

PADPULS4 M-BUS Pulse Input Modules

The M-PADPULS series of devices connects meters with contact output to the M-Bus system. This is a simple and flexible solution for reading already installed gas, electricity, heat, water and steam meters.

The power for the impulse adaptor is taken from the M-Bus. An integrated battery maintains the count function in case of a bus voltage failure. The capacity of the battery allows operation without M-Bus connection for guaranteed 3 years.

During installation the M-PADPULS modules can easily be adapted to the pulse output of the meter using MBCONF configuration software. The measured medium, the pulse value, the pulse unit and the initial meter count are nearly free adjustable to the individual meter by setup software.

PADPULS4 can connect up to 4 pulse meters. PADPULS4-D has display to show the current readings on-site.

Features

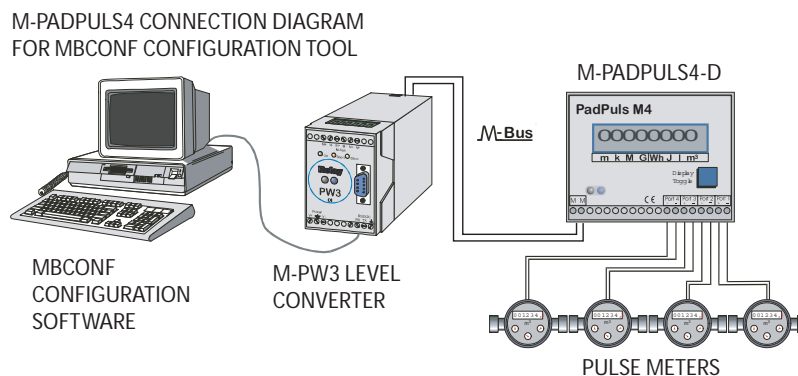
- Connect for 4 Pulse Output Meters to M-Bus
- Powered from the EN1434-3 M-Bus
- Suitable to most pulse meters



Model Type	Model	Description
	M-PADPULS4	M-Bus Pulse Input Module, 4 Pulse Inputs
	M-PADPULS4-D	M-Bus Pulse Input Module, 4 Pulse Inputs with Display
Technical Data	Power Supply	By M-Bus, switches automatically to battery in case of bus failure
	Bus Operation	max. 3mA (2 unit loads)
	Battery Operation	Power Input max 60uA
	Battery Life	Only Battery Operated: 3 years With Optional Battery: 8 years
	Pulse Input Specification (Requirements)	Potential : Floating Resistance: open > 1MΩ, closed < 2kΩ Contact Duration: min 30ms Pulse Intervale: min. 30ms Pulse Frequency: max 14HZ
	M-Bus Protocol	According to EN1434-3 300, 2400 baud (auto-baud detect)
	Operating Temp	0..+55°C
	Protection Class	IP40
	Mounting	DIN-Rail or Wall Mounting
	Display	6 Digit Roller Counter
Mounting	DIN-rail	
Dimensions	W55 x H77 x D110 mm W100 x H77 x D110 mm	

Connection Details

The following picture shows a typical installation, wiring and configuration setup for the M-PADPULS4 modules.



The figure shows the link of four counters with impulse outputs to the PADPULS4. It is recommended to use 2-wire cables (twisted pair) with a max. length of 10m. In any case it must be noted that the total capacity of the cable plus impulse generator attached at any port may not exceed 2nF (optional 12nF with activating "long pulse sampling" option in the configuration).

NOTES:-

- If not all the ports of PADPULS4 are used, you should not attach a cable to the respective unused port. The capacity of an open-circuited cable reduces the lifetime of the battery in stand-alone operation (no M-Bus available).
- If the pulse frequency is over 14 Hz, false countings can occur.
- The PADPULS4 is supplied from M-Bus if it is available. In this normal state the internal battery is then not loaded. Only if the M-Bus fails the battery takes over (NEEDS TO BE ACTIVATED) automatically the supply. There is no loss of data and the counting function is continued. The PADPULS4 draws approximately 2.75mA current (maximum 2 unit loads) from the M-Bus.

Functional Description

The PADPULS4 serves for the adaptation to the M-Bus system of consumption measuring instruments, such as, current, gas or water meters. However, the meters to be adapted must have a floating pulse output. Up to four impulse meters can simultaneous be connected to the inputs of this device.

Optionally the user can activate a tariff function, by which energy or volume pulses are accumulated in separate meter readings for primary and secondary tariffs. In this case a floating signal for tariff switch is used at Port 2 and / or Port 4.

Each port or each tariff of the PADPULS4 can be read on M-Bus using its own primary and secondary address. The PADPULS4 thus acts as four stand-alone M-Bus Slaves! The user configures the pulse collector with the software MBCONF. The accumulated pulses are converted into kWh, m3, J or other physical units. The user interface of MBCONF allows the operator to get an easy access to the configuration. Alternatively the communication and configuration can be done using the optical interface of the pulse adapter. It is also suited for mobile reading with a handheld or laptop and an optical reading head.

When connected to the M-Bus the PADPULS4 is powered from the bus. A built-in battery (needs to be activated by opening the enclosure) ensures that metering continues if the M-Bus is interrupted. The integrated display (LCD) allows an M-Bus independent operation as a remote display.

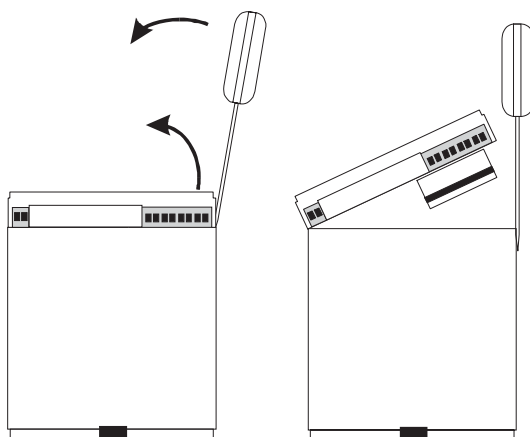
Another feature of the PADPULS4 is the due-date function. Meter data are saved separately at the preset due-date at 00:00 hour (day change to the due-date) by the implemented clock with calendar function. The due-date can be changed without lost of the already stored counters. Additionally the M-Bus Master can initiate an immediate execution of the due-date function by sending of the so-called „Freeze“ command. A „Freeze“ sent to all pulse collectors using the broadcast address 254 is helpful for generating reading profiles of an M-Bus system. Afterwards the master software polls the data of all meters.

The complete configuration data is saved into a non-volatile memory (EEPROM). Additional security is provided by daily saving of meter readings into this EEPROM. In case of M-Bus fail and empty battery the last saved data is restored on power up.

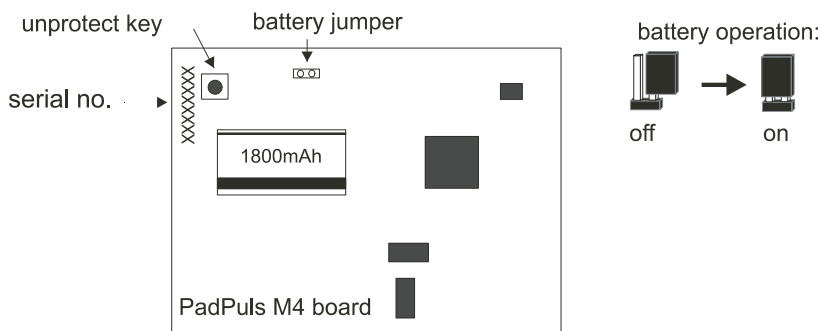
The configuration data can be protected against unauthorized manipulation. The PADPULS4 can therefore be switched to protection mode with a special M-Bus telegram. Subsequent changes to device parameters cannot be made in this operating mode. The protection mode can then only be disabled by opening the sealed housing and pressing the unprotect pushbutton for minimum 4 seconds.

Activating Back-Up Battery

In order to activate the battery the case cover is required to be removed to access the PCB. The case cover can be removed from the lower housing half with the help of a small screwdriver. The screwdriver is placed, as in the drawing, into the small opening at the cover side. After light moving of the screwdriver in the displayed direction the cover can be taken off.



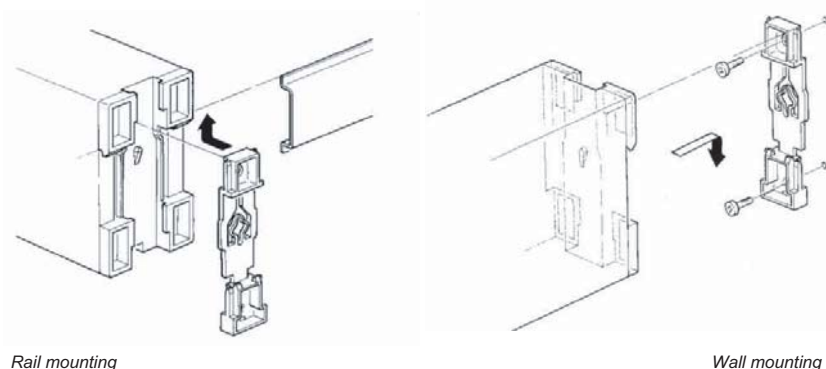
Coming from factory the PADPULS4 unit battery must first be activated. The housing must be opened (see drawing) and the jumper has to be placed on both pins. Then battery operation and data saving is activated on M-Bus failure. You should also remove the transparent protective foil from the front cover. On the back of the PADPULS4 board there are the following control elements:



NOTE: If the device is not used for a longer time, it is advisable to deactivate battery operation by removing the jumper to preserve the battery life.

DIN-Rail or Wall Mounting

On the back of the housing there is a special mechanism for mounting the device on a DIN rail according to DIN EN 50022. This mechanism can be removed, turned over and fixed on the wall with two screws. Afterwards you can mount the device without using a rail. The following figures show the two options:



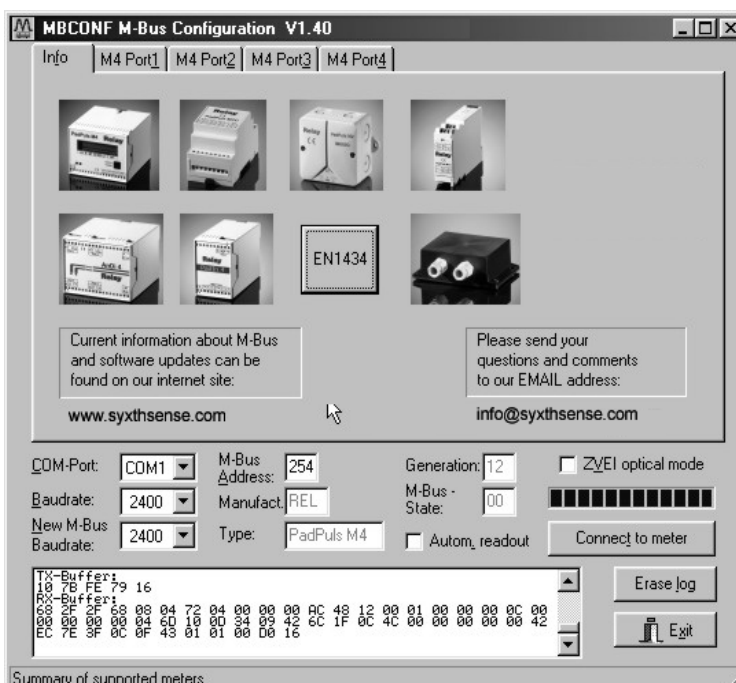
Configuration

The M-PADPULS4 devices must be configured during the installation to match the corresponding meter. For example, if the gas meter single pulse equates 10 liters, then M-PADPULS module is required to be configured with this setting.

To connect the M-PADPULS4 module to M-BUS master (such as HRP22-M or M810 TCP/IP module) M-BUS address is required to be programmed. HRP22-M has four primary M-BUS addresses available 1-4.

The configuration is carried out using MBCONF software that is freely available via www.syxthsense.com web-site. The configuration tool is required to be connected via COM-port to a M-BUS level converter that converts the M-bus telegrams from RS232 to M-bus.

The program is arranged as a sheet system. The sheet "Info" contains general options of the communication with the M-Bus device to be configured. In this sheet the user can select the serial port of the PC, the baudrate of the PC, the baudrate of the M-Bus device and the M-Bus primary address which is used for communication. After a successful connection with the M-Bus device, further manufacturer information is shown in the sheet "Info" and additional device-specific sheets are displayed.



NOTE: M-Bus address is used as broadcasting address to find any M-bus devices on the network.

This sheet shows some photos of M-Bus devices from the product range. The lower third of this sheet is likewise visible in every other tab. On the lower part the following configuration parameters are always available:-

COM-Port

is the serial port of the PC to which the M-Bus level converter is connected. The selected port will be saved in an INI file and will be restored on startup. Therefore the COM-Port has to be configured only once.

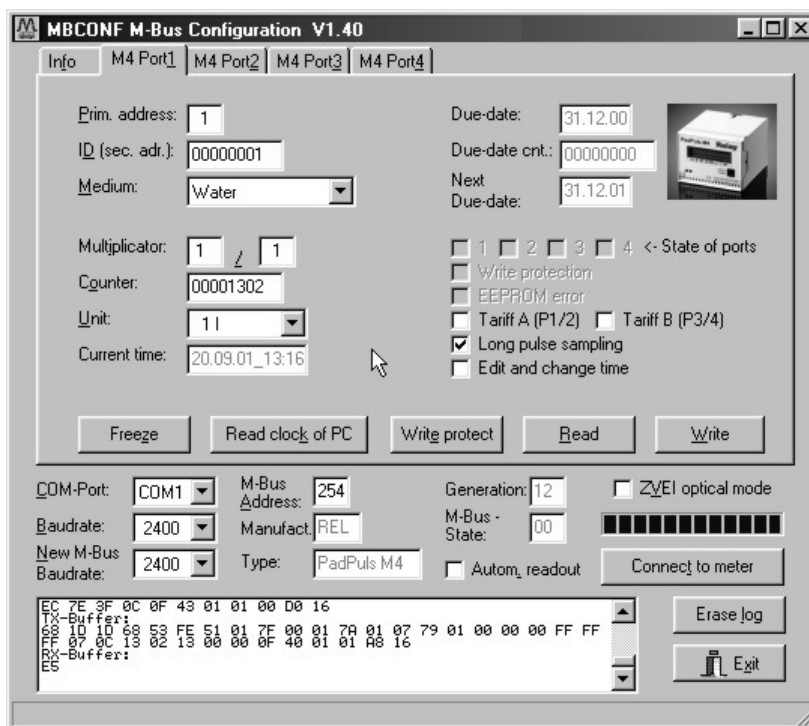
Baudrate

is the transmission speed of the serial port of the PC used for parameterization. Possible selections for this used M-Bus baudrate are 300, 2400 or 9600 baud.

Note: Baudrates of more than 2400 baud are not supported by all M-Bus level converters which are available on the market! The selected baudrate must be identical to the baudrate of the M-Bus device. (see: "New M-Bus Baudrate"). The PADPULS4 supports the baudrates 300 and 2400 Bd.

New M-Bus Baudrate	allows reprogramming the baudrate of the M-Bus device. The new baudrate is sent to the M-Bus device after a change in the appropriate selection box. If the M-Bus slave accepts this command, it acknowledges the telegram with the single character „\$E5“ (\$ for hexadecimal notation) using the old baudrate. Afterwards the device switches to the new baudrate. This button is not needed for the PADPULS4, since it automatically detects the baudrate used by the master.
M-Bus Address	is the primary address of the connected M-Bus slave. In a direct connection with only one slave you can use the broadcast address 254. Using this address every M-Bus device must answer regardless of its own address.
Connect to meter	is used to request data from the slave. The type of device is then automatically recognized. The items “Manufact.,” “Generation,” “Type” and “M-Bus State” will then be refreshed. New sheets are generated depending on manufacturer and type of the M-Bus device. A single sheet for each channel appears in case of PadPuls M4. The sheets are labelled “M4 Port1” for the first ... “M4 Port4” for the fourth channel.
Manufact.	is an item that shows the 3-letter manufacturer code after successful reading (“Connect to meter”). The item is read only.
Generation	shows the software revision of the firmware of the connected M-Bus device. The item is read only.
Type	shows the type (here: PADPULS4) of the connected device. This item is read only.
M-Bus State	shows the M-Bus state of the connected device. This item is read only.
ZVEI optical mode	If this option is activated, devices with an optical interface and protocol according to EN 1434-3 can be read and programmed using an optical reading head (e.g. PADPULS4).
Autom. readout	The software always reads the data after writing, if this option is activated (useful for checking the correct programming).
Log-Window	The so-called log window is always visible. All M-Bus communication steps are logged in this window. Data is displayed in hexadecimal notation. It is possible to mark outputs in the log window and copy them with the keys “CTL-C” to the windows clipboard. Then the data can be easily imported to any text editor for documentation. As soon as the max. storage capacity of the window is achieved, no more data is logged. If you want to log further, you must delete the logged data.
Erase log	clears all outputs inside the log window.
Exit	terminates the program and stores the current setting of serial port (port no.) into the INI file.

The following picture shows the current settings and values of the respectively pulse channel (port) of the PADPULSE 4 (in this example: Port 1). The following input boxes and buttons are used to change the params of the pulse adapter:



- Primary address** is the M-Bus address of the selected port. Values between 1 and 250 can be entered in this field for new assignment of the address. After pressing the “Write” button the software programs this primary address and further variable settings on this sheet into the M-Bus device.
- ID (sec. adr.)** is the 8 digit M-Bus ID (identification no.), which is also used for secondary addressing of this port.
- Medium** describes the measured medium of the connected meter. Examples: Oil, Water, Heat, Electricity
- Multiplicator** is the pulse increment (multiplier) of the connected meter. For each registered pulse the device adds “multiplier” to the counter. The numerator can take values between 0 (no counting) and 99, the denominator between 1 and 256.
- Unit** is the physical unit of the counter and of the pulse increment. All proper units including variants with power of ten from the DIN EN 1434-3 are offered in the selection list.
- Counter** is the accumulated counter. It has to be related to the unit mentioned above. The counter can be programmed equal to the counter of the connected meter in a range of 0 to 99999999.
- Current time** is the current date and time-of-day of the internal clock in the format DD.MM.YY_hh.mm. This field can be only edited and modified in the PadPuls, if the switch “Edit and change time” is activated. The button “Read clock of PC” transfers once the current date and time of the PC into this window. The time-of-day and the date always apply to all ports of PADPULS4.
- Due-date** is the last due-date (date of the last storage of the due-date counter) in the format DD.MM.YY. This field is read only.
- Due-date cnt.** is the counter which was saved at the due-date. This field is read only.
- Next Due-date** is the next (future) due-date (date of the next storage of the counter) in the format DD.MM.YY. The counter will be saved at 00:00, e.g. with due-date 01.01 at change from 31th of December 23:59 to 1st of January 00:00. This field can be edited and programmed only, if the switch “Edit and change time” is marked. The due-date always applies to all ports of PADPULS4.

State of ports	shows the current input state of all ports (a closed contact is marked). This item is read only.
Write protection	is marked, if the device is protected against programming. Then you cannot configure the adapter. The protection can be removed after opening the sealable housing and pressing the "Unprotect" pushbutton for a minimum of 4 seconds.
EEPROM error	is marked, if there was an error while reading the non-volatile memory. In this case you must reconfigure the device.
Tariff A (P1/2)	is used for activation tariff mode on port 1 and 2. The tariff mode will be selected after pressing the "Write" button, if the check box is marked. Port 1 is then used as pulse input and port 2 is the tariff switch. With an open tariff switch the pulses are accumulated to the counter for port 1 (main tariff). With a closed tariff contact the pulses increment the counter for port 2 (special tariff).
Tariff B (P3/4)	is used for activation tariff mode on port 3 and 4. The tariff mode will be selected after pressing then "Write" button, If the check box is marked. Port 3 is then used as pulse input and port 4 is the tariff switch. With an open tariff switch the pulses are accumulated to the counter for port 3 (main tariff). With a closed tariff contact the pulses increment the counter for port 4 (special tariff).
Long pulse sampling	activates a longer charging of the contacts before sampling the inputs. This allows higher capacitors and / or many pulse generators with So interface (photocoupler with capacitors) to be connected. On delivery the extended pulse sampling is activated. The lifetime of battery is increased for about 15% if this feature is not used.
Edit and change time	activation of this check box allows editing and programming of the "Current time" and "Next due-date". The checkbox is deactivated automatically after successful configuration with "Write".
Freeze	transmits a command to the PADPULS4 telling it to freeze the counters. The PADPULS4 then copies the current counter to the "Due-date counter" and the current date to the (last) "Due-date". The storage is done for all ports simultaneously. This the same behaviour as at due-date. The freeze command can be used with the broadcast address 255 to order all PadPuls to save the current counters. Then the M-Bus master has enough time to read all meters and get values of the same time (reading profiles).
Read clock of PC	once gets the current date and time from the clock of the PC and transfers it into the item "Current time".
Write protect	Transmits a command to the PADPULS4 to activate write protect. The PADPULS4 then allows no further configuration. It is protected against unnoticed manipulation.
Read	reads the M-Bus device and refreshes the data on the selected sheet.
Write	sends the current options to the pulse converter, which saves this data into the non-volatile memory. The PadPuls M4 changes the options only if the write protect is deactivated. It is recommended to read the data after writing and check it.

Notes:

- The variables „Current time“, „Next due-date“, „Write protection“, „Long pulse sampling“ and the command „Freeze“ always apply to all ports. Therefore you need to edit these items only in one sheet. The write protect should be activated after successful configuration of all ports.
- Please press first the button „Connect to meter“ after connecting a new M-Bus device. Afterwards all sheets are refreshed.
- Examples for configuration of pulse increment and unit:
 - Water meter with counter = 45120 l and 1 Pulse = 10 l:
 - Choice 1: Unit = 10 l, Multiplicator = 1 / 1, Counter = 4512 (x 10 l)
 - Choice 2: Unit = 1 l, Multiplicator = 10 / 1, Counter = 45120 (x 1 l)
 - Electricity meter with counter = 78346 kWh and 64 pulses / kWh:
 - Choice: Unit = 1kWh, Multiplicator = 1 / 64, Counter = 78346 (x 1kWh)
 - Electricity meter with counter = 112,345 kWh and 1000 pulses / kWh:
 - Choice: Unit = 1Wh, Multiplicator = 1 / 1, Counter = 1123454 (x 0,001Wh)
- With activated tariff option the pulses are evaluated with the adjustments of the respective port. Therefore you should take care that both ports have the same pulse increment and unit.

