

# The MBus Driver

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The MBus driver interfaces to a network of energy meters supporting the M-Bus protocol standard. The driver supports a network of up to 250 meters, depending on the hardware used, which may span several kilometres. Available for Commander and ObSys.

This document relates to MBus driver version 1.0 and 1.2

Please read the *Commander Manual* or *ObSys Manual* alongside this document, available from [www.northbt.com](http://www.northbt.com)

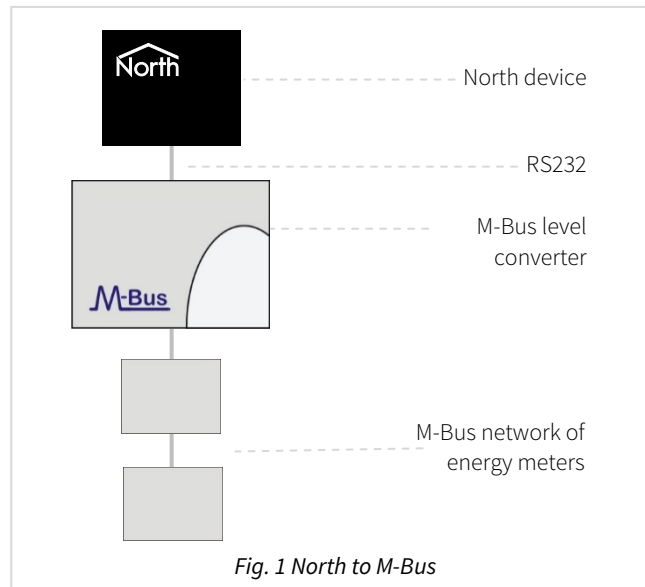
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# Compatibility with the M-Bus System

The M-Bus driver allows North to interface with a network of energy meters supporting the M-Bus protocol standard.

The driver connects, via an M-Bus level converter, to a network of energy meters (Fig. 1). These can include water, electricity, gas, and heat meters. Depending on the M-Bus level converter used, up to 250 energy meters are supported, which can be networked over several kilometres.



## Equipment

The North device connects to an M-Bus level converter. This converts the RS232 electrical signal to the M-Bus two-wire standard (EN 13757-2), and provides power to the M-Bus interface on each energy meter.

The driver supports many different manufacturers' energy meters fitted with an M-Bus option, including: ABB, Hydrometer, Kamstrup, AB Svensk, Viterra, Sontex, etc.

The M-Bus network is polarity independent, and various meter types from different manufacturers can co-exist on the same network.

## Values

The driver scans the M-Bus network for meters and automatically polls their available values. Up to 32 non-historical primary values are available from a meter. Depending on the meter type, values available include:

- Energy
- Volume
- Operating time
- Power
- Volume flow
- Temperature

Multi-tariff values and sub-units up to 16 are supported. The driver provides limited support for non-standard manufacturer-specific data.

The M-Bus driver sends alarms when a meter goes online or offline.

## Prerequisites

Each M-Bus meter must be configured with a unique primary address in the range 1 to 250. The supplier may program this, or information on the default value may be provided in the meter's documentation. Alternatively, the driver includes a local connect mode (when only one meter is connected) which may be used to configure the address.

An M-Bus level converter, sometimes called an M-Bus master, is required for each network. These are rated based on the number of energy meters connected. M-Bus level converters are available from North for up to 20, 60, or 250 meters – order code MISC/MBUS/*number of meters*. If sourcing your own M-Bus level converter, we recommend a model without a display.

The driver will auto-configure meters to communicate at 2400 baud by default. However, if a meter's baud rate is not variable then specify it in the driver configuration. A baud rate lower than 1200 requires Commander version 2.0 build 01/07/16 or later.

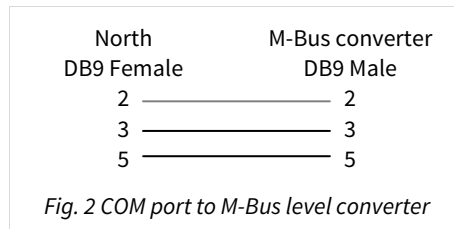
# Using the Driver

On ObSys and Commander, the MBus driver is pre-installed. On both these North devices, you can use the driver to create an interface to M-Bus. Once started, you will need to set up the driver before it can communicate with the M-Bus system.

## Making the Cable

Connect the North device's COM port to an M-Bus level converter.

The connection from the COM port to the M-Bus converter will vary. Usually it has a port for connecting to a PC; if this is the case connect as follows:



The maximum RS232 cable length is 15 metres, and should be as short as possible.

## Starting the Interface

- 📖 To start an interface using the MBus driver, follow these steps:
  - **Start Engineering** your North device using ObSys
  - Navigate to **Configuration, Interfaces**, and set an unused **Interface** to 'MBus' to start the particular interface
  - Navigate to the top-level of your North device, then rescan it

The driver setup object (Mc), labelled **M-Bus Setup**, should now be available. If this object is not available, check an interface licence is available and the driver is installed.

## Setting up the Driver

- 📖 To set up the driver, follow these steps:
  - Navigate to the **M-Bus Setup** object (Mc). For example, if you started interface 1 with the driver earlier, then the object reference will be 'M1'
  - Set the **COM Port** object (RS.COM) to select which serial port number on the North device the M-Bus system is connected

## Checking Communications

Wait for the **Module State** object (S) to have the value 'idle', indicating the driver has finished scanning the M-Bus network for meters.

Scan the **M-Bus System** object (Sc) to discover which meters are communicating with the driver. Each meter contains a **Communications Reliable** (Mx.I.CS) object.

# Alarms

When the M-Bus driver detects an alarm condition, it sends a North-format alarm to the device's alarm processing.

The driver sends an alarm when the system is powered-on, and when an energy meter stops responding or re-starts.

## Format

North-format alarms contain six text fields. The MBus driver places the following information into these fields, depending on the alarm type.

### System Alarms

**System** - copied from Device Label (DL) within the driver setup

**Point** - 'System'

**Condition** - 'Power On'

**Priority** - '3'

**Date & Time** – when the condition was detected by the driver

### M-Bus Network Alarms

**System** – copied from Device Label (DL) within the driver setup

**Point** – 'M-Bus Network'

**Condition** – 'Meter x Not Responding' or 'Meter x Communicating'

**Priority** – '3'

**Date & Time** – when the condition was detected by the driver

## Examples

System	Point	Condition	Priority	Date	Time
M-Bus System	System	Power On	3	18/01/12	23:22:00
M-Bus System	M-Bus Network	Meter 5 Not responding	3	18/01/12	10:10:57
M-Bus System	M-Bus Network	Meter 5 Communicating	3	18/04/12	14:23:00

# Object Specifications

Once an interface is started, one or more extra objects become available within the top-level object of the device. As with all North objects, each of these extra objects may contain sub-objects, (and each of these may contain sub-objects, and so on) - the whole object structure being a multi-layer hierarchy. It is possible to navigate around the objects using the ObSys Engineering Software.

Each object is specified below, along with its sub-objects.

## Example Object Reference

An example of a reference to an object in the same device: the M-Bus System (S1) contains a meter at address 11 (M11), with Parameter 1 (P1), which contains a value (V). Therefore, the complete object reference is 'S1.M11.P1.V'.

An example of a reference to an object in a different device: the IP network object (IP) contains Default Commander object (CDIP), which contains the object above (S1.M11.P1.V) – therefore the complete object reference is 'IP.CDIP.S1.M11.P1.V'.

## Device Top-Level Objects

When an interface is started using the MBus driver, the objects below become available within the top-level object of the device. For example, if interface 1 is started, then the object references 'M1' and 'S1' become available.

Description	Reference	Type
<b>M-Bus Setup</b> Set up the MBus driver, started on interface <i>c</i> ( <i>c</i> is the interface number)	Mc	Fixed Container: On the Commander platform this will be <i>[CDM v20\MBus v12]</i> On the ObSys platform this will be <i>[OSM v20\MBus v12]</i>
<b>M-Bus System</b> Access M-Bus system connected to interface <i>c</i> ( <i>c</i> is the interface number)	Sc	Variable Container: <i>[MBus v12]</i>

# MBus Driver Setup

Object Type: [OSM v20\MBus v12]

Object Type: [CDM v20\MBus v12]

The MBus Driver Setup contains the following objects:

Description	Reference	Type
<b>RS232 COM Port</b>	RS.COM	Obj\Num; Range: 1...8; Adjustable
<b>Device Label</b> Label displayed when scanning the system and within alarms	DL	Obj\Text; Max. 20 chars; Adjustable
<b>Maximum Address</b> Address of highest numbered meter. Used when scanning the M-Bus network	AH	Obj\Num: 1...250; Adjustable Default value: 250
<b>Minimum Address</b> Address of lowest numbered meter. Used when scanning the M-Bus network	AL	Obj\Num: 1...250; Adjustable Default value: 1
<b>Local Connect</b> Enable this option only when one M-Bus meter is connected. Once enabled, this enables the Meter Configuration object and communicates using the broadcast address	LC	Obj\NoYes; Adjustable
<b>Interface State</b> Current action performed by the driver	S	Obj\Enum: 0...3 Values: 0=Initialising, 1=Scanning Network, 2=Reading, 3=Idle
<b>Meter Address Now</b> Address of meter the driver is attempting to communicate with	S.M	Obj\Num: 0, 1...250, 254
<b>Advanced Options</b> Configure optional advanced driver features	A	Fixed Container: [MBus v12\Advanced]



# MBus Driver Advanced Options

Object Type: [OSM v20\MBus v12\Advanced]

Object Type: [CDM v20\MBus v12\Advanced]

The MBus Driver Advanced Options contains the following objects:

Description	Reference	Type
<p><b>Poll Rate</b> Set to the rate the driver requests values from the meters. Use this when a meter, particularly those powered by battery, has a maximum poll rate.</p>	SR	Obj\Enum; Adjustable Values: 0=Default, 1=1min, 2=5mins, 3=15mins, 4=30mins, 5=1hr, 6=6hrs, 7=12hrs, 8=24hrs
<p><b>Last Poll started</b> Time the driver last started requesting values from meters</p>	LS	Obj\DateTime
<p><b>Minutes until next poll</b> Number of minutes until the driver requests values from all meters</p>	SC	Obj\Num: 1...3600
<p><b>Baud Rate</b> Adjust this option if all meters use a baud rate other than 2400 baud, or support a higher baud rate</p>	BR	Obj\Num: 300...38400; Adjustable Default: 2400
<p><b>Fixed Baud Rate</b> Set this option if all meters are programmed with a baud rate, and do not need auto-configuring by the driver</p>	O2	Obj\NoYes; Adjustable
<p><b>Override Reply Timeout (ms)</b> The driver calculates a reply timeout based on the baud rate. If a longer timeout is required, set using this object.</p>	TO	Obj\Num: 0...5000; Adjustable Default: 0
<p><b>Disable SND_NKE</b> Enable this option only when advised by North Support. This option prevents the driver sending the SND_NKE command before requesting data. This is required by some older Kamstrup meters</p>	O1	Obj\NoYes; Adjustable
<p><b>Debug Enable</b> Enable this option only when one M-Bus meter is connected. Once enabled, this enables the Meter Configuration object and communicates using the broadcast address</p>	DE	Obj\NoYes; Adjustable

# M-Bus System

Object Type: *[Mbus v12]*

Object Type: *[Mbus v11]*

Object Type: *[Mbus v10]*

The M-Bus System shows available meters on the M-Bus network. It contains the following objects:

Description	Reference	Type
<b>Meter <i>x</i></b> The meter address, <i>x</i> , is in the range 1...250. In Local Connect mode, <i>x</i> is the broadcast address 254	M <i>x</i>	Variable Container: <i>[Mbus v12\Meter]</i>

## M-Bus Meter

Object Type: *[Mbus v12\Meter]*

Object Type: *[Mbus v11\Meter]*

Object Type: *[Mbus v10\Meter]*

Each M-Bus meter contains the following objects:

Description	Reference	Type
<b>Meter Information</b> Meter manufacturer, ID, version and type information, etc.	I	Variable Container: <i>[Mbus v12\Meter\Info]</i>
<b>Parameter x</b> Value from the meter. The parameter number, x, is in the range 1...32 and is dependent upon the number of compatible values within the meter	Px	Fixed Container: <i>[Mbus v12\Meter\Param]</i>
<b>Meter Configuration</b> Use to set the meter's primary address. This object is only available Local Connect mode	C	Fixed Container: <i>[Mbus v12\Meter\Config]</i>

## Decoding Manufacturer-Specific Data

The M-Bus Meter also contains objects to decode the first 112 bytes of manufacturer-specific data.

Description	Reference	Type
<b>Manufacturer Value – BCD</b> The offset, <i>a</i> , is the starting byte position within the data block in the range 0...112. The length, <i>b</i> , is the number of bytes of data to decode in the range 1...4.	O <i>a</i> .B <i>b</i>	Obj\Num
<b>Manufacturer Value – BCD with Formula</b> As above, but with formula <i>z</i> applied (see note 1)	O <i>a</i> .B <i>b</i> .F <i>z</i>	Obj\Float
<b>Manufacturer Value – Integer</b> The offset, <i>a</i> , is the starting byte position within the data block in the range 0...112. The length, <i>b</i> , is the number of bytes of data to decode in the range 1...4.	O <i>a</i> .I <i>b</i>	Obj\Num
<b>Manufacturer Value – Integer with Formula</b> As above, but with formula <i>z</i> applied (see note 1)	O <i>a</i> .I <i>b</i> .F <i>z</i>	Obj\Float
<b>Manufacturer Value – IEEE Float</b> The offset, <i>a</i> , is the starting byte position within the data block in the range 0...112.	O <i>a</i> .F4	Obj\Float
<b>Manufacturer Value – IEEE Float with Formula</b> As above, but with formula <i>z</i> applied (see note 1)	O <i>a</i> .F4.F <i>z</i>	Obj\Float

## Notes

1. The formula number, z, is in the range 1...21:

Formula	Multiply
1	10.0
2	100.0
3	1000.0
4	10000.0
5	100000.0
6	1000000.0

Formula	Multiply
7	10000000.0
8	100000000.0
9	1000000000.0
10	10000000000.0
11	0.1
12	0.01

Formula	Multiply
13	0.001
14	0.0001
15	0.00001
16	0.000001
17	0.0000001
18	0.00000001

Formula	Multiply
19	0.000000001
20	0.0000000001
21	0.00000000001

## Meter Information

Object Type: [Mbus v12\Meter\Info]

Object Type: [Mbus v11\Meter\Info]

Object Type: [Mbus v10\Meter\Info]

The Meter Information object contains information about the specific meter on the M-Bus network. The following objects are available:

Description	Reference	Type
<b>Manufacturer ID</b>	MAN	Obj\Text: 3 chars Visit <a href="http://www.dlms.com/flag/">www.dlms.com/flag/</a> for the current list of manufacturer identification characters
<b>Meter ID</b> Meter's serial number	ID	Obj\Text: 8 chars
<b>Meter Version</b>	VER	Obj\Num
<b>Meter Type Label</b> Indicates what the meter is measuring. E.g. electricity, heat, oil, water etc.	DT.L	Obj\Text
<b>Meter Status</b> Meter application status	S	Obj\Enum: 0...3 Value: 0=Ok, 1=Application Busy, 2=Application Error, 3=Other
<b>Power Low</b>	S.B2	Obj\NoYes
<b>Permanent Error</b>	S.B3	Obj\NoYes
<b>Temporary Error</b>	S.B4	Obj\NoYes
<b>Manufacturer Specific (bit 5)</b>	S.B5	Obj\NoYes
<b>Manufacturer Specific (bit 6)</b>	S.B6	Obj\NoYes
<b>Manufacturer Specific (bit 7)</b>	S.B7	Obj\NoYes
<b>Comms OK</b> Indicates if the driver is communicating with the meter and the values have been updated	CS	Obj\NoYes

# Meter Parameter

Object Type: [Mbus v12\Meter\Param]

Object Type: [Mbus v11\Meter\Param]

Object Type: [Mbus v10\Meter\Param]

A Meter Parameter object contains a single value or reading from an M-Bus compatible meter. The driver stores the non-historical primary values of a meter, including multi-tariff and sub-unit values.

The Parameter object contains the following sub-objects:

Description	Reference	Type
<b>Label</b> Automatically generated label, see typical parameters below	L	Obj\Text; Max. 40 chars
<b>Value</b> Parameter's value (see note 2)	V	Obj\Text The type is dependent upon the measured value, i.e. Float, Num, Text, DateTime, or Date
<b>Value with Formula z</b> Parameter's value with additional formula applied (see notes 1 and 2) Available in version 1.1 only	V.Fz	Obj\Float
<b>Units</b> Engineering units, see typical parameters below	U	Obj\Text; Max. 5 chars
<b>Tariff</b> Indicates the parameter's tariff number on multi-tariff meters	T	Obj\Num: 0...16
<b>Sub-Unit</b> Indicates the parameter's sub-unit number on sub-metered values	SU	Obj\Num: 0...16

## Notes

- The formula number, z, is in the range 1...21:

Formula	Multiply
1	10.0
2	100.0
3	1000.0
4	10000.0
5	100000.0
6	1000000.0
7	10000000.0

Formula	Multiply
8	100000000.0
9	1000000000.0
10	10000000000.0
11	0.1
12	0.01
13	0.001
14	0.0001

Formula	Multiply
15	0.00001
16	0.000001
17	0.0000001
18	0.00000001
19	0.000000001
20	0.0000000001
21	0.00000000001

- Large numbers: 64-bit and 32-bit values can contain up to 20 significant figures. Numbers this size are ok for displaying to a user, but may be too large to perform accurate maths functions. These values can be read in blocks of six significant figures by appending the object reference with a block number. Block 1 reads the six least significant figures, block 2 the next six significant figures, etc.

For example, if object 'P1.V' reads the 64-bit value '674407370955.1615', then object 'P1.V.1' will read the least six significant figures '55.1615', object 'P1.V.2' the value '073709', and object 'P1.V.3' the value '6744'.

You can also use a formula with a block number. The object has the format 'P1.V.F13.1'. This will apply the formula first then access the requested block of six significant figures.

Floating point numbers are formatted to four decimal places.



## Typical Parameters

The following types of parameters may be available depending on the meter type:

Label	Units
Energy	kWh, kJ
Volume	m <sup>3</sup>
Mass	Kg
On Time	sec, min, hrs, days
Operating Time	sec, min, hrs, days
Power	kW, kJ/h
Volume Flow	m <sup>3</sup> /h, m <sup>3</sup> /min, ml/s
Mass Flow	kg/h
Flow Temperature	°C
Return Temperature	°C
Temperature Difference	K
External Temperature	°C
Pressure	bar
Date	
Date & Time	
Fabrication Number	
HCA	
Averaging Duration	sec, min, hrs, days
Actuality Duration	sec, min, hrs, days

The label may also include the text: '(Max)', '(Min)' or '(Err)'.

If the parameter refers to a sub-unit, then the label includes 'Ux' (where x is the sub-unit number). If the parameter refers to a multi-tariff, then the label includes 'Tt' (where t is the tariff number).



# Meter Configuration

Object Type: [Mbus v12\Meter\Config]

Object Type: [Mbus v11\Meter\Config]

Object Type: [Mbus v10\Meter\Config]

When Local Connect mode is enabled from *Mbus Driver Setup*, the Meter Configuration object is available.

Meter Configuration communicates using the broadcast address to the attached meter (so only one meter can be connected to the network). Use this object to set the meter's primary address.

Description	Reference	Type
<b>Manufacturer ID</b>	MAN	Obj\Text: 3 chars Visit <a href="http://www.dlms.com/flag/">www.dlms.com/flag/</a> for the current list of manufacturer identification characters
<b>Meter ID</b> Meter's serial number	ID	Obj\Text: 8 chars
<b>Meter Type Label</b> Indicates what the meter is measuring. E.g. electricity, heat, oil, water etc.	DT.L	Obj\Text
<b>Address</b> Primary address of meter	ADDR	Obj\Num: 1...250; Adjustable

## MBus Driver Setup (Legacy versions)

Object Type: [OSM v20\MBus v11]

Object Type: [CDM v20\MBus v11]

Object Type: [OSM v20\MBus v10]

Object Type: [CDM v20\MBus v10]

The MBus Driver Setup contains the following objects:

Description	Reference	Type
<b>RS232 COM Port</b>	RS.COM	Obj\Num; Range: 1..8; Adjustable
<b>Device Label</b> Label displayed when scanning the system and within alarms	DL	Obj\Text; Max. 20 chars; Adjustable
<b>Maximum Address</b> Address of highest numbered meter. Used when scanning the M-Bus network	AH	Obj\Num: 1..250; Adjustable Default value: 250
<b>Minimum Address</b> Address of lowest numbered meter. Used when scanning the M-Bus network	AL	Obj\Num: 1..250; Adjustable Default value: 1
<b>Local Connect</b> Enable this option only when one M-Bus meter is connected. Once enabled, this enables the Meter Configuration object and communicates using the broadcast address	LC	Obj\NoYes; Adjustable
<b>Interface State</b> Current action performed by the driver	S	Obj\Enum: 0..3 Values: 0=Initialising, 1=Scanning Network, 2=Reading, 3=Idle
<b>Interface Address Now</b> Address of meter the driver is attempting to communicate with	S.M	Obj\Num: 0, 1..250, 254
<b>Advanced Option: Baud Rate</b> Adjust this option if all meters have a fixed baud rate other than 2400 baud, or support a higher baud rate. Available in version 1.1 only	BR	Obj\Num: 300..38400; Adjustable Default: 2400
<b>Advanced Option: Disable SND_NKE</b> Enable this option when advised by North Support. This option prevents the driver sending the SND_NKE command before requesting data. This is required by some older Kamstrup meters	O1	Obj\NoYes; Adjustable

# Driver Versions

Version	Build Date	Details
1.0	21/08/2007	Driver released
1.0	20/10/2007	Modified state table to reset meter before communication, fixed driver to calculate WORD to enable storage of values from all meters
1.0	25/03/2008	Added support for BCD and signed integers
1.0	28/06/2010	Added option to disable SND_NKE command
1.0	23/01/2013	Released for Commander 2.0
1.0	15/04/2013	Improved value-updating in Local Connect mode
1.1	23/08/2016	Added support for 64-bit values. Added option to use formula with parameter's value. Added driver baud rate object (BR) Added support for more value types
1.1	12/7/2017	Resolved issue when adjusting Advanced Option: Baud Rate object (BR). Only 300 or 600 was accepted.
1.2	18/6/2018	Improved support for meters with minimum conformance to M-Bus (Level A): driver re-attempts requests (some meters require a message to wake-up), and configurable poll rate (some meters have limited communication frequency when powered by battery). Added option to Fixed Baud Rate, preventing the driver from auto-configuring meters. Driver now calculates reply timeout based on the baud rate. Added option to override this.

## Next Steps...

If you require help, contact support on 01273 694422 or visit [www.northbt.com/support](http://www.northbt.com/support)



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