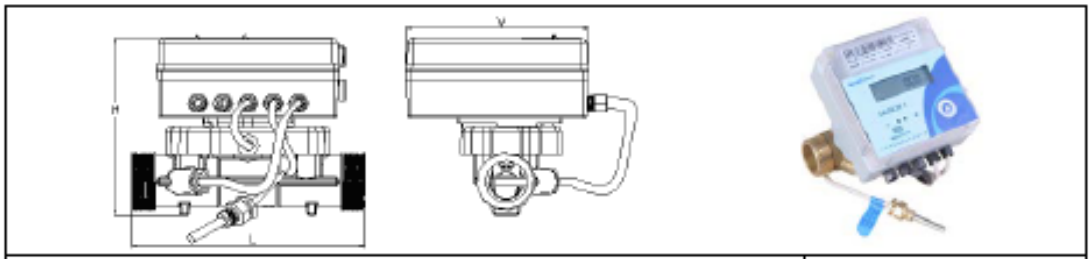
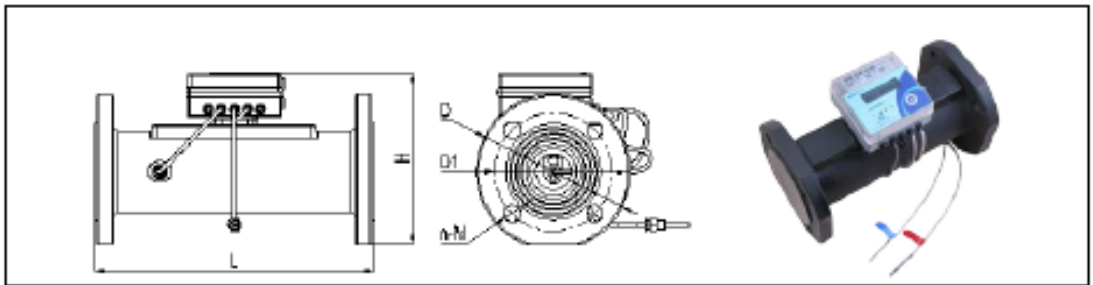
Series 230 Ultrasonic BTU Meter

Type Selection



Dimensions In (mm)					Flow-rate GPM (m^3/h)	
DN	L	D	H	W	Q_{max}	Q_p
0.8 (20)	5.1 (130)	G1B	4 (101)	4 (102)	13 (3)	6.6 (1.5)
0.8 (20)	5.1 (130)	G1B	4 (101)	4 (102)	22 (5)	11 (2.5)
1 (25)	6.3 (160)	G11/4B	4.2 (106)	4 (102)	31 (7)	15 (3.5)
1.3 (32)	7.1 (180)	G11/2B	4.4 (113)	4 (102)	53 (12)	26 (6)
1.6 (40)	7.9 (200)	G2B	4.8 (121)	4 (102)	88 (20)	44 (10)



Dimensions In (mm)							Flow-rate GPM (m^3/h)	
DN	L	D	H	D1	n	M	Q_{max}	Q_p
2 (50)	11.8 (300)	6.5 (165)	6.9 (175)	4.9 (125)	4	0.7 (19)	132 (30)	66 (15)
2.6 (65)	11.8 (300)	7.3 (185)	7.7 (196)	5.7 (145)	4	0.7 (19)	220 (50)	110 (25)
3.1 (80)	13.8 (350)	7.9 (200)	8.5 (216)	6.3 (160)	8	0.7 (19)	352 (80)	176 (40)
3.9 (100)	13.8 (350)	8.7 (220)	9.2 (233)	7.1 (180)	8	0.7 (19)	528 (120)	264 (60)
4.9 (125)	13.8 (350)	9.8 (250)	10 (264)	8.3 (210)	8	0.7 (19)	881 (200)	440 (100)
5.9 (150)	19.7 (500)	11.2 (285)	11 (291)	9.4 (240)	8	0.9 (23)	1321 (300)	660 (150)
7.9 (200)	19.7 (500)	13.4 (340)	14 (347)	12 (295)	12	0.9 (23)	2202 (500)	1101 (250)

The Series 230 UHM is a highly accurate and stable BTU meter. It utilizes ultrasonic technology to measure household heating and cooling energy consumption. The series UHM is a compact meter that has been designed to incorporate the flowmeter and calculator all in one unit for simplification of the unit's installation. The 8-digit LED display makes reading the measured value simple and easy. The compact size and lack of moving parts makes the series UHM a low maintenance unit. These features make it great for installation on chillers, and boilers.

SPECIFICATIONS

Service: Clean water.
Wetted Materials: Brass and Stainless steel.
Range: See chart; Q_{min}:Q_{max} = 1:100.
Accuracy: Flowmeter: ±(2+0.02 Qp / Q)%;
Temperature: ±(0.3 + 0.05 * T)K; ΔT = T ± 0.1K
Serial Communications: M-BUS, MODBUS, or BACNET.
Temperature Limits: Ambient: 41 to 131°F (5 to 55°C);
Storage: 41 to 131°F (5 to 55°C);
Process: 36 to 203°F (2 to 95°C).
Ambient Humidity: <93%.
Pressure Max: 232 psi (16 bar) / 362psi(25 bar) , default 16 bar.
Pressure Loss: <1.5 psi (10 kPa).
Power Requirements: External Supply: 24 VDC / 24 VAC.
Display: 8 digit LED.
Flow Direction: Unidirectional.
Enclosure Rating: IP65.
Process Connection: See chart.
Mounting Orientation: Horizontal or Vertical.
Weight: See chart.
Agency Approvals: CE.

INSTALLATION INSTRUCTIONS

1. Install the meter as shown in either Figure 1 or Figure 2.
2. Mount the temperature sensor with the blue tag on the corresponding return pipe on application. The sensor with the red tag has already been installed in the meter.
3. Flush the system in the proper direction until:
   - No impurities remain in the filter and pipe.
   - No water leaks when pressure is added to the system.
   - The humidity inside the enclosure containing the meter does not exceed 85%.
4. After flushing for a period of time; close the ball valves on either side of the meter and flush the impurities out of all filters.

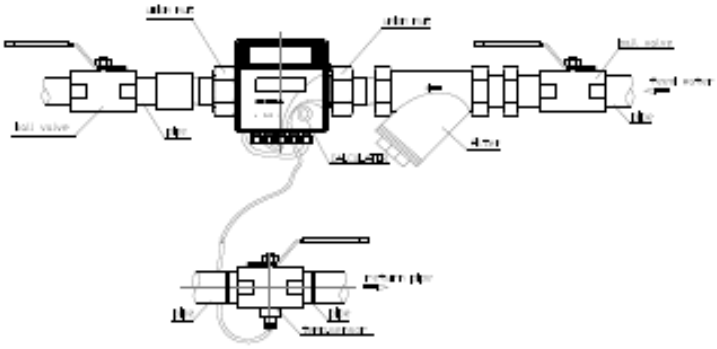


Figure 1: Installation Diagram for DN20 to DN40

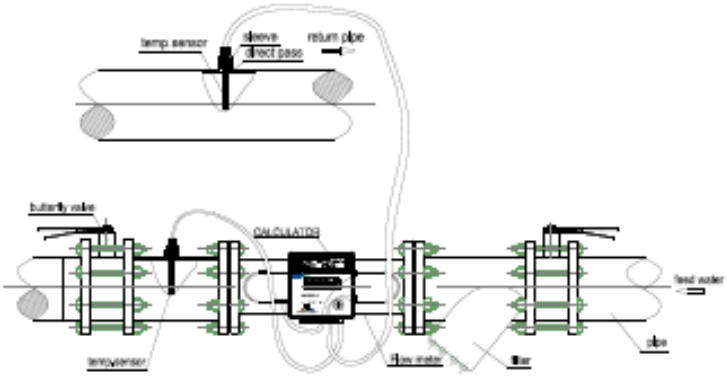


Figure 2: Installation Diagram for DN50 to DN 250

INSTALLATION REQUIREMENTS

NOTE: If the following requirements are not followed, then large air particles and impurities in the pipe could influence the meter's measuring accuracy.

1. Ensure that there is a 10D straight run of pipe upstream and a 5D straight run of pipe downstream form the meter.
2. See the installation positions in Figure 3, in which A and B are the proper installation positions, while C and D are the improper positions.
3. If the meter is installed on the horizontal pipe, it must be oriented at least 45° from horizontal (see Figure 4). If the meter's face is horizontal (see Figure 5), then debris accumulation can increase inaccuracies. There is no special requirement when installing on the vertical pipe work.

NOTE: the meter can be installed on the return pipe or the supply pipe according to users' needs, but it should be selected in advance.

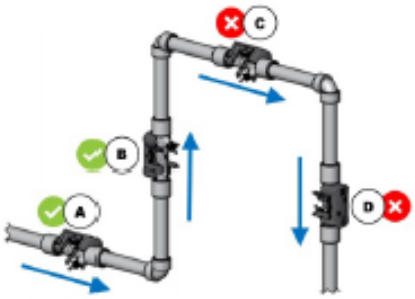


Figure 3: Installation Positions

INSTALLATION NOTES

1. Don't pull the temperature probe's cables to tight
2. Don't directly weld the meter to the pipe; the extreme heat will damage the BTU meter's internal elements.
3. **WARNING** Don't install the meter near a high temperature heat source such as during electro gas welding. Doing so after installing an optional battery could cause the battery to explode and cause injury to people and damage the meter.
4. Make sure the arrow on the meter's body is the pointing in the direction of flow.
5. If several meters are installed on the same vertical pipe work, each meter should be separated from the others to avoid pipe leakage or fallen debris that could affect the other meters' operation.

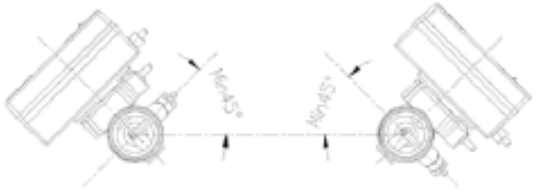


Figure 4: Mounting Rotation 1

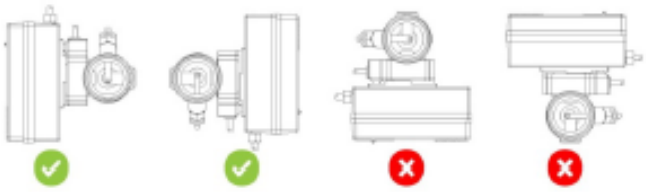


Figure 5: Mounting Rotation 2

FEATURES

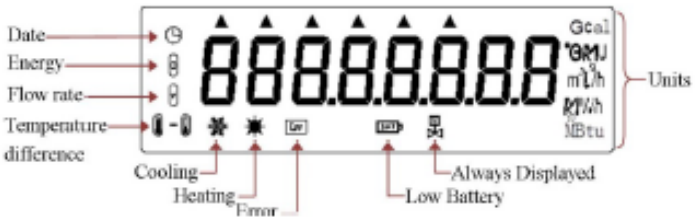
- Works with both heating and cooling systems
- High accuracy
  The high quality ultrasonic transducer and advanced electronic measurement technology work together to ensure the meter's high accuracy and stability
- No moving parts
  This decreases the maintenance cost and ensures that the meter is resistant to dirty water
- PT1000 platinum resistance
- Low starting flow-rate
  The U-shaped acoustic path widens the dynamic flow-rate measurement range and increases the accuracy of low and high end measurements where other, more narrow ranged, devices are inaccurate
- Horizontal or vertical installation
- Flow pulse and M-BUS output ports can be used for automated meter reading
- Automatic diagnostic function.
  An error code will be displayed on the screen to indicate the problem
- Ability to install an optional 3.6 V battery that can last up to 6 years

PULSE OUTPUT

Note: have to state when ordering if flow sensor part need pulse output, default no pulse output for Series 230 UHM BTU Meter.

The pulse output is used to communicate the flow-rate to an external counter. The number of gallons per pulse is located in the table below.

DN	Q_p	Gallons / Pulse
20	1.5	0.00688
20	2.5	0.01147
25	3.5	0.01605
32	6	0.02752
40	10	0.04586
50	15	0.06879
65	25	0.11466
80	40	0.18345
100	60	0.27518
125	100	0.45863
150	120	0.68795
200	200	1.14658



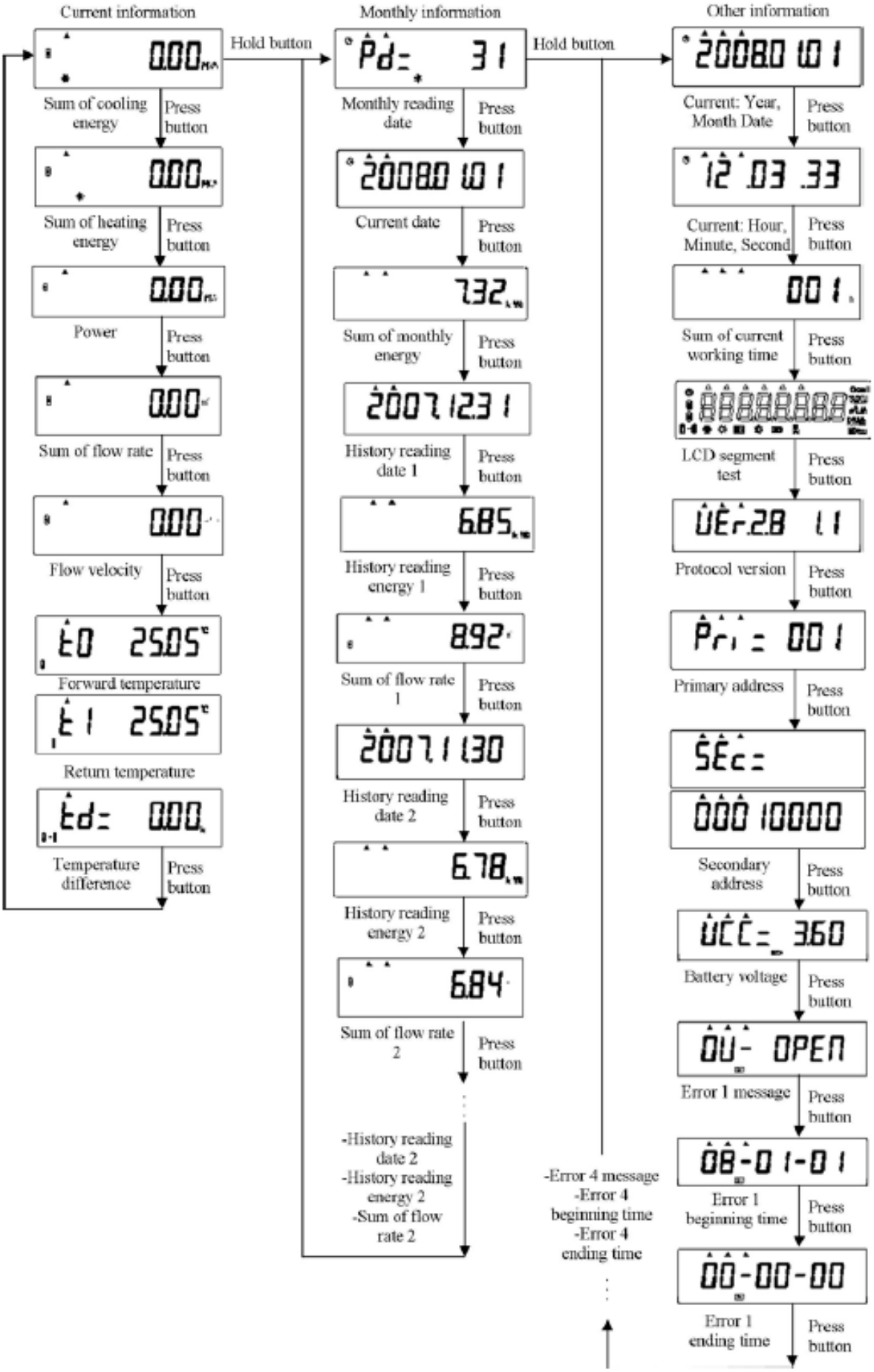
DISPLAY

1. **Switching Between Information**
   Holding down the button for > 1s will switch the sections from current information ▲, to monthly information▲▲, and then to other information ▲▲▲. Once in the desired section, pressing the key will switch the information shown for the given section.
2. **Display Units**
   Energy is displayed in kW•h, power is displayed in kW, flow volumeis displayed asm^3, and flow-rate is displayed in m^3/h.
3. **Display Details**
   a. "Monthly Reading Date" is displayed as "Pd-XX", in which XX is the end date of the current month's energy summation. The factory default value is 31, meaning thatthe monthly recording period ends at midnight on the 31st day of the month. At this time the current month's cumulated energy will be stored and the system will begin to record the next month's energy.
   b. The meter can store and display the recordings from the past 18 months.
   c. The units for "Sum of Working Time" (hours) is displayed as h.
   d. "Software and Protocol Editions" are displayed as "UEr.X.X X.X". The first X.X is the software edition code andthe second X.X is the communication protocol edition code.
   e. "Leaving-factory serial number" is the meter's identification number, which is the same as the one in the external label. This serial number is a unique number set by the factory; it is also the secondary address in M-BUS system.
   f. Battery Voltage displays "UCC-X.XX" (the default unit is Volts). When the battery's voltage capacity is lower than 2.9±0.1V, "" w BAT ar on the display. This symbol will not appear if no battery is installed.
   g. If there are any unresolved errors, the start date will display as normal but the end date will display "00-00-00", and then the error message will be displayed.

Error message table:

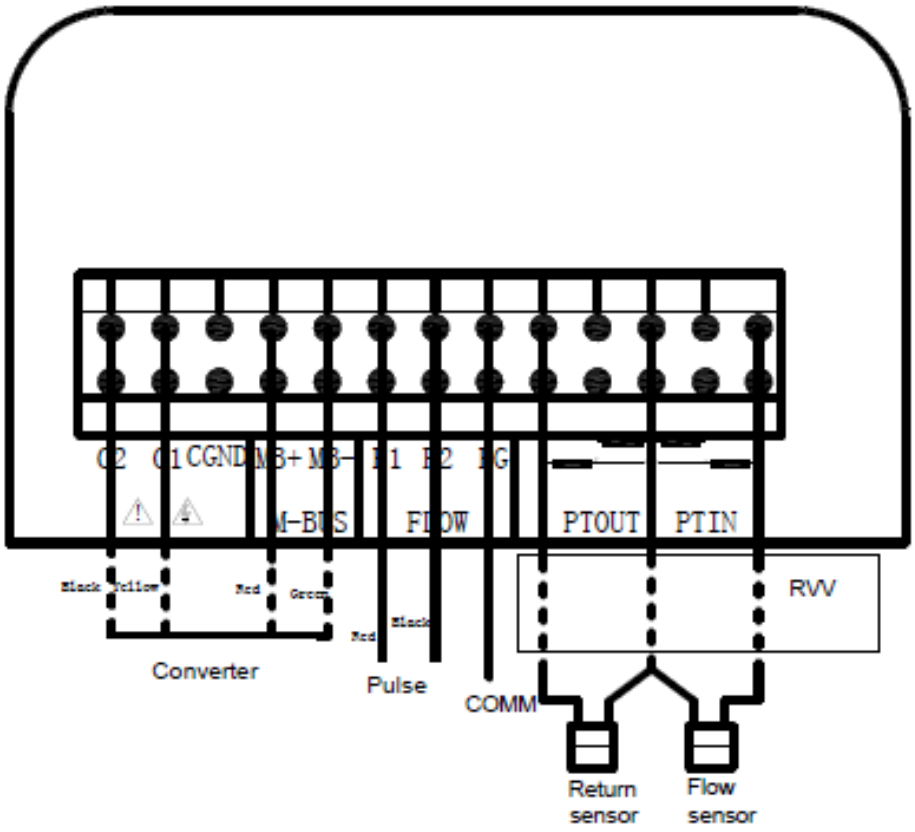
Error messages	Explanation
IN—CLOSE	Temperature sensor of water supply is in closed state
IN—OPEN	Temperature sensor of water supply is in open state
OU—CLOSE	Temperature sensor of return water is in closed state
OU—OPEN	Temperature sensor of return water is in open state
FL-OPEN	Flow sensor failure. (Could be caused by air in the meter, the absence of water, or water flowing in the wrong direction)
COD-XXXX	There is an error in malfunction record. "XXXX" is the error code

4) Display Menus



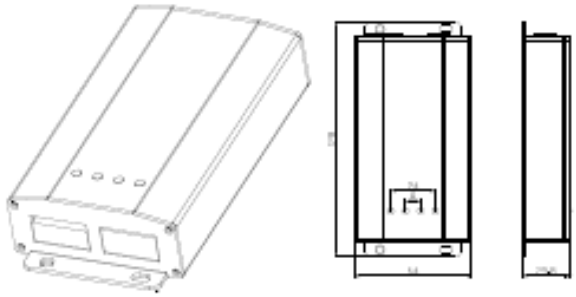
Wiring Diagram

9. Notes



1. If the meter will not be used in freezing conditions, drain all water from the connecting pipe. Low temperatures will cause the water to freeze in the pipe and damage the meter.
2. This device is intended to be used with clean water. While dirty water will not damage the meter, it will cause errors in the reading.
3. A filter should be mounted near the meter and cleaned regularly.
4. If the heat exchanging system is operating normally, but the instantaneous flow-rate of the heat meter reduces significantly, then there is too much dirt in the filer. This will narrow the pipe and reduce the flow. Cleaning the filter will fix the problem.
5. To protect the meter and avoid damage from harsh conditions, it is recommended that the meter be encased in an enclosure.
6. Primary Address: first 2 digits of Manufacturer ID
7. Secondary Address: later 8 digits of Manufacturer ID
8. Company Code: BAS (0833)
   - Version:54
9. Data: (Data variables order from UHM)
   - Cooling Energy
   - Heat Energy
   - Flow-rate
   - Operating Time
   - Flow Temperature
   - Return Temperature
   - Temperature Difference
   - Instantaneous Energy
   - Instantaneous Volume
   - Monthly energy
   - Recorded Volume
   - Recorded Date

MDU004A-B-M AND MDU004A-M-M CONVERTERS



DESCRIPTION

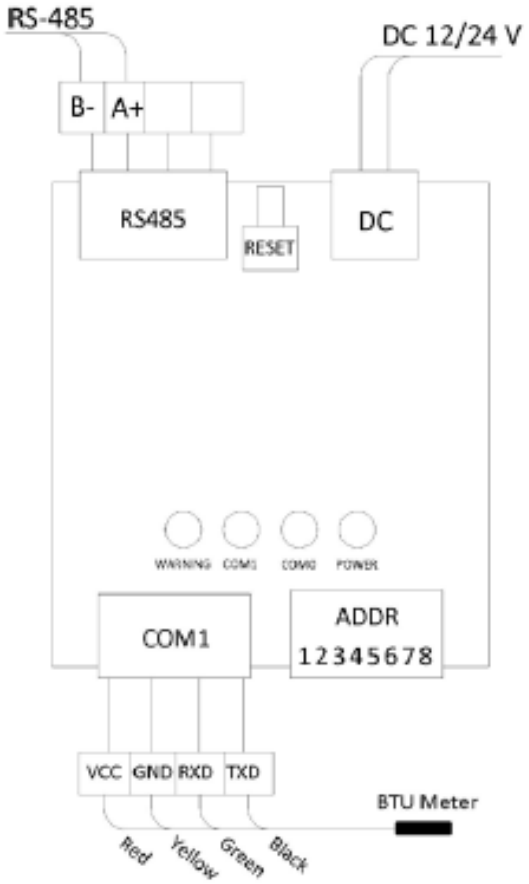
These converters enable communication between several UHM's connected to the same network. Both the MDU004A-B-M BACnet converter and the MDU004A-M-M MODBUS converter have identical setups and follow the same set of instructions.

SPECIFICATIONS

Temperature Limits:Ambient: 41 to 131°F (5 to 55°C);
Storage: -13 to 158°F (-25 to 70°C).
Humidity Limits:0 to 85% RH, no condensation.
Atmospheric pressure: 12 to 15 psi (86 to 106kPa).
Input voltage: 24VDC ±10%.
Power consumption: ≤1.5W.
Communication baud rate: BACnet: 38400 bps;
MODBUS: 9600 bps.
Enclosure Rating: NEMA 1General Enclosure.

INSTALLATIONNOTES

1. When connecting the UHM to the converter it is recommended to use a twisted-pair of shielded line.
2. Maximum length of the RS-485 communication network segment is 3950 ft. (1200 m).
3. If the converter is mounted on the wall, it should be about 5 ft. (1.5 m) above the floor, in a grounded metal cabinet, and within 4 ft. (1.2 m) of the BTU meter.
4. The converters are encased in a general enclosure and therefore should not be installed in locations with the following:
    a. Gas
    b. Rain
    c. Humidity
    d. Direct sunshine
    e. Corrosion
    f. Large electromagnetic fields
    g. Large-scale mechanical equipment
    h. Large-scale electric equipment
5. Connecting wires are not included



CONNECTIONS

RS485:RS485 communication interface A+ and B-.

DC: 12 to 24 VDC power supply input.
Connect the wires according to the wiring diagram on the converter's shell.

COM1:Four terminals that connect to the meter (VCC, GND, RXD, TXD). The order of the wires should be: red, yellow, green, black.

BUTTONS

RESET: The converters reset button.

ADDR: Address input.
Each number represents a switch to assign the address. Up is 0 (off) and down is 1 (on).

LEDs

WARNING: Self-checking errors indicator
The WARNING indicator will light up if there is an equipment initialization error, it will also light up if the address is incorrect.

COM1:Downlink indicator (converter ⇆ meter)
When the converter communicates with the meter, the COM1 will flash once if the communication is successful. If the communication fails, the COM1 will remain lit until the communication is established.

COM0: Uplink indicator (converter ⇆ computer)
The LED is lit while data is transmitting and it will turn off upon completion

POWER: Power indicator
A lit LED indicates that the unit has power.

Dial-up 1→8	Address	Dial-up 1→8	Address	Dial-up 1→8	Address	Dial-up 1→8	Address	Dial-up 1→8	Address	Dial-up 1→8	Address
10000000	1	10001000	17	10000100	33	10001100	49	10000010	65	10001010	81
01000000	2	01001000	18	01000100	34	01001100	50	01000010	66	01001010	82
11000000	3	11001000	19	11000100	35	11001100	51	11000010	67	11001010	83
00100000	4	00101000	20	00100100	36	00101100	52	00100010	68	00101010	84
10100000	5	10101000	21	10100100	37	10101100	53	10100010	69	10101010	85
01100000	6	01101000	22	01100100	38	01101100	54	01100010	70	01101010	86
11100000	7	11101000	23	11100100	39	11101100	55	11100010	71	11101010	87
00010000	8	00011000	24	00010100	40	00011100	56	00010010	72	00011010	88
10010000	9	10011000	25	10010100	41	10011100	57	10010010	73	10011010	89
01010000	10	01011000	26	01010100	42	01011100	58	01010010	74	01011010	90
11010000	11	11011000	27	11010100	43	11011100	59	11010010	75	11011010	91
00110000	12	00111000	28	00110100	44	00111100	60	00110010	76	00111010	92
10110000	13	10111000	29	10110100	45	10111100	61	10110010	77	10111010	93
01110000	14	01111000	30	01110100	46	01111100	62	01110010	78	01111010	94
11110000	15	11111000	31	11110100	47	11111100	63	11110010	79	11111010	95
00001000	16	00000100	32	00001100	48	00000010	64	00001010	80	00000110	96

INSTRUCTION OF MODIFYING ADDRESS

To enter the address modification process, flip all of the switches either up or down. The WARNING indicator will flash once per second to indicate that you have entered the address modification process; you will have one minute to modify the address. Flip all of the dial-up switches to the on (1) or off (0) position indicated by the code in the table above. The first number corresponds to the first switch, second number to the second switch, and so on.If the modified address is correct then the WARNING indicator will turn off. If it is incorrect (the address is 0 or >127) then the WARNING light will remain on.

TROUBLESHOOTING GUIDE

Failure	Possible causes	Solutions
None of the indicators are lit	No power supply	Inspect the external power supply
	Internal faults of the device	Deliver to manufacturer for repair
Power indicator is off but the other indicators work	Power indicator is damaged	Deliver to manufacturer for repair
COM0 indicator is on, which indicates failure in communication	Address is incorrect	Make sure the address displayed on the dial-up switches matches the actual address
	Uplink wire failure	Inspect the line
COM1 indicator is on	The subordinate equipment doesn't connect or is connected incorrectly	Inspect the line, then test it
WARNING indicator is on	Address is incorrect	Reset the address
	Internal faults of device	Deliver to manufacturer for repair

NOTES

1. Please read the instruction carefully before installing or using the converter. Any damages during installation are not in warranty scope.
2. The device does not allow hot-swap; resulting damage to the device is not in warranty scope.
3. Any damage resulting from disassembly is not in warranty scope.
4. Do not use the converter in locations with the following:
   a. Splashing hot water or oil
   b. Direct sunlight
   c. Dust or corrosive gas (especially vulcanization gas, ammonia, etc,)
   d. Drastic temperature changes
   e. Ice or condensation
   f. Radiation directly from a heater
5. When connecting, note the connection sequence of converter and meter and the wire's length. The length of the connecting wire is 4 ft(1.2m), damage resulting from changing the wire's length without the manufacturer's permission it is not in the warranty scope.
6. When using the converter to form a network, only use the standard wiring of the RS-485.
7. Place the communicator and its power supply far away from devices that produces surge or strong, high-frequency waves (such as high-frequency welding machine, high-frequency machine etc.).
8. Use the power voltage and load within the specification range.
9. **NOTICE** When cleaning DO NOT use paint thinner. Use either a slightly damp towel or standard grade alcohol.

WARRANTY/RETURN

Refer to "Terms and Conditions of Sales" in our catalog and on our website.Contact customer service to receive a Return Goods Authorization number before shipping the product back for repair. Be sure to include a brief description of the problem plus any additional application notes.

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