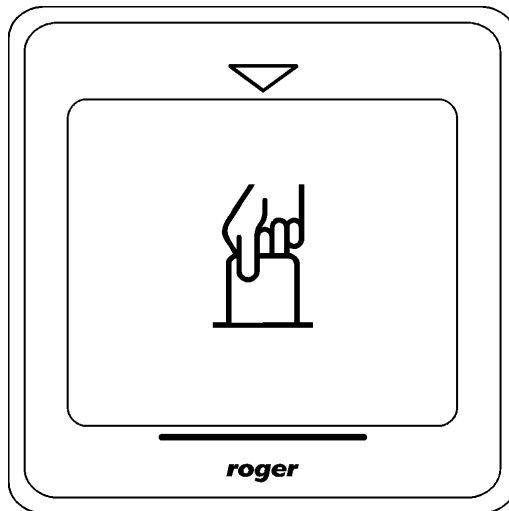*Roger Access Control System*

User Manual for
PR821-CH access and hotel automation controllers

Firmware version: 2.18.9 or newer

Hardware version: 1.0

Document version: Rev. I

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Contents

1. INTRODUCTION

1.1 This manual

This manual contains minimum information that is necessary to properly install device, perform initial test and configure for hotel applications. Following documents which are available at www.roger.pl supplement this manual:

- Functional description of PRxx1 controllers,
- PR Master User Manual

2. DESCRIPTION AND SPECIFICATION

PR821-CH is single room/door controller used in RACS 4 access control system and it additionally offers hotel automation and intruder alarm functionalities. PR821-CH is equipped with card holder and built-in two system EM125kHz/MIFARE® reader. Peripheral devices communicating in RACS CLK/DTA format such as HRT82MF hall reader, function key panel HRT82FK and XM-2 I/O expander can be connected to the controller.

Controllers can be configured with PR Master software installed on computer and they can be connected to computer by means of communication interface e.g. UT-2USB, UT-4DR, RUD-1 or by means of CPR32-NET-BRD network controller.

Note: PR821-CH controllers require PR Master 4.5.14 or newer.

Table 1. Specification	
Supply voltage	Nominal 12VDC, min./max. range 10-15VDC
Proximity cards	EM 125 kHz (UNIQUE) in accordance with EM4100/4102 and 13.56 MHz in accordance with ISO/IEC 14443A and MIFARE
Average current consumption	100mA
Tamper	Isolated contact, NC type, 24V/50 mA rated
Inputs	Three (IN1..IN3) NO/NC inputs, electrically biased to +12V via 15kΩ resistor, triggering level approx. 3.5V
Relay output	One (REL1) relay output with single NO/NC contact, 30V/1.5A
Transistor outputs	Two (IO1,IO2) open collector outputs, 15VDC/1A
Distances	Between controller and communication interface (RS485): max. 1200m Between reader and controller: max. 150 m Between controller and I/O expander: max. 150 m
Environmental class (according to EN 50131-1)	Class II, indoor general conditions, temperature: -10°C- +50°C, relative humidity: 10 to 95% (no condensation)
IP code	IP30
Dimensions HxWxD	85 x 85 x 27 mm
Weight	approx. 120g
Certificates	CE

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3. INSTALLATION

3.1 Terminals and connection diagram
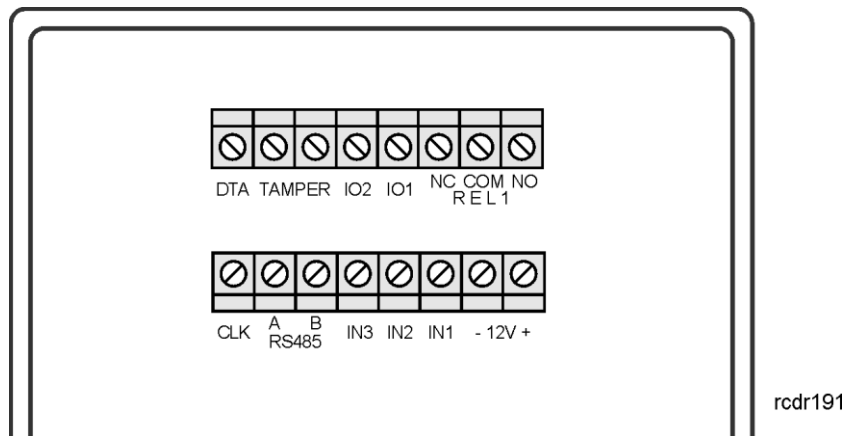
Fig. 1 PR821-CH controller

Table 2. PR821-CH terminals	
Terminal	Description
+ 12V	12VDC power supply
- 12 V	Ground
IN1	IN1 input line
IN2	IN2 input line
IN3	IN3 input line
RS485 A	RS485 communication bus
RS485 B	RS485 communication bus
CLK	RACS CLK/DTA bus
DTA	RACS CLK/DTA bus
TMP	Tamper switch
TMP	Tamper switch
IO1	IO1 output line
IO2	IO2 output line
REL1-NC	REL1 relay output (NC)
REL1-COM	REL1 relay common terminal
REL1-NO	REL1 relay output (NO)
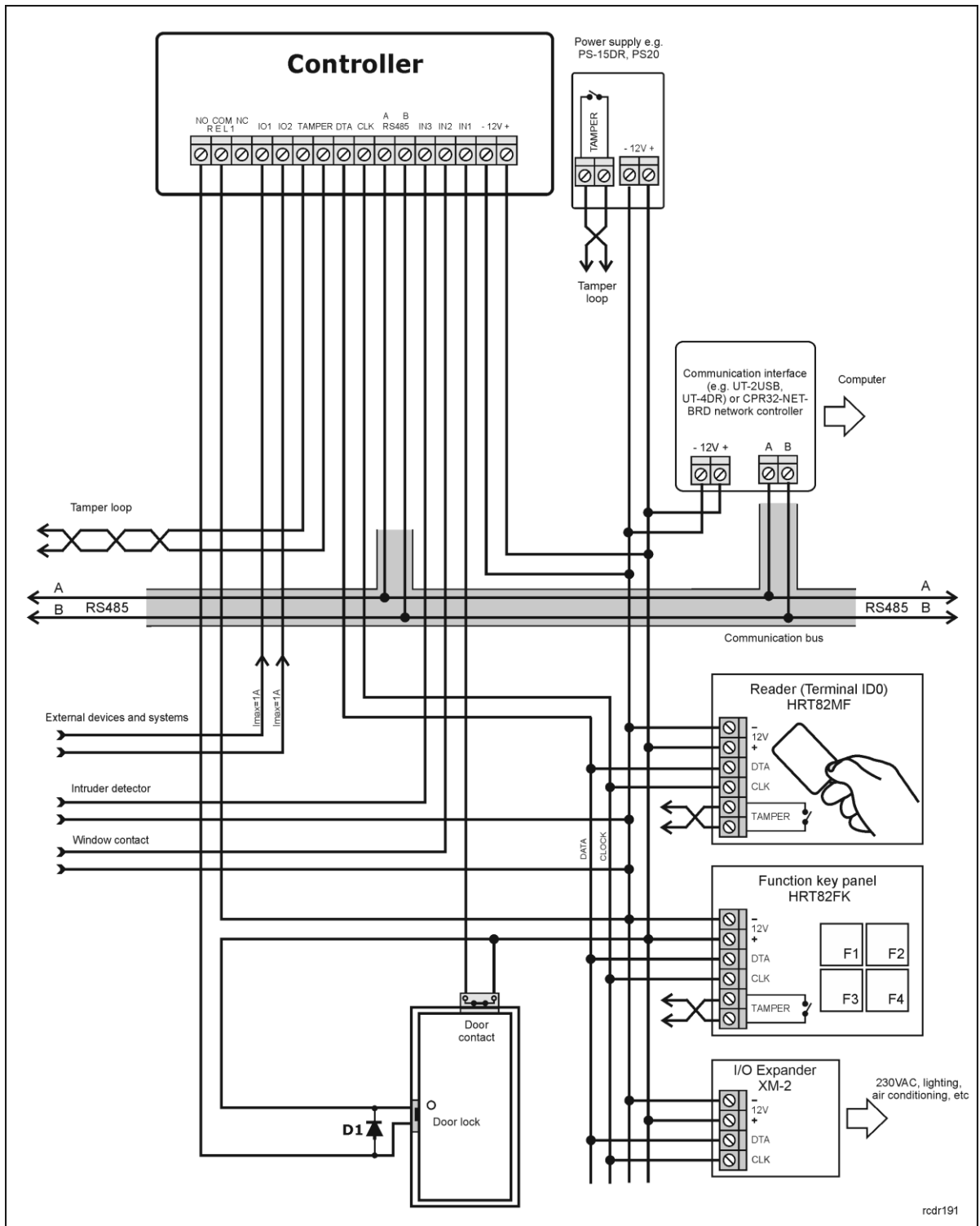
Fig. 2 Typical connection of PR821-CH controller

3.2 LED indicators

Contrary to other PR series controllers, the controller PR821-CH is not equipped with LED indicators but it offers card holder backlight.

3.3 Power supply

Controllers require 12VDC nominal power supply. The power must be connected to +12V and -12V terminals. Additionally, the -12V line can be used as reference potential for the RS485 bus, IN1-IN3 input lines and RACS CLK/DTA bus. The power supply can be provided by means of power supply unit (e.g. PS-15DR, PS20) which can be equipped with backup battery in order to ensure operation of access control in case of power failure.

Note: All devices connected to RS485 bus (including controllers) should have the same supply minus (GND). In order to ensure this, all the GND terminals from various power supply units within the system should be connected with each other using separate wire. Alternatively, the common supply minus of the entire system can be earthed however only in one point.

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 negative effects, it is necessary to use a general type semiconductor diode e.g. 1N4007 (one piece of such diode is included with the controller). It should be connected as close as possible to the inductive element (electric strike or magnetic lock).
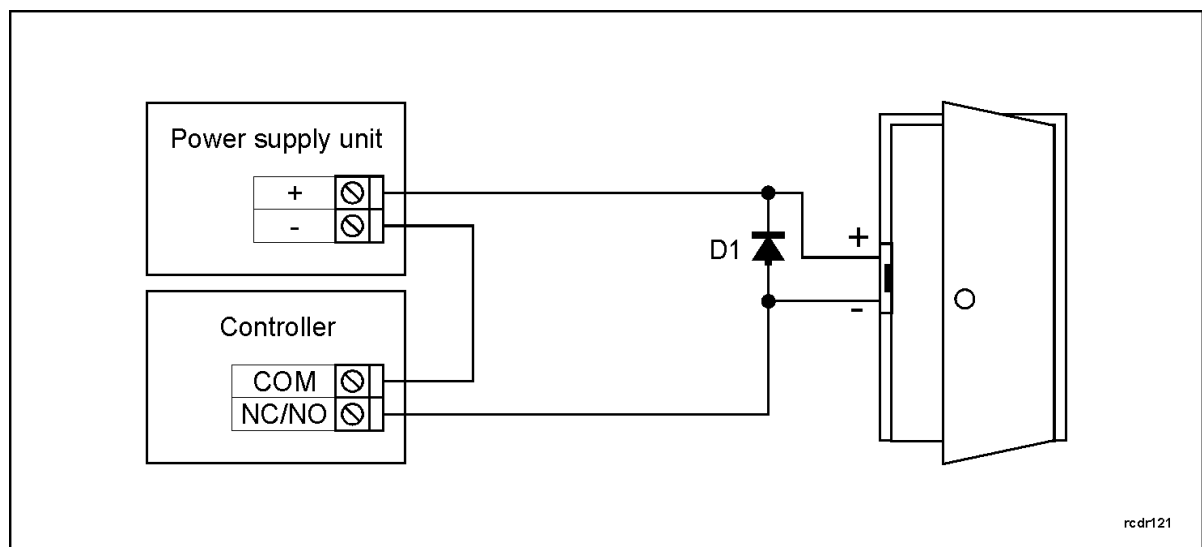
Fig. 3 Connection of door lock

3.5 Communication with controller

RS485 bus and UT communication interface (e.g. UT-2USB) are used for communication with controller. Single RS485 bus creates network (subsystem) and up to 32 controllers with unique addresses in range of 00..99 can be connected to the bus. For the communication with distant subsystems it is required to use UT-4DR or UT-4 v2.0 communication interface or CPR32-NET-BRD network controller as all of them enable communication through computer network (LAN or WAN). The RS485 bus consists of two signal lines A and B. In the RACS 4 system any topology can be used (star, tree or any combination of them, except for loop) in order to connect controllers in network (subsystem). 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 RACS 4 system

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guarantees proper communication in a distance of up to 1200 meters as well as high resistance to interferences.

3.6 Communication of controller with peripheral devices

The communication of controller and peripheral devices can be established by means of RACS CLK/DTA. RACS CLK/DTA is the addressable bidirectional communication standard developed by Roger company. Addresses of all devices connected to CLK and DTA lines must be properly configured in range of 0..15. Factory default address of peripheral devices can be changed according to procedures specified in their manuals but in majority of cases it is not necessary to modify the addresses at all. Standard unshielded signal cables (e.g. U/UTP cat. 5) with maximal length of 150m can be used for RACS CLK/DTA communication. Practically, devices communicating on RACS CLK/DTA bus can be connected to the controller in distance up to 500m, but such conditions are not guaranteed by the manufacturer.

The PR821-CH controller is equipped with built-in reader and can operate with external HRT82MF reader, XM-2 I/O expander and HRT82FK function key panel. The address of external reader must be ID=0 (default address is ID=1), the address of XM-2 expander must be ID=5 and the address of HRT82FK must be ID=12. All mentioned devices must be connected to CLK and DTA lines of the controller.

3.7 Input and output lines

Functions are assigned to input and outputs by means of PR Master software. The list of available functions is given in the sections 6.1 Input functions and 6.2 Output functions.

3.7.1 Inputs

All inputs (IN1..IN3) of controllers have identical electric structure and can be configured as NO or NC lines using PR Master software. 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.

3.7.2 Relay outputs

Controllers offer one relay output (REL1) with single switching contact. Maximum load for REL1 equals to 30V/1.5A. 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.

3.7.3 General purpose outputs

Controllers offer two transistor outputs (IO1, IO2). Both 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 Controller enclosure disassembly

Front part of controller enclosure is attached to the back part by means of latches. In order to disassemble the enclosure it is the best to use included plastic key. If the key is not available then flat screwdriver with 3-4mm tip can be used instead. Disassemble by inserting the key into each of four holes in controller enclosure and push until each latch is released.

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3.9 Wall mounting

Controller PR821-CH

85.0

58.5

58.5

27.0

85.0

TAMPER

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Plastic key

NOTE
Open the enclosure with included plastic key. Insert key ending into each of four holes until each internal latch is released.

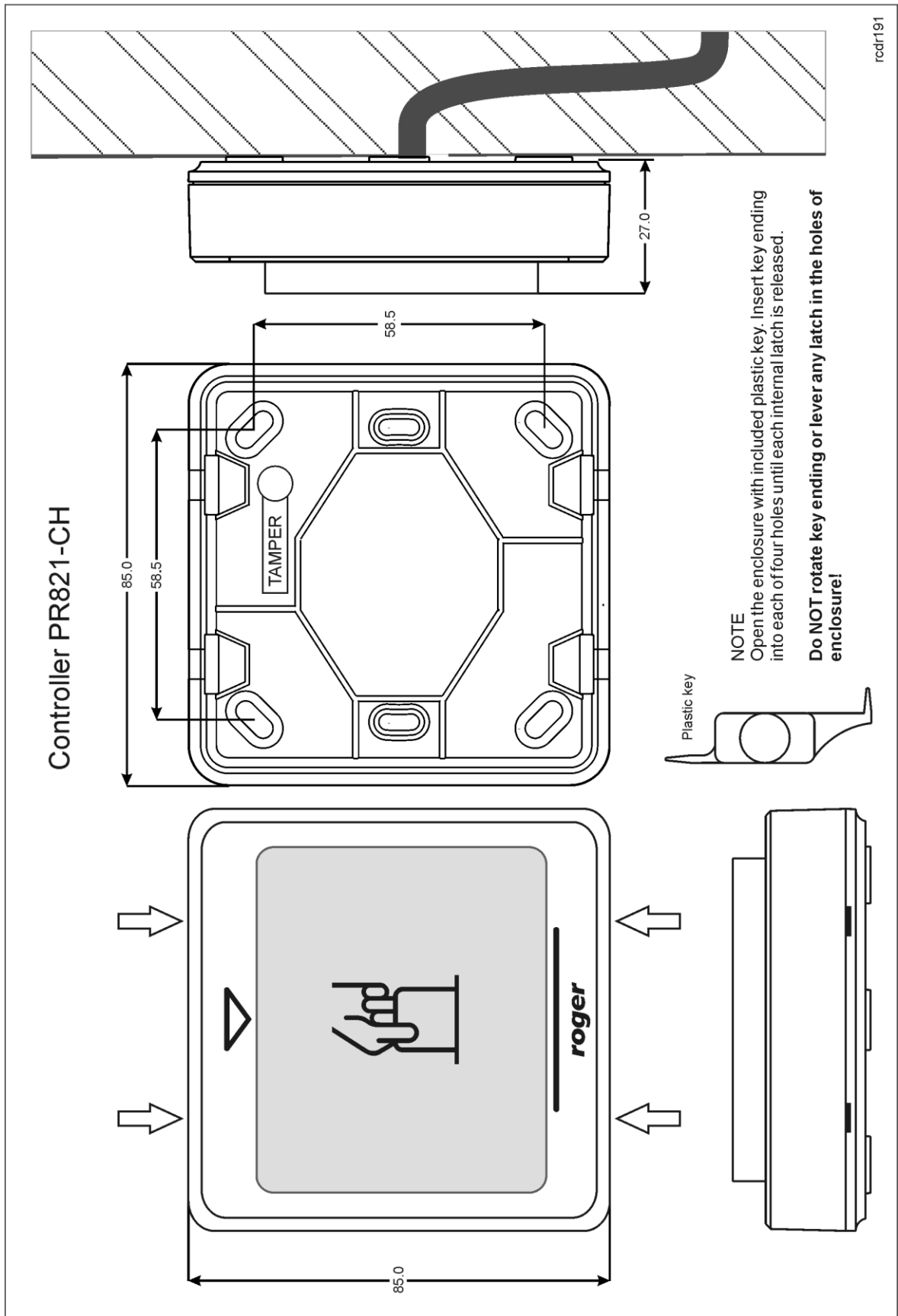**Do NOT rotate key ending or lever any latch in the holes of enclosure!**

Fig. 4 Installation of PR821-CH controller

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3.10 Installation guidelines

- Install devices in such way as to ensure easy access to screw terminals and jumpers (RST, FDM) located inside the controller – see fig. 5.
- Prior to controller installation it is recommended to configure its address (ID number) – see 4.1 Controller address. Factory default address is ID=00.
- All electric connections must be made with power supply switched off.
- All devices connected to the same communication bus (RS485 and RACS CLKD/DTA) should be connected to the same negative potential (GND). Therefore all GND terminals from various power supply units used in the system should be connected with each other.
- 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).
- Device can be cleaned by means of wet cloth and mild detergent without abrasive components. In particular do not clean with alcohols, solvents, petrol, disinfectants, acids, rust removers, etc. Damages resulting from improper maintenance and usage are not covered by manufacturer warranty.

4. CONFIGURATION

4.1 Controller address

If controller works autonomously (standalone mode), then address setting can be skipped and default address ID =00 can be used but if the controller is to be connected with other controllers by means of RS485 bus and operate in network system, then it is necessary to assign unique address to such controller (ID number from range 00..99). Two or more devices with the same address result in communication conflict and make a proper communication with these devices impossible. Following addressing methods are available:

- During update of controller firmware by means of RogerISP software (so called Fixed ID)
- Manually during Memory Reset procedure
- By means of PR Master software

The first method enables configuration of hardware address while the remaining ones enable configuration of software addresses. The main difference between these two addressing methods is such that software address contrary to hardware address can be modified using any of mentioned methods. Therefore Fixed ID has the highest priority and the other methods have lower priority.

Note: A new controller can be connected to the existing system without the necessity to change its address but only if no other controller operates with default address ID=00. Once the controller is connected to the RS485 communication bus, it should be detected by means of PR Master software and new address should be configured.

4.1.1 Addressing during firmware update (Fixed ID)
FixedID can be set during update of the controller firmware by means of RogerISP software. Prior to firmware upload, RogerISP software offers the possibility to set Fixed ID address in range of 00..99 or disable it (FixedID=None). Once the FixedID is selected and uploaded to the controller

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software addressing is ignored. In order to disable or modify FixedID it is necessary to start firmware upload procedure.

Note: When FixedID is configured then controller address cannot be modified based on software addressing method. FixedID address is maintained even in case of controller configuration error. Therefore controller can be always detected on the communication bus with the same address by means of PR Master software.

4.1.2 Addressing during Memory Reset procedure
Software address can be configured during Memory Reset procedure – see 4.2 Memory Reset procedure.

Note: Software address is effective only if FixedID is None.

4.1.3 Addressing by means of PR Master software
Software address can be configured by means of PR Master software. In such case connect the controller to PC via communication interface (e.g. UT-2USB, UT-4DR) or via CPR32-NET-BRD network controller, detect the controller and configure the address.

Note: Software address is effective only if FixedID is None.

4.2 Memory Reset procedure

Memory Reset procedure erases current settings and restores default factory settings. Additionally Full Memory Reset enables to program new MASTER card/PIN as well as new address of the controller. After Memory Reset procedure the controller automatically enters normal working mode.

Note: If current address of the controller is hardware type (see 4.1 Controller address) i.e. FixedID then address selected during Memory Reset procedure is ignored.

4.2.1 Simplified Memory Reset Procedure
Simplified Memory Reset restores default settings with controller address ID=00 and enables programming of new MASTER card.

- Remove connections to CLK and DTA terminals
- Connect CLK with DTA
- Restart the controller (place and remove jumper on RST contacts – see fig. 5 or switch power supply off/on) - continuous acoustic signal shall be generated
- Disconnect CLK and DTA
- Read any card at the reader, this will be a new MASTER card
- After a few seconds the controller shall restart automatically and switch to normal mode

4.2.2 Full Memory Reset procedure
Full Memory Reset restores default settings and enables programming of new MASTER card and controller ID address. This procedure requires connection of PRT series reader with keypad (e.g. PRT82MF).

- Remove connections to CLK and DTA terminals
- Connect CLK with DTA
- Restart the controller (place and remove jumper on RST contacts – see fig. 5 or switch power supply off/on) - continuous acoustic signal shall be generated
- Disconnect CLK and DTA
- Connect PRT series reader with keypad (e.g. PRT82MF) to CLK and DTA lines (without switching power supply off) and execute further steps by means of that reader.
- Press the [#] key
- Read any card at the reader, this will be a new MASTER card or skip this step and press only the [#] key
- Enter two digits (in range of 00 to 99) by means of keypad, this will be new ID address or skip this step and press only the [#] key so the default ID=00 could be assigned

- After a few seconds the controller shall restart automatically and switch to normal mode

After Memory Reset controller resumes its work with default factory settings and configured address. You can then test its operation using MASTER card (if available).

4.3 Firmware update

The latest versions of firmware and Roger ISP software are available at www.roger.pl. 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 Roger ISP 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 the system.

Firmware update procedure

- Place jumper on FDM pins (see fig. 5)
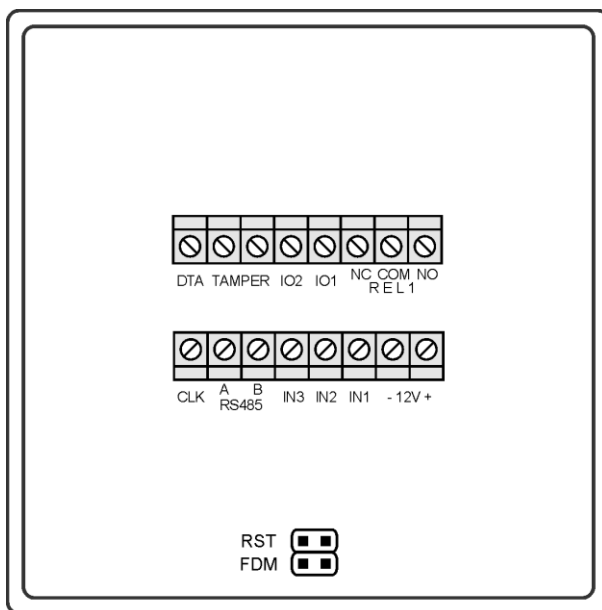
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Fig. 5 Location of FDM and RST pins inside PR821-CH controller enclosure

- Reset device (place and remove jumper on RST pins or switch power off/on)
- Start RogerISP software and select communication port (in case of RUD-1 select **USB-RS485 Converter**).
- Press the button **Erase**
- Once more reset device (place and remove jumper on RST pins or switch power off/on)
- In Firmware window select firmware *.hex file (can be downloaded from www.roger.pl) and then select the button **Program**
- After firmware upload remove jumper from FDM pins and reset device (place and remove jumper on RST contacts or switch power off/on)

Note: If the controller is not responding after firmware update procedure then it is necessary to perform reset – see 4.2 Memory Reset procedure or update the firmware once more.

Note: In case of network system, it is required to restart controller within PR Master software by right clicking particular controller and selecting the option **Restart controller and verify version**.

5. SCENARIO OF OPERATION

5.1 General description

Hotel system based on PR821-CH controllers enables quick guest enrolment, 230VAC power supply control when guest card is in card holder, air conditioning control and intruder alarm functionalities. Exemplary scenario of operation is presented in fig. 6 where guest identification is performed with MIFARE proximity cards.

Following devices are used in fig. 6:

- RUD-3 – USB reader enabling quick MIFARE card assignment to guest at reception desk
- CPR32-NET-BRD – network controller with Ethernet-RS485 interface for connection of up to 32 controllers which provides event buffer and clock
- PR821-CH – hotel controller with card holder and relay for door lock control
- HRT82MF – hall reader enabling guest identification at room entrance (alternatively, PRT82MF or PRT82MF-BK reader can be used as hall reader)
- HRT82FK – optional panel with four touch type functions key
- PR312MF – outdoor access controller with built-in reader and relay. Alternatively there can be used PR102DR + PRT84MF PR402DR + PRT82MF, etc.

Additionally, PR402DR controllers and XM-8 expanders can be used in hotel system in order to provide access control in elevators.

All Roger devices can be supplied with 12VDC. All cabling for RS485 and RACS CLK/DTA buses can be provided with U/UTP cat.5 cables. The maximal distance from CPR32-NET-BRD to the furthest controller (RS485 bus) equals to 1200m while maximal guaranteed distance from controller to the furthest peripheral device (RACS CLK/DTA bus) equals to 150m. The maximal number of users in the system is 1000 while every PR821-CH can operate with up to 8 guests, each with individual card.
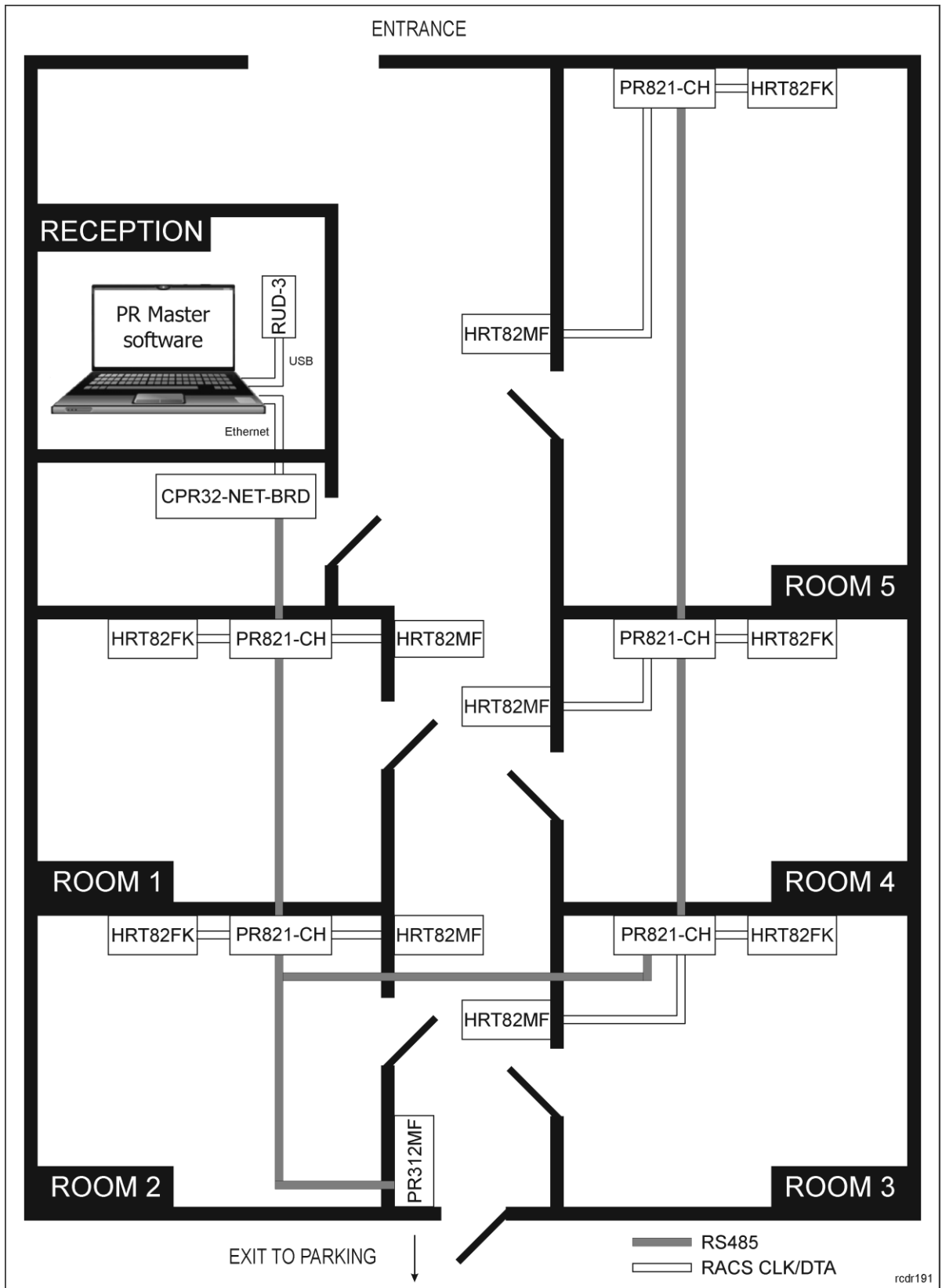
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Fig. 6 Example diagram of hotel system based on RACS 4 system

5.2 System configuration

Prior to connection of controllers to RS485 bus it is necessary to assign individual addresses to them (see section 4.1). Default address of every controller is ID=00.

After connection of devices according to fig. 2 and fig. 6 and installation of PR Master software which is available at www.roger.pl it is necessary to proceed as follows:

- Create subsystem(s) selecting **Networks->Add network** in the main window of PR Master software
- Detect controller on RS485 bus selecting **Networks->Controllers->Add**
- Configure optional settings in controller properties selecting controllers in the main window of PR Master software and modify controller names in **General** tab
- Enrol hotel staff users assigning them proximity cards and access rights selecting **Users** in the main window of PR Master software
- Upload the configuration selecting **Update system now** in the main window of PR Master software

5.3 Users

Two types of users can be distinguished in hotel system i.e. hotel staff and guests. Such roles can be also configured in hotel system with PR821-CH controllers.

The easiest and most convenient method for guest enrolment is to select the option **Guests->Add** in the main window of PR Master software. In guest enrolment window (fig. 7) it is necessary to assign card number using RUD-3 reader and **Read card** button, to assign hotel room selecting PR821-CH controller in **Hotel room** field and to assign number to the guest in **Guest** field. Guest first and last names are optional. Additionally access period can be specified in order to define guest stay time in hotel. Default check-out day is the next day while default check-out time can be specified selecting in PR Master top menu **Tools->Options->Misc->Default check-out time**. Guest can also be assigned with Access Group in order to define his general access rights e.g. access to parking, main entrance, etc. More information on Access Groups configuration is given in PR Master User Manual and functional descriptions of PRxx1 and PRxx2 series controllers. Default Access Group for guest enrolment can be specified in the properties of particular Access Group selecting **Groups->Add/Edit->Default Guest group**.

Note: In order to enable guest assigning to particular room (controller), the option **Hotel room** must be enabled in controller properties in **General** tab.

Hotel staff users can be defined selecting the option **Users** in the main window of PR Master software and then creating NORMAL type user, assigning Access group and card number. Additionally in case of such users the option **Hotel staff** in the tab **Hotel options** must be selected. When hotel staff user inserts card into card holder then power supply and air conditioning are switched on automatically. Additionally, when hotel staff user card is in the holder then DOOR AJAR alarm is disabled so door to the room can remain opened when the room is cleaned.

Fig. 7 Guest enrolment with PR Master software

6. FUNCTIONALITIES OF PR821-CH CONTROLLER

Many functionalities of PR821-CH controller and PRxx1 series controllers are identical. This manual mainly describes functionalities which are distinctive for PR821-CH controller and are not included in the manual Functional description of PRxx1 series controllers. Controllers can be configured with PR Master software installed on computer and they can be connected to computer by means of communication interface e.g. UT-2USB, UT-4DR, RUD-1 or by means of CPR32-NET-BRD network controller.

6.1 Input functions

PR821-CH controller is equipped with three inputs and XM-2 expander can be connected to the controller in order to increase the number of available inputs by two. Input lines can be configured in regard of their function and NC/NO triggering by means of PR Master software within properties of particular controller. For NO line (normally open), the triggering is done by closing the circuit while in case of NC line (normally close), the triggering is done by opening the circuit (voltage disconnection).

Additionally all input functions can be divided into ON/OFF monitored and ON monitored. In case of ON/OFF monitored input functions, controller detects the moment of input activation and deactivation. In case of ON monitored input functions, controller detects only their activation, thus it is not relevant how long the input is activated and when it is deactivated as only the activation triggers certain actions within the system. For example **[01]:Door contact** function is ON/OFF monitored type and the controller reacts to its activation and deactivation while the function **[31]:Set AIR CONDITION** is ON monitored one and the controller reacts only to its activation.

Table 3 contains selected input functions of PR821-CH controller and remaining ones are described in the manual Functional description of PRxx1 series controllers.

Table 3. Input functions of PR821-CH controller			
No.	Function	Type	Description
[15]	**INTRUDER – delayed**	ON monitored	Delayed intruder alarm line which is used in intruder alarm system incorporated into PR821-CH controller and is dedicated to connection of intruder detector.
[16]	**Window contact**	ON/OFF monitored	The input is dedicated to connection of window detector. Input activation is interpreted by the controller as window opening while input deactivation is interpreted as window closing. The input is used both in intruder alarm incorporated into PR821-CH controller and it can switch air conditioning off.
[31]	**Set AIR CONDITION**	ON monitored	When the input is activated then AIR CONDITION Flag is switched on.
[32]	**Clear AIR CONDITION**	ON monitored	When the input is activated then AIR CONDITION Flag is switched off.
[33]	**Toggle AIR CONDITION**	ON monitored	When the input is activated then AIR CONDITION Flag is switched on/off.
[34]	**Set DO NOT DISTURB**	ON monitored	When the input is activated then DO NOT DISTURB Flag is switched on.
[35]	**Clear DO NOT DISTURB**	ON monitored	When the input is activated then DO NOT DISTURB Flag is switched off.
[36]	**Toggle DO NOT DISTURB**	ON monitored	When the input is activated then DO NOT DISTURB Flag is switched on/off.
[37]	**Set ASSISTANCE**	ON monitored	When the input is activated then ASSISTANCE Flag is switched on.
[38]	**Clear ASSISTANCE**	ON monitored	When the input is activated then ASSISTANCE Flag is switched off.
[39]	**Toggle ASSISTANCE**	ON monitored	When the input is activated then ASSISTANCE Flag is switched on/off.
[40]	**Set MAKE UP ROOM**	ON monitored	When the input is activated then MAKE UP ROOM Flag is switched on.
[41]	**Clear MAKE UP ROOM**	ON monitored	When the input is activated then MAKE UP ROOM Flag is switched off.
[42]	**Toggle MAKE UP ROOM**	ON monitored	When the input is activated then MAKE UP ROOM Flag is switched on/off.

6.2 Output functions

PR821-CH controller is equipped with one relay and two transistor type outputs and XM-2 expander can be connected to the controller in order to increase the number of relay outputs by two. Output lines can be configured in regard of their function by means of PR Master software within properties of particular controller. Relay outputs REL1 and REL2 provide isolated NO/NC/COM terminals (under normal operating conditions NO-COM connectors are opened, whereas NC-COM connectors are closed). Every transistor output is capable of operating with current up to 1A/15VDC. Transistor outputs are equipped with internal fuses for switching off outputs automatically once a maximum current level is exceeded.

Table 4 contains selected output functions of PR821-CH controller and remaining ones are described in the manual Functional description of PRxx1 series controllers.

Table 4. Output functions of PR821-CH controller		
No.	Function	Description
[41]	AIR CONDITION	The output represents the state of AIR CONDITION flag.
[42]	DO NOT DISTURB	The output represents the state of DO NOT DISTURB flag.
[43]	CARD IN HOLDER	The output represents the state of CARD IN HOLDER flag.
[44]	CHECK-IN STATUS	The output represents the state of CHECK-IN STATUS flag.
[45]	MAKE UP ROOM	The output represents the state of MAKE UP ROOM flag.
[46]	ASSISTANCE	The output represents the state of ASSISTANCE flag.
[47]	SERVICE IN PROGRESS	The output represents the state of SERVICE IN PROGRESS flag.
[48]	POWER SUPPLY	The output represents the state of POWER SUPPLY flag.
[49]	WINDOW STATUS	The output represents the state of WINDOW STATUS flag.
[50]	GUEST BLOCKING	The output represents the state of GUEST BLOCKING flag.
[51]	FLAG 1	The output represents the state of FLAG 1 flag.
[52]	FLAG 2	The output represents the state of FLAG 2 flag.
[53]	FLAG 3	The output represents the state of FLAG 3 flag.
[54]	FLAG 4	The output represents the state of FLAG 4 flag.
[55]	FLAG 5	The output represents the state of FLAG 5 flag.
[56]	FLAG 6	The output represents the state of FLAG 6 flag.
[57]	FLAG 7	The output represents the state of FLAG 7 flag.

6.3 Function cards

Function cards are proximity cards programmed with particular function. Functions cards can be defined with PR Master software in properties of controller in the tab **Function cards**. The same function can be assigned to multiple cards but single card can be assigned with single function. Except for typical function cards recognized by PRxx1 series controllers, the PR821-CH can additionally operate with following functions:
[FP26]:Toggle AIR CONDITION
[FP27]:Toggle DO NOT DISTURB
[FP28]:Toggle ASSISTANCE
[FP29]:Toggle MAKE UP ROOM
[FP30]:Toggle GUEST BLOCKING
[FP32]:Toggle FLAG 1
[FP33]:Toggle FLAG 2
[FP34]:Toggle FLAG 3
[FP35]:Toggle FLAG 4
[FP36]:Toggle FLAG 5
[FP37]:Toggle FLAG 6
[FP38]:Toggle FLAG 7
[FP39]:Toggle FLAG 8

Note: Function cards are recognized only at Terminal ID0 i.e. external reader connected to the controller.

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6.4 System Flags and timers

System Flags are logic states in a controller's memory corresponding to certain conditions/events related to controller. Some of the flags are predefined for particular purposes (LIGHT, TAMPER, INTRUDER) whereas other are fairly universal and can be used for administrator defined purposes (AUX1, AUX2).

Initially, every flag is switched off. Flags can only be switched on upon certain system events/conditions. Flag returns to off state when preset time interval elapses (timer) or when specific event occurs. Some of the flag timers can be set into a bi-state type mode (latch mode) – in this mode flag state changes permanently till occurrence of particular event. Flag state can be signalled at controller's output if adequate function is assigned to the output.

Timers which specify activation time for certain flags can be configured for every controller in its properties in the tab **Timers** (see fig. 8) whereas flag states are displayed in the window which can be opened by right clicking of particular controller and selecting **Controller flags** (see fig. 9). Some of the flags can be switched manually with toggle button. All flags displayed in Controller flags window are presented in table 5.
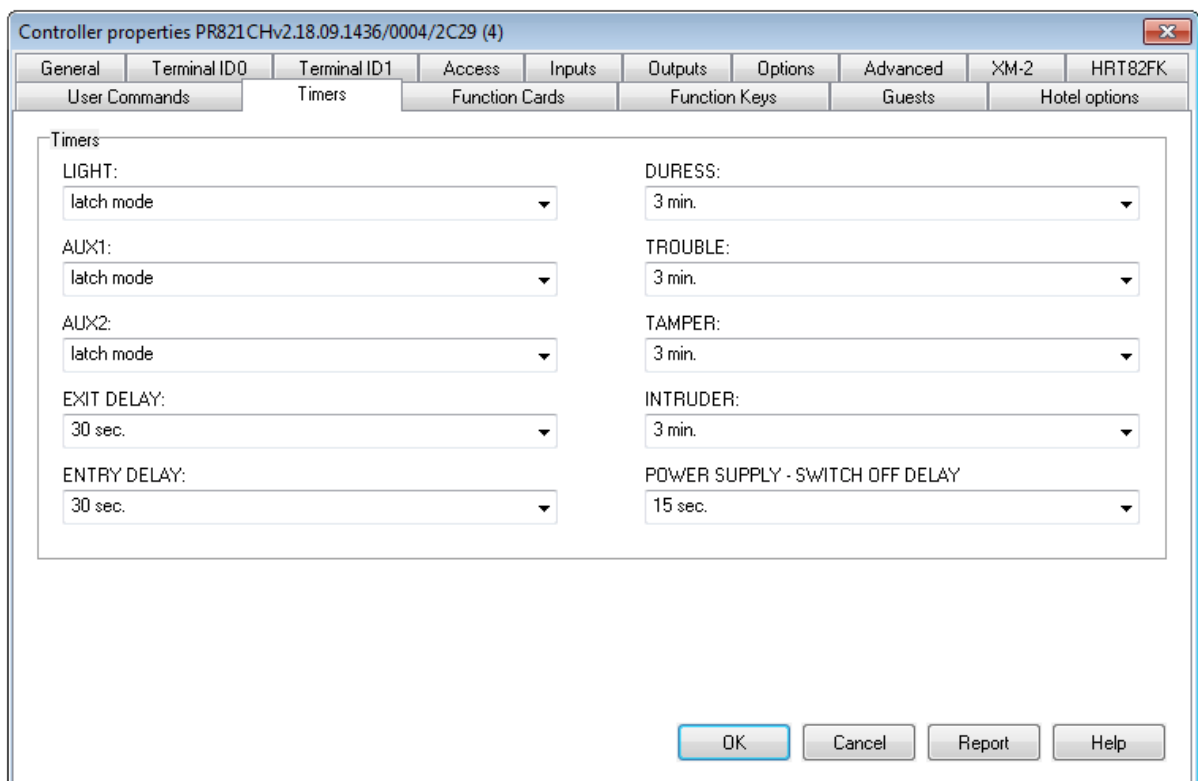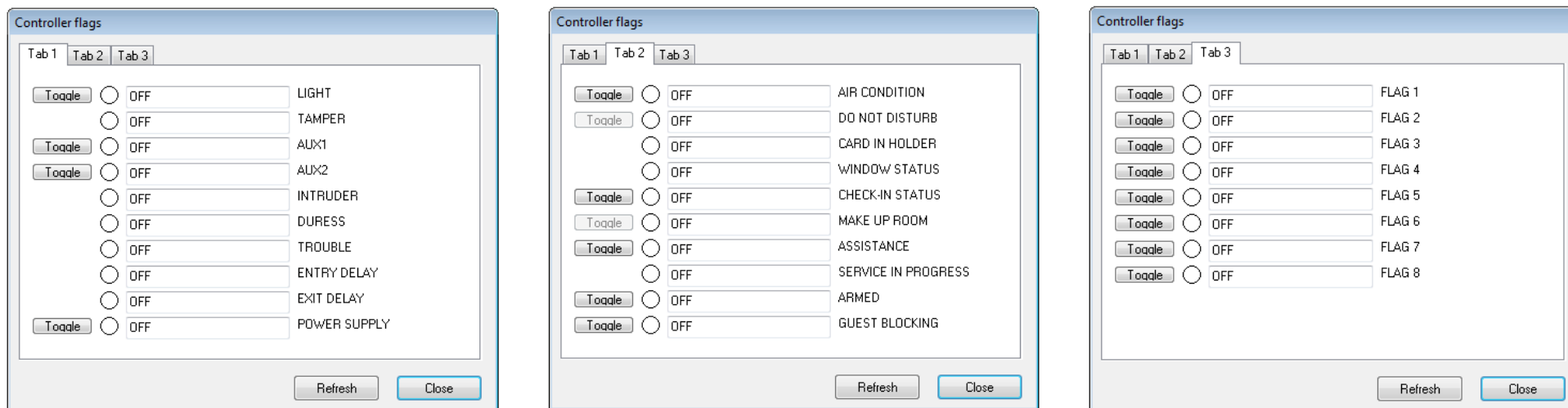

Fig. 8 PR821-CH timers

Controller flags

Tab 1 | Tab 2 | Tab 3

Toggle ○ OFF — LIGHT
○ OFF — TAMPER
Toggle ○ OFF — AUX1
Toggle ○ OFF — AUX2
○ OFF — INTRUDER
○ OFF — DURESS
○ OFF — TROUBLE
○ OFF — ENTRY DELAY
○ OFF — EXIT DELAY
Toggle ○ OFF — POWER SUPPLY

Refresh | Close

Controller flags

Tab 1 | Tab 2 | Tab 3

Toggle ○ OFF — AIR CONDITION
Toggle ○ OFF — DO NOT DISTURB
○ OFF — CARD IN HOLDER
○ OFF — WINDOW STATUS
Toggle ○ OFF — CHECK-IN STATUS
Toggle ○ OFF — MAKE UP ROOM
Toggle ○ OFF — ASSISTANCE
○ OFF — SERVICE IN PROGRESS
Toggle ○ OFF — ARMED
Toggle ○ OFF — GUEST BLOCKING

Refresh | Close

Controller flags

Tab 1 | Tab 2 | Tab 3

Toggle ○ OFF — FLAG 1
Toggle ○ OFF — FLAG 2
Toggle ○ OFF — FLAG 3
Toggle ○ OFF — FLAG 4
Toggle ○ OFF — FLAG 5
Toggle ○ OFF — FLAG 6
Toggle ○ OFF — FLAG 7
Toggle ○ OFF — FLAG 8

Refresh | Close

Fig. 9 PR821-CH flags

Table 5. System flags

Flag	Flag activation	Flag deactivation	Flag activation effect
LIGHT	- Function cards: **[FP15]:Set LIGTH** **[FP17]:Toggle LIGHT** - Inputs/Function keys: **[68]:Set LIGHT** **[70]:Toggle LIGHT** - Remotely from PR Master software	- Function cards: **[FP16]:Clear LIGHT** **[FP17]:Toggle LIGTH** - Inputs/Function keys: **[69]:Clear LIGHT** **[70]:Toggle LIGHT** - When flag time (timer) elapses - Remotely from PR Master software	LIGTH flag is used to control lighting in hotel room. When the flag is activated then output with the function **[64]:LIGHT** is activated and event **[046]:LIGHT is on** is generated.
TAMPER	- Input: **[08]:TAMPER**	- Controller disarming - When flag time (timer) elapses - Remotely from PR Master software when alarm(s) are cleared	TAMPER flag is used for alarming unauthorized controller disassembly or sabotage. When the flag is activated then events **[052]:INTRUDER is on** and **[540]:Tamper Alarm ON** are generated and INTRUDER flag is activated.

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AUX1	- Function cards: **[FP12]:Set AUX1** **[FP14]:Toggle AUX1** - Inputs/Function keys: **[71]:Set AUX1** **[73]:Toggle AUX1** - Remotely from PR Master software	- Function cards: **[FP13]:Clear AUX1** **[FP14]:Toggle AUX1** - Inputs/Function keys: **[72]:Clear AUX1** **[73]:Toggle AUX1** - When flag time (timer) elapses - Remotely from PR Master software	AUX1 is general purpose flag. When the flag is activated then output with the function **[66]:AUX1** is activated and event **[048]:AUX1 is on** is generated.
AUX2	- Function cards: **[FP20]:Set AUX2** **[FP22]:Toggle AUX2** - Inputs/Function keys: **[74]:Set AUX2** **[76]:Toggle AUX2** - Remotely from PR Master software	- Function cards: **[FP21]:Clear AUX2** **[FP22]:Toggle AUX2** - Inputs/Function keys: **[75]:Clear AUX2** **[76]:Toggle AUX2** - When flag time (timer) elapses - Remotely from PR Master software	AUX2 is general purpose flag. When the flag is activated then output with the function **[67]:AUX2** is activated and event **[050]:AUX2 is on** is generated.
INTRUDER	- Input: **[08]:TAMPER** - Inputs when the option **Enable anti-burglary functions** is selected and ARMED flag is activated: **[01]:Door contact** **[09]:INTRUDER** **[16]:Window contact** **[15]:INTRUDER – delayed**	- Controller disarming - When flag time (timer) elapses - Remotely from PR Master software when alarm(s) are cleared	INTRUDER flag is used for anti-burglary functions of PR821-CH controller. When the flag is activated then output with the function **[68]:INTRUDER** is activated and event **[052]:INTRUDER is ON** is generated. Full description of intruder alarm functionalities is given in section 6.7 Intruder alarm system.
DURESS	- When PIN differing by +/-1 from any correct PIN is entered on reader keypad	- When flag time (timer) elapses	DURESS flag has no particular application in hotel automation system especially when readers with keypads and PINs are not applied.

TROUBLE	- Inputs: **[05]:AC lost** **[06]:Low battery** - Lost communication with XM-2 expander	- Controller disarming - When flag time (timer) elapses	TROUBLE flag is used for signalling power supply problems.
ENTRY DELAY	- Input: **[15]:INTRUDER–delayed**	- Controller disarming - When flag time (timer) elapses	ENTRY DELAY flag is used in anti-burglary functions of PR821-CH controller. If the controller is not disarmed by inserting authorized card into holder before ENTRY DELAY timer elapses then INTRUDER flag is activated. As long as ENTRY DELAY flag is activated anti-burglary functions are disabled and signals on inputs **[01]:Door contact**, **[15]:INTRUDER-delayed** and **[16]:Window contact** are ignored. ENTRY DELAY flag is used only if the option **Enable anti-burglary functions** in controller properties in **Options** tab is selected. When the flag is activated then output with the function **[71]:ENTRY DELAY** is activated.
EXIT DELAY	- When card is removed from holder and controller becomes armed	- Controller disarming - When flag time (timer) elapses	EXIT DELAY flag is used in anti-burglary functions of PR821-CH controller. As long as EXIT DELAY flag is activated anti-burglary functions are disabled and signals on inputs **[01]:Door contact**, **[15]:INTRUDER-delayed** and **[16]:Window contact** are ignored. EXIT DELAY flag is used only if the option **Enable anti-burglary functions** in controller properties in **Options** tab is selected. When the flag is activated then output with the function **[72]:EXIT DELAY** is activated.
POWER SUPPLY	- When CARD IN HOLDER flag is activated by authorized user card in holder - Remotely from PR Master software	- When authorized user card is removed from holder plus time specified by POWER SUPPLY – SWITCH OFF DELAY timer	POWER SUPPLY flag is used for 230VAC power supply control in hotel room. If the flag is switched on remotely from PR Master software then it will not switch off automatically and it requires remote deactivation from the software. When the flag is activated then output with the function **[48]:POWER SUPPLY** is activated. Full description of the feature is given is section 6.5 Power supply (230VAC) control

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AIR CONDITION	- Function card: **[FP26]:Toggle AIR CONDITION** - Inputs/Function keys: **[31]:Set AIR CONDITION** **[33]:Toggle AIR CONDITION** - When CARD IN HOLDER flag is activated by authorized user card in holder, CHECK-IN STATUS flag is activated and the option **AC switched automatically by CHECK-IN STATUS flag** is disabled - When CHECK-IN STATUS flag is activated and the option **AC switched automatically by CHECK-IN STATUS flag** is enabled - Remotely from PR Master software	- Function card: **[FP26]:Toggle AIR CONDITION** - Inputs/Function keys: **[32]:Clear AIR CONDITION** **[33]:Toggle AIR CONDITION** - When card is removed from holder - When CHECK-IN STATUS flag is switched off - Remotely from PR Master software	AIR CONDITION flag is used for air conditioning control in hotel room. In standard scenario of operation the flag is switched on and off by authorized user card in holder. When the flag is activated then output with the function **[41]:AIR CONDITION** is activated and event **[204]:AIR CONDITION is on** is generated. Full description of the feature is given in section 6.6 Air conditioning control.
DO NOT DISTURB	The flag can be activated only if CHECK-IN STATUS flag and CARD IN HOLDER flags are switched on. - Function card: **[FP27]:Toggle DO NOT DISTURB** - Inputs/Function keys: **[34]:Set DO NOT DISTURB** **[36]:Toggle DO NOT DISTURB** - Remotely from PR Master software	- Function card: **[FP27]:Toggle DO NOT DISTURB** - Inputs/Function keys: **[35]:Clear DO NOT DISTURB** **[36]:Toggle DO NOT DISTURB** - Remotely from PR Master software - When CHECK-IN STATUS flag or CARD IN HOLDER flag is switched off - When MAKE UP ROOM flag is switched on	DO NOT DISTURB flag is used for signaling guest request to hotel staff. When the flag is activated then output with the function **[42]:DO NOT DISTURB** is activated, event **[206]:DO NOT DISTURB is on** is generated and respective LED indicator is switched on HRT82MF reader.
CARD IN HOLDER	- When authorized user card is placed in holder i.e. hotel staff card or card specified by the option **CARD IN HOLDER flag switched by** in controller properties in **Hotel options** tab.	- When authorized user card is removed from holder	CARD IN HOLDER flag is used for signaling that user card is in holder. The flag controls POWER SUPPLY flag and can control AIR CONDITION flag depending on settings in controller properties in **Hotel options** tab. When the flag is activated then output with the function **[43]:CARD IN HOLDER** is activated and event **[202]:Card inserted** is generated.

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WINDOW STATUS	- Input (activation): **[16]:Window contact**	- Input (deactivation): **[16]:Window contact**	WINDOW STATUS flag is used for signaling window opening and closing in hotel room and it is switched on as long as input with the function **[16]** is switched on. When the flag is activated then output with the function **[49]:WINDOW STATUS** is activated and event **[200]:Window opened** is generated. The flag can be used in anti-burglary functions and air conditioning control according to sections 6.6 Air conditioning control and 6.7 Intruder alarm system
CHECK-IN STATUS	- Remotely from PR Master software	- Remotely from PR Master software	CHECK-IN STATUS flag is used for assigning room to guest(s). It affects functioning of DO NOT DISTURB flag, MAKE UP ROOM flag and air conditioning control. When the flag is activated then output with the function **[44]:CHECK-IN STATUS** is activated.
MAKE UP ROOM	The flag can be activated only if CHECK-IN STATUS flag is switched on. - Function card: **[FP29]:Toggle MAKE UP ROOM** - Inputs/Function keys: **[40]:Set MAKE UP ROOM** **[42]:Toggle MAKE UP ROOM** - Remotely from PR Master software	- Function card: **[FP29]:Toggle MAKE UP ROOM** - Inputs/Function keys: **[41]:Clear MAKE UP ROOM** **[42]:Toggle MAKE UP ROOM** - Remotely from PR Master software - When CHECK-IN STATUS flag is switched off - When DO NOT DISTURB flag is switched on	MAKE UP ROOM flag is used for signalling guest request to hotel staff. When the flag is activated then output with the function **[45]:MAKE UP ROOM** is activated, event **[208]:MAKE UP ROOM is on** is generated and respective LED indicator is switched on HRT82MF reader.
ASSISTANCE	- Function card: **[FP28]:Toggle ASSISTANCE** - Inputs/Function keys: **[37]:Set ASSISTANCE** **[39]:Toggle ASSISTANCE** - Remotely from PR Master software	- Function card: **[FP28]:Toggle ASSISTANCE** - Inputs/Function keys: **[37]:Set ASSISTANCE** **[39]:Toggle ASSISTANCE** - Remotely from PR Master software - When SERVICE IN PROGRESS flag is switched on	ASSISTANCE flag is used for signalling call for assistance. When the flag is activated then output with the function **[46]:ASSISTANCE** is activated, event **[210]:ASSISTANCE is on** is generated and respective LED indicator is switched on HRT82MF reader.

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SERVICE IN PROGRESS	- When hotel staff user card is placed in holder	- When hotel staff user card is removed from holder	SERVICE IN PROGRESS flag is used for signalling hotel staff user presence in hotel room and it enables 230VAC power supply and air conditioning activation in the room. When the flag is activated then CARD IN HOLDER flag, POWER SUPPLY flag and output with the function **[41]:AIR CONDITION** are activated (AIR CONDITION flag still remains switched off) and respective LED indicator is switched on HRT82MF reader.
ARMED	If the option **Enable anti-burglary functions** is selected: - When authorized user card is removed from holder - Remotely from PR Master software	If the option **Enable anti-burglary functions** is selected: - When authorized user card is placed in holder - Remotely from PR Master software	Controller arming and disarming can be performed in many ways and it can be used to configure and manage multiple functionalities in RACS 4 system. However in case of hotel automation it is assumed that ARMED flag shall be used only for intruder alarming after selection of the option **Enable anti-burglary functions** in controller properties in **Hotel options** tab. In such scenario, the flag is controlled by authorized card in controller's holder. When the flag is deactivated then output with the function **[0]:Disarmed Mode** is activated. Controller arming and disarming generates relevant events. More information on anti-burglary functions are given in section 6.7 Intruder alarm system
GUEST BLOCKING	- Function card: **[FP30]:Toggle GUEST BLOCKING** - Remotely from PR Master software	- Function card: **[FP30]:Toggle GUEST BLOCKING** - Remotely from PR Master software	GUEST BLOCKING flag is used for temporary blocking of guest access to hotel room. When the flag is activated then output with the function **[50]:GUEST BLOCKING** is activated.
FLAG 1..8	- Function card: **[FP32..FP39]:Toggle FLAG 1..8** - Remotely from PR Master software	- Function card: **[FP32..FP39]:Toggle FLAG 1..8** - Remotely from PR Master software	FLAG 1..8 are general purpose flags to be used mainly in third party hotel systems integrated with RACS 4 system.

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6.5 Power supply (230VAC) control

PR821-CH offers functionalities which enable 230VAC power supply activation and deactivation in hotel room. The power supply is not switched directly by the controller and it is necessary to use external relay for that purpose. The output connected to the relay e.g. IO1 must be assigned with the function **[48]:POWER SUPPLY**. The example of 230VAC power supply control is shown in fig. 10.

Caution!: In case of installation with 230VAC voltage, adequate safety measures must be applied and all works can be executed only by qualified and certified personnel.
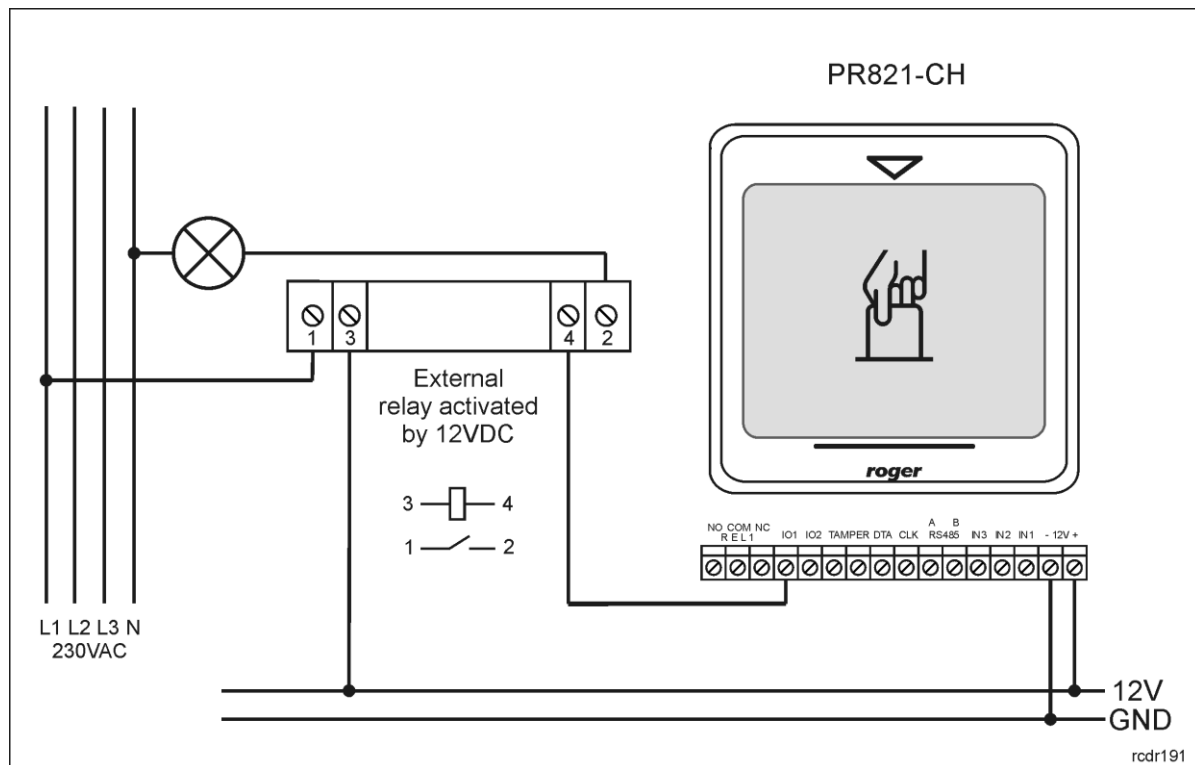

Fig. 10 Power supply (230VAC) controlled by PR821-CH controller

In the standard scenario it is assumed that 230VAC power supply shall be activated by authorized user card i.e. by means of CARD IN HOLDER flag which activates POWER SUPPLY flag and successively the output with the function **[48]**. In such case 230VAC supply is available in room as long as card is in the holder plus time configured with POWER SUPPLY – SWITCH OFF DELAY timer in controller properties in **Timers** tab. By default, hotel staff user i.e. NORMAL user with **Hotel staff** attribute as well as guest user can activate CARD IN HOLDER flag in room with their cards. However it is also possible that any user card or any EM125kHz or Mifare card could activate the flag and successively switch 230VAC power supply on. This can be configured with the option **CARD IN HOLDER flag switched by** in controller properties in **Hotel options** tab. Additionally it is also possible to switch the supply remotely from PR Master software using POWER SUPPLY flag but such method has lower priority than switching with card.

6.6 Air conditioning control

PR821-CH offers functionalities which enable air conditioning control in hotel room. For that purpose one of controller outputs with the function **[41]:AIR CONDITION** can be used. AIR CONDITION flag and associated output **[41]** can be activated in several ways according to table 5. In standard scenario of operation it is assumed that air conditioning shall be activated with authorized user card i.e. by means of CARD IN HOLDER flag which activates AIR CONDITION flag and successively the output with the function **[41]**. By default, hotel staff user i.e. NORMAL user with **Hotel staff** attribute as well as guest user can activate CARD IN HOLDER flag in room with

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their cards. However it is also possible that any user card or any EM125kHz or Mifare card could activate the flag and successively switch air conditioning on. This can be configured with the option **CARD IN HOLDER flag switched by** in controller properties in **Hotel options** tab.

The alternative method for air conditioning control is to use CHECK-IN STATUS flag instead of CARD IN HOLDER flag. In such case the option **AC switched automatically by CHECK-IN STATUS** in controller properties in **Hotel options** tab have to be selected. CHECK-IN STATUS flag can be activated manually from PR Master software by right clicking the controller and selecting **Controller flags**.

Additionally, air conditioning can be controlled with HRT82FK panel function keys, buttons connected to controller inputs, function card and command from PR Master.

Air conditioning can be automatically switched off when window is opened i.e. when WINDOW STATUS flag is on. In such case it is necessary to activate the option **Switch AC off when window opened** in controller properties, in **Hotel options** tab. When the window is opened then the output with function **[41]** is switched off (but AIR CONDITION flag is still on) as long as WINDOW STATUS flag is on plus 15 second.

6.7 Intruder alarm system

PR821-CH offers intruder alarm functionalities in hotel room. In order to activate the system it is necessary to select the option **Enable anti-burglary functions** in controller properties in **Options** tab.

In standard scenario of operation it is assumed that HRT82MF reader, door contact, window contact and intruder alarm detector are installed and connected respectively to controller inputs with such functions as **[01]:Door contact**, **[16]:Window contact** and **[15]:INTRUDER – delayed**. If it is necessary to use more than three inputs then XM-2 expander can be connected to the controller to increase the number of available inputs by two.

If anti-burglary functions are enabled then the controller is by default in Armed Mode which is signalled by activated ARMED flag. When controller is armed then activation of inputs with functions **[01]**, **[09]**, **[15]** and **[16]** i.e. forced door/window opening or intruder detection results in activation of INTRUDER flag and successively activation of the output with the function **[68]:INTRUDER** for the time specified by INTRUDER timer which can be configured in controller properties in **Timers** tab. Alarm siren or external alarm system/device can be connected to controller output with the function **[68]**.

The controller is automatically disarmed when authorized user card is in the holder. When the controller is in Disarmed Mode then anti-burglary functions are disabled and signals on inputs **[01], [09]**, **[15]** and **[16]** are ignored. When authorized card is used at hall reader (Terminal ID0) then access is granted. If then controller input with the function **[15]** is activated then the flag ENTRY DELAY is switched on for the time specified by the timer ENTRY DELAY. It is assumed that it is the time required for guest to walk into the room and insert card into holder in order to disarm the controller. When the card is removed from the holder the controller remains disarmed and the flag EXIT DELAY is switched on for the time specified by the timer EXIT DELAY. It is assumed that it is the time required for guest to leave the room. When EXIT DELAY time elapses then the controller is automatically switched to Armed Mode.

When the option **Enable anti-burglary functions** is selected then the controller can be armed and disarmed remotely from PR Master software and with other methods used in PRxx1 series controllers i.e. inputs, cards of SWITCHER Full and SWITCHER Limited type users. Nevertheless it is recommended not to use these methods as in certain situations they can disrupt proper functioning of PR821-CH intruder alarm system.

PR821-CH controller can not only detect Intruder alarm but also Door Ajar alarm which requires connection of door contact to controller input with the function **[01]:Door contact**. Door Ajar alarm is raised when after access granting and Door Open Timeout, the input **[01]** is still activated (door remain opened). Door Open Timeout can be configured in controller properties in **Access** tab. When Door Ajar alarm is raised then controller outputs with function **[02]** and **[03]** are activated. The alarm is detected regardless of anti-burglary functions. In case of hotel staff user the alarm is not raised when card of such user is in card holder. Therefore hotel staff user can leave door opened without raising Door Ajar alarm.

6.8 Configuration of HRT82MF hall reader

According to fig. 2 and section 3.5, HRT82MF proximity card hall reader communicates with controller using RACS CLK/DTA bus. The reader is equipped with four LED indicators and touch button. Indicators are used for signalling hotel staff presence and such hotel services as Make up room, Assistance and Do not disturb. Services can be activated with HRT82FK function key panel. Default function of touch button is **[01]:Door bell**. It is possible to select other function from the list in controller properties in **Function Keys** tab using PR Master software.

Note: Default address of HRT82MF reader is ID=1. In order to use the reader with PR821-CH controller it is necessary to configure the address ID=0. Procedure for address modification is described in HRT82MF Installation Guide.

Note: PR821-CH controller can operate also with PRT82MF or PRT82MF-BK readers instead of HRT82MF reader.

6.9 Configuration of HRT82FK function key panel

According to fig. 2 and section 3.5, HRT82FK panel communicates with controller using RACS CLK/DTA bus. The configuration of panel is performed with PR Master software in controller properties in **HRT82FK** tab. The panel can be used for activation of such hotel services as Make up room, Assistance and Do not disturb. Such services are signalled with respective LED indicators of HRT82MF hall reader.
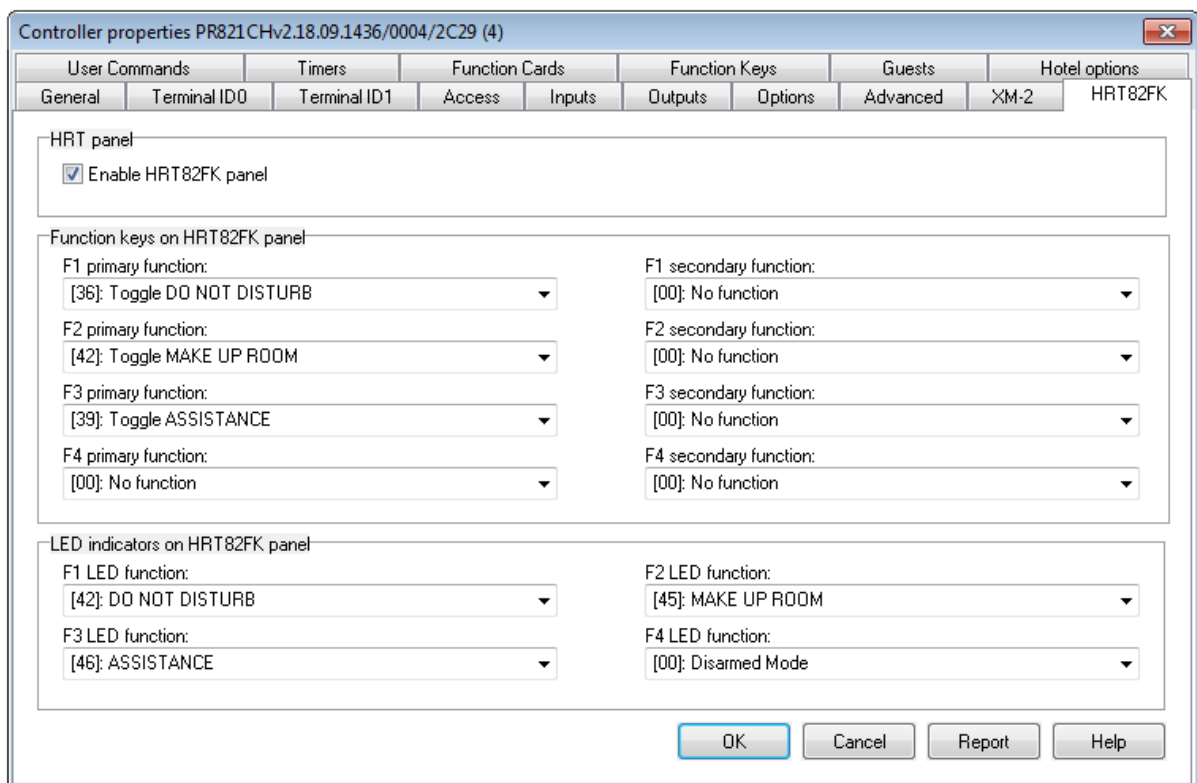

Fig. 11 HRT82FK configuration window in PR Master software

In the window shown in fig. 11 the administrator can enable HRT82FK panel as well as assign primary and secondary functions to all function keys. By default primary function require short (1 sec.) key pressing while secondary function requires longer (3 sec.) key pressing. Key pressing times can be configured with RogerVDM software. Additionally LED indicators for all function keys can be configured. In practical applications, indicator is assigned with the function associated with the key function in order to signal that the key was used and adequate function or state was activated.

7. PR821-CH CONTROLLER IN THIRD PARTY APPLICATIONS

PR821-CH controller can be used in third party hotel systems using PR Master software API. Documentation and software example are available in Automation subfolder after PR Master installation.
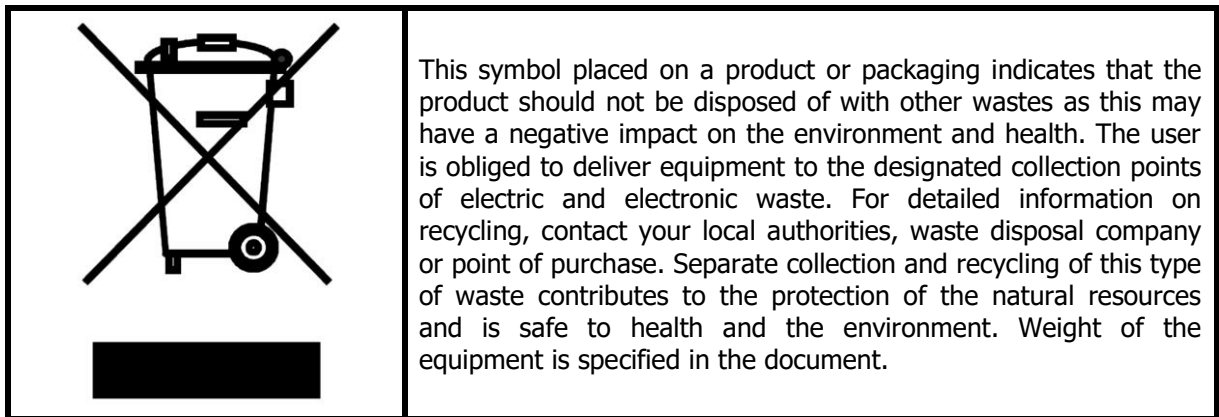
The PR Master enables following operations:

- creation, reading, updating and deleting in the RACS database
- import of events from RACS database
- sending commands to RACS system
- online (live) monitoring of the access system

The PR Master API was implemented in COM (Component Object Model) technology and operates as an OLE Automation unit. The API can be used only when main program (PR Master) is running but it is not necessary to start the software in monitoring mode.

8. ORDERING INFORMATION

Table 6. Ordering information	
PR312MF	Access controller with built-in MIFARE card reader and keypad.
PR821-CH	Access controller with built-in EM 125 kHz (UNIQUE) card reader, MIFARE card reader and card holder.
HRT82MF	Hall MIFARE card reader.
HRT82FK	Function key panel.
CPR32-NET-BRD	Electronic module of network controller.
UT-4DR	Ethernet-RS485 communication interface.
UT-2USB	USB-RS485 communication interface.
XM-2DR	I/O Expander.

	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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