+ M-BUS -

- TS +

**M-Count
2-C**

M-BUS
Data-
Logger

S01   S0+   S02

L   ACT   N

# M-Count 2C

## TWO CHANNELS DATA LOGGER
## FOR DIN-RAIL MOUNTING
with changes valid to: 28.8.2010

## ASSEMBLY AND CONFIGURATION

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## CONTENT:

## GENERAL  DESCRIPTION:

M-Bus Logger (pulse logger) is a two channels pulse logger designed for mounting on DIN rail.

Read pulses of the two pulse inputs can be freely parameterized.
Pulses can be evaluated and the values assigned to the unit.

Inputs can be fully parameterized using included the Windows software. It can be read both an immediate value consumption measured by meters and the amount of power within a specified time period.

Value of consumption within the specified period shall be transferred to a PC with a separate timer tact. After saving the values of consumption within the specified period in the memory register further reading within the specified period will automatically move on the next available preset period. This is especially convenient for consumption, to be read out automatically every month.

The readout pulsed bus protocol corresponds to M-Bus according to EN 1434-3 standard.

## INPUTS:

Through the ACT input and through the inputs with tariff switching can memorize the high (HT) and low (LT) tariffs in different memory registers. This functionality is completely set by the configuration software.

With built-in lithium battery the pulse inputs remain active even after an M-Bus failure for approx. 200 days. Ie. consumption values measured by meters will also be registered at the M-Bus failure.
The meter readings are stored in internal flash memory and will remain in it for several decades, even during power failure or lithium batteries failure received the device.

Built-in lithium battery can be replaced with a new one without disconnecting and removing the module from the cabinet. To replace the battery remove the lid of device (see in further). Subsequently, using tweezers with insulated spikes, the old battery is removed from the brackets and replaced by new one, which is inserted into the same brackets.

As the battery is only needed in case of an M-Bus failure, the battery is running in systems on about 10 years upon condition of frequent breakdowns M-Bus failure.

The device works perfectly well with an empty battery or without battery.

The required battery type is CR2032.

## CONNECTIONS:

ACT : Switching high (HT) and low (LT) tariff using the control voltage 230 V/AC
G1 : Phase (L1) for the ACT
G2 : Neutral for ACT

TS- : Switching tariffs with relay contact
TS+ : Switching tariffs with relay contact

S01 : Pulses input for channel 1 (+) (meter PIN20)
S02 : Pulses input pulses for channel 2 (+) (meter PIN20)
S0- : Common input (-) for S1 and S2 (meter PIN21)

M-Bus (+)    M-Bus connection
M-Bus (-)    M-Bus connection



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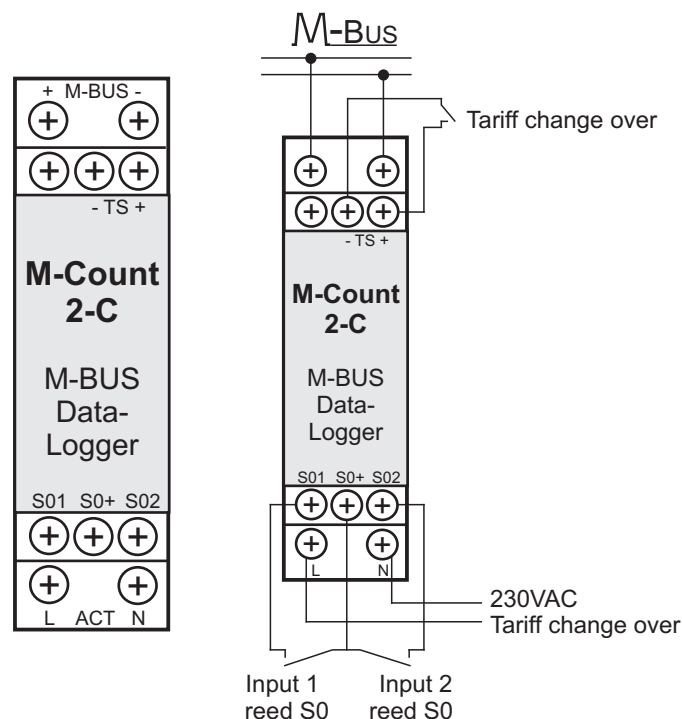
## TECHNICAL DATA:

| | |
|---|---|
| Case | Cover designed to the size of the TE module for DIN rail mounting |
| Dimensions | Width = 17,5 mm (1 modulo on DIN rail = 1-TE)<br>Height = 82 mm<br>Depth = 63 mm |
| Power supply | max. 1,5 mA through the M-Bus network (comply to standards for M-Bus network)<br>50µA during time of battery operation |
| Battery | Type: Lithium CR2032<br>Secure full functionality of pulse inputs as well as during power failure of M-Bus network. Operation life during total M-Bus network failure > 200 days |
| Storing data in memory | Technology Flash |
| Interface | Passive of type M-Bus according to DIN EN 1434-3 standard |
| Transmission speed | 2400 bauds (basic) 9600 8E1 |
| Software | According to IEC 60870-5 standard with primary and secondary addresses |
| Pulse outputs | Number of inputs 2<br>Types: potential free and type S0, voltage on contacts 2,6 - 3,6 V<br>Current on contacts approx. 34µA<br>Pulse frequency max. 60 Hz<br>Length of pulses - at least 15 ms<br>Pause between 2 pulses - at least 15 ms |
| Interface for inputs of meters | |
| Real time clocks | Accuracy 10ppm at 25°C (approx. 30 seconds/monthly) |
| Tariffs switching | 230 VAC via ACT contacts - Input for switching tariffs or through a switching contact, potential free terminals for TS PIN (+) (-) |
| Temperature range | -15 up to +65° C |
| Interface for meters | Free programmable from 1 up to 32767 |

**With right of technical changes !**

## COMMISSIONING:

For the commissioning of the device first must be removed the front cover, see picture No.: 1



Picture No. 1
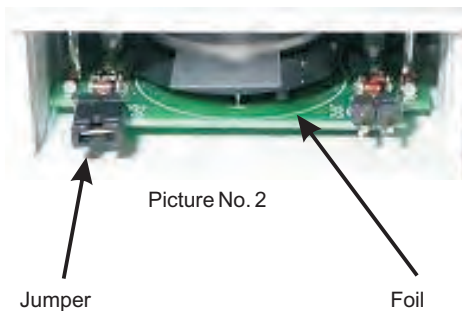


Picture No. 2

Jumper          Foil

Then remove the plastic insulating foil between a lithium battery and conductive coupling to the printed circuit board, see picture No.: 2

Now the device can be connected to the M-bus network. With the help of a M-Bus repeater (for example repeater type M-Rep6) the M-Count 2C can be configured and read out via a PC.

Configuration (setup-up) and read out software is burned on the enclosed CD to the module.

Operating System Requirements PC: Windows XP, Windows 2000, PC serial interface.

All other instructions to the configuration of the device and channel assignments, click the "User's Guide for configuration software for the M-Bus interface, which is also available on CD in the "DOC" format (translation attached to the device).

## GENERAL INFORMATION ABOUT M-BUS:

M-Bus is a communication system for the read-out, registration, evaluation, data collection, optimization and control of energy measurement and data processing. Through this modular system it is possible to build links between different energy meter and the computer-controlled terminal devices and equipment. Very high resistance to noise immunity system ensures safe acquisition and trouble-free transfer and registration data from the meters. Complex systems can be grouped and transferred to large distance using a PC interface with modems.

M-Bus system is mainly used in industry, the management and operation of buildings, exhibitions and fairs, shopping centres, science centres, technology park, etc.

## M-BUS STRUCTURES:

M-bus system consists of user- configured specifically of the system components as well as various repeaters that are combined in one or more segments of a simple two-wire line.

The following structures of an M-bus segment
* Linear structure
* Tree
* Star structure

Each bus segment M-bus system is terminated with a repeater and connected up to 250 end devices.

The maximum number of end devices connected to the bus depend on the performance of the repeater.

Is it possible to offer a repeater for connection of 10, 70, 120 or 250 end devices.

The control centre of an M-Bus network is always the M-Bus Master. This is usually defined by a standard PC with a modem or a serial interface (RS232) to the M-Bus Repeater.



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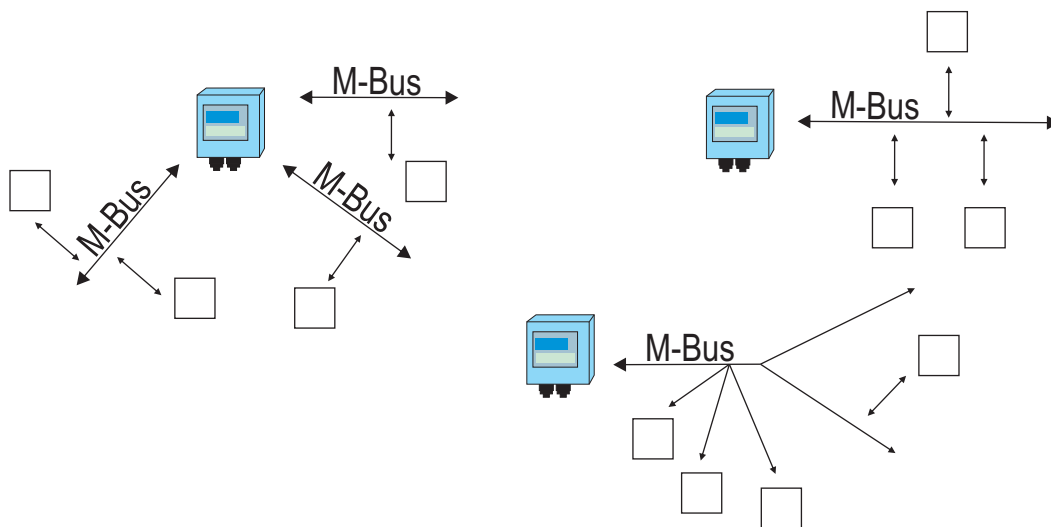
## COMMUNICATION:

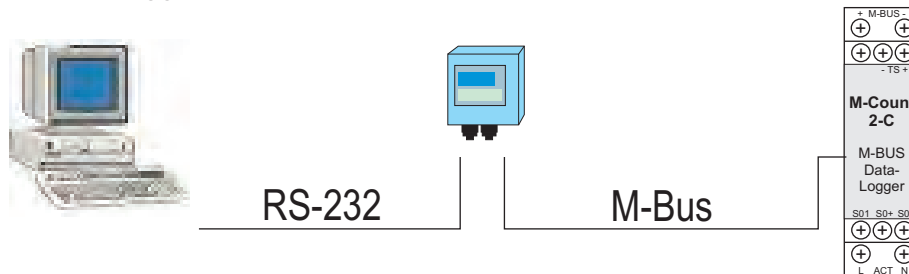Data transmission is serial in the cascading structure of the main (master) and subordinate (slave) units. As a link between the PC and the M-Bus-Logger can be used a M-Bus Master or Mini Master with a RS232 interface:



RS-232                M-Bus

A standard telephone wire (for example JYSTY N * 2 * 0.8 mm or better) can be used for data transmission in the M-bus system.

# CONFIGURATION  AND  MODULE  SETTINGS

## 1. INSTALLATION  OF  THE  M-BUS  CONFIGURATOR:

First insert the included CD into the CD-ROM drive in your PC and run the **Setup.exe** file located in the root directory on the CD.

Follow the instructions that will be displayed on the screen. Installing software may take several minutes.
Upon successful completion of software installation, click on the desktop PC (desktop) on the icon for the M-bus configurator.

## 2. RUNNING M-BUS CONFIGURATOR:

The program is started by double clicking the mouse button on the icon of the M-bus configurator..

You see the following menu:
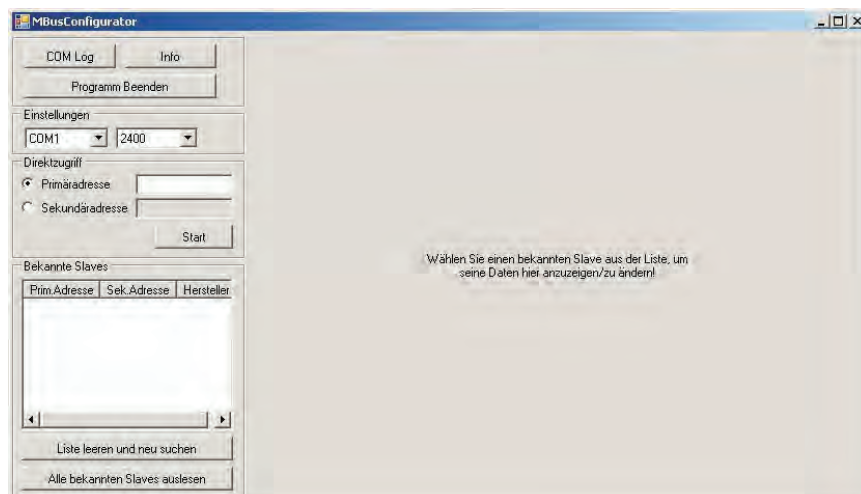


To configure the M-Bus module set upon condition that the M-Bus module is connected via a serial or parallel-port USB to your computer.
In the upper left menu, click box labeled "Einstellungen" (Settings). Here, you must first set up the communication interface (serial port) on your computer with the M-Bus level converter to communicate. Baud rate should always be set at 2400 baud.

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The program offers two options for setting the network addresses of the connected M-Bus converter. Either direct access through primary and secondary addresses field M-Bus module or via an automatic search for addresses.
**Important notice !** The automatic search does not work with all commercially available level converters!
If your M-Bus module supports automatic address search, then you must again click on the button "leeren Liste und neu suchen" ("Clear List" and then click "New Search"). After some time, the program offers you a list of all M-Bus modules, which are located in the M-Bus network.
If your module does not support automatic search, you must first select whether you want to reach the M-Bus module via the primary or secondary address. Then enter the address in the text box and start the search by clicking "Start" button below the text field of primary and secondary address of the M-Bus module. The number of the secondary address of the module M-Count 2C can be found below the front cover or, where appropriate, on its bottom part. The primary address is set by the supplier at the address "0".

Once the M-Bus module is found, the following screen will appear:
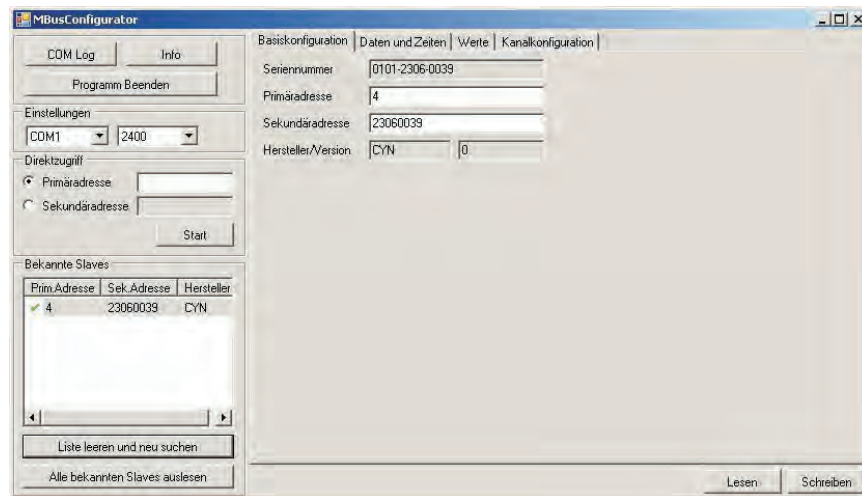


All known slaves (modules M-Bus) are displayed in the list.
If you want now to edit the M-Bus module then (in the field "Bekannte Slaves"), click on the appropriate line on the list of selected M-Bus module. On the right side of the mask set parameterization of the selected M-Bus module.

# 3. BASIC CONFIGURATION:

In the basic configuration (see above) the addresses of the M-Bus modules and serial numbers are displayed.
If you want to change the primary or secondary address of the M-Bus module, click on the relevant input box "Eingabefeld" (entry data field) and type in the box number new address of the M-Bus module. Permissible numbers of primary addresses are from 1 to 250. Secondary address is the eight digits number in the range from 00000000 to 99999999 and is set as standard according to serial number of the M-Bus module. After entering the new address numbers, you must also enter this number into the M-Bus network. Therefore, click on the "Schreiben" (write) button, which is located in the grille at the bottom right corner.

Click on the button "Lesen" (read), which is located in the right lower corner and check whether the write operation is completed without errors.. Only after "Read" operation any changes to be saved and recorded in the mask.

# 4. DATES AND TIMES:

With this option „Daten und Zeiten" (date and time), which is on the tab at the top right side of the mask, to select the real time set for M-Bus modules, parameterized record date („Stichtagsautomatik") and reviewed the operation time of modules.
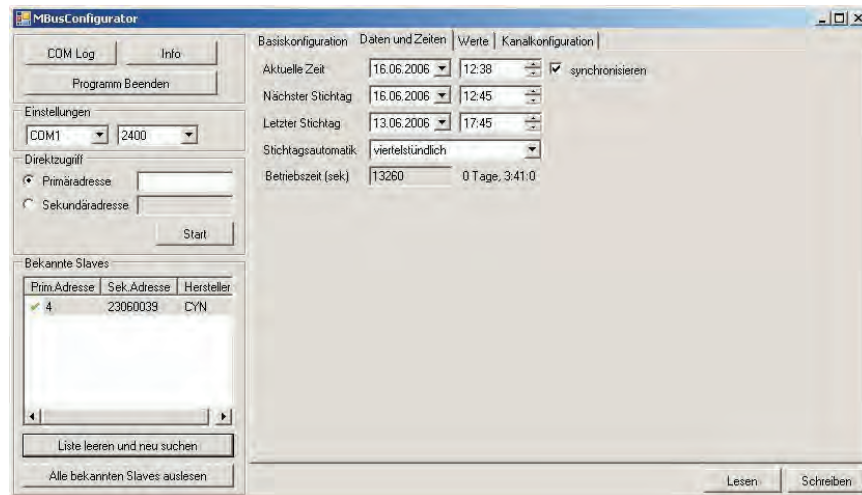


The current time can be set manually or automatically - according to your choice.
Through the first data field in the list, you can access the calendar and set the current calendar date.
In the right data field, data field next to the calendar, the valid time is to be set.
If you click on the box „synchronisieren" (synchronization), then the date and time on your computer will be transferred to M-Bus modules involved in the M-Bus network.
Any change is written be clicking on the button „Schreiben" (store), which is located in the grille at the bottom right corner.

Each M-bus module has its own qualifying date and time („Stichtagsautomatik"), which means that the M-Bus module automatically saves to a defined time period its value into memory („History-Register").
This value can be triggered and displayed, for example, monthly for accounting (billing) of electricity consumption.

Determining date and time („Stichtagsautomatik") may be defined in multiple time periods according to the offer in its drop-down menu:
- Quarter (viertelstündlich)
- Hour (stündlich)
- Day (Tagle)
- Week (wöchentlich)
- Month (monatlich)
- Year (jährlich)

The following example shows the event mask set monthly determining period for the repeating of the determining time and date („Stichtagsautomatik"):



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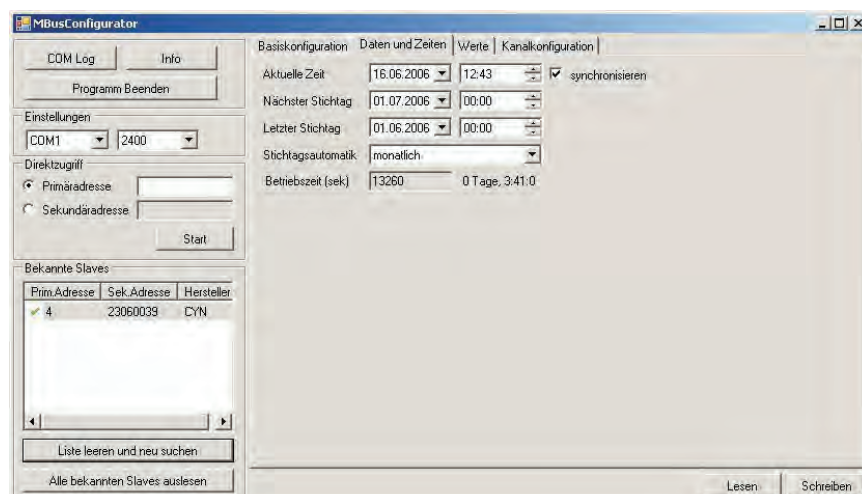
Current date is set to June 16, 2006 in this example.

To save the monthly value of M-Bus module, for instance, the data field „nächste Stichtag" (next determining time) is set July 1, 2010 date and time of 0:00. In addition is necessary to set the value („Stichtagsautomatik") on a monthly period.

After finalising of the above adjustment it is necessary to save the changes and to write modules using the „Schreiben" (store), which is located in the grille at the bottom right corner and se the data are transferred to M-Bus modules.

Reaches the time and date of July 1, 2010 0:00pm, then at this date and time will be imposed on the value of the M-Bus module state to the historic register.

Settings and recall the historic register is done by menu sheet „Kanalkonfiguration", which is above the right side of the mask.

Now automatically presets (increase by one month) the determining date of the next day for registration and data storage. In the data field „letzter Stichtag" (the last determining date) the information display the date and time of last entry and data storage.

Since the value of additional determining day was to be overwritten your system is able to remove and store data for another month.

# 5. VALUES:

In this menu item, using the menu sheet "Wert" (value), which is located above on the right side of the mask, are displayed the read-out and stored data (values) in the registry as either current or in their historical course. In addition, in this menu the channel units are to be set.
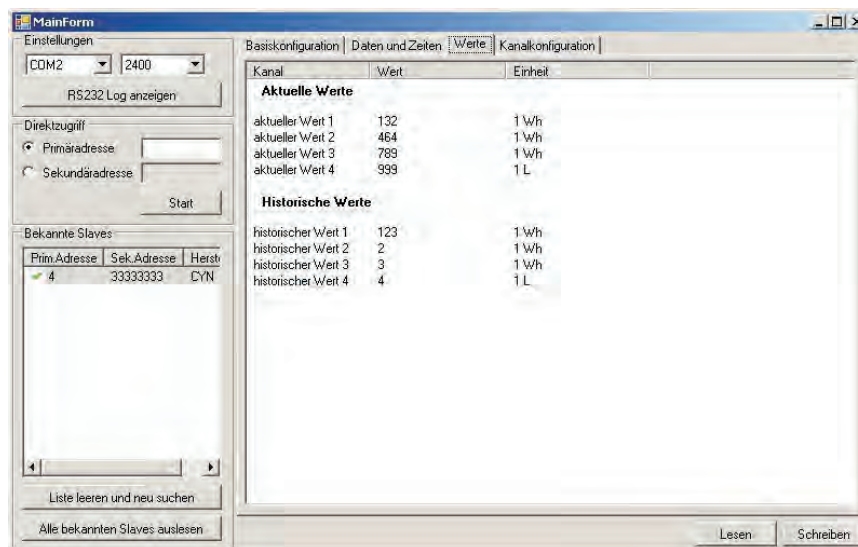


The unit ("Einheit") of the memory register can be changed by double clicking on the column field, "Einheit" for each of the data values 1-4 ("Wert 1 ... Wert 4").

After double-clicking the mouse displays the following menu for the units that may be involved in the M-bus system.



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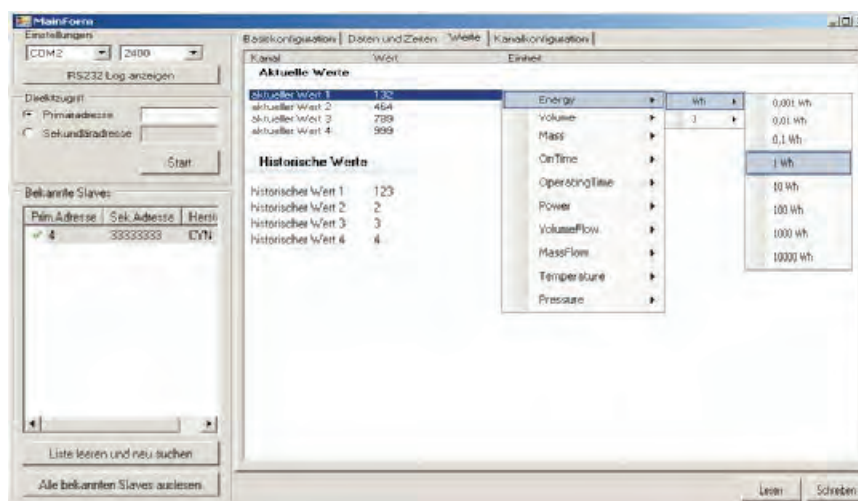
By double clicking the mouse on a column entry "Wert (value) you can allocate the size of the data in the registry values. This is needed, for example using mechanical meters (i.e. type feraris meters), which is necessary to set the starting state of the register of current values for M-Bus data logger.

# 6. CHANNEL CONFIGURATION:

With the help of this menu the both functions for the input channels and channel-switching rates can be assigned to the functions needed for a subsequent operation for pulse counting. Since the M-Bus devices to register the data is freely programmable logger to provide a significant number of applications.
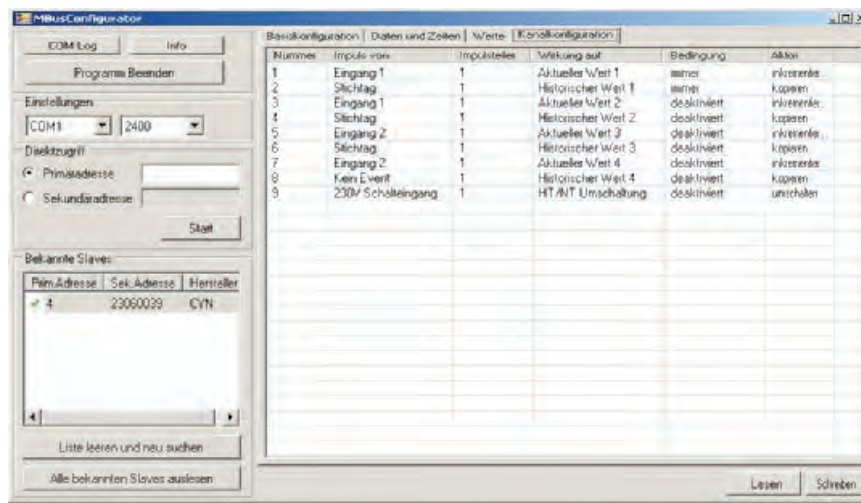In the picture below you can see one example of the application.
Different settings will be explained in the following clarification:



# 6.1. PULSE FROM ("PULSE VON"):



- **No event** ("Kein Event") : this case will be implemented if there is no action at this row
- **Input 1** ("Eingang 1") : pulses at pulse input 1 of the M-Bus logger will be further processed in this setting raw
- **Input 2** ("Eingang 2") : pulses at pulse input 2 of the M-Bus logger will be further processed in this setting raw

- **Secondary clock** ("Sekundentakt") : secondary microprocessor clock is further processed, for example, to trigger the internal system clock
- **Determining day** ("Stichtag") : every time, when a determining day is achieved in which the defined action carries out
- **230 V Switching input** ("230V Schalteingang") : whenever a signal at the switching input 230 or the TS - input is applied, the record is performed.

## 6.2. PULSE DIVIDER ("IMPULSTEILER"):

Pulse divider adjusts the pulse input channel for the pulse value from the meters.
For example: if the KWh meter has 2000 pulses / 1 kWh, it must be in the box of „Impulsteiler" (pulse divider) columns the value 2000. **Warning !** In the „Wert" (variable) column must be a variable unit also in kWh.
In negative case the M-bus protocol does not offer value in kWh, but only in Wh, and therefore there is need to set the value to 1000 Wh.
If the memory register is set to Wh, then it must be written divider No. 2 in the registry for entry of 2000 pulses / kWh. This means that the register is then set at 2 impulses / Wh. This setting gives quite identical values to the measured values.

## 6.3. EFFECT ON („WIRKUNG AUF"):

In this column you can enter information, what effect the settings of this line.
Whether the data are stored in the current or historical memory, etc.

The following settings are possible:



-   **Actual**                                          : setting of this line will be stored in memories 1-4 for data values
    („Aktuell")                                           („Wert 1 … Wert 4")
-   **History**                                          : setting this line will be stored in memories 1-4 for historical values
    („Historisch")                                       („Wert 1 … Wert 4")

-   **Times**
    („Zeiten")



  -   **Current time**                       : setting of this line will is written to the registry for the current time
      („Aktuelle Zeit")

  -   **Determined date**                    : setting of this line will is written to the registry
      („Stichtagsdatum")                        for the determined time

  -   **Next determined date**               : setting of this line will is written to the registry
      („Nächster Stichtag")                     for the next determined time

  -   **Operating seconds**                  : setting of this line will is written to the registry
      („Betriebssekunden")                      for the operating seconds

-   **Switching tariffs**                          : the settings of this line cause high (HT) and low (NT) tariffs changeover
    („HT/NT Umschaltung")

-   **Determined time period**                : setting of this line affects the time periods change
    („Stichtagsinterval „)

## 6.4. STATUS ("BEDINGUNG"):

This menu sets when the condition for the function of this configuration line is executed.

| deaktiviert |
| --- |
| immer |
| HT Modus |
| NT Modus |

- **deactivation** : The functions of this line are disabled (deactivated)
  („deaktiviert")
- **always** : condition is "**always**" true and is therefore carried out continuously
  („immer")

- **HT mode (high tariff)** : function of this mode will be made only
  („HT-Modus") if **switching rates ("HT") is on (active)**

- **NT mode (low tariff)** : function of this mode will be made only
  („NT-Modus") if **switching rates ("NT") is on (active)**


## 6.5. ACTIVITY ("AKTION"):

This menu sets, what activities will be carried out in this line during the record to the memory register („Wirkung auf").

| inkrementieren |
| --- |
| dekrementieren |
| löschen |
| kopieren |
| umschalten |

- **increment** : the value in this register will always be increased by one unit when the input
  („inkrementieren") from („Impuls von") is firmly set to pulse output

- **decrement** : value in this register will always be reduced by one when the input from
  („dekrementieren") („Impuls von") is firmly set to pulse output

- **delete** : value in this register will always be deleted when the input from ("Impuls von")
  („löschen") will be firmly set by a combination of set pulses

- **copy** : value in this register will be copied when the input from ("Impuls von") is firmly
  („kopieren") set to pulse output. This function will be used, for example, when data (values)
  are copied to the achievement of the applicable data from the current registry
  to the historic registry values

- **switchover** : the value of this register changes when the input from ("Impuls von") will be
  („umschalten") firmly set pulse output. This function is needed for switching the high and low
  tariff („HT/NT Umschaltung").

The value of this register changes when the input from ("Impuls von") will be firmly set pulse output. This function is needed for switching the high and low tariff (HT / NT Umschaltung).

# DATA PROTOCOL FOR PULSE LOGGER M-BUS

## FUNCTION AND DATA STRUCTURE:

On a request by the host RSP_UD2 comes from the device, the default response RSP_UD back with variable data structure.

The 15 blocks of data (DIB) to the fixed header correspond to the M-Bus protocol and divided as follows:
01 - value 1, Actual
02 - value 1, History
03 - value 2, Actual
04 - value 2, History
05 - value 3, Actual
06 - value 3, History
07 - value 4, Actual
08 - value 4, History
09 - Further determined date
10 - Last determined date
11 - current time (UTC)
12 - Operating time in seconds
13 - Primary address
14 - Parameterization of the determined date (* 1)
15 - coded serial number
16 - (User Data), additional configuration data

* 1) Set the determined date:
0 - fifteen minutes = quarter (viertelstündlich)
1 - hourly (stündlich)
2 - daily (Tagle)
3 - weekly (wöchentlich)
4 - monthly (monatlich)
5 - yearly (jährlich)

## PROTOCOL STRUCTURE:

99 99   LENGTH
68   START
08   Activation of the requested data
02   Primary address
72   Reply with variable data structure
13 00 20 32 2E 0F 00 00 01 02 00 00   Fixed Data Header

| Sec Adr | Manufacturer | Version | Medium | Access No. | Status | Signature |
|---------|--------------|---------|--------|-----------|--------|-----------|
| 4 byte | 2 byte | 1 byte | 1 byte | 1 byte | 1 byte | 2 byte |

04 03 40 E2 01 00 04 = Data Record 03 =   1 Wh 40 E2 01 00 = 123456   meter counter   current value 1
04 01 01 00 00 00 01 = Data Record 01 = 0,01 Wh 01 00 00 00 =   meter counter   historical value 1
04 2B 16 03 16 11 00 = Data Record 2B =   1 W 16 03 16 11 286 655 254   meter counter   current value 2
04 00 00 00 00 00 04 = Data Record 00 =   mWh 00 00 00 00 = 0   meter counter   historical value 2
04 00 00 00 00 00 04 = Data Record 00 =   mWh 00 00 00 00 = 0   meter counter   current value 3
04 00 00 00 00 00 04 = Data Record 00 =   mWh 00 00 00 00 = 0   meter counter   historical value 3
04 00 00 00 00 00 04 = Data Record 00 =   mWh 00 00 00 00 = 0   meter counter   current value 4
04 00 00 00 00 00 04 = Data Record 00 =   mWh 00 00 00 00 = 0   meter counter   historical value 4
04 6D 2D 00 01 11         Last determined date
6D 04 1E 00 09 15         Next determined date
04 6D 16 00 FC 09         Current time
04 20 B2 20 31 00         Operating time
01 7A 02                  Primary address = 02
01 6F 00                  Reserved
04 6F 15 C0 41 04         Reserved meter counter 71417877 ???
0F 0D                     Coded serial number
20 10 00 01 |
51 13 00 01 |
22 00 00 01 |
53 03 00 01 |
34 00 00 01 |
55 03 00 01 |
36 00 00 01 | -           Configuration settings for the inputs and determined date
57 03 00 01 |            content:     - Pulse from („Impulz von")
18 13 00 01 |                         - pulse divider and last byte („Impulzteiler")
59 13 00 01 |                         - status („Bedingung")
4A 10 00 01 |                         - action to be performed („Aktion")
4B 10 00 01 |
6D 04 00 01 |
65   Checksum
16   last character

For reading of meter in M-Bus network via secondary address it should be first sent the broadcast request (action) through the primary address.
The slave responds with 0xE5.

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Request from the master:

| 68 0B 0B 68 | 53 FD 52 | **44 33 22 11** | FF FF FF FF | **48** 16 |
|:---:|:---:|:---:|:---:|:---:|
| 1 | 2 | 3 | 4 | 5 |

1 = Start of Long Frame Long
2 = C, A, CI with A = FD (Broadcast)
3 = Secondary address as a 32 bit BCD
4 = more restrictions (Manufacturer, version ,...)
5 = Checksum and telegram-end character

Variable bytes are shown in **bold**.

Response from the meter (slave):

E5

Now the meter (slave) is selected on the secondary address and can then be activated according to the code. This happens just as the primary address, except that the request is sent as a broadcast.

Request from the master:

| 10 | 7B FD | 78 16 |
|:---:|:---:|:---:|
| 1 | 2 | 3 |

1 = Start of the ShortFrame
2 = C, A with A = FD (Broadcast)
3 = Checksum and telegram-end character

Response from the slave (a little more clearly shown):

```
68  99  99  68
08  01  72
44  33  22  11  2E  0F  00  00  16  02  00  00
04  03  B7  00  00  00
04  03  00  00  00  00
04  00  00  00  00  00
04  00  00  00  00  00
04  00  00  00  00  00
04  00  00  00  00  00
04  00  00  00  00  00
04  00  00  00  00  00
04  6D  16  0B  84  46
04  6D  00  09  81  46
04  6D  04  10  C8  06
04  20  81  7D  00  00
01  7A  01
01  6F  00
04  6F  05  80  61  05
0F  0D
    20  10  00  01  51  13  00  01  22  00  00  01  53  03  00  01
    34  00  00  01  55  03  00  01  36  00  00  01  57  03  00  01
    18  13  00  01  59  13  00  01  4A  10  00  01  4B  10  00  01
    6D  04  00  01
C1  16
```

# KRALgroup

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**Your partner for the energy measuring**

DIN RAIL MOUNTED ENERGY METERS
RE-CONDITIONED ENERGY METERS
PRE-PAYMENT ENERGY METERS
CARDS AND GSM ENERGY METERS
SPECIAL ENERGY METERS AND INSTRUMENTS FOR SWITCHBOARDS
OTHER MEASUREMENTS FOR ELECTRIC ENERGY
CURRENT TRANSFORMERS
ENERGY MEASURING IN LANDING-PLACES, BERTHS AND HARBORS (MARINAS)
ENERGY MEASURING IN CAMPS, EXHIBITIONS AND TRADE CENTRES
ENERGY MANAGEMENT SYSTEMS (M-Bus, PLC, GSM, RS-485, EIB, INSTA-BUS)

We are pleased to advise you ...