

Switching on

The PadMess M-Bus central (PMZ) can be switched on as follows:

- Press the ON key on the tactile keyboard.
- If an external modem is connected, the unit switches on when a modem-modem connection has been established. (DCD line on the serial interface of the external modem is monitored).
- If an internal PCMCIA modem is fitted, the unit is switched on as soon as a modem-modem connection has been established (DCD).
- The unit switches on at the pre-set readout time (alarm time of the integrated clock).
- If a PC is connected to the service interface the master station can be switched on by pressing a key on the PC.

Switching off

- If the unit is not used for approximately five minutes (no keystroke on the tactile keypad or no inputs from the serial interfaces) it switches itself off automatically.
- If the unit is operated from the serial interface, the PMZ may be switched off manually with the menu item "Escape and Switch off".
- If the unit is not operated remotely and no automatic readout is active, it can also be switched off with the ON key.
- If an established modem connection is interrupted the master station switches itself off automatically.

Operation

The PMZ can be operated from the tactile keypad, through the integrated serial service port, through an external modem connected to the modem port, or with the internal PCMCIA modem.

After switching on, the PMZ expects entries from the tactile keypad. Operation is switched to the input channel in question (or to the relevant interface) depending on whether an entry is made to the PMZ through the service interface, from the modem port or from the PCMCIA modem. The tactile keypad is then disabled and the message "Remote control active / Keyboard locked !" appears on the PMZ screen. Entries cannot now be made from the tactile keypad or from another input channel; to change the input channel the PMZ must be switched off and switched on again. The input channel through which the first entry was made is then used for all further inputs; all other input channels are disabled.

By using one of the serial interfaces the master station can now serve as a transparent level converter as well. The other interface and the readout function of the master station are not impaired. The transparent mode can be activated separately for each interface, however a MODEM that can transmit 11 bits is required for transparent transmission per external MODEM. The baud rate in transparent mode corresponds to the selected M-Bus baudrate and can be 300, 2400 or 9600 baud. In case of several selected baudrates the central uses 2400 baud for transparent function. In transparent mode the master station is switched off after being inactive for approximately four minutes on the service interface, and immediately after the connection has been released on the MODEM interface.

New: The PMZ can now be operated through the serial interface and modem interface using our free software FService. Please feel free to download FService and the manual for the FService from www.relay.de.

Automatic Readout

The M-Bus master station allows the connected M-Bus meters to be read at regular intervals; the meter data can be stored permanently. This data can then be collected and read per modem or laptop using the YMODEM protocol. Readouts can be made at ¼ hour, hourly, daily, weekly, monthly and yearly intervals.

Meters can be read automatically by one of two methods, (1) all meters connected at the readout time are searched, (2) meters specified in a list of meters (slave list) are read. The latter method is much faster and the meters to be read can be selected manually. The slave list can be created by the master station itself or it can be specified by the operator. If there is no slave list (deleted) the meters are searched.

Operation from the Tactile Keypad

Tenant Menu:

After switching on the PMZ expects a meter ID number (secondary address) to be entered. This entry can be made on the tactile keypad (leading zeros need not be entered). Digits entered incorrectly can be deleted by pressing the “<-” key, the entire entry can be deleted with the “C” key. The entry is completed with the “E” key and the PMZ attempts to read the meter with the specified secondary address. If the meter does not exist, or another fault occurs, an error message appears. If the meter is read successfully, a screen page with the following information (ID number, medium, manufacturer's ID (MAN), version number and M-Bus status (bits) is displayed. The first meter reading appears on the screen when a key is pressed. If the meter in question outputs a number of meter readings, the individual meter readings can be displayed on the screen with the “↑” or “↓” keys. The key to press to see further meter readings appears in the bottom line on the screen. If any other key besides “↑” or “↓” is pressed, the PMZ returns to the initial menu where the next ID number can be entered. If a meter list is available, the master station searches this list after the ID number has been entered and uses the associated primary address for reading out if necessary. This allows meters that do not support secondary addressing to be read in the tenant menu. Please refer to “Service menu – Search for meter and meter list” for the meter list.

Supervisor Menu:

Press the “F1” key to select the “Supervisor” menu. The pass code is queried here (that can only be set through the serial interfaces and not from the tactile keypad). If the entry is correct, you can select further PMZ functions:

1. Read primary
Meters can be readout using the primary address with this menu item in the same way as the ID number (secondary address) is read (see above). The operator procedure is as described above.
2. Search meters
A meter search can be performed with this menu item. The PMZ searches all primary addresses from 0 to 250 and displays the meter readings of the meters found on the screen. Where there are several meter readings the individual meter readings can be output with the “↑” or “↓” keys. The search continues when another key is pressed. When the PMZ reaches the primary address 250, or if the “C” key is pressed, the primary search is stopped and secondary addresses are searched with wild cards. The meter readings are displayed in the same way as with the primary search. When the secondary search has ended or the “C” key is pressed again, the search is stopped and the “Supervisor” menu appears again.
3. M-Bus Baud Rate
If this option is selected, a further menu appears, where the baud rates to be used for reading the M-Bus meters, are specified: 0: 300 baud; 1: 2400 baud; 2: 9600 baud; 3: 300 and 2400 baud; 4: 2400 and 9600 baud; 5: 300, 2400 and 9600 baud. The selected (actual) option is also displayed. The M-Bus baud rate can be changed by pressing one of the keys from 0 to 5. If an option is selected, where a number of baud rates are specified, the system attempts to read the meter with the highest baud rate, then the next lowest rate, and so on, until the meter responds. With primary and secondary addressing the baud rate is reduced until the specified meter responds. All baud rates are checked in the meter search without a slave list. The

“Supervisor” menu appears if “E” or “C” is pressed. The selected M-Bus baud rates are stored permanently in the PMZ, so that they are not lost when the unit is switched off.

4. Time and Date

If this option is selected, a further menu appears where the current time (1), the current date (2) and the readout time (3) can be set. All meter readings stored in the flash Eprom in the PMZ can be deleted in item 4 as well. To delete all stored meter readings enter the code “123E”. If the entry is invalid the meter readings are not deleted.

The time, the date and the readout time are set by entering the new time (or the new date, readout time), whereby the specified format (for example HH,DD,MM) must be used (“<-” key: Delete last character; “C” key: Delete all characters; “E” key: Enter). Invalid entries are ignored. If the entry is valid, the selected entry is displayed on the screen. If the “E” key is pressed without a previous entry, the old settings are confirmed in the same way as with the “C” key.

When the actual time has been entered in menu item 1 the day of the week (Sunday . . . Saturday) is queried by the master station. The readout mode (0:off, 1:hourly, 2:daily, 3:weekly, 4:monthly, 5:yearly, 6:every quarter of an hour) is set in menu item 3 (readout time) and then the readout time, day of the week, day or date is queried, depending on the selected readout mode.

Note: The key for choosing the readout mode “every quarter of an hour” is not displayed, because there is not enough place on the LCD.

The “Supervisor” menu appears again if the “C” key is pressed in the “Time of day / Date” menu.

Press the “C” key to switch from the “Supervisor” menu to the initial menu (only secondary address can be entered).

Press the F1 key in the Supervisor menu to go to a further menu where the service interface and/or the external MODEM interface can be switched to transparent mode. Press key 1 to switch the transparent mode for the service interface and key 2 to switch the transparent mode for the MODEM interface. Key “C” aborts the menu without altering the settings and key “E” ends the menu while activating the changes.

IMPORTANT: When all entries have been made in the “Supervisor” menu it is very important to press the “C” key (repeatedly if necessary) to return to the initial menu or to switch off the master station with the ON key. Otherwise unauthorized persons may gain access to the “Supervisor” menu, while the PM has not yet been switched off automatically, and delete all meter readings.

Operation Through the Serial Interfaces

Any terminal program with YMODEM (batch) support can be used to operate the master station with a PC. The settings are 9600 Bd, 8 data bits, no parity, 1 stop bit and ANSI emulation.

If an entry is made (a key is pressed on the terminal computer) through one of the serial input channels (service, external or internal modem) the PMZ switches to this input channel, whereby all other input channels including the tactile keypad are disabled. Operation through a serial interface is protected by a password. One of the following menus is selected with the password as well.

The master station offers several means of access:

- **Command Menu**

Operation with ESC sequences with a customized program, for which a unit can be made available in Pascal source code. This menu is not described here, reference is made to the documentation for “MODMZENT.PAS”.

- **Meter Reader Menu**

This menu is started when the meter reader password is entered. The meter reader can only read the stored data here, read single meters using primary or secondary addressing and switch off the master station again. The unit is thus protected against operator error or manipulation by the meter reader. The meter reader password can only be set in the service menu.

Menu items: 1: Download the stored meter data
 2: Reading one meter using primary addressing
 3: Reading one meter using secondary addressing
 Q: Escape and switch off

See service menu (1.1: Downlaod the stored meter data / 2: Reading one meter using primary addressing / 3: Reading one meter using secondary addressing / Q: Escape and switch off) for an explanation of the above options.

- **Service Menu**

This menu is started when the service pass code is entered. The selectable pass code is the same as the pass code that must be entered on the tactile keypad in order to select the “Supervisor” menu (see above). The service menu is described below:

1: Readout of all meter data

When this option is selected a further menu appears:

1: Download the stored meter data

All meter readings stored in the flash Eprom of the PMZ may be output per YMODEM (batch) protocol to the terminal computer with this menu item. The YMODEM protocol download must be activated on the terminal computer for this purpose when this menu item has been selected. Should no meter readings be stored in the flash Eprom, no file is transmitted. The meter readings are sorted according to media and output, whereby the files OTHER.XLS, ELECTRIC.XLS, GAS.XLS, HEAT.XLS, STEAM.XLS, HOTWATER.XLS, WATER.XLS, HKV.XLS, RESERVED.XLS, OIL.XLS, AIR.XLS, BUS.XLS, COOLING.XLS, HEATCOOL.XLS, COLD_WTR.XLS, DUAL_WTR.XLS, PRESSURE.XLS, AD_CO NV.XLS und ERROR.XLS can be transmitted. If no meter reading for a particular medium is stored in the flash Eprom, the file is not transmitted. The file ERROR.XLS contains the data from meters that have reported a fault in the M-Bus status at the time of reading out.

2: Download the actual meter data

All meter readings that were found previously with a manual meter search (see Item 4) can be output to the terminal computer per YMODEM (batch) protocol in this menu item. These meter readings are also sorted according to media and transmitted with the suffix .XLS to the terminal computer. Meter readings found during the manual meter search are only stored in the main memory of the PMZ; they are therefore lost when the system is switched off. If no manual meter search is made before this menu item is selected, an error message is output.

3: Binary download the stored meter data

The stored contents of the flash Eprom (meter readings) are transmitted unsorted in binary format to the terminal computer per YMODEM (batch) protocol in this menu item. The ZENTRALE.BIN file is created. The difference between this menu item and item 4 is that only memory addresses containing stored data are transmitted. This option has been implemented for test purposes only and can be used in an emergency, if the sorted output of the meter readings does not function correctly. It may then be possible to reconstruct the meter readings and locate the cause of the error by examining the binary file.

4: Binary download of the whole data memory

The entire contents of the flash Eprom (meter readings) are transmitted unsorted in binary format to the terminal computer per YMODEM (batch) protocol in this menu item. The ZENTRALE.BIN file is created. This option has been implemented for test purposes only and can be used in an emergency, if the sorted output of the meter readings does not function correctly. It may then be possible to reconstruct the meter readings and locate the cause of the error by examining the binary file.

2: Reading one meter using primary addressing

The meter readings of the meter with the specified primary address are output. Press RETURN, without entering a primary address, to return to the main menu.

3: Reading one meter using secondary addressing

The meter readings of the meter with the specified secondary address are output. Press RETURN, without entering a secondary address, to return to the main menu.

4: Search for meter and meter list

A further menu appears if this option is selected:

1: Search for meter without generating the meter list

A search for primary addresses of connected meters is performed with this menu item. When address 250 is reached, a secondary address search is performed. Press any key to abort the primary and secondary searches (Important: the abort is delayed if a meter is being searched at the same time. A delay of up to three seconds can occur especially at 300 baud). If the system searches with several M-Bus baud rates, the user can switch from one baud rate to the next per keystroke. All found meter readings are output and stored in main memory (if a meter is found during the primary and secondary search, it is saved only once). Meter readings stored in main memory may be transmitted to the terminal computer with menu item 2 (Download the actual meter data) per YMODEM (batch) protocol. All meter readings in the main memory are deleted, if a new search for connected meters is started. No meter list is generated by this search.

2: Search for meter with generation of meter list

A search for meter can be performed with this menu item in the same manner as described above, with one difference: namely, that the meters found are entered in the meter list used by the automatic readout. This meter list is saved permanently.

3: Readout of meter list

This menu item starts the readout of the slave list per YMODEM (batch) protocol. The file "SLAVELIST.PMZ" is created on the PC.

4: Upload and storage of the meter list

This menu item allows the slave list to be transmitted from the PC to the master station and stored there. Any existing slave list will be deleted after successful transmission. This means that the supervisor can exclude individual meters from the readout, by deleting them from the previously read slave list. Before transmission to the master station the slave list must be compressed with the utility program COMPSL.EXE. See Appendix.

5: Erase the meter list

The slave list is deleted in the master station with this option; the search is thus activated during the automatic readout.

5: Changing the M-Bus baudrates

If this option is selected, a further menu appears, where the baud rates to be used for reading the M-Bus meters, are specified: 0: 300 baud; 1: 2400 baud; 2: 9600 baud; 3: 300 and 2400 baud; 4: 2400 and 9600 baud; 5: 300, 2400 and 9600 baud. The selected (actual) option is also displayed. The M-Bus baud rate can be changed by pressing one of the keys from 0 to 5. If an option is selected, where a number of baud rates are specified, the system attempts to read the meter with the highest baud rate, then the next lowest rate, and so on, until the meter responds. With primary and secondary addressing the baud rate is reduced until the specified meter responds. All baud rates are checked in the meter search without a slave list. The main menu appears if any other key is pressed. The selected M-Bus baud rates are stored permanently in the PMZ, so that they are not lost when the unit is switched off.

6: Changing time and date

Time and date can be set with this option. The format (for example HH:MM:SS) must be used. Invalid entries are ignored. If the entry is correct the time of day or the date is updated. If RETURN is pressed without an entry the time of day or date are not modified. The day of the week (Sunday to Saturday) is also queried from the master station.

7: Changing automatical readout time

A new readout time and a new readout mode can be set for the automatic meter readout and storing in flash Eprom with this option. When the readout mode (disabled, every quarter of an hour, hourly, daily, weekly, monthly or yearly) has been entered, the master station queries the necessary information (time of day, day of the week, day in the month or day + month). (Important: When the PMZ has been activated at the readout time, the automatic meter readout does not take place immediately, but approximately five minutes after the PMZ has not been used. That is, the readout takes place before the PMZ is switched off).

8: Changing the terminal baudrate

The speed of transmission of the service interface can be set here (Important: Baud rates > 19200 can only be used generally with terminal computers with buffered serial interfaces). The baud rate is not saved permanently and is set to 9600 Bd again after reset. The speed of transmission for the external and internal modem is fixed at 9600 baud and cannot be changed with this menu item.

9: Updating the Operating System

The operating system can be reloaded in the flash Eprom with this option. The binary file with the new operating system program must be transmitted per YMODEM (batch) protocol to the PMZ for this purpose (Important: The supply voltage must not be disconnected while the flash Eprom is being programmed with the new operating system, otherwise the PMZ is not serviceable and the flash Eprom must be reloaded with an Eprom programmer. Flash Eprom programming starts when the operating system file has been correctly transmitted. If the file transmission is aborted this does not cause any problems). The size of the file is 192 kBytes.

0: Configuration of the central

The user receives information here on the hardware and software versions, and the installed MODEMS; he can set various parameters and configure an internal (PCMCIA) MODEM if available.

The following parameters can be set: service passcode, readers pass code, address and the options hydrometer DYLINE-E / Sontex or NeoVac meter. These parameters are stored permanently and are not lost when the master station is switched off. If RETURN is pressed without an entry having been made, the existing contents are not altered. The service pass code serves as an access code to the Service and Supervisor menu and can comprise a maximum of six digits. The readers password serves as access to the meter reader menu and can comprise a maximum of four digits. The address can be chosen at will and has a maximum of 32 characters; it is transmitted in the header of the file with the meter readings (see above).

There are further menu items to define (1) whether the daylight.saving fundtion is enabled, and (2) whether Neovac SX700 distributors for heating costs / Sontex Supercal heat counters / Sontex IF645 impulse meters are connected. In the second option, the maximum allowed response time for the slaves at 2400 baud is increased by about half a second. The readout process for the units in the bus system will be slowed down when these menu item is activated.

The "Service interface transparent" and " External MODEM interface transparent " options can also be set here and will be activated after the next cold restart.

L: Deleting all stored meter data

All meter readings stored in the flash Eprom in the master station can be deleted with this menu item. This option should only be called once during the installation of the master station in order to initialize the stored readings correctly before the new meter readings are saved. This option should otherwise only be called in emergencies, that is, if serious errors occur while reading meter data files.

Q: Escape and Switch off

The PMZ is switched off and the terminal connection is disconnected. This option should always be called at the end of a session in order to initialize the PMZ. If the connection is disconnected without calling "Escape and switch off", the PMZ remains active for approximately another five minutes (that is, until it switches off automatically) and can only be accessed through the service interface. If an internal or external modem is connected to the PMZ, this will be initialized.

Appendix:

A) Notes on Saving the Meter Data in the Flash Eprom

Meter data is saved in a 256 kByte area in the flash Eprom. The complete M-Bus message for every readout and every meter is stored with date and time of day of the readout. The memory area is cyclically written, that is when the memory area is full, the oldest data are overwritten. It should be noted that a 64 kByte block is deleted every time.

The number of saved data records depends greatly on the number of meters connected and their M-Bus message lengths. The number of readouts that can be stored (N) is determined with the following formula for the particular installation:

$$N = 262144 / \text{sum of all meter data in a readout}$$

The length for a stored protocol is obtained from the M-Bus message length + 12 characters for date and time of day.

B) Notes on Startup with Modem

The optional internal (PCMCIA) MODEM is fitted and configured by the manufacturer. Only the telephone line and the terminals marked with S1A and S1B must be connected.

An external MODEM is configured by the manufacturer and supplied with a connection cable if required. This MODEM can be connected to the terminals CTS, TXD, DSR, DCD, RTS, RXD, DTR and GND with an 8-core cable or to the RS232 marked 10-pole trough with a special cable. This connection may also be run from the housing as a DB9 connector if necessary. A standard interface cable, supplied with most modems, is connected and arrested with knurled screws.

An external MODEM supplied by the customer should be configured with the PC software INITMODM.EXE. The MODEM is initialized by this program with AT commands loaded from an ASCII file specified as a parameter. The MODEM is connected to a serial port in the PC (COM1 or COM2), the power supply unit for the modem is switched on and the program is started with the following parameters (example):

INITMODM 1 TRUST14.PMZ : Initializes the MODEM at COM1 with AT commands from TRUST14.PMZ

The following settings are recommended for most modems:

AT	* for baud rate identification
AT&F	* Load factory settings
ATL0M0	* Loudspeaker low/off
AT&C1	* CD signal, if remote modem carrier is available
AT&D3	* Resets modem after DTR signal off
AT&S0	* DSR always on
ATS0=2	* Modem answers after two rings (Auto Answer)
AT&W0	* Storing the configuration in non-volatile memory 0

The MODEM can be connected to the master station after successful configuration.

C) Notes on Initial Startup

Please note that no valid pass code (or valid address) is available for initial startup. The fixed pass code must therefore be used for initial startup in order to access the main menu. Up to 3 x 255 random characters are output to the screen for the subsequent parameterization of the master station, as neither the memory cells for the pass code or those for the address contain correct values.

D) Slave Lists

Entering the Slave List

Use any editor — for example, Turbo Pascal — and follow the following rules:

- 0) The first line in the file must contain something. Text lines are ignored by the program.
- 1) The beginning of every slave list line must contain the three-digit primary address. Leading zeros may be left out, however blanks (shown below with ‘.’) should be used in their place.
- 2) Then comes two blanks.
- 3) The eight-digit secondary address comes next.
- 4) Followed by a blank.

These stipulations should be followed (at least) in order to obtain a search list entry in the flash. The following data must not necessarily be entered to read a meter using the search list. If available they will also be processed during the search.

Sample File:

```
Adr . . . . . ID . . Manufact . . Version . . Medium . . MBusBaud  
.. 4 . . 0 0 0 0 0 4 0 . . . . . PAD . . . . . 5 . . . . . 2 . . . . . 0  
1 0 1 . . 5 0 0 0 0 0 4 . . . . . SLB . . . . . 1 . . . . . 4 . . . . . 3  
.. 0 . . 5 1 3 0 0 3 8 5 . . . . . TCH . . . . . 3 7 . . . . . 4 . . . . . 5  
.. 0 . . 1 2 3 4 5 6 7 8 . . . . . F F F F . . . . . 2 5 5 . . . . . 2 5 5 . . . . . 0
```

(1..3) (6.....13) (19..22) (29..31) (37..39) (49)

Cursor positions

Notes:

- Secondary addressing is performed with ID, Manufact, Version, Medium with Adr = 0
- Wild cards: Manufact = FFFF, Version = 255, Medium = 255
- MBusBaud: 0 → 300 Bd 4 → 4800 Bd
 1 → 600 Bd 5 → 9600 Bd
 2 → 1200 Bd
 3 → 2400 Bd

A slave list created or edited according to the example above must be compressed with the PC program COMPSL.EXE and can then be stored in the master station by calling up the menu item “ Search for meter and Meter List” / Submenu “Upload and storage of meter list”.

E) XLS Files

Meter readings read as XLS files have a format that can be imported into almost every database or table calculation. The individual columns are separated by tabulators and new lines are created with a CR (#13#10).

A Sample File:

water.xls	Stettiner Str. 38											
Datum	Zeit	Adr	ID-Nr.	HST	Nr.	Wert	Einheit	Beschreibung	Art	Modul	SP-Nr	Tarif
30.01.1997	11:49	5	96010002	END	1	1512	m3	Volumen	akt.	0	0	0
					2	1	m3	Volumen	akt.	0	0	0
30.01.1997	11:59	5	96010002	END	1	1512	m3	Volumen	akt.	0	0	0
					2	1	m3	Volumen	akt.	0	0	0
31.01.1997	12:21	5	96010002	END	1	1512	m3	Volumen	akt.	0	0	0
					2	1	m3	Volumen	akt.	0	0	0
31.01.1997	13:10	5	96010002	END	1	1512	m3	Volumen	akt.	0	0	0
					2	1	m3	Volumen	akt.	0	0	0
31.01.1997	16:57	5	96010002	END	1	1512	m3	Volumen	akt.	0	0	0
					2	1	m3	Volumen	akt.	0	0	0

