MAXIMUM POWER DEMAND CONTROLLER

Assembly and operation instructions

Marek Perhac
Ing. Roman Jurkovic
Ing. Tomas Varholak

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General description

MAXIMUM POWER DEMAND CONTROLLER

This device consists of microcomputer system, which runs measurements of the power consumption with optional archiving of the acquired data followed by evaluation together with regulation actions.

Consumption measurement is based on monitoring of the main electrical energy meter. To get the most acurate reading of the consuption the meter's digital outputs are used. Simultaneously, synchronisation impulses are being monitored, to synchronize the system with power meter.

Regulation lies in disconnecting of the selected devices for necessary time not to overcome the maximum preset value. Since all of the devices are spread on the wider area (area of the company), the whole system is solved in the modular way. Its fundamental is central microcomputer for impulse evaluation, running regulation algorithms as well as direct device switching-off in its range. Using a standard communication interface, it is possible to connect another switch-off modules serving for disconnecting faraway devices.

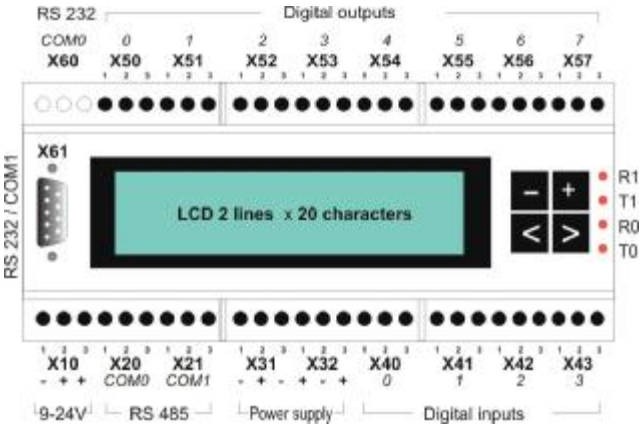
Central microcomputer

Is a compact equipment placed within a plastic box enabling comfortable mounting into the distribution frame on the DIN 35 mm rail. The case has standard profile of circuit breaker with 9 modules width.

Technical parameters of the microcomputer

- central processing unit with 32 kB of back-up memory
- 4 digital opto-coupled inputs 5-24 VDC
- 8 digital, opto-coupled transistor outputs max. 30 VDC/ 1 A
- 2 communication interfaces RS 485 and RS 232
- 2x20 characters illuminated LCD and 4 push-buttons for configuring
- power supply 9-24 V, cca. 1,5 W
- dimensions 160x90x60 mm

Placement of the features on the microcomputer



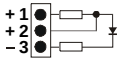
Power supply (X10, X31, X32)

All terminals '+' and '-' are connected with each other. Power supply is being led to X10:1,2 terminals, all the resting terminals are available for supplying digital inputs and other accesories. Supply voltage should be within range 9 to 24 V (total power drawn does not exceed 1,5 W). Power

supply must also cover the consuption of all connected accesories. The device is protected against the reversal of poles.

Digital inputs (X40 – X43)

Input circuits connected according to this scheme:

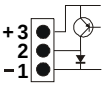


Input voltage in the range 5-12 V is led to the terminals 2, 3 and in the range 5-24VDC to the terminals 1,3

Each input is galvanically insulated, equipped with Schmitt flip-flop circuit, protected against the reversal of poles, current consumption of 2-8 mA (according to input voltage).

Digital outputs (X50 – X57)

Connection of the output circuits as shown below:



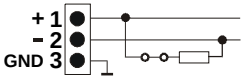
Voltage max. 30VDC is connected to the terminals 3,1 and load to the terminals 2,1 with max. consumption of 1 A. Protection diode on the output clamps enables direct connection of the induction load (relay).

Each output is galvanicly insulated and is not protected against overloading or short circuit. Power supply unit should be equipped accordingly.

Communication interface

The microcomputer is equipped with COM1 serial channel as standard interface.

2 interfaces RS 485 are available at terminals X20 (COM0) and X21 (COM1) as shown below:



There's jumper under the cover of the terminal board which enable or disable termination impedance 150 Ohm. Channel COM1 has an output on the plug X61. It is a standard 9 pin CANNON plug PC compatible. Used signals are:

pin2 – RXD
pin3 – TXD
pin5 – GND

There are 4 signalling LEDs on the front panel:

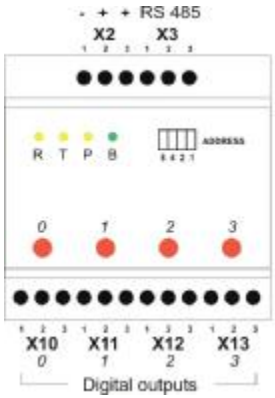
R1 – receiving on the channel COM1
T1 – transmitting on the channel COM1
R0 - receiving on the channel COM0
T0 – transmitting on the channel COM0

Switch-off module

Connected to the central E3 computer by RS485 comm line the switch-off module provides possibility to extend whole system accros the installation place. Maximum distance between end points of RS485 comm line is not to exceed 1200 meters.

Technical parameters

- 4 digital, optically insulated transistor outputs max. 30VDC/1A
- communication interface RS 485, 1200 Bd
- external power supply 8-24 V; 50mA current drawn from power supply
- dimensions 70x90x60 mm



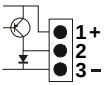
Placement of the features on the output module:

Power supply

Voltage 8-24V is connected to the terminals '+' and '-'; current consumption is under 50 mA. Module is protected against the reversal of poles.

Digital outputs (X10 – X13)

The output circuits are connected as shown below:

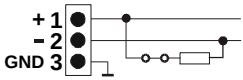


Voltage max. 30VDC is connected to the terminals 3,1 and load to the terminals 2,1 with maximum current consumption 1A. Protection diode on the output clamps enables direct connection of the induction load (relay).

Each output is galvanicly insulated but is not protected against overload or short circuit. Safety circuits should be included at the power supply.

Communication interface

Module is equipped with serial RS 485 comm line with output on the X3 terminal board as shown below:



There is a jumper under the cover of the terminal board to enable or disable termination impedance 150 Ohm. Maximum of 15 modules is to be connected to a single communication link, where each get address from 1 to 15. The address is set using jumper which are accessible under the front panel. Jumpers have values 8-4-2-1, respectively, from left to right. The address of the module is equal to the sum of the values of the jumper.

There are signaling LEDs on the front panel with the following meaning:

R – receiving of data
T – transmitting of data
P – switching over to transmitting
B – module run (flashing)

System installation

Installation of the whole regulator system lies in mounting the microcomputer, switch-off modules, supplies, relay and i.e. in the distribution frame, interconnecting them, connecting of power circuits and setting up the appropriate system configuration.

Connecting of the central microcomputer

The power supply is to be connected to the terminals X10.

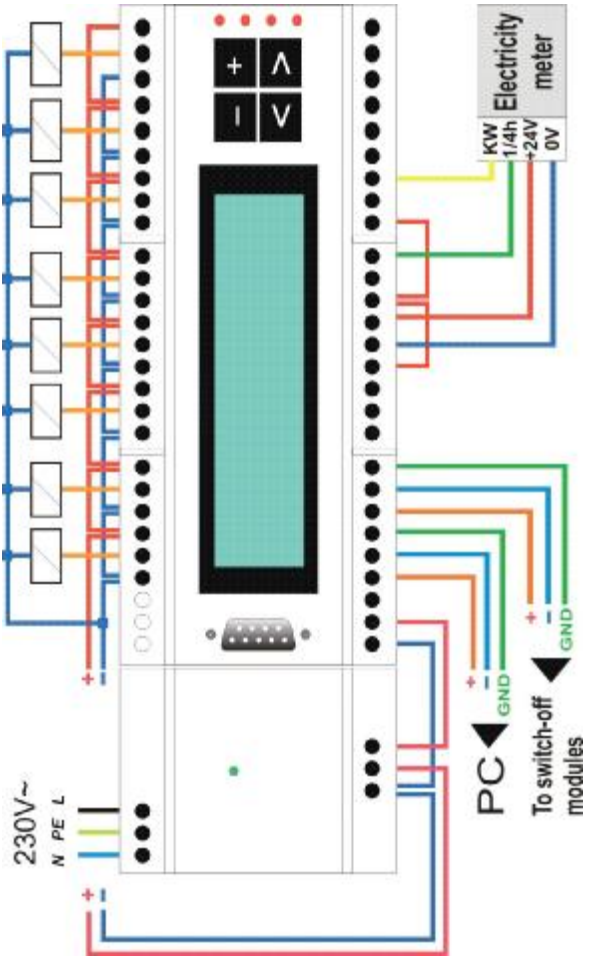
Input X40 is available for the synchronization (e.g.10min., 15min.) impulses, input X41 is available for impulses from the main utility meter. Most meter model available on the market supply both load and synchronisation pulses. When connected according to the picture, the inputs are supplied directly from the microcomputer, through the terminal X32. It is possible to connect another meters equipped with impulse output to the X42 and X43 terminals, such as reactive energy meter or any other meter(s). This measuring does not participate in the regulation, these values are archived for every synchronisation period together with the main consumption metering. When this signal is not available, alternative program switching is possible by setting a time period, which will be described later.

The relays are usually connected to the outputs X50-X57 of the microcomputer. The output circuits may be supplied from the external power supply or X31, X32 termianals can be used as well. The number of relays is limited not to overload the power supply. The relays's contacts are used to control devices by interrupting voltage to their contactors' coils and so on.

If switch-off and input modules are used in installation in the system, their communication link COM0 is connected to the X20 terminal. Avoid star connection of the bus. End-point devices should have termination resistor connected (see jumper underneath the terminals cover)

Communication link COM1 is reserved for operation with the master computer (PC).

Typical microcomputer connection



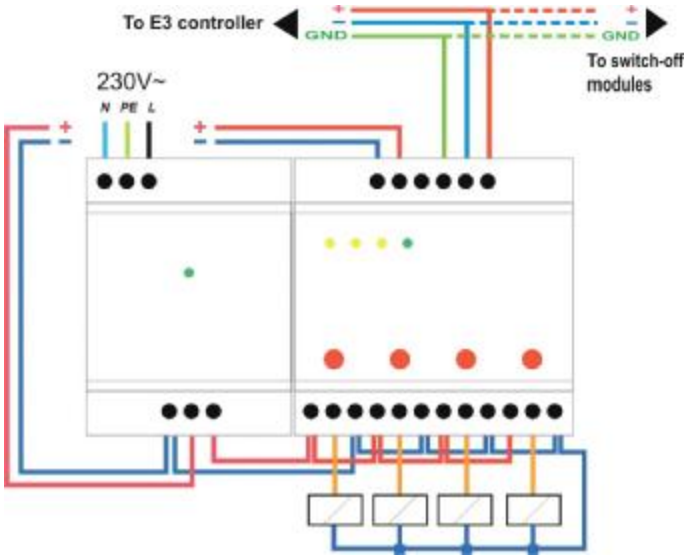
Connection of the switch-off module

Power supply 9-24V is to be connected to the X2 terminal. The relays are connected to the outputs X10-X13 in the similar way as it is with the central microcomputer.

The RS485 bus is connected to the X3 terminal. The termination impedance is to be found under the cover of the appropriate terminal board.

It is very important to set the correct address of module in the range 1 to 15 using jumpers placed under the front panel. There cannot be two of the modules of the same address.

Typical connection of the switch-off module:



Configuration

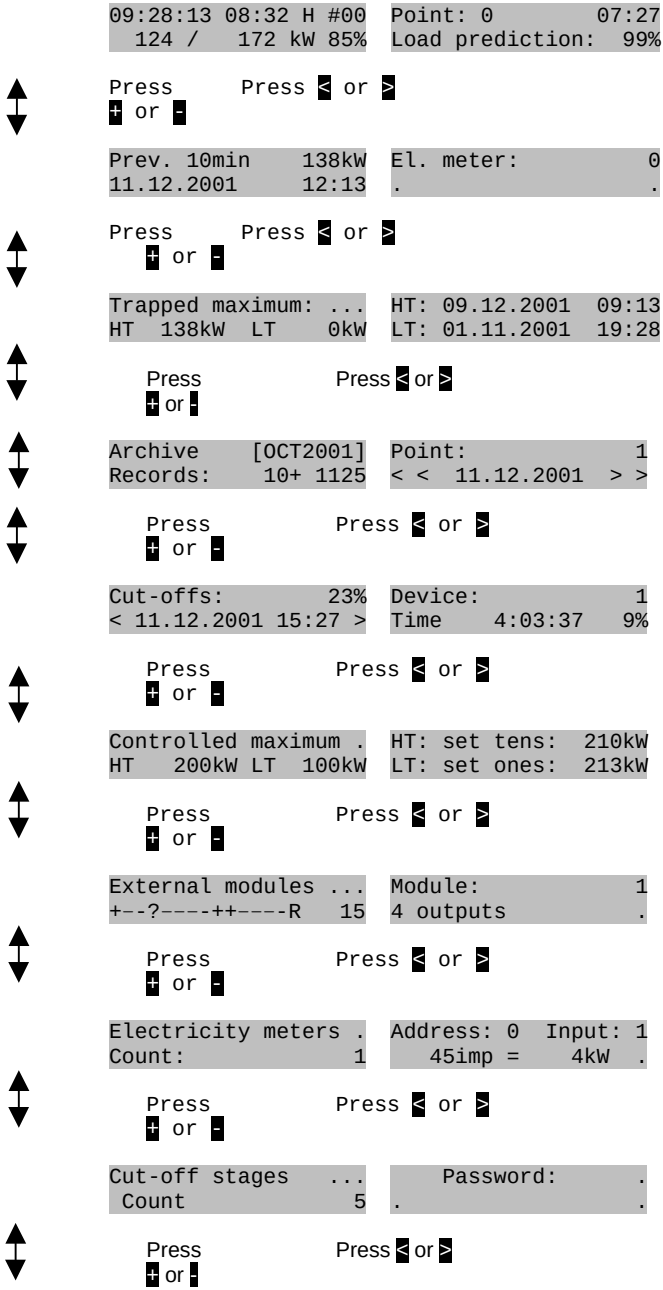
The basic element of the whole system is the central microcomputer, that is responsible for its function: consumption measuring, evaluation and decision-making to control the load as well as necessary communication with a user.

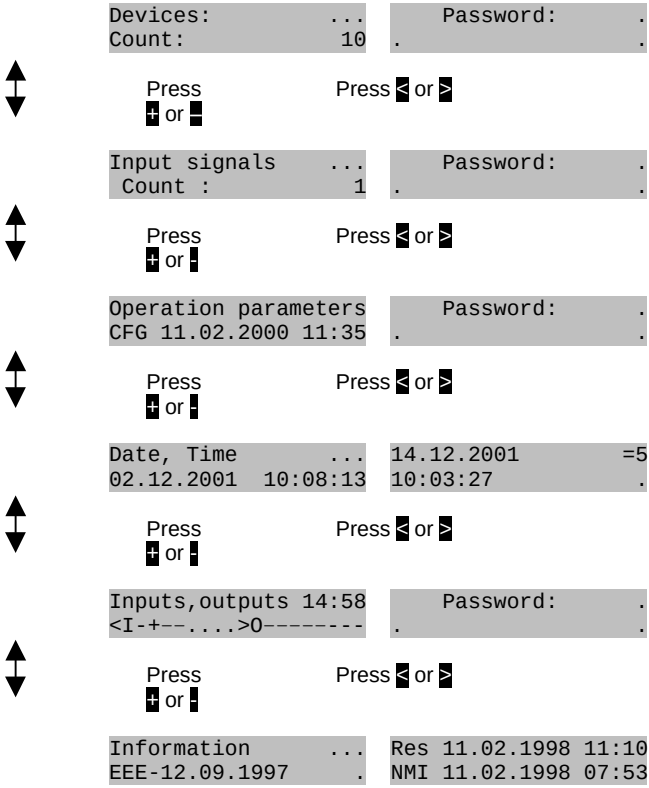
Operation of the system is run at different levels. Basic – configuration level is a necessary part of the installation and represents setting of all the parameters needed for the proper function of the system. To prevent from the unintentional or illegal impact into the system configuration, each input into this level is protected with a two-characters password. The predefined password is “FB”, the user can change it any time. The configured system is able to work independently and does not require any further attention of human. It enables occasional checking of the function, monitoring of the measured values, that represents the next level of the operation.

The microcomputer is equipped with two-line display and four push-buttons. The buttons ‘+’ and ‘-‘ serve to select required item or set required (usually numerical) value. The button ‘>’ is used to confirm the selected item or value (‘ENTER’ on PC), the button ‘<’ cancels (‘ESC’ on PC).

The up-to-date information are displayed about the overall state of the system, measured values and preset configuration parameters. Since the range of this information exceeds the possibility of the two-line display, they are divided into a few categories, among which we can move using the buttons ‘+’ and ‘-‘ . Using the button ‘>’ enables to set the selected parameters, or to display further information, as described below. The button ‘<’ serves to go back to the basic state – this equals to “Esc” button on the PC. The function of the microcomputer (consumption measuring and evaluation, executing regulation algorithms, communication with the extension modules) is run in the background.

The function of the microcomputer is shown in the following picture:


09:28:13 08:32 H #00
124 / 172 kW 85%
Point: 0 07:27
Load prediction: 99%
Press + or -
Press < or >
Prev. 10min 138kW
11.12.2001 12:13
El. meter: 0
.
Press + or -
Press < or >
Trapped maximum: ...
HT 138kW LT 0kW
HT: 09.12.2001 09:13
LT: 01.11.2001 19:28
Press + or -
Press < or >
Archive [OCT2001]
Records: 10+ 1125
Point: 1
< < 11.12.2001 > >
Press + or -
Press < or >
Cut-offs: 23%
< 11.12.2001 15:27 >
Device: 1
Time 4:03:37 9%
Press + or -
Press < or >
Controlled maximum .
HT 200kW LT 100kW
HT: set tens: 210kW
LT: set ones: 213kW
Press + or -
Press < or >
External modules ...
+--?----++----R 15
Module: 1
4 outputs .
Press + or -
Press < or >
Electricity meters .
Count: 1
Address: 0 Input: 1
45imp = 4kW .
Press + or -
Press < or >
Cut-off stages ...
Count 5
Password: .
. .
Press + or -
Press < or >



1. Initial menu

There is a basic information displayed in the form:

```
09:28:13 08:32 H #00
  124 /   172 kW 85%
```

Note: you can always return to initial menu by pressing ‘<’ button several times.

The information stands for:

09:28:13 ... actual time
08:32 ... actual time within the synchronisation period
If there was a microcomputer reset, the time untill the first synchronization impulse within the period is undefined a in there is “??:??” shown on its place. Meanwhile there is no regulation run.

#00 ... cut-off stage (0 – no regulation)

124/172 kW ... measuring of the major consumption, immediate and average power within the synchronisation period

86% ... proportion of the average performance to preset maximum

After pushing '>' button, the system enables to display actual data for other meters than main consuption (if defined). The information shown contains the number of the measurement, immediate time within the synchronisation period, immediate and average power.

```
Point: 1          07:27
     84 /   72 kW 85%
```

```
Point: 0          07:27
Load forecast:      99%
```

It is possible to move among the different measurements using the buttons '+' and '-'. The measurement number 0 represents the major consumption, that is why instead of the performance the estimated consumption is displayed in per cents.

2. The last synchronisation period

There is information about the average performance of the major consumption on the display measured during the last synchronisation period, with the time of the last synchronization impulse:

```
Period:           138kW
11.12.2001        12:13
```

If the synchronization impulse was the first one after the microcomputer reset or there incoming impulses shorter than 1 second (due to improper connection or failure of the supplying device), the following information is displayed in this place:

```
Period:             0kW
  Impulse:      20 ms!
```

Pushing the „>" button allows the user to see measured values of the other meters, if they are configured. By entering the electric supply meter number 0 (main measurement), it is possible to gain detailed information about the course of the selected synchronisation period. There are four periods available: actual, the preceding period and the periods with the highest consumption. After choosing the period, the information about the record is displayed, that contains its order number and the total number, the time within the period, the average power and the regulation level:

```
Record: 43/59  10:45
Load:    48%     #00
```

Browsing the records can be done by the buttons ‘+’ and ‘-‘. Records are saved every 15 seconds.

3. Trapped maximum

The information is displayed showing the highest measured synchronisation period maximum for the high and the low tarif since the last reset:

```
Trapped maximum: ...
HT  138kW  LT    0kW
```

After pushing the button ‘>’, the information is displayed showing the time when these values were recorded (or the time of the reset, if the value is reset):

```
HT: 09.12.2001 09:13
LT: 01.11.2001 19:28
```

Another push of the button ‘>’, allows user to reset these values. The text is displayed “Reset?”; reset is carried out after pushing ‘>’ and entering the correct password. The selection can be cancelled canceled by pushing ‘<’ button.

4. Archive

The following text is displayed:

```
Archive    [OCT2001]
(Records: 204+  1125
```

The time data (OCT2001) represents the actual calendar month, in which the archiving of the measured values is run for the major and subordinate consumption in 1/4 hour periods; the system saves even the values of the previous month within its memory capacity cca 9 days. The memory of the microcomputer is backed-up, so the values remain saved even in the case of blackout. Next, the number of the saved records is shown for the previous and actual month. After pushing ‘>’ enter the number of the meter (0 for the main consumption, the rest for the other meters).

The date of the last record is shown in the form:

```
Input:              1
< <  11.12.2001  > >
```

If the number of the records is 0 (after system initialization), only the text “Empty file...” is displayed. Using the buttons ‘+’ and ‘-‘, it is possible to browse days, the button ‘<’ serves for return to previous menu. After pushing ‘>’ button one more time, the first or last record of the selected day is displayed:

```
 1.    25:     124kW
< 11.12.2001 12:27 >
```

For each period, the number of the meter, the record number, the average power and the time of the synchronisation period are displayed. If the measured value is shown in the form “????”, an incomplete synchronisation period was recorded (e.g. after the reset).

5. Regulation run

In this place, the system provides information about the level of the regulation.

```
Cut-offs:          23%
< 11.12.2001 15:27 >
```

Percentage value represents the proportion of the time the system spent in the regulation state, to the total time since the last reset shown in the bottom line. After pushing ‘>’ and entering the number of the device, it is possible to get similar information about the total and proportional time of switching-off the other devices:

```
Device:             1
Time    4:03:37   9%
```

Device number 0 represents the summary of all the devices, where the total regulation time is displayed. The buttons ‘+’ and ‘-‘ enable browsing through each device, after pushing ‘>’, it is possible to reset the measured time and monitoring of the regulation run during the certain period of time.

6. Controlled maximum

There is a displayed value of the controlled maximum for the high and low tarif:

```
kW maximum limit ...
HT   200kW LT  100kW
```

These values can be changed by pushing '>', roughly by 10 kW a then finely by 1 kW, using the buttons '+' and '-', separately for the high and the low rate. Because of nature of impulse-depend calculating of the average power it is recommended to set a 1-2% lower maximum than the required controlled value should be kept, letting a certain clearance for the controller.

7. Extension modules

There is an actual information about the extension modules on the display, connected to the central microcomputer via a communication link:

```
Extension modules ..
+--?----++----R   15
```

The characters in the bottom line show the actual state of the corresponding modules with addresses 1 to 15 (left to right) with the following meaning:

- `-` module not configured (the address not occupied)
- `+` module configured, communication is O.K.
- `T` the microcomputer is transmitting the message to the module
- `R` the microcomputer is expecting the message from the module
- `?` no communication from module that should be otherwise present

The numerical value on the right represents the address of the module being actually communicated. After pushing '>', entering the password and entering the number of the required module, it is possible to define its type by choosing from the list:

- none
- 4 outputs module
- 4 inputs module for Electricity Meters
- 3 inputs module + synchronisation pulse

All input/switch-off modules connected to RS485 bus must have set corresponing address in advance or collision may occur.

8. Electricity meters

There is information on the display showing the number of the configured the electricity meters:

```
Electricity meters .
Total:              1
```

The first the electric supply meter (number 0) is reserved as the main metering, the other ones are subordinate measurements only and may or may not participate in the regulation. After pushing '>', entering the password and typing the number of the electric supply meter, its address and the number of the input on the given module is shown, as well as the ratio of the electric supply meter, which includes

```
Address: 0  Input: 1
   45imp =    4kW  .
```

The new setup is done after pushing '>'. First, the address is chosen, then number of the input and the type of the electric supply meter (active, reactive). Following is a flag whether the meter should or should not participate in total main power calculation and therefore if it influences the regulation. All meters that are flagged Regulation: yes are summed all together to gain information about total power for regulation purpose. If the address and the input are set to 0, this electric supply meter is canceled and removed from the list. The configuration of the electric supply meter goes on by choosing the proper type from the list using '+' and '-':

```
Meter:              ...
   12000imp =    1kW
```

When choosing the item ' other ', the constant is set by entering the numerical value of the number of impulses and the corresponding consumption in kWh (kVarh). After the confirmation of the value, the current and voltage transformations are set in the same way. Entering of values is canceled with '<'.

9. Cut-off stages

The actual number of the cut-off stages is displayed:

```
Cut-off stages   ...
 Count             5
```

Each stage corresponds to one switched-off device, where the total number of regulated devices can be higher. All the devices are ordered into groups marked by letters from ‘A’ to ‘Z’ (see the Devices menu) where each group contains device(s), that is/are equivalent from the point of significance - that means they have the same priority of switching-off.

When the controller decides that power should be lowered, it set the cut-off stage #1. Should this be unsufficient, the stage #2, #3 and so on are sequentially set until the load drops below the certain limit calculated internally by the controller’s algorithm.

Each stage corresponds with certain group of device(s). Therefore, calling stage #1 will call one group of device(s) (A to Z as set) where one of the device(s) that belong to the group AND is first in the queue (within all devices in the group) is turned off. Afterward, this device is set on the end of the device(s) queue.

Devices that belongs to groups assigned to the lower stages will be switched off more frequently and for the longer periods.

Configuration of each stage can be done after pushing ‘>’ and by choosing number of the stage; the escape can be done by pushing ‘<’ button. The text “Group : @ “ appears for the selected regulation level and one can set the required group with ‘+’ and ‘-‘. Character @ stands for the undefined group and the regulation level with this assignment is canceled. That is also the way the number of regulation levels can be reduced.

Important note: assigning ANY group to the stage 0 (zero) causes the group is called permanently, because stage 0 indicates “no-regulation or any regulation state”. Therefore, this state is always active.

10 Devices

There is an actual number of devices on the display:

```
Devices:          ...
Total:             10
```

After pushing ‘>’, entering password and after choosing the required device, the configuration can be set or changed by entering following parameters:

Group – assign device to group A to Z

Power [kW] – nominal power of the device

Address – address of the switching-off module (1–15), which the device is connected to or 0 for the controller

Output – number of the output on the given module, which disconnects the device (numbered from 0), or different parameter (according to the module type)

Inversion – setup of the inverse output function (if yes selected, output is energized in the idle state, de-energized in the regulation state)

Max cut-off – maximum time the device can be held turned off, after that it is turned on regardless of any other regulation requrement.

Min cut-off – minimum time the device must be held turned off, even though conditions of regulation enable to switch device on

Min idle – minimum time the device has to be hold “on” after previous period of “off” state

Note: all three timer functions have the highest priority, assuming priority over any regulation requirement.

Device [cut-off] – number of device that must be in the mode of regulation (turned off) to allow the actual device enter to the “off” mode also

Device [idle] - number of device that must be in the mode of non-regulation (turned on) to allow the actual device enter to the “off” mode

Signal active - number of signal, which must be active to allow the actual device enter to the “off” mode

Signal inactive - number of signal, which must be inactive to allow the actual device enter to the “off” mode

11. Input signals

Input signals may be used as a codition to allow or do-not-allow enter specific device to the “off” mode (see paragraph 10 Signal active/Signal inactive above) or can control high/low tarif mode.

```
Input signals    ...
Count:             1
```

To enter the menu the password is required. Choose signal number and set following parameters:

```
Signal No. :       1
 Address: 0 Input: 4
```

Address – indicates address of input module (1-15) or the controller itself (0)

Input – indicates input number on the module or controller

Note: inputs 4, 5, 6, 7 at the controller (address 0) are internal timers of the controller. These timers could be set in input/output menu (see below).

12. Regulation parameters

There is following text on the display:

```
Regulation param's..
CFG 11.02.2000 11:35
```

There is a date in the bottom line, that shows the time of the last configuration change of the system. By pushing '>' and entering the password further additional regulator parameters can be set:

Cut-off begins – time within synchronisation period, when the cut-off stage can be increased and thus more devices switched off

Reconnect until - time within synchronisation period, till the regulation level can be decreased and thus more devices switched on

Initial cut-off stage – define the stage, which is automatically set after reset of the microcomputer and is maintained untill the first synchronization impulse.

Low tarif control signal – enter address and number of input of the signal that controls high/low tarif

More parameters – possibility to change further, less frequently used parameters (after confirmation with '>')

Device address – changing regulator address for communication with PC (initially set to 0)

Communication time – time period in [s] when the controller initialise next round of communication via RS485 bus. If set less than total amount of input/cut-off modules the communication goes round and round without stop.

Synchronization..– selection of the edge of the synchronization impulse stating the beginning synchronisation period (rising – falling – internal by real time – external by input module)

Cut-off curve [%] from : till – defining the switch off level in % of the preset regulated performance for the beginning and the end of the 1/4 hour period (recommended is not to change preset value)

Measuring period – set 10, 12, 15, 20, 30, 60 minutes according to your local standard

Password change – Change password for sonfiguration of the system

12 Date, time

There is actual date and time on the display:

```
Date, Time          ...
02.12.2001  10:08:13
```

After pushing ‘>’, time can be set. The calendar day, month, year, week day, hour and minute are displayed, respectively. Required value is set using ‘+’ and ‘-‘ and confirmed using ‘>’. By pushing ‘<’, setting is canceled without any changes. Since the microcomputer has its internal real time clock with own power supply, the time is always updated even during the blackout and does not have to be set when switching on.

13 Inputs, outputs

There is following information on the display:

```
Inputs,outputs 14:25
<I-+--....>0-+--+---
```

There is an actual state of the inputs and the outputs. Characters ‘-’ stay for inactive and ‘+’ for active state of input or output. Further pushing of ‘>’ the controller asks for the password and let you in the menu where outputs can be tested or internal timers configured.

```
Output test       ...
_____________________
```

Press ‘>’ to enter output test menu or any of ‘+’, ‘-‘ button to enter internal timer set menu.

Output test energizes and de-energizes all outputs on the controller sequentially (from 0 to 7) during the period of 80 seconds:

```
Output test    ... 76
<I---....>0++++----
```

Output test can be interupted any time by pressing any button. It is adviceable to test all the outputs after relay wiring done to make sure all the relays works OK.

Internal input (internal timer function) set real-time period “from...to” is the input to be active:

```
Internal input :   4
from:15:40  to:05:20
```

This example shows that internal input #4 is active all the time during period starting 15:40 one day and ending 05:20 next day.

Note: there are 4 independent timers available at the address “0” – these are inputs 4 to 7. For further use please refer to the paragraph 10 Signal active/Signal inactive.

14. Information

There is following information on the display showing the software version:

```
Information      ...
EEE-05.02.2002    .
```

After pushing ‘>’ the information is displayed showing the time of the last microcomputer reset and/or power supply failure:

```
Res 11.02.2002 11:10
NMI 11.02.2002 07:53
```

If there is “WD” text displayed instead of “Res”, the last reset was caused by the Watchdog circuit; this flag can be canceled by pushing ‘>’:

```
WD: 15.10.1998 14:56
  Cancel WatchDog? .
```

After the next push of ‘>’ the time data is displayed showing the last initialization of the system:

```
Ini 11.02.1998 07:53
 Initialisation? ...
```

After the confirmation it is possible to set the predefined system configuration; this is protected against the unintentional interference with the password.

Attention: confirmation of the password after „Initialisation?“ query erases all the data and the system configuration stored!

Example: Controller configuration record

S/N: _____ *Date:_____*

kW maximum limit

kWh-H: _____ kW *kWh-L: _____ kW*

Switch-off modules

Type: *Address:* **1 2 3 4 5 6 7 8 9 10 11 12 13 14 15**
4 outputs ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

Meters

	Addr.	*Input*	*Type*	*Ratio*		*Voltage(V)*	*Current(A)*
0	**0**	**1**	**Active**	_____	**imp/kWh**	_____/___	_____/__
1	___	___	_____	_____	**imp/k**___	_____/___	_____/__

Stages

Regul. stage: *01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16*
Group: __ __ __ __ __ __ __ __ __ __ __ __ __ __ __ __

Regul. stage: *17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32*
Group: __ __ __ __ __ __ __ __ __ __ __ __ __ __ __ __

Devices

Number	Group	Power [kW]	Address	Output	Inversion No/Yes	Regulation max.	Regulation min.	Idle min.	Device regulated	Device idling	Device description
1	__	_____	__	__	____	__:__	__:__	__:__	_____	_____	_____
2	__	_____	__	__	____	__:__	__:__	__:__	_____	_____	_____
3	__	_____	__	__	____	__:__	__:__	__:__	_____	_____	_____
4	__	_____	__	__	____	__:__	__:__	__:__	_____	_____	_____
5	__	_____	__	__	____	__:__	__:__	__:__	_____	_____	_____
6	__	_____	__	__	____	__:__	__:__	__:__	_____	_____	_____
7	__	_____	__	__	____	__:__	__:__	__:__	_____	_____	_____
8	__	_____	__	__	____	__:__	__:__	__:__	_____	_____	_____
9	__	_____	__	__	____	__:__	__:__	__:__	_____	_____	_____
10	__	_____	__	__	____	__:__	__:__	__:__	_____	_____	_____
11	__	_____	__	__	____	__:__	__:__	__:__	_____	_____	_____
12	__	_____	__	__	____	__:__	__:__	__:__	_____	_____	_____
13	__	_____	__	__	____	__:__	__:__	__:__	_____	_____	_____
14	__	_____	__	__	____	__:__	__:__	__:__	_____	_____	_____
15	__	_____	__	__	____	__:__	__:__	__:__	_____	_____	_____
16	__	_____	__	__	____	__:__	__:__	__:__	_____	_____	_____
17	__	_____	__	__	____	__:__	__:__	__:__	_____	_____	_____
18	__	_____	__	__	____	__:__	__:__	__:__	_____	_____	_____
19	__	_____	__	__	____	__:__	__:__	__:__	_____	_____	_____
20	__	_____	__	__	____	__:__	__:__	__:__	_____	_____	_____
21	__	_____	__	__	____	__:__	__:__	__:__	_____	_____	_____
22	__	_____	__	__	____	__:__	__:__	__:__	_____	_____	_____
23	__	_____	__	__	____	__:__	__:__	__:__	_____	_____	_____
24	__	_____	__	__	____	__:__	__:__	__:__	_____	_____	_____
25	__	_____	__	__	____	__:__	__:__	__:__	_____	_____	_____
26	__	_____	__	__	____	__:__	__:__	__:__	_____	_____	_____
27	__	_____	__	__	____	__:__	__:__	__:__	_____	_____	_____
28	__	_____	__	__	____	__:__	__:__	__:__	_____	_____	_____
29	__	_____	__	__	____	__:__	__:__	__:__	_____	_____	_____
30	__	_____	__	__	____	__:__	__:__	__:__	_____	_____	_____
31	__	_____	__	__	____	__:__	__:__	__:__	_____	_____	_____
32	__	_____	__	__	____	__:__	__:__	__:__	_____	_____	_____

Regulation parameters:

Disconnect from __:__ Reconnect till __:__
Initial regulation level:__
Low rate from __:__, till __:__
Regulator address __
Synchronization: edge(rising – falling), internal (yes – no) Password: __(FB)