

# ***AMR-UI2RDO2***

## ***Sub-plaster module***

Operation manual

*Version 1.00*



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## History of revisions

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Document name: amr-ui2rdo2\_g\_en\_100.pdf

Author: Jiří Březina

Revision	Date	Changes
100	16. 02. 2016	New document

## Related documentation

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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

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**AMR-UI2RDO2** is programmable module built-in plastic box, intended for sub-plaster mounting.

- Basic features**
- 2 relay outputs with galvanic separation
  - 2 universal inputs without galvanic separation
  - RS485 serial interface without galvanic separation
  - Power supply 24 V DC
  - Programming in DetStudio / EsiDet environment

## 2. Technical parameters

<b>Processor</b>	Type	STM32F103
	FLASH	128 KB
	RAM	20 KB
	EEPROM	2 KB

<b>Universal inputs</b>	Number of inputs	2
	Type of inputs 1)	Potential free / Ni1000 / Pt1000
	Galvanic separation	No
	Connection point	Screw terminal block CPP3,5/3
	Wire cross section	0.14 mm <sup>2</sup> to 1 mm <sup>2</sup>
	Maximum inlet wire length	30 m

1) The way of use of universal inputs depends on application program created in DetStudio / EsiDet environment.

### Ni1000 / Pt1000 input

Measured temperature range	
– Ni1000 (6180 ppm/°C)	-35 °C to 120 °C
– Ni1000 (5000 ppm/°C)	-40 °C to 145 °C
– Pt1000 (3850 ppm/°C)	-45 °C to 205 °C
Accuracy	
– Ni1000 (6180 ppm/°C)	±0.5 °C
– Ni1000 (5000 ppm/°C)	±0.6 °C
– Pt1000 (3850 ppm/°C)	±0.8 °C
Input temperature dependence	70 ppm/°C
Input overvoltage protection	Diodes

### Potential free contact

R <sub>max</sub> for log. 0	< 1080 Ω
R <sub>min</sub> for log. 1	> 1320 Ω

### 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 > 10 <sup>7</sup> cycles Nominal load > 10 <sup>7</sup> cycles
Connection point	Screw terminal block CZM5/2
Wire cross section	0.5 mm <sup>2</sup> to 1.5 mm <sup>2</sup>

### 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 <sup>2</sup> to 1 mm <sup>2</sup>

<b>Power supply</b>	Nominal power supply voltage	24 V DC
	Power supply voltage range	10 V DC to 30 V DC
	Maximum power consumption	100 mA at 24 V DC
	Connection point	Screw terminal block CPP3,5/3
	Wire cross section	0.14 mm <sup>2</sup> to 1 mm <sup>2</sup>
<b>Mechanics</b>	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
<b>Temperatures</b>	Operating temperature range	0 °C to 50 °C
	Storage temperature range	0 °C to 50 °C
<b>Others</b>	Maximum ambient humidity	< 95 % non-condensing
	Programming	DetStudio / EsiDet

## 2.1. Dimensions

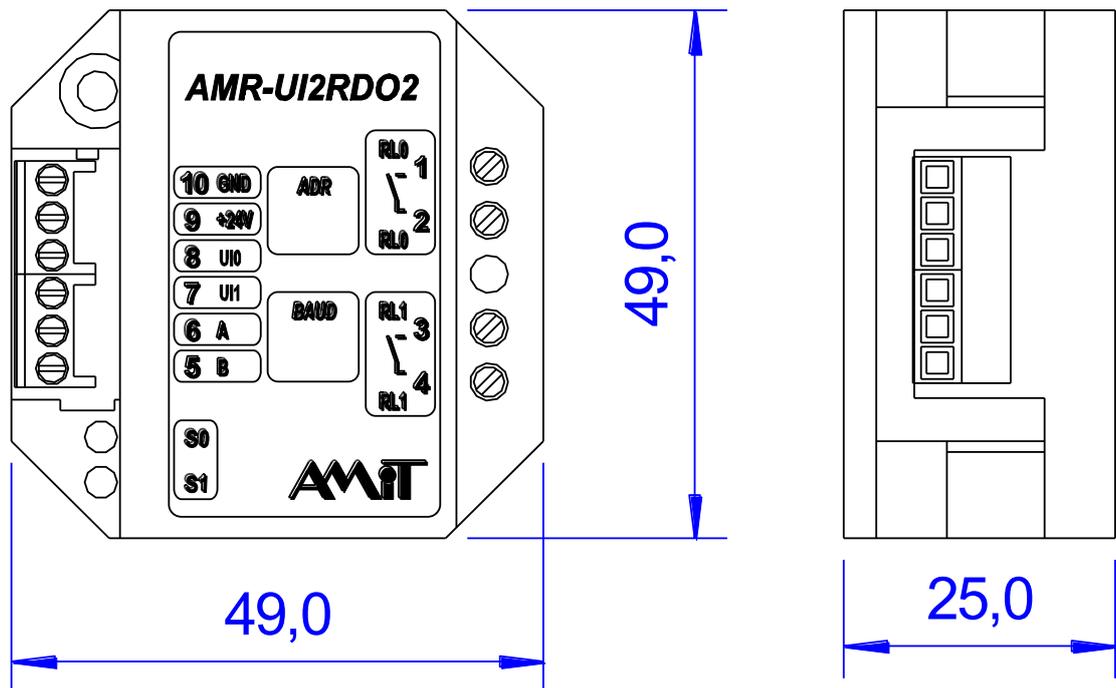


Fig. 1 - AMR-UI2RDO2 dimensions

## 2.2. Recommended drawing symbol

Following drawing symbol is recommended for **AMR-UI2RDO2** module. Only part of it will be visible in following examples.

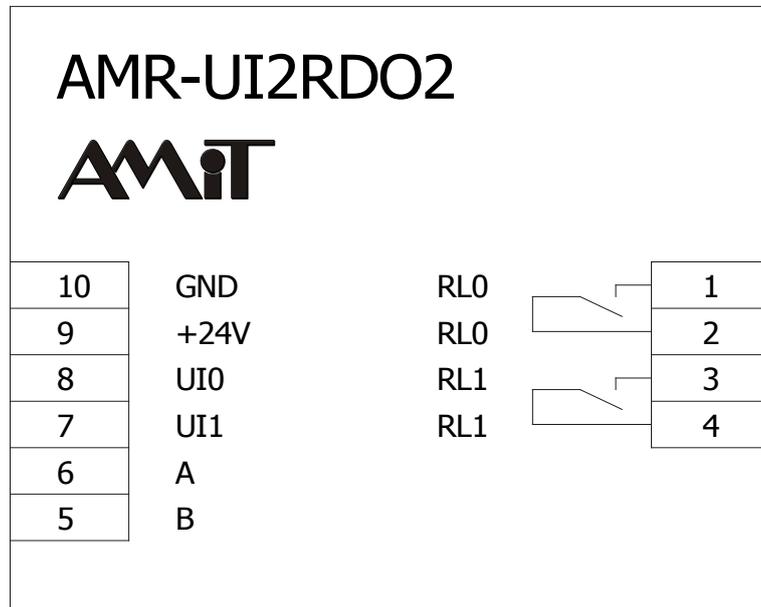


Fig. 2 - Recommended drawing symbol for **AMR-UI2RDO2**

### 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 B
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 $\leq 16$ A per phase and not subject to conditional connection	Complies <sup>1)</sup>
EN 61000-4-2:2009	Electromagnetic compatibility (EMC) – Part 4-2: Testing and measurement techniques – Electrostatic discharge immunity test	Complies <sup>2)</sup> (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 ( $\pm 2$ 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 ( $\pm 1$ 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 <sup>3)</sup> ( $\pm 1$ kV/ $\pm 2$ 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 true, when any appliance being connected to device outputs has the peak current consumption not greater than 0.9 A AC. When the appliance has greater current consumption, it is necessary to review again the compliance assessment with EN 61000-3-3 in terms of installation.
- 2) Test is performed with indirect coupling.
- 3) Level  $\pm 1$  kV between lines, level  $\pm 2$  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-UI2RDO2 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 GND terminal together with power supply. For proper operation of RS485 it is necessary to abide the rules presented in Application Note AP0016 – Principles of using RS485 interface.

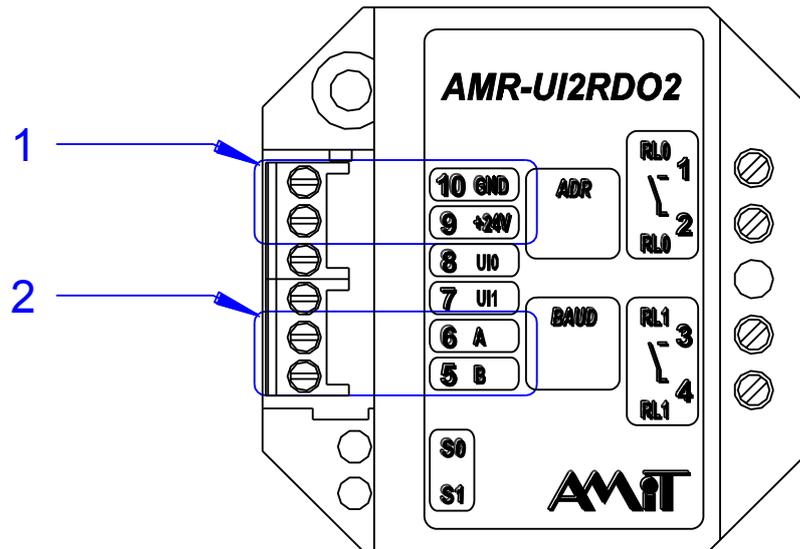


Fig. 3 - Location of power supply and RS485 terminals

Legend

Number	Meaning
1	Power supply terminals
2	RS485 line terminals

Terminal wiring

Terminal	Description	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 and universal inputs

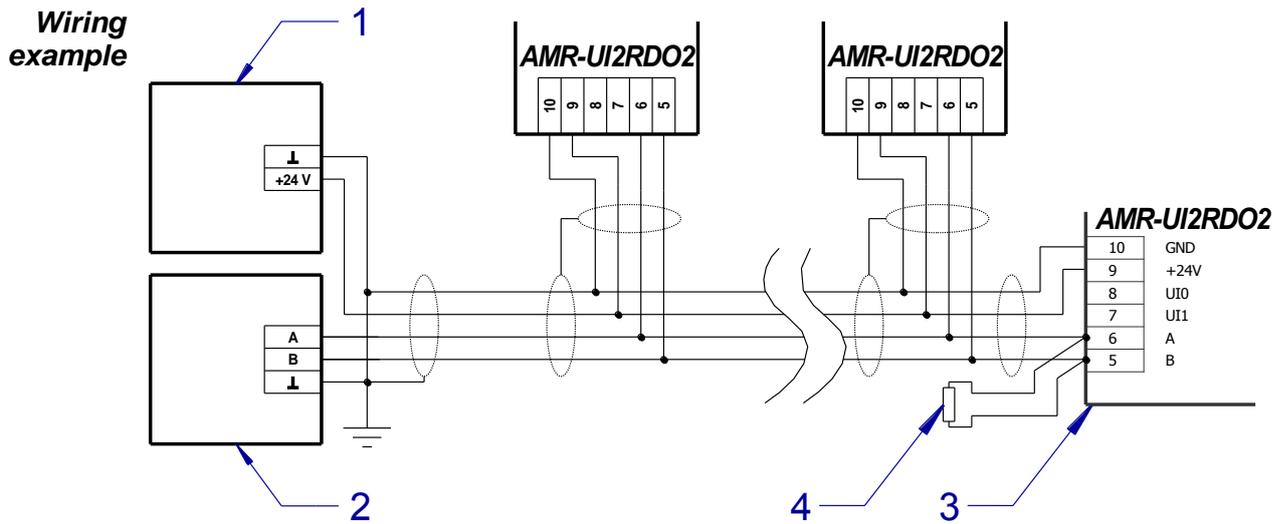


Fig. 4 - Power supply and RS485 wiring

Legend

Number	Meaning
1	Power supply 24 V DC
2	Superior control system
3	Sub-plaster module <b>AMR-UI2RDO2</b>
4	External terminating resistor attached nearby terminating station

**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, intermediate stations disconnected. For line termination is used resistor (typically  $120 \Omega \pm 20 \%$ ), 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.

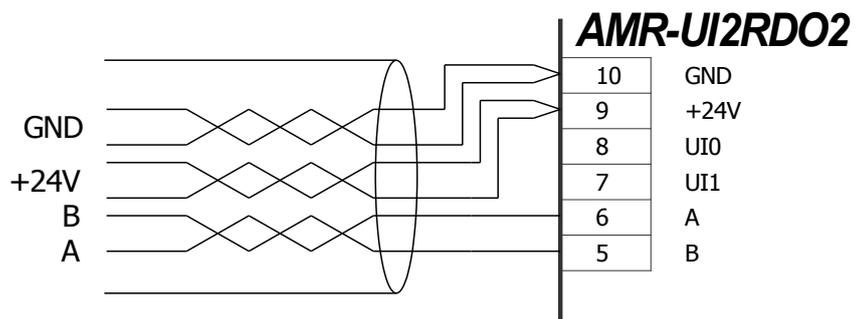


Fig. 5 - Example of use of structured cabling

## 5. Universal inputs

AMR-UI2RDO2 module is fitted with two universal inputs. Inputs can operate as potential free digital inputs, or as inputs for resistance temperature sensors Ni1000/6180, Ni1000/5000 or Pt1000.

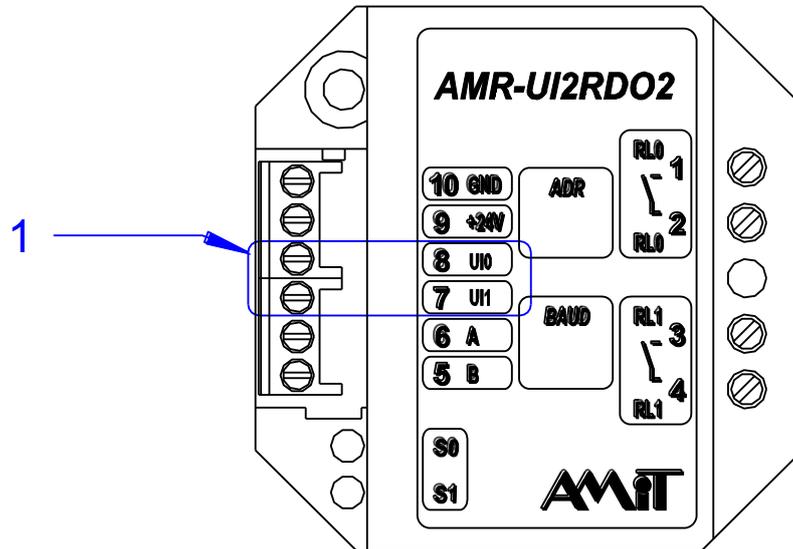


Fig. 6 - Location of universal inputs terminals

Legend

Number	Meaning
1	Terminals for universal inputs

**Terminal wiring** Universal inputs are utilizing common with power supply terminal GND.

Terminal	Description	Meaning
7	UI1	Universal input 1
8	UI0	Universal input 0
10	GND	Common Ground – power supply, RS485 and universal inputs

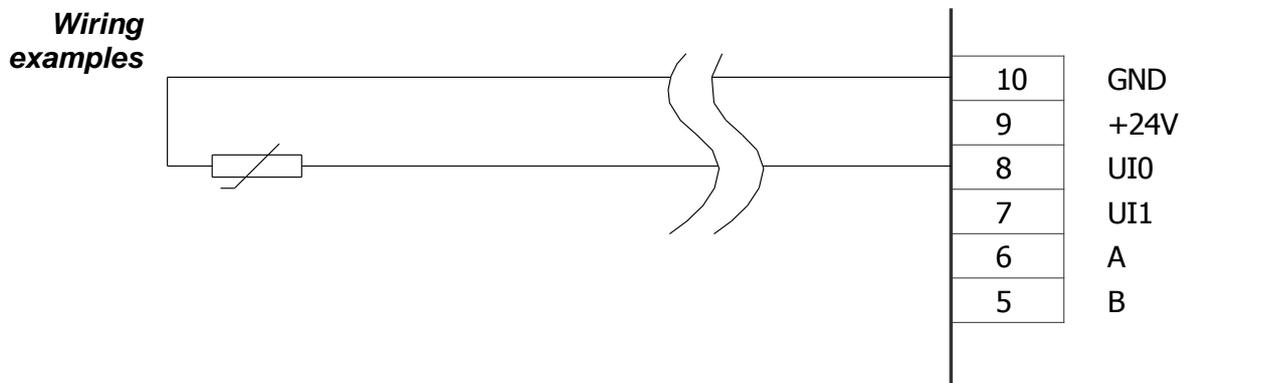


Fig. 7 - Example of temperature sensor connection

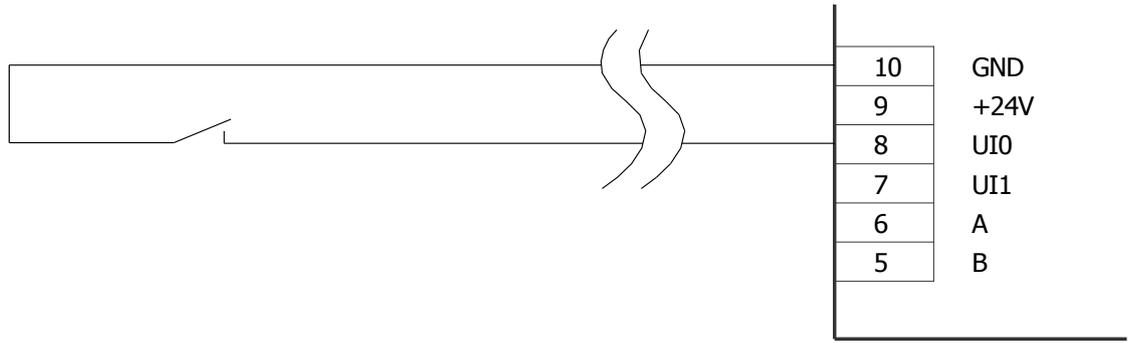


Fig. 8 - Potential-free contact wiring example

## 6. Relay outputs

Module **AMR-UI2RDO2** is equipped with two relay outputs with separated switching contacts, without common terminal.

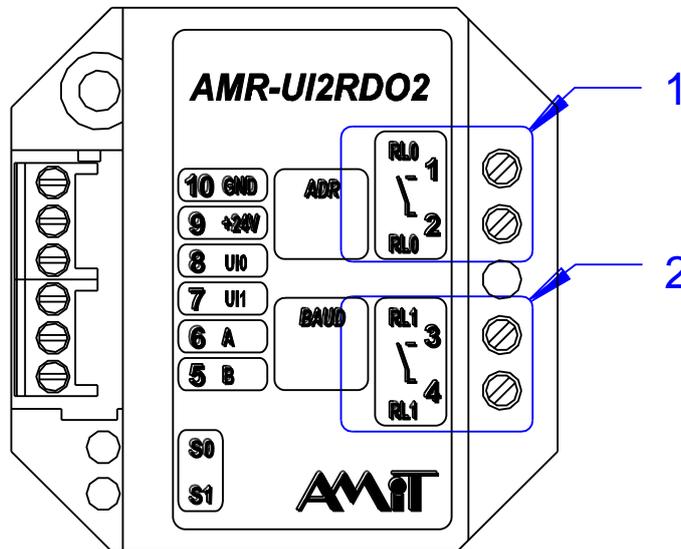


Fig. 9 - Location of relay outputs terminals

<i>Legend</i>	Number	Meaning
	1	Relay 0 terminal
	2	Relay 1 terminal

<i>Terminal wiring</i>	Terminal	Description	Meaning
	1	RL0	Relay contact 0
	2	RL0	Relay contact 0
	3	RL1	Relay contact 1
	4	RL1	Relay contact 1

## 7. Mounting

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The **AMR-UI2RDO2** 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

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**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 universal 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 control system are guaranteed only when these wiring principles are applied.

## 8. Programming and setting

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Loader is implemented by manufacturer in **AMR-UI2RDO2** module, with communication parameters stated in chapter 9. Factory settings.

New application program can be created by using:

- DetStudio / EsiDet      development environment.

Application program can be downloaded into module by:

- DetStudio                      development environment,
- AMRconfig                      service and programming utility,
- AMRdownload                  multiprogramming utility.

**SW Download** Programs can be downloaded from [www.amit.cz](http://www.amit.cz) web site, section AMiT Automation.

### 8.1. Setting of communication parameters

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Communication parameters can be changed only from PC by using:

- DetStudio                      development environment,
- AMRconfig                      service and programming utility.

**Connection to PC** Module **AMR-UI2RDO2** 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 SW 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 use. Service button is located under module front panel. Button can be pushed by suitable blunt tool.

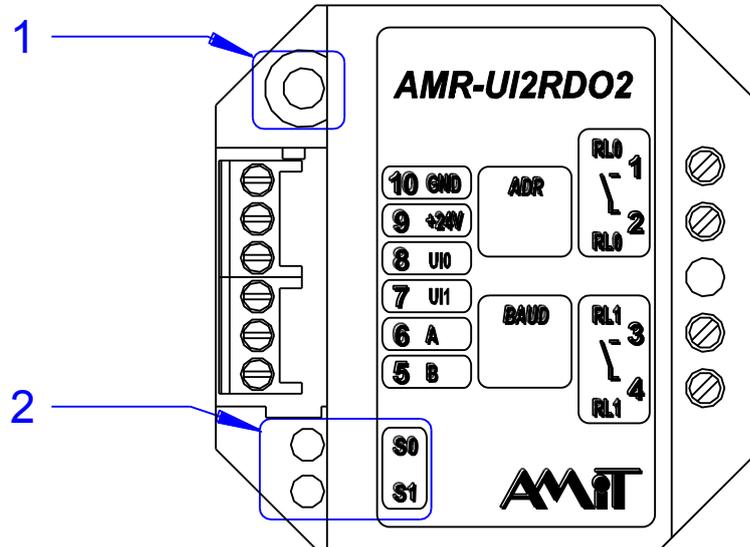


Fig. 10 - Location of indication LED's and service button

Legend	Number	Meaning
	1	Service button location
	2	LED indicators location

Indication LED	LED	Light	Meaning
	S0	Blinking with 0.1 s period during 1 s	Indication of going-through Reset.
		Blinking with 0.2 s period	Loader is launched.
		Blinking with 0.5 s period	Application is running.
		Irregular blinking	Running application is indicating error. Irregular blinking means, that a pause of 2 s follows after a particular number of blinks. Number of blinks between two 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.

<b>Service button</b>	<b>Pressing length</b>	<b>Action</b>
	> 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.	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

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<i>Program settings</i>	<b>Item</b>	<b>Setting</b>
	Network type	Modbus RTU
	Address	1
	Speed	38400 bps
	Parity	Even

## 10. Ordering information and completion

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<i>Sub-plaster module</i>	<b>AMR-UI2RDO2</b>	Complete, see chapter 10.1 Completion
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### 10.1. Completion

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<b>AMR-UI2RDO2</b>	<b>Part</b>	<b>Quantity</b>
	Sub-plaster module	1

## 11. Maintenance

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Device requires no periodic control, nor maintenance.

## 12. Waste disposal

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**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.