AMR-DI2RDO2

Sub-plaster module

Operation manual

Version 1.01

Producer: AMiT, spol. s r. o.
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Contents

History of revisions

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Revision	Date	Changes
100	17. 5. 2012	New document
101	2. 2. 2016	Changes in chapters 2, 3, 4, 5, 7 and 8, updated figures

Related documentation

1. Help file for EsiDet part of DetStudio development environment
   file: Esidet_cs.chm
2. Application Note AP0016 – Principles of using RS485 interface
   file: ap0016_en_xx.pdf

1. Introduction

AMR-DI2RDO2 is programmable module built-in plastic box, intended for sub-plaster mounting.

Basic features

- 2 relay outputs with galvanic separation
- 2 non-potential inputs without galvanic separation
- RS485 serial interface without galvanic separation
- Power supply 24 V DC
- Programming in DetStudio / EsiDet environment

2. Technical parameters

Processor

Type	STM32F103
FLASH	128 KB
RAM	20 KB
EEPROM	2 KB

Digital inputs

Quantity	2
Type	Non-potential
Galvanic separation	No
R_{max} for log. 1	< 300 Ω
R_{min} for log. 0	> 400 Ω
Connection point	Screw terminal block CPP3,5/3
Wire cross section	0.14 mm^2 to 1 mm^2
Maximum inlet wire length	30 m

Relay outputs

Quantity	2
Type	Switching relay contact
Galvanic separation	Yes
Nominal voltage current	250 V AC / 30 V DC 3 A (resistance load)
Contact lifetime	Without load > 107 cycles Nominal load > 107 cycles
Connection point	Screw terminal block CZM5/2
Wire cross section	0.5 mm^2 to 1.5 mm^2

RS485

Quantity	1
Galvanic separation	No
Overvoltage protection	Transil 600 W
Communication rates	9600 bps to 115200 bps
Max. number of modules on segment	256
Line termination	120 Ω external
Connection point	Screw terminal block CPP3,5/3
Wire cross section	0.14 mm^2 to 1 mm^2

Power supply

Nominal power supply voltage	24 V DC
Power supply voltage range	10 V DC to 30 V DC
Power consumption	Max. 100 mA at 24 V DC
Connection point	Screw terminal block CPP3,5/3
Wire cross section	0.14 mm^2 to 1 mm^2

Mechanics

Mechanical design	Plastic box
Mounting	Into sub-plaster junction box
Ingress protection rate	IP20
Weight – netto – brutto	0.040 kg ±5 % 0.080 kg ±5 %
Dimensions (w × h × d)	(49 × 49 × 25) mm

Temperatures

Operating temperature range	0 °C to 50 °C
Storage temperature range	0 °C to 50 °C

Others	Maximum ambient humidity	< 95 % non-condensing
	Programming	DetStudio / EsiDet

2.1. Dimensions

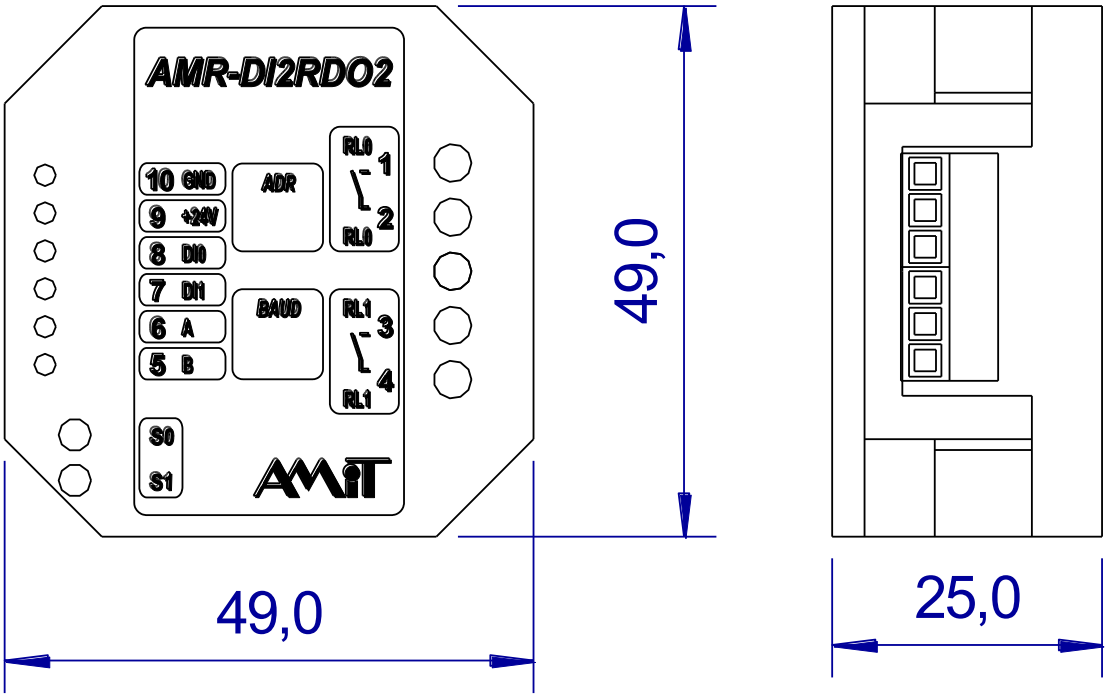


Fig. 1 - **AMR-DI2RDO2** dimensions

2.2. Recommended drawing symbol

Following drawing symbol is recommended for **AMR-DI2RDO2** module. Only part of it will be visible in following examples.

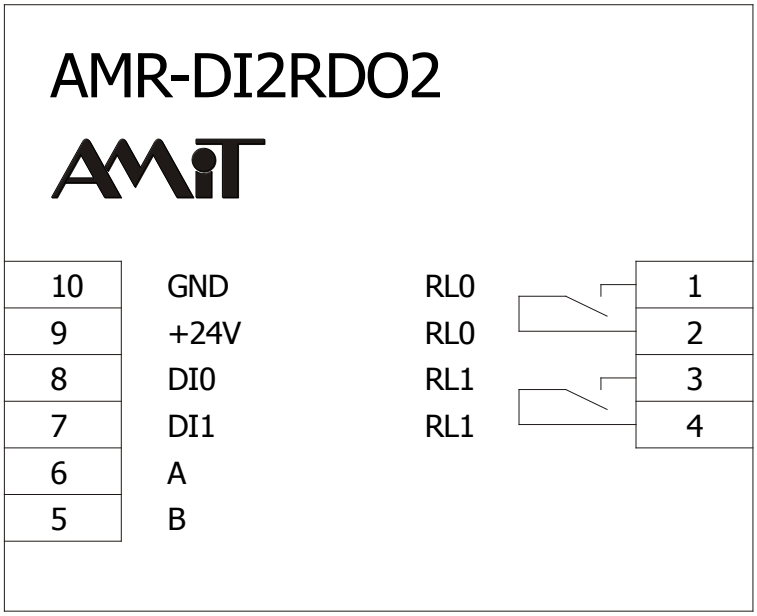


Fig. 2 - Recommended drawing symbol for **AMR-DI2RDO2**

3. Conformity assessment

This product comply with requirements of Czech Government Decree NV616/2006 and NV17/2003. The compliance assessment with NV616/2006 has been performed in accordance with harmonized standard EN 61326-1, compliance assessment with NV17/2003 has been performed in accordance with harmonized standard EN 61010-1.

Tested in accordance with standard	Type of test	Classification
EN 55011:2009	Industrial, scientific and medical equipment – Radio-frequency disturbance characteristics – Limits and methods of measurement	Class A 1)
EN 61000-3-3:2008	Electromagnetic compatibility (EMC) – Part 3-3: Limits - Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current <= 16 A per phase and not subject to conditional connection	Complies [2])
EN 61000-4-2:2009	Electromagnetic compatibility (EMC) – Part 4-2: Testing and measurement techniques – Electrostatic discharge immunity test	Complies [3]) (8 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 1000 MHz	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, 1000 MHz to 2000 MHz	Complies (3 V/m)
EN 61000-4-3:2006	Electromagnetic compatibility (EMC) – Part 4-3: Testing and measurement techniques – Radiated, radio-frequency, electromagnetic field immunity test, 2000 MHz to 2700 MHz	Complies (1 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 + RS485, relay outputs	Complies (±2 kV)
EN 61000-4-4:2012	Electromagnetic compatibility (EMC) – Part 4-4: Testing and measurement techniques - Electrical fast transient/burst immunity test, universal inputs	Complies (±1 kV)
EN 61000-4-5:2006	Electromagnetic compatibility (EMC) – Part 4-5: Testing and measurement techniques – Surge immunity test, power supply + RS485, relay outputs	Complies [4]) (±1 kV/±2 kV)

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 (3 V)
EN 61010-1 ed. 2	Safety requirements for electrical equipment for measurement, control, and laboratory use – Part 1: General requirements	Complies

[1]) This is a Class A device. In the internal environment this product can cause some radio disturbances. In such case the user can be requested to take the appropriate measures.
[2]) This is true, when any appliance being connected to device outputs has the peak current drain not greater than 0.9 A AC. When it happens, it is necessary to review again the compliance assessment with EN 61000-3-3 in terms of used application software.
[3]) Test is performed with indirect coupling.
[4]) Level ±1 kV between lines, level ±2 kV between line and ground.

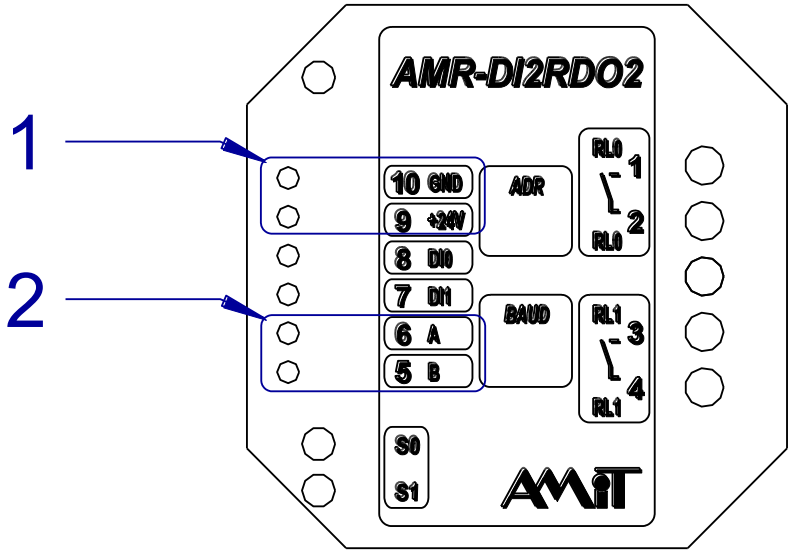
3.1. Other tests

Tested in accordance with standard	Type of test	Classification
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
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

4. Power supply and RS485 communication line

Power supply **AMR-DI2RDO2** module can be powered only by DC power supply. Power source must meet requirements listed in chapter 2. Technical parameters.

RS485 line The RS485 interface without galvanic separation uses the common terminal GND together with power supply. For proper working of RS485 it is necessary to abide the rules presented in Application Note *AP0016 – Principles of using RS485 interface*.



Obr. 1 - Location of power supply and RS485 terminals

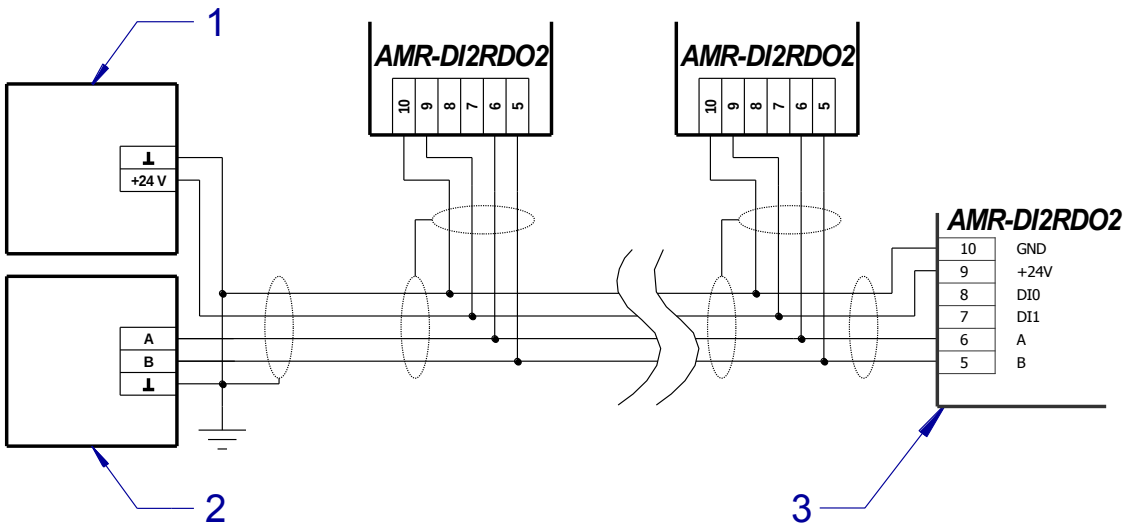
Legend

Number	Meaning
1	Power supply terminals
2	RS485 line terminals

Terminal wiring

Terminal	Label	Meaning
5	B	RS485 line, signal B
6	A	RS485 line, signal A
9	+24V	Power supply +24 V DC
10	GND	Common Ground – power supply, RS485 line and digital inputs

Wiring example



Obr. 2 - Power supply and RS485 wiring

Legend

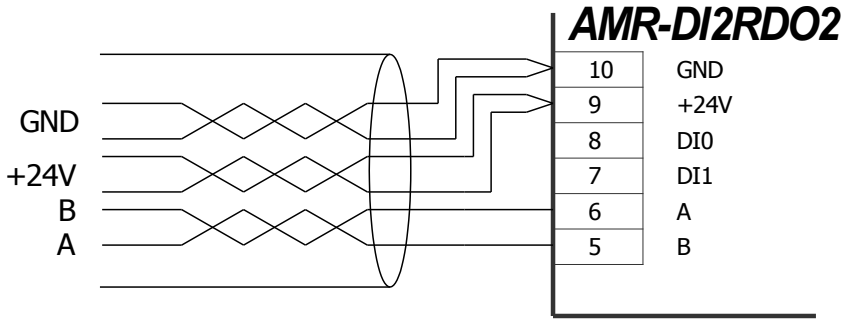
Number	Meaning
1	Power supply 24 V DC
2	Superior control system
3	Sub-plaster module **AMR-DI2RDO2**

RS485 line termination

Each station on RS485 communication line must have properly set the line termination. The line terminating stations must have the termination always connected, and intermediate stations disconnected. For line terminating is used resistor (typically 120 Ω ±20 %), which is attached into terminal block parallelly with A and B line terminals.

Note

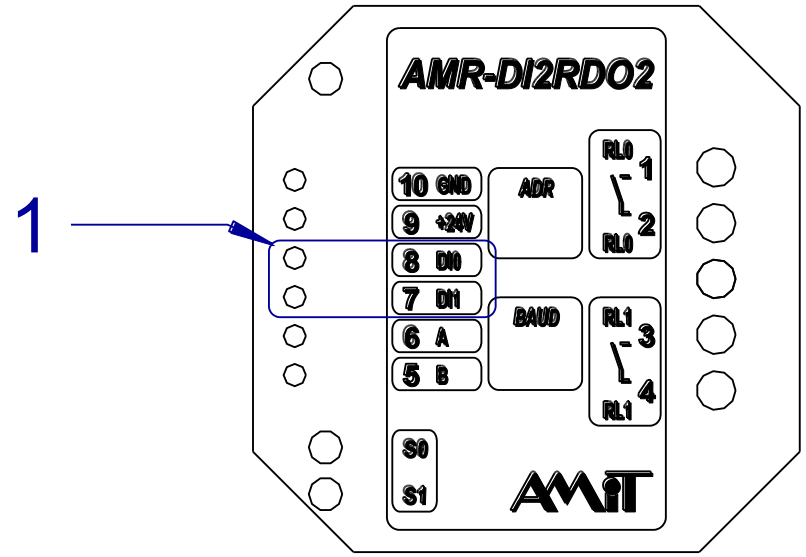
We recommend to use structured cabling for power supply and RS485 wiring. Cable shielding must be connected in single point to PE terminal on the side of the power supply source.



Obr. 3 - Example of use of structured cabling

5. Non-potential inputs

The **AMR-DI2RDO2** module is equipped with two digital inputs, that can be used in programmable function for controlling outputs. Activation of appropriate input occurs after its bonding with common terminal GND.



Obr. 4 - Location of non-potential inputs terminals

Legend

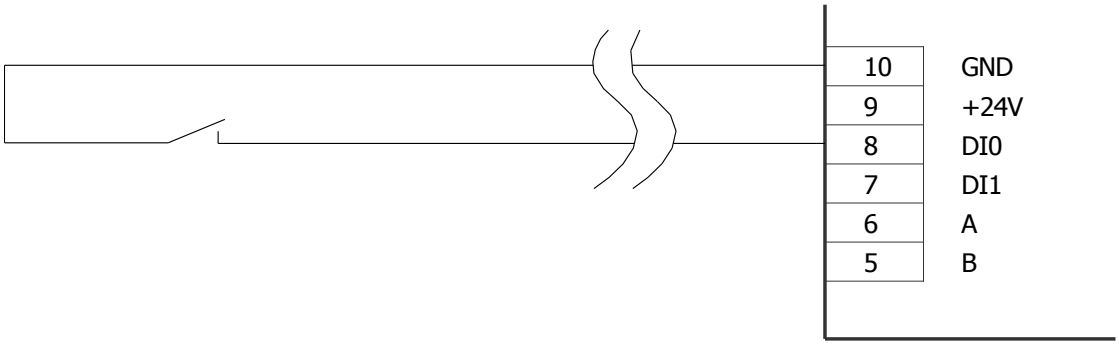
Number	Meaning
1	Terminals for potential free inputs

Terminal wiring

Potential free inputs are utilizing common with power supply terminal GND.

Terminal	Label	Meaning
7	DI1	Input 1
8	DI0	Input 0
10	GND	Common Ground – power supply, RS485 line and digital inputs

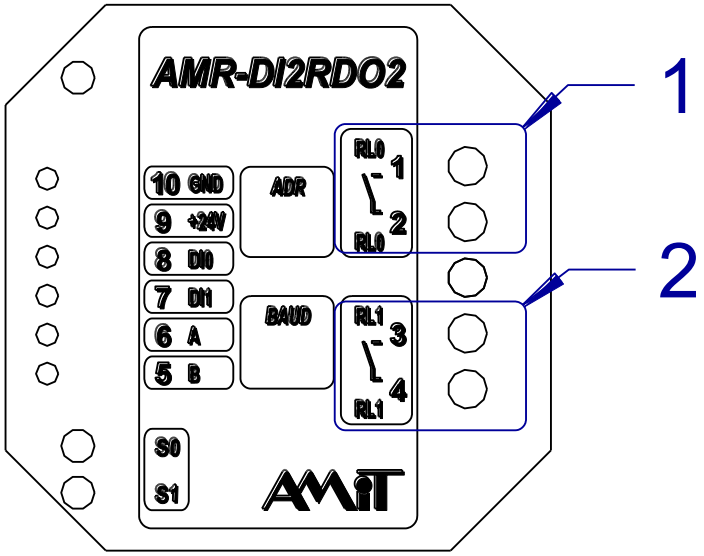
Wiring example



Obr. 5 - Non-potential contact wiring example

6. Relay outputs

Module **AMR-DI2RDO2** is equipped with two relay outputs with separated switching contacts, without common terminal.



Obr. 6 - Location of relay outputs terminals

Legend

Number	Meaning
1	Relay 0 terminal
2	Relay 1 terminal

Terminal wiring

Terminal	Label	Meaning
1	RL0	Relay contact 0
2	RL0	Relay contact 0
3	RL1	Relay contact 1
4	RL1	Relay contact 1

7. Mounting

The **AMR-DI2RDO2** module is intended for mounting into universal sub-plaster junction box KU-68. Inside the junction box the module can be arbitrary oriented.

7.1. Installation rules

Cabling design Cablings connected to terminals n. 5, 6, 9 and 10 (RS485, power supply) must be shielded. Universal input cablings must be shorter than 30 m.

Connecting to PE Connect module power supply terminal (GND) and cable shielding to PE terminal in one place, close to power supply source.

RS485 line It is necessary to perform connecting of RS485 line according to recommendations presented in Application Note *AP0016 – Principles of using RS485 interface*.

Routing the signal outside the building Inlets for digital inputs must be routed only inside the building. The rest of the signals, when routed outside the building, must be fitted with overvoltage protection.

Note All PE connections must be realized with as low as possible impedance. Technical parameters of the device are guaranteed only when these wiring principles are applied.

8. Programming and setting

AMR-DI2RDO2 module has a programmed from the production Loader, with communication parameters stated in chapter 9. Factory settings.

New application can be created by using:
- DetStudio / EsiDet development environment.

Application software can be loaded into module by:
- DetStudio development environment,
- AMRconfig service and programming utility,
- AMRdownload multiprogramming utility.

SW Download Programs can be downloaded from www.amit.cz web site, section Download.

8.1. Setting of communication parameters

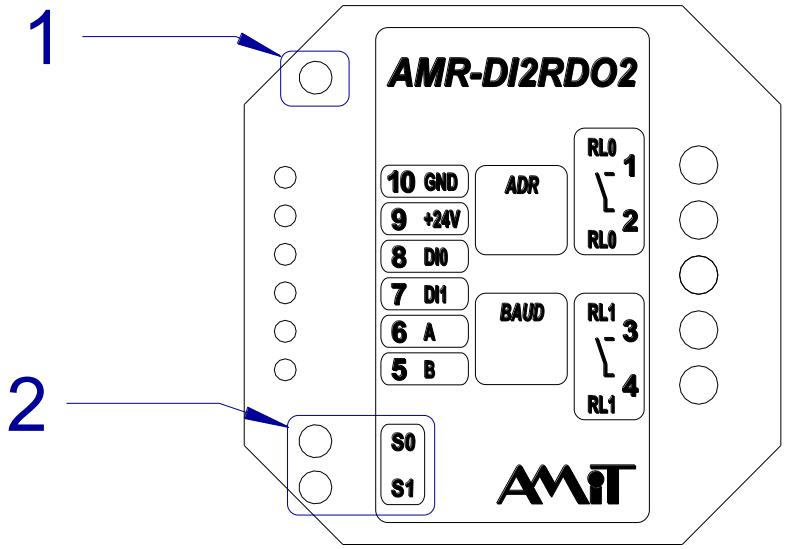
Communication parameters can be changed only from PC by using:
- DetStudio development environment,
- AMRconfig service and programming utility.

Connection to PC Module **AMR-DI2RDO2** needs to be point-to-point connected to the PC via USB/RS485 converter (e.g. **SB485S** type from AMiT production).

To change the parameters, follow the Help for program equipment mentioned above.

8.2. Indication LED and service button

LED S0 serves for indication of module program status. LED S1 is reserved for future utilization. Service button is located under module front panel. Button can be pushed by suitable un-sharp tool.



Obr. 7 - Location of indication LED's and service button

Legend

Number	Meaning
1	Service button location
2	LED indicators location

Indication LED

LED	Light	Meaning
S0	Blinking 0.1 s for 1 s period	Indication of going-through Reset.
	Blinking with 0.2 s period	Loader is launched.
	Blinking with 0.5 s period	Application run.
	Irregular blinking	Running application is indicating error. Irregular blinking means, that a pause of to 2 s follows after a particular number of blinks. Number of blinks between to pauses indicates numeric error code: 1 – error reading from Backup RAM, 2 – error during reading from EEPROM, 3 – suspiciously frequent writing to EEPROM, 15 – unknown error.
S1		Reserved for future use.

Service button

Pressing length	Action
> 1 s After turning-on	Loader with original communication parameters is launched.
> 3 s, but < 10 s While application is running	Loader with original communication parameters is launched.
> 10 s During the application run, or after the startup.	Initiated Loader, with communication parameters, stated in chapter 9. Factory settings. The original application is launched after each further start.

If no application is loaded after the Loader is initiated, the original application can be started by switching the unit off and on again.

9. Factory settings

Program settings

Item	Value setting
Network type	Modbus RTU
Address	1
Speed	38400 bps
Parity	Even

10. Ordering information and completion

Sub-plaster module	**AMR-DI2RDO2**	Complete, see chapter 10.1 Completion

10.1. Completion

AMR-DI2RDO2

Part	Quantity
Sub-plaster module	1

11. Maintenance

Device requires no periodic control nor maintenance.

12. Waste disposal

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