## Safety Information

- Comply with ESD protection measures

- The M-bus module with pulse inputs is supplied with a built-in battery – avoid short-circuits on the PCB

- Disconnect the M-bus voltage during connection work

- Route connecting cables only through the bush sleeves of the meter

- Do not cut the bush sleeves shorter than necessary because this may lower the degree of protection

1   Description of function

The M-bus module is an add-on module for the type UH50 meter (firmware 5.15 and higher). The module enables the meter to communicate with an M-bus center in order to transmit measured values.

This description applies to M-bus modules of the "4th generation": These modules are available in two types:

- WZU-MB G4 (type "MB G4")no picture
- WZU-MI with pulse inputs (type "MI"), see picture
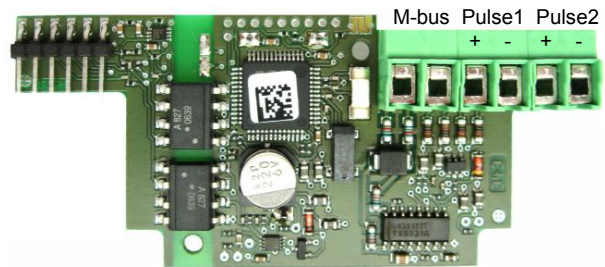
picture: WZU-MI

The module has two integrated pulse counters and calculates cumulated volumes from the pulses coming from connected pulse transmitters according the parametrized significance. These volume values are transmitted to the UH50 where they are stored and can be displayed or output as required. If no M-bus voltage is connected, a battery powers the module processor and the pulse inputs.

For the module firmware 4.11 and higher and the meter firmware 5.17 and higher, the modules are also suitable for NTA-compliant communication.

There is also the predecessor model of the 2nd generation. The description of the functions makes a distinction where this is appropriate.

2   Installation and assembly

The UH50 meter has two module slots for fitting add-on modules. These are named "Modul 1" and "Modul 2" on the dial plate (visible after removing the cover).
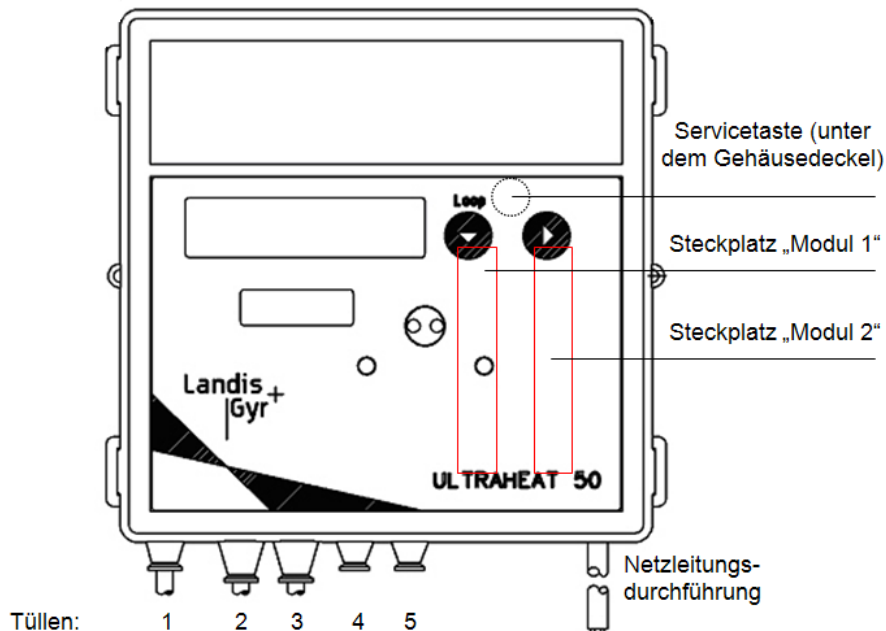
Module "MB G4" may fitted on both of the slots. **Module „MI"** (with pulse inputs) must **only be fitted at slot module 1**.

Module "MI" is supplied with a built-in battery. Short-circuits on the PCB must be avoided. The relevant rules for handling electrostatically sensitive devices must be observed.

For connection with the M-bus center (or M-bus repeater) and for the pulse inputs, 2 flexible cables with a conductor cross-section of 0.25 mm^2 to 0.75 mm^2 are provided, which are to be combined to a multi-core line.

The outer diameter of the cable must be between 4 mm and 6 mm. All cables have to be routed through the existing bush sleeves in the meter. It may be convenient to combine the M-bus cables and the cables for the pulse inputs in a single multi-conductor cable outside the UH50 in a splitting box.

> If a **shielded cable** is used for the M-bus voltage or pulse inputs: The shield must not be connected at the meter end (only connect at one end).

2.1 Display on the LCD of the meter

The following displays are examples and may differ from the actual display list of the meter.

User loop ("LOOP 0")

P1 1-3	
123456,7 m³	

Current value pulse meter 1; in 2-sec. cycles

P1 2-3	
123456,7 m³	

Current value pulse meter 2; in 2-sec. cycles

Service loop 1 ("LOOP 1")

P1 1-3	
123456,7 m³	

Previous year pulse meter 1; in 2-sec. cycles

P1 2-3	
123456,7 m³	

Previous year pulse meter 2; in 2-sec. cycles

Service loop 3 ("LOOP 3")

P1 1-3	
123456,7 m³	

Previous month pulse meter 1; in 2-sec. cycles

P1 2-3	
123456,7 m³	

Previous month pulse meter 2; in 2-sec. cycles

Service loop 4 ("LOOP 4")

Modul 1 M I
Modul 1 G 4

Type "MI" in slot "Module 1"; in 2-sec. cycles

Modul 1 M B
Modul 1 G 4

Type "MI" in slot "Module 1"; in 2-sec. cycles

Modul 2 M B
Modul 2 G 4

Type "MI" in slot "Module 2"; in 2-sec. cycles;

P1 1-1
01010101

Meter scaling for pulse meter 1; in 2-sec. cycles;

P1 1-2
0,00025 m⁄l

Meter scaling for pulse meter 1; in 2-sec. cycles;

P1 2-1
02020202

Meter scaling for pulse meter 2; in 2-sec. cycles;

P1 2-2
0,00 100 m⁄l

Meter scaling for pulse meter 2; in 2-sec. cycles;

3 M-bus part

3.1 Technical data of the M-bus part

Standard	EN 1434-3; EN 13757 Part 2, Part 3	
Protocol	EN 60870-5	
Electrical isolation	from the meter:	yes
	from the pulse inputs:	no
Connection	Insulation stripping length	5 mm
	Connection capacity	
	- rigid or flexible,	0.25...0.75 mm²
	- flexible with ferrules,	0.25...0.75 mm²
Polarity	any	
Voltage	50 V DC maximal	
Current consumption	1 M-bus load (1.5 mA)	
Addressing	Primary or secondary	
Baudrate	300, 1200, 2400, 4800 or 9600 baud	
Interface description	see TKB3448	

3.2 Parameter setting of the M-bus function

3.2.1 Preparing parameterization

For parameterization, the meter must be put into parameter setting mode with the service button. First remove the housing cover, then press the service button for about 3 seconds, then replace the housing cover. Apply the opto-head and start the service software.

3.2.2 M-bus module parameterization

In the menu **"Parameterization"** / submenu *"M-bus module G4"*, the parameters are defined for the particular module that is plugged in.

For the module types "MB G4" and "MI" the following applies: The parameters become effective as soon as the meter returns to normal mode, even when the bus voltage is already applied to the module.

The above figure shows the options for setting the parameters of M-bus modules.

- Setting the primary address:
  Set the primary addresses for „Module 1" and „Module 2" respectively

- Set the secondary address (= property number of UH50):
  Set the shared secondary address for "Module 1" and "Module 2"

- Select normal read-out mode or fast read-out mode for "Module 1" and "Module 2":

- Select the type of representation for the output values:
  - according to EN 13757 Part 3 ("modern")
  - as for the 2nd generation (downward compatible = **default setting at delivery**)
  - output with fixed frame according to EN1434-3 (1997)

- Identification for medium type:
  Defines which medium is referred to in the M-bus telegram, e.g. 04 = heat

- Set the user lock:
  The user lock disables the execution of certain M-bus commands

- Clear user lock:
  Enables execution of certain M-bus commands again

- Permanently customized value output in normal read-out mode:
  For a description, see "Changing M-bus value output permanently"

- Permanently customized value output in fast read-out mode:
  For a description, see "Changing M-bus value output permanently"

A change to the M-bus primary addresses and the M-bus secondary address in the *"M-bus module G4"* menu is also effective for M-bus modules of the 2nd generation.

3.2.3 Changing M-bus value output temporarily

As was already the case with M-bus modules of the 2nd generation, with the selection command
SND_UD with CI=51 and chained selection parameters (DIFs and VIFs)
it is possible to select the data to be output on the M-bus.

When the bus voltage is disconnected, this selection programmed in the module will be lost again; after bus voltage recovery, the permanently selected values will be output again.

In the case of the modules of the 2nd generation, it was possible to select only a subset of the standard values for the display using this method.

One new feature is the option of putting together an individual value output from a larger selection of 63 values on M-bus modules "MB G4" and "MI" in an analogous way to the selection commands described above (see M-bus interface description TKB3448). It is possible to select not only a subset of the values output in the normal telegram, but other values of the selection list can also be transmitted.

Example:

The module is in normal read-out mode with a "G4-compatible display".

The value output is to contain the current heat quantity (part of the normal read-out) and the power maximum of the previous month with the appropriate timestamp of the power maximum of the previous month (not part of the normal read-out).

Transmitted data:

68h 0Ch 0Ch 68h 53h 21h 51h 98h 11h ADh 6Fh 08h 06h 98h 11h 2Dh 6Eh 16h.

Where:

68 0C 0C 68	Beginning of frame with variable length
53	C-field (SND_UD)
21	Primary address 33 (decimal)
51	CI-field
98 11 AD 6F	Time stamp maximum heat power previous month
08 06	Selection of current heat quantity
98 11 2D	Maximum heat power previous month
6E	Checksum
16	End of frame with variable length

Acknowledgment of the above telegram:
Received: E5h (OK)

Read out the following data (REQ_UD2):
Transmitted: 10h 7Bh 21h 9Ch 16h
Received: 68h 29h 29h 68h 08h 21h 72h 78h 56h 34h 12h A7h 32h ...

Example of the decoding:
Addr.:33 No.:12345678 Manu.:LUG Gen.:4 Med.:Heat Cnt.:204 Stat.:0

Energy:	14524 kWh
Power:	0.0 kW Maximum Tariff: 1 Storage No.: 2
Timestamp power:	(empty value) Maximum Tariff: 1 Storage No.: 2
Manufacturer data:	A010001709

If a corresponding previous month's set day has not yet been passed in the meter and a requested previous month's value has therefore not yet been stored, the (empty) previous month's values are output with the value "0" or "0.0" and the timestamps contain the note "empty value" (00h 00h 00h 00h).

3.2.4 Changing M-bus value output permanently (customizing)

Type "MB G4" and "MI" modules also allow you to adapt the output of measured values from the M-bus module to individual user requirements **permanently**. The necessary control parameters are stored in the meter and read out from the meter by the M-bus module when the bus voltage is applied.

With the service software, the output lists for normal read-out mode and fast read-out mode can be compiled using drag&drop.

This is done in the menu *Parameterization* / submenu *M-bus module G4* using the *"Select data"* function.

The following restrictions must be observed.

- Normal read-out mode: up to 228 values – output bytes in the M-bus frame
- Fast read-out mode: up to 8 measured values per telegram
  no output of values from the previous month or the previous year
  in the M-bus telegram

In the "normal read-out mode" and "fast read-out mode" columns, the current status of the telegram length is shown in "Maximum frame size [actual length/ max. length]".

Note: The sequence of the selected values does not have any effect on the sequence of the value output in the M-bus telegram.

The previous month's values and the previous year's values are not output in fast read-out mode.
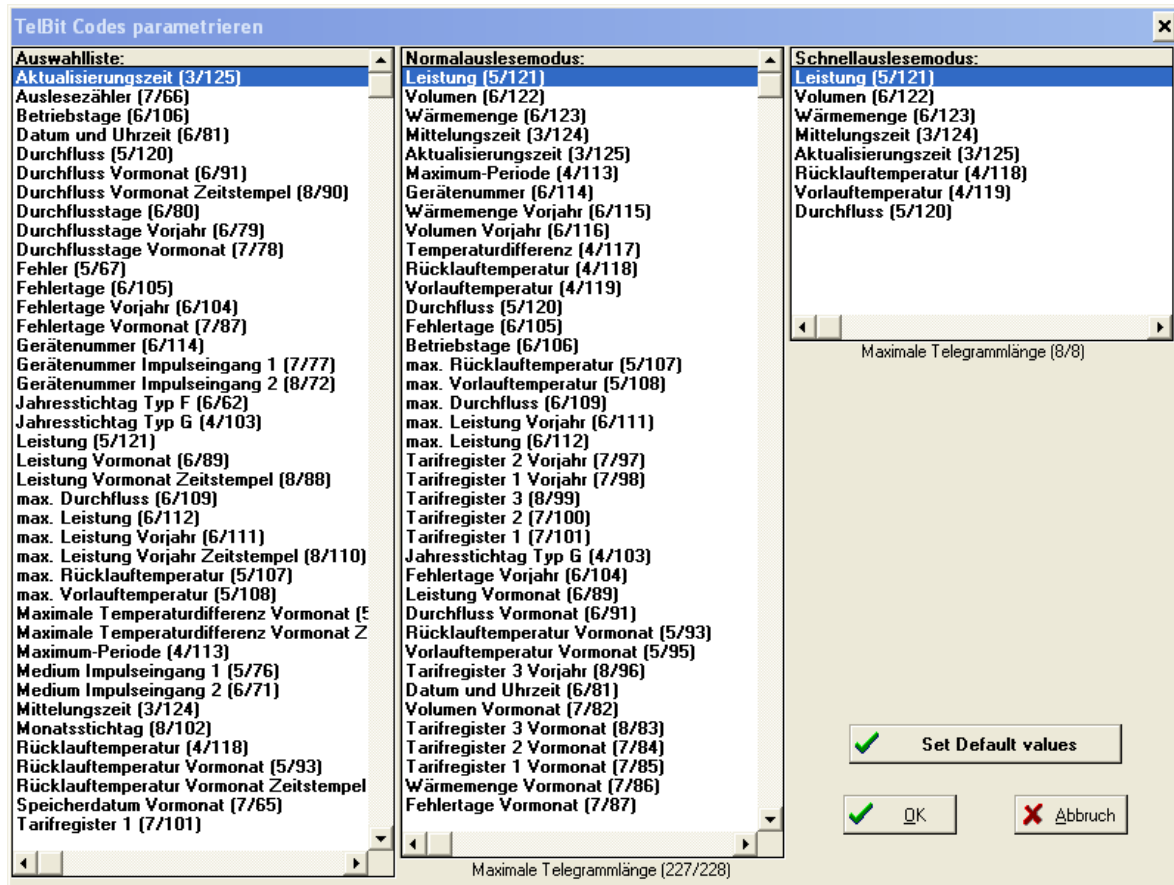
With the *"Set Default values"* button, the factory settings of the output lists are restored for "normal read-out mode" and "fast read-out mode". The output lists are then as they were in the 2nd generation and are therefore downward compatible.

4   NTA-compliant data output

NTA 8130 (**N**etherlands **T**echnical **A**greement) is a regulation of Dutch origin. Its objective to achieve interoperable communication between consumption devices (electricity, gas, heat and water meters), and thus to facilitate the modern requirements of Smart Metering.

The requirements and procedures are described in detail in the „**D**utch **S**mart **M**etering **R**equirements" - the „P2 Companion Standard" - (DSMR P2) applies for the meter M-bus module.

In firmware version 4.11 and higher of the M-bus module WZU-Mx, the „NTA-compliant data output" is a third operation mode along with the „normal read-out mode" and the „fast read-out mode".

In the "NTA-compliant data output" operating mode, the data output list for the M-bus interface is predefined, and only varies with the "device type" (=M-Bus identification for the media type).

To use the NTA-compliant data output, the meter must have **at least firmware version 5.17**.

The NTA-compliant data output is activated using the service software at the meter. The adjustment is done under the „**Parameterization**" / „**NTA**" menu. This menu item will be offered with meter firmware 5.17 and higher**,** when the meter has been prepared for parameterization**.** The appropriate module is not required to be plugged in the meter.

4.1   Equipment identifier

For NTA-compliant M-bus output, devices require a 17-character equipment identifier (17 characters of ASCII text). With firmware version 5.17 and higher, the meters receive the "KEMA code" as the equipment identifier from the factory. In the NTA-compliant M-bus telegram, the equipment identifier enables the exact identification of the meter in the M-bus telegram.

4.1.1   Controlling the equipment identifier

To do this, the device has to be prepared for parameterization first (see sect. 3.2.1).

The menu „**Parameterization**" / submenu „**NTA**" offers the following submenu items for the NTA functions:

Entering the equipment identifier	❶
Provide equipment identifier (read out)	❷
Debinding NTA module (complete; wired and wireless)	❸

Select the submenu item „Provide equipment identifier (read out)" ❷ - the value stored in the meter will be output in the text field of the service software.

4.1.2   Modifying / reparameterizing the equipment identifier

To modify the set equipment identifier, proceed as follows:

First, the device has to be prepared for parameterization (see sect. 3.2.1).

Select the submenu item „Enter equipment identifier" ❶ in the menu **"Parameterization"** / submenu **"NTA"**.

Enter equipment identifier	❶
Provide equipment identifier (read out)	❷
Debinding NTA module (complete; wired and wireless)	❸

A window pops up:
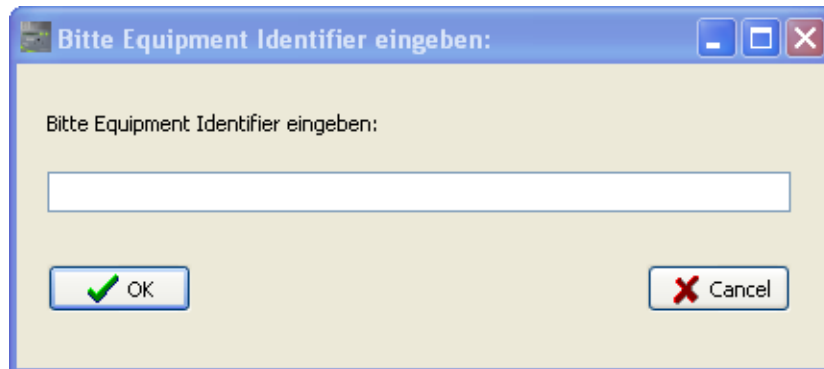
You can enter a new equipment identifier in this window, according to the following rules:

- The characters allowed correspond to the printable characters in ISO/IEC 8859-1.
- A length of 30 ASCII characters must not be exceeded; longer strings will be cut off when transferred to the meter.

Clicking the OK button will transfer the selection to the meter.

Note: If no characters are entered into the input field (i.e. if it is left empty), the current equipment identifier will be deleted as soon as the OK button is pressed.

4.2   Activating the NTA functionality

The control of the module's operating mode is done at the meter (NTA functionality possible in meter firmware version 5.17 and higher) using the service software.

4.2.1   NTA debinding procedure

With the debinding procedure, the module is switched into an NTA operating mode that allows the NTA-compliant master (e.g. the electricity meter) to identify and bind it as a new partner device (binding). When debinding, old NTA keys are deleted in the UH50, if necessary. The primary address is set to 00h and the module is switched into an NTA operating mode that allows the NTA-compliant master (e.g. the electricity meter) to identify and bind it as a new partner device (binding).

To do this, the device has to be prepared for parameterization first (see sect. 3.2.1).

The menu „**Parameterization**" / submenu „**NTA**" offers the following submenu items for the NTA functionalities:

Entering the equipment identifier	❶
Provide equipment identifier (read out)	❷
Debinding NTA module (complete; wired and wireless)	❸

Now select the submenu item „**Debinding NTA module (complete; wired and wireless)**" ❸ .

The service software will ask you to confirm the following dialog box:
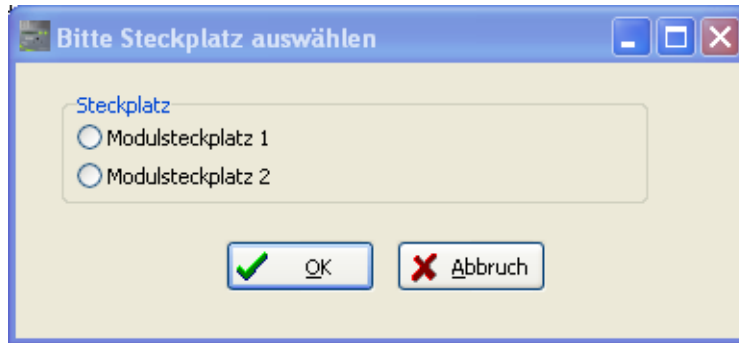
Please enter whether the M-bus module is or is to be in slot 1 or 2 of the meter and click OK to confirm. The respective M-bus module is now in NTA operating mode.

In LOOP 4, the meter LCD will show that the debinding procedure has been completed (if the WZU-MB G4- or the WZU-MI module is inserted):

Meter LCD, service loop 4 ("LOOP 4")

for module slot 1

Modul 1   M B
Modul 1   G 4

Type "MB" in slot "Module 1";
in 2-sec. cycles

switches to

Modul 1   M B
unbi nd   N 4

Type "MB" in slot "Module 1";
in 2-sec. cycles

for module slot 2

Modul 2   M B
Modul 2   G 4

Type "MB" in slot "Module 2";
in 2-sec. cycles;

switches to

Modul 2   M B
unbi nd   N 4

Type "MB" in slot "Module 2";
in 2-sec. cycles;

According to DSMR P2, an on-site electricity meter will serve as M-bus master. This master will perform the binding of the meter with the NTA-enabled M-bus module. The exact binding procedure to the master can be found in the operating guide of the electricity meter.

As soon as the module has been successfully been connected to the electricity meter (binding), the display in LOOP 4 switches from

| unbi nd   N 4 | to | bi nd   N 4 | and the binding procedure according to DSMR P2 is complete.

After the binding of the module, the master controls the subsequent M-bus communication.

Note: In NTA operating mode, the master performs the meter's time synchronization. Therefore, the NTA debinding procedure will delete the summer-/wintertime table in the counter. The summer-/wintertime table cannot be parameterized again as soon as no NTA functionality (wired oder wireless) is parameterized for module slot 1 and 2.

4.3 Exiting the NTA functionality

To exit the NTA functionality of the M-Bus module, a debinding procedure according to section 4.2.1 must be performed first.

This is necessary to reset parameterizations performed in the meter while it was in NTA operating mode.

Afterwards, open the "**M-Bus Module G4"** submenu in the "**Parameterization"** menu:
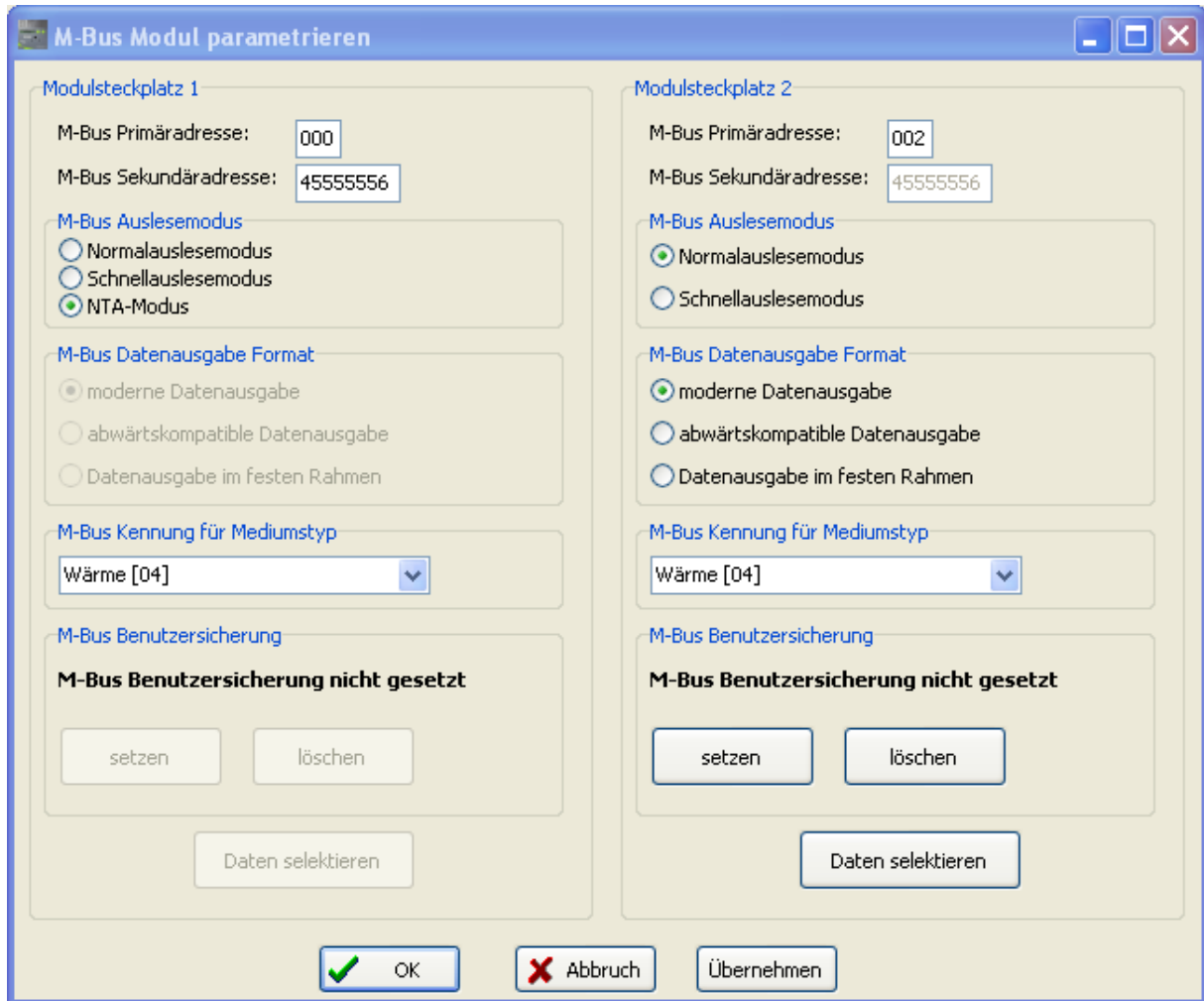
If the NTA mode is parameterized for the M-bus module, this is indicated by the additional text field "NTA mode" in the subitem "M-bus read-out mode" (in the example for module slot 1).
If „Normal read-out mode" or „Fast read-out mode" has been selected and the selection has been confirmed with OK, the NTA functionality for the respective module will be ended.
The M--bus module WZU-Mx works according to the operating mode selected in the M-bus read-out mode - „normal read-out mode" or „fast read-out mode".

Note: If the NTA mode has neither been parameterized for module slot 1 nor for module slot 2, the meter's summer-/wintertime table can be parameterized again, if necessary. The switch from summertime to wintertime is activated again.

5   Pulse part of the "MI" module

The "MI" module is equipped with two pulse inputs that are electrically isolated from the meter.

Note: The volume values calculated in the meter from the pulse inputs are not capable of being officially calibrated.

In addition to a possible voltage supply from the M-bus connection, the "MI" module is equipped with a battery. This powers the module processor and the pulse input, if no M-bus voltage is applied.
As pulse transmitters for the pulse inputs, either isolated contacts (e.g. relay contacts or Reed contacts) or electronic transmitters as "open collectors" can be used.
If an "open collector" circuit is used as the transmitter of the pulse inputs, the cable must always be electrically isolated from the M-bus inputs of the MI module.

5.1   Technical data of the pulse part

Number of pulse inputs	2 pulse inputs per "MI" module

Number of "MI" modules per UH50	An "MI" module is only permissible in slot **Module 1**
Life of the module battery	5 years of operation + 1 year storage duration; if the M-bus voltage is applied for at least 90% of the operating time, the battery life increased to 10 years
Standard for pulse inputs	Class IB per EN 1434-2
Frequency	max. 10 Hz
Pulse duration (low)	≥ 50 ms
No-pulse duration (high)	≥ 50 ms
Pulse value	0.01 liters / pulse to 10,000.00 liters / pulse, in steps of 0.01 liters / pulse
Display and output in the UH50	in m^3, 7-digit; acc. to parameter setting with or without 1 decimal place
Polarity	yes, must be correct, if transmitter is of type "open collector"
Electrical isolation	from the meter: yes from the M-bus inputs: no
Output voltage	Approximately 3.3 V
Internal resistance	approx. 1 MΩ
Source current	approx. 3 µA

Pulse input closed (low)
    Switching threshold low
    Resistance
	< 0.2 V
	< 50 kΩ

Pulse input open (high)
    Switching threshold high
    Resistance
	unconnected collector
	≥ 6 MΩ

Connection	Insulation stripping length 5 mm
	Connection
	          - rigid or flexible, 0,25...0,75 mm²
	          - flexible with ferrules, 0,25...0,75 mm²

Permissible cable length	max. 10 m The cables should be as short as possible and on no account exceed 10 m.

5.2 Parameter setting of the pulse functions

The "MI" module is supplied in "storage mode," which means:
-   the module is powered with voltage by a battery,
-   the parameters "Device number", "Meter reading," "Pulse value," and "Decimal place" are zero,
-   the pulse inputs are inactive.

Until the module receives parameter setting data, the input inputs remain inactive.

5.2.1 Activating pulse inputs

Put the meters into parameterization mode (see "3.2.1 Preparing parameterization").
In the menu **Parameterization** / submenu *Pulse input*, the values for the parameters "Device number," "Meter reading," "Pulse value," "Decimal place," and identification of the medium type in the M-bus telegram are defined. Parameter setting is performed separately for pulse input 1 and pulse input 2.
With the "OK" button, the entered parameters are transmitted.

When the pulse inputs have been parameterized, the "MI" module functions as follows:
- The pulses at the pulse inputs are counted.
- Every 5 minutes, a register advance in steps of 1 m³ or 0,1 m³ (depending on the decimal place) is calculated from the counted pulses and the pulse value; the pulse meter reading is transmitted to the meter, where it is stored.

5.2.2 Deactivating pulse inputs ("Storage mode")

To deactivate one or both pulse inputs (storage mode; only when input is deactivated), set the parameter pulse value to zero for the relevant input in the menu stated above. The parameters are then transmitted with the "OK" button.

No more pulses are counted for a deactivated input.

5.3 Replacing a module

When a type "MI" module is replaced, the new module must be initialized.

After the new module has been plugged in and is connected, put the meter into parameterization mode (see "3.2.1 Preparing parameterization").

In the menu **Parameterization** / submenu *Pulse input*, the parameters of the pulse inputs currently stored in the UH50 *are* read out and displayed.

The shown values can be changed – if necessary – or the particular pulse input is initialized without change with the button "Pulse input 1 initialize" or "Pulse input 2 initialize".

After the meter has returned to normal mode, the module will function as defined.

6 Ordering data

For each individual module: WZU-MB G4 or WZU-MI

For heat meter with module: UH50-xxxx-xxxx-xxx-xYZx-xxx

    YZ = N_   for type „MI" as Module 1
    YZ = NB   for type „MI" as Modul 1 and type „MB G4" as Module 2
    YZ = B_   for type "MB G4" as Module 1
    YZ = _B   for type "MB G4" as Module 2
    YZ = BB   for type „MB G4" as Module 1 und Type „MB G4" as Module 2

You will also find up-to-date information on our heat meters on our INTERNET site:
www.landisgyr.com

Landis+Gyr GmbH
Humboldtstr. 64
D-90459 Nürnberg
Germany