DM-MB2ET/A

Communication converter
M-Bus to Ethernet

Operation manual

Version 1.02

AMiT

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Contents

History of revisions

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Revision	Date	Author of change	Changes
100	05. 04. 2011	Csörgő V.	New document.
101	23. 06. 2011	Csörgő V.	Correction of operating range -25 °C to 50 °C.
102	30. 05. 2017	Říha Z.	Change in chapter 1, 2, added figures, change of manual structure.

Related documentation

1. **DM-MB2ET/A** – Software in converter **DM-MB2ET/A** – Programmers guide
   file: dm-mb2eta_ms_en_xxx.pdf

2. Application Note AP0010 – Communication in M-Bus Network
   file: ap0010_en_xx.pdf

3. Application Note AP0008 – Communication in MODBUS Network
   file: ap0008_en_xx.pdf

4. Application Note AP0037 – Principles of Ethernet network usage
   file: ap0037_en_xx.pdf

1   Introduction

DM-MB2ET/A is M-Bus communication converter to Ethernet.

Basic features
- MASTER-type M-Bus interface, up to 3 SLAVE-type units
- Ethernet interface 10/100 Mbps (communication MODBUS/TCP, APE, Direct)
- Power supply +24 V DC or PoE
- Mounting on a rail DIN 35 mm

Note The communication MODBUS/TCP allows up to 6 clients to be connected.

2 Technical parameters

Communication CPU		
	CPU	STM32F107VCT6
	FLASH	256 KB
	SRAM	64 KB

Ethernet		
	Quantity	1
	Communication speed	10/100 Mbps
	Galvanic isolation	Yes
	Insulation strength	500 V AC / 1 minute [1]
	Operation indication	LED on mainboard
	Connection point	Connector RJ45, according to IEEE802.3

Note [1] Insulation must not be used for dangerous voltage separation.

M-Bus		
	Quantity	1
	Interface type	MASTER
	Transmission speed	150 bps to 9600 bps
	Overvoltage protection	Transil 600 W
	Interface short-circuits protection	Resettable thermal fuse 100 mA
	M-bus interface power supply	From internal power supply
	Galvanic isolation	No
	Number of connectable units	1 to 3, SLAVE-type
	Operation indication	LED on mainboard
	Connection point	WAGO 231-302/102-000
	Wire cross section	0.08 mm^2 to 2.5 mm^2

Power supply 24 V DC		
	Nominal power supply voltage	24 V DC
	Power supply voltage range	19.2 V DC to 28.8 V DC
	Maximum power consumption	210 mA at 24 V DC
	Power dissipation (typical)	2.5 W
	Galvanic isolation	Yes [2]
	Insulation strength	500 V AC / 1 minute [3]
	Connection point	WAGO 231-302/102-000
	Wire cross section	0.75 mm^2 to 2.5 mm^2
	Power supply system	Device must not be power supplied from DC distribution network of building [4]

Note [2] Galvanically isolated from the internal electronics.
[3] Insulation must not be used for dangerous voltage separation.
[4] For detailed information, see the chapter "6.1 Installation rules" paragraph "Power supply".

Power supply PoE		
	Nominal power supply voltage	48 V DC
	Power supply voltage range	43.2 V DC to 52.8 V DC
	Maximum power consumption	70 mA at 48 V DC
	Galvanic isolation	Yes [5]
	Insulation strength	500 V AC / 1 minute [6]
	Connection point	Connector RJ45 (for Ethernet connection)

Note [5] Galvanically isolated from the internal electronics.
[6] Isolation must not be used for dangerous voltage separation.

Mechanics	Mechanical design	Plastic box
	Mounting	On DIN rail 35 mm
	Ingress protection rate	IP20
	Weight – netto	0.16 kg ±5 %
	– brutto	0.22 kg ±5 %
	Dimensions (w × h × d)	(71 × 90 × 73) mm

Temperatures	Operating temperature range	-25 °C to 50 °C
	Storage temperature range	-25 °C to 50 °C

Others	Maximum ambient humidity	< 95 % non-condensing

2.1   Dimensions
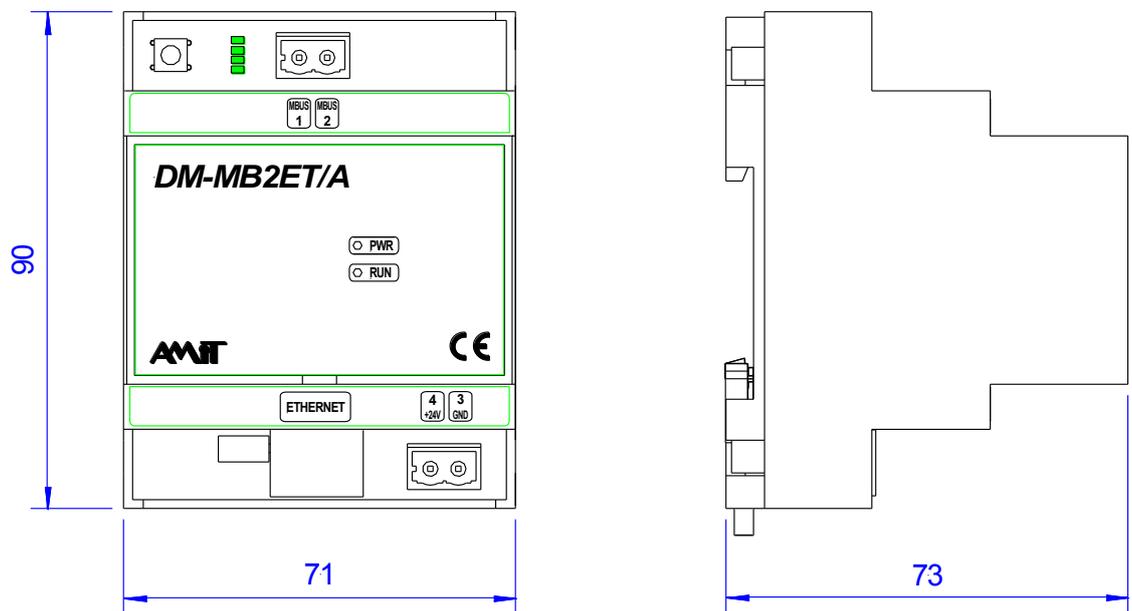
Fig. 1 – **DM-MB2ET/A** dimensions

2.2 Recommended drawing symbol

Following drawing symbol is recommended for the communication converter **DM-MB2ET/A**. Only part of it will be visible in following examples.
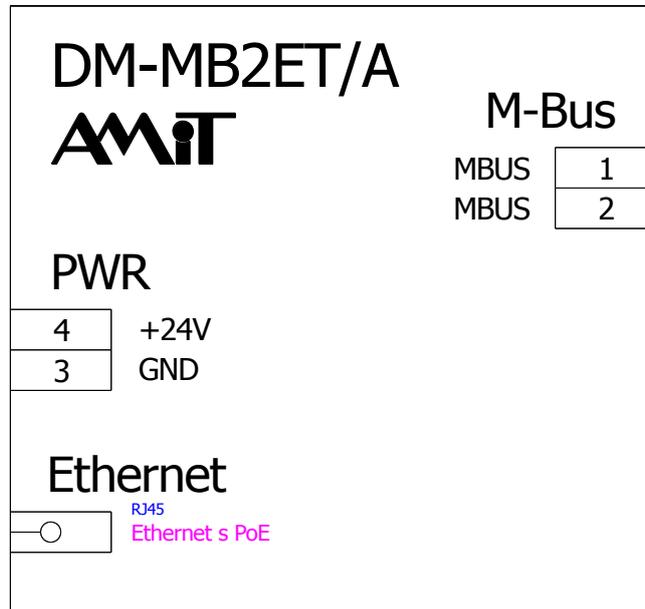
Fig. 2 – Recommended drawing symbol for **DM-MB2ET/A**

3 Conformity assessment

The equipment meets the requirements of NV616/2006 Czech Government Decree. The compliance assessment with NV616/2006 has been performed in accordance with harmonized standard EN 61326-1:2013.

Tested in accordance with standard	Type of test	Class
EN 55011:2009	Industrial, scientific and medical equipment – Radio-frequency disturbance characteristics – Limits and methods of measurement	Complies, A [7])
EN 61000-4-2:2009	Electromagnetic compatibility (EMC) – Part 4-2: Testing and measurement techniques – Indirect electrostatic discharge immunity test, contact discharge	Complies (±8 kV)
EN 61000-4-2:2009	Electromagnetic compatibility (EMC) – Part 4-2: Testing and measurement techniques – Indirect electrostatic discharge immunity test, air discharge	Complies (±16 kV)
EN 61000-4-3:2006	Electromagnetic compatibility (EMC) – Part 4-3: Testing and measurement techniques – Radiated, radio-frequency, electromagnetic field immunity test 80 MHz to 1 GHz	Complies (10 V/m)
EN 61000-4-3:2006	Electromagnetic compatibility (EMC) – Part 4-3: Testing and measurement techniques – Radiated, radio-frequency, electromagnetic field immunity test 1.4 GHz to 2 GHz	Complies (10 V/m)
EN 61000-4-3:2006	Electromagnetic compatibility (EMC) – Part 4-3: Testing and measurement techniques – Radiated, radio-frequency, electromagnetic field immunity test 2 GHz to 1.7 GHz	Complies (3 V/m)
EN 61000-4-4:2012	Electromagnetic compatibility (EMC) – Part 4-4: Testing and measurement techniques – Electrical fast transient/burst immunity test, power supply, Ethernet, M-Bus	Complies (±4 kV)
EN 61000-4-5:2006	Electromagnetic compatibility (EMC) – Part 4-5: Testing and measurement techniques – Surge immunity test, power supply, M-Bus shielding	Complies (±3 kV)
EN 61000-4-5:2006	Electromagnetic compatibility (EMC) – Part 4-5: Testing and measurement techniques – Surge immunity test, Ethernet shielding	Complies (±4 kV)

Tested in accordance with standard	Type of test	Class
EN 61000-4-6:2009	Electromagnetic compatibility (EMC) – Part 4-6: Testing and measurement techniques – Immunity to conducted disturbances, induced by radio-frequency fields	Complies (10 V)

Note [7]) This is a class A device. This device can cause some radio disturbances in the internal environment. In such case, the user can be requested to take the appropriate measures.

3.1 Other tests

Tested in accordance with standard	Type of test	Classification
EN 60068-2-1:2007	Environmental testing – Part 2-1: Tests – Test A: Cold	Complies
EN 60068-2-2:2007	Environmental testing – Part 2-2: Tests – Test B: Dry heat	Complies
EN 61000-4-29:2000	Electromagnetic compatibility (EMC) – Part 4-29: Testing and measurement techniques – Voltage dips, short interruptions and voltage variations on DC input power port – Immunity test	Complies

4 Power supply

The communication converter **DM-MB2ET/A** can be power supplied by DC power supply or Ethernet (PoE). The power supply must meet requirements mentioned in the chapter "2 Technical parameters".

Connection of power supply voltage is indicated by LED PWR.
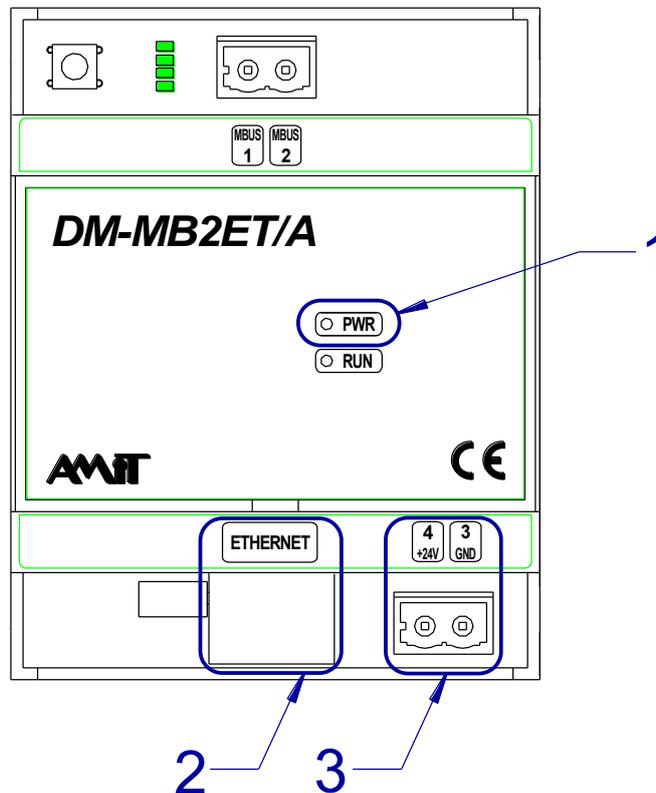
Fig. 3 – Power supply connector +24 V DC

	Number	Description
Legend	1	LED PWR
	2	Connector for Ethernet with PoE
	3	Connector for power supply 24 V DC

	Terminal	Signal	Description
Terminals marking	3	GND	Power supply, ground
	4	+24V	Power supply, +24 V DC

	LED	Description
LED states description	Lit	Power supply is connected
	Not lit	Power supply is not connected

Wiring example
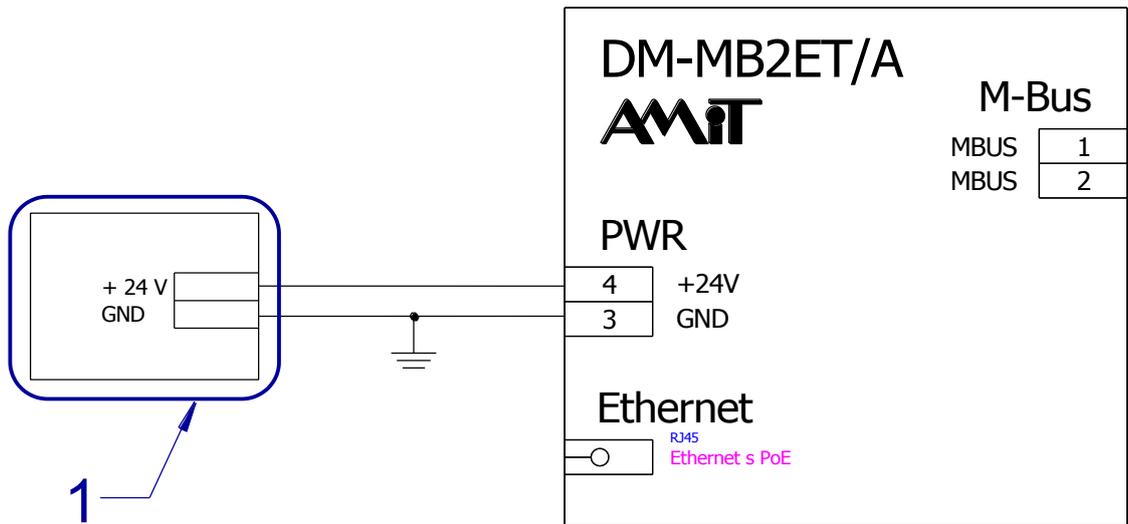
Fig. 4 – Example of power suppling from power supply +24 V DC

Legend

Number	Description
1	External power supply 24 V DC

Note It is recommended to connect the GND terminals with switchboard PE terminal during installation.

Power supply PoE The communication converter can be power supplied by PoE. For this power supply, e.g. standard PoE switches from AMiT production can be used.

Wiring example
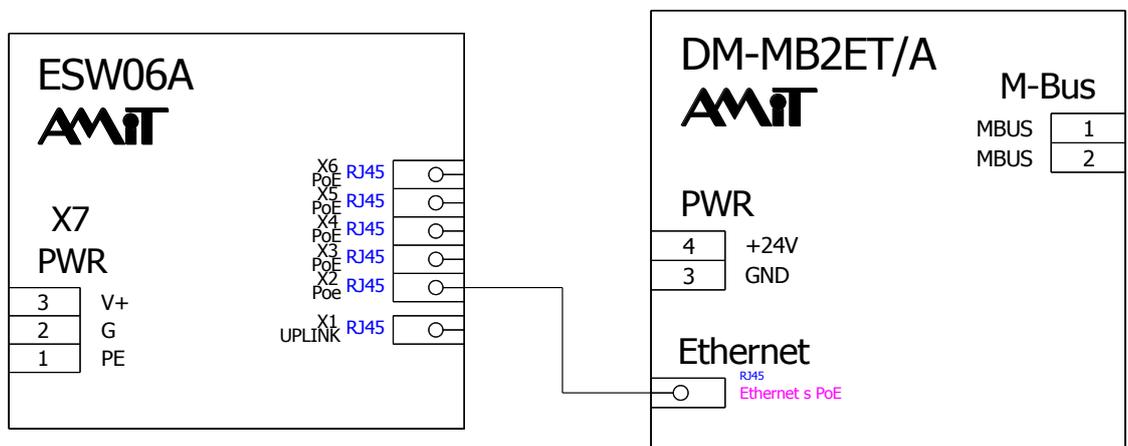
Fig. 5 – Example of power supplying from power supply PoE

5 Communication interfaces

The communication converter **DM-MB2ET/A** has two communication interfaces:
- M-Bus interface,
- Ethernet interface.

5.1 M-Bus interface

The communication converter **DM-MB2ET/A** works on M-Bus interface as MASTER. The device supports up to 3 SLAVE-type stations on M-Bus interface.

M-Bus interface activity is indicated by LEDs on the mainboard.
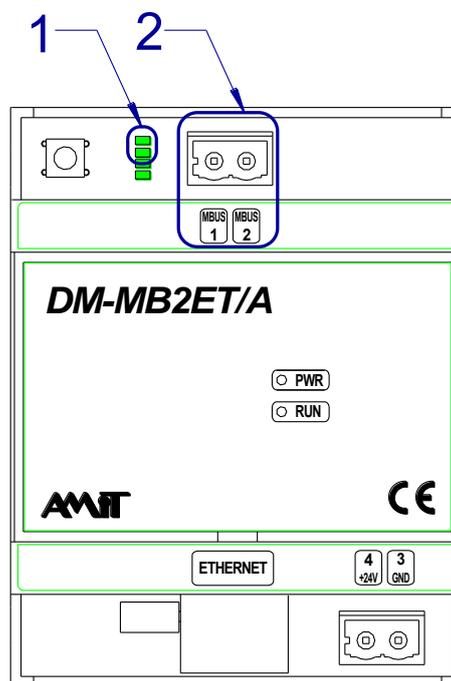
Fig. 6 – Location of LEDs and terminals for M-Bus

Legend	Number	Description
	1	Status LEDs
	2	Terminals for M-Bus

Terminals marking	Terminal	Signal	Description
	1	MBUS	Terminal for M-Bus interface
	2	MBUS	Terminal for M-Bus interface

LEDs description	LED	Description
	MBUS Rx	Converter is receiving data
	MBUS Tx	Converter is transmitting data

Note M-Bus interface is galvanically separated from power supply +24 V and from power supply PoE. M-Bus interface is not galvanically separated from internal electronics.
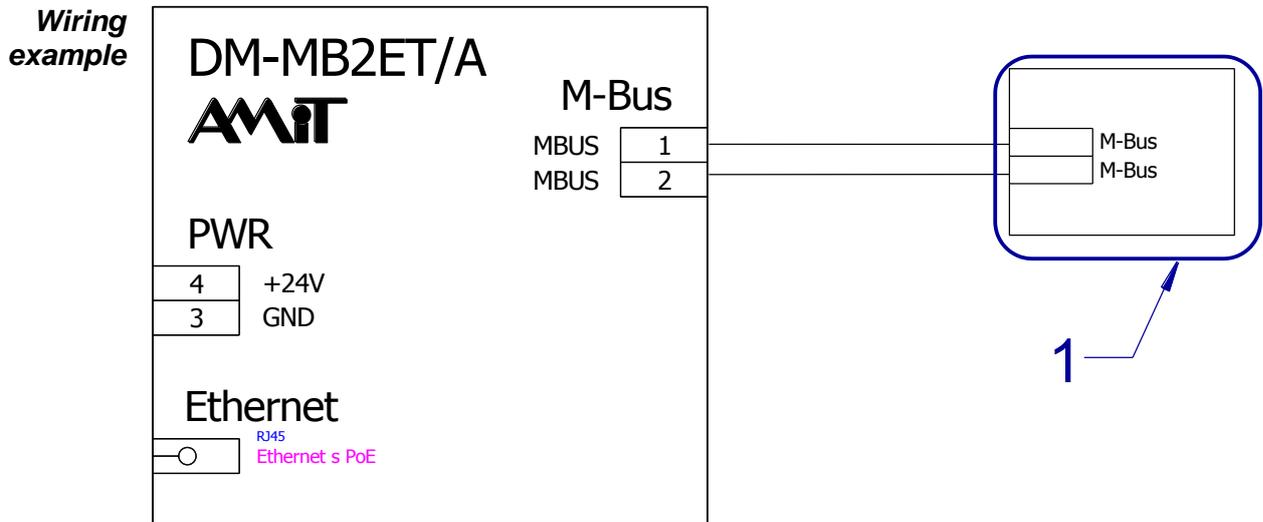
Wiring example

Fig. 7 – Wiring example of M-Bus interface

Legend

Number	Description
1	Periphery (slave) in network M-Bus

More information about M-Bus interface connection can be found in Application Note *AP0010 – Communication in M-Bus Network*.

5.2 Ethernet interface

- Speed 10/100 Mbps
- Half-duplex or Full-duplex support
- Direct and crossover cable support
- Interface state indication by LED LINK and LED ACT

Ethernet interface activity is indicated by LEDs on the mainboard.
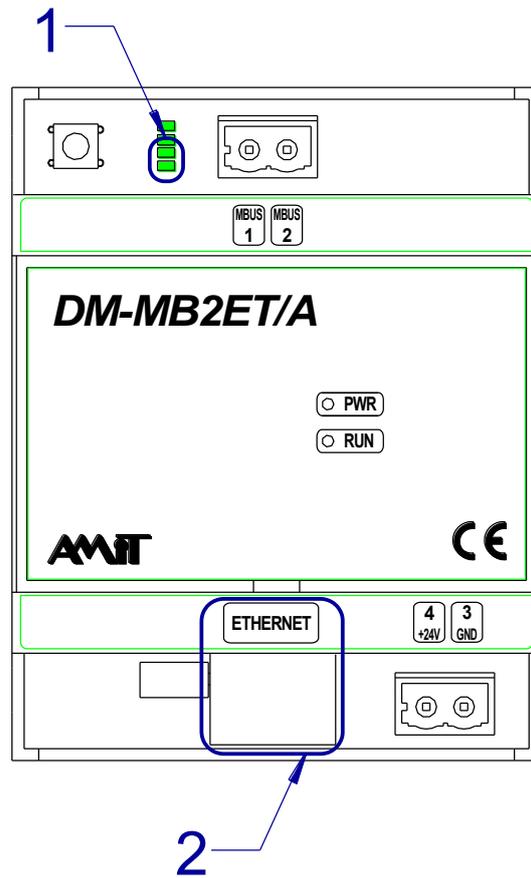
Fig. 8 – Location of LEDs and connector for Ethernet

	Number	Description
Legend	1	Status LEDs
	2	Connector for Ethernet

The order of connector RJ 45 PINs is shown in the following figure.
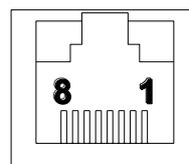
Fig. 9 – Order of RJ45 connector PINs

	Pin	Signal	Description
Ethernet connector wiring	1	Tx+ / PoE A	Signal Tx+ / wire for PoE switch
	2	Tx- / PoE A	Signal Tx- / wire for PoE switch
	3	Rx+ / PoE A	Signal Rx+ / wire for PoE switch
	4	+48V PoE B	Power supply PoE +48 V
	5	+48V PoE B	Power supply PoE +48 V
	6	Rx- / PoE A	Signal Rx- / wire for PoE switch
	7	0V PoE B	Power supply PoE 0 V
	8	0V PoE B	Power supply PoE 0 V

	LED	Description
LEDs description	ETH ACT	Communication takes place on Ethernet interface
	ETH LNK	Established connection on Ethernet interface

More information about Ethernet interface connection can be found in Application Note *AP0037 – Principles of Ethernet network usage*.

6 Mounting

The communication converter **DM-MB2ET/A** must be mounted in the switchboard. It is intended for mounting on DIN rail 35 mm.

6.1 Installation rules

Power supply The equipment must not be power supplied from DC distribution network of building. More equipment can be power supplied from a single power supply assuming the similar-type equipment and the same building location.

Connecting to PE It is recommended to connect the GND terminals with switchboard PE terminal during installation.

M-Bus It is necessary to use 2-wire cable with the shielding for M-Bus interface connection. The cable must not be longer than 30 m and must not come out of building. Connect the cable shielding to the PE terminal immediately on switchboard input. The cable FTP or STP is recommended, two pairs will create one M-Bus input.

Ethernet Ethernet interface can be connected through a cabling Cat5 with the shielding.

Note All PE terminal connections must be realized with the lowest impedance as possible. The technical parameters of communication converter are guaranteed only, when these wiring principles are applied.

Filtration All cables, leading to the communication converter, must be pulled through a filter ferrite. The ferrites must be placed as closed as possible to the converted. Two cables can be pulled through one ferrite filter. The ferrites must be used because of radio interference. If they are not used, the manufacturer does not provide the guaranteed radiation parameters. Recommended ferrites are listed in ordering information.
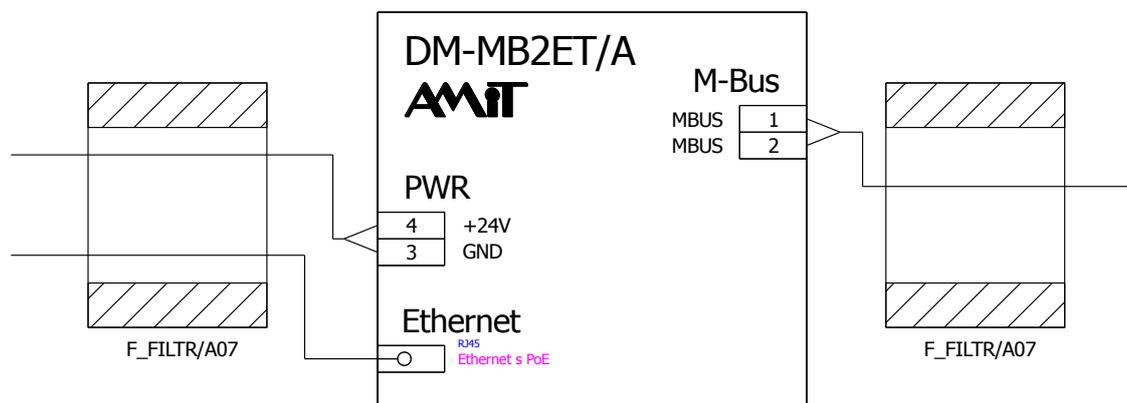
Fig. 10 – Ferrite filters wiring on the cables

7   Converter configuration

It is necessary to switch the converter to service mode for converter communication. The converter can be switched to service mode using a service button.

7.1   Service button

The service button is located in upper left corner of converter.
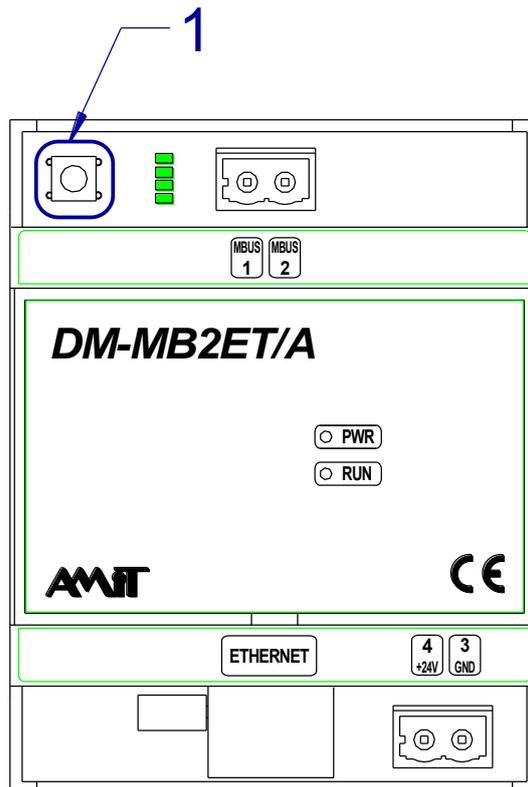
Fig. 11 – Service button location

Legend	Number	Description
	1	Service button

7.2   LED RUN

The converter state is indicated by LED RUN.
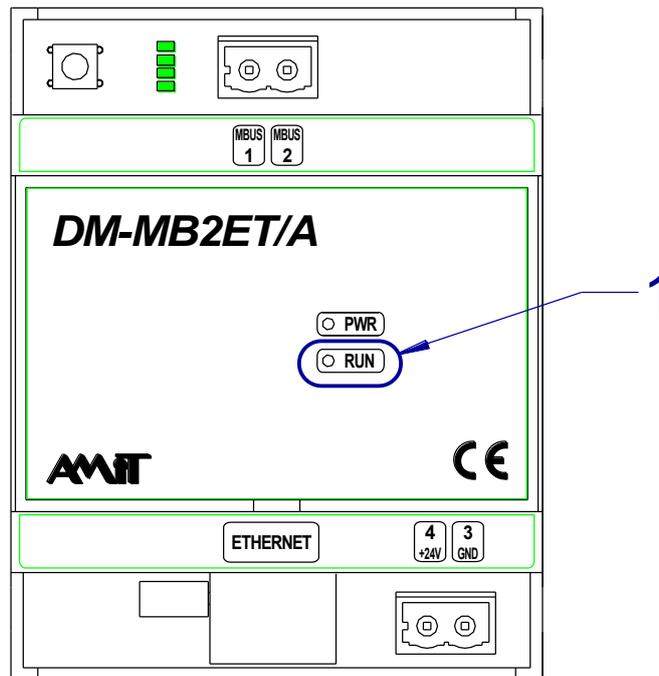
Fig. 12 – LED RUN location

	Number	Description
Legend	1	LED RUN

	LED	Description
LED description	Flashing with period 0.5 s	Converter is in service mode.
	Flashing, period 2 s	Converter is in application mode (standard operation).
	Lit	Converter has switched to factory settings.

7.3   Service mode

It is possible to change the device communication parameters in service mode. Details regarding individual parameters setting are mentioned in the programmer manual dm-mb2et_ms_en_xxx.pdf.

The converter can be switched to service mode, as follows:

- Disconnect **DM-MB2ET/A** from the power supply voltage.
- Connect the power supply voltage while holding the service button.
- Hold the button for 5 s, then release. LED RUN is flashing with the period 0.5 s (the button must be pressed within 10 s, otherwise **DM-MB2ET/A** will pass into the factory setting).

Device settings are performed using a web interface. It is necessary to turn the device off and on for its launching with a new setting.

8   Factory settings

Ethernet factory settings

Parameter	Default value
Converter IP address	192.168.1.1
Network mask	255.255.0.0
Default gateway	192.168.1.254
DHCP	Activated

M-Bus factory settings

Parameter	Default value
Port M-Bus	2000
M-Bus communication speed	2400 bps
Mode	1 – Direct
Direct timeout	500

8.1   Factory settings restoring

Factory settings can be restored using the service button (see the chapter "7.1 Service button").

Restoring
procedure
- Disconnect **DM-MB2ET/A** from the power supply voltage.
- Connect the power supply voltage while holding the service button.
- Hold the button for at least 10 s (until LED RUN will not light permanently), then release the button.
- Disconnect and connect the power supply voltage of converter.

Attention **DHCP settings cannot be switched to the factory settings!** DHCP factory settings cannot be restored after manual settings change. The parameter can only be changed manually (see the programmers guide dm-mb2et_ms_en_xxx.pdf).

9 Ordering information and Package contents

Communication converter	**DM-MB2ET/A**	Complete, see the chapter "9.1 Package contents"

Others	**F_FILTR/A07**	Ferrite filter on cable, cable diameter 6.0 mm to 7.5 mm

9.1 Package contents

DM-MB2ET/A	**Part**	**Quantity**
	Communication converter M-Bus to Ethernet	1
	WAGO 231-302/102-000	2

10 Maintenance

With exception of cleaning, the device requires no periodic control, nor maintenance.

Cleaning Time after time it is necessary to remove a dust from the device according to the way of use. The device can be cleaned by dry soft brush or vacuum cleaner, only when turned-off and disassembled.

Note **The maintenance mentioned above can be performed by manufacturer or authorized service only!**

11 Waste disposal

Electronics disposal A disposal of device is governed by the regulations on handling electrical waste. The device must not be disposed in common public waste. It must be delivered to places specified for that purpose and recycled.