## Contents

1. **Introduction** 4
   1.1 Design 4

2. **Functionality** 5
   2.1 Overview of functions 7

3. **Connections** 8
   3.1 Overview of connections 9
   3.2 Power supply 10
   3.3 USB 10
   3.4 RS-232 14
   3.5 RS-485 14
   3.6 Optical eye 15
   3.7 M-Bus Output 15
     3.7.1 Current and voltage 15
   3.8 M-Bus Repeater Input 16

4. **Cabling** 18
   4.1 Special features of M-Bus Master 250D 18
   4.2 Electrical conditions in an M-Bus network 18
     4.2.1 M-bus modules 19
   4.3 Installation parameters 19

5. **M-Bus Addressing** 24
   5.1 Primary addressing 24
   5.2 Secondary addressing 24
   5.3 Enhanced secondary addressing 24

6. **M-Bus communication** 25
   6.1 Communication speed 25
   6.2 Transparent reading 25

7. **Operation of M-Bus Master MultiPort 250D** 26
   7.1 Keys 27
   7.2 Light Emitting Diodes 28
     7.2.1 Power 28
     7.2.2 Request 29
     7.2.3 Data 29
     7.2.4 Overload 29
   7.3 Display 29
   7.4 Menu overview 30
7.5 Meter search by means of MultiPort 250D
7.5.1 Primary scanning
7.5.2 Secondary scanning
7.6 Meter reading by means of MultiPort 250D
7.6.1 Meter reading after scanning
7.6.2 Meter reading from the menu Read Meter
7.7 Settings of MultiPort 250D
7.7.1 Date and time
7.7.2 Contrast
7.7.3 M-Bus
7.8 Other settings
7.9 PIN code
7.10 Advanced
7.10.1 Reading a meter via primary address
7.10.2 Reading a meter via secondary address
7.10.3 Display latest meter reading
7.10.4 Network troubleshooting
7.10.5 Information loggers
7.10.6 Factory settings
7.10.7 Restart master
7.10.8 About M-Bus Master MultiPort 250D

8 Web Server
8.1 IP->COM program
8.1.1 Configuration of IP->COM
8.2 Main menu
8.3 Status menu
8.4 Settings
8.5 Remote control
8.6 Power statistics
8.7 About M-Bus Master MultiPort 250D

9 GSM/GPRS

10 Dimensioned drawings

11 Technical data

12 Ordering numbers

13 Notes
1. Introduction

M-Bus is a bus system, which is specially suited for reading of water, heat, cooling, gas and electricity consumption meters.

An M-Bus system consists of an M-Bus Master and a number of meters with M-Bus interface. A network can include different meter types and brands. The cable type used will typically be twisted pair copper.

The connected meters are read either direct by the master with data appearing on the master’s display, or by a reading program which is connected to one of the master’s communication ports.

The master powers the M-Bus slave modules in the meters. Battery supplied meters thereby achieve a longer battery lifetime.

The maximum size of an M-Bus network using Kamstrup M-Bus Master MultiPort 250D is 250 meters. If a number of masters are configured as repeaters and coupled in cascade and only secondary addressing is used, a total of 1,250 meters can be connected, and the total cable length can be up to approx. 14 km.

If primary addressing is used up to 250 meters can be connected.

Communication on the M-Bus network is asynchronous serial bit transmission in half duplex, which means that it is only possible to communicate in one direction at a time.

Communication speed can be 300, 2400 or 9600 Baud.

It is not necessary to connect a PC to the master during installation, maintenance and troubleshooting on the M-Bus network as the master itself includes the functions needed. Operation is carried out via display and front keys.

M-Bus is standardized according to EN 13757-2 and EN 13757-3.

1.1 Design

M-Bus Master MultiPort 250D is built into a solid cabinet, which complies with protection class IP 67.

The front consists of a backlit LCD, 6 keys, 4 status LEDs and an optical eye.

The power supply is a switch mode type which enables you to connect the master to a power supply between 100 and 240 Volt. The frequency must be 50-60 Hz.
2. Functionality

Kamstrup M-Bus Master MultiPort 250D is an M-Bus master designed for the connection of up to 250 meters with M-Bus interface. The cable length of a master can be up to 2800 m depending on cable type. The master supports primary, secondary and enhanced secondary addressing. Enhanced secondary addressing is supported when the Master is used as level converter, not when reading via the display.

All inputs are galvanically separated from the M-Bus network.

Designing the master it has been considered important that installation and analysis work can be effected direct from the master without having to connect a PC with dedicated software.

As master MultiPort 250D is operated via its display and the six front keys.

The display has been designed with a user-friendly menu structure, which makes it simple to perform scanning, reading and analysis of the M-Bus network. Furthermore, the display currently provides information on network status such as current communication and number of connected meters (Unit Loads).

As level converter one or several of the integral communication ports are connected to a reading system, a control unit or similar. Communication is controlled from the connected units.

MultiPort 250D can be accessed from all available communication ports. The integral port controller prevents collision in case of simultaneous communication through more than one port.

When the port controller detects communication on one port, communication on other ports becomes impossible. When communication on one port is finished, all ports are open to communication.

The Repeater function makes it possible to extend the size of the M-Bus network both as to number of meters and total cable length. If one master and four repeaters are installed in a network, the total cable length can be extended to approx. 14 km and up to 1250 meters can be connected.
With 4 repeaters, up to 1250 meters and 14 km cable length

The master’s module area provides extra communication options, e.g. GSM/GPRS, and also prepares the master for additional future functionalities.

The integral web server enables remote operation of the master as to configuration, scanning and reading via RS-232, RS-485 and USB.

Operation via keys and communication through the optical eye can be protected by a PIN code.
Four light emitting diodes indicate the status of mains supply, data communication as well as possible overload and short-circuit of the M-Bus network.

Kamstrup M-Bus Master MultiPort 250D has been designed for installation indoors. The protection class can be up to IP 67.

2.1 Overview of functions

- Usable as master, repeater and level converter
- Backlit 128 x 64 pixels LCD
- Reading via display of both Kamstrup meters and foreign brands
- Supports primary, secondary and enhanced secondary addressing
- Collision detection with break signal
- Up to 250 slaves per master
- Integral repeater function
- Up to four repeaters in a system = a total of 1250 meters
- Up to 14 km cable length
- 300, 2400, and 9600 baud communication speed
- Byte recovery
- Echo suppression
- Transient protection
- Integral USB, RS-232, RS-485 and optical eye with automatic port controller
- Module area for e.g. GSM/GPRS module
- All ports are transparent and galvanically separated from the M-Bus network
- Integral web server for remote configuration, analysis and reading
- PIN code protection of keyboard and optical eye
- Event loggers for M-Bus master and M-Bus network
- Cable connection via 9 PG cable glands
- Local and remote update of firmware for future functionality
- Up to IP 67 protection class.
3. Connections

All connections in MultiPort 250D are screw terminals with max. cable size of 2 mm². The protection class of M-Bus Master MultiPort 250D can be up to IP 67. IP 67 means full dust protection as well as water tightness for minimum 30 minutes down to 1 metre. In order to obtain the highest IP protection the cables used must be correctly mounted through the master’s unions.
## 3.1 Overview of connections

<table>
<thead>
<tr>
<th>Connection number on master</th>
<th>Designation</th>
<th>Colour/connector no.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Power supply</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>134 N</td>
<td>Blue</td>
<td>Neutral</td>
<td></td>
</tr>
<tr>
<td>135 L</td>
<td>Brown</td>
<td>Live</td>
<td></td>
</tr>
<tr>
<td>136 PE</td>
<td>Yellow/green</td>
<td>Protective earth</td>
<td></td>
</tr>
<tr>
<td><strong>USB 2.0</strong></td>
<td></td>
<td>Max. recommended cable length: 5 m</td>
<td></td>
</tr>
<tr>
<td>130 VCC</td>
<td>Red/1</td>
<td>5V power supply</td>
<td></td>
</tr>
<tr>
<td>131 D-</td>
<td>White/2</td>
<td>Data -</td>
<td></td>
</tr>
<tr>
<td>132 D+</td>
<td>Green/3</td>
<td>Data +</td>
<td></td>
</tr>
<tr>
<td>133 GND</td>
<td>Black/4</td>
<td>Ground</td>
<td></td>
</tr>
<tr>
<td><strong>RS-232</strong></td>
<td></td>
<td>Max. recommended cable length: 15 m</td>
<td></td>
</tr>
<tr>
<td>105 RxD</td>
<td>2</td>
<td>Received Data</td>
<td></td>
</tr>
<tr>
<td>106 TxD</td>
<td>3</td>
<td>Transmitted Data</td>
<td></td>
</tr>
<tr>
<td>107 GND</td>
<td>5</td>
<td>Ground</td>
<td></td>
</tr>
<tr>
<td>108 DTR</td>
<td>4</td>
<td>Data Terminal Ready</td>
<td></td>
</tr>
<tr>
<td>109 CTS</td>
<td>8</td>
<td>Clear To Send</td>
<td></td>
</tr>
<tr>
<td>111 DSR</td>
<td>6</td>
<td>Data Set Ready</td>
<td></td>
</tr>
<tr>
<td>112 RTS</td>
<td>4</td>
<td>Request To Send</td>
<td></td>
</tr>
<tr>
<td><strong>RS-485</strong></td>
<td></td>
<td>Max. recommended cable length: 1,200 m</td>
<td></td>
</tr>
<tr>
<td>137 A/-</td>
<td></td>
<td>Transmit/Receive inverted</td>
<td></td>
</tr>
<tr>
<td>138 A+</td>
<td></td>
<td>Transmit/Receive non-inverted</td>
<td></td>
</tr>
<tr>
<td>139 GND</td>
<td></td>
<td>Ground</td>
<td></td>
</tr>
<tr>
<td><strong>M-Bus Repeater Input</strong></td>
<td></td>
<td>Jumper must be set to Repeater</td>
<td></td>
</tr>
<tr>
<td>53 L1</td>
<td></td>
<td>M-Bus input to master in repeater mode</td>
<td></td>
</tr>
<tr>
<td>54 L2</td>
<td></td>
<td>M-Bus input to master in repeater mode</td>
<td></td>
</tr>
<tr>
<td><strong>M-Bus Master Output</strong></td>
<td></td>
<td>4 sets connection terminals, connection in parallel</td>
<td></td>
</tr>
<tr>
<td>24 L1</td>
<td></td>
<td>M-Bus output from master to meters</td>
<td></td>
</tr>
<tr>
<td>25 L2</td>
<td></td>
<td>M-Bus output from master to meters</td>
<td></td>
</tr>
</tbody>
</table>
3.2 Power supply

The power supply of M-Bus Master MultiPort 250D is the switch mode type which requires voltage between 100 V and 240 V. The frequency can be 50 Hz or 60 Hz.

The mains cable is connected to the master through the associated gland. The diameter must be between 4 and 8 mm.

The master is supplied without mains cable and we recommend a fixed installation, i.e. without using a mains plug as this would reduce reliability of operation.

3.3 USB

M-Bus Master MultiPort 250D’s USB-connection can be used for M-Bus communication on an equal basis with the other serial connections.

The following communication speeds can be used for M-Bus communication:

- 300 Baud 8E1
- 2400 Baud 8E1
- 9600 Baud 8E1

USB version 2.0, which allows up to 5 m cable length, is used. In connection with other USB versions than 2.0 the maximum cable length recommended is 3 m.

The master’s integral port controller makes sure that communication is only possible on one serial port at a time.

The master is available with a factory-mounted 145 cm cable fitted with a USB connector type A.

To be able to communicate with M-Bus Master MultiPort 250D via USB the corresponding USB driver must be installed on the computer used for reading.

The program is available on Kamstrup’s home pages under the menu Support -> Downloads -> M-Bus Master 250D.
Selecting Run the installation program starts automatically.
When the program is retrieved it is saved under C:\Kamstrup\M-Bus Master 250D. Select as shown below in order to install the program.
Completing the Found New Hardware Wizard

The wizard has finished installing the software for:

Kamstrup M-Bus Master MultiPort 2500

The hardware you installed will not work until you restart your computer.

Click Finish to close the wizard.
### 3.4 RS-232

M-Bus Master MultiPort 250D’s RS-232-connection can be used for M-Bus communication on an equal basis with the other serial connections.

The following communication speeds can be used for M-Bus communication:

- 300 Baud 8E1
- 2400 Baud 8E1
- 9600 Baud 8E1

Maximum recommended cable length is 15 m.

The master’s integral port controller makes sure that communication is only possible on one serial port at a time.

The master is available with a factory-mounted 145 cm RS-232 cable fitted with a DB9F female connector.

![RS-232 connector type DB9F](image)

### 3.5 RS-485

M-Bus Master MultiPort 250D’s RS-485-connection can be used for M-Bus communication on an equal basis with the other serial connections.

The following communication speeds can be used for M-Bus communication:

- 300 Baud 8E1
- 2400 Baud 8E1
- 9600 Baud 8E1

Maximum recommended cable length is 1,200 m.

The master’s integral port controller makes sure that communication is only possible on one serial port at a time.
3.6 Optical eye

M-Bus Master MultiPort 250D’s optical eye can be used for M-Bus communication on an equal basis with the other serial connections.

The following communication speeds can be used for M-Bus communication:

- 300 Baud 8E1
- 2400 Baud 8E1
- 9600 Baud 8E1

The master’s integral port controller makes sure that communication is only possible on one serial port at a time.

3.7 M-Bus Output

All meters in an M-Bus network are connected to M-Bus Output terminals 24 and 25. The master includes four sets of connections coupled in parallel.

3.7.1 Current and voltage

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bus mark/space</td>
<td>41 V DC/28 V DC</td>
</tr>
<tr>
<td>Detection level, communication</td>
<td>7 mA</td>
</tr>
<tr>
<td>Detection level, collision</td>
<td>25 mA</td>
</tr>
<tr>
<td>Max. normal operating current</td>
<td>375 mA</td>
</tr>
<tr>
<td>Warning level, operating current</td>
<td>377 mA         - Overload LED flashes</td>
</tr>
<tr>
<td>Overload level, operating current</td>
<td>500 mA         - Overload LED is constantly illuminated</td>
</tr>
</tbody>
</table>
### 3.8 M-Bus Repeater Input

Kamstrup M-Bus Master 250D can be used as both master and repeater. Used as master up to 250 meters can be connected in an M-Bus system.

The Repeater function makes it possible to extend the size of the M-Bus network both as to number of meters and total cable length. If one master and four repeaters are installed in a network, the total cable length can be extended to approx. 14 km and up to 1250 meters can be connected.

The master is configured as repeater by placing the jumper on the connector marked Repeater. Using an M-Bus Master MultiPort 250D as a repeater the M-Bus network in front of the repeater is connected to M-Bus Repeater In on terminals 53 and 54. The following meters are connected to M-Bus Out on terminals 24 and 25.
The master’s display shows that it is configured as a repeater.
When the master is configured as a repeater, only the menu points which can be used with this configuration are displayed.
If the repeater is not connected to a master or repeater via terminals 53 and 54, the below-mentioned symbol is displayed.

**Note:** The power supply MUST be switched off during reconfiguration between master and repeater.
4. Cabling

Typically unshielded twisted pair cable up to approx. 1.5 mm² is used. The cabling topology is typically star or bus or a combination of both. The connection in M-Bus is independent of polarity and no termination resistance at the end of the cabling is needed.

If a cable type with shield is used, it is important that the two M-Bus conductors are not connected to ground or shield.

No precise indication as to the maximum cable length in an M-Bus network can be given as it depends on various parameters.

The two most important parameters to consider when selecting cable for an M-Bus installation are the cable resistance and the cable capacity. Generally speaking the resistance limits the number of M-Bus slaves, and the capacity limits the communication speed.

Furthermore, we recommend keeping a certain distance between M-Bus cables and other cables in order to minimize noise immission.

4.1 Special features of M-Bus Master 250D

M-Bus Master MultiPort 250D has been designed with the newest cable driver technology, and is, therefore, rather insensitive to the capacity of the M-Bus network.

Thus, designing an M-Bus network to be used together with M-Bus Master MultiPort 250D the limiting factor as to possible cable length will primarily be the cable resistance in the network.

4.2 Electrical conditions in an M-Bus network

According to EN 13757-2 the maximum output voltage from an M-Bus Master must not exceed 42 V. The output voltage from M-Bus Master MultiPort 250D is 41 V.

- If the voltage measured over terminals 24-25 is 24 V or more at the most distant meter, there is a high degree of certainty that all meters can be read
- If the voltage is between 20 and 24 V, it will probably be possible to read all meters
- If the voltage is between 18 and 20 V, the meter may be read
- If the voltage is below 18 V it is most likely that the meter cannot be read

There must be no communication on the M-Bus network when the above measurement is made.
4.2.1 M-bus modules

Each M-Bus module loads the M-Bus network too. According to the standard an M-Bus module should load the network with 1 unit load (UL) corresponding to 1.5 mA. Some modules, however, load with up to 4 UL. Capacitively the load of an M-Bus module is 0.5 – 1 nF.

The number of connected M-Bus slaves is shown on the display of the M-Bus Master 250D. Please note that it is not possible to show the exact number of connected slaves. This due to tolerances in the slaves.

4.3 Installation parameters

The following parameters are essential to the possible cable length of an M-Bus network.

4.3.1 Cable

The cable resistance and capacity must be as low as possible. The thicker the cable, the lower the resistance. The thicker the cable, the higher the capacity.

An M-Bus cable must minimum be able to handle 50 V and 500 mA.

<table>
<thead>
<tr>
<th>Diameter (mm ø)</th>
<th>Cross section (mm²)</th>
<th>Resistance in Ohm per 1,000 metres</th>
<th>Length in metres per Ohm</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5</td>
<td>0.20</td>
<td>90</td>
<td>11</td>
</tr>
<tr>
<td>0.65</td>
<td>0.33</td>
<td>53</td>
<td>19</td>
</tr>
<tr>
<td>0.8</td>
<td>0.50</td>
<td>35</td>
<td>29</td>
</tr>
<tr>
<td>1.0</td>
<td>0.79</td>
<td>23</td>
<td>45</td>
</tr>
<tr>
<td>1.13</td>
<td>1.00</td>
<td>18</td>
<td>57</td>
</tr>
<tr>
<td>1.26</td>
<td>1.25</td>
<td>14</td>
<td>71</td>
</tr>
<tr>
<td>1.39</td>
<td>1.52</td>
<td>12</td>
<td>87</td>
</tr>
<tr>
<td>1.6</td>
<td>2.0</td>
<td>8.7</td>
<td>115</td>
</tr>
</tbody>
</table>

Examples of resistance in copper cable
Please note that the resistance in copper depends on its purity. The purer the copper, the lower its resistance.

<table>
<thead>
<tr>
<th>LiYY</th>
<th>2x0.34 mm²</th>
<th>2x0.50 mm²</th>
<th>2x0.75 mm²</th>
<th>2x1.0 mm²</th>
<th>2x1.5 mm²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current load</td>
<td>Max. 4.5 A</td>
<td>Max. 6 A</td>
<td>Max. 10 A</td>
<td>Max. 12 A</td>
<td>Max. 18 A</td>
</tr>
<tr>
<td>Cable resistance</td>
<td>56 Ω/km</td>
<td>39 Ω/km</td>
<td>26 Ω/km</td>
<td>20 Ω/km</td>
<td>12 Ω/km</td>
</tr>
<tr>
<td>Capacity</td>
<td>110 nF/km</td>
<td>120 nF/km</td>
<td>120 nF/km</td>
<td>120 nF/km</td>
<td>120 nF/km</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>J-Y(St)YY</th>
<th>2x0.60 mm²</th>
<th>2x0.80 mm²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current load</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Cable resistance</td>
<td>65 Ω/km</td>
<td>37 Ω/km</td>
</tr>
<tr>
<td>Capacity</td>
<td>120 nF/km</td>
<td>100 nF/km</td>
</tr>
</tbody>
</table>

Examples of cable types

In big networks using secondary addressing worst case load must be considered as 250 slaves of 1UL (Unit Load) can draw 5.4 A each, which thin cables will not be able to withstand.

Please note that resistance can be stated in two different ways in cable specifications; i.e. as cable resistance or loop resistance.

Loop resistance is the total resistance measured through the two conductors. Cable resistance is the resistance through one conductor. Therefore, loop resistance is always twice the cable resistance.
4.3.2 Cable topology

An M-Bus network normally uses bus or star topology, or a combination of both. The advantage of bus topology is shorter wires. The disadvantage is that a cable interrupt will mean that all the following meters can no longer be read.

The advantage of star topology is that all the other meters can still be read after a cable interrupt. The disadvantage is a large consumption of cable with a high leading load, which reduces the maximum cable length and makes a reduction of communication speed necessary respectively.

Bus topology offers two solutions, one looping the cable through each meter. This solution presupposes that there is room for two cables and that the connection terminals are prepared for the connection of two sets of cables. All connections are thereby typically made inside the meter.

Using bus topology with each individual meter connected to the bus, a number of connections must be established on the bus itself.
Bus topology with each individual meter connected to the bus

Star topology connecting each individual meter direct to the M-Bus Master
4.3.3 Examples of network sizes

The below-mentioned tables show examples of possible network sizes with different cable sizes. Each connected repeater increases the possible cable length by the below-mentioned lengths.

**Cable type 0.34 mm² (56 Ohm/110nF)**

<table>
<thead>
<tr>
<th>Speed / Number of meters</th>
<th>10</th>
<th>50</th>
<th>150</th>
<th>250</th>
</tr>
</thead>
<tbody>
<tr>
<td>300 Baud</td>
<td>10,000 m</td>
<td>2,000 m</td>
<td>700 m</td>
<td>400 m</td>
</tr>
<tr>
<td>2400 Baud</td>
<td>4,000 m</td>
<td>2,000 m</td>
<td>700 m</td>
<td>400 m</td>
</tr>
<tr>
<td>9600 Baud</td>
<td>2,000 m</td>
<td>2,000 m</td>
<td>700 m</td>
<td>400 m</td>
</tr>
</tbody>
</table>

Possible cable lengths with all meters placed at the end of the cable network

<table>
<thead>
<tr>
<th>Speed / Number of meters</th>
<th>10</th>
<th>50</th>
<th>150</th>
<th>250</th>
</tr>
</thead>
<tbody>
<tr>
<td>300 Baud</td>
<td>10,000 m</td>
<td>3,500 m</td>
<td>1,200 m</td>
<td>700 m</td>
</tr>
<tr>
<td>2400 Baud</td>
<td>7,000 m</td>
<td>3,500 m</td>
<td>1,200 m</td>
<td>700 m</td>
</tr>
<tr>
<td>9600 Baud</td>
<td>3,500 m</td>
<td>3,500 m</td>
<td>1,200 m</td>
<td>700 m</td>
</tr>
</tbody>
</table>

Possible cable lengths with meters evenly distributed in the cable network

**Cable type 1.5 mm² (12 Ohm/110nF)**

<table>
<thead>
<tr>
<th>Speed / Number of meters</th>
<th>10</th>
<th>50</th>
<th>150</th>
<th>250</th>
</tr>
</thead>
<tbody>
<tr>
<td>300 Baud</td>
<td>10,000 m</td>
<td>8,000 m</td>
<td>2,800 m</td>
<td>1,600 m</td>
</tr>
<tr>
<td>2400 Baud</td>
<td>10,000 m</td>
<td>8,000 m</td>
<td>2,800 m</td>
<td>1,600 m</td>
</tr>
<tr>
<td>9600 Baud</td>
<td>3,500 m</td>
<td>3,500 m</td>
<td>2,800 m</td>
<td>1,600 m</td>
</tr>
</tbody>
</table>

Possible cable lengths with all meters placed at the end of the cable network

<table>
<thead>
<tr>
<th>Speed / Number of meters</th>
<th>10</th>
<th>50</th>
<th>150</th>
<th>250</th>
</tr>
</thead>
<tbody>
<tr>
<td>300 Baud</td>
<td>10,000 m</td>
<td>10,000 m</td>
<td>4,800 m</td>
<td>2,800 m</td>
</tr>
<tr>
<td>2400 Baud</td>
<td>10,000 m</td>
<td>10,000 m</td>
<td>4,800 m</td>
<td>2,800 m</td>
</tr>
<tr>
<td>9600 Baud</td>
<td>6,500 m</td>
<td>6,500 m</td>
<td>4,800 m</td>
<td>2,800 m</td>
</tr>
</tbody>
</table>

Possible cable lengths with meters evenly distributed in the cable network
5. M-Bus Addressing

Primary, secondary and enhanced secondary addressing are supported. The master’s integral collision
detector enables wild card search for meters in connection with secondary and enhanced secondary
addressing.

Using wild card search one or several of the digits of the meter’s address are replaced by wild cards when
searching for meters.

5.1 Primary addressing (001-250)

Each meter must have a unique primary address between 001 and 250. If more than one meter have the same
address, a collision will occur and the meters cannot be read.

Kamstrup M-Bus modules automatically use the last 2-3 digits of the customer number as their primary
address.

5.2 Secondary addressing (00000001-99999999)

Secondary addressing uses the last 8 digits of the meter number as M-Bus ID.

Kamstrup MULTICAL® meters use the customer number as their secondary address, which makes it possible to
change the secondary address.

5.3 Enhanced secondary addressing (00000001-99999999)/(00000001-99999999)

The meter’s serial number is used for enhanced secondary addressing. A meter’s serial number is unique and
cannot be changed after production.
6. M-Bus communication

M-Bus communication is half duplex allowing two-way communication with one M-Bus slave at a time. The master's integral port controller makes sure that communication is only possible on one serial port at a time.

6.1 Communication speed

M-Bus Master MultiPort 250D supports the following communication speeds:
- 300 Baud 8E1
- 2400Baud 8E1
- 9600 Baud 8E1 (not via GPRS)

6.2 Transparent reading

MultiPort 250D is equipped with the following communication possibilities for reading from e.g. remote reading systems, control systems and various controllers with M-Bus interface:
- USB
- RS-232
- RS-485
- Optical eye
- GSM/GPRS (optional equipment)

Communication through the above-mentioned ports is transparent and includes collision detection.
7. Operation of M-Bus Master MultiPort 250D

The master can be operated by means of its display and six keys.
7.1 Keys

According to the display structure the left and right function keys are soft keys, i.e. their function depends on the displayed menu point.

The six keys have the following functions:

<table>
<thead>
<tr>
<th>Left function key</th>
<th>Right function key</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Left function key" /></td>
<td><img src="image" alt="Right function key" /></td>
</tr>
<tr>
<td>The function of the key is displayed in the lower left-hand corner of the display if the key has a function in the selected display menu. The text in the lower left-hand corner of the display can also be for your information without the key having a function.</td>
<td>The function of the key is displayed in the lower right-hand corner of the display if the key has a function in the selected display menu. The text in the lower right-hand corner of the display can also be for your information without the key having a function.</td>
</tr>
<tr>
<td><strong>Down</strong></td>
<td><strong>Up</strong></td>
</tr>
<tr>
<td><img src="image" alt="Down" /></td>
<td><img src="image" alt="Up" /></td>
</tr>
<tr>
<td>Moves ▼ in the display downwards in the menu.</td>
<td>Moves ▲ in the display upwards in the menu.</td>
</tr>
<tr>
<td><strong>Back</strong></td>
<td><strong>OK</strong></td>
</tr>
<tr>
<td><img src="image" alt="Back" /></td>
<td><img src="image" alt="OK" /></td>
</tr>
<tr>
<td>Moves one level back (upwards) in the menu, or back to the previous screen if a shortcut key has been used.</td>
<td>Starts the function which has been selected with the arrow keys.</td>
</tr>
</tbody>
</table>
7.2 Light Emitting Diodes

The master has four light emitting diodes on its front plate.

7.2.1 Power

Green light emitting diode which is lit when the master is connected to supply power of 100-240 V, 50-60 Hz.
7.2.2 Request
Orange light emitting diode which flashes briefly when a command or a request from the master is transmitted to the M-Bus network.

7.2.3 Data
Orange light emitting diode which flashes when an M-Bus slave sends data to the master. The duration depends on the amount of data being sent.

7.2.4 Overload
Red light emitting diode which flashes when the load on the M-Bus network is between 375 and 500 mA. Is permanently lit when the load on the M-Bus network exceeds 500 mA.

7.3 Display
The resolution of the backlit display is 128x64 pixels. The master is operated by means of the display and the six keys.
The four corners of the display are used for four different types of information.

Title
Displays the name of the menu, e.g. Main Menu, or indicates whether the master is configured as master or as repeater.
**Location**
Shows where you are in a menu list, a meter list or a meter data list. Alternatively, it displays details of an ongoing function, e.g. secondary scanning at 2400 Baud.

**Status**
Indicates the status of the screen in question (refers to Title). For example it can indicate the number of slaves found during scanning.

**Notifier**
Displays information on a recent event. For instance it could be the number of a meter found during scanning. Notifier can also be a shortcut key, e.g. a meter reading can be started using the right-hand function key.

### 7.4 Menu overview

The top menu shows time and date, the configuration of the master as master or repeater, and the number of unit loads, with which the meters load the master. Typically the load of one meter is 1 unit load. If PIN code protection is on, a padlock is displayed.

The main menu shows the different menus available in the master.

### 7.5 Meter search by means of MultiPort 250D
Carrying out a meter search (scanning) by means of the master, you can choose primary or secondary scanning.
Available communication speeds are 300, 2400 or 9600 Baud, and scanning can be carried out at all three speeds.

It appears from the top of the master’s display whether scanning has been effected with primary or secondary addressing, and also the selected speed is displayed.
At the bottom of the display the number of meters found as well as the number of the last meter found is shown.

### 7.5.1 Primary scanning

Primary scanning scans for meters with M-Bus addresses between 001 and 250.

#### Select type of scanning

Primary scanning

#### Select speed

Select speed

### 7.5.2 Secondary scanning

Secondary scanning scans for meters with M-Bus addresses between 00000000 and 99999999. Wildcard search is indicated by the meter number being replaced by one or several times “F”.

#### Scanning completed

Scan Completed
7.6 Meter reading by means of MultiPort 250D

Meter reading is effected either immediately after a scanning or from the menu Read Meter.

7.6.1 Meter reading after scanning

Scanning having been completed select Read Meter using the right function key to have the list of meters found displayed. Select the meter to be read using ▼ and ▶.
The meter is read

The meter has been read

When the meter has been read the first data will appear in the display, which also indicates the total number of registers that can be read. The example above displays registers 1 to 5 of a total of 50 registers.

Scroll using ▼ and ▲.

Pressing ✔ again reading data is displayed in detailed resolution.

Detailed temperature indication

Detailed module type indication

Reading MULTICAL® meters both M-Bus specific and producer specific data are displayed by the master. Among other things software version and module type are displayed.

From other meter types M-Bus specific data is displayed.
7.6.2 Meter reading from the menu Read Meter

M-Bus Master MultiPort 250D remembers the meters from the latest scanning. This means that it is not necessary to scan the whole M-Bus network every time a meter is to be read. You just select the meter to be read from the menu Read Meter and press \( \checkmark \).

7.7 Settings of MultiPort 250D

A number of configurations can be set via the master’s display.

All settings will be remembered, also when the master is without supply voltage. Press \( \checkmark \) to save the settings.

7.7.1 Date and time

Adjust time and date using the keys. The value is changed using \( \uparrow \) and \( \downarrow \) and the left and right function keys are used for switching between the individual values.
7.7.2 Contrast

The contrast of the display can be adjusted for optimum reading.

7.7.3 M-Bus

Scan Startup Delay
Scan Startup Delay sets the master’s delay in starting a scanning after pressing ✓. Default Startup Delay is 700 ms.

NKE Delay
NKE Delay sets the master’s delay after having sent a normalisation/initialisation to the meters in the network. An initialisation has the effect that all modules are reset and collect new data from the meters. Some module types require initialisation to be able to read them. Other module types need a period of time after initialisation to make data ready for reading. Default NKE Delay is Off.
**Bus Collision Delay**

Bus Collision Delay sets how long the master must pause before continuing scanning after a collision between a number of M-Bus addresses.

Default Collision Delay is 700 ms.

**Bus Overload Delay**

Bus Overload Delay sets the delay of the internal scanner function after having detected an overload on the M-Bus outputs. This can e.g. be caused by too many connected meters or short-circuit in the cable network.

Default Overload Delay is 700 ms.

**7.8 Other settings**

![Miscellaneous](image)

**Backlight Mode**

Select whether the display should be permanently lit or only when the master is operated.

**Clock Appearance**

Select analog or digital display.

**Optical Eye**

The optical eye can be activated and deactivated. If not in use, and when the master is placed in very light surroundings, the optical eye ought to be deactivated in order not to disturb communication on the other communication ports.

Default the optical eye is deactivated.
7.9 PIN code

Keyboard and reading via the optical eye of M-Bus Master MultiPort 250D can be protected by a PIN code. The value is changed using ▲ and ▼ and the left and right function keys are used for switching between the individual digits. Press ✓ in order to activate the PIN code.

A padlock is displayed when the PIN code function is active. If the padlock is open the master is unlocked, the padlock is closed when the master is locked.

The master is automatically locked approx. 30 minutes after end of use.

Note: If the PIN code has been lost, the master can only be reset by a Kamstrup technician.

7.10 Advanced

The menu area Advanced includes various functions for meter reading, network troubleshooting, display of operation and error loggers etc.
7.10.1 Reading a meter via primary address

Instead of scanning the whole network in order to read a single meter, the meter can be read by selecting its M-Bus address.

Address and Baud rate are selected using the function and arrow keys.

7.10.2 Reading a meter via secondary address

Instead of scanning the whole network in order to read a single meter, the meter can be read by selecting its M-Bus address.

Address and Baud rate are selected using the function and arrow keys.
7.10.3 Display latest meter reading

Data of the latest meter reading can be displayed by the master without reading the meter again.

7.10.4 Network troubleshooting

If an M-Bus network includes one or more masters which have been configured as repeaters, troubleshooting can be limited by reconfiguring a repeater to a master. Thereby you can scan the network from the selected master without the meters in front of the selected master being read.

Communication from the master can be effected using keys and display, as well as RS-232, USB and optical eye.

When the troubleshooting has been finished the operator must reconfigure to repeater using the keys or by restarting the master.

7.10.5 Information loggers

The M-Bus master has two loggers with information on previous events.
M-Bus logger

The M-Bus logger displays the latest scannings of the M-Bus network. Each event is time stamped by the master’s built-in real time clock.

System logger

The system logger shows events in the master. Each event is time stamped by the master’s built-in real time clock.

7.10.6 Factory settings

The master’s settings can be restored to the settings it had when it was produced.
Please note that loggers are reset too.

7.10.7 Restart master

If it is not possible to switch off the power supply, the master can be restarted by selecting the menu Reboot.

7.10.8 About M-Bus Master MultiPort 250D

The menu About displays the master’s serial number as well as the individual hardware and software unit revisions.
8. Web Server

MultiPort 250D has a built-in web server for remote control and configuration.

The following programs can be used as PC-program:

- Microsoft® Internet Explorer version 8
- Mozilla Firefox 3
- Google Chrome 5

To be able to communicate with the master an IP for COM port converter must also be installed. The program can be collected on Kamstrup’s homepages.

Communication can be effected via RS-232, RS-485 and USB.

The available options are described below.

8.1 IP->COM program

The program IP->COM Programm\textsuperscript{1} is downloaded from www.kamstrup.dk.

\textsuperscript{1} The IP->COM Program is Freeware from Stephen Hill. Copyright © 2002. All Rights Reserved.
Select Download from the menu area Support. Then select M-Bus Master 250D and next IP->COM.
Save the program on your PC. Start the program and follow the installation instructions on the screen. Start the program when the installation has been completed.

8.1.1 Configuration of IP->COM

Select the COM port, to which the master has been connected. Please note that a USB connection requires the selection of a COM port too.
Select Configure.
Select 38400, 8, None, 1, None and click on Apply.
Alternatively, 9600, 8, None, 1, None, can be selected if the cable is very long.
Please note that the operation at 9600 is somewhat slower than at 38400.
In the menu TCP/IP Service, select Allow multiple connections and Allow only 1st connection to Tx. Support Telnet and Strip Line feeds must be empty.
Port number is automatically filled in.
Then select Enable.
When finished, Disable must be selected in order to release the COM port.
The selected COM port appears from Windows Device Manager.
If you want to change the selected COM port, double-click on it in Device Manager. Under Port settings select Advanced and change to the required COM port.
8.2 Main menu

In order to access M-Bus Master MultiPort 250D start the browser and enter the following, http://localhost:xxxx.

Replace xxxx by the Port Number of the program IP->COM. In the example 1022, of which 22 corresponds to the COM port, to which the master is connected.
Subsequently select the menu point you wish to apply.
8.3 Status menu

Displays various current status values for the master.
8.4 Settings
Setting of date, time, PIN code etc.
8.5 Remote control

The master can be remotely controlled via its web server.
Event loggers

Displays an overview of registered events.
8.6 Power statistics
Displays in an overview when the master has been switched on and off.
8.7 About M-Bus Master MultiPort 250D
Displays an overview of serial number, HW and SW versions.
9. GSM/GPRS

M-Bus Master MultiPort 250D can be extended by a Kamstrup GSM 6H modem, enabling the master to be remotely read via GSM or GPRS. Reading via GPRS, the maximum M-Bus communication speed is 2400 Baud. GSM 6H is mounted in the upper module area and is connected to the master’s internal power supply as shown in the picture.

Electrical connection between the GSM 6H module and the M-Bus Master is established by means of a Jumper.

The external antenna must be connected as shown below and placed well away from the M-Bus master and the connected network wires.

As remote reading system we recommend Kamstrup PcBase III and PcNet III.

**SMS command**

<table>
<thead>
<tr>
<th>SIGNAL - for reading the signal strength</th>
</tr>
</thead>
<tbody>
<tr>
<td>Syntaks, command</td>
</tr>
<tr>
<td>Syntax, return answer</td>
</tr>
<tr>
<td>Example</td>
</tr>
<tr>
<td>Return answer, correct</td>
</tr>
<tr>
<td>Return answer, error</td>
</tr>
</tbody>
</table>

**NOTE:** SMS commands must be sent in either capital or small letters. Capital and small letters must not be mixed in the same SMS command.
10. Dimensioned drawings

All measurements in mm.
## Technical data

### Electrical (M-Bus)

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of slaves per master</td>
<td>250 at 1 unit load per slave</td>
</tr>
<tr>
<td>Total number of slaves</td>
<td>1250 at 1 master and 4 repeaters</td>
</tr>
<tr>
<td>Cable length per master</td>
<td>Up to approx. 2800 m, depending on cable type, cable topology and number of connected slaves</td>
</tr>
<tr>
<td>Total cable length</td>
<td>Up to approx. 14 km at 1 master and 4 repeaters</td>
</tr>
<tr>
<td>Cable thickness</td>
<td>Max. 2 mm²</td>
</tr>
<tr>
<td>Communication ports</td>
<td>RS-232, RS-485, USB, optical eye</td>
</tr>
<tr>
<td>Communication speeds</td>
<td>300/2400/9600 baud</td>
</tr>
<tr>
<td>Data frame</td>
<td>1 start bit, 8 data bits, 1 parity bit (even), 1 stop bit</td>
</tr>
<tr>
<td>Addressing modes, transparent</td>
<td>Primary/secondary/enhanced secondary</td>
</tr>
<tr>
<td>Addressing modes, direct reading</td>
<td>Primary/secondary</td>
</tr>
<tr>
<td>Address range, primary</td>
<td>001-250</td>
</tr>
<tr>
<td>Address range, secondary</td>
<td>00000000-99999999</td>
</tr>
<tr>
<td>Address range, enhanced secondary</td>
<td>00000000-99999999/00000000-99999999</td>
</tr>
<tr>
<td>Bus mark/space</td>
<td>41 V DC/28 V DC</td>
</tr>
<tr>
<td>Detection level, communication</td>
<td>7 mA</td>
</tr>
<tr>
<td>Detection level, collision</td>
<td>25 mA</td>
</tr>
<tr>
<td>Max. normal operating current</td>
<td>375 mA</td>
</tr>
<tr>
<td>Warning level, operating current</td>
<td>377 mA</td>
</tr>
<tr>
<td>Overload level</td>
<td>500 mA</td>
</tr>
</tbody>
</table>
## Electrical (GSM 6H)

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequencies</td>
<td>900-1800 MHz phase II+</td>
</tr>
<tr>
<td>Transmitting power 900 MHz Class 4</td>
<td>2 W</td>
</tr>
<tr>
<td>Transmitting power 1,800 MHz Class 1</td>
<td>1 W</td>
</tr>
<tr>
<td>GPRS classes</td>
<td>8, B</td>
</tr>
<tr>
<td>Communication speeds GSM</td>
<td>300/2400/9600 baud</td>
</tr>
<tr>
<td>Communication speeds GPRS</td>
<td>300/2400 baud</td>
</tr>
</tbody>
</table>

## Electrical (HTTP)

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Communication ports</td>
<td>RS-232, RS-485, USB</td>
</tr>
<tr>
<td>Communication speed</td>
<td>9600/38400 baud</td>
</tr>
<tr>
<td>Data frame</td>
<td>1 start bit, 8 data bits, no parity bit, 1 stop bit</td>
</tr>
</tbody>
</table>

## Electrical (in general)

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power supply</td>
<td>100-240V 50/60 Hz</td>
</tr>
<tr>
<td>Power consumption</td>
<td>Max. 40 W</td>
</tr>
</tbody>
</table>

## Mechanical

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating temperature range</td>
<td>0…55 °C, non-condensing, installation indoors</td>
</tr>
<tr>
<td>Storage temperature range</td>
<td>20…+60 °C</td>
</tr>
<tr>
<td>Protection class</td>
<td>Up to IP 67, depending on cables</td>
</tr>
<tr>
<td>Dimensions</td>
<td>210 x 168 x 64 mm (H x W x D)</td>
</tr>
<tr>
<td>Weight</td>
<td>1 kg</td>
</tr>
</tbody>
</table>

## Approvals and standards

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Approvals</td>
<td>CE marking</td>
</tr>
<tr>
<td>Standards</td>
<td>EN 13757-2, EN 13757-3</td>
</tr>
</tbody>
</table>
# 12. Ordering numbers

<table>
<thead>
<tr>
<th>Description</th>
<th>Ordering No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>M-Bus Master MultiPort 250D</td>
<td>MBM-M210000</td>
</tr>
<tr>
<td>M-Bus Master MultiPort 250D with GSM 6H</td>
<td>MBM-M210000</td>
</tr>
<tr>
<td>RS-232 cable DB 9, 145 cm</td>
<td>6699-335</td>
</tr>
<tr>
<td>USB cable, 145 cm</td>
<td>6699-336</td>
</tr>
<tr>
<td>GSM 6H incl. mini Triangle antenna with 1.5 m cable</td>
<td>670XXXXX.MBM250D</td>
</tr>
</tbody>
</table>