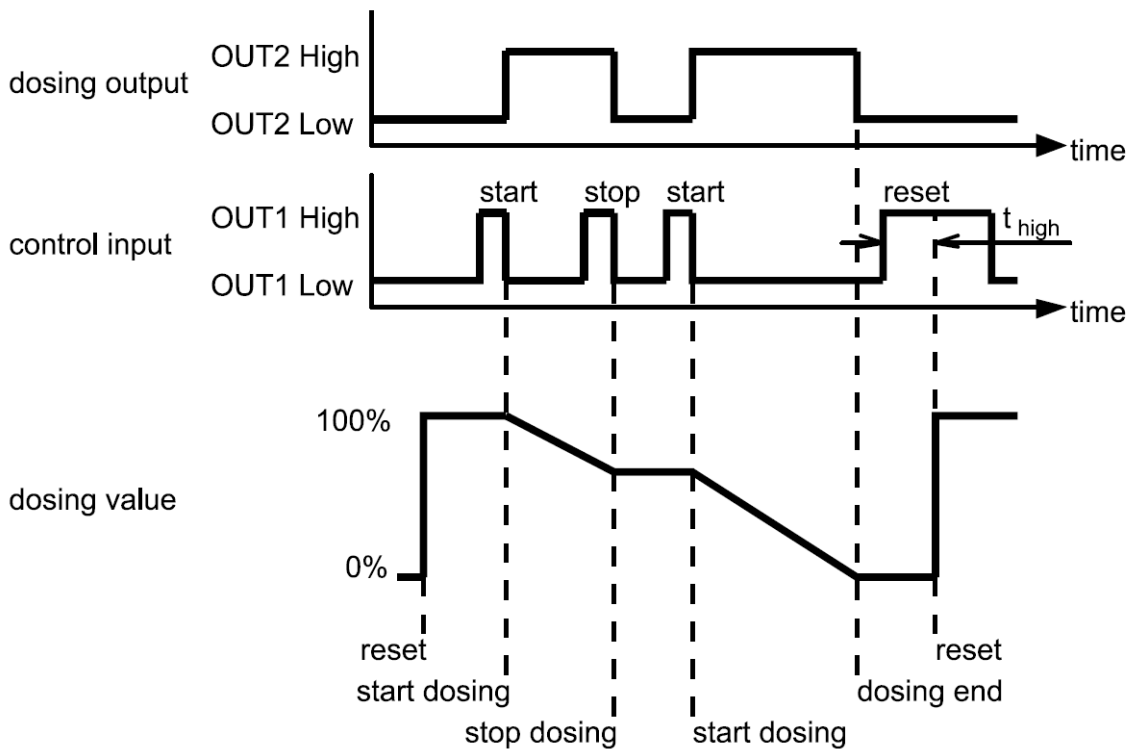
Description of dosing parameters

Dosing quantity "Value"
Parameter "Value" determines the dosing volume. The volume unit is specified in the "Unit" parameter.
The maximum size is limited to 9999.9 (one digit after the decimal point).
The absolute quantity can be extended or restricted by a suitable choice of dosing unit.

Dosing unit "Unit"
Parameter "Unit" defines the dosing volume unit. The choices are: mL, L, m3, galUS, galUK, barrel, user.

Dosing correction value "Correction value"
The "Correction value" parameter can be used to correct a system-related, constant "incorrect dosing" without having to change the actual dosing quantity.
The correction value can be both positive and negative.
If the system doses a smaller volume than intended, the correction value must be positive, but negative for a larger real volume. e.g.
Dosing quantity = 10 L
Correction value = -1 L
In this case, the metering counter will count from 10 L to '0', but will stop at 1 L because the quantity to be metered is 9 L calculated on the basis of the correction value of -1 L.
With a correction value of +1 L, the dosing counter will stop counting at -1 L, because the dosing amount is calculated to be 11 L.
10 - (- 1 L) = 11 L
The adjustable value of the correction value must always be:
(Value + Correction Value)> 0
If this condition is not met, this will be indicated by a warning message and the
correction value will be preset to the value - (Value-0.1).

Dosing parameter "Timeout"
During the dosing process, the presence of a flow value not equal to 0 is constantly monitored.
For this purpose, the parameter "Timeout" is used to set the time after which the status message "Time Out" is triggered.
The timeout value can be set between 0.5 and 10 sec.

15-FACTORY TEST AND QUALITY CERTIFICATE

With reference to the equipment:

(Electromagnetic Flowmeter)

I certify that materials, dimensions, and product performance are in compliance with our production and inspection

Quality Control: .... Date of production and test: ....