PRTxxLT series
EM 125 kHz readers

Firmware version: n/a

Document version: Rev. K

CE

This document refers to following products:

- *PRT12LT*
- *PRT12LT-BK*
- *PRT62LT*
- *PRT64LT*
- *PRT66LT*

Operating Manual

1. IMPORTANT NOTES

The PRTxxLT reader is simplified version of corresponding PRTxxEM series reader and it cannot be operated in standalone (offline) mode but it can work as slave (online) terminal connected to master controller. Factory default PRTxxLT reader is preconfigured with **RACS address ID=0** mode but it can be reconfigured with several available data output formats within Memory Reset procedure .

Note: If after power up the LED SYSTEM (orange) is on it and the reader makes regular sounds then it means that reader's memory is corrupted. In this case reader must be programmed again within Memory Reset procedure.

1.1. ABOUT THIS MANUAL

This manual is dedicated for all versions of PRTxxLT readers as all of them represent the same logical functionality. The only difference between various types of PRTxxLT series readers is limited to their mechanical construction, environment in which they can be installed and keypad which is available in some of PRTxxLT readers.

Note: Always check the firmware and hardware version for which manual is dedicated. Using wrong version of manual may cause that device will not behave as described in document.

2. GENERAL DESCRIPTION

The PRTxxLT readers are designed for use in access control installations to enable user identification via EM 125 KHz (and compatible) proximity cards and/or PIN-s. The PRTxxLT reader works as a slave unit , it reads cards/PIN-s and then transmits collected data to host access controller for further processing.

2.1. FEATURES

2.1.1. General

- EM 125 KHz proximity cards (EM4100/4102 compatible)
- Tamper switch (detection of enclosure opening and detachment)
- Outdoor installation (depends on particular reader)
- 26/32/32 reversed/34/42/66 bit Wiegand data formats
- Magstripe data format (ABA Track II emulation)
- RACS data output format (Roger format)
- Various options for transmission of PIN-s and keys
- LED and BUZZER control inputs
- CE approval

2.2. PROXIMITY CARDS

The PRTxxLT was designed for EM 125 KHz proximity cards compatible with EM 4100/4102 transponders. Reader returns card number without check sum bits. Card number is transmitted starting from the LSB to MSB and if required (it depends on the data output format selected for the given reader) can be supplemented with leading zeros or reduced on the MSB positions.

2.3. FUNCTION KEYS

Some of the PRTxxLT readers are equipped with two (e.g. PRT12LT) or one (PRT42LT and PRT42LT-BK) function keys: [F1]- marked with door bell icon and [F2] – marked with the light bulb icon. The function of each function keys depends on the reader's operating mode and its configuration.

When in RACS Mode, pressing function key will cause transmission of the relevant code to the host controller which can further take adequate action (e.g. trigger door bell, light etc.). The host's reaction for function key always depends on its configuration.

When in Wiegand or Magstripe modes, pressing the F1/F2 causes following codes send over the output lines:

For Wiegand:

- F1=C hex
- F2=D hex

For Magstripe:

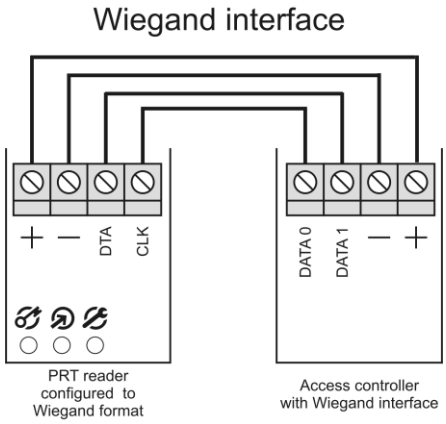
- F1=FF FF FF FF BC hex (1099511627708 dec)
- F2=FF FF FF FF BD hex (1099511627709 dec)

2.4. OPERATING MODES

The PRTxxLT offers following data transmission formats:

- Wiegand 26bit
- Wiegand 32bit, normal mode (from MSB to LSB)
- Wiegand 32bit, reverse order (from LSB to MSB)
- Wiegand 34bit
- Wiegand 42bit
- Wiegand 66bit
- Magstripe (ABA Track II emulation, also called Clock & Data)
- RACS address ID0..3 (addressable format for communication with Roger controllers)

Wiegand Formats



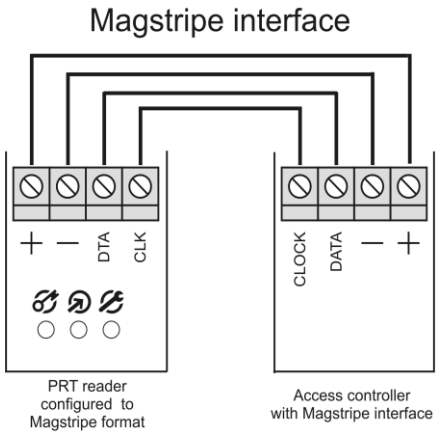
When using **Wiegand** transmission format, data is transmitted to the host via CLK and DTA lines. Depending on the selected version of the transmission format, the reader can send 26, 32, 34, 42 or 66 bits to the host. PIN can be transmitted as a whole (when # key is pressed) or each digit separately – see section 3.2.

In **Wiegand** format all LED indicators and buzzer of the reader can be controlled by IN1 and IN2 inputs. Both inputs (IN1 and IN2) are triggered by shorting them to supply minus. Input functions can be configured within Memory Reset procedure. In addition, whenever card is read or PIN is entered reader activates momentary LED SYSTEM and buzzer.

Wiegand transmission is unidirectional and data is sent to host device without receipt confirmation.

Note: For card codes which require more bits than the number of bits available in the selected data transmission format, reader omits the most significant bits (MSB-s) of the card code. As a result transmission from a reader is not the same as full card code.

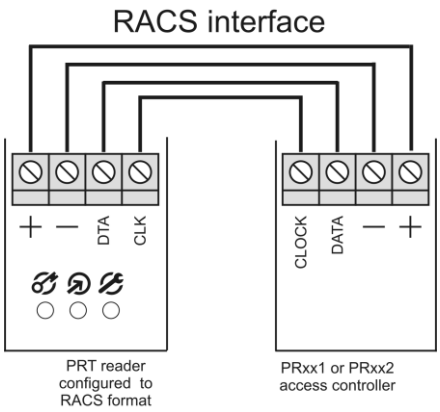
Magstripe Formats



When using **Magstripe** transmission format, data is transmitted to the host via CLK and DTA lines. In **Magstripe** format all LED indicators and buzzer of the reader can be controlled by IN1 and IN2 inputs. Both inputs (IN1 and IN2) are triggered by shorting them to supply minus. Input functions can be configured within Memory Reset procedure. In addition, whenever card is read or PIN is entered reader activates momentary LED SYSTEM and buzzer.

Card code is always transmitted as a whole number (no digits are lost) while PIN can be transmitted as a whole (when # key is pressed) or each digit separately – see section 3.2.

RACS Format



When using **RACS** format, the PRTxxLT reader communicates with the access controller via CLK/DTA lines. Unlike in the Wiegand and Magstripe formats, the PRTxxLT unit using **RACS** format requires an individual address (ID=0…3) to be set during configuration of reader's operating mode (Memory Reset procedure). In **RACS** format, communications between the PRTxxLT reader and the host is bidirectional which allows the controller to monitor the communication. The reader's LED-s and the buzzer are controlled by the host unit. When all LED-s are flashing it indicates that reader lost communication with the host unit.

When in **RACS** mode triggering of the IN1 disables reading of the card and keypad. This input can be used for temporary disabling of the reader. The IN2 is not used in **RACS** mode. PIN is transmitted as a whole when # key is pressed.

3. PROGRAMMING

3.1. MEMORY RESET

The **Memory Reset** is a procedure which erases reader's memory and restores factory default settings. It also enables programming of operating mode and additionally it enables configuration of IN1 and IN2 inputs in Wiegand and Magstripe Terminal modes.

Memory Reset procedure(variant 1 for RACS format):

1. Power down the unit.
2. Remove all connections from CLK and IN1 lines.
3. Make electrical bridge between CLK and IN1.
4. Restore power.
5. While LED OPEN (green) is flashing and is accompanied with continuous sound disconnect CLK from IN1.
6. Wait till LED SYSTEM starts flashing.
7. Enter three digits which will configure the reader for required operating mode i.e. [000].. [003]. Reader generates two beeps with every entered digit.
8. Once the previous step is completed reader automatically ends the **Memory Reset** and switches to normal operation.

Note: When in step 7 an unknown operating mode is entered or no operating mode is entered for 20 s then reader will automatically exit the Memory Reset procedure.

Memory Reset procedure(variant 2 for Wiegand and Magstripe formats):

1. Power down the unit.
2. Remove all connections from CLK and IN1 lines.
3. Make electrical bridge between CLK and IN1.
4. Restore power.
5. While LED OPEN (green) is flashing and is accompanied with continuous sound disconnect CLK from IN1.
6. Wait till LED SYSTEM starts flashing.
7. Enter three digits which will configure the reader for required operating mode i.e. [020], [021] or [1xx]. Reader generates two beeps with every entered digit.
8. When LED SYSTEM is on, enter two digits to define the function of IN1 input:

   [11]: Line off

   [25]: LED STATUS control

   [28]: Buzzer control

   [29]: LED OPEN control

[30]: LED SYSTEM control.

9. Enter two digits to define the function of IN2 input in the same way as in case of IN1.
10. Once the previous step is completed reader automatically ends the **Memory Reset** and switches to normal operation.

Note: If in the step 6 no function is selected within 9 s or both steps are skipped with # key then Memory Reset is completed with default settings i.e. IN1=[29] and IN2=[28]. It is forbidden to assign the same functions to both inputs except for the function [11].

3.2. PROGRAMMING OF READERS WITHOUT KEYPAD

Although some PRTxxLT readers are not equipped with keypad they can still be programmed manually with the same programming procedures as readers with keypad. The difference in programming is such that instead of pressing certain keys (like you normally do when programming readers with keypad) you must emulate key pressing by multiple readings of **Programming Card** (i.e. any EM125kHz card). For example in order to emulate key [9] you must read **Programming Card** 9-times (simply present it to the reader and take it back 9 times) and then wait approx. 3 seconds for the reader to generate a confirmation signal (two beeps) which means that series of card readings is accepted as an equivalent of key pressing and the reader is now waiting for the next step of the programming procedure.

Key	**Emulation Method**
[1]..[9]	Read card [N]-times where [N] is equal to programmed digit
[0]	Read **Programming Card** 10-times
Note: Each time you complete the sequence of multiple readings of the programming card wait for the reader to generate signal (two beeps) which will confirm that reader has accepted series of card readings as the equivalent of key pressing.	

Example: In order to program [001] operating mode:

1. [0]: Read 10-times programming card and then wait for two beeps
2. [0]: Read 10-times programming card and then wait for two beeps
3. [1]: Read 1-time programming card and then wait for two beeps

3.2.1. Reader Operating Modes

The factory new reader is pre-configured with **RACS address ID=0** but it can be changed using Memory Reset procedure. There are following operating modes available for the PRTxxLT series reader:

Code	**Operating mode**	**Description**
000	RACS address ID=0	Reader operates as a slave unit connected to the host controller that requires RACS data transmission format.
001	RACS address ID=1	
002	RACS address ID=2	
003	RACS address ID=3	
020	Magstripe (only card)	Reader operates as a slave unit connected to the host controller which requires Magstripe data transmission format, keys are not transmitted.
021	Magstripe UNITEK (card or PIN)	Reader operates as a slave unit connected to a host controller which requires Magstripe data transmission, keys transmitted as single digits, format is compatible with specification of UNITEK controllers (with transmission of PIN-s).
10x	26 bit Wiegand	Reader operates as a slave unit connected to the host controller that requires relevant Wiegand data
11x	34 bit Wiegand	

12x	42 bit Wiegand	transmission format.
13x	66 bit Wiegand	
14x	32 bit Wiegand, without parity	
15x	32 bit Wiegand, without parity, reverse order	
Note: For Wiegand data formats the second digit of the operating mode code (marked as X) specifies the method which reader uses when transmitting PIN-s or keys. For details regarding methods of PIN transmission refer to table below.		

PIN/keys transmission options		
X	**Description**	**Details**
X=0	1-10 digits long PIN, transmitted in BCD format	Each key pressed is buffered in reader's memory; with a press of a [#] key reader transmits entire PIN code. The PIN code is transmitted as a BCD coded number.
X=1	1-12 digits PIN, transmitted in binary format	Each key pressed is buffered in reader's memory; with a press of a [#] key reader transmits entire PIN code. The PIN code is transmitted as a binary number.
X=2	Each key pressed is transmitted separately as 4-bit number plus 2 control bits	Each key pressed is immediately transmitted to the host controller as a sequence of 6 bits (EXXXXP) where XXXX represents the code of the pressed key supplemented by two control bits (E and P). The E represents the even bit calculated from the first half of a transmitted code where P represents the parity of a second half of the bit stream. This format is compatible with HID 5355 series readers, option: *With Parity*. Key coding as in Table B (below).
X=3	Each key pressed is transmitted separately as 4-bit number	Each key pressed is immediately transmitted to the host controller as a sequence of 4 bits (XXXX) which represent the code of the pressed key, no control bits added. This format is compatible with HID 5355 series readers, option: *Without Parity*. Key coding as in Table B (below).
X=4	Each key pressed is transmitted separately as 8-bit number with parity	Each key pressed is immediately transmitted to the host controller as a sequence of 10 bits (EXXXXXXXXP) where XXXXXXXX represents the code of the pressed key supplemented by two control bits (E and P). The E represents the even bit calculated from the first half of a transmitted code where P represents the parity of a second half of the bit stream. Key coding as in Table A (below).
X=5	Each key pressed is transmitted separately as a 8-bit number without parity bits	Each key pressed is immediately transmitted to the host controller as a sequence of 8 bits (XXXXXXXX) where XXXXXXXX represents the code of the pressed key supplemented by two control bits (E and P). The E represents the even bit calculated from the first half of a transmitted code where P represents the parity of a second half of the bit stream. Key coding as in Table A (below).
X=6	1-6 keys long PIN transmitted as Wiegand 26 bit stream with control bits	1-6 keys long PIN, each key represented by 4-bit long codes (key codes according to table B). Reader sends data after six keys are pressed or earlier when # key is pressed. Reader wait max ca. 15 seconds for each key press. Key's buffer is cleared if no keys have not been entered within ca. 15 seconds. Examples: Keys entered "1234#" – code transmitted "001234" Keys entered "123456" – code transmitted "123456"

X=7	1-4 keys long PIN transmitted as Wiegand 32 bit stream without control bits	1-4 keys long PIN, each key represented by 8-bit long codes (key codes according to table A). Reader sends data after four keys are pressed or earlier when # key is pressed. Reader wait max ca. 15 seconds for each key press. Key's buffer is cleared if no keys have not been entered within ca. 15 seconds. Examples: Keys entered "123#" – code transmitted "0123" Keys entered "123456" – code transmitted "123456"

Table A: 8-bit key coding		
Key	**HEX**	**BIN**
0	F0	11110000
1	E1	11100001
2	D2	11010010
3	C3	11000011
4	B4	10110100
5	A5	10100101
6	96	10010110
7	87	10000111
8	78	01111000
9	69	01101001
*	5A	01011010
#	4B	01001011
F1	3C	00111100
F2	2D	00101101

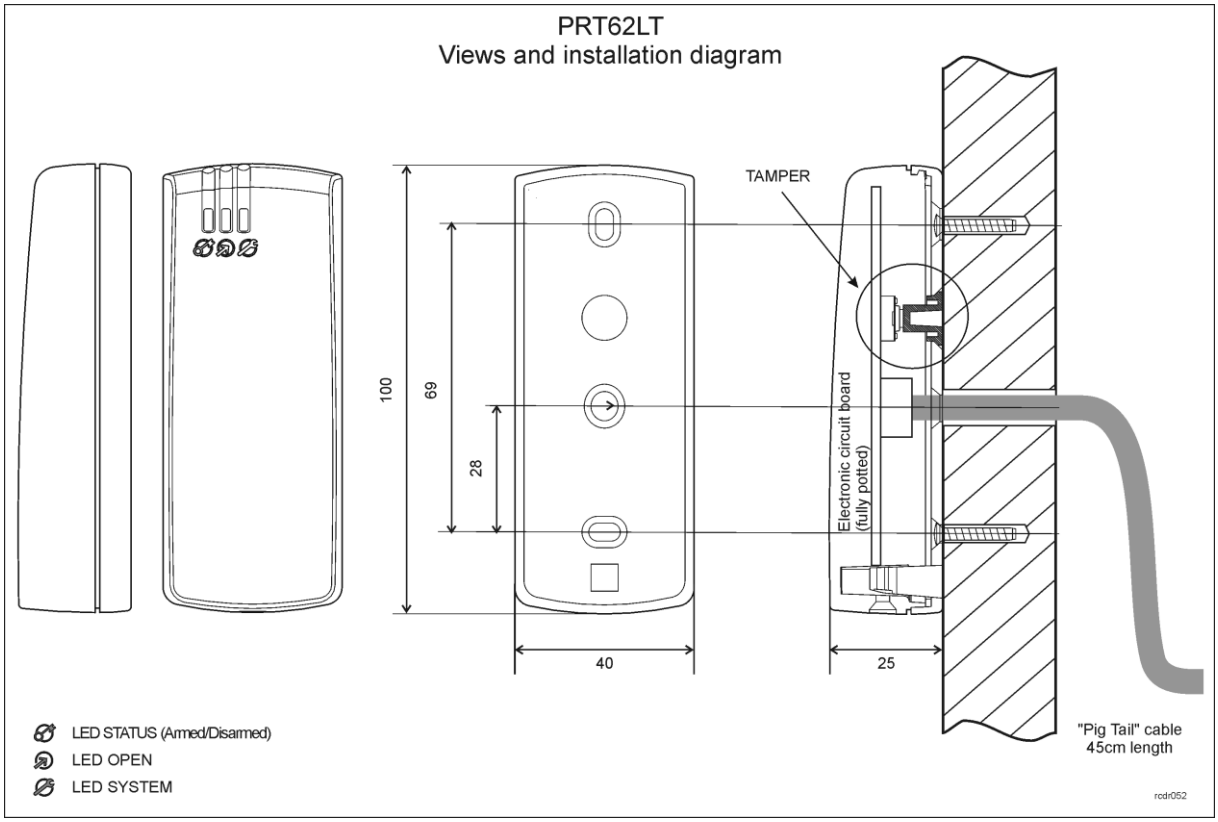
Table B: 4-bit key coding		
Key	**ASCI**	**BIN**
0	0	0000
1	1	0001
2	2	0010
3	3	0011
4	4	0100
5	5	0101
6	6	0110
7	7	0111
8	8	1000
9	9	1001

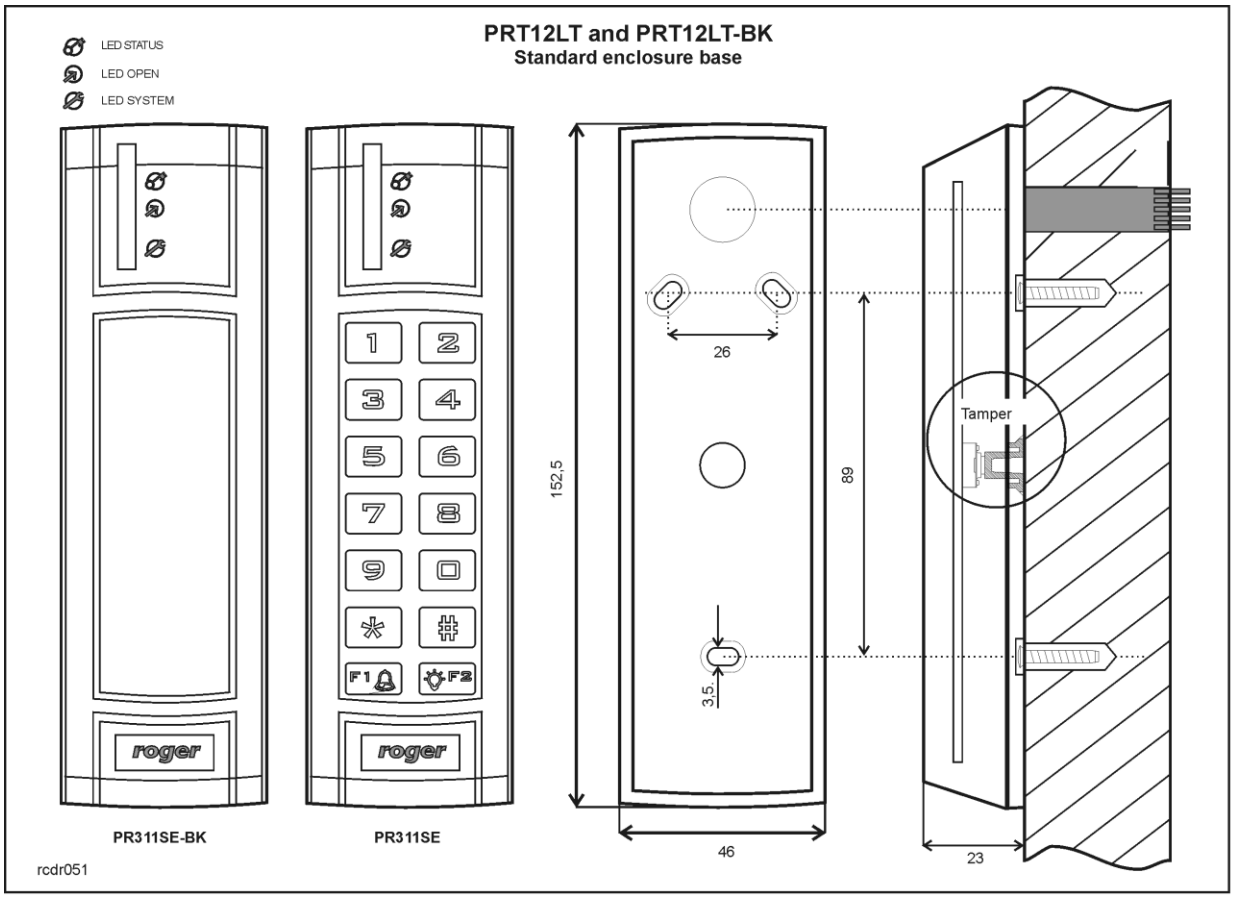
*	A	1010
#	B	1011

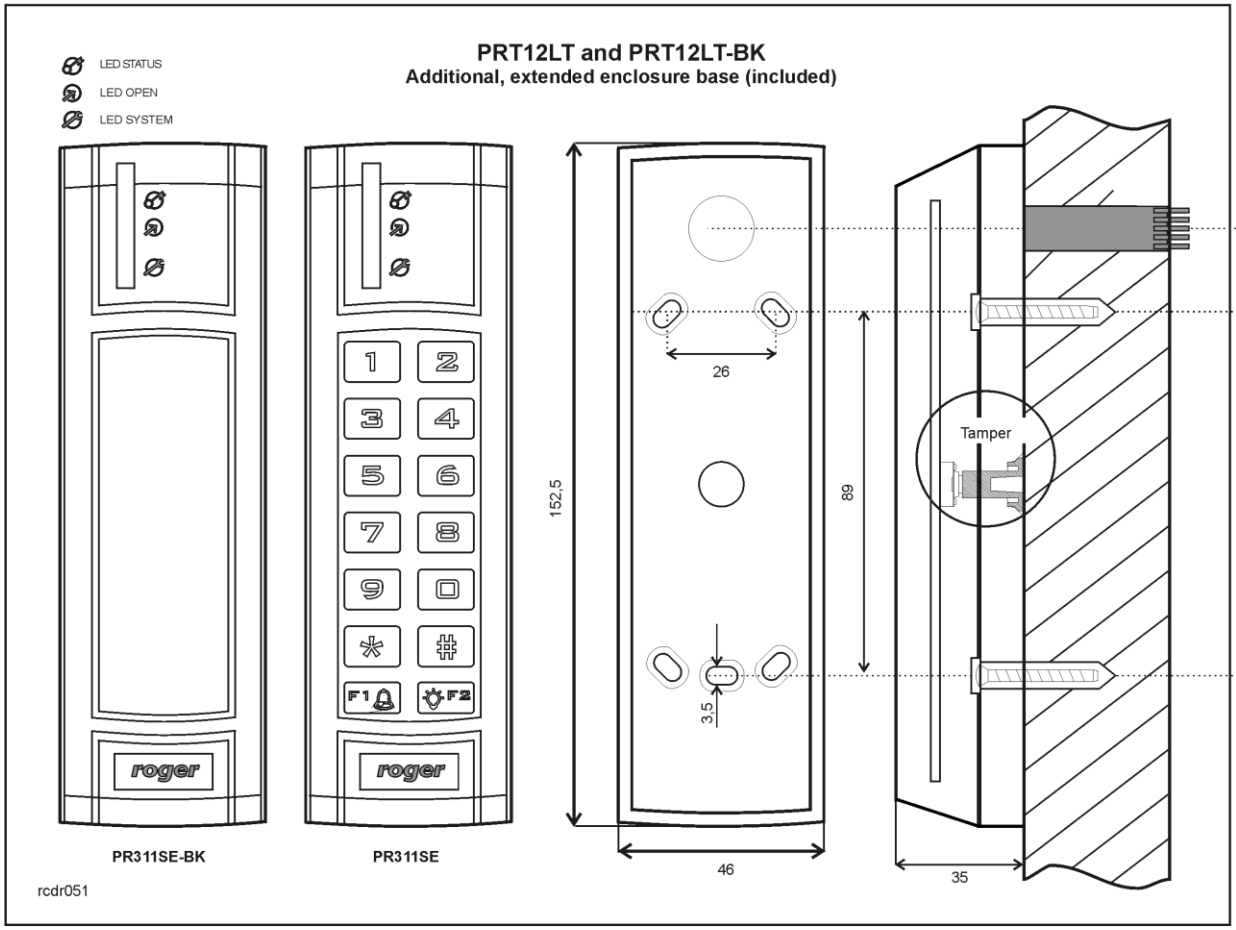
4. INSTALLATION GUIDELINES

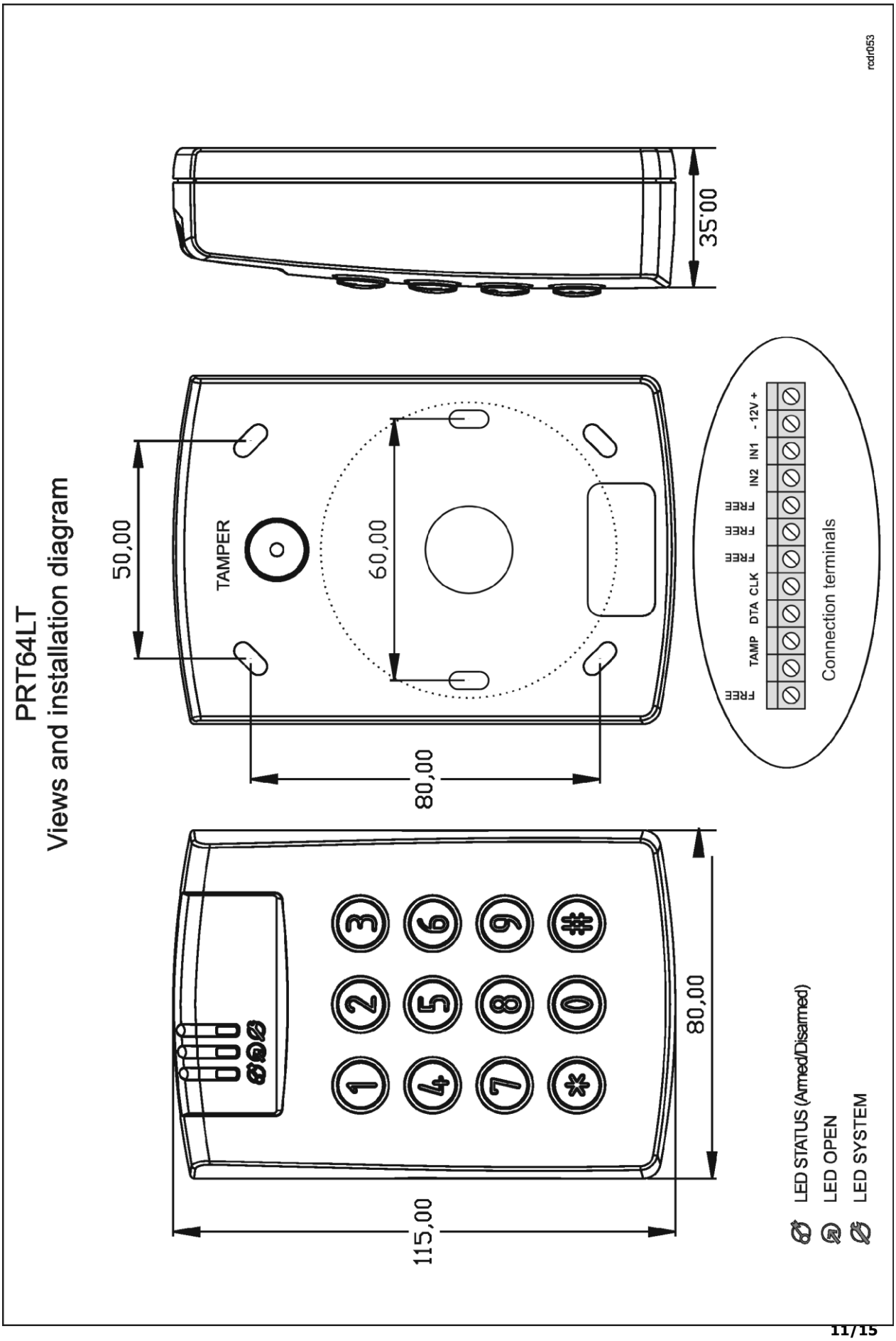
- Reader should be installed in such a way to ensure physical access to the connection cable and/or screw terminals.
- A new factory delivered unit is configured for **RACS address ID=0**
- The reader should be mounted near the supervised door on a vertical piece of supporting structure
- Disconnect power supply before making any electrical connections
- Be aware that when installing the reader directly on the metal type surface card reading distance will deteriorate
- For installations on a metal surface you can place a non-metallic 10 mm thick spacer (a plastic/plaster plate etc.) between the reader and the supporting structure
- For installations with two readers to be mounted on the opposite sides of the same wall and aligned along the same geometrical axis, place a metal plate between them and make sure none of two readers has direct contact with it (allow min. 10 mm space)
- For best results mount the proximity readers at least 0.5 m apart
- With its relatively weak electromagnetic field generation, reader should not cause any harmful interference to operation of other equipment. However, its card reading performance can be affected by other interference generating devices, esp. radio waves emitting equipment or CRT computer monitors
- If card reading performance of the reader deteriorates (e.g. reduced reading range or incorrect readings) consider reinstallation in a new location.

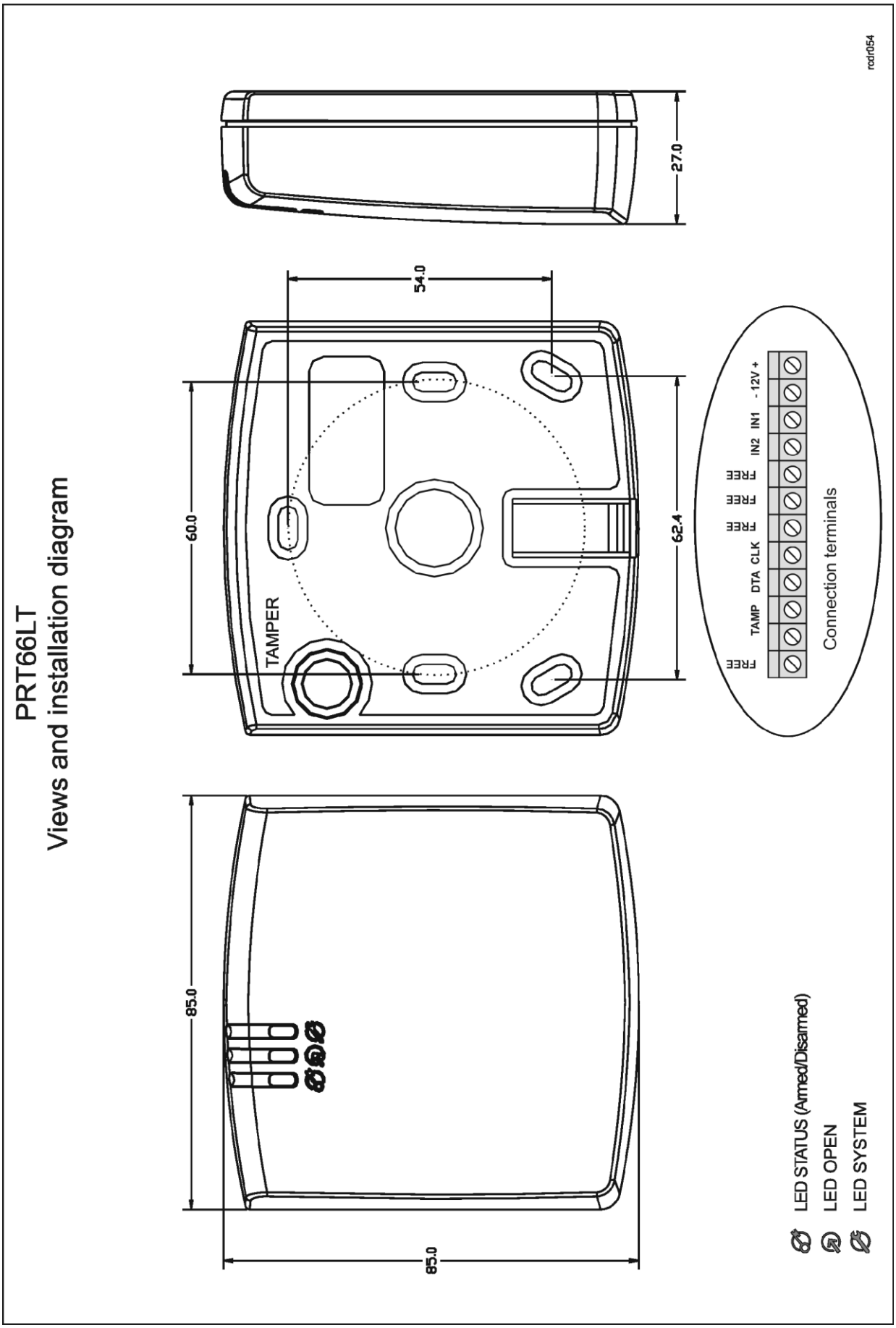
Screw terminals and wires		
Wire Color	**Label**	**Function**
Green	CLK	DATA 0 line for Wiegand, CLOCK for Magstripe and RACS
Brown	DTA	DATA 1 line for Wiegand, DATA for Magstripe and RACS
Yellow	IN1	Input line; in Wiegand and Magstripe formats this line by default controls LED OPEN. In RACS format the line can be used to block card reading and PIN entering. Line is active when shorted to ground
Pink	IN2	Input line; in Wiegand and Magstripe formats this line by default controls internal buzzer of the reader. Line is active when shorted to ground
Red	+12V	Supply input plus
Blue	GND	Supply input minus
Grey	TAMP	Tamper switch contacts, normally closed, isolated, 24V/50mA. Contacts became open when unit is detached from the place of installation or upper part of enclosure is open
White		


PRT62LT
Views and installation diagram
TAMPER
100
69
28
40
25
Electronic circuit board
(fully potted)
"Pig Tail" cable
45cm length
LED STATUS (Armed/Disarmed)
LED OPEN
LED SYSTEM
rcdr052

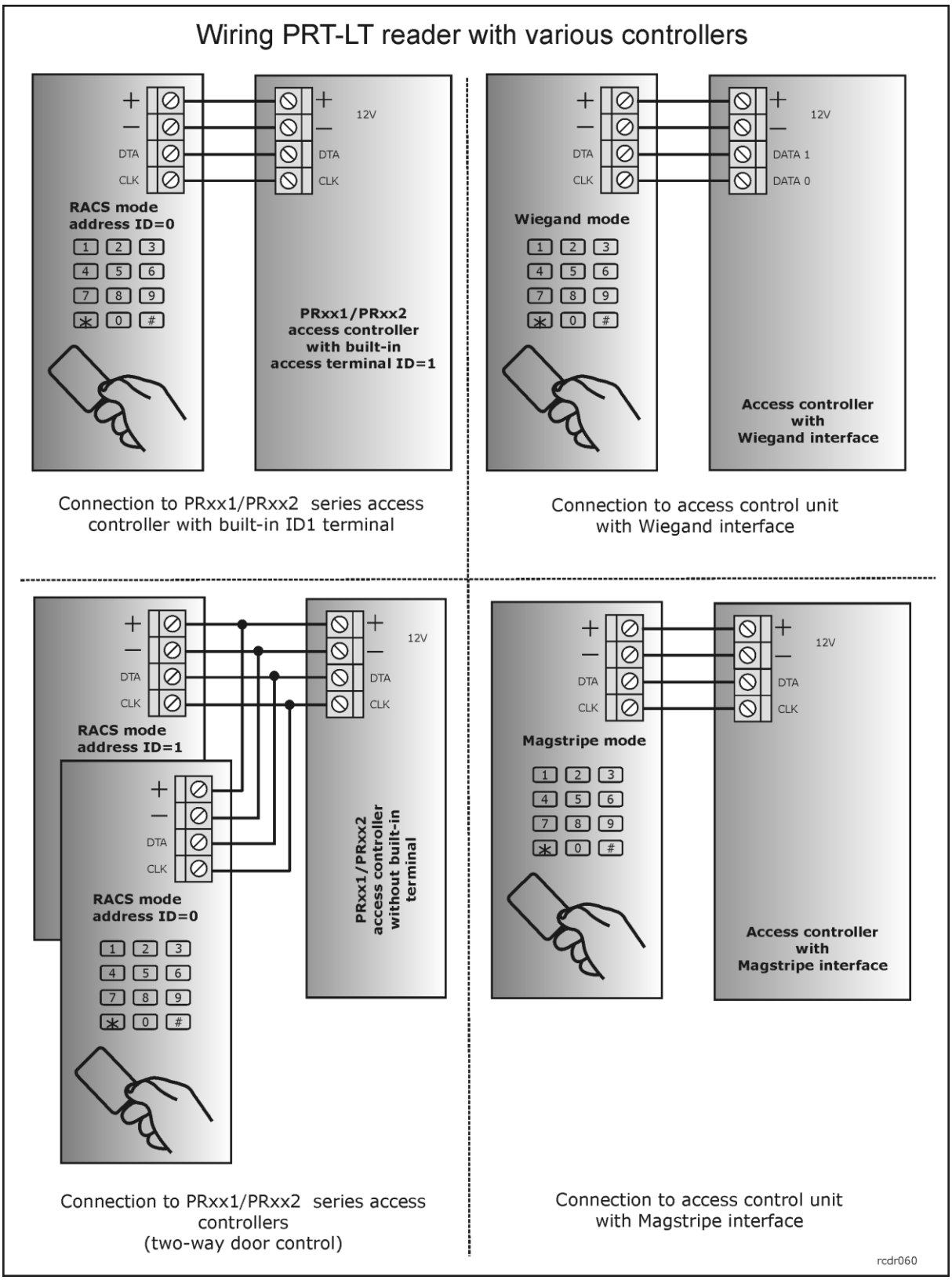

PRT12LT and PRT12LT-BK
Standard enclosure base
LED STATUS
LED OPEN
LED SYSTEM
PR311SE-BK
PR311SE
rcdr051
152,5
26
89
3,5
46
23
Tamper


PRT12LT and PRT12LT-BK
Additional, extended enclosure base (included)
LED STATUS
LED OPEN
LED SYSTEM
PR311SE-BK
PR311SE
rcdr051
152,5
26
89
3,5
46
35
Tamper


PRT64LT
Views and installation diagram
rodr053
35'00
50,00
TAMPER
60,00
80,00
FREE
TAMP
DTA
CLK
FREE
FREE
FREE
IN2
IN1
-12V +
Connection terminals
115,00
80,00
LED STATUS (Armed/Disarmed)
LED OPEN
LED SYSTEM


PRT66LT
Views and installation diagram
rodr054
27.0
54.0
60.0
62.4
TAMPER
85.0
85.0
FREE
TAMP
DTA
CLK
FREE
FREE
FREE
IN2
IN1
- 12V +
Connection terminals
LED STATUS (Armed/Disarmed)
LED OPEN
LED SYSTEM

roger

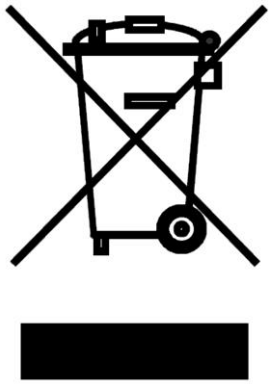

Wiring PRT-LT reader with various controllers
+
—
DTA
CLK
RACS mode
address ID=0
1 2 3
4 5 6
7 8 9
* 0 #
12V
PRxx1/PRxx2
access controller
with built-in
access terminal ID=1
Connection to PRxx1/PRxx2 series access controller with built-in ID1 terminal
Wiegand mode
DATA 1
DATA 0
Access controller
with
Wiegand interface
Connection to access control unit with Wiegand interface
RACS mode
address ID=1
RACS mode
address ID=0
PRxx1/PRxx2
access controller
without built-in
terminal
Connection to PRxx1/PRxx2 series access controllers
(two-way door control)
Magstripe mode
Access controller
with
Magstripe interface
Connection to access control unit with Magstripe interface
rcdr060

Technical Specification	
Supply voltage	Nominal 12VDC, min,/max. range 10-15 VDC
Current consumption (average)	PRT12LT: 65mA PRT12LT-BK: 45mA PRT62LT: 45mA PRT64LT: 65mA PRT66LT: 45 mA
Reading distance	PRT62LT: up to 12 cm, others: up to 15 cm Note: Reading distance is defined for good quality proximity cards placed in optimal position against the reader. For all PRTxxLT readers optimal card position is in the front of the reader (card surface parallel to front of the reader)
Anti-sabotage protection (Tamper)	NC contact, 50mA/24V
Proximity cards	EM 125KHz (EM4100/4102 compatible)
Communication distance	Between access controller and PRT reader: max. 150 m
IP Code	PRT12LT/PRT12LT-BK: IP65 PRT62LT: IP65 PRT64LT: IP65 PRT66LT: IP65 Note 1: The IP65 rating is guaranteed if the bottom of the housing is tightly adhered to the surface on which the device is installed. It is the installer's responsibility to seal the space between the bottom of the housing and the surface on which the device is mounted
Environmental class (according to EN 50131-1)	Class IV, outdoor-general, temperature: -25°C- +60°C, relative humidity: 10 to 95% (non condensing) Class I, Indoor, temperature: +5°C- +40°C, relative humidity: 10 to 95% (non-condensing) PRT12LT/PRT12LT-BK: Class IV PRT62LT: Class IV PRT64LT: Class IV PRT66LT: Class IV
Dimensions H x W x D	PRT12LT/PRT12LT-BK: 152.5 x 46 x 23 mm PRT62LT: 100 x 45 x 25 mm PRT64LT: 115 x 80 x 35 mm PRT66LT: 85 x 85 x 27 mm
Weight	PRT12LT/PRT12LT-BK: 150g PRT62LT: 100g PRT64LT: 120g PRT66LT: 120g
Approvals	CE

Ordering Codes	
PRT12LT	Outdoor proximity reader with keypad, laser engraved long durability silicon rubber keypad, two function keys, dark grey ABS enclosure, pig-tail cable
PRT12LT-BK	The same as PRT12LT but without keypad

PRT62LT	Outdoor, miniature proximity reader without keypad, dark gray ABS enclosure, pig-tail cable
PRT64LT	Outdoor, proximity reader with keypad, dark gray ABS enclosure, screw terminals
PRT66LT	Outdoor, proximity reader without keypad, dark gray ABS enclosure, screw terminals

Product History			
Hardware	**Firmware**	**Date**	**Description**
V1.0	fv1.20	29/10/09	Initial product version
v1.0	fv1.38	28/07/11	Configurable IN1 and IN2 inputs for Magstripe and Wiegand



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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