

Comet F₂

INSTALLATION MANUAL

1. SENSOR LOCATION

During the sensor assembly keep following principles:

- By reason of the correct measuring the sensor has to be filled up with the measured liquid fully.
- The most suitable sensor location is in a horizontal or upward part of piping.
- The location in the highest part of piping is unsuitable (Concentration of air bubbles can cause failed measuring) and also location in the outlet piping with free outfall (when the flow is stopped, the outlet piping is discharged and accordingly there is not fulfilled the condition, that the sensor has to be filled up with the liquid)
- An alternate solution is to locate the sensor into the trap.
- If there is the outlet piping longer then 5 m behind the sensor, install the air-outlet valve behind the sensor.
- In long piping locate the adjustment or closing valve behind the sensor in the flow direction (suction)
- When you use the pump, never locate the sensor into the pump suction.
- Stilling (straight) lengths of piping have to fulfil following conditions:
 - 5 x DN ... in front of the sensor,
 - 3 x DN ... behind the sensor.

Reducer up to 8° is included!

- Flanges of the sensor are connected to piping flanges by means of ground couplings.

In case of using of nonconductive surface of connecting pipes (e.g. rubbered, plastic etc.) it is necessary to use the metal grounding inserts in flange connection, or ground-electrodes to ensure the contact between liquid and the sensor's frame.

2. CONNECTION OF SENSOR TO CONVERTER

Distance

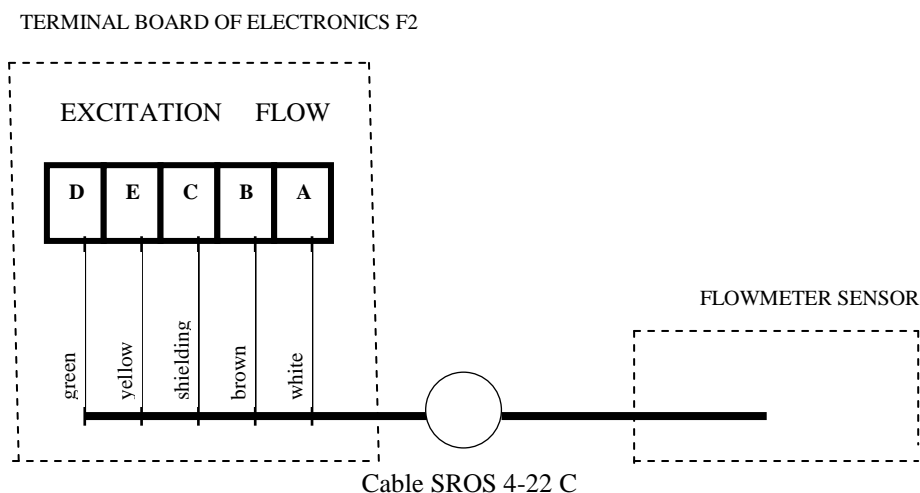
Standard length of cable between the sensor and converter is **5 m**.

Maximal length of cable (by the Customer's request) is **30 m**.

Patch cord connection

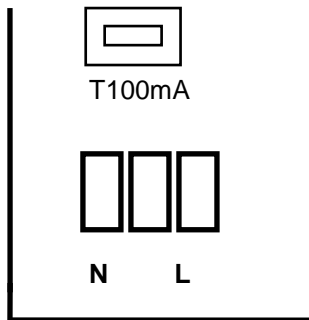
- Check if production numbers of the sensor and the converter are agreeing.
- Connect the patch cord always before converter connection to line voltage. If the line cord is connected to the converter, **it is non-permissible to connect and disconnect the patch cord, if the converter is under voltage.**

- Cable connection:



3. LINE VOLTAGE

Inductive flowmeter F_2 is powered by the line voltage 230V/50Hz, supplied into terminals of converter - marked **L - N**.



The converter is an electrical equipment of the II. class (without protecting terminal).

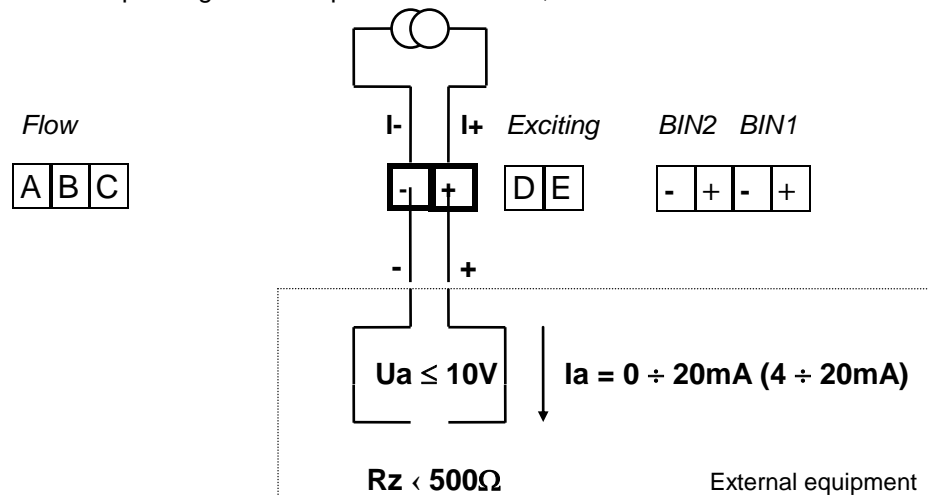
It is not equipped with the line switch and it is necessary to secure it and to switch off in another equipment (e.g. switch board). With regard to low supply (max 12VA) it is suitable to use a two-core cable with line wires with a small diameter (recommended 1 mm²) for easier handling.

Switch on the line voltage after the connection of sensor's patch cord and possible V/V equipment!

4. EXTERNAL EQUIPMENT CONNECTION

4.1 Analogue current output

Active current loop with galvanic separation 0 - 20mA, or 4 - 20mA.



Provide connection by any twin-lead. Keep conformable polarity of terminal connectors in Comet F_2 and outlying input equipment.

Keep stated condition of input resistance size!

Implicate also the circuit resistance in the resistance value (only at extremely long circuit and too thin conductors).

Setup of an analogue output - see Lit [1], item ANAL.

If the distant input requests the voltage 0 - 5V, or 0 - 10V, set the mode $I_a = 0 - 20\text{mA}$ and resistance R_z use as follows:

For range 0 - 5V
For range 0 - 10V

$R_z = 250\Omega$,
 $R_z = 500\Omega$.

4.2 Multifunctional outputs

Comet F₂ is equipped by two multifunctional outlets on terminal connectors V+,V- (BIN1) and S+,S- (BIN2).

Multifunctional outlets can be set to following functions:

- Impulses of flowed volume in plus direction
- Impulses of flowed volume in minus direction
- Impulses of flowed volume in both directions
- Comparison
- Batch start (**BIN1**) / batch stop (**BIN2**) (impulses 640ms)

It is possible to choose volume subsidiary to one impulse (0.1l,1l,10l,100l,1m³,10m³,100m³) and the width of impulses (10ms,20ms,40ms,80ms,160ms,320ms). Comet F₂ sends up the number of impulses, which corresponds to volume of liquid flowed in the measuring cycle (640 ms). In case of more impulses the impulse's width corresponds to the interval length (mark-space ratio 1:1). Subsidiary volume to one impulse and chosen width of impulse has to guarantee, that there need not come more than 50 impulses! In case of this incorrect setup, you will be informed by message:

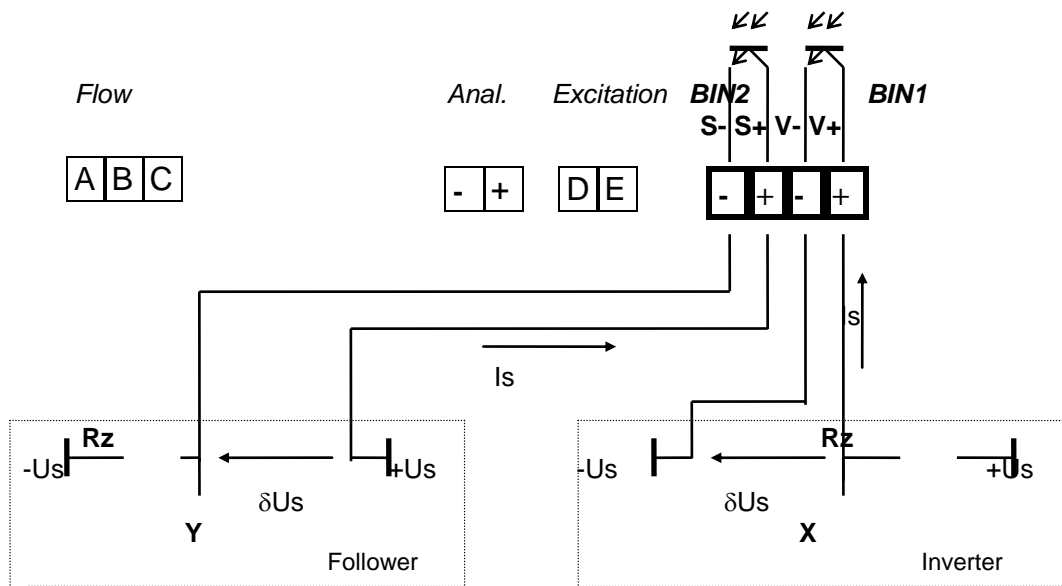
E5 . . . OVF:IMP m3,l .

The **comparison** can be set in two levels. Then choose active (switched on) state of output transistor at:

- the momentary flow is less than the chosen comparative level,
- the momentary flow is higher than the chosen comparative level,
- the momentary flow between the comparative levels,
- the momentary flow outside the comparative levels.

Mode setup and impulses outputs are set in the item **BIN**. Comparative levels and mode are set in the item **COMP** - see Lit [1].

Multifunctional outputs are in galvanic separation with the transistors with an opened collector.



Output transistor is controlled by an opto-member (galvanic separating). On the side of the distant equipment it can be engaged either as an inverter (see BIN1) or as a follower (see BIN2).

The output is *passive*, it means, that the supply voltage of the loop has to be from the external supply. The receiver in external equipment can be engaged either as an inventor or as a follower:

Outlet transistor	Inverter (Outlet X)	Follower (Outlet Y)
Opened (quiescent state)	+ Us	+ Us
Closed (active state)	- Us	- Us

Voltage -Us will mostly be zero - ground (GND).

It is necessary to keep following conditions:

Voltage between output connectors (V+,V-,S+,S-) Comet F₂ $\delta U_s \leq 30V_{ss}$

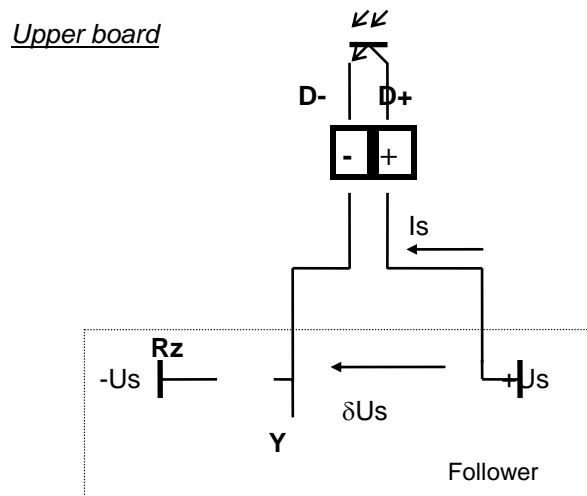
Current loop $I_s \leq 20mA$

From above mentioned conditions follows, that the load resistor R_z has to fulfil following condition for maximal current 20mA:

$$R_z \geq \frac{(+U_s) - (-U_s)}{20} \text{ [k}\Omega \text{ ; V]}$$

4.3 Serial output port

Serial port is the current loop of **TxD** signal. For the serial port activation Comet F₂ has to be in mode LOCAL item TRAN, see Lit [1].



Transistor is controlled with the opto-member (galvanic separating). On the side of the distant equipment it can be engaged either as an inverter or as an follower. It is the same like multifunctional outputs (see 4.2)

If the serial port is active (mode LOCAL in item TRAN), there is still transmitted to connectors of output port **D+,D-** the information with actual data of Comet F₂ meter in following format:

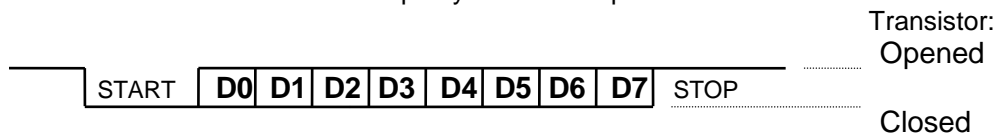
Character	Description	Position	Number of characters
Bxxxxxx	production number	1 - 7	7
xxxxxxx.x	volume V+ [m ³]	8 - 16	9
xxxxxxx.x	volume V- [m ³]	17 - 25	9
xxxxx.x	total time of measuring [h]	26 - 32	7
±x.xxxxx	momentary flow [l/s]	33 - 40	8
x	status character (service)	41	1
xxxxx	checksum	42 - 46	5
CR LF	completion codes	47 - 48	2

Legend:

- Data block contains 48 characters ASCII.
- Character "x" means figure 0 - 9.
- Location of decimal point at V+ and V- is adjustable – see item POINT in command DISP.
- Momentary flow has a space in the beginning (positive flow) or minus sign (negative flow). Decimal point is movable with maximal accuracy up to six decimal numbers.
- Zeros from the left side are replaced by interspaces, except production number, where they are left.
- Checksum is sum of decimal equivalent codes on positions 4 to 41.

Character format:

Character consists of 8 bits without parity and one stop bit.



Status report:

If Comet F₂ is not in measuring mode, or if the error comes into being, there is transmitted the status report along the serial port. The status message always consists of 10 characters. The first characters always are "/M".

The status report is in following format:

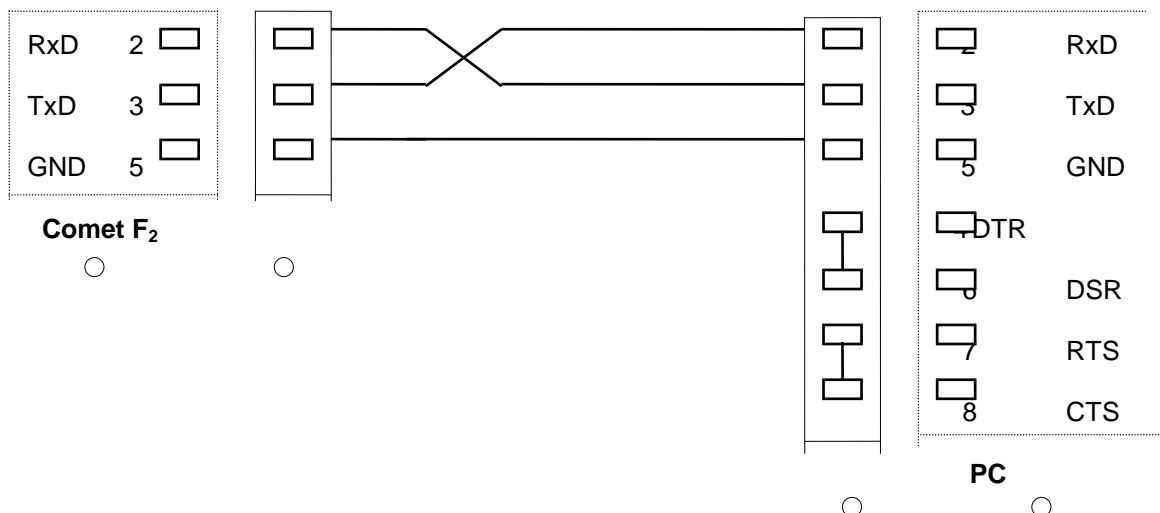
Characters	Item description	Position	Number of codes
/M CON	grid switching on	1 - 8	8
CR LF		9 - 10	2
/M Cxx	electrodes cleaning	1 - 8	8
CR LF		9 - 10	2
/M Exx	error message	1 - 8	8
CR LF		9 - 10	2
/M SEL	parameters insertion	1 - 8	8
CR LF		9 - 10	2

Character "x" represents number 0 - 9.

5. INTERFACE RS232

The ninepin connector Canon for the pc connection equips comet f2.

For the connection Comet F₂ - PC is adequate only three-wire connection with jumpers on the PC side:



Electrical properties of TXD signal and RXD one on the Comet F₂ side:

	RXD		TXD
Voltage range	- 15 V ÷ + 15 V		Voltage range ≥ ± 5V
Input resistor	3kΩ ÷ 7kΩ		Output resistor ≥ 300Ω

The cable connecting Comet F₂ to PC should not be longer than 20 m!

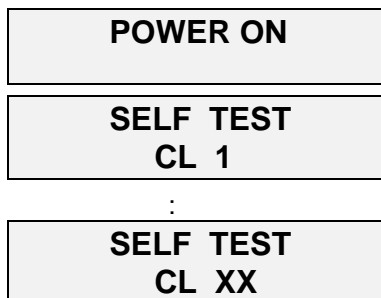
Into the connector Canon it can be also connected an external converter RS232 - RS485, which has to be powered from the external supply and the direction of transmission has to be controlled by the ET function from the output BIN1 or BIN2, see lit[1], item TRAN, mode LAN.

6. Equipment switching on and main MENU

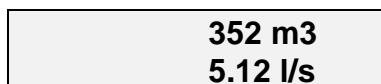
Instruction for Comet+₂ engagement

1. Connect the cable of flowmeter sensor,
2. Connect all necessary external equipment,
3. Connect the line voltage,
4. Close the line voltage (circuit breaker).

On the display of Comet F₂ there appears following step by step:



After the electronics test finishing (XX – number of steps depends on the programme version), Comet F₂ comes to the mode of a measuring display. There is also displayed cumulated value of the positive flow and the momentary flow value at the same time.



By pressing the button right arrow ⇒ , it is subsequently displayed:

- * - Difference of cumulated volumes (DELTA V)
- * - Cumulated value of negative flow (VOLUME-)
- Operational time in hours (TIME)
- * - Value of maximal flow (100% FLOW)
- Batch (BATCH)

* Items marked by star need not be displayed. Option in item DISP - see Lit [1].

Transit to main menu

Main menu on the Comet F₂ display makes possible service to choose mode, setup of units and parameters of all functions, which are available at Comet F₂.

Transit from mode of measured values display into the mode main menu make by **pressing of the button EXE for 2 seconds!**

On the display there are displayed the first two lines of main menu:



The cursor winks on the opted item. **Shift in main menu** by arrows:

- ⇒ , ⇐ ... shift in items in lines
- ↑ , ↓ ... shift in lines
- EXE ... saving of chosen item.

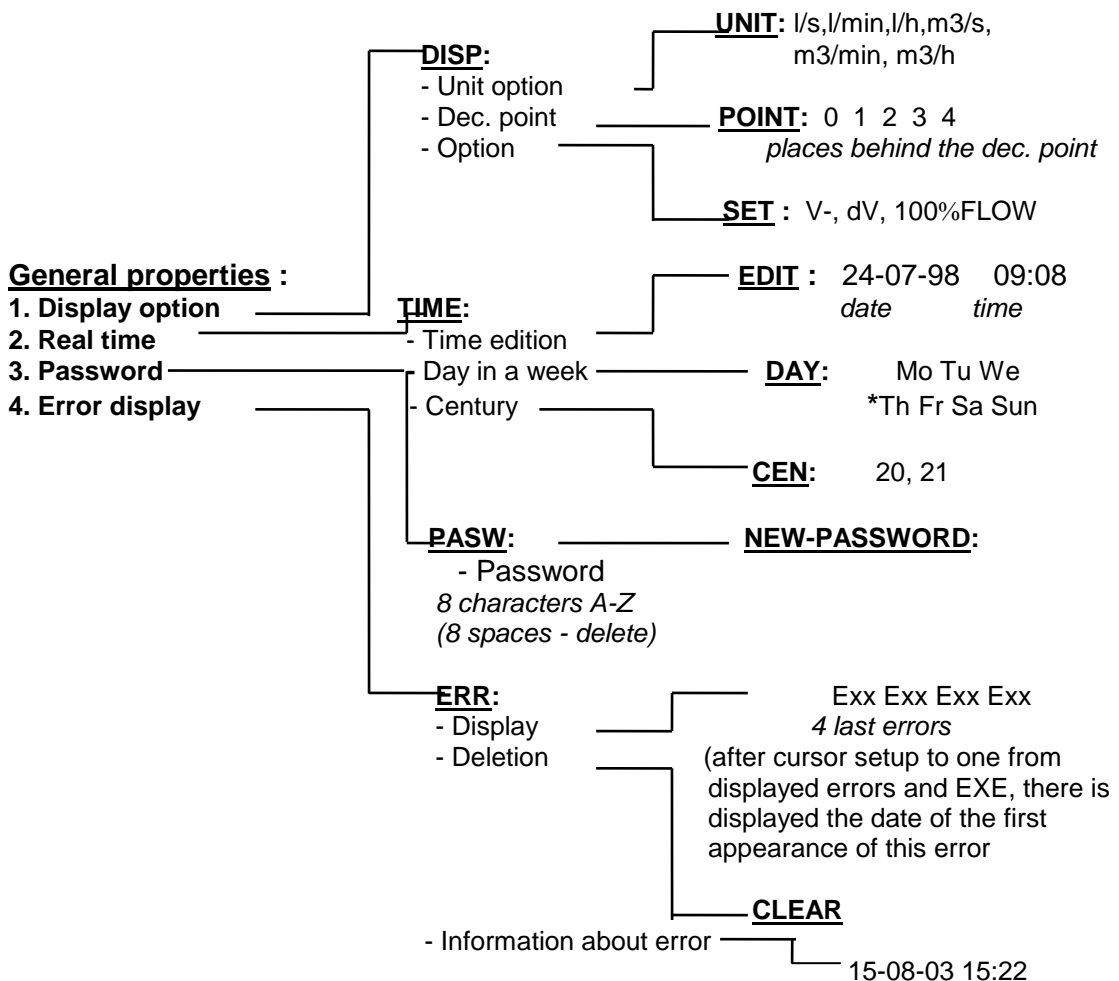
Note! If you insert the password, you cannot enter to main menu without this password.

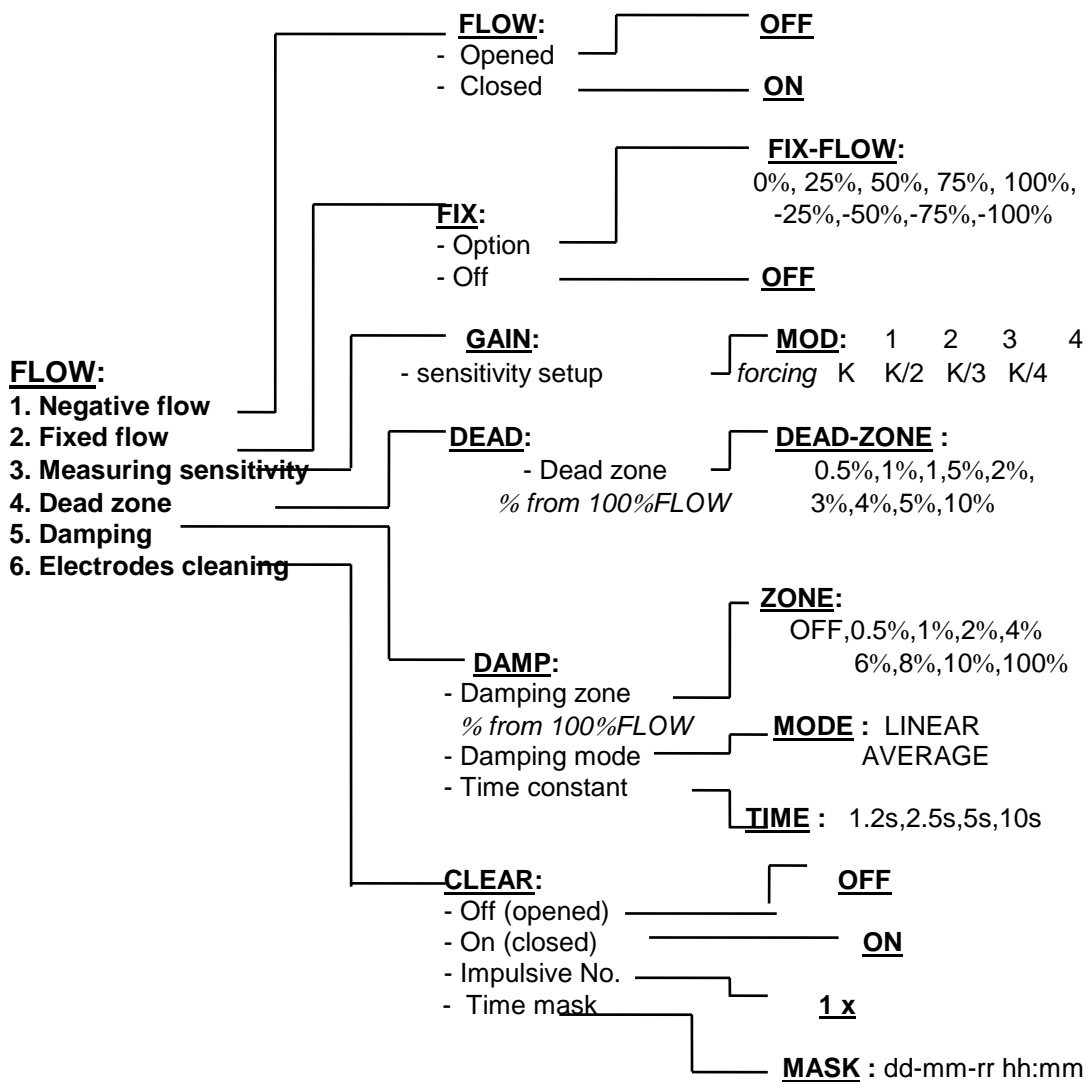
On the display is the notice **PASSWORD:** and you have to insert the password, which can consist of 8 characters (max.), see lit [1].

Other items in main menu are: GAIN,DEAD,CLEAR,CALB,FIX,FLOW-,ERR,TRAN,BATCH, TIME,SAMP,PASW,END.

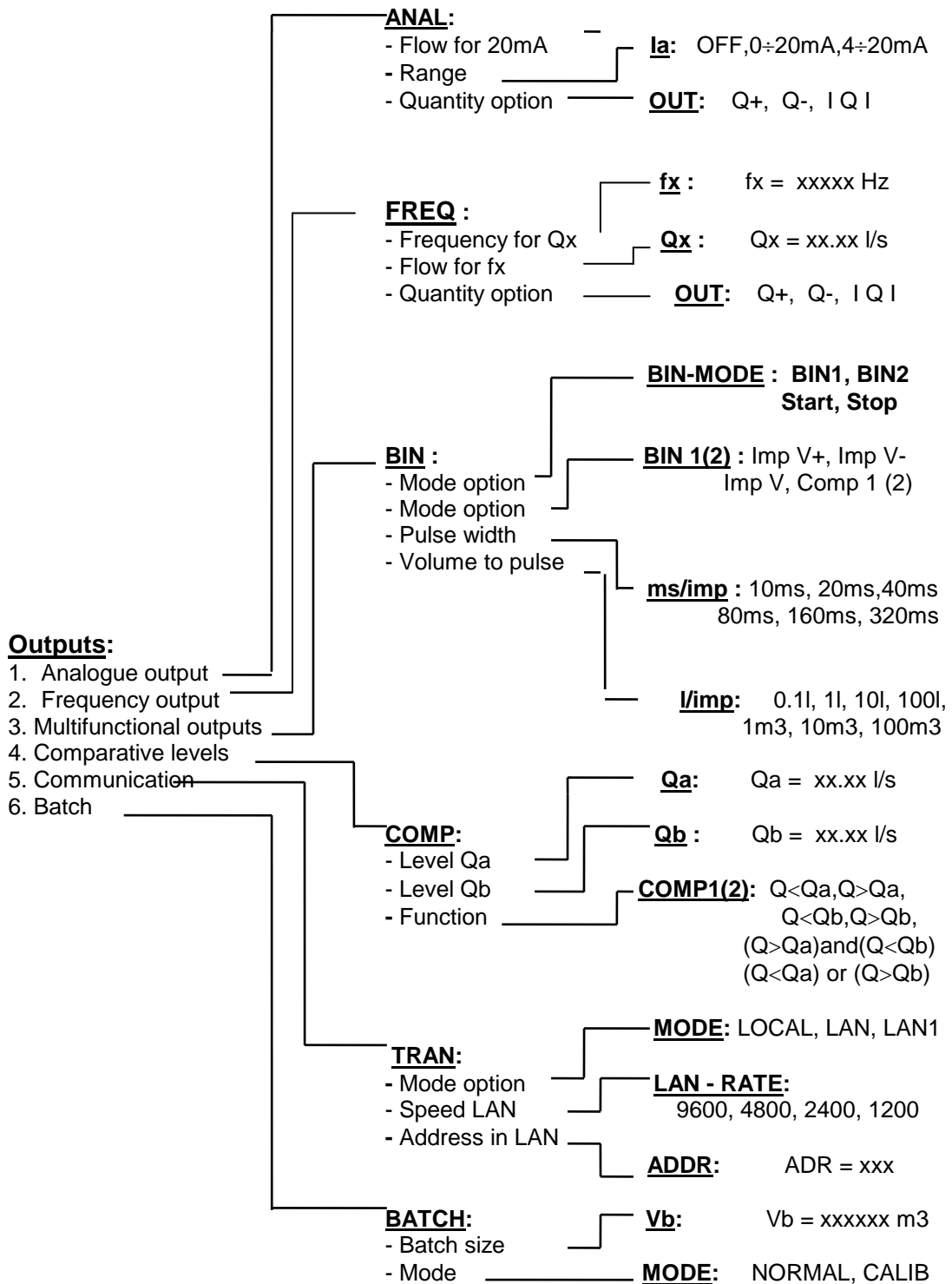
In details see Lit [1]. Below you will find only main menu scheme.

Main menu - summary





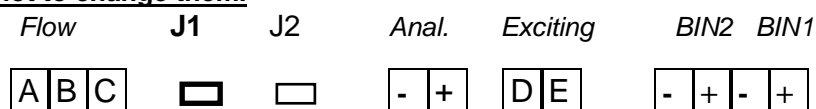
MAX: xx.xx l/s = 20mA



CALIBRATION

Only the responsible workers in production and test-rooms can provide calibration.

Calibration is done by the command CALIB. It makes possible responsible worker to change calibration constants and parameters and the calibrating seal is removed. The user can only to read constants, but **not to change them.**



The calibrating seal is located on the lower board (jumper J1 is secured with the mechanical stop).

SAMPLING:

		- VAR:	
		- Momentary flow	_____ Q
		- Maximal flow	_____ MAX
		- Minimal flow	_____ MIN
		- Average flow	_____ AVR
SAMP:			
1. Variable option	_____		
2. Period option	_____	PER:	_____ PER = xx min
3. Time mask	_____	MASK:	_____ xx-xx-xx xx:xx
4. Sampling starts	_____	START	(with previous samples deleting)
5. Continuation	_____	RUN	(without previous samples deleting)
6. Sampling stops	_____	STOP	
7. Saved samples reading	_____	READ:	

⇒ Following value
⇐ Previous value
↑ Previous sample
↓ Following sample

Note:

Arrows and EXE button provide insertion and edition of parameters:

↑ Increases numbers (0 - 9) or characters (A - Z),

↓ Decreases numbers or characters,

EXE Confirms the validity of parameters setup.

7. PREVIEW OF ERROR AND STATUS MESSAGES

Soft errors

Soft error cannot cause incorrect measuring or the change of cumulated and saved data. It is mostly the error of wrong parameters' setup, connection to PC etc.

E5 Size error of some binary output (BIN 1 or BIN 2).

Binary output cannot send out the right number of impulses in time period. For example if the flow is 5 l/s the width of impulse is set 320 ms and the unit 1 l/imp is dedicated to impulse, then the odds are that it cannot be sent out 5 impulses per one second (5 x 320 ms = 1,6 s).

Correction: Set possible values **ms/imp** or **l/imp** in menu BIN1 or BIN2.

Message E5 is displayed after the persisting size error of some binary output in the left bottom of the display. Other displayed data stay saved.

E40-E43 Data transmission errors between F2 and PC

Errors are displayed only for a short term during the transmission (max. 3 s).

The display of other data is not interrupted during this time. These errors have no effect on measuring and they don't invade other displayed data.

Possible reason: Bad connection to PC. Defective cable (some disconnected line wire or there are missing jumpers RTS-CTS or DSR-DTR). Bad version of the SETUP communication programme.

Hard errors

Hard error is error, which can invalid or change saved data. These are all other errors except above-mentioned soft ones, which are marked **Exx** (xx is the number of error with the text below). This information is important only for service technicians. The user cannot impress this information.

Other messages

POWER ON It means the right function after the connection to electrical network. The accumulator has regular voltage.

E30 SYSTEM RESET It can be caused, when the back up accumulator has low voltage or the equipment was connected to the network too soon after its switch off (< 10 s).

Correction: Let the equipment on for longer time (e.g. 8 hours). Then the accumulator will recharge automatically.

This status has no effect to measuring. But there is a possibility of data loss when the network is off.

CLx SELF TEST. Central test after the network is closed

C **C** in the beginning of the second line means, that the electrodes' clearing is provided.

□ The symbol □ in the end of the first line means, that the flow was higher than 120% Q_{max} for the duration of last five minutes

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Lit [1] : COMET F₂ - Reference instruction

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