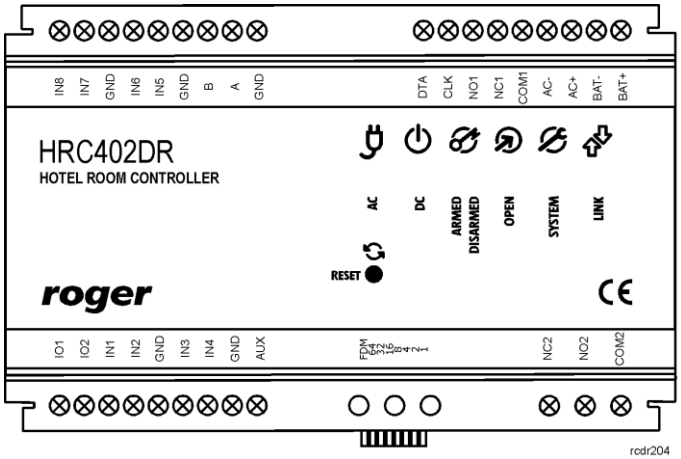
Roger Access Control System

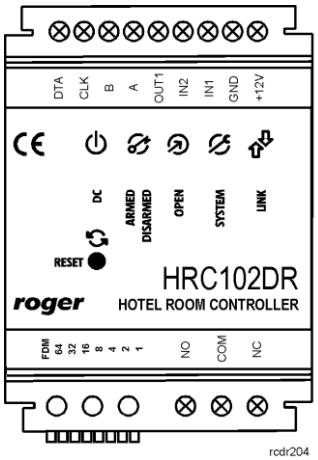
Installation guide for HRC series controllers

Firmware version: 1.3.2.57 or newer

Hardware version: 1.0

Document version: Rev. A





Contents

1. INTRODUCTION

This manual contains minimum information that is necessary to properly install device. Following documents supplement this manual:

- Functional description of HRC series controllers
- Installation guides for HRT series devices

In order to acquire the first one it is necessary to obtain Roger consent and sign non-disclosure agreement (NDA). The remaining ones are available at www.roger.pl.
If various versions of controllers are not distinguished in particular paragraph, then designation HRC402 type controller applies to all versions of this device and similarly the designation HRC102 type controller applies to all versions of this device.

2. DESCRIPTION AND SPECIFICATION

HRC402DR and HRC102DR type controllers are single room/door controllers and together with HRT and XM series peripheral devices they are dedicated to hotel applications. HRC series controller communicates with HRT and XM series devices using RACS CLK/DTA bus and it enables to implement access control, hotel automation and alarm functions in hotel system. Differences between various models of HRC controllers are limited to enclosures, power supplies and number of available inputs and outputs. The summary of all versions of HRC controllers is given in table 1.
In order to communicate with the controller it is necessary to use communication interface e.g. UT-2USB, UT-4DR, UT-4 v.2.0 or RUD-1

Note: In case of HRC series controllers it is necessary to develop own management software. Roger company offers only devices and communication protocol.

Table 1 Versions of HRC controllers

Name	Installation	Power supply	Inputs/outputs
HRC402DR	Plastic enclosure adapted for installation on DIN 35mm rail.	18VAC, 12VDC or 24VDC power supply. Backup battery can be connected directly. The controller offers 12VDC power supply outputs (AUX, TML).	8 x NC/NO inputs
			2 x transistor outputs 1A/15VDC
			1 x relay output 1.5A/30V
			1 x relay output 5A/30VDC and also 5A/230VAC
HRC402DR-BRD	PCB module with mounting holes. Additional attachments for installation on DIN35mm rail are included.	see HRC402DR	see HRC402DR
HRC402DR-12VDC	see HRC402DR	12VDC power supply. Backup battery cannot be connected directly. The controller offers 12VDC power supply outputs (AUX, TML).	see HRC402DR
HRC402DR-BRD-12VDC	see HRC402DR-BRD	see HRC402DR-12VDC	see HRC402DR
HRC102DR	Plastic enclosure	12VDC power supply.	2 x NC/NO inputs

	adapted for installation on DIN 35mm rail	Backup battery cannot be connected directly.	1 x transistor output 1A/15VDC
			1 relay output 1.5A/30V
HRC102DR-BRD	PCB module with mounting holes. Additional attachments for installation on DIN35mm rail are included	see HRC102DR	see HRC102DR

Table 2. Specification of HRC402 type controllers		
Supply voltage	Nominal 18VAC, min./max. range 17-22VAC (only HRC402DR/HRC402DR-BRD) Nominal 12VDC, min./max. range 10-15VDC Nominal 24VDC, min./max. range 22-26VDC (only HRC402DR/HRC402DR-BRD)	
Backup battery	13.8V/7Ah, charging current app. 300mA (only HRC402DR/HRC402DR-BRD)	
Average current consumption	100 mA (excluding load points connected to AUX and/or TML outputs)	
Inputs	Eight (IN1..IN8) NO/NC inputs, electrically biased to +12V via 15kΩ resistor, triggering level app. 3.5V	
Relay outputs	Two (REL1,REL2) relay outputs with single NO/NC contact, 30V/1.5A (REL1) and 230VAC/5A (REL2)	
Transistor outputs	Two (IO1,IO2) open collector outputs, 15VDC/1A	
Power supply outputs	Two power supply outputs: 12VDC/0.2A (TML) and 12VDC/1A (AUX)	
Distances	Between controller and communication interface (RS485): max. 1200m Between controller and HRT device (RACS CLK/DTA): max. 150 m Between controller and XM expander (RACS CLK/DTA): max. 150 m	
Environmental class (acc. to EN 50131-1)	Class I, indoor general conditions, temperature: +5°C to +40°C, relative humidity: 10 to 95% (no condensation)	
IP code	HRC402DR/HRC402DR-12VDC: HRC402DR-BRD/HRC402DR-BRD-12VDC:	IP41 IP20
Dimensions HxWxD	HRC402DR/HRC402DR-12VDC: HRC402DR-BRD/HRC402DR-BRD-12VDC:	85 x 124 x 73mm 80 x 115 x 28mm
Weight	HRC402DR/HRC402DR-12VDC: HRC402DR-BRD/HRC402DR-BRD-12VDC:	ok. 200g ok. 100g
Certificates	CE	

Table 3. Specification of HRC102 type controllers	
Supply voltage	Nominal 12VDC, min./max. range 10-15VDC
Average current consumption	40mA

Inputs	Two (IN1,IN2) NO/NC inputs, electrically biased to +12V via 15kΩ resistor, triggering level app. 3.5V
Relay output	One (REL1) relay output with single NO/NC contact, 30V/1.5A
Transistor output	One (OUT1) open collector output, 15VDC/150mA
Distances	Between controller and communication interface (RS485): max. 1200m Between controller and HRT device (RACS CLK/DTA): max. 150m Between controller and XM expander (RACS CLK/DTA): max. 150 m
Environmental class (according to EN50131-1)	Class I, indoor general conditions, temperature: +5°C to +40°C, relative humidity: 10 to 95% (no condensation)
IP code	HRC102DR: IP41 HRC102DR-BRD: IP20
Dimensions HxWxD	HRC102DR: 85 x 62 x 73mm HRC102DR-BRD: 80 x 54 x 15mm
Weight	HRC102DR: ok. 115g HRC102DR-BRD: ok. 50g
Certificates	CE

3. INSTALLATION

3.1 Terminals and connection diagram

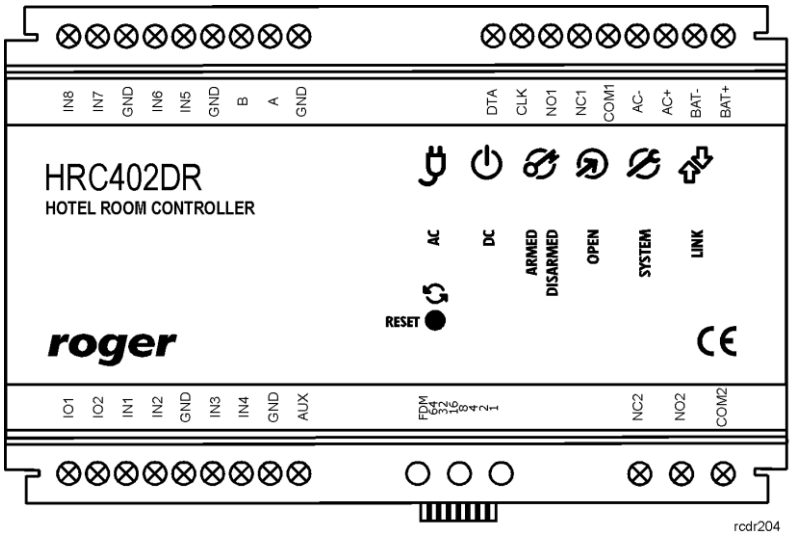


Fig. 1 HRC402DR controller

Table 4. HRC402DR terminals			
Terminal	Description	Terminal	Description
IN8	IN8 input line	P1	Power supply for controller
IN7	IN7 input line	BAT-	Backup battery (disabled for HRC402DR-12VDC controller)
GND	Ground	BAT+	Backup battery (disabled for HRC402DR-12VDC controller)

IN6	IN6 input line	IO1	IO1 output line
IN5	IN5 input line	IO2	IO2 output line
GND	Ground	IN1	IN1 input line
B	RS485 communication bus	IN2	IN2 input line
A	RS485 communication bus	GND	Ground
GND	Ground	IN3	IN3 input line
DTA	RACS CLK/DTA comm. bus	IN4	IN4 input line
CLK	RACS CLK/DTA comm. bus	TML	Built-in feeder 12VDC/0.2A output (recommended for HRT82MF reader)
NO1	REL1 relay output (NO)	AUX	Built-in feeder 12VDC/1A output (power supply for general purposes)
NC1	REL1 relay output (NC)	NC2	REL2 relay output (NO)
COM1	REL1 relay common terminal	NO2	REL2 relay output (NC)
P2	Power supply for controller	COM2	REL2 relay common terminal

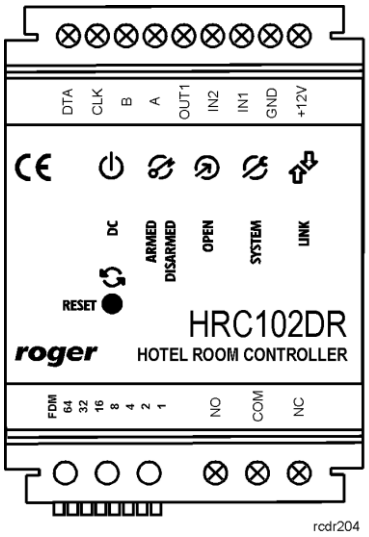


Fig. 2 HRC102DR controller

Table 5. PR102DR terminals			
Terminal	Description	Terminal	Description
DTA	RACS CLK/DTA comm. bus	IN1	IN1 input line
CLK	RACS CLK/DTA comm. bus	GND	Ground
B	RS485 communication bus	+12V	12VDC power supply
A	RS485 communication bus	NO	REL1 relay output (NO)
OUT1	OUT1 output line	COM	REL1 relay common terminal
IN2	IN2 input line	NC	REL1 relay output (NC)

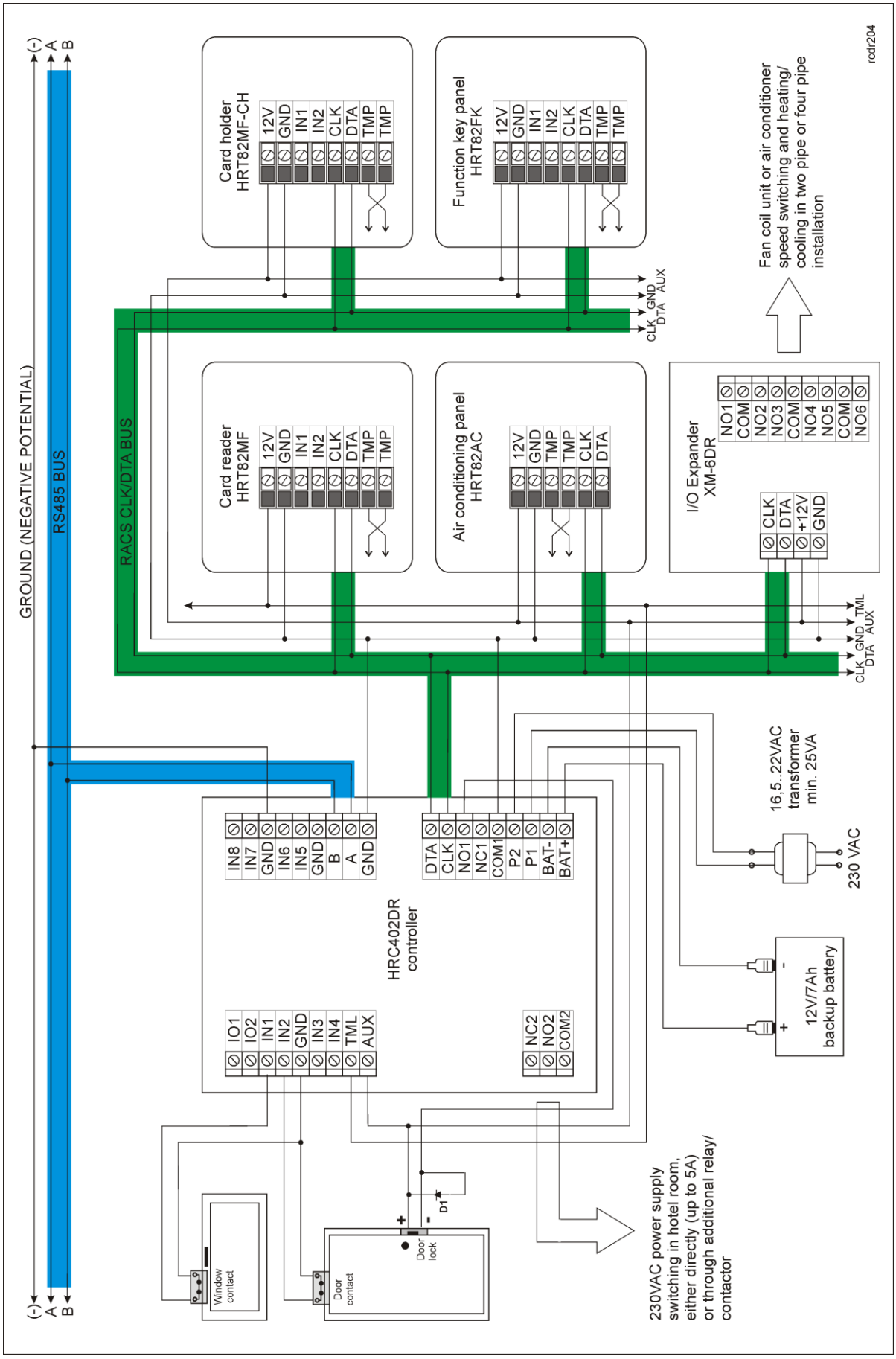


Fig. 3 Typical connection of HRC402DR controller

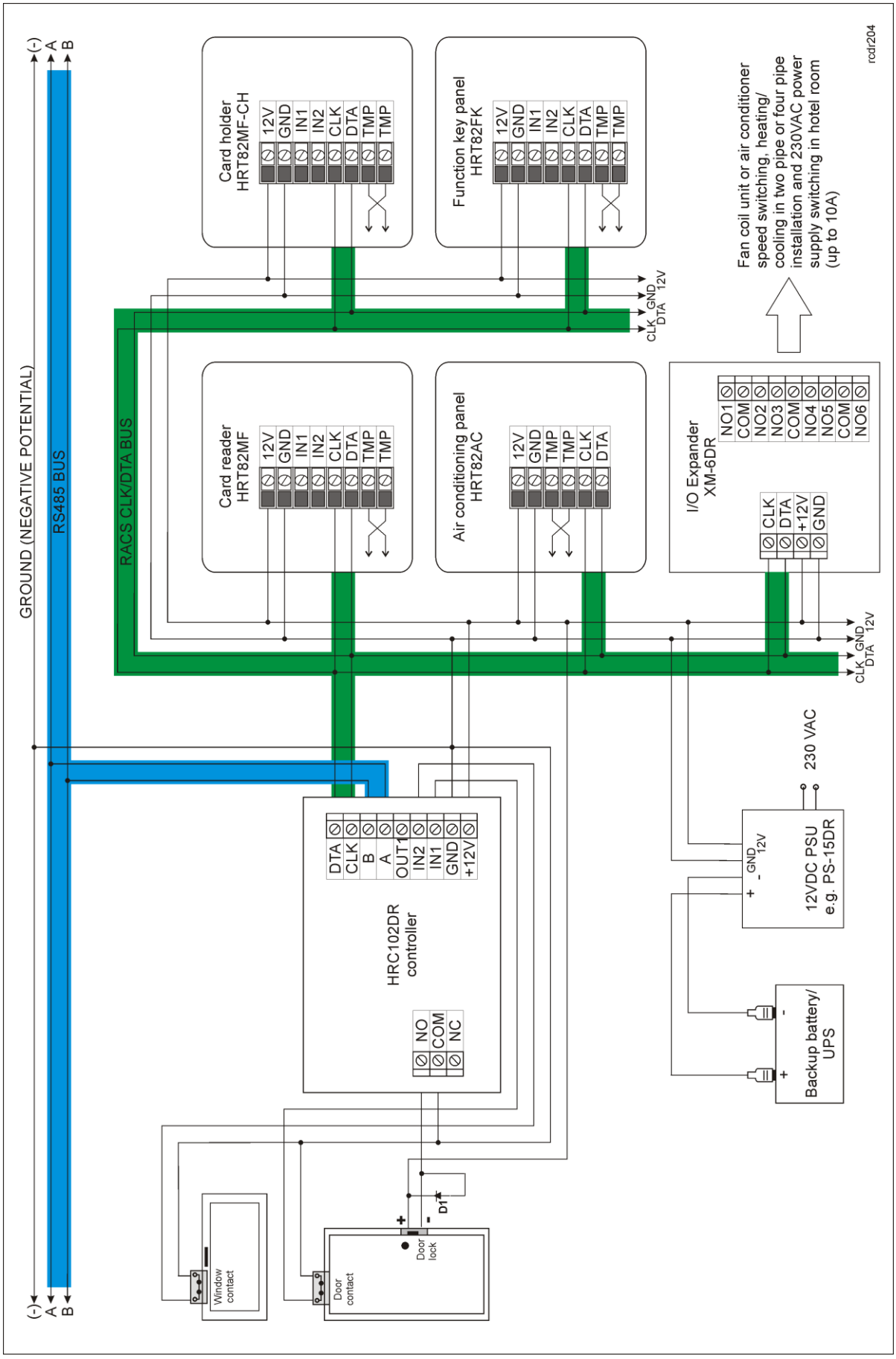


Fig. 4 Typical connection of HRC102DR controller

3.2 LED indicators

HRC series controllers are equipped with LED indicators. Their functions are explained in table 6. Additionally RESET button is available and it enables to restart the controller in the same way as in case of powering device off and then on. The RESET button can also be used during Memory Reset procedure and during firmware update procedure.

Table 6.LED indicators

Symbol	Names	Colour	Function
	AC	Red	Connected 18VAC power supply
	DC	Green	Connected 12VDC power supply
	ARMED/ DISARMED, STAT, STA	Red/ green	Programmable
	OPEN, OPN	Green	Programmable and additionally used for signalling controller errors
	SYSTEM, SYS	Orange	Programmable and additionally used for signalling controller errors
	LINK, LNK	Green	Communication on RS485 bus

3.3 Power supply

3.3.1 HRC402DR and HRC402DR-BRD controllers

Basically, HRC402DR and HRC402DR-BRD controllers are designed for power supply from 230VAC/18VAC transformer with minimal power output 25VA, but they can also be supplied with 12VDC or 24VDC. The connection of power supply is shown in fig. 5, fig. 6 and fig. 7.
If controller is supplied with 18VAC or 24VDC, then 12V backup battery can be connected in order to provide power supply in case of mains supply shortage. The controller charges backup battery with 300mA stabilized current up to 13.8V. Backup power supply is activated automatically in case of main powers supply shortage. If the voltage at backup battery drops below approx. 10V then the battery is automatically disconnected from controller and remains disconnected until mains power supply returns. Depending on charging phase of backup battery, the voltage at AUX and TML terminals may vary in range of 11V (initial charging phase) to 13.8V (final charging phase) which is not a symptom of failure but it results from applied concept of battery charging.
In case of 12VDC power supply, backup battery cannot be directly connected to controller and in such case backup power supply must be provided by power supply unit.

General guidelines for 18VAC power supply

- GND terminals of controllers must be connected with any wire.
- Controllers can operate with directly connected backup batteries.
- Controllers cannot be started using only power supply from backup battery.

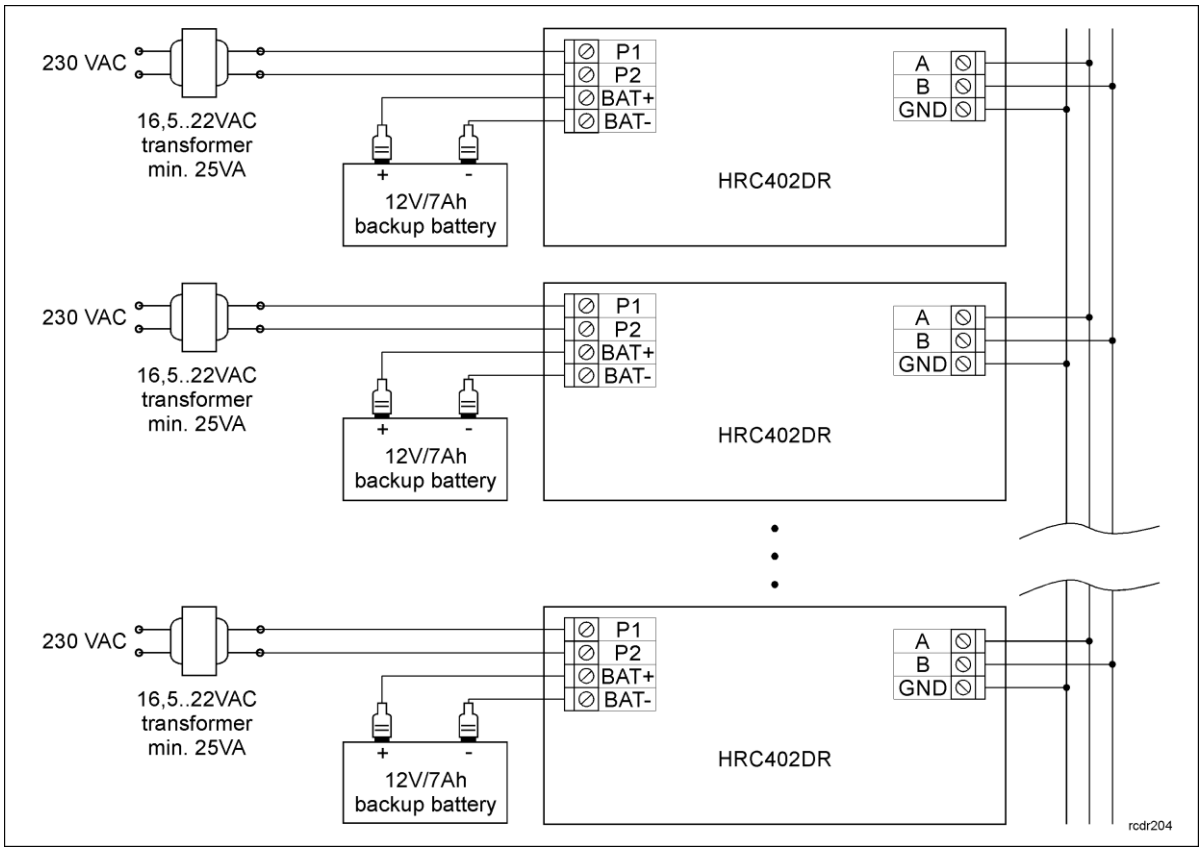


Fig. 5 HRC402DR/HRC402DR-BRD controllers supplied with 18VAC

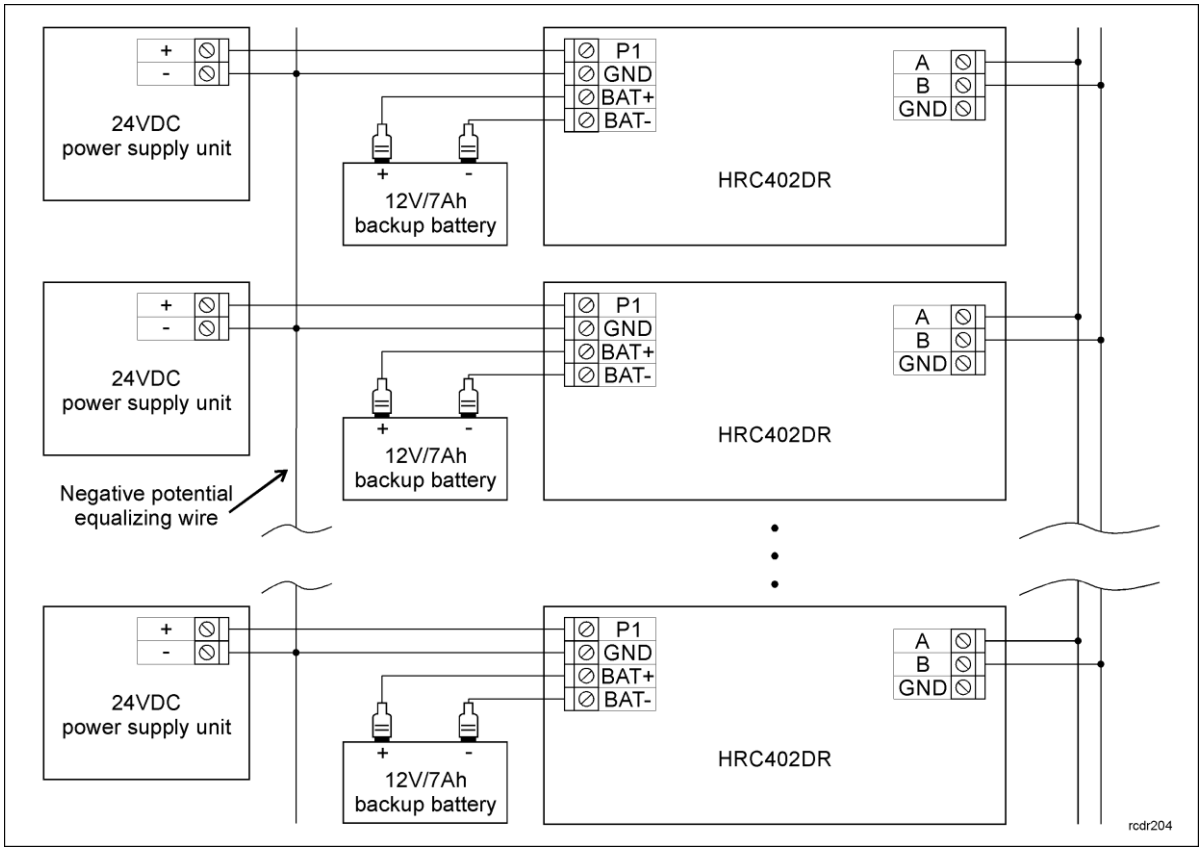


Fig. 6 HRC402DR/HRC402DR-BRD controllers supplied with 24VDC

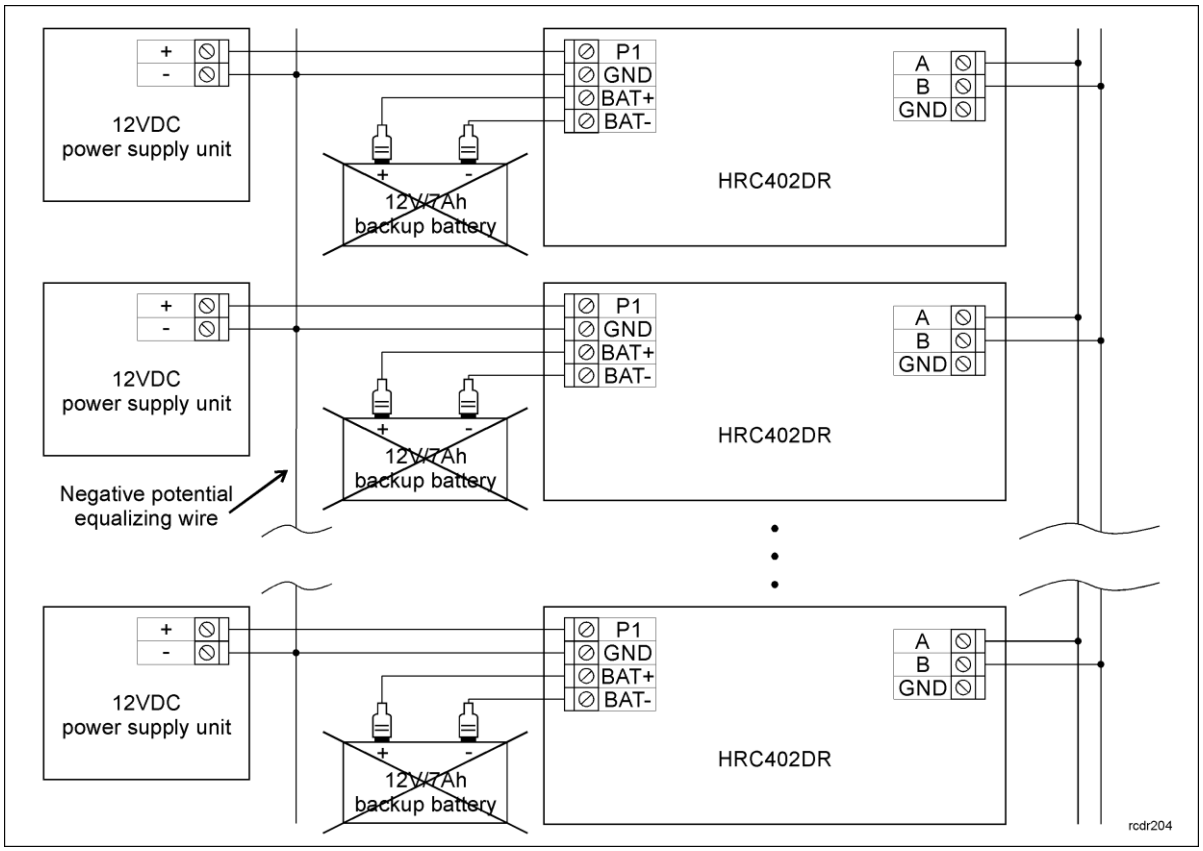


Fig. 7 HRC402DR/HRC402DR-BRD controllers supplied with 12VDC

General guidelines for 24VDC and 12VDC power supply

- Negative (GND) potentials of power supply units must be connected with any wire.
- It is not necessary to connect GND terminals of HRC series controllers.
- Connect controller and power supply unit with separate wire. The wire section must be such as to prevent more than 0.5V voltage drop between controller and unit at maximal load.
- It is recommended to install controller possibly close to power supply unit, preferably in the same room.
- 24VDC supplied controllers can be equipped with backup batteries while in case of 12VDC supplied controllers, backup supply must be ensured on power supply unit side.
- Controllers can be supplied from single power supply unit if the output power is sufficient.

3.3.2 Remaining HRC series controllers

HRC402DR-12VDC, HRC402DR-BRD-12VDC as well as HRC102DR and HRC102DR-BRD controllers are designed for 12VDC power supply. The supply must be connected according to fig. 8. General guidelines are the same as for HRC402DR controllers supplied with 12VDC.

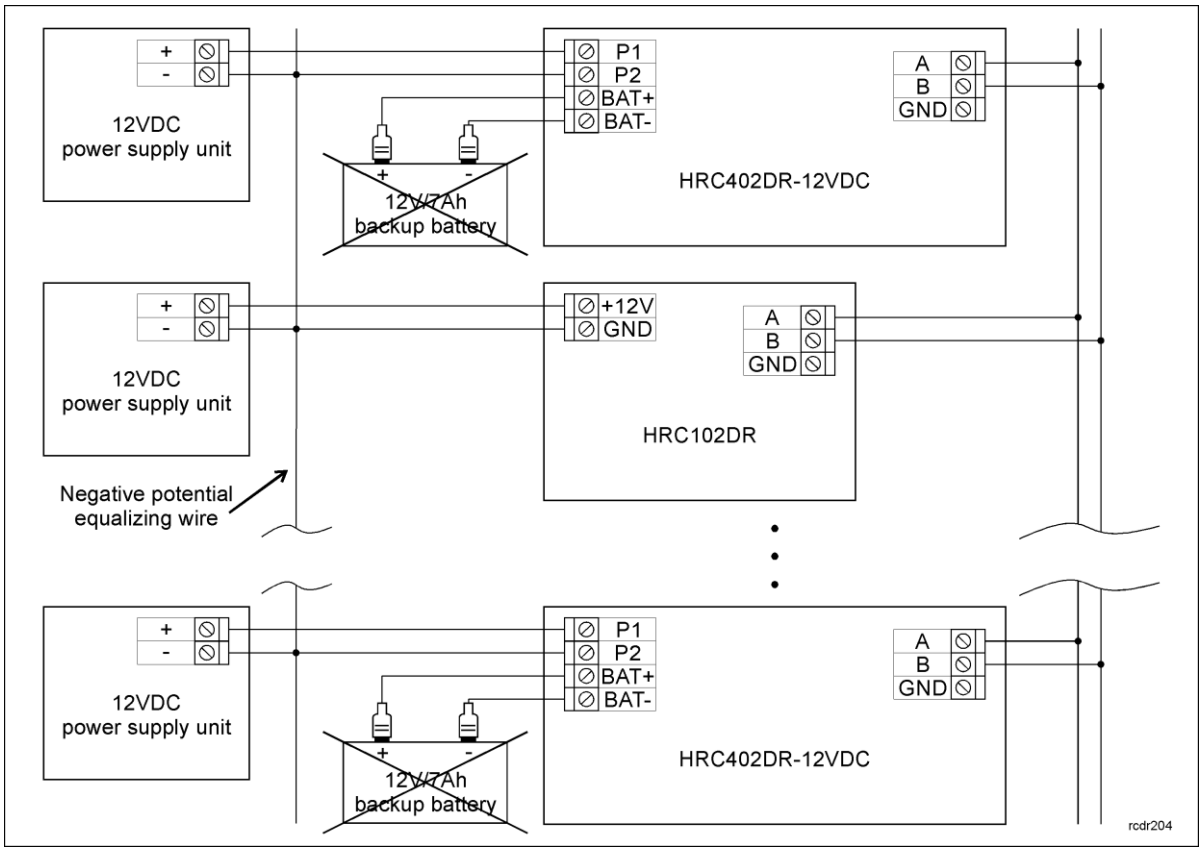


Fig. 8 HRC402DR-12VDC and HRC102DR controllers supplied with 12VDC

3.4 Connection of door lock

In majority of cases, door locking devices are inductive type. It means that overvoltage (voltage surge) can occur when current flow is interrupted and it can interfere with the controller electronic components. In extreme cases it may result in improper operation of the controller or even freeze. Moreover, overvoltage condition causes quicker wear of relay contacts. In order to limit this adverse effect, it is necessary to use a general type semiconductor diode e.g. 1N4007 (one piece of such diode is included with the controller). The diode should be connected as close as possible to the inductive element (electric strike or magnetic lock).
Door lock can be supplied from controller AUX terminal – see fig. 3 or directly from power supply unit – see figure below.

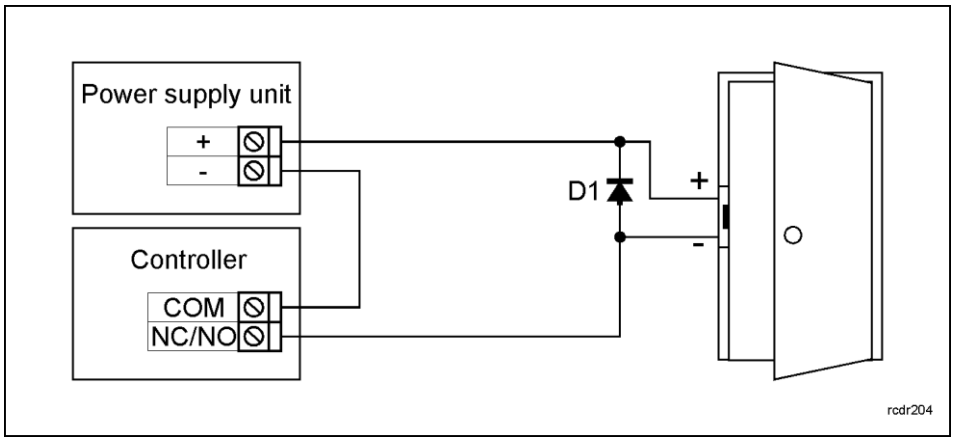


Fig. 9 Connection of door lock

3.5 RACS CLK/DTA communication bus

RACS CLK/DTA is the addressable bidirectional communication standard developed and applied in Roger controllers in order to enable their communication with peripheral devices. Addresses of all devices connected to CLK and DTA lines must be properly configured in range of 0..15. Addresses of HRT devices can be configured with RogerVDM software while addresses of XM expanders can be configured with jumpers. Detailed procedures are included in respective manuals. In majority of cases it is not necessary to modify factory configured default addresses. Peripheral devices which can be connected to RACS CLK/DTA bus are listed in table 7.
Standard unshielded signal cables (e.g. U/UTP cat. 5) with maximal length of 150m can be used for RACS CLK/DTA communication.

Note: Practically, devices communicating in RACS CLK/DTA standard can be connected to the controller in distance up to 500m, but it is not guaranteed by the manufacturer.

Table 7. Peripheral devices

Name	Description	Default address	Dedicated range of addresses	Notes
HRT82MF	Hall MIFARE card reader	ID=1	ID=0..1	-
HRT82MF-CH	MIFARE card holder	ID=0	ID=0	-
HRT82FK	Function key panel	ID=12	ID=12..15	HRC controller can operate with up to four panels with individual addresses from dedicated range.
HRT82AC	Air conditioning control panel	ID=7	ID=7	HRT82AC cannot be used on the same bus with HRT82TS because of address conflict.
HRT82TS	Temperature sensor module	ID=7	ID=7	HRT82TS cannot be used on the same bus with HRT82AC because of address conflict.
XM-6DR	I/O expander with 6 relays	-	ID=5..6	HRC controller can operate with up to two expanders with individual addresses from dedicated range.

3.6 RS-485 communication bus

The RS485 bus consists of two signal lines A and B. Any topology can be used (star, tree or any combination of them, except for loop) in order to connect controllers in network (subsystem) and to establish hotel system. The matching resistors (terminators) connected at the ends of transmitting lines are not required. In most cases communication works with any cable type (standard telephone cable, shielded or unshielded twisted pair etc.) but the recommended cable is unshielded, twisted pair (U/UTP cat.5). Shielded cables should be limited to installations subject to strong electromagnetic interferences. The RS485 communication standard used in the hotel system guarantees proper communication in a distance of up to 1200 meters as well as high resistance to interferences.
Particular subsystem with RS485 bus consists of up to 32 HRC controllers which are single room/door controllers. For the communication of managing computer with subsystem (RS485 bus) UT-2USB serial communication interface is used. Alternatively, UT-4DR and UT-4 v2.0 communication interfaces can be used for communication through computer network (LAN or WAN).

3.7 Input and output lines

Functions are assigned to programmable inputs and outputs.

3.6.1 Inputs

All inputs of controllers have identical electric structure and can be configured as NO or NC lines. The NO input is triggered by shorting it to supply minus (GND) while the NC input must be normally shorted to supply minus (GND) and it becomes triggered when connection with GND is interrupted. Every input is internally connected (pulled up) to the power supply plus (+12V) through a 15kΩ resistor.

3.6.2 Relay outputs

Controllers offer relay outputs, each with single switching contact. In case of HRC402DR type controllers maximum load for REL1 equals to 30V/1.5A while maximum load for REL2 equals to 230VAC/5A and also 30VDC/5A. HRC102DR type controllers are equipped with single 30V/1.5A relay. In the normal state (relay is off) the NC-COM contacts are shorted. In the triggering state (relay is on) the NO-COM contacts are shorted. In case of power outage both relays remain in the off state.

3.6.3 General purpose outputs

Controllers offer transistor outputs. The outputs are open collector type i.e. in normal (off) state are pulled to supply plus via 15kΩ resistor and when in trigger (on) state they short to supply minus. Maximum load for each output equals to 15VDC/1A. In case of overcurrent outputs are automatically switched off and controller automatically restarts.

3.8 Installation guidelines

- Install devices in such way as to ensure easy access to screw terminals, addressing jumpers, RST button and FDM jumper of the controller.
- Prior to controller installation it is recommended to configure its address (ID number) – see 4.1 Controller address.
- All electric connections must be made with power supply switched off.
- All devices connected to the same communication bus (RS485 and RACS CLK/DTA) should be connected to the same negative potential (GND). In order to satisfy this requirement connect the power supply according to section 3.3 Power supply.
- General purpose diode e.g. 1N4007 should be always connected in parallel and as close as possible to the door locking device (magnetic lock, electric strike, relay, contactor).
- It is required to install readers in minimal distance of 0.5m from each other. If two readers have to be installed on opposite sides of the same wall, it is recommended not to place them directly opposite (in the same axis). If this condition cannot be fulfilled then place metal plate between reader and wall as well as non-metal spacer with 10mm minimal thickness between reader and metal plate.
- Because of relatively low magnetic field readers should not interfere with other devices, however its operation can be disrupted by devices generating strong electromagnetic field.
- If the range of card reading is significantly lower than specified in technical documentation then consider relocation of the reader.
- Readers can be installed on metal surfaces but in such case reduction of reading distance should be expected. The reading distance reduction effect can be minimized by installing readers on non-metal spacer with minimal thickness of 10 mm (e.g. PVC).

4. CONFIGURATION

4.1 Controller address

Every controller connected to RS485 bus must be assigned unique address (ID number) in range of 01..63. Two or more devices with the same address result in communication conflict and make a proper communication with these devices impossible. Controller address is configured by means of jumper according to fig. 10. Each time the new address is configured, controller must be restarted (via RESET button or powering device off and on) to make new settings valid.

Note: '64' pins are not used in address configuration but they are used in Memory Reset procedure.

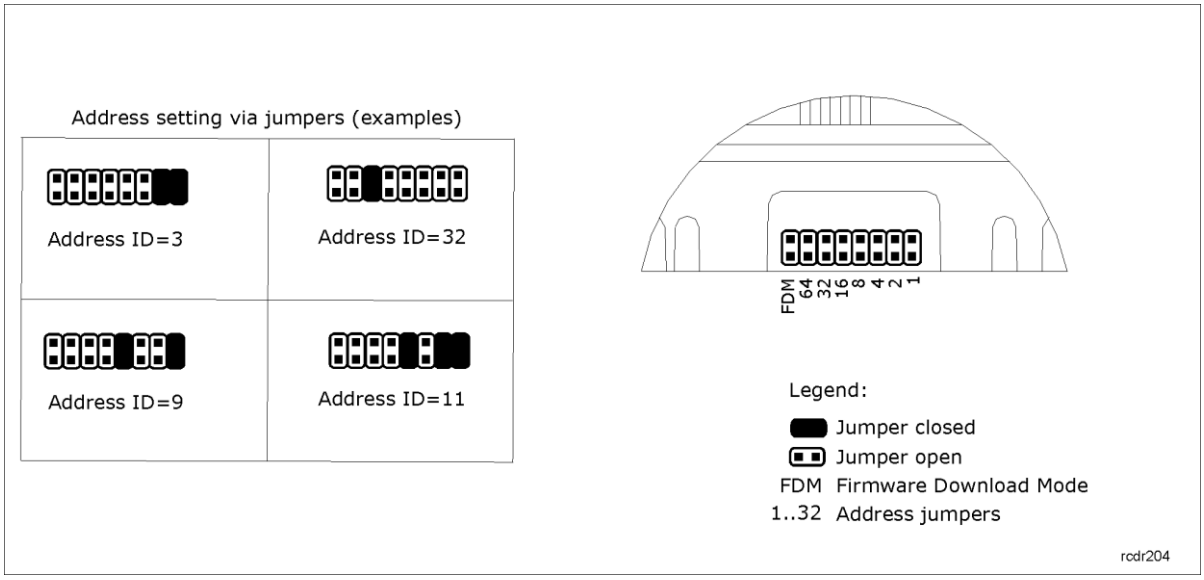


Fig. 10 Addressing jumpers

4.2 Memory Reset procedure

Memory Reset procedure erases current settings and restores default factory settings. After Memory Reset procedure the controller requires restarting in order to enter normal working mode.

Memory Reset procedure
Memory Reset restores default settings without erasing event log.

1. Remove all jumpers from controller pins
2. Place jumpers on '64' and '8' pins
3. Restart the controller (press RESET button or switch power supply off/on)
4. After approximately 10 sec the controller shall signal the result of reset by means of SYSTEM (orange) and OPEN (green) LED indicators:

- 1 SYSTEM blink and 3 OPEN blinks – successful erasing
- 1 SYSTEM blink and 4 OPEN blinks – erasing error

5. Place again previous address jumper(s)
6. Restart the controller (press RESET button or switch power supply off/on)

Full Memory Reset procedure
Full Memory Reset restores default settings and erases event log.

1. Remove all jumpers from controller pins
2. Place jumpers on '64' and '16' pins
3. Restart the controller (press RESET button or switch power supply off/on)
4. After approximately 10 sec the controller shall signal the result of reset by means of SYSTEM (orange) and OPEN (green) LED indicators:

- 1 SYSTEM blink and 1 OPEN blink – successful erasing
- 1 SYSTEM blink and 2 OPEN blinks – erasing error

5. Place again previous address jumper(s)
6. Restart the controller (press RESET button or switch power supply off/on)

4.3 Controller programming

Controllers can be configured by means of:

- Software developed by integrator based on communication protocol for HRC series controllers.
- RogerHRCM utility software

More information on controller programming can be found in the document Functional description of HRC series controllers. In order to acquire this document it is necessary to obtain Roger consent and sign non-disclosure agreement (NDA).

4.4 Firmware update

In order to update firmware it is necessary to connect the device by means of RS485 bus to communication interface (UT-2USB or RUD-1) and then connect the interface to PC with installed RogerISP software. It is not necessary to disconnect the controller from hotel system, it is only required to place FDM jumper in order to put the device in firmware download mode. Therefore firmware update can be performed by means of RS485 bus of hotel system.
Alternatively, functions of HRC communication protocol can be used for uploading the firmware.

Firmware update procedure

1. Place jumper on FDM pins
2. Restart device (press RESET button or switch power supply off/on)
3. Start RogerISP software with /S parameter and select communication port (in case of RUD-1 select USB-RS485 Converter).
4. Additionally in top menu enable the option *Commands->Set BLJB option (Atmel)*
5. Do not modify other default options in RogerISP
6. Select firmware *.hex file and then select the button *Program*
7. After firmware upload remove jumper from FDM pins and restart device (press RESET button or switch power supply off/on)

Note: If the controller is not responding or the firmware is actually not updated after firmware update procedure then repeat the procedure.

5. TROUBLESHOOTING

Controller conditions and errors are signalled with SYSTEM and OPEN LED indicators located on the front panel or board. If configuration error is detected by the controller when started then default configuration is automatically restored, event is logged and normal working mode is started.

Table 8. Troubleshooting

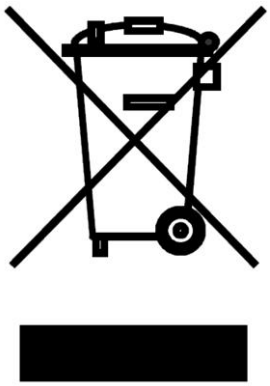
Issue	Visual indication	Acoustic indication	Solution
No communication with controller	-	-	1. Check if RS485 bus is properly connected, wires are undamaged and the bus does not exceed 1200m. 2. Verify if controller power supply is in accordance with section 3.3 of this manual. 3. Check if the controller address is unique and is in range of 01..63.
Device configuration error	Double blink of orange LED SYSTEM and then single blink of green LED OPEN indicators.	-	1. Upload the configuration again.
Configuration memory error	Double blink of orange LED SYSTEM and then double blink of green LED OPEN indicators.	-	1. Controller probably requires repair or replacement.

6. ORDERING INFORMATION

Table 9.Ordering information	
HRC402DR	Hotel controller in enclosure adapted for installation on DIN 35mm rail.
HRC402DR-BRD	Electronic module of HRC402DR controller.
HRC402DR-12VDC	Hotel controller in enclosure adapted for installation on DIN 35mm rail, 12VDC power supply.
HRC402DR-BRD-12VDC	Electronic module of HRC402DR-12VDC controller.
ME-2-S	Metal enclosure with 80VA transformer, adapted for 4 x HRC402DR-BRD controllers.
ME-2-D	Metal enclosure with 13.8VDC/3.5A power supply unit, adapted for 4 x HRC402DR-BRD controllers or 8 x HRC102DR controllers.
ME-2-5	Metal enclosure with 13.8VDC/11A power supply unit, adapted for 9 x HRC402DR-12VDC controllers or 18 x HRC102DR controllers.
UT-4DR	Ethernet-RS485 communication interface.
UT-2USB	USB-RS485 communication interface.
RUD-1	Portable USB-RS485 communication interface with 12VDC/0.12A output.

7. PRODUCT HISTORY

Table 10. Product history		
Product version	Released	Description
HRC402DR v.1.0	05/2013	The first commercial version of the product
HRC102DR v.1.0	12/2013	The first commercial version of the product

	This symbol placed on a product or packaging indicates that the product should not be disposed of with other wastes as this may have a negative impact on the environment and health. The user is obliged to deliver equipment to the designated collection points of electric and electronic waste. For detailed information on recycling, contact your local authorities, waste disposal company or point of purchase. Separate collection and recycling of this type of waste contributes to the protection of the natural resources and is safe to health and the environment. Weight of the equipment is specified in the document.

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