



CHECKMAG

***MAGNETIC -INDUCTIVE FLOWMETER
REMOTE VERSION***

Operating Instructions



1	<i>Introduction.....</i>	<i>3</i>
1.1	<i>Checkmag application.....</i>	<i>3</i>
1.1.1	<i>Checkmag Advantages.....</i>	<i>3</i>
1.1.2	<i>Do not install where.....</i>	<i>3</i>
1.2	<i>The principle of inductive sensor operation.....</i>	<i>3</i>
2	<i>Specifications</i>	<i>4</i>
2.1	<i>Measurement conditions</i>	<i>4</i>
2.1.1	<i>Measurement is independent of:</i>	<i>4</i>
2.1.2	<i>Checkmag operation and measurement precision.....</i>	<i>4</i>
2.1.3	<i>Measurement precision is negatively affected by:</i>	<i>4</i>
2.2	<i>Checkmag assembly</i>	<i>4</i>
2.2.1	<i>Sensor assembly</i>	<i>4</i>
2.2.2	<i>Converter</i>	<i>4</i>
2.2.3	<i>Additional assemblies</i>	<i>5</i>
2.3	<i>Checkmag connection and assembly.....</i>	<i>5</i>
2.3.1	<i>Signal cable connection</i>	<i>6</i>
3	<i>Sensor location and its position in piping.....</i>	<i>7</i>
3.1	<i>Recommended positions for sensor installation.....</i>	<i>7</i>
3.2	<i>Recommendations for installation.....</i>	<i>7</i>
4	<i>Checkmag grounding.....</i>	<i>8</i>
4.1	<i>Electrodes</i>	<i>8</i>
4.2	<i>Checkmag commissioning</i>	<i>8</i>
5	<i>Checkmag inductive sensor – specifications.....</i>	<i>9</i>
6	<i>Series 99 converter - specifications</i>	<i>9</i>
7	<i>Series 99 converter terminal board connection</i>	<i>10</i>
8	<i>Converter dimensions</i>	<i>10</i>
9	<i>Additional devices</i>	<i>10</i>
10	<i>Packaging, transportation and storage</i>	<i>10</i>
11	<i>Warranty.....</i>	<i>11</i>
12	<i>Instructions for use</i>	<i>12</i>
12.1	<i>Graphic structure of individual Series 99 menus.....</i>	<i>14</i>
12.1.1	<i>S + Q – user mode.....</i>	<i>15</i>
12.1.2	<i>Standard view</i>	<i>15</i>
12.1.3	<i>Q (t) record.....</i>	<i>15</i>
12.1.4	<i>H-statistics</i>	<i>15</i>
12.1.5	<i>D-statistics</i>	<i>16</i>
12.1.6	<i>M-statistics</i>	<i>16</i>
12.1.7	<i>Date/time view.....</i>	<i>16</i>
12.1.8	<i>Password check</i>	<i>16</i>
12.1.9	<i>Version.....</i>	<i>25</i>
13	<i>Examples</i>	<i>26</i>
13.1	<i>Setting of comparators</i>	<i>26</i>
13.2	<i>Setting of electronics</i>	<i>27</i>
14	<i>Data acquisition program and basic information.....</i>	<i>28</i>

Arkon Flow Systems

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Requirements for assembly and service:

from 9:00 a.m. to 4:30 p.m. (European time)

Arkon Flowmeters

- DN 10 - DN 1000 inductive flowmeters
- Ultrasonic flowmeters
- Ultrasonic level transmitters
- Flumes & weirs

1 Introduction

Checkmag magnetic-inductive flowmeters are precise measuring devices intended for the measurement of liquid flow of electrically conductive media. The meters may be used for measurements, registration, dosing, mixing, etc. as operating and/or certificated meters according to Act no. 505/1990 Coll. on Metrology.

1.1 Checkmag application

- Water management, drinking and waste water measurement
- Chemical, textile, paper, mining industry
- Food industry
- Power engineering and heating plants
- Agriculture

1.1.1 Checkmag Advantages

- Independent of power supply fluctuation and line voltage interference
- Independent of pressure, temperature and density, etc of the media
- No pressure losses
- No disturbances of measured liquid consistency

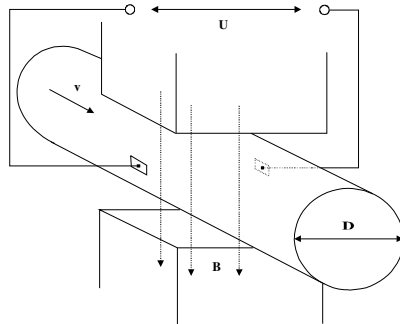
1.1.2 Do not install where

- Liquid conductivity, is 5 $\mu\text{S}/\text{cm}$, or less
- Partly filled pipe is possible
- Non lamina flow occurs
- Velocities less than 0.5 m/sec

1.2 The principle of inductive sensor operation

The measurement is based on the principle of Faraday's law of electromagnetic induction. In compliance with this law, electric voltage is induced in an electrically conductive body, which moves across a magnetic field. The following equation is applied for voltage to be induced (generally):

$$\underline{U = B \times D \times v} \quad \text{where:} \quad \begin{array}{l} U = \text{inductive voltage} \\ v = \text{mean flow speed vector} \end{array} \quad \begin{array}{l} D = \text{piping diameter} \\ B = \text{magnetic induction} \end{array}$$



If magnetic induction B and piping diameter D are constant, then induction voltage is proportional to the mean flow speed.

Liquid is flowing via a flowmeter perpendicularly to the direction of the magnetic field. Electric voltage which is monitored by two electrodes placed perpendicularly to both magnetic field and flow is induced by a stream of liquid with minimum electrical conductivity.

Excitation current with a rectangular waveform is generated in a converter and fed to sensor coil windings generating the flowmeter magnetic field. The forced-current system provides constant excitation under all conditions that can occur during the operation.

2 Specifications

2.1 Measurement conditions

2.1.1 Measurement is independent of:

- Temperature and pressure
- Density and viscosity
- Solid contents
- Usual magnetic field interference levels

2.1.2 Checkmag operation and measurement precision

The following conditions must be achieved for reliable Checkmag operation and measurement precision:

Minimum liquid conductivity	>20 $\mu\text{s/cm}$ for demineralised cold water > 5 $\mu\text{s/cm}$ for other fluids
Flowrate	minimum 0.1 m/sec., max. 10 m/sec.
Steady flowrate	straight lengths - upstream 5 DN - downstream 3 DN for any DN changes a bevel up to 8° is included in straight lengths
Sensor completely filled with liquid	
High-quality connection between sensor and liquid to be measured, earthing	

2.1.3 Measurement precision is negatively affected by:

- Liquid aeration, air bubbles
- Strong stray earth currents
- Non lamina flow
- Solids or magnetic metals in the medium to be measured

2.2 Checkmag assembly

2.2.1 Sensor assembly

A measuring tube is produced from non-magnetic material with welded flanges. The measuring tube is lined with an insulated lining of the required properties (depending upon the measured medium). A system of magnetic circuit excitation coils that generate the magnetic field are fixed on the body of the measuring tube.

A pair of electrodes that are located opposite one another are installed inside the measuring tube, with the lining are produced from stainless steel or other similar material (according to the chemical resistance required for the measured medium).

The complete electrical section is placed inside a steel housing (welded) with an outlet (neck) for cables.

On the outlet, the signal cable with a standard length of 8 metres is fixed via a cable seal (different lengths may be ordered). The welded housing provides high protection, and the surface finish provides permanent climatic resistance.

2.2.2 Converter

The electronic control and evaluation unit is remote mounted with an alphanumeric display.

2.2.3 Additional assemblies

Checkmag flowmeter may be produced as a „certificated meter“ in compliance with the Act on Metrology no. 505/1990 Coll. All meteorological features of the meter according to the customer's request are verified and marked by the official mark and cannot be modified.

Multi-point calibration. The flowmeters are calibrated to three points in the basic option. According to the customer's requirements, the number of calibration points may be increased.

Increased electrical protection IP 68: the requirement must be clearly specified (immersion depth and time, explosive environment, etc.).

Higher PN, different built-in sensor lengths, other flange assemblies (DIN, ANSI, etc.) on request

SmartMQI 3.2. controlled data acquisition software – it allows evaluating the statistical data received from a flowmeter on any PC.

2.3 Checkmag connection and assembly

Converter connection to power supply must be performed in compliance with the standards and rules to be effective:

ČSN 332180	Connection of electrical instruments and appliances
ČSN 332000-4-4-41	Protection against electric shock.
ČSN 341610	Heavy current distribution network in industrial plants.
ČSN 343100	Safety operational rules for electrical installations operated by low-level experienced personnel.

If requested our Service Division will carry out commissioning. If work is done by any different organisation, the warranty can be cancelled in the case of such unauthorised work.

Electrical protection allows the use of the instrument in all kinds of active, passive and complex environments, and after an agreement with us, it is possible to carry out some additional modifications even for severe climatic conditions.

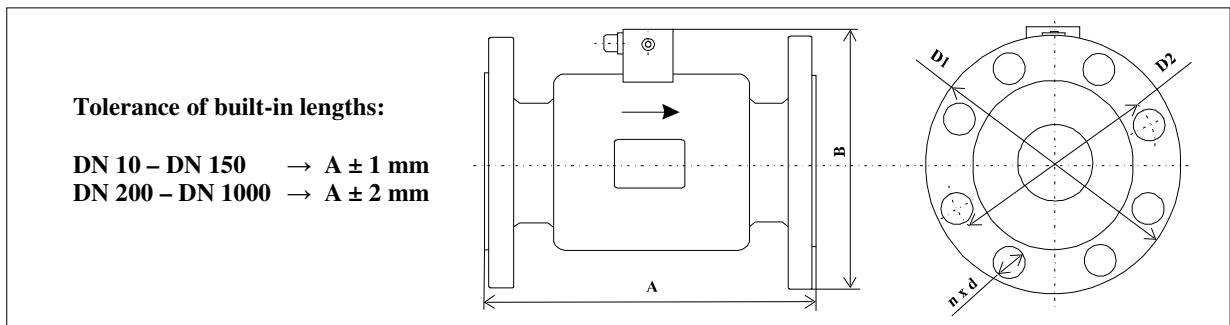
Signal and output cable routing should not be located near power output distribution network or in common ducts.

Table for 1 m / s flowrates

DN	m ³ / h	l / min.	l / s
10	0,283	4,712	0,079
20	1,131	18,85	0,314
25	1,767	29,452	0,491
32	2,895	48,255	0,804
40	4,524	75,398	1,257
50	7,069	117,81	1,964
65	11,946	199,1	3,318
80	18,096	301,59	5,027
100	28,274	471,23	7,854
125	44,179	736,31	12,272
150	63,617	1060,3	17,671
200	113,10	1885	31,42
250	176,71	2945,2	49,087
300	254,47	4241,2	70,686
350	346,36	5772,7	96,211
400	452,39	7539,8	125,66
500	706,86	11781	196,35
600	1017,9	16965	282,74
800	1809,6	30159	502,65
1000	2827,4	47124	785,4

Constructional dimensions and weights of inductive sensors

DN	PN	Dimensions [mm]						Weight kg
		A	B	D1	D2	d	n	
10	16	150	150	90	60	14	4	4,5
20			150	105	75	14	4	6,5
25			150	115	85	14	4	6,5
32			160	135	100	18	4	7
40			170	145	110	18	4	7
50		200	170	160	125	18	4	8,5
65			190	180	145	18	4	12
80			230	195	160	18	8	12,5
100		250	250	215	180	18	8	14
125			280	245	210	18	8	19
150	300	320	280	240	23	8	23	
200	350	380	335	295	23	12	34	
250	400	445	405	355	27	12	55	
300	500	500	460	410	27	12	73	
350		520	520	470	27	16	150	
400	600	615	580	525	30	16	200	
500		750	710	650	33	20	290	
600		870	840	770	36	20	420	
800	800	1050	1020	950	40	24	610	
1000	1000	1285	1255	1170	42	28	950	



2.3.1 Signal cable connection

Signals which are transmitted from a sensor electrode circuit to the converter will be in a range of millivolts. They will be very sensitive to magnetic and electrostatic interference from neighbouring high-voltage cables, power supply cables and high power output motors, etc. The interference is mainly compensated for by the converter connection, nevertheless if possible, it is necessary to prevent all spurious signals.

The signal cable is of a special construction and length and is a part of the shipment, its length should not be changed (for certificated meter must not be changed). The proper cable connection to the converter is important; doing so may cause measurement failures. Special requirements are laid on shielding, and the measurement precision depends on its quality. The cable must not be extended.

The shielding must be well insulated on the whole route from ground and the other metal subjects. It is recommended that the cable is located in a separate conduit or trays.

3 Sensor location and its position in piping

The inductive flowmeter sensor can be installed in any position according to requirements, however for horizontal assembly, the electrode axis must always be horizontal.

Sensor must remain full of liquid.

It is recommended that the flow direction should follow the arrow on the sensor cover; the converter is also preset for this direction. On the operating meter, it is possible to adjust the reverse flow direction by changing the Checkmag converter parameter.

Bolts and nuts – verify if there is a sufficient space for their installation near flanges.

Vibration and deflection of piping – fix the piping on both sides from the flowmeter to avoid any deflection and vibrations.

If you install any pipes with higher internal diameters, install a reducer; this will provide an axial shift without increased mechanical stress of piping and sensor flanges.

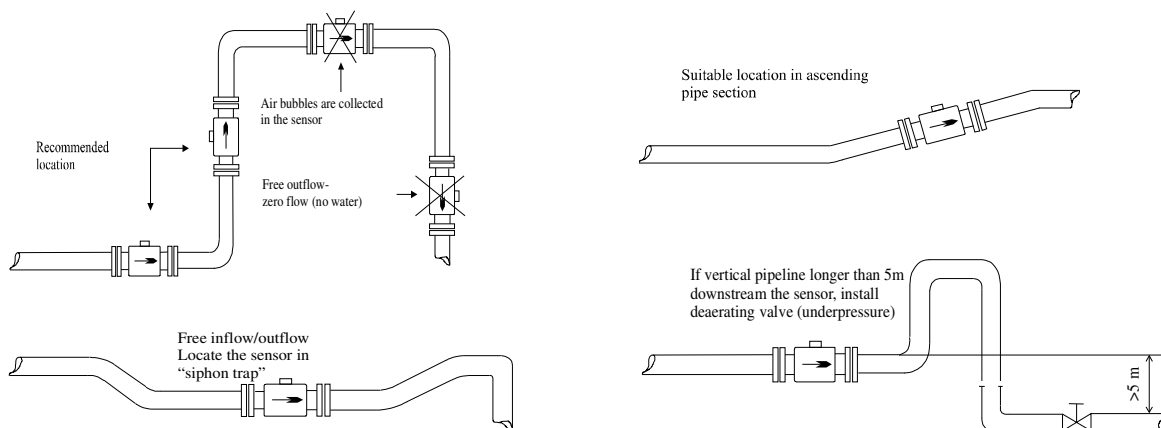
To improve flow, use only the recommended straight lengths upstream (5DN) and downstream of the sensor (3DN). Any change of a diameter with an angle up to 8° is excluded from the above-mentioned straight lengths.

Suitably assembled flow deflectors and a combination of diffusers are used in more sophisticated installations.

When you install the sensor in insulated piping (e.g. glass, artificial mass, etc.), use proper sealing ground rings.

A conductive connection between a sensor ground point and the liquid to be measured is needed for a proper measurement!

3.1 Recommended positions for sensor installation



3.2 Recommendations for installation

To avoid any measurement errors which are caused by air bubbles or failures on the lining, pay attention to the following recommendations:

During assembling correctly seat the sensor, tighten screws uniformly and move on a diagonal one after another.

It should be noted that the parallelism of flanges has a greater effect on packing than excessive tightening forces on curved and seated flanges.

The sensor must be installed inside piping so that the axis of sensor electrode is always horizontal.

A PTFE (teflon) lining calls for extra care during handling and assembly. During installation/operation avoid excessive underpressure in pipes. Please do not change and damage the outlet extension on both ends of the sensor. The sensors are shipped from the factory with special covers to avoid any shape deformations. (PTFE elastic memory should cause a partial compensation in future). Please remove the covers just before installation, and when you insert it between counterflanges, replace by a number of smooth metal sheet pieces which are removed just before tightening the bolts.

Packing – The extended part of lining does not operate properly as a seal, hence appropriate packing must be inserted between sensor and pipeline. If the packing protrudes into a flow profile at any point, this will cause turbulence and reduce the measurement quality.

During installation, make sure the sensor slides into piping if the pipeline is not flexible enough. It is recommended that installation inserts (especially for greater internal diameters) should be used. During installation of the sensor, counterflanges must not be welded (danger of the sensor lining failure).

4 Checkmag grounding

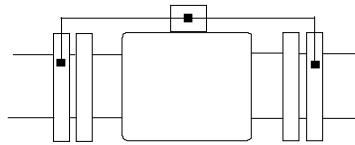
For reliable and proper operation of the inductive meter, it is necessary to use high-quality protective grounding. Internal flowmeter cables and power supply PE (PEN) conductors provide protective grounding.

Working grounding is also provided via internal cables and a high-quality connection of the sensor body with two metal pipe counterflanges. It is recommended that a connection made with M6 welded screws or bored threaded holes is used. The connection under flange fixing screws is not recommended because of possible corrosion resulting in measurement failures.

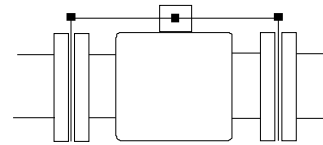
When assembled into piping made from non-conductive material (or with non-conductive lining), it is necessary to provide working grounding with liquid by a different method, e.g. by grounding rings. The rings can be ordered from factory, their material and chemical resistance must comply with the liquid to be measured – usually produced from the same material as sensor electrodes.

When assembled, it is necessary to insert the packing on both sides of the grounding ring. Make sure that no parts will protrude into a internal sensor profile (turbulence).

Drawing of sensor working grounding inside pipeline



Use of grounding rings



4.1 Electrodes

The electrode material must be selected according to its chemical resistance of the liquid to be measured.

The electrode purity can affect the measurement precision, and high impurity concentration can affect the measurement process (liquid insulation).

Immediately after shipping, it is not necessary to clean the electrodes before installing the sensor inside piping. Clean with a fine cloth, or use a chemical detergent. Avoid any damage of the lining!

If the electrodes must be cleaned during operation, either mechanical or electrolytic methods may be used.

Mechanical cleaning can only be used for a suitable sensor assembly, otherwise dismantle the sensor from the pipeline. After cleaning reinstall the sensor.

Any electrolytic method is advantageous for its simplicity, however it can only be applied for the contamination that can be removed by electrolysis (low contamination and deposit).

All detailed instructions are available from the flowmeter manufacturer on request.

If a flowmeter operates under normal conditions, for most liquids it is not necessary to clean flowmeters during their life, only self-cleaning by flowing liquid is satisfactory (a recommended velocity is over 3 m/s).

4.2 Checkmag commissioning

Checking installation and connections.

- Proper sensor and grounding
- Tightening all cable connection clamps and plug in all connectors.
- Verify the completeness of the shipped set according to the serial numbers of sensor and converter.
- Verify proper supply voltage; see the label on the converter.
- Verify proper electrical protection.
- If the installation is fault-free, fill the pipeline with liquid and verify the sensor tightness inside the pipeline. After short washout, switch the system on-off-on.

5 Checkmag inductive sensor – specifications

Internal diameter	DN 10 - 1000	
Connecting flanges	SN 13 12 24	DN 10 – 1000 / PN 16 and lower
	SN 13 11 60	different options and higher pressures – after agreement
Grounding rings	Shipped if ordered	
Electric conductivity	5 $\mu\text{S} / \text{cm}$, $\mu\text{20 S} / \text{cm}$ for demineralized water	
Ambient temperature	- 20 to + 60 C	
Thermal sensor lining resistance	teflon (PTFE)- 25 to + 150 C	
	rubber - 5 to + 90 C	
Sensor power supply	from converter series 99	
Electric protection (SN 33 20-5-51)	IP 67; IP 68 is also available if agreed and specified	
Environment (SN 33 03 00)	321 – 342 in compliance with Appendix 1 of the appropriate standard	
Sensor tube material	chrome-nickel steel, class 17	
Lining material	teflon (PTFE) DN 10 – DN 500	
	rubber DN 20 – DN 1000	
Electrode material	chrome-nickel steel, class 17, if ordered; titanium, platinum, Hastelloy steel	
Connecting flanges	steel, class 11	
Sensor cover	steel sheets	

6 Series 99 converter - specifications

Input resistance	minimum 10^{10} Ohm
Measurement accuracy	0.5 percent of a value measured in a range of 10 to 100 %
Measurement filtration	adjustable in more modes
Low flow rejection	adjustable in 0.1 percent steps
Flow direction	bi-directional measurement distinguished by a sign (current flow is integrated to total volume (S+ in forward direction and S- in backward flow direction)
Zero flow	automatic adjustment
Statistics	archiving the values measured within 3 months in the following display modes: average 5-minute current flowrates, total volume per hour, day, month and flowmeter operating time
Clock	clock and calendar with the leap year system according to the Gregorian calendar up to the year of 2099 (backup in case of power failure)
Quantity display	two-line alpha numeric LCD display, 2 x 16 digits with back light
Control	four-key keyboard
Programmable functions	empty pipeline detection, electrode contamination electrochemical cleaning of electrode without dismantling the sensor
<u>Outputs (galvanically separated)</u>	
Analogue active	standardised 0-20 mA, 4-20 mA, 0-5 mA, or generally selected -30 to+30 mA / 400 Ohms including negative mode (current vrs. Output quantity curve is a descending function)
Pulse	programmable number of pulses per litre, number of pulse per m^3 , further see Instructions for use
Binary	4 x relays of operational status indication (comparators, failure, pulse output of total volume (especially for forward and backward flow directions, comparators (4 modes) – non-inductive load 3A/240V AC/DC.
Frequency (open collector) (on request)	nominal range 1 kHz, maximum 30 VDC / 50 mA
Communication (on request)	RS 232C, RS 485, selectable baud rate, special protocol, for displaying stored data, SmartMQI software for data acquisition (evaluation on a common PC)
Cable outlets	3 – 5 x PG 11
Power supply	230 V +10 % / -15 %, 50 Hz, 30 VA
Electric protection	IP 65
Ambient temperature	-20 to + 50° C
Dimensions	300 x 210 x 100 mm (H x W x D)
Weight	4.5 kg

11 Warranty

The warranty conditions are covered by The Terms & conditions of Sale of the RTM-EXPOLINK s.r.o. and the Return Regulations and the Warranty conditions of the RTM-EXPOLINK s.r.o. .

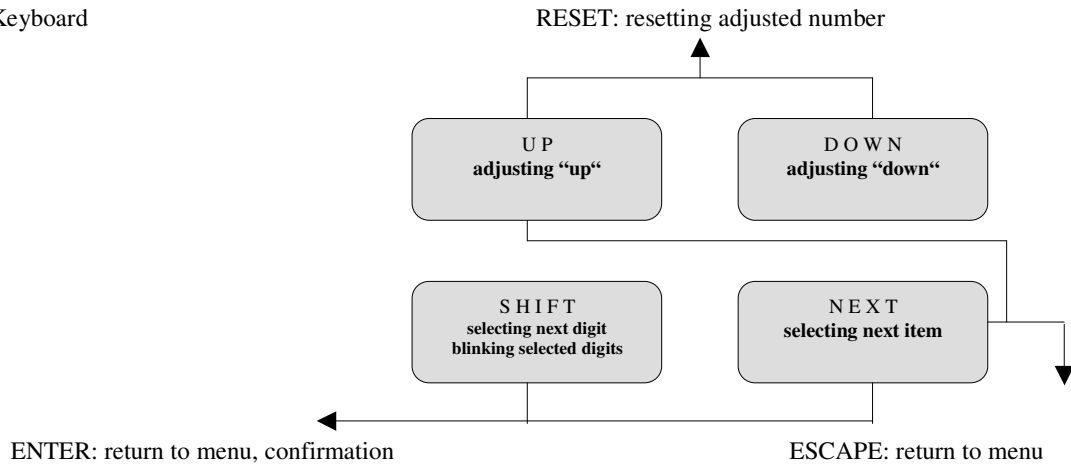
The Terms & conditions of Sale of the RTM-EXPOLINK s.r.o. and the Return Regulations and the Warranty conditions of the RTM-EXPOLINK s.r.o. are an integral part of the Resellers contract and Confirmation of Order. Please see your Resellers contract or www.arkon.co.uk, menu Support.

The Warranty sheet is included in the Packing note of the goods.

For reclamation procedure, please consult our web sites www.arkon.co.uk, menu Support or call the RTM-EXPOLINK office.

12 Instructions for use

Keyboard



S + Q menu description– user mode:

S + Q	Displaying current flow in both directions, total volume in both directions, closing a relay. Individual items can be selected in MAIN menu, Display box.
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RUN menu description – measurement mode, reading the statistic data:

Standard view	Moving from user menu and return.
Q(t) record	Recording 5 average flowrates.
H-statistics	Hourly statistics: total volume, operational time and flowmeter failure time.
D-statistics	Daily statistics: total volume, operational time and flowmeter failure time.
M-statistics	Monthly statistics: total volume, operational time and flowmeter failure time.
Date/time view	Displaying the date and time.
Password check	Selecting four-digit password which is necessary for moving from RUN to MAIN menu.
Version	Instrument type and program version.

MAIN menu description – instrument adjustment:

Run	Moving to measurement mode, reading the statistical data and return.
Run / s	Running in service mode (intended for installing and testing the instrument).
Qsupp, ..	low flow rejection limit, identifying positive flow direction, <i>measurement delay after switching on</i>
Filter	<i>filtration constant and filter delay.</i>
Range	<i>current flow range.</i>
Display	time parameters that display the individual quantities, displaying individual quantities.
Unit, format	flowrate unit Q and format of displaying the quantities Q, S+ and S- .
Pulse output	pulse output for the external counter, total volume per one pulse, pulse width.
Comparators	four flow comparators with 4 modes, static or pulse mode.
Failure	intended for future checking status parameters.
Relays	assigning the functions for relays 1 to 4, external counter pulse output, 1 to 4 comparator outputs, failure, aerating the sensor.

Analog output	assigning output quantity, output range, nominal current (0-20, 4-20, 0-5, 0-10 mA), extending current range above the upper limit of nominal current (e.g. up to 24 mA), negative output range.
RS 485 -	<i>entering transmission line parameters.</i>
Manual output	manual control (testing) of 1 to 4 relays, current and frequency outputs.
Zero adjust	adjusting device zero point: performed during calibration in factory, after installation can be completed.
Recalibration	<i>adjusting parameters of automatic internal recalibration in the measurement mode.</i>
Air detector	<i>adjusting detection parameters of empty piping</i>
Cleaner	adjusting parameters for cleaning sensor electrode.
Date, time	adjusting the date and time: for initialisation press only NEXT key and hold for 3 seconds
Password	adjusting the password for moving cross the main menu - MAIN, SENSOR and HIDDEN.
Adjustment range	= 0001 – 9999, value = 0000 – cancelling the password.
Version	instrument type and program version

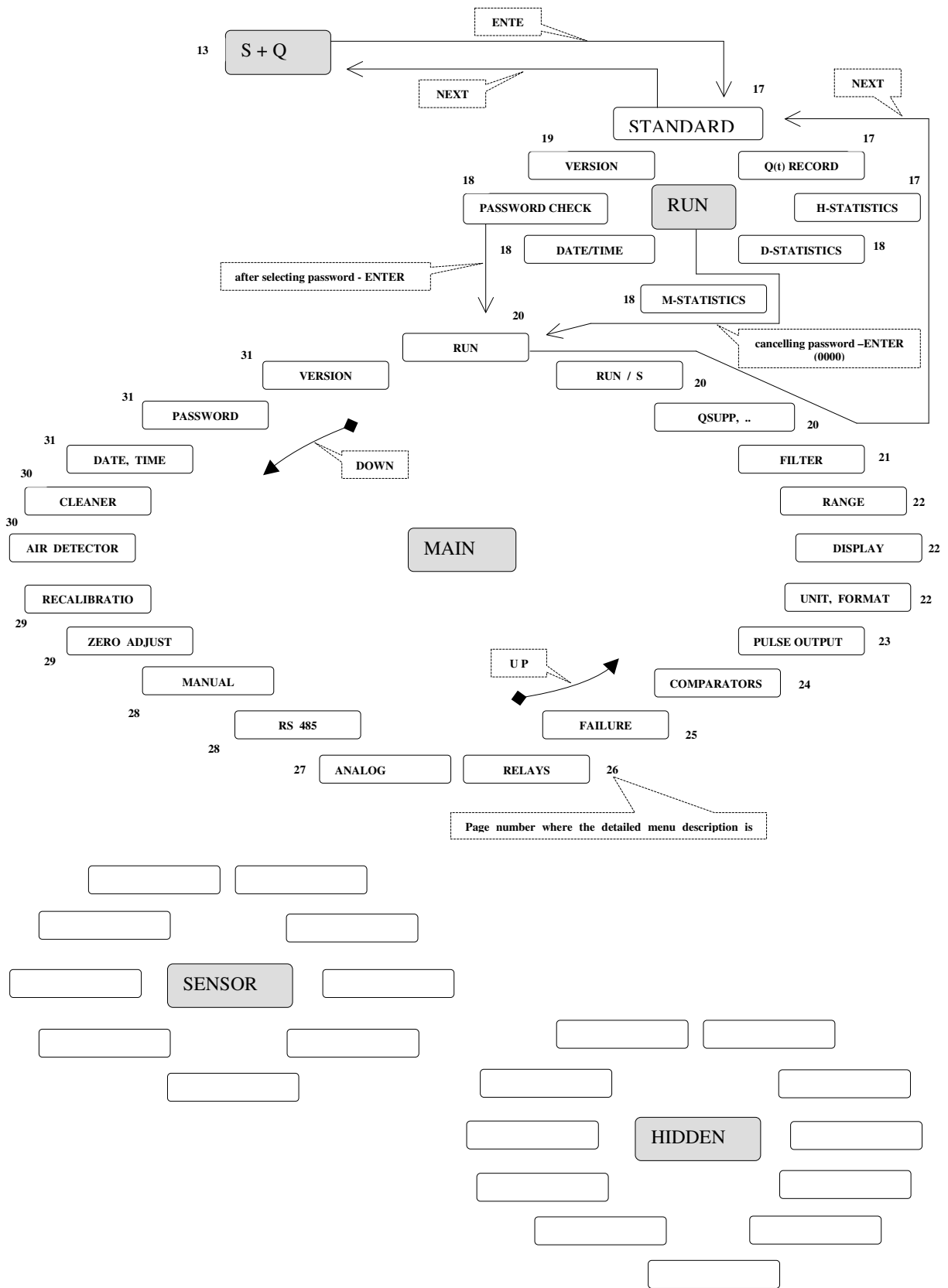
SENSOR and HIDDEN menu description

The area intended for the basic device adjustment, calibration under normal conditions – not available!

CAUTION:

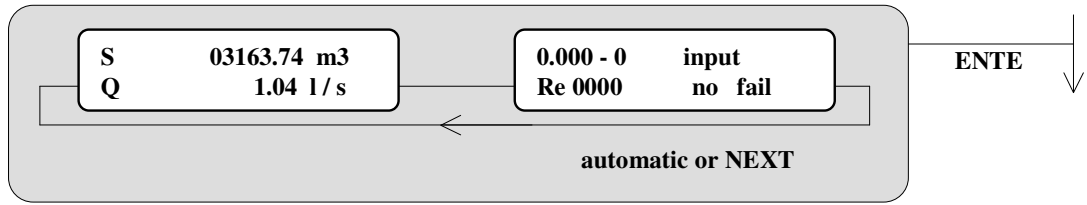
The description in the MAIN, SENSOR and HIDDEN menu written in Italics should not be changed. The parameters are preset with respect to the given location and the sensor type.

12.1 Graphic structure of individual Series 99 menus



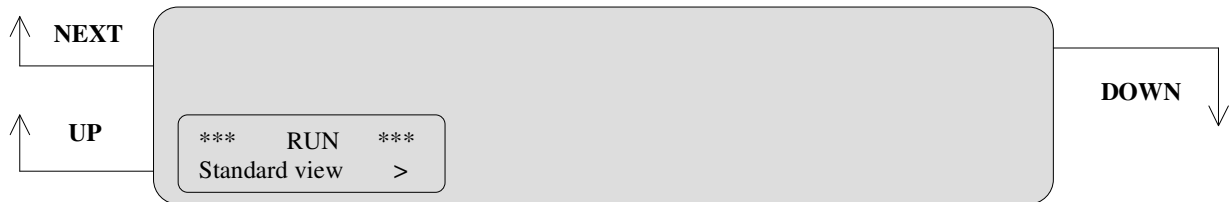
12.1.1 S + Q – user mode

The program identification and the program version will be displayed during the first three seconds after switching on the instrument. The individual screens of selected quantities will alter (in preset time intervals) automatically after the elapse of a 3-second interval, pressing the NEXT button may also alter the screens. The screens and the intervals may be selected in the MAIN menu, and Display screen.



12.1.2 Standard view

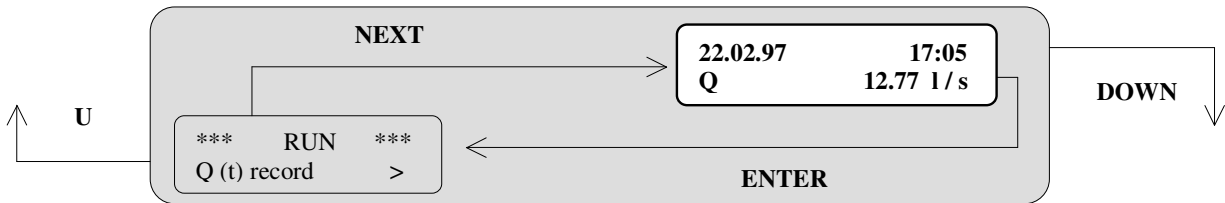
Moving from the user mode and return: The measurement is proceeding.



12.1.3 Q (t) record

Recording 5-minute average flowrates Q: The measurement is proceeding.

Key functions – UP or DOWN - selection in 5-minute steps, UP+DOWN resets hours and minutes, SHIFT+UP or DOWN - selects the days.

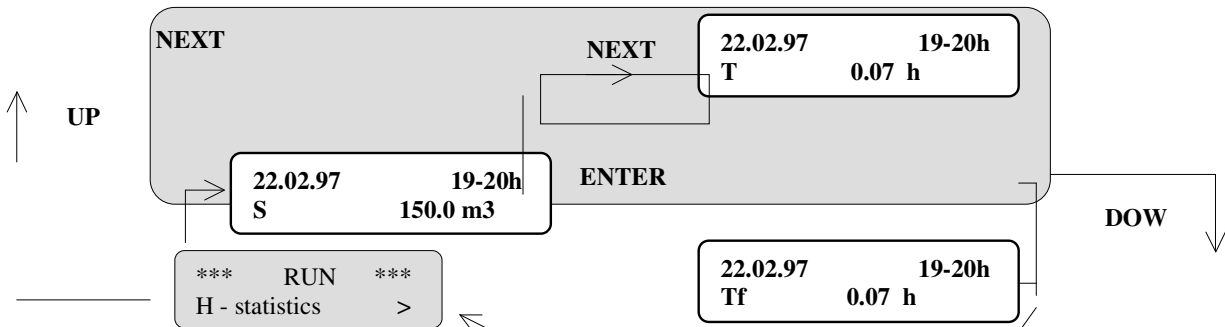


12.1.4 H-statistics

Hourly statistics: total volume S, measurement time T and failure time Tf for every hour:

The measurement is proceeding.

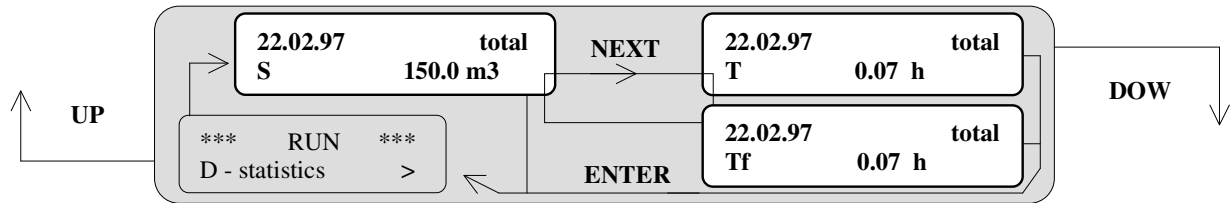
Key functions - UP or DOWN, selection in hours, UP+DOWN resets the clock, SHIFT+UP or DOWN selects the days.



12.1.5 D-statistics

Daily statistics: total volume S, measurement time T and failure time Tf for every day:
The measurement is proceeding.

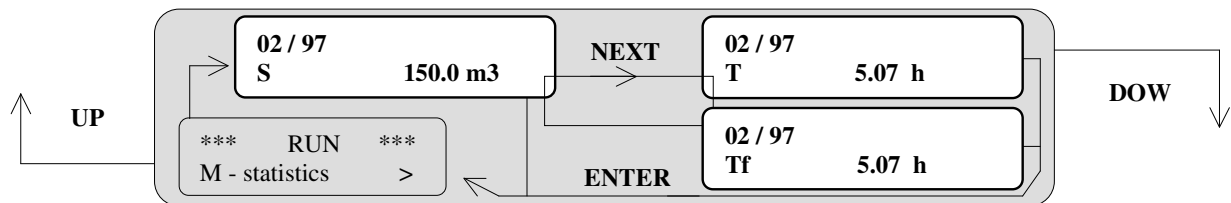
Key functions - UP or DOWN, selection in days, SHIFT+UP or DOWN, selection in months.



12.1.6 M-statistics

Monthly statistics: total volume S, measurement time T and failure interval Tf for every month:
The measurement is proceeding.

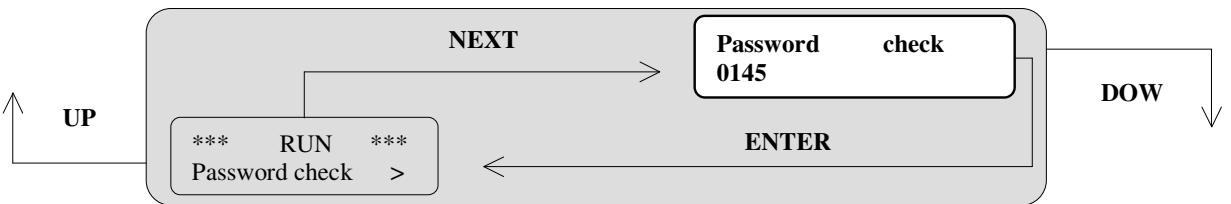
Key functions - UP or DOWN selection in months.



12.1.7 Date/time view

Displaying the date and time: The measurement is proceeding.

12.1.8 Password check



Selecting 4 –digit password: The measurement is proceeding.

The password is necessary for moving from RUN to MAIN. The access code for moving in the device menu is set in the factory usually to the value of last three digits of the flowmeter serial number. For example the serial number is 97145 – then the password = 0145.

Key functions - SHIFT selecting the next digit (selected digits are blinking), UP or DOWN selecting the numbers.

12.1.8.1 Run

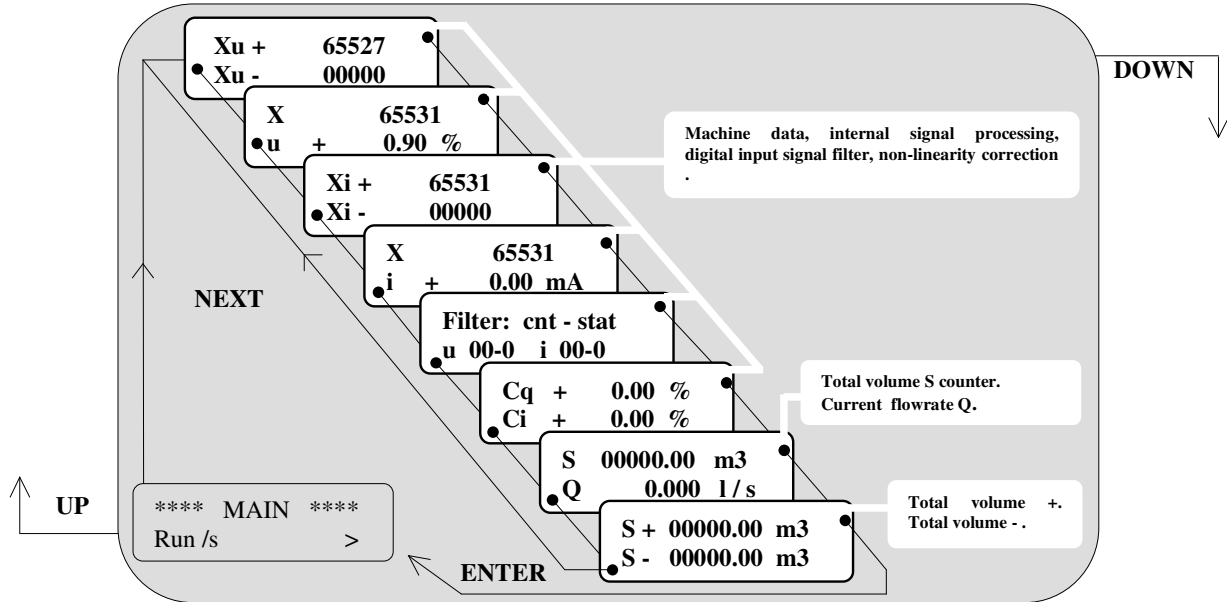
Moving to the measurement mode and return:



12.1.8.2 Run /s

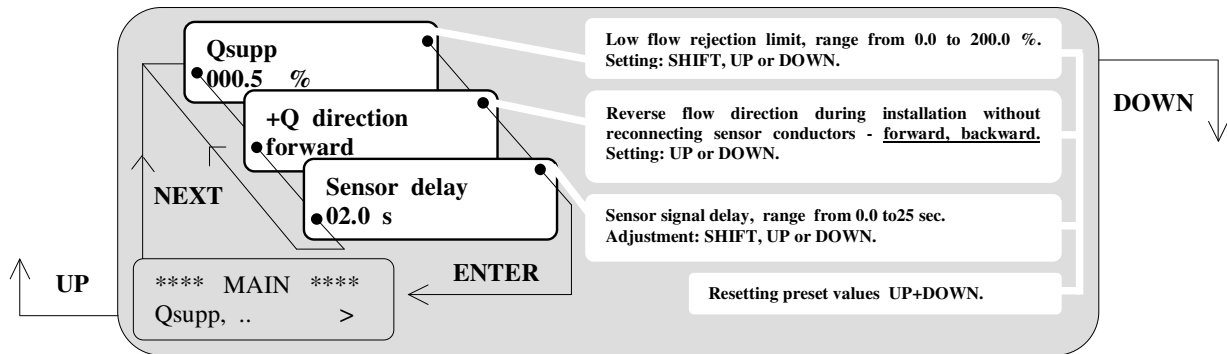
The measurement process in the service mode:

This is intended for installing and testing the device. The measurement process is launched in the service mode by pressing the NEXT key. The proper measurement runs in the same way as in the user mode, however the method of displaying the quantities on the screen is modified according to service control. Eight screens can be scrolled on the display by pressing the NEXT key.



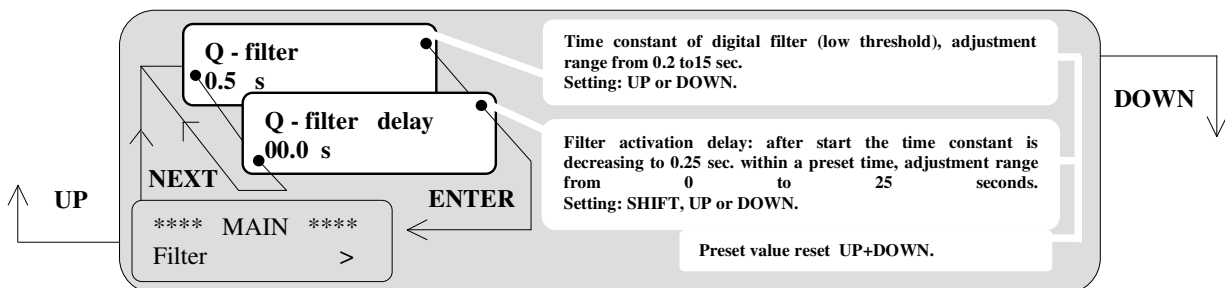
12.1.8.3 Qsupp,

Low flow rejection limit, identification of positive flow direction, measurement delay after starting the flowmeter:



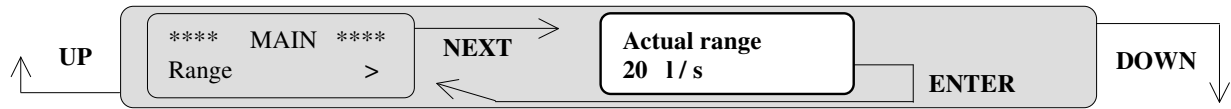
12.1.8.4 Filter

Filtration constant and filter delay:



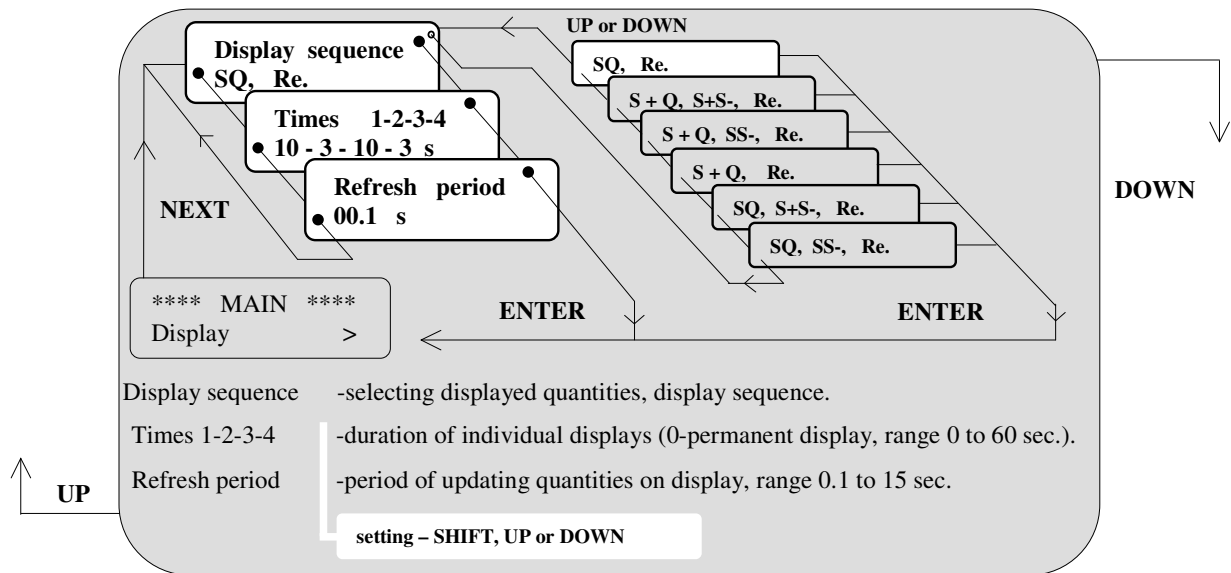
12.1.8.5 Range

Current flowrate range: however the instrument operates up to 200 percent of this value!
Read only parameter.



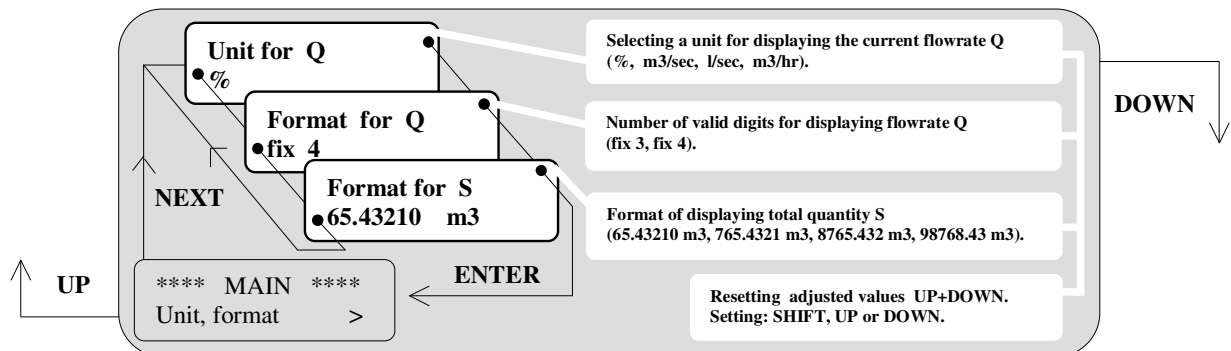
12.1.8.6 Display

Time parameters displaying individual quantities, format of displaying individual quantities:



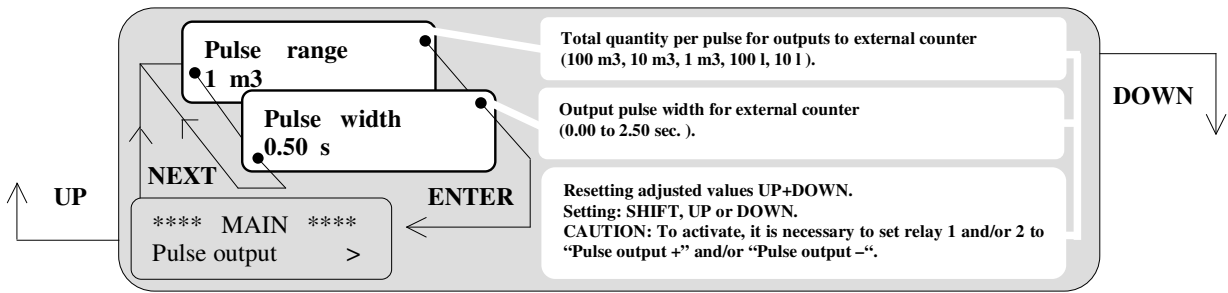
12.1.8.7 Unit, format

Flowrate unit Q and format of displaying quantities Q, S+ and S-:



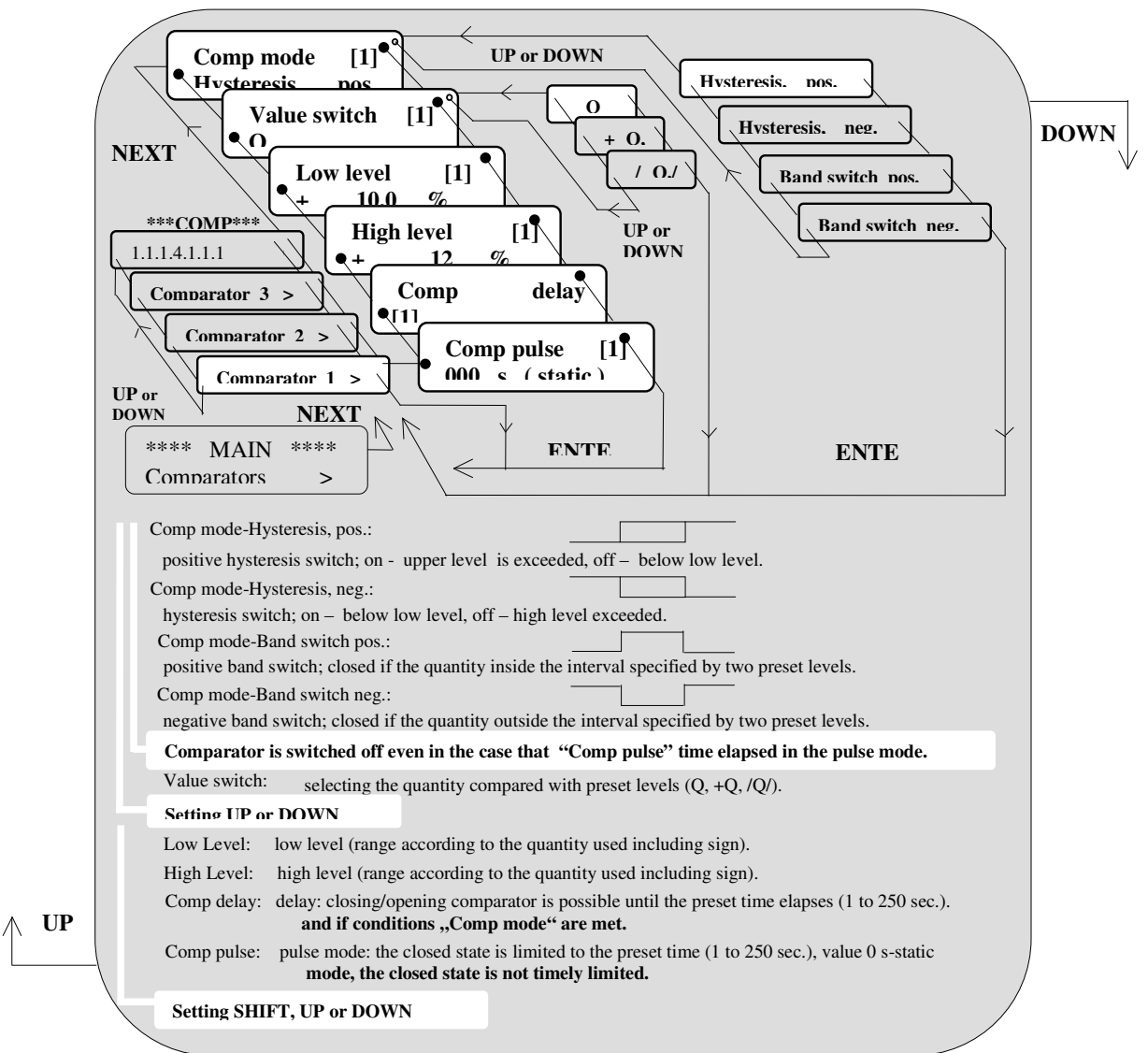
12.1.8.8 Pulse output

Pulse output for external counter, total quantity per 1 pulse, pulse width.



12.1.8.9 Comparators

Four flow comparators with 4 modes, static and/or pulse modes are available:

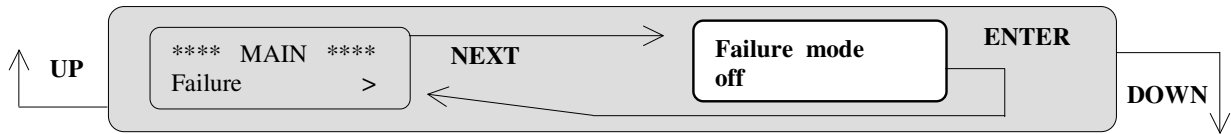


CAUTION:

In addition to setting the quantities in compliance with the above-mentioned table, it is necessary to select a relay in „Comparators 1 to 4“ mode. Otherwise the comparator has no effect on SMART outputs.

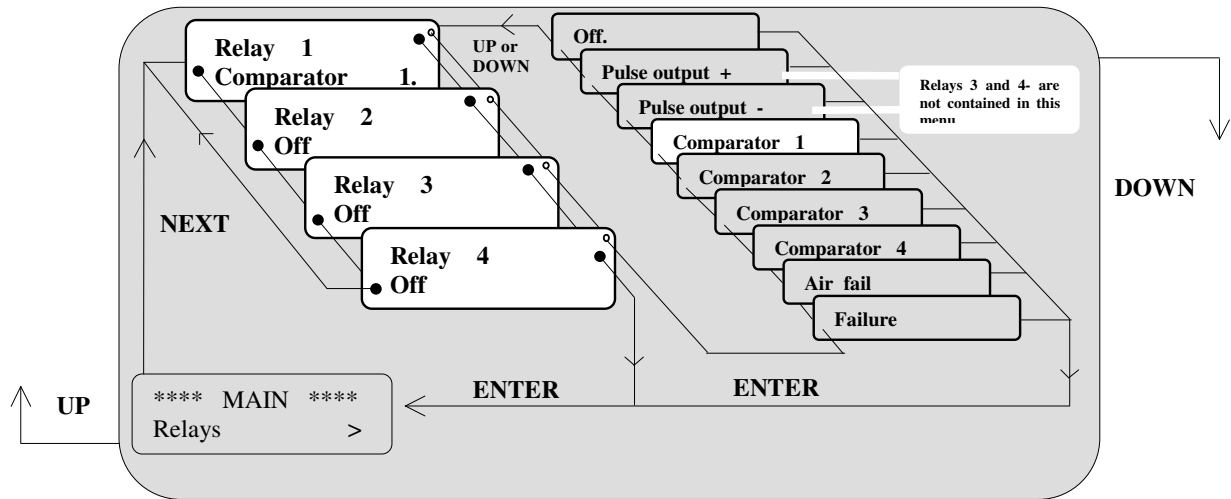
12.1.8.10 Failure

Intended for a future parameter extension that will control the status:



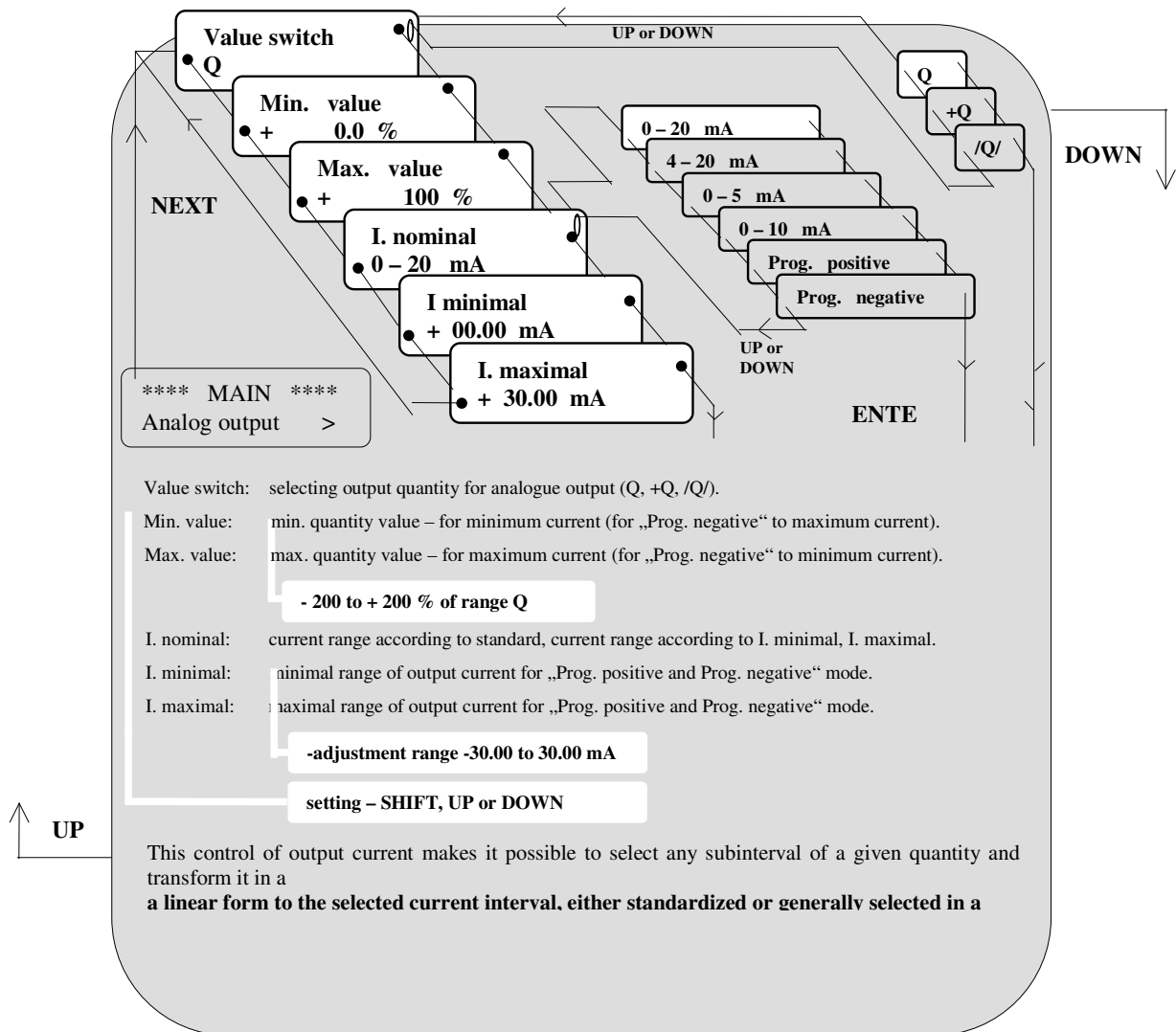
12.1.8.11 Relays

Assigning the functions for relay 1 to 4, pulse output for external counter, 1 to 4 comparator output, sensor failure and sensor aeration:



12.1.8.12 Analog output

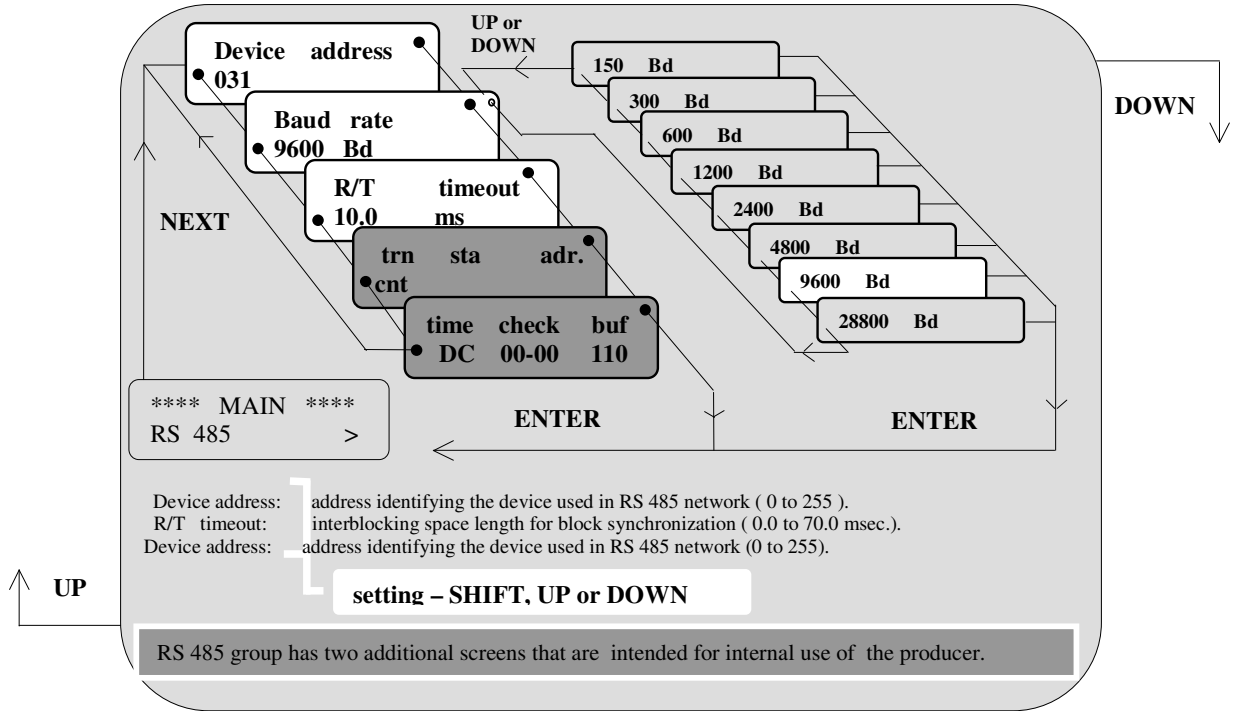
Assigning output quantity, output range, nominal current, current range extension:



12.1.8.13 RS 485

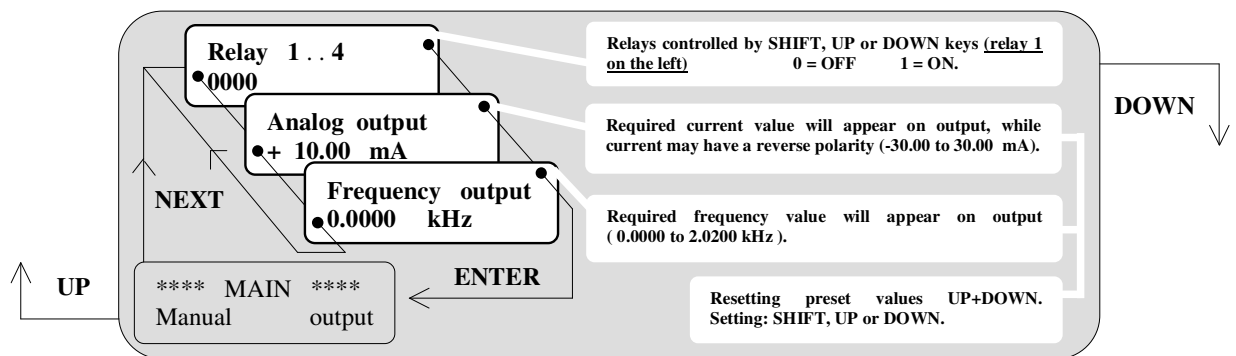
Entering transmission line parameters:

The communication line makes it possible to transfer not only all basic device quantities (Q, S, S+, S-), but also all statistic records. This output is programmed to the transmission format. This is a binary asynchronous protocol which is written by the manufacturer's company and described in , Protocol for SMART Checkmag flowmeters“ documentation (not commonly shipped).



12.1.8.14 Manual output

Manual control (testing) of 1 to 4 relays, and current and frequency output:



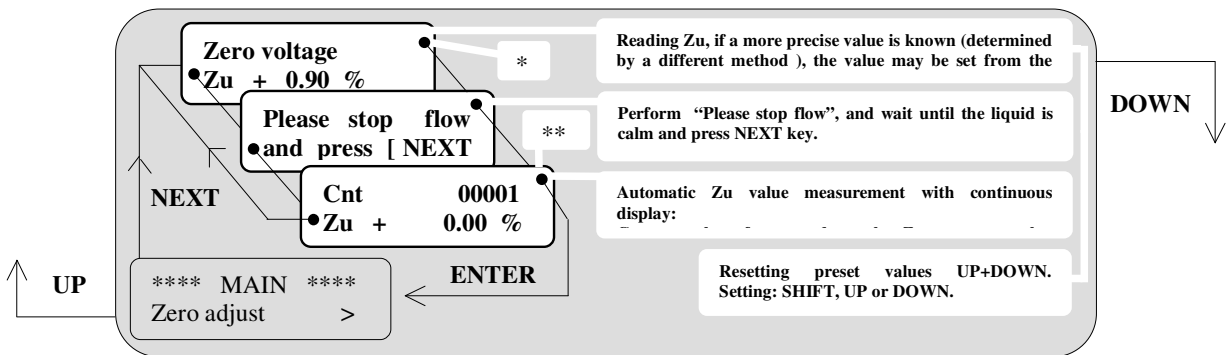
12.1.8.15 Zero adjust

Setting the zero point of the device, performed during calibration in factory, any readjustment during installation is possible:

Consult the manufacturer if you want to change zero adjust. The adjustment is given by the quantity value Zu [%] that can be measured or set from the keyboard.

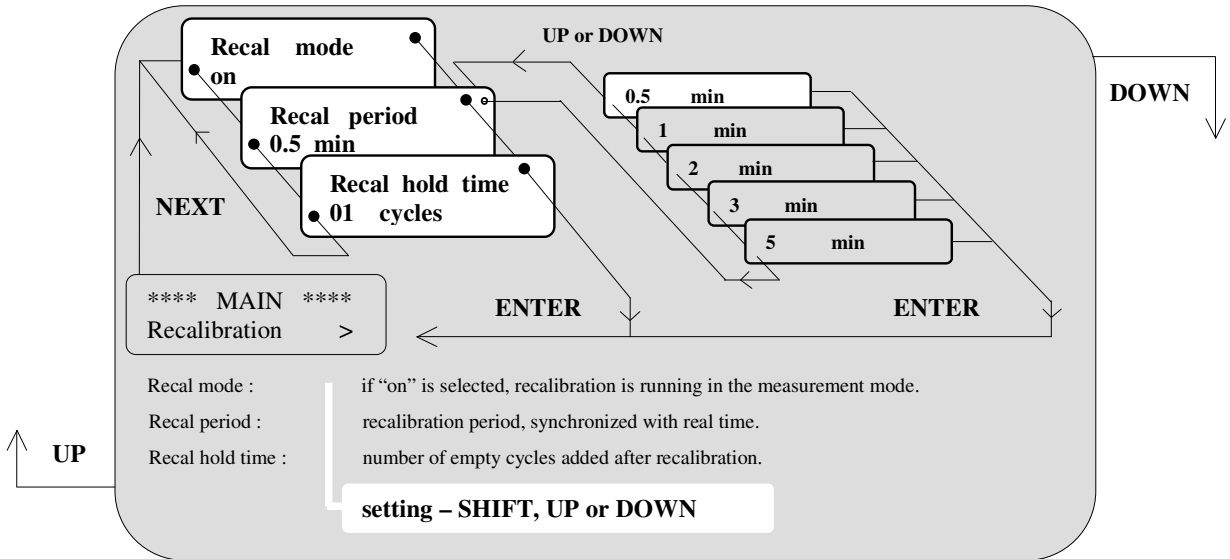
Legend to the following graphics:

- * Press NEXT key in the case that the Zu value should be measured, otherwise use ENTER or ESCAPE to return to menu.
- ** The measurement is completed automatically when the preset number of samples (limit) has been measured (this number of samples is optimised in the factory). Only in an emergency, should pressing NEXT or ESCAPE key from the keyboard be used to interrupt the measurement.



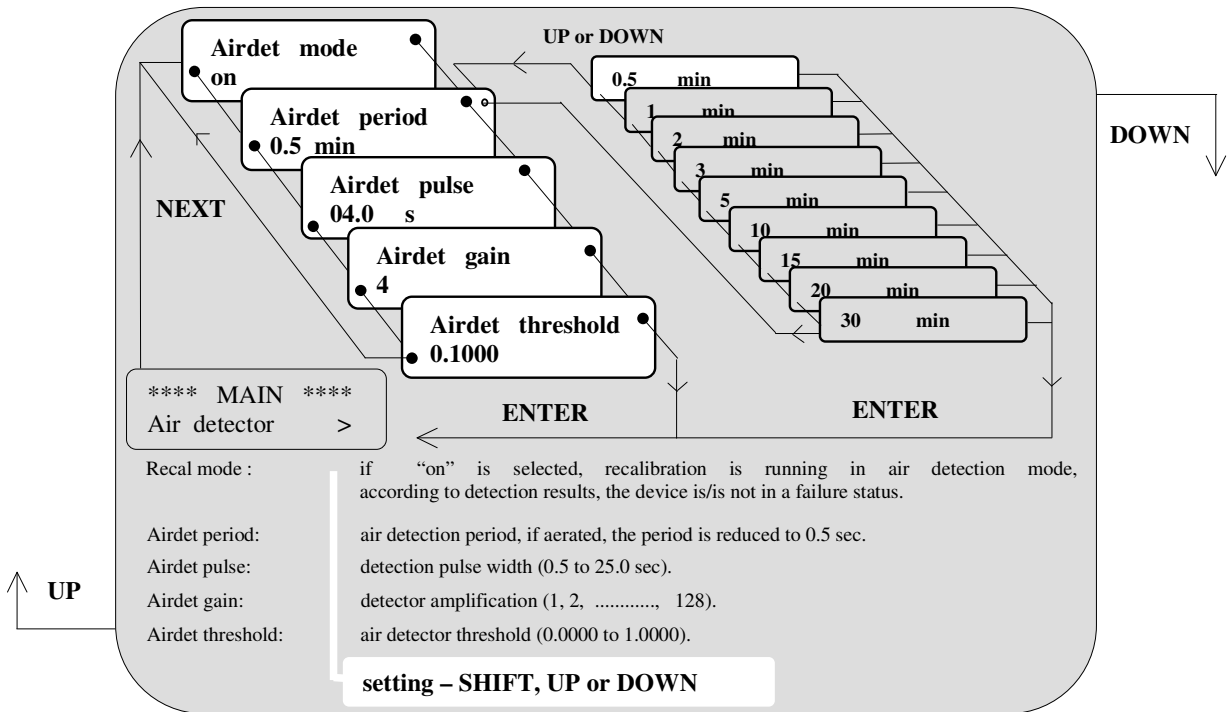
12.1.8.16 Recalibration

Setting parameters of automatic internal recalibration in the measurement mode:



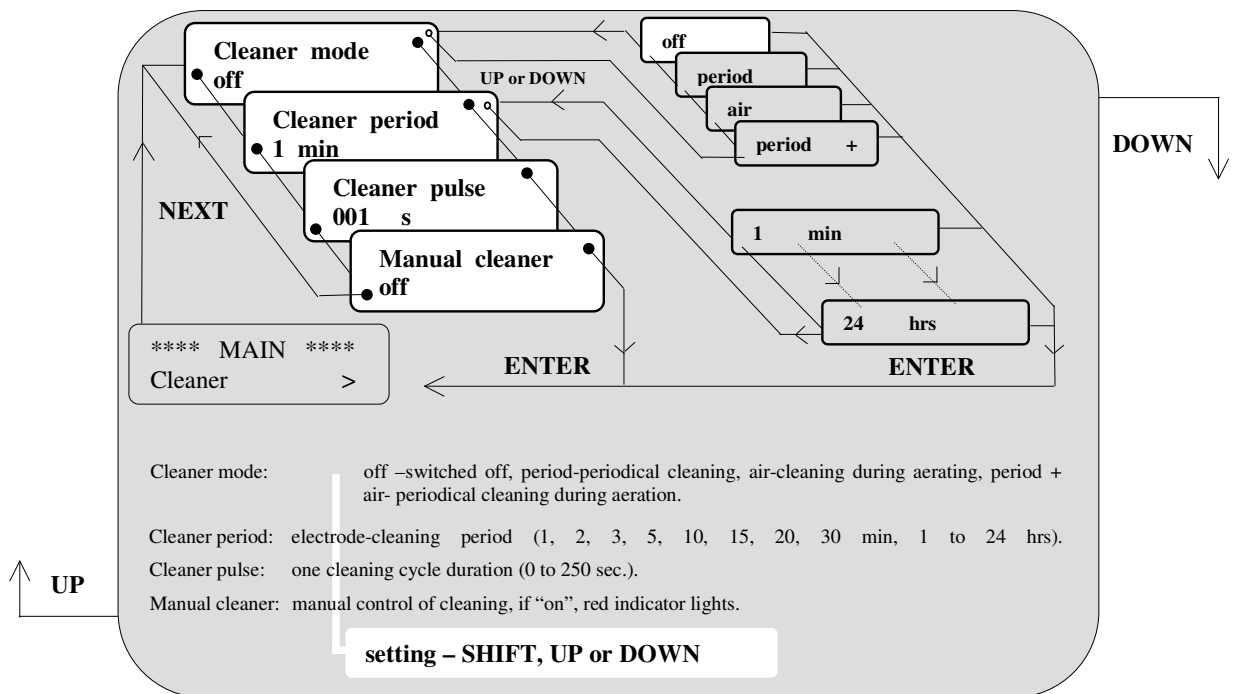
12.1.8.17 Air detector

Setting parameters for empty pipe detection:



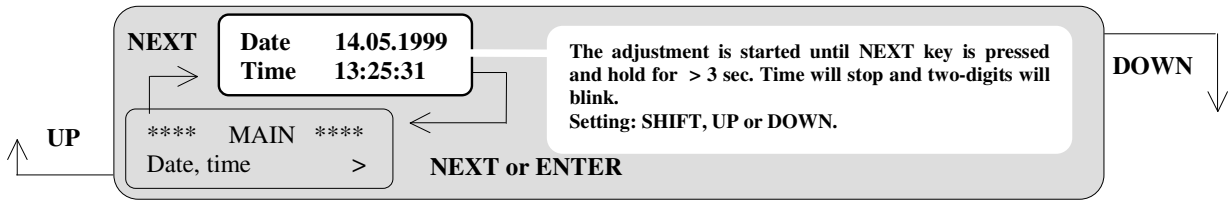
12.1.8.18 Cleaner

Setting parameters for electrode cleaning:



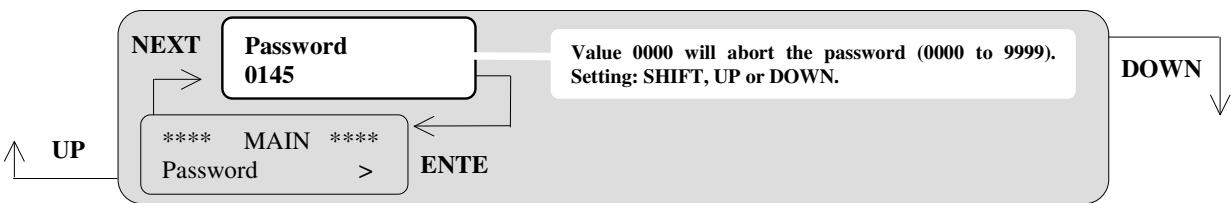
12.1.8.19 Date, time

Setting the date and time, for initialisation press NEXT key and hold for 3 sec.:



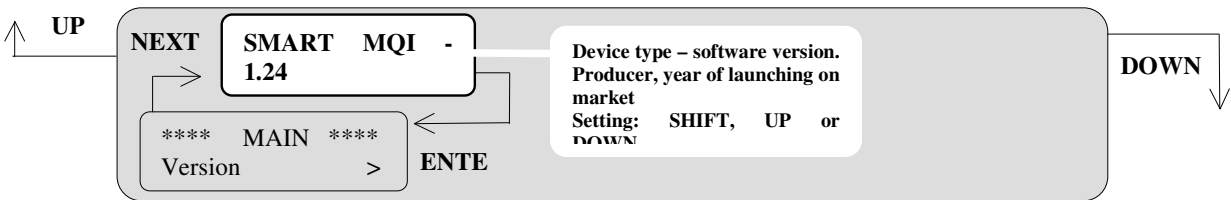
12.1.8.20 Password

Setting access password:



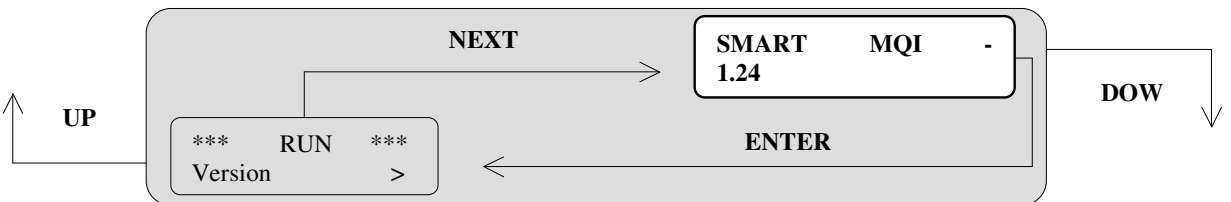
12.1.8.21 Version

Device type and program version:



12.1.9 Version

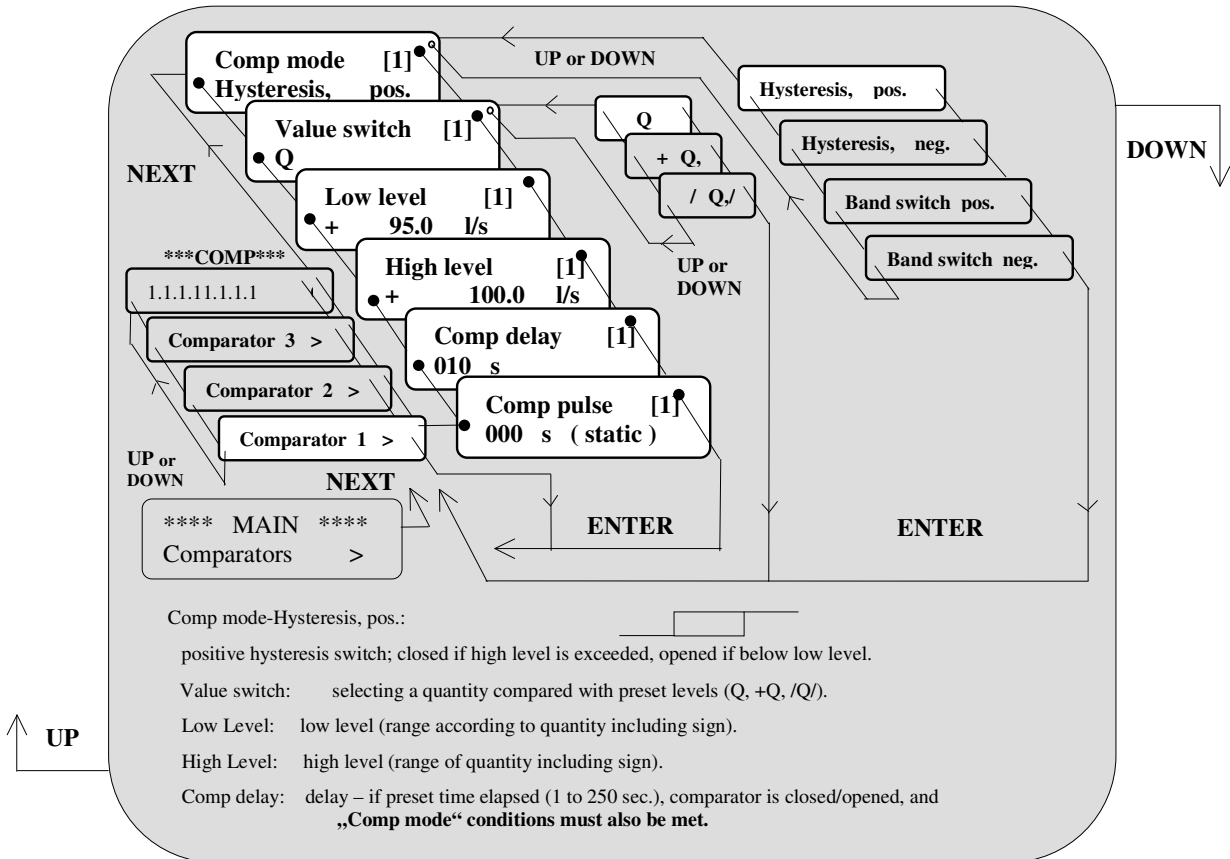
The instrument type and program version: The measurement is proceeding.



13 Examples

13.1 Setting of comparators

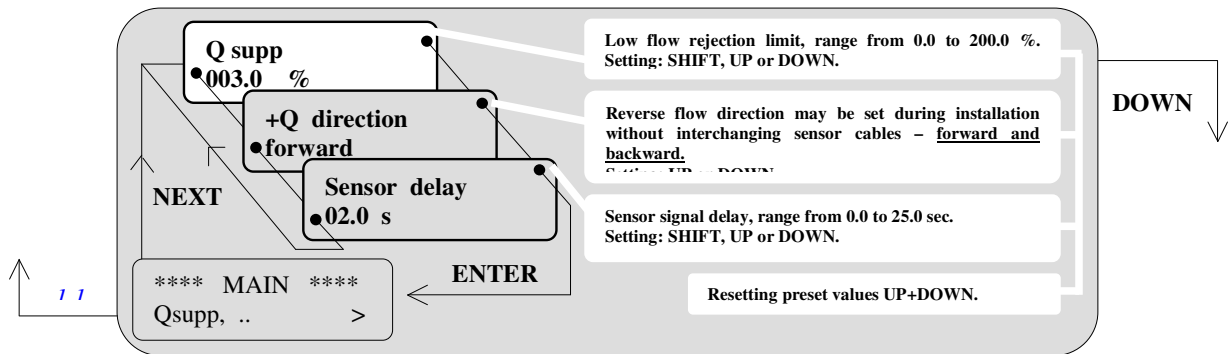
If flow is higher than 100 l/sec., it is necessary to close a relay contact in the SMART unit. Adjust the following parameters:



Relay 1 – for Comparator 1 must also be assigned in the Relays menu to the preset comparator. The preset comparator including the assigned relay will close/open relay 1 if current flowrate exceeds 100 l/sec. with a preset delay of 10 sec. The closed relay 1 will open if flowrate reduces below 95 l/sec. with a delay 10 sec.

13.2 Setting of electronics

The flowrates below the low limit of up to 3 percent of the range must be blocked (i.e. sneak flowrate). Adjust the following parameters:



The preset low limit will prevent to measure in a range lower than 3 percent for a flowmeter (including the counter integration).

All other corrections and adjustment of SMART device may be carried out similarly according to the instructions for adjustment.

14 Data acquisition program and basic information

SmartMQI 3.2 evaluation program (shipped on a special order)

This program makes it possible to transfer the statistic register values from the SMART device, to a PC disk and to display the data on a PC monitor or print hardcopies of numerical values and graphics on a printer.

Data transmission from SMART device to a PC disk

This is a preparatory phase that secures the data transmission from the statistical registers of the SMART device to a PC disk. The data from one calendar month is transmitted as an integral part and the data will be stored to one DAT file on a PC disk. DAT files will be used for all other operations that are performed with measured values.

Numerical report of flowrates

The data from every calendar day is represented in one table. This table contains 5-minute flowrate averages Q that are acquired during the whole day. Daily minimum / maximum values including their corresponding times are shown below the table. One table is printed on one page, however the data are scrolled in sequences on the monitor.

Graphic flowrate report

The data from every calendar day is plotted in one chart. The chart shows 5-minute flowrate averages Q during the whole day. The data is presented by either points or continuous curves.

Statistical data report

The following statistical data are presented:

Qsum	...	total volume	[m ³]
Tsum	...	measurement time	[h]
Qstr	...	mean flowrate	[l/s]

The statistical data report is printed in one following modes:

"Daily"	...	all data from a day is printed in table including summary and hourly data
"Monthly"	...	all data from a month is printed in table including monthly summary data and daily data
"Yearly"	...	annual data is printed in table including annual summary data and monthly data

The printed report includes the data from a selected year. In "Daily" mode, tables are printed from a selected initial date up to a final date inclusively (e.g. from 9/1 to 1/2 inclusively). In "Monthly" mode, tables are printed from a selected initial month up to a final month inclusively. In "Yearly" mode, the complete yearly data is printed (one table).

One table is printed on one page, however the data is scrolled in sequences on the monitor.

Graphic statistical data

In graphic mode, the data of total volume Qsum is also printed in three modes:

"Daily"	...	a bar graph for every day that shows total volume Qsum for individual hours
"Monthly"	...	a bar graph for every month that shows total volume Qsum for individual days
"Yearly"	...	a bar graph for every year that shows total volume Qsum for individual months

The selection of the year and an initial and final date (or month) is the same as for the numerical data report.

Minimum PC configuration for SmartMQI 3.2.

PC / AT 486, graphic card and VGA monitor, printer for graphic hardcopies, serial port RS 232C (one of COM1 to COM4, that is not used), operating system Windows 98 SE.

If the connection cable between a flowmeter and a PC is longer than 10 m, please use SMART device with a RS 485 port.

The RS 232C / RS 485 converter must be installed between serial port and RS 485 port (shipped by Arkon Flowmeters.).