Universal Counter Modul UCM-5

Manual

Content

1. Overview

2. Applications
   2.1 Cost-Centre-Analysis
   2.2 Power-Factor-Controlling

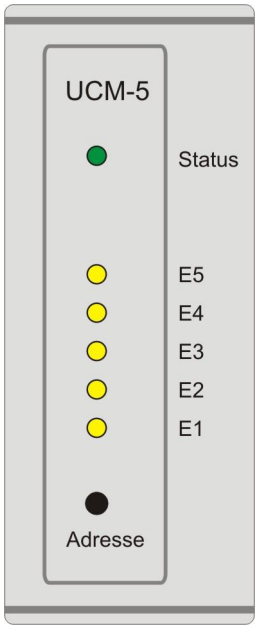
3. Function

4. Programming
   4.1 Modbus-ID
   4.2 Baud rate
   4.3 Pulse weight

5. MODBUS Protocol
   5.1 Read data (Function code 3)
   5.2 Write data (Function code 6)
   5.3 Register table

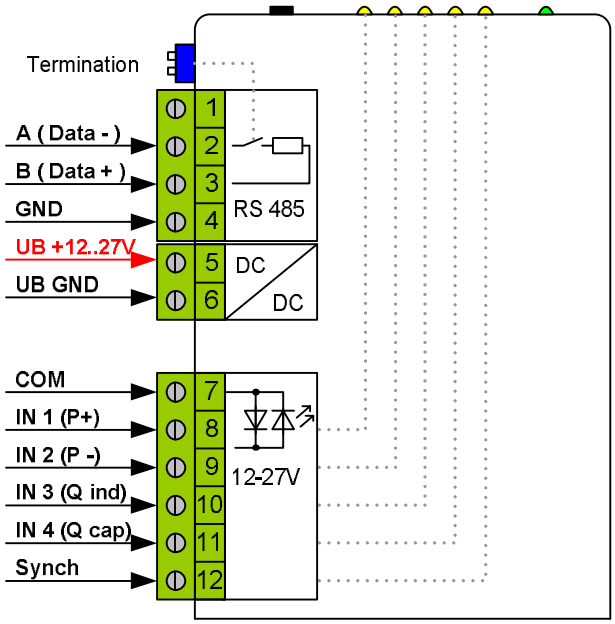
6. Connection diagrams

7. Technical data



1. Overview

Picture 1



Termination switch:
Activate (set both slide switch to ON) the terminal resistor if the device is located at the physical end of the BUS.
Clamp 1 – 4:
MODBUS / RS485-Interface to connect with additionally devices or PC

Clamp 5 – 6: Supply voltage

Clamp 7 – 12:
S0-Interface to connect energy meters with pulse interface

P+ → Import active energy [Wh]
P- → Export active energy [Wh]
Q+ → Lagging reactive energy (inductive) [varh]
Q- → Leading reactive energy (capacitive) [varh]
Sync → Synchronisation input (¼h)

2. Applications

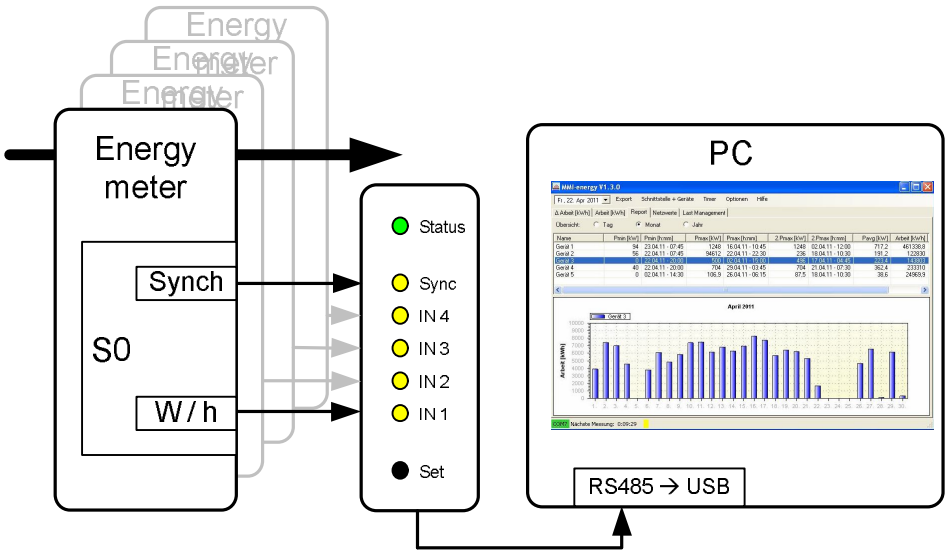
2.1
Logging pulses from energy meters to create systems for cost-centre-analysis with the provided software. Other measuring devices like MMI6000 and MMI7000 can be used for cost-centre-analysis too.

2.2
For installation of power factor controlling systems which uses pulses from an energy meter to control the power factor. At these systems no current converters are required.

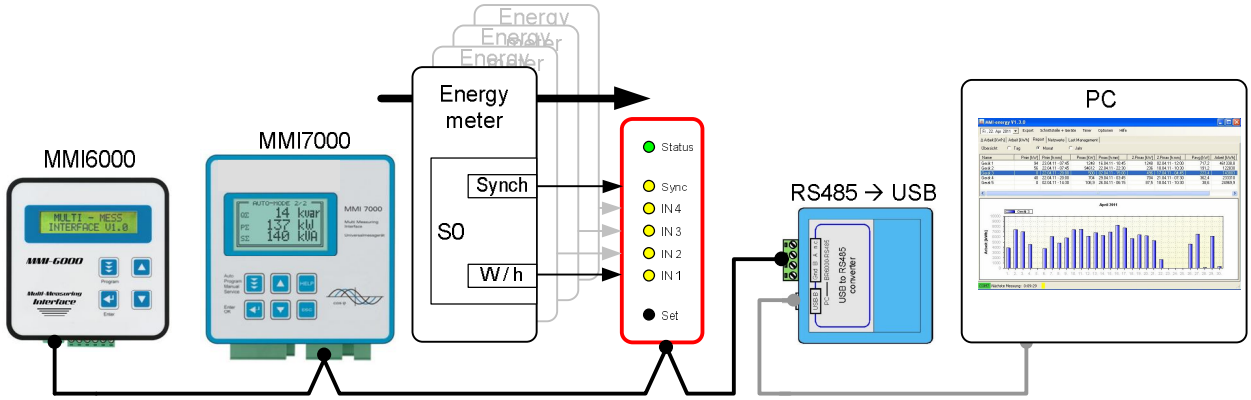
2.1 Cost-Centre-Analysis

At this application the pulses of up to 4 energy meters (per UCM-5 module) can be logged with MMI-energy. Up to 31 UCM-5 are possible per BUS. Additionally there is one sync-input for synchronising pulse counting. Normally the sync pulse is provided by the energy meter (network operator). After sync-events the number of pulses per period will be saved. If there is no sync-pulse available a user specific sync-time can be programmed with the included software.

Picture 2 Pulse counting for up to 4 energy-meters per module



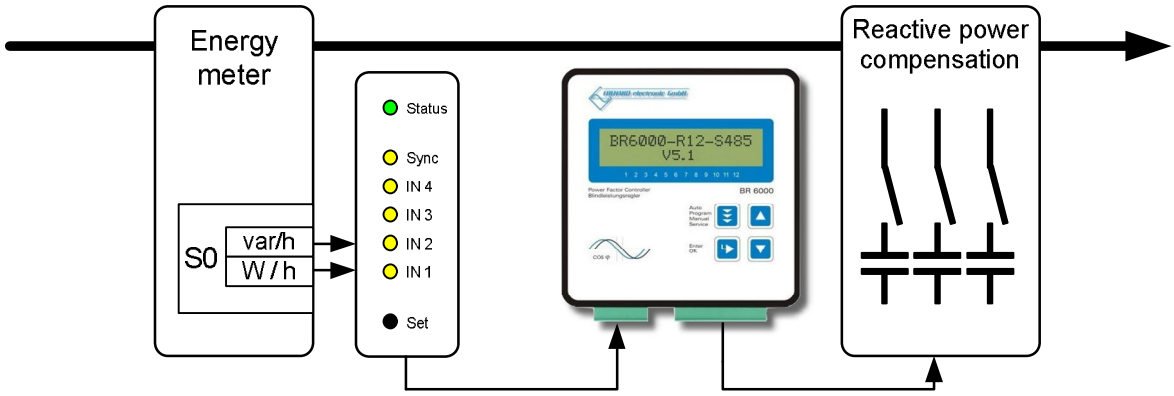
Picture 3
Example: Energy metering at miscellaneous metering points with multi measuring devices MMI6000 / MMI7000 and UCM-5 connected via MODBUS.



2.2 Power-Factor-Controlling

With this application no additional conventional current transformer is required – only an energy meter with an impulse-interface is needed. For minimum configuration P+ and Q+ are needed. If P- and Q- are connected in addition, the controlling is faster and more exact.
The actual active- and reactive power is calculated from the energy pulses that are provided by the energy-meter. The power values are transmitted to BR6000 which uses the data to control the power factor.

Picture 4



UCM-5
for programming
see capture 4

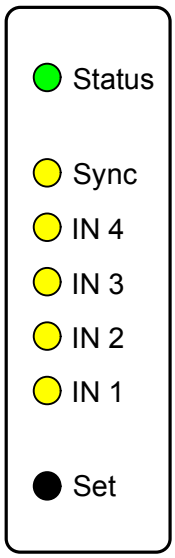
BR6000-R12/S485
Settings: enter Expert Mode 1 (Passwort: 6343)
19. Protocol: extern
20. Baudrate: equal to UCM-5 (Factory setting: 38400)
21. Address: ID of UCM-5
26. Analyzer-type: MMI6000

3. Function

UCM-5 count and stores the pulses of the connected pulse-sources. Pulse count divided by pulse-weight equals the energy of measured time intervals. UCM-5 also measures the delay two pulses and calculates the actual active-, apparent- and reactive power. These values are used for power factor controlling. All values are available over the RS485-Interface.

During pulses or continuous signals, the LEDs at the front panel show high-level signals of the assigned inputs. The green status LED flickers if MODBUS transmission is in process. If the Set-key is pressed for more then 3 seconds the green status LED is flashing and the MODBUS device ID can be set by pressing the key again (see chapter 4)

Picture 5



Power on, flickering during MODBUS communication

Sync input (flash at high level)

Input 4 (flash at high level)

Input 3 (flash at high level)

Input 2 (flash at high level)

Input 1 (flash at high level)

For programming MODBUS ID push more then 3s

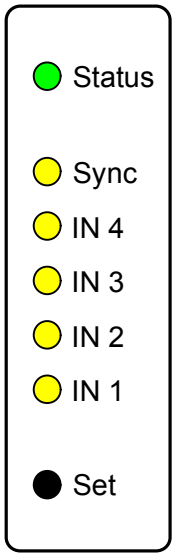
4. Programming

4.1 MODBUS-ID

Address range 1 - 31, factory setting 1

For changing the MODBUS address (ID) press and hold the Set key for more then 3 seconds. The ID can be changed if the green status LED is flashing (3Hz). Every time the key is pressed again the ID will be increment by 1. The maximum ID is 31. After 31 the ID will be set to 1 again. If the key is inactive for more the 10 seconds the ID is saved and the device enters to normal operation mode.

Picture 6



Flashing (approx. 3Hz)

Quantity	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
16 (2^4)																●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
8 (2^3)								●	●	●	●	●	●	●	●									●	●	●	●	●	●	●	●
4 (2^2)				●	●	●	●					●	●	●	●					●	●	●	●					●	●	●	●
2 (2^1)		●	●			●	●			●	●			●	●			●	●			●	●			●	●			●	●
1 (2^0)	●		●		●		●		●		●		●		●		●		●		●		●		●		●		●		●

The programmed ID is calculated by total sum of the quantity of each lighting LED. If the key is inactive for more then 10 seconds the address is saved.

Example ID9: IN1 and IN4 are “ON”

4.2 Baud rate

Available baud rates: 9600, 19200, 38400 (factory setting)

For standard applications a baud rate of 38400 shall be used. For integrating UCM-5 to an existing system the baud rate can be changed via MODBUS instructions or with the included windows software. Further details about the MODBUS instructions are available at the register table. At windows software the baud rate will be automatically adjusted to the entered interface baud rate by opening the setup dialogue.

4.3 Pulse weight

To calculate correct power and energy it is necessary that the accurate pulse weight (kWh/pulse) is programmed at the UCM-5. This can be done by windows software “MMI-energy”. For further details see the manual of “MMI-energy” that is available at the included CD.

5. MODBUS – Protocol

5.1 Read data (Function code 3)

The following tables show the MODBUS protocol format of function code 3. An example can be found at the lower row of the table: read register 20 of slave with ID 1. Slave reply value is 233.

Request (Master → Slave)

Slave Adresse	Function Code – 3	Register (High)	Register (Low)	Quantity* (High)	Quantity * (Low)	CRC (Low)	CRC (High)
1	3	0	20	0	1	196	44

Reply (Master ← Slave)

Slave Adresse	Function Code – 3	Quantity	Data (High)	Data (Low)	Data ..	CRC (Low)	CRC (High)
1	3	2	0	233		121	202

Note: Maximum number of words to read is 25.

5.2 Write data (Function code 6)

The following tables show the MODBUS protocol format of function code 6. An example can be found at the lower row of the table: write value 259 to register 40 of slave with ID 1. According to a correct transmission the slave replies the received data.

Write (Master → Slave)

Slave Address	Function Code – 6	Register (High)	Register (Low)	Data (High)	Data (Low)	CRC (Low)	CRC (High)
1	6	0	40	1	3	72	81

Reply (Master ← Slave)

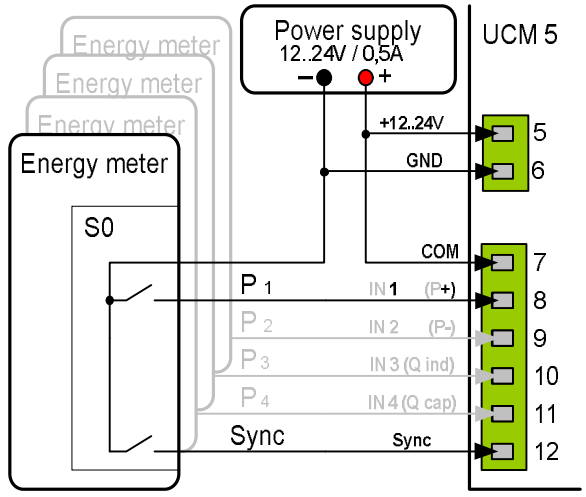
Slave Address	Function Code – 6	Register (High)	Register (Low)	Data (High)	Data (Low)	CRC (Low)	CRC (High)
1	6	0	40	1	3	72	81

5.3 Register table

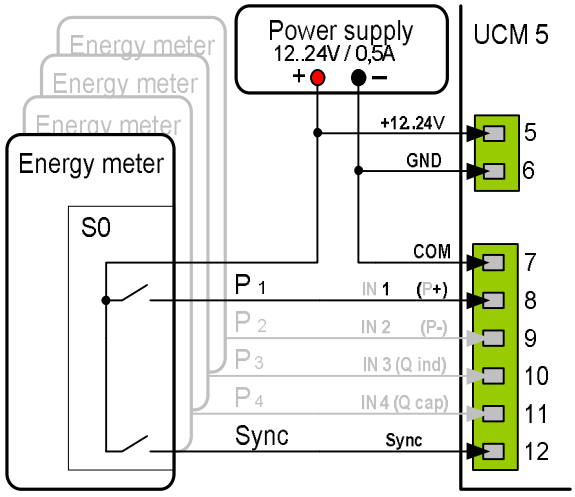
The complete MODBUS register table is available at the included software CD.

6. Connection Diagram

Application: Energy logging



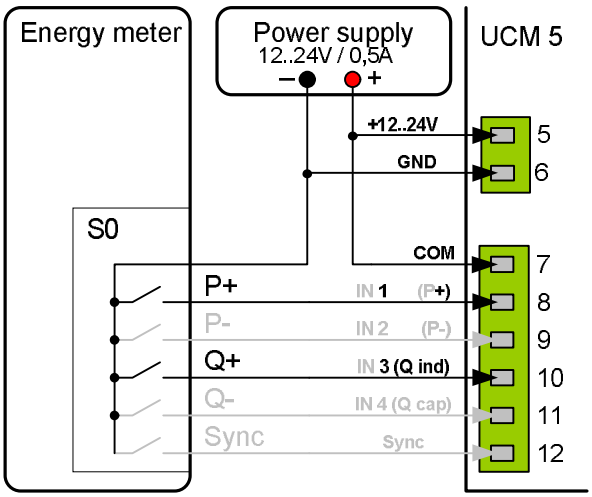
Pic. 7 Common positive voltage



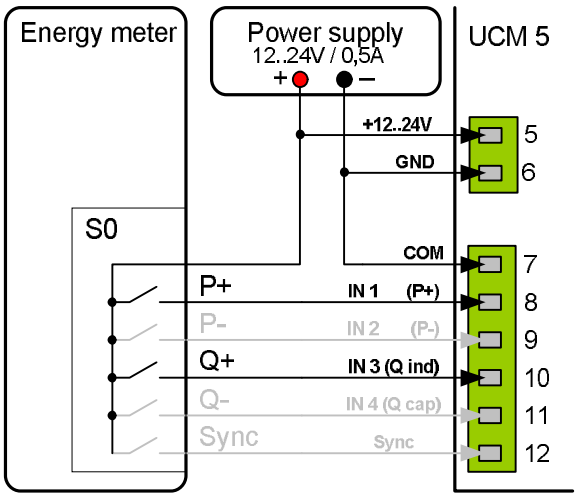
Pic. 8 Common ground

If there is no Sync input available the internal timer can be configured. It is possible to connect up to 4 energy meters to one UCM-5.

Application: Power factor controlling



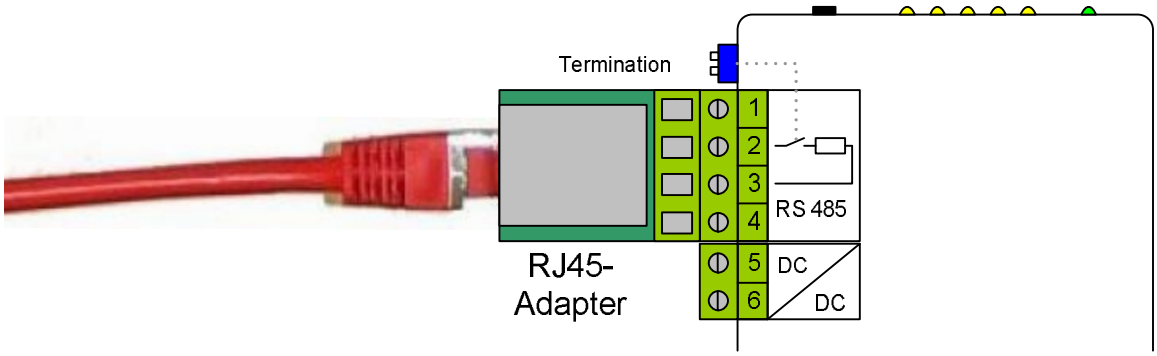
Pic 9 Common positive voltage at UCM 5



Pic 10 Common ground at UCM 5

As minimal option P+ and Q+ are required for power factor controlling. For faster and more exact controlling P- and Q- will be necessary. Sync is not needed at this mode.

Picture 11



To use standard patch-cable for MODBUS connection an optional RJ-45 adapter is available.
(Type: CV-1xRJ45-BR6000; Ordering Number: B44066 R1611 E230)

7. Technical Data

Dimensions:	35 x 82 x 126 mm(B x H x T) DIN-rail assembling
Weight:	130 g
Supply voltage: Power consumption:	24VDC (12 .. 27 V) < 1VA
Inputs:	4 S0-Impulse-Inputs + ¼-h sync.-input Voltage: 10…27V (High signal) Current: Low signal: 2mA @ 3V High signal: 10mA @ 12V, 20mA @ 24V
Interface:	RS485 – MODBUS, galvanic isolated, 4 pin terminal
Baud rate:	9600, 19200, 38400 Baud (factory setting)
Address range	1… 31, factory setting is 1
Maximum devices per BUS	31
Protection type (VDE 0470)	IP20
Accessories included:	UCM-5, terminals, Software CD
Operating temperature:	-10 … + 50°C
Storage temperature:	-10 … + 75°C
Ordering number:	UCM-5 B44066 R1411 E230