

**SPIRAX SARCO** s.r.o.

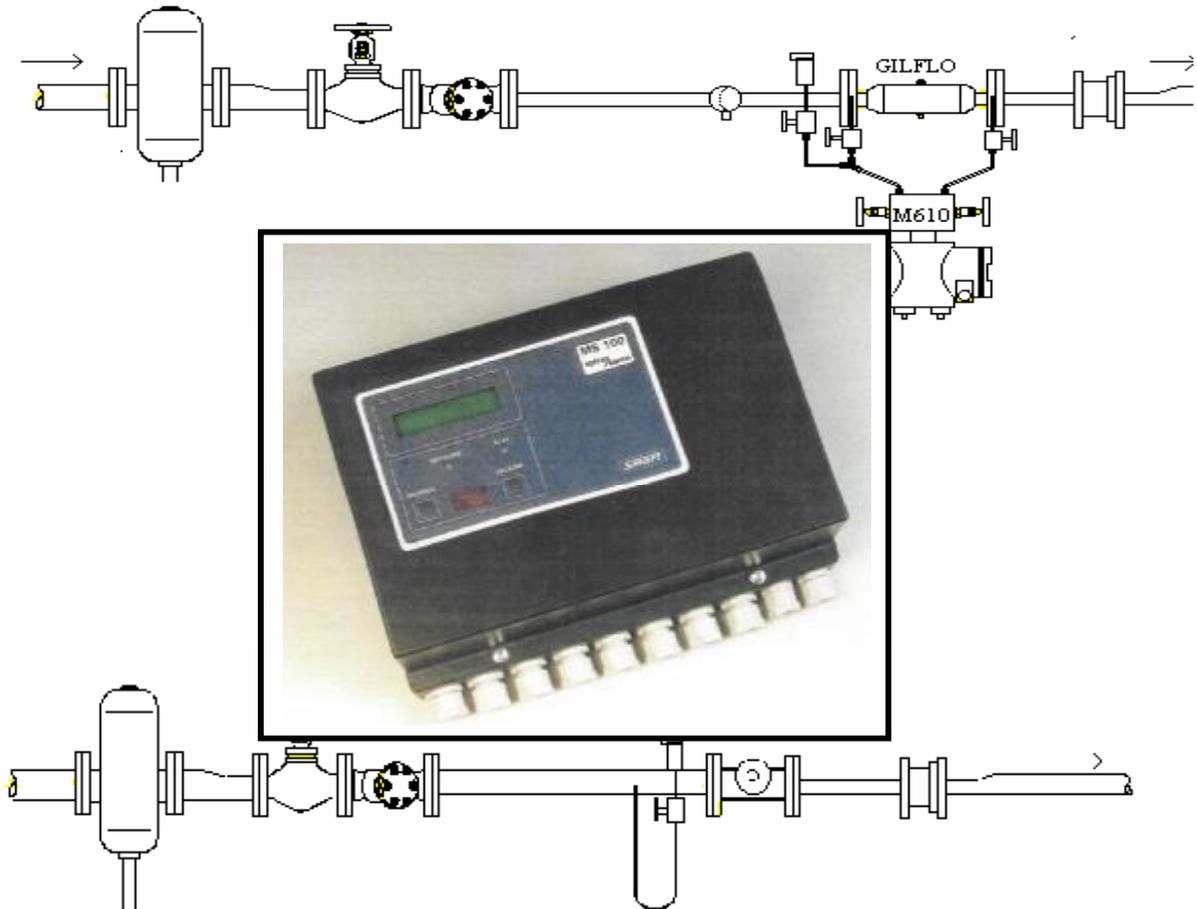
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*Smart*  
Purkyňova 45, Brno  
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**MS 100 Series Computer**  
*FULLY PROGRAMMABLE DATA COLLECTION*  
*UNIT FOR ENERGY / MASS MEASUREMENT PURPOSES*

**Operators Manual**

*Issue 1*



# 1/ Introduction

User manual describes very briefly function of MS100 Series Computer, explains a front panel buttons manipulation and reading of measured data. Manual introduces data transfer from MS100 computer to standard Personal Computer. It assumes that MS100 computer has been installed and commissioned to steam and/or condensate meters application by Spirax Sarco trained specialists. In the case of problems, ask Spirax Sarco specialists for help.

# 2/ Function

## Description

MS100 Series Computer is a multipurpose computer for steam and condensate mass/energy calculation. The computer has 8 input channels and it is possible to configurate (arbitrary by commissioning) each channel to one of inputs, present in a computer version. Inputs are analogue, frequency or digital types and physically in computer there are plug – in converters and corresponding terminals. There are 9 slots in computer for input and output converters. Standard, extend or special version can be ordered to define inputs and outputs to meet any installation \*:

- Standard version** - Version covers most of the applications of MS100 computer (Up to 2 Spiraflos and 1 condensate meter or up to 1 Spiraflo and 1 Gilflo and 1 condensate meter, steam superheated or saturated or up to two Giflors and one condensate meter, saturated steam)
- |   |                       |
|---|-----------------------|
| Analogue inputs with double precision ( P ) | 2                     |
| Analogue inputs ( I )                       | 3                     |
| Digital input (D)                           | 1                     |
| Frequency inputs (F)                        | 4 (multi – converter) |
| Outputs                                     | No                    |
| Interface                                   | RS232 **              |
- Extended version** - On request. Especially for 2 Giflors and superheated steam .
- |   |                        |
|---|------------------------|
| Analogue inputs with double precision ( P ) | 2                      |
| Analogue inputs ( I )                       | 4                      |
| Digital input (D)                           | 1                      |
| Frequency inputs (F)                        | 4 (multi – converter)  |
| Analogue outputs (W)                        | 2. (multi – converter) |
| Interface                                   | RS232 **               |
- Special version** - On request.  
Combination of 9 converters , extended memory, RS484, Current loop Interface, IR interface

For purpose of steam/condensate measuring the channels are **firmly specified in up to 3 groups. Number of used groups is from 1 to 3 by the number of meters in installation..**

If the application does not use all the channels , free channels and inputs can be used for any technical measurement. It is possible to program free inputs and then any measured value can be, by demand of customer, displayed and transferred by interface.

## Description of group and channel specification:

### Group 1

**Channels 1 - 3** Steam energy/mass measuring and calculation for use with Spiraflo or Gilflo flowmeter

**CH 1 – Temperature channel** (analogue input for Gilflo or frequency input for Spiraflo/M322)

**CH 1 - Pressure channel** (analogue for Gilflo or Spiraflo or omit – in case of saturated steam)

**CH 3 – Flow rate** (analogue double precision input for Gilflo or frequency input for Spiraflo/M322)

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\*Note : Special hardware extender can be used if lack of inputs / outputs.

\*\*Note: External hardware RS232 to RS485 converter - on demand

**Group 2**

**Channels 4 - 6** Steam or condensate energy/mass measuring and calculation for use with Spiraflo or Gilflo meter –for steam or turbine for condensate meter or not used (by Option code)

**CH 4 – Temperature channel** (analogue input for Gilflo or Condensate meter or frequency input for Spiraflo/M322)

**CH 5 - Pressure channel** (analogue for Gilflo or Spiraflo or omit – in case of saturated Steam or condensate)

**CH 6– Flow rate** (analogue double precision input for Gilflo or frequency input for Spiraflo/M322 or digital input for condensate meter – turbine with pulsed output)

**Group 3**

**Channels 7 – 8** Condensate energy/mass measuring or not used

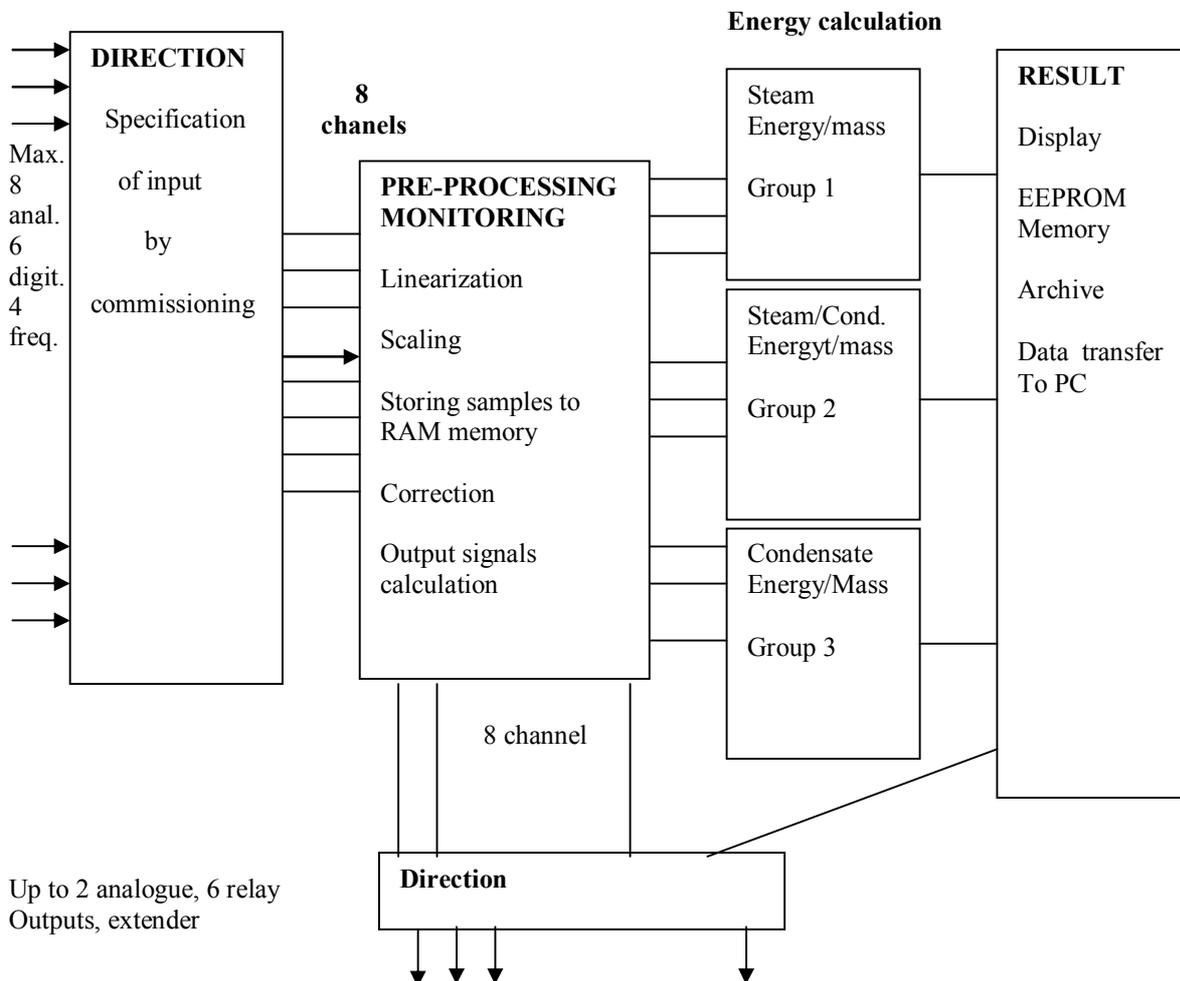
**CH 7 – Temperature channel** (analogue input for condensate temperature)

**CH 8 - Condensate flowrate** channel (digital input from condensate turbine meter)

Note 1/ In case of **saturated steam** meter, it is possible (by commissioning) to **omit the pressure measurement**. The computer calculates the pressure from measured temperature and do not calculate wet steam mass/ energy.

Note 2/ For use with two condensate meters ask for special version with two digital inputs.

**Function diagram**



## Measured and calculated values.

Basic **result of steam/condensate measuring**, if no mentioned any feature, timers and digital/graphical expression on PC it is:

Continuos display of **temperature** (°C), **pressure** (MPa)(if measured), **flowrate** (kg/h) **of steam**.

Calculation of measured steam with pressure and temperature compensation and consequential display of:

**Edry** – energy (GJ) , summarised energy in steam (superheated and saturated )

**Ewet** – energy (GJ) , summarised energy in steam with temperature and pressure under saturation curve (mixture of steam and condensate). Calculation is made in so **called Saturation bandwidth** (set by commissioning) under saturation curve. Energy is decreased by **Wet steam correction** (%/°C) multiple by depth under saturation curve (°C). Wet steam correction may be a result of agreement between supplier and buyer of steam or result of investigation.

$E_{wet} = E_{undersat} ( 1 - (Wet\ st.\ Corr.)(T_{sat} - T)/100)$

$E_{undersat}$  – internal measured value approximated to energy at satur. curve,  $T_{sat} - T$ - depth under saturatuin curve

**Mdry** – mass ( in t = 1000kg), summarised mass of steam (superheated and saturated)

**M wet** – mass (t) summarised mass in steam with temperature and pressure under saturation

**Time wet** - elapsed time, when the steam was wet.

Continuos display of **condensate temperature** (°C) if measured.

Calculation of condensate (if measured) and consequential display of:

**E condens** – summarised energy (GJ) in condensate

**M condens**- summarised mass (t) of condensate

Calculation in Net energy

$E_{total} (GJ) = E_{dry} - E_{condens}$

If we use two steam meters  $E_{dry} = E1_{dry} + E2_{dry}$  and similarly if there are two condensate meters

$E_{condens} = E1_{condens} + E2_{condens}$

If there is not condensate meter then  $E_{total} = E1_{dry} + E2_{dry}$  or only  $E1_{dry}$

Time when steam meter is out of range

**Timen/m** (hours) – it is a elapsed time, when the flowrate of appropriate steam meter was under minimum or above maximum.

Time of power failure

**Time out** (hours) – elapsed time of power failure - computer without power.

Note 1: All values, described above, are accessible on MS100 display for the time of reading (actual values). In addition all described values you can read from memory as values written at the end of last 24 month (written in to memory in last month day midnight) and at the end of the last 8 days (written each day at midnight) and as values of hand started timer. By interface and PC it is possible to read it too.

Note 2. If more than one meter of the same type is used, so index 1 or 2 follows the description of measured value.

## Technical data

Measuring channels	up to 8
Input/output slots	9
Serial interface slot	RS232 (standard), RS485, optical IR window
Measuring group for energy	up to 3
Internal memory	
RAM, battery back-up	32KB (standard), 64KB, 128KB
EEPROM	2KB
ROM	64 KB
Display	LCD 2 x 16 character, 2 signal LED
Keyboard	2 buttons
Ambient Temperature Limits	-10 to 50°C
Supply Voltage/Consumption	230V (185 to 251V)/ 15W
Accuracy	0,5%
Dimension	255 x 200 x 90 mm
Weight	1,5 kg
Enclosure Rating	IP 54
Back-up battery life	min 4 years

### Inputs and outputs

Choice of inputs and outputs which can be in MS100 computer.

#### Inputs:

Type	Abbr.	Description	Note
0/4 - 20mA	P	Double precision active or passive current input with voltage supply 20V and current limitation at 30mA. Preferentially for DP cell of Gilflo. It is possible to use it for temperature or pressure transmitter too. Active or passive by wiring of terminals, choice 4-20mA or 0-20mA by commissioning.	2 pc. in standard version
0/4 - 20mA	I 1	Active or passive current input with voltage supply 20V and current limitation at 30mA. It is possible to use it for temperature or pressure transmitter. Active or passive by wiring of terminals, choice 4-20mA or 0-20mA by commissioning.	3 pc. in standard version
Frequency input	F	Quadruple frequency input 25 – 2000 Hz for SpiraFlo application. From M322 frequency signals of temperature and flowrate. This one quadruple input is for up to 2 SpiraFlos (pressure transmitters directly to analogue inputs)	1 pc in standard version (4 inputs)
Digital input	D	TTL or open collector signal 15V, 0 = 50Hz with adjustable pre-scale. For turbine condensate flowmeter with pulsed output	1 pc. in standard version
Resistor input		4-wire resistor input 82 – 230 Ohm for Pt100 range –25 to 350°C	Non standard
0 – 50mV		For thermocouplers	Non standard

#### Outputs

4 – 20mA	W	Double current output 4 – 20mA/20V for transmission any measured value or for flowrate (in kg/h range adjustable by commissioning)	On demand
Relay	Z	Double relay output for pulsed output of energy or mass measuring. By commissioning – you can set a number of pulses on 1 GJ or on 1t. For alarm purpose – to set alarm limits.	On demand

Manufacturer offers wide range of inputs/outputs for special use and hardware extender of inputs or outputs.

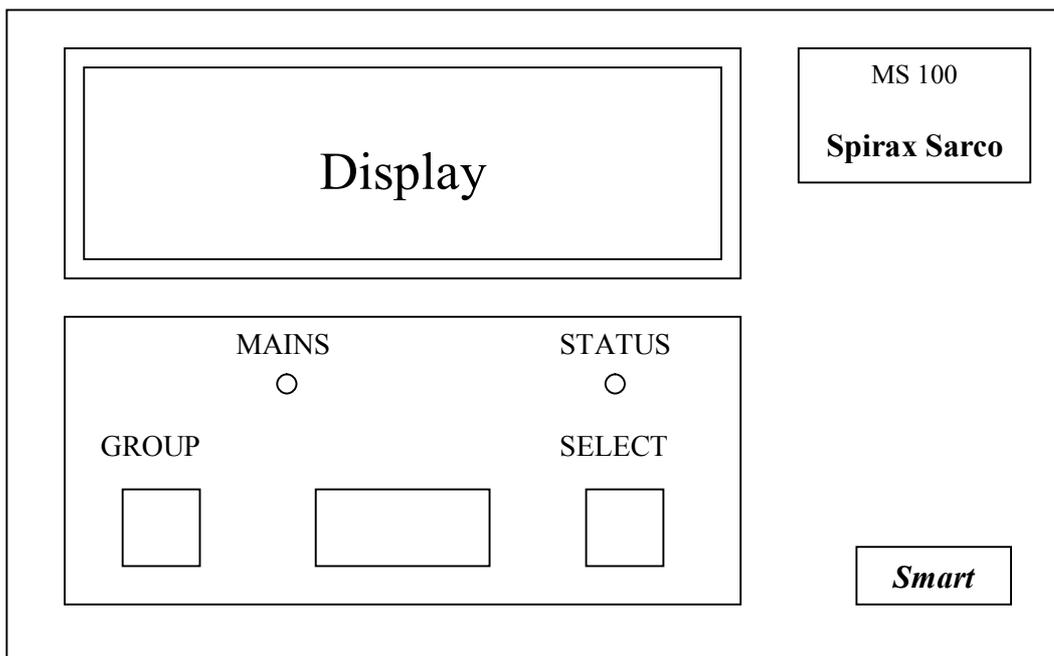
#### Location of inputs/outputs terminals for standard version

1	2	3	4	5	6	7	8	9	10
P	P		I 1	D	I 1		I 1	F	Com- munication

Location of inputs/outputs terminals is on the computer label on the right hand side of computer.

### 3/ Front panel

Description of front panel and his function differs from the use of MS100 computer .  
**User must apply this description to his system and installation.**



**Display** is LCD type, 2 x 16 characters. It serves for description of values, digital values, units, error messages, date and labels. After pressing any button the **display is back-lighted for about 30 sec.**

**MAINS** green LED indicates presence of **power**. (In Czech version the description is NAPÁJENÍ)

**STATUS** yellow LED (in Czech version STAV) indicates:

**Off** – unit is disabled

**On** – unit is measuring,, all parameters are OK, no errors.

**Flashing** – unit is measuring, some measured value is incorrect (see Error Messages) or steam is wet – under saturation curve or out of sensor range.

**SELECT** button – for cyclic (one way) reading of measured or calculated values placed by its meaning to **row**.

**GROUP** button – for choosing the row of values.

Note : Red windows between buttons is for non-standard infra red interface.

#### 3.1 MS100 Display

Pressing the GROUP button allows to chose various data rows and its descriptions. Remember that the **first press of any button switches back-light on only** (if not) without any action.

#### 3.2 Current measured values row

It is a basic row which is present on display if no buttons are pressed for time longer then 30 sec. and the display is not back-lighted.

Display returns to this row from any other row if there is no button activity for 30 sec.

A first press to any button (if back-lighting is not on) does not change the display, only switch on the back-light.

Any numeric value of this row currently follows the steam or condensate state in pipes.

By pressing STATUS, you can proceed cyclically all current values present in the row. Any last value chosen this way stays on display till another activity of buttons.



### 3.2 Batch name row

After one pressing of GROUP button if the back-light is On and Current measurement display is present or after two pressing if the back light is Off you can pass to Batch name row. This row serves as the way how to do branching and to gain calculated data collected in batch of data. Batch of data is a set of calculated data with defined start and stop of data collection. Various start or stop differs the batches.

By pressing SELECT button in Batch name row you can chose the batch of measured data which you are interested in. Display windows specifies exactly each batch name and from this item you can enter in to appropriate batch **Summarised data rows** by pressing GROUP button .

**Important note: If there no buttons have been activated for about 30 sec, display “returns” automatically to Current measured values row and the back-light switches off. If you whenever wont quickly return in to Current measured values row, press simultaneously both buttons.** The note is valid for any next display status.

There are other representation of individual batch name row items written here **in order in which they appear after entering in Batch name row**. It is possible to proceed in Batch name row step by step by pressing SELECT button .

#### 3.3.1 Total values batch

It appears as the first item after entering in Batch name row.

Total values	
HH:MM:SS	DD-MM-Y

**Total values** is in fact written on display to identify the batch.

**DD-MM-Y** it is numeric expression of commissioning date – DD = day, MM = month, Y = last digit of year

**HH:MM:SS** time of commissioning – here HH = hour, MM = minute, SS = second

Note: commissioning time it means here the time of setup transfer to MS100.

From this batch item you can enter in to Summarised data row of total values by pressing GROUP button. If you do it ,**the first Summarised data row of total values appears. It is rather most important row** because it brings the **actual measured values** (see 3.4 to summarised data row). It means energy, mass of steam and condensate and other data summarised **from the commissioning till the moment of reading the row**. All others data from the MS100 computer are a comfort equipment only. First summarised data row of total has in all items of row (see 3.4) **label “T” in left hand down corner** and **actual month and year decade in upper right hand corner**.

!!

**It is strongly recommended to check the label and date to avoid reading of wrong data.**

Note : For some users this is all, what they need from the steam meter, but MS100 offers very high comfort of reading of many types of archived data collected in various batches - as you can see in following text.

As the first (actual) summarised data row from Total values batch are on display you can follow by pressing (step by step) the GROUP button to 24 another total batch rows, where are summarised **values** from the time of commissioning **till the end of month and year which you can see in upper right hand corner of display**. These values are stored at midnight of the last day of each month. All by real time of MS100 – which was set by commissioning. This way it is possible to read summarised values stored in memory at the end of each month , 24 month back. Oldest month items are re-written by the new one.

Note : If the installation is new you can follow to the month of commissioning only.

### 3.3.2 Partial values batch

From Total values in Batch name row you can move into Partial values batch (by pressing SELECT button ) with following display representation:

Partial values	
HH:MM:SS	DD-MM-Y

**Partial values** is shown on display to identify the batch

**HH:MM:SS DD-MM-Y** - it means hours : minutes : seconds, day - month - last digit of year of manual start of measurement. How to start this kind of measurement - see 3.3.5. **Check this time** – it can happen that the start was changed by wrong manipulation with buttons. Special care must be therefor taken if you use Partial values batch.

If you pass by pressing GROUP button to Summarised data row of Partial values batch, you can get similar data as in the case of Total values batch. You can read an actual and then step by step stored values 24 month back. **But all this values are calculated from the manual start** (till the end of each month or till actual date – written on upper right hand corner).

Label “P” (as partial) is visible in bottom left hand corner.

**It is strongly recommended to check the label and date to avoid reading of wrong data.**

### 3.3.3 Daily archives batch

From the previous Batch name row you can move into Daily archives batch by pressing SELECT button.

Daily archives	
HH:MM:SS	DD-MM-Y

**Daily archives** is shown on display to identify the batch

**HH:MM:SS DD-MM-Y** MS100 real time. Time was set by commissioning, by our recommendation it is winter time.

Note: **The real MS100 time** is quartz driven and very stable. If it is necessary to correct the real time, the setup transfer must be send from PC to MS100. It is the same setup as before and only the transfer of it corrects MS100 real time by PC real time (we recommend winter time). **All calculated data are cleared** if setup is loaded into MS100. As the commissioning part of MS100 is mostly locked a correction of time must be made by Spirax Sarco trained specialists. We recommend to do it ones in 3 or 4 years.

From this Batch row item you can enter, by pressing GROUP button to Summarised data row of Daily archives batch. Daily archives batch collects the total values of measured data which has been stored at midnight of the last days from 8 days cycle. In another word , the data **from the moment of commissioning till the midnight of the day which is highlighted in the upper right hand corner of display** (see 3.4). Designation of the day is made here in unusual way:

**D - x** where x is a number of days back

e. g. **D - 1** it collects data till midnight of yesterday.

Label “ **L** “ is present in bottom left hand corner.

**It is strongly recommended to check the label and date to avoid reading of wrong data.**

### 3.3.4 15 min. maximum batch

From the previous Batch name row item you can move to 15 min. maximum batch by pressing SELECT button.

Sometimes it is important to follow consumption of steam in 15 min interval (summarised fluently in GJ) and to know when this value was the highest. It is more substantial information then to know a moment of short pick of flow. 15 min. maximum batch offers this information.

<b>15 min. maximum</b> <b>HH:MM:SS            DD-MM-Y</b>
--

**15 min. maximum** is written on display to identify the batch

**HH:MM:SS    DD-MM-Y** - it means hours : minutes : seconds    day - month - last digit of year of manual start of 15 min. maximum calculation. The way of start is **common for Partial values and for 15 min. maximum. New start erases the previously calculated 15. Min maximum.** How to start this kind of measurement - see 3.3.5. **Check this time** – it can happen that the start was changed by wrong manipulation with buttons. Special care must be therefor taken if you use it.

If you continue by pressing GROUP button, you get for one or two steam measurements actual 15 min steam consumption (in GJ) and after another press of GROUP button the highest value of 15 min. consumption - so called 15. Min Maximum and the time when it has occurred ( from start time till reading ).

**To leave the data of this batch press simultaneously both buttons.**

### 3.3.5 Erase partial v.

From the previous Batch name row item you can move to this window by pressing SELECT button.

This item is used only for the purpose of **manual start of Partial values batch and 15 min. maximum.**

<b>Erase partial v.</b> <b>HH:MM:SS            DD-MM-Y</b>
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**Erase partial v.** is written on display to identify the batch

**HH:MM:SS    DD-MM-Y** It means the time of last manual start

By pressing GROUP button you activate new manual start for Partial values batch and for 15 min. maximum. At the same moment you erase all previous data in Partial values batch and in 15 min. maximum batch. Then the display automatically returns to Current measured values row.

### 3.4 Summarised data row.

This row brings the calculated data to display. It is possible to enter into this row by pressing Group button from previous Batch name row item. It is possible to enter Summarised data row from following Batch name row items:

- Total values batch
- Partial values batch
- Daily archives batch

**Form of Summarised data row is for all batches the same It differs in label (X) and in date (DATE) description. You can find in par. 3.3.1 to 3.3.3 an explanation of this for each data batch.**

If you are in any Summarised data row, you must **check the label and date (month and year decade)** window to be sure that you are reading data from proper batch and proper month or day. If you are in chosen row - it is possible to read the row items cyclically (one way) by pressing SELECT button step by step. With small exception of Etotal, the **order** of items in row of any batch **is the same**.

DESCRIPTION	DATE
X            NUMERIC VALUE	UNIT

**Description:** It is a short description of numeric value displayed at the same time. The Description simply specifies if the value is for steam or condensate and shows a number of sensor group (number of meter). If there is one steam meter or one condensate meter only specified by commissioning, the description (and numeric value too) with index 2 are omitted. The description and units are firmly established by manufacturer and are written in English. **Numeric value** is summarised number calculated with all corrections.

**Table of descriptions and units** is in order, how it can be proceeded by pressing SELECT button. Table is made for one steam and one condensate meter only. If there are two steam or condensate meters. then description of the same meaning with index 2 appears behind description with index 1.

Note 1: Small exception is order of **Etotal** (in most rows it is the first value in order).

Note 2: If there is no condensate meter, no description of condensate energy or mass appears.

Display description	Meaning	Unit
E 1 dry	Summarised energy in steam (superheat and saturated )	GJ
E 1 wet	Summarised energy in steam with temperature and pressure under saturation curve (mixture of steam and condensate). Calculation is made in so called Saturation bandwidth (set by commissioning) under saturation curve . Energy is decreased by Wet steam correction (%/°C) multiple by depth under saturation curve (°C). (Wet steam correction may be a result of agreement between supplier and buyer of steam or result of investigation.)	GJ
E1 condens.	Summarised energy (GJ) in condensate	GJ
M1 dry	Summarised mass of steam (superheat and saturated)	t
M1 wet	Summarised mass of steam with temperature and pressure under saturation curve.	t
M1 condens.	Summarised mass (t) of condensate	t
Time 1 wet	Summarised time, when the steam was wet.	hour
Time 1 n/m	Summarised time, when the flowrate of appropriate steam meter was under minimum or above maximum	hour
Time out	Summarised time of power fail of computer.	hour
E total	$E_{total} = E_{dry} - E_{condens}$ Note: If two steam meters are used $E_{dry} = E_{1dry} + E_{2dry}$ and similarly if there are two condensate meters used $E_{condens} = E_{1condens} + E_{2condens}$ If there is no condensate meter then $E_{total} = E_{1dry} + E_{2dry}$ or only $E_{1dry}$	GJ

Note. In case of Total values batch and Daily archives batch, the summarising starts it time of commissioning data transfer to MS100. In case of Partial values batch summarising starts manually. End of summarising are:

- in case of actual date in date window (upper right corner) at the moment of reading
- in case of any past month in Date window at the midnight of the last day of this month
- in case of D – x in date window at the midnight of “x “ days back from today. E. g. x = 1 it means at yesterday’s midnight. (from the commissioning).

**DATE** on display with the meaning of the end of data summarising. It can be:

- MMY Y month and decade of year (e. g. February 2001 it is 0201 there) for Total and Partial values batch
- D – x where x is a number of days back from today. (E. g D – 1 it is yesterday ) – for Daily archives batch purpose.

**X** on left hand bottom corner it can be :

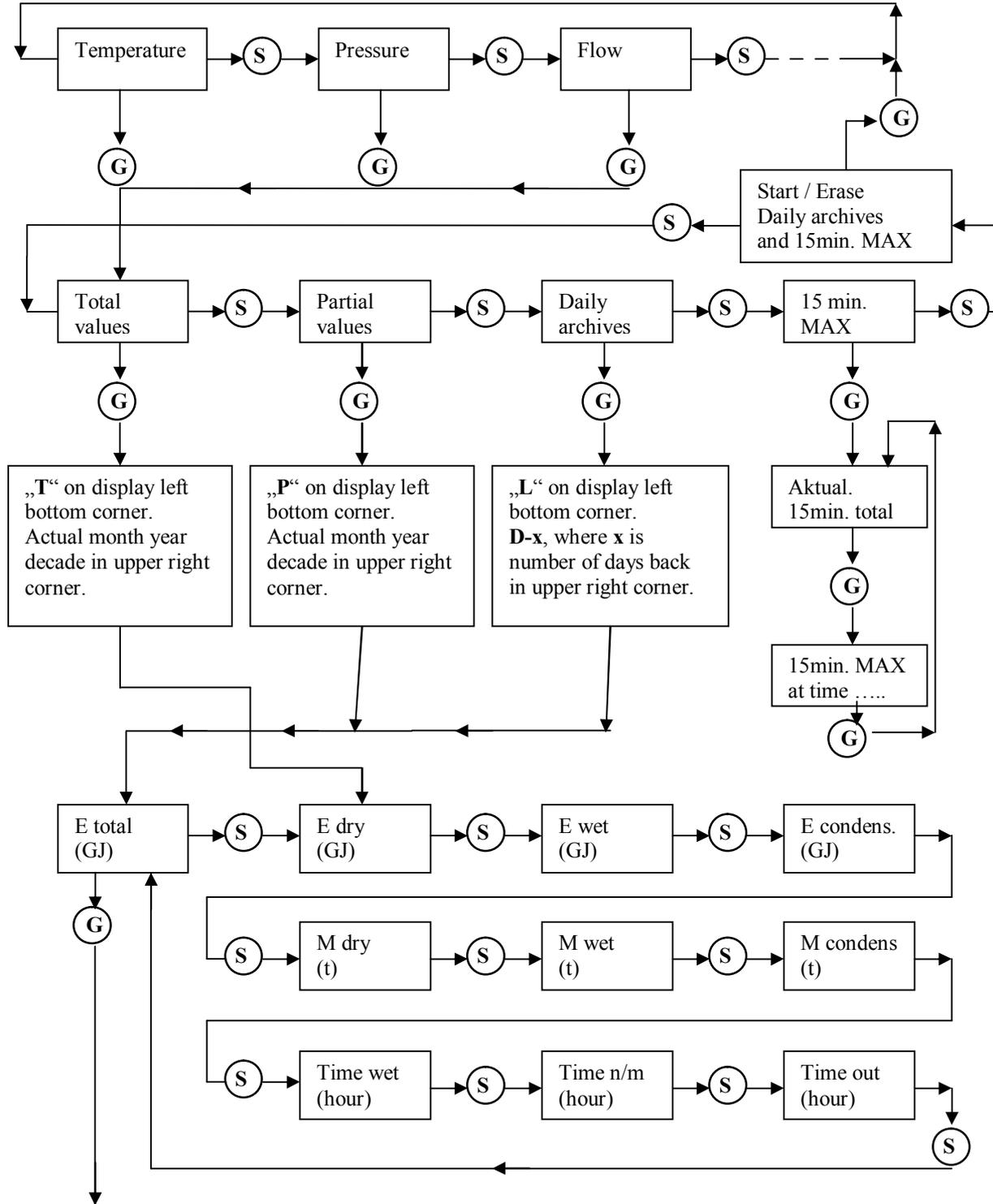
- **T** - label of Total values batch
- **P** - label of Partial values batch
- **L** - label of Daily archives batch

**NUMERIC VALUE** the meaning is described in the table above. This number on display **does not change in time**. The number is valid for moment of its appearing on display – it is read from MS100 registers.

# DISPLAY MANIPULATION DIAGRAM

FIRST PRESS OF BUTTON (S) OR (G) BACK-LIGHTS THE DISPLAY.

SIMULTANEOUS PRESS BOTH BUTTONS RETURNS DISPLAY TO FIRST LEVEL.



Values from archives. Each press of **G** chooses one month back or one day back (24months or 8 days). Values are written at midnight of the last day of month or at midnight for Daily archives. Date on upper right corner identifies the period. Calculation of **Total and Daily starts after commissioning**, **Partial and 15 min. maximum have manual start.**





## 4/ Data transfer to PC.

All measured and calculated data are available to read by PC too. In addition measured /calculated data can be stored in files and it is possible to create graphs from measured values.

For standard version of communication it is necessary to use supplied **communication cable** (length about 2m), to connect it in a free **PC port (No. 1 or 2)**, the second end insert into MS100 plug-in **connector placed inside the second cable gland from the right side of MS100.**

### Communication software for PC

The communication software requires following **PC configuration**

IBM-PC 286 or higher, EGA, VGA or SVGA

Colour monitor recommended

DOS 3.0 or higher, 300kB free memory

RS232 COM 1 or COM2 serial interface

No mouse installation on the COM port

### Programs:

**ms100\_xx.exe** -main program for commissioning and user data transfer. xx - is version of program (e. g. in February 2000 the version is **ms100\_5.exe**)

**egavga.bgi** – part of main the program

**Start the ms100\_xx.exe program in any working directory of PC.** The menu appears.

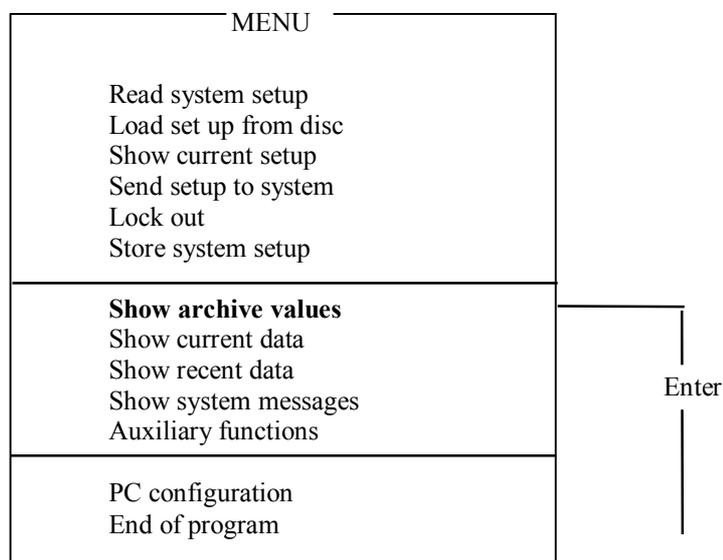
Note : All programming products will be placed in this working directory too.

**!!! If Czech version of program appears especially during the first run of program, chose “Konfigurace systemu” (last but one menu line), press Enter, chose line 4 of next menu and by horizontal arrow chose UK – (English version) and press Enter . Then store the English version by F2 key. !!!!!**

**First do the PC configuration (described in 5/)** and then for data transfer use the second part of menu only.

Note 1: The data transfer from MS100 to PC, displaying the measured data, calculated mass and energy on the PC screen - it is possible by the same MS100 - PC connection and program as commissioning. We recommend, commissioning is a matter of specialist and it should be locked out. The data transfer - it is a matter of customer and user of MS100 and it is free to use. **For the purpose of data transfer serves the second part of MENU.** If locked, the customer can use first part of Menu for information only and any transfer into MS100 is disabled.

Note 2: **Help line in bottom part of PC screen offers menu and data manipulation**



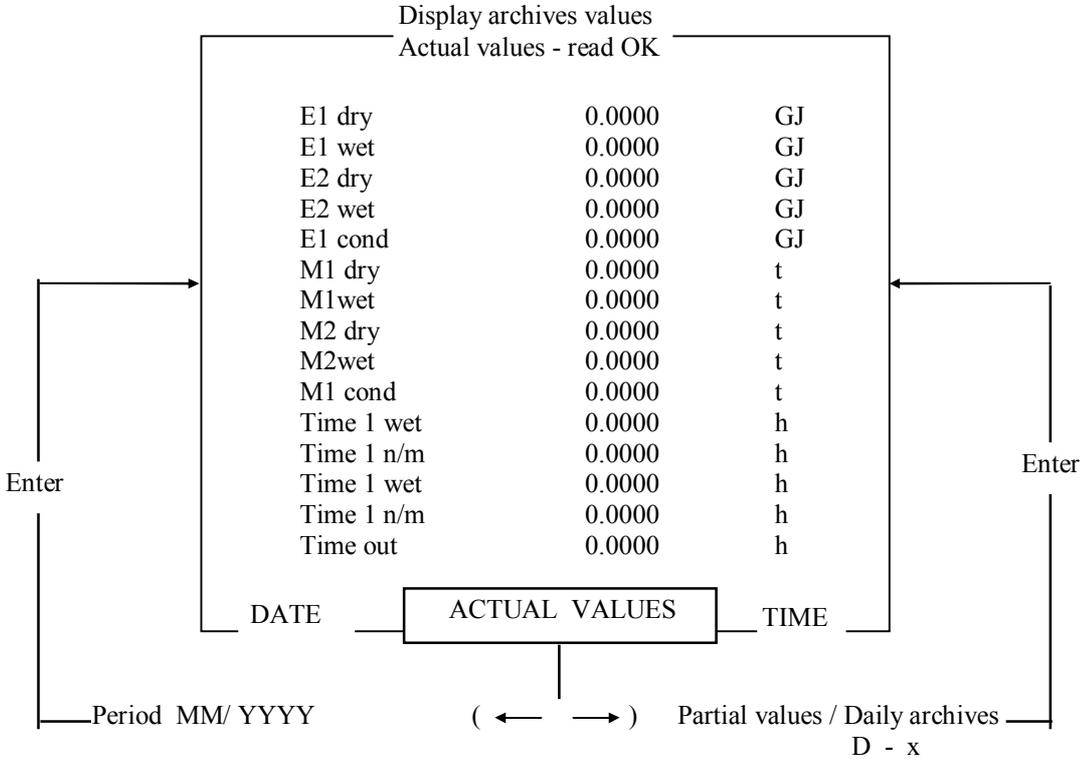
After pressing the Enter key the program reads **actually** calculated data to the PC computer. A result window containing final calculated data ( Total batch **till the moment of transfer**) appears on the screen. The values, descriptions and units are the same as it is possible to read on MS100 display as actual Total data batch (till the moment of reading - the same as on MS100 display, when „T“ label is in bottom left hand display corner and actual month and year decade are in upper right hand corner.)

**If after any trial of communication appears next window:**

**Communication error  
(wrong specification of serial port)**

**check PC configuration, check if there is not, by mistake, twice started ms100\_xx.exe program -especially under Window system, check plug-in connector and PC port connector . Then press Space key and try the communication again.**

Example for two steam and one condensate configuration:  
(Zero numeric values are written in example)



Note that after first jump, the description **Actual values** appears in small window in lower part between date and time of data transfer. The table shows the values since the beginning of measurement (since commissioning) till the moment of data transfer . Date and time of the data transfer is shown in the bottom part of the table. By pressing **F2** key, the PC creates in working directory a **subdirectory** with the same name **as serial number of computer** and then the present table is stored there in file „**actual.dat**“. It is text type of file and it is possible to load it back to screen by pressing **F3** key (follow help line on PC screen). If there is in directory one file „**actual.dat**“ present, then by pressing **F2** you change the name of this file to „**actual.old**“ and new transferred data creates the „**actual.dat**“ file.

Note: Two files only „actual.dat“ and „actual.old“ can be in sub - directory. Arrange transfer of files if you want to store it more times.

Notice that E total is not transferred – it is because E total can be easy calculated by PC and that only few applications use E total.

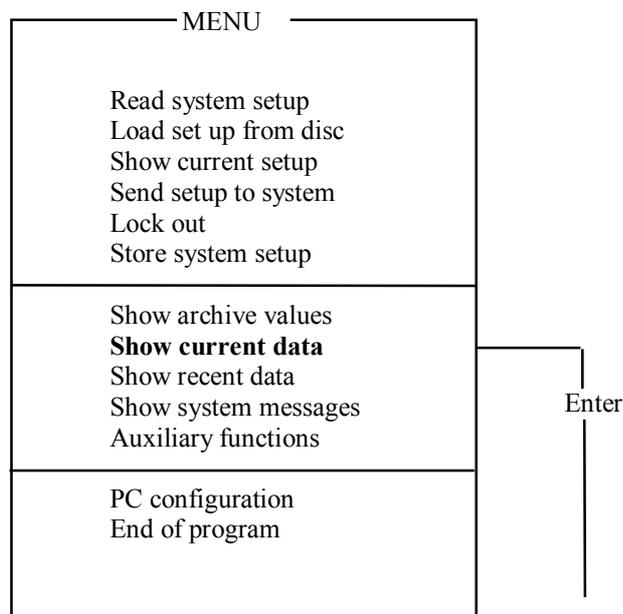
By pressing arrow keys ← or → you can chose in small window in bottom part following description:

- **Period MM/YYYY** , where MM is one of the last 24 month and YYYY the year. Then the PC is prepared to read chosen archive data into the PC **after Enter pressing**.  
 Note: MS100 stores archive data to its memory at the end of the displayed month. (at midnight of MS100 time). The data are the „total“ batch type - it means summarised data since the start of measuring (since commissioning transfer) till the end of chosen month.  
 Note: After 24 month the oldest data are re-written by new data.
- **day - x** , where x - is number between 1 to 8 (included) . It means that PC is prepared (**after Enter**) to read archive data written to MS100 memory each day at midnight (of MS100 time). Stored data are Total batch type - it means summarised data since the start of measuring till the end of chosen day.  
 Note: After 8 days the oldest data are re-written by the new data.
- **Partial values** . PC is prepared to read (**after Enter**) the values summarised since the manual start ( described earlier).

If the described choice is prepared in the small window, **press Enter** and the asked data are transferred to PC with DATE and TIME in bottom part of table. The same way as in the case of actual value you can **store the archive data** which you have just on screen, by pressing F2 key and to read back from memory to screen by pressing F3 key. The file with name adequate to the table name are created in PC memory and the same way as for „Actual“ the name.dat and name.old file can be created. (In subdirectory by serial number of MS100.)  
 Example of files:

<b>D_ - 1.dat</b>	Data from the beginning of measurement till yesterday midnight
<b>P_1_2000.old</b>	Data from the beginning of measurement till end of January 2000
read	There is another file of the same type in memory, which has been later
<b>Partial.dat</b>	Data from the manual start

**Show current data**



After pressing the Enter key MS100 continuously sends the **measured and calculated input values of all channels**. The computer displays the window showing graphs of all defined channel inputs and also the two numeric values of the channel . In case of flowrate **graph shows input value but numeric value is calculated value**. Graph is moving and first **numeric value** of each channel ( highlighted value) is the **current actual value** adequate to the right end of graph which was read **at the time written above the right end** of the graph. Second (not highlighted) numeric value is a value at the time given by line in the graph which you can shift by arrows  $\rightarrow$  or  $\leftarrow$  anywhere on the graph. The time adequate to this line is written on upper left end of graph.

Note 1: At the beginning, the moving line can be hidden on right end of graph.

Note 2: All graphs represents input values of channels. Flowrate in graph is not calculated flowrate but input representation. E. g. calculated flowrate on MS100 display and in the right side of PC screen in case of low temperature or pressure can be zero but as in pipe there is any flowrate, the input representation on this graph is non – zero. It allows **in start up of steam to check the flow rate** when temperature and pressure are so low that no calculated flowrate is on MS100 display.

Note 3: As one scale is there for all channels, the horizontal scale of graph is in percentage of input range established by commissioning.

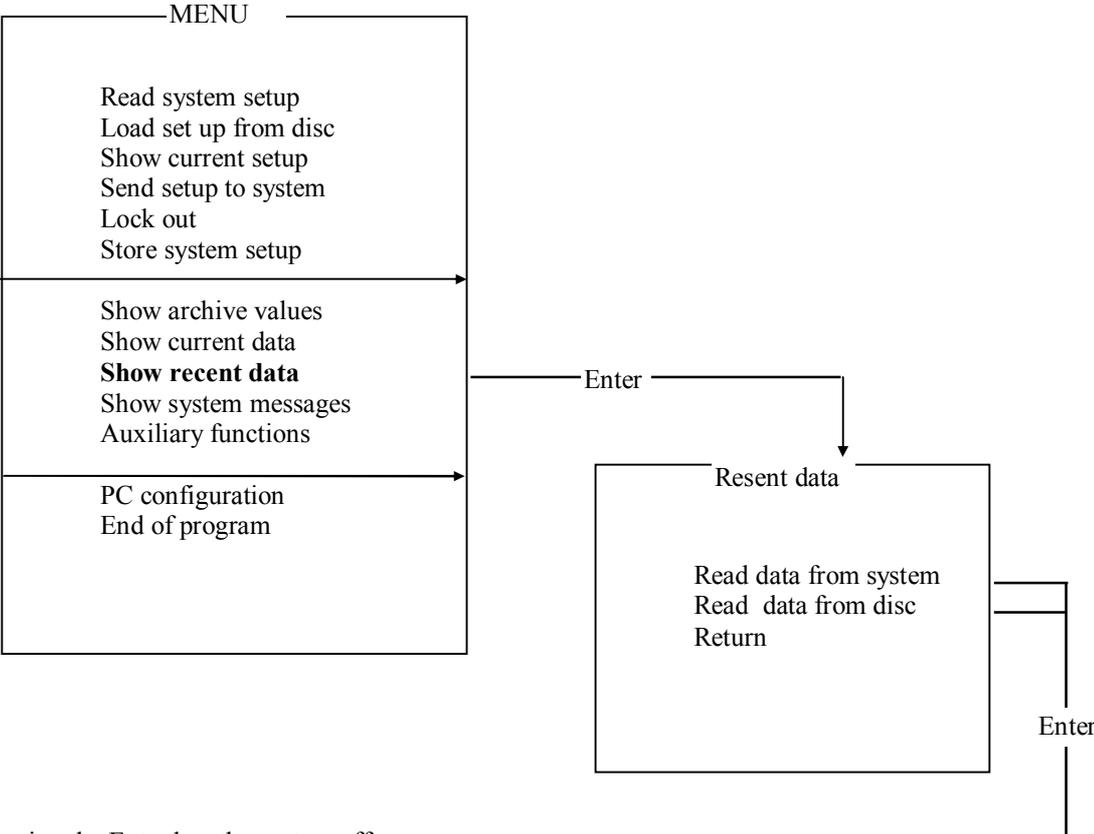
Note 4: Graph of any channel can be turned on/off by pressing numeric key 1 ... 8 adequate to channel .

Note 5: Hardcopy do by PC system means. “H” order in help line use if you have EPSON 9 type of printer only.

**Press Esc key to exit from the graph.**

**Show recent data (so called „history of steam“)**

For each input channel, there is specified the interval of storing measured values to MS100 buffer. Interval is set on request of customer or firmly established by Spirax recommendation to 10 min. Table of reserved memory for each channel and length of monitored „history of steam“ you can check in System table (after reading the set up) by choosing Message number and then by pressing “I” key.



After pressing the Enter key the system offers:

- a/ **Reading the data from disc** - after another Enter the special small window offers the list of previously saved data files with recent data (if any)
- b/ **Reading the data from the system** - it means all data from the MS100 buffer.

AS result of both is reading of data and then creating of graphical and numeric expression of input values. The graph is static and mostly with the length exceeding one screen. You can move through the whole graph by using arrows  $\rightarrow$  or  $\leftarrow$  or move quickly by pressing **PgUp** or **PgDn** key. **Zooming** by + or - key can be used and a zoom scale is written at the top of the table. In upper right corner there is also the time information valid for the right end of the graph.

Numeric values of each channel are valid at the above time information. . In case of flowrate **graph shows input values but numeric value is calculated values.** It can happen that graph of flowrate has any value but in the same moment numeric value is zero. In this moment must be temperature or pressure out of parameters (or error occurs). Check carefully the graph, the situation when flowrate in graph is any but numeric value is zero indicates bad state of steam (low or too high temperature or pressure or error) and it indicates very easy the start up of steam and if the start up was made correctly.

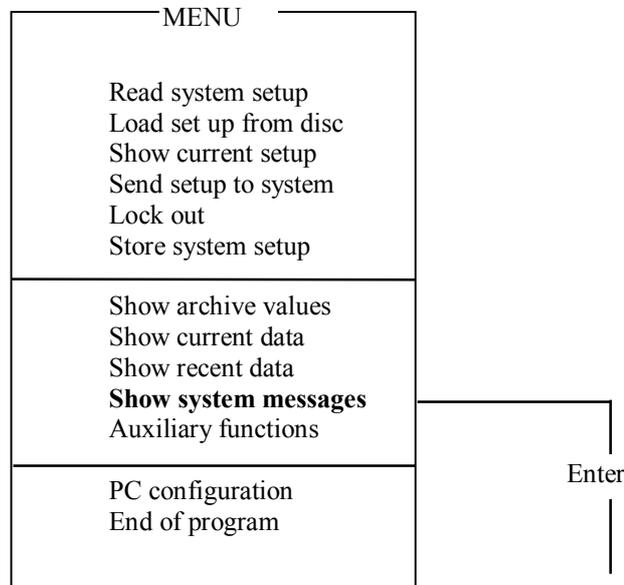
Its possible to switch off or on any input graph by pressing a number of input.

Note: If the movement of graph is not fluent by pressing  $\leftarrow$ ,  $\rightarrow$  or PgUp and PgDn, check if storing interval and size of buffer (set by commissioning) are the same for all channels.

If you press **Esc for leaving** the graph the system offers you to **store the graph** and then to define any name of file for later displaying it (by Read data from disc menu instruction) or it is possible to return to main Menu.

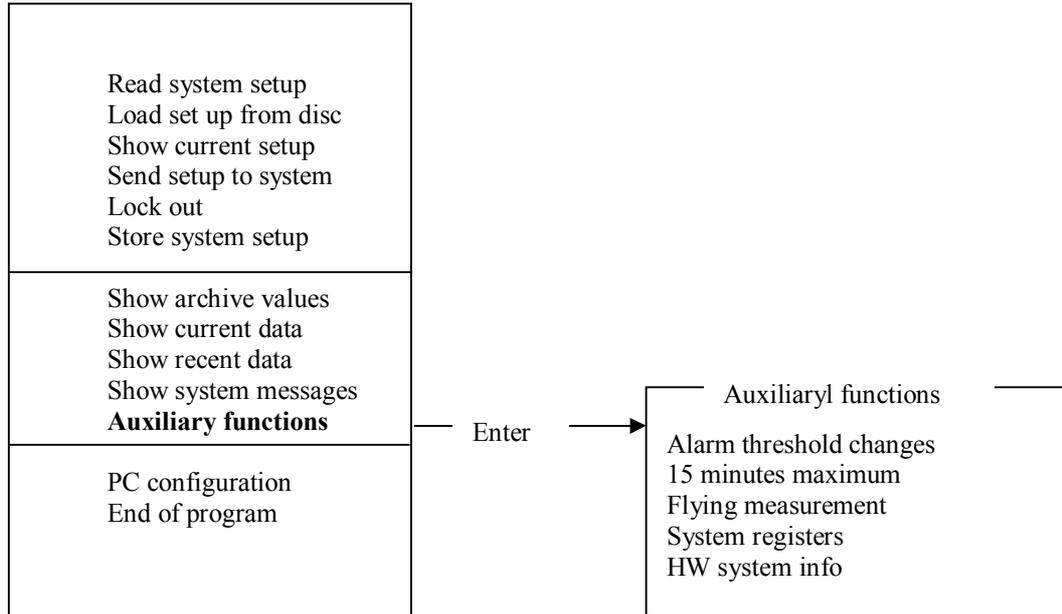
Note: Hardcopy do by PC system means. "H" order in help line use if you have EPSON 9 type of printer only.

### Show system message



After pressing of **Enter** key the system reads and displays the system messages - **mostly power ON and power OFF times.**

## Auxiliary functions



After Enter , submenu with additional functions appears. By Enter you can go ahead.

**Alarm threshold changes.** It is the way how to change alarm limits without a commissioning changes. Digital relay output must be present in MS100 hardware and appropriate setting by commissioning. (not in standard version).

**15 minutes maximum.** Sometimes it is important to follow steam consumption in 15 min interval (summarised in GJ) and to know when this value was the highest. It is more substantial information then to know a moment of a short flow pick. This information appears on screen after pressing Enter key. For both steam meter groups of sensor . By pressing “N” you can erase the old calculation and start the new one.

Note: See commissioning for 15 minutes maximum range setting.

**Flying measurement.** Mostly for MS100 testing purposes – after Enter the submenu appears where you can set:

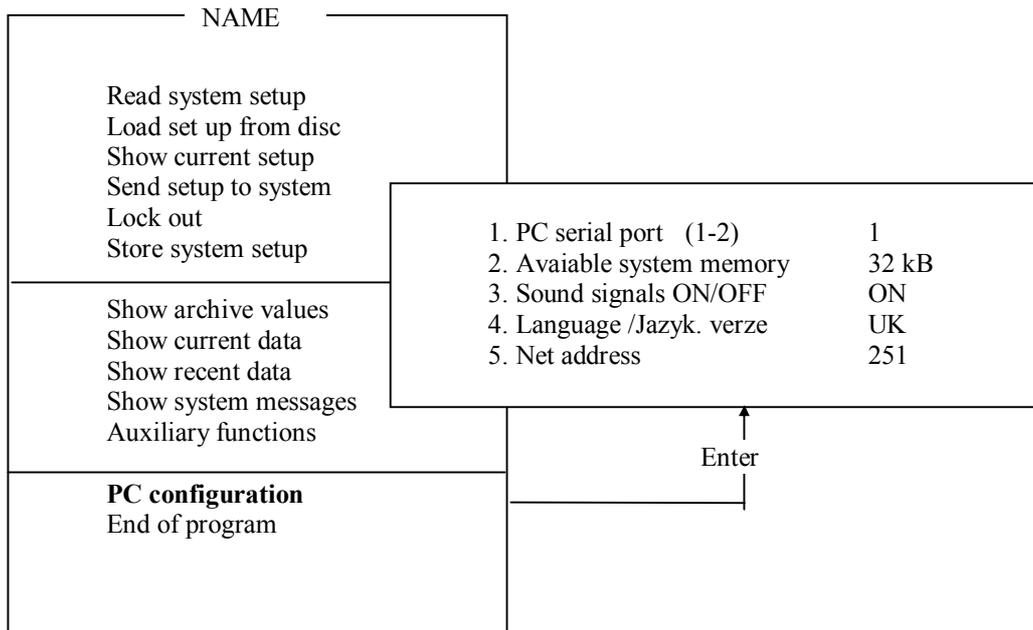
**Measured circuit** : 1. or 2. group of steam sensors  
**Number of measuring intervals:** by arrows → or ← you can set till 100  
5 sec intervals  
**Buffer erase** : Clear or not internal buffer

After this setting and Enter, short time measurement of chosen group is made and the results appear on screen. Note that you can read immediate enthalpy of steam. Use **Esc** for exit.

**System registers** . Pressing Enter key starts reading of actual values of group 1 and 2 of steam sensors. Note that enthalpy and flowrate in energy units are there (description “heat” for energy). This function can be used for data transfer out of ms100\_xx.exe program (on special request)

**HW system info.** After pressing Enter key it appears information about the hardware , memory and address of MS100.

## 5/ PC configuration and language



**PC serial port** : Pressing (  $\rightarrow$  ) keys selects PC serial port 1 or 2

**Available system memory**: Pressing (  $\leftrightarrow$  ) keys selects MS100 memory (memory for storing of monitored data in MS100 computer). Chose between 32 - 64 - 128kB by physically installed memory in purchased version. For standard version it is **32 kB**.

**Sound signals ON/OFF** selects the choice by pressing (  $\leftarrow$  ).

**Language** - Pressing (  $\rightarrow$  ) keys selects the **English** / Czech description on the computer monitor.

**Net address.** Use 251 if you have standard connection with only one MS 100 computer with RS232C interface. It is a global net address which enables communication regardless to any setting of address in MS100. It is possible to use here the same address as it is set in MS100. If you have more than one MS100 computer connected to one PC, you can communicate with all by changing of the address. (Note that after first activity with all MS100 computers in RS485 loop you can chose the addresses by pressing Tab only.) For the purpose of connecting more MS100 computers ask non standard version with RS485 interface or better use external hardware converter RS232 -RS485.

If you are not sure about address set in MS100 press "A" in this line and the address will be displayed automatically.

**Press F2 to store the PC configuration**