

PADPULS2 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.

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.

PADPULS2 can connect up to 2 pulse meters.

- Due-date function



Features

- Connect for 2 Pulse Output Meters to M-Bus
- Powered from the EN1434-3 M-Bus
- Suitable to most pulse meters
- Input for tariff switch signal
- Fully operable in case of M-Bus failure

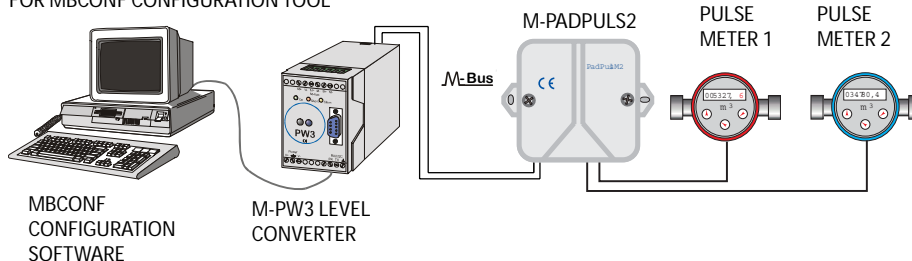
Model Type	Model	Description
	M-PADPULS2	M-Bus Pulse Input Module, 2 Pulse Inputs
Technical Data	Power Supply	By M-Bus, switches automatically to battery in case of bus failure
	Bus Operation	max. 1.5mA (1 unit loads)
	Battery Operation	Current Taking max 50uA
	Battery Expectancy	10 years at max. 18 failure days p.a. (changeable coin-type battery)
	Pulse Input Specification	2 Pulse Inputs, Individually Configurable Potential : Floating Resistance: open > 1MΩ, closed < 2kΩ Contact Pulse Duration: min 30ms Pause Between Pulses: min 30ms Pulse Frequency: max 14Hz
	M-Bus Protocol	According to EN1434-3 300, 2400 baud (auto-baud detect)
	Supported M-Bus Functions	SND_NKE, REQ_UD2, SND_UD, ignores FCB-Bit (according to EN1434-3)
	M-Bus Telegram Data Structure	variable structure, Low-Byte-First (CI: 72h) length = 53 Bytes 1. data record: counter 2. data record: date and time 3. data record: last due-date 4. data record: last due-date counter 5. data record: next due-date 6. data record: manufacturer specific data
	Operating Temp	0..+55°C
	Storage Temp	-20..+70°C
Humidity	10..70% rH (non-condensing)	
Protection Class	IP40	

Mounting	Wall Mounting
Dimensions	W80 x H80 x D52 mm

Connection Details

The following picture shows a typical installation, wiring and configuration setup for the M-PADPULS2 modules.

M-PADPULS2 CONNECTION DIAGRAM
FOR MBCONF CONFIGURATION TOOL



The figure shows the link of two counters with impulse outputs to the PADPULS2. 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 PADPULS2 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 PADPULS2 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 PADPULS2 draws approximately 1.5mA current (maximum 1 unit load) from the M-Bus.

Functional Description

The PADPULS2 serves for the adaptation to the M-Bus system of consumption measuring instruments, such as, electricity, gas or water meters. However, the meters to be connected must have a floating pulse output. Up to two 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. Each port or each tariff of the PADPULS2 can be read on M-Bus using its own primary and secondary address.

The PADPULS2 thus acts as two 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. When connected to the M-Bus the PadPuls M2 is powered from the bus. A built-in battery ensures that metering continues if the M-Bus is interrupted. Two battery options are available. The version with the higher capacity allows M-Bus independent metering for several years.

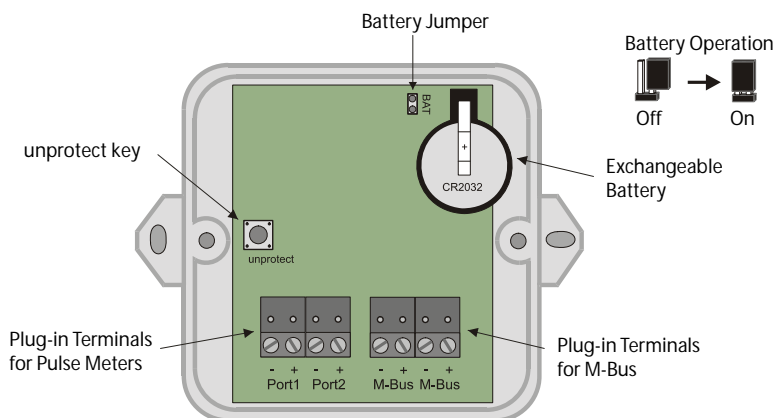
Another feature of the PADPULS2 is the due-date function. Meter data are saved separately at the preset due-date at 00:00 hour (day change to the due-date) by the implemented clock with calendar function. The due-date can be changed without lost of the already stored counters.

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 PADPULS2 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

Coming from factory the PADPULS2 must first be activated. The cover of the housing is to be removed. On the circuit board there is a 2pin row marked with "BAT". Here the jumper must be put on both pins to allow battery operation and security function in case of M-Bus failure.



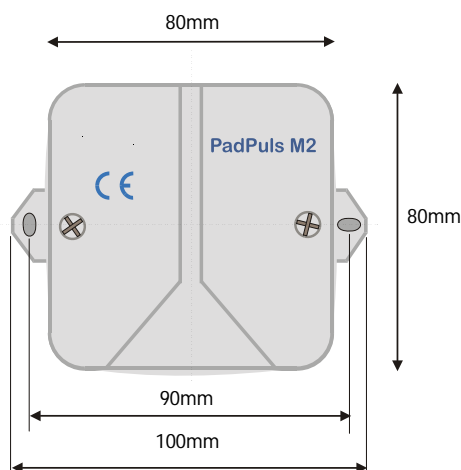
NOTE: If the device is not used for a longer time, it is advisable to deactivate battery operation by removing the jumper to preserve the battery life.

NOTE: If the battery should be empty, it can be exchanged.

The PADPULS2 is supplied from M-Bus if it is available. In this normal state the internal battery is then not loaded. Only when the M-Bus fails the battery takes over automatically the supply. There is no loss of data and the counting function is continued. The PADPULS2 draws approximately 1.5mA current (one unit load) from the M-Bus.

Mounting Enclosure

The bottom part of case is first attached to the wall with the terminals arranged downward. Please use 2 screws mounted through the outside drillings at the case. The cable for pulse generator and M-Bus interface are led through the self sealing cable glands in the housing. You should break the cable glands with a small screw driver if you use flexible cables. To ensure a high protective class of up to IP65 the hole must be much smaller than the outer diameter of the cable. If you lift the terminal connectors and feed the cables far enough through the glands, you can connect the wires comfortably outside of the housing. Afterwards please withdraw the cables again and put the terminals on the appropriate pin rows on the circuit board. The strain relief is given by looping the enclosed cable straps around the cable. If you have completed all assembly and configuration work, you should protect the device against manipulation with one sticking on each screw on the cover of the case.



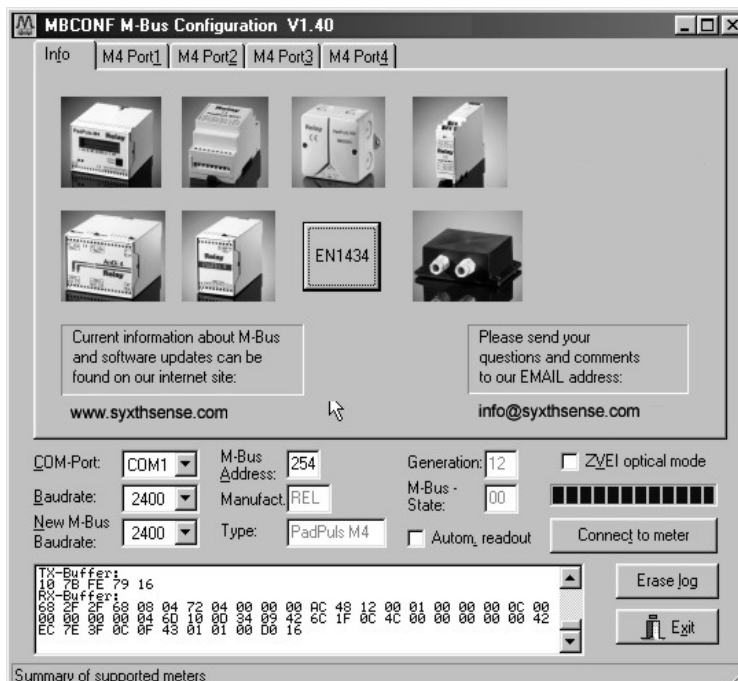
Configuration

The M-PADPULS2 devices must be configured during the installation to match the corresponding meter. For example, if the gas meter single pulse equates 10 liters, then PADPULS2 module is required to be configured with this setting.

To connect the M-PADPULS2 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.

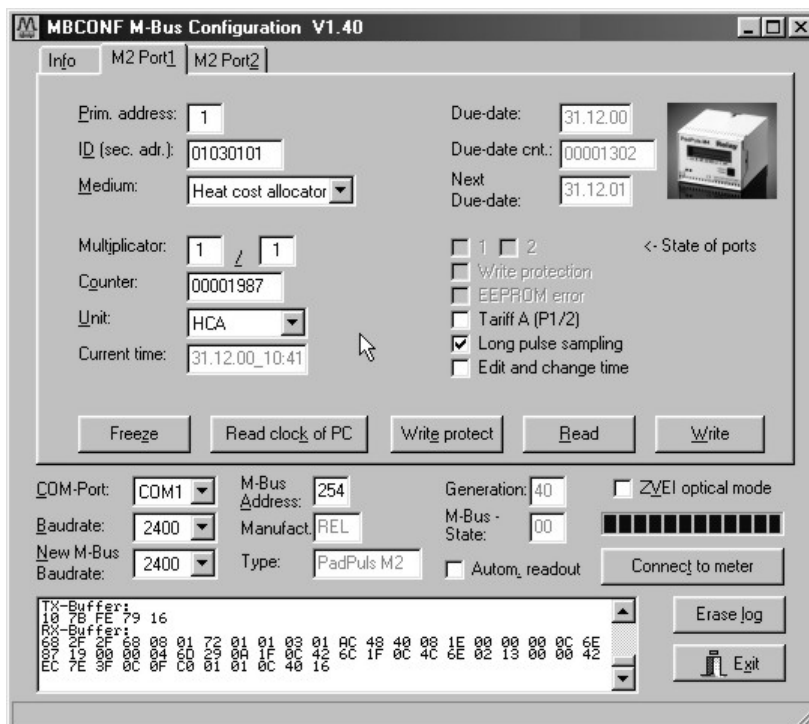
Note: Baudrates of more than 2400 baud are not supported by all M-Bus level converters which are available on the market! The selected baudrate must be identical to the baudrate of the M-Bus device. (see: "New M-Bus Baudrate"). The PADPULS2 supports the baudrates 300 and 2400 Bd.

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 PADPULS2, 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 M2. The sheets are labelled "M2 Port1" and "M2 Port2" for the second 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: PADPULS2) 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. PADPULS2).
- 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 2 (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 (multiplicator) of the connected meter. For each registered pulse the device adds "multiplicator" 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).
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 PADULS4 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, Multiplier = 1 / 1, Counter = 4512 (x 10 l)
 - Choice 2: Unit = 1 l, Multiplier = 10 / 1, Counter = 45120 (x 1 l)
 - Electricity meter with counter = 78346 kWh and 64 pulses / kWh:
 - Choice: Unit = 1kWh, Multiplier = 1 / 64, Counter = 78346 (x 1kWh)
 - Electricity meter with counter = 112,345 kWh and 1000 pulses / kWh:
 - Choice: Unit = 1Wh, Multiplier = 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.

Troubleshooting

Error	Possible Reason For Error
No function in battery mode	- Battery jumper is not placed - Battery is empty (voltage min. 2.9V)
No function after installation, although the battery jumper is placed and the M-Bus is connected	- After placing the jumper a reset is generated using an R/C combination. It is possible that the reset was not correct. Please lift the jumper, wait about 10 seconds and place it again.
Pulses are not counted or wrong	- Check connection of the pulse meter - Activate the „extended pulse sampling“ if your system has: <ul style="list-style-type: none"> a) long cables (> 10m) b) high capacitors c) electronic S0 interface - Check configuration (especially pulse increment and tariff mode)

