



Controller **C-01**

ASSEMBLY AND OPERATION MANUAL

CE EAC



Controller

C-01

Assembly & Operation Manual

CONTENTS

1	APPLICATION.....	3
2	OPERATION CONDITIONS.....	3
3	TECHNICAL SPECIFICATIONS.....	4
3.1	Supported scanners.....	5
4	DELIVERY SET.....	6
4.1	Standard delivery set.....	6
4.2	Additional equipment, offered as an option.....	6
5	DESCRIPTION.....	7
5.1	Design and operation.....	7
5.2	Controller boards.....	7
5.3	Signals of inputs.....	10
5.3.1	Inputs IN1 – IN4.....	10
5.3.2	Inputs DUA, DUS _t , DUB, FA.....	11
5.4	Settings of output signals.....	12
5.4.1	Relay outputs OUT1, OUT2.....	12
5.4.2	Outputs OK1 and OK2.....	12
5.4.3	Outputs Ld A, LdSt, Ld B.....	13
6	MARKING AND PACKAGING.....	14
7	SAFETY REQUIREMENTS.....	14
7.1	Installation safety requirements.....	14
7.2	Operation safety requirements.....	14
8	INSTALLATION.....	15
8.1	Cable lengths.....	15
8.2	Installation order.....	16
8.3	Method for obtaining an IP-address.....	18
8.4	Connection of readers / scanners.....	19
8.4.1	Connecting readers by using Wiegand interface.....	19
8.4.2	Connecting scanners by using RS-232 interface.....	19
8.4.3	Connecting scanners via USB interface.....	20
8.5	Connecting locks.....	21
8.6	Turnstile and electromechanical gates configuration.....	23
8.7	Connecting OD VCP.....	24
8.8	RC-panel configuration.....	26
8.9	Connecting a <i>Fire Alarm Device</i>	27
8.10	Connection of optional equipment.....	27
9	CONFIGURATION.....	30
9.1	First start of the controller.....	30
9.2	Controller configuration options.....	30
9.2.1	Configuration by means of application exchange protocol.....	30
9.2.2	Using configuration templates from the Web-interface.....	30
9.3	Connecting to Web-interface of the controller.....	31
10	SW UPDATING.....	31
11	OPERATION.....	32
11.1	ACM and controller operation algorithm.....	32
11.2	Indication of ACS and controller configurations.....	34
12	TROUBLESHOOTING.....	36
12.1	The controller doesn't work.....	36
12.2	Failure of communication with PC.....	36
13	MAINTENANCE.....	38
14	TRANSPORTATION AND STORAGE.....	39
	Appendix 1. Instruction on connection of alcohol detector.....	40
	Appendix 2. Instruction on connection of the controller through <i>PoE</i> -splitter.....	42
	Appendix 3. <i>C-01</i> Controller Web-interface. User Manual.....	44

Dear Customer!

*Thank you for purchasing a controller manufactured by PERCo.
Please follow the instructions given in the Manual carefully,
and this quality product will provide many years of trouble-free use.*

This **Operation Manual** (hereinafter – the Manual) provides information on technical specifications and operation of **C-01 controller**. The Manual aims to provide correct operation of the controller and complete use of its technical capabilities. Installation and maintenance of the device must be carried out by person who has fully studied this manual.

Abbreviations adopted in the Manual:

- ACM – access control mode;
- ACS – access control system;
- OD – operating device;
- PS – power supply;
- PWP – passage waiting period;
- RC – remote control;
- SW – software;
- VCP – vehicle checkpoint;
- WRC – wireless remote control.

1 APPLICATION

C-01 controller (hereinafter – *the controller*) is used in on-line based access control systems (incl. paid access and ticket access systems etc.).

The controller supports connection up to 6 readers / barcode scanners (two - via *Wiegand* interface, two – via *RS-232* interface and two – via *USB* interface), and enables to organize up two two-way passages or one-way passages (the list of supported scanners – Sect. 3).

Depending on the configuration (Sect. 9.2) the controller can control the following ODs:

- one or two electromagnetic or electromechanical locks that support one or two-way passage;
- one turnstile or gate;
- one boom barrier or an automatic gate of vehicle checkpoint.

2 OPERATION CONDITIONS

The controller, with regard to resistance to environmental exposure complies to GOST15150-69, category NF4 (operation in premises with climate control).

Operation of the controller is allowed at ambient air temperature from +1°C to +40°C and relative air humidity up to 80% at +25°C.

3 TECHNICAL SPECIFICATIONS

Operating voltage	12±1.2 V
Consumption current (12 V)	max 0.2A ¹
Power consumption	max 2.5W ¹
Communication interface standard	<i>Ethernet</i> (IEEE 802.3)



Important:

By default, the controller has a preset: IP-address and MAC-address, which are indicated in the warranty certificate included in the passport and on the controller board; subnet mask: 255.0.0.0; Gateway IP-address: 0.0.0.0.

<i>Ethernet</i> data transfer speed	10/100 Mbps
Number of controlled ODs	up to 2 ²
Number of scanners connected via <i>USB</i> interface	2
Number of scanners connected via <i>RS-232</i> interface	2
Number of readers connected via <i>Wiegand</i> interface	2
Supported <i>Wiegand</i> interfaces	-26, -34, -37, -40, -42
Number of relay outputs for OD control	2
Number of additional “open collector” outputs	2
Number of additional inputs, controlled by «dry contact» outputs	2
Number of remote control inputs	3
Number of remote control indication outputs	4
Mean lifetime	8 years
Electric shock protection class	III (IEC 61140)
Web-interface	yes
Dimensions	210×189×46 mm
Weight	max. 1.5 kg

¹ Not including the consumption of readers, scanners and other additional equipment.

² Depends on the selected configuration of the controller. The configuration can be done in a third-party software via *PERCo-C01 Exchange protocol* or by using the templates from the controller Web-interface (Sect. 9.2).

3.1 Supported scanners¹

Scanners manufactured by «Metrologic»:

- IS3480 Quantum E
- MS 7120 Orbit USB
- MS 7180 OrbitCG
- 3310g Vuquest
- MS3580 Quantum T

Scanners manufactured by «DataLogic»:

- Magellan 800i
- (PSC) VS800

Scanners manufactured by «Motorola»:

- Motorola (Symbol) MS-954
- Motorola (Symbol) MS-1204
- Motorola (Symbol) MS-1207
- SYMBOL LS 9208
- Motorola (Symbol) MS-3204
- Motorola (Symbol) MS-3207
- Motorola (Symbol) MS-2204
- Motorola (Symbol) MS-2207

Scanners manufactured by «Opticon»:

- Opticon OPM 2000
- Opticon NLV 2001
- Opticon NLV 1001

**Note:**

All scanners must be preconfigured before you connect them to the controller (set interface parameters and barcode encode formats supported by scanner). Data that was read by scanner will be transferred via *Ethernet* interface in accordance with exchange application protocol (see *PERCo-C01 exchange protocol*).

¹ Scanner parameters are listed in Sections 8.4.2, 8.4.3.

4 DELIVERY SET

4.1 Standard delivery set

Controller	1
Jumper	5
Suppressor 15-18 V	2
Mounting hardware:	
Lead-through	1
Plastic dowel	3
Screw	3
Self-adhesive mount	3
Plastic cable tie 100 mm	5
Package	1
Passport	1
Operation manual	1

4.2 Additional equipment, offered as an option:

Controller power supply	1
PoE-splitter ¹	1
Siren	1
RC-panel	1
Wireless remote control kit ²	1

¹ *PoE-splitter* – allows energizing of the controller via *Ethernet* network. Splitter can be used with network switches that support *PoE* technology and that are compatible with *IEEE 802.3af* standard.

² WRC kit consists of a receiver that is connected to the controller and transmitters (tags).

5 DESCRIPTION

5.1 Design and operation

The controller is produced in the form of electronics module in metal housing with a removable cover. The cover houses power indication.

The controller provides:

- Connection via *Ethernet* (*IEEE 802.3*);
- Support of *TCP/IP* protocols;
- Supports application layer of communications protocol over WebSockets (RFC 6455), the protocol uses JSON (RFC 7159) format for data exchange;
- Connection to system server by using IP-address that is set during configuration (it is possible to use WSS (WebSockets over SSL/TLS) secure channel);
- updating of embedded software through *Ethernet*.

On default, the controller has:

- unique MAC-address (specified in the certificate and on the item board);
- IP-address (specified in the certificate and on the item board);
- Subnet mask (255.0.0.0).

Following ways to set up IP-address, gateway and subnet mask are provided at the stage of system configuration:

- work with default settings;
- static IP-address (manual input);
- receipt form DHCP-server.

The following additional equipment may be connected:

- up to two readers via *Wiegand* interface;
- up to two scanners via *RS-232* interface;
- up to two scanners via *USB* interface;
- up to two door sensors or two passage sensors (turnstile PASS outputs);
- up to two RC buttons («*Exit*») for a lock or RC-panel of a turnstile (swing gate);
- up to five devices sending commands to additional inputs;
- up to two devices controlled by controller additional outputs («open collector» outputs)
- up to three devices controlled by controller additional outputs («TTL» outputs);
- emergency unlock devices (emergency passage unlock) *Fire Alarm*.

The controller as a part of ACS provides:

- operation in ACM: «*Open*», «*Control*»;
- saving of the set mode in the non-volatile memory, to avoid the turn-off of the mode in case of power failure;
- support of card withdrawal function activation during the shutdown of the card capture reader.

5.2 Controller boards

The controller includes two boards – top board (processor module) and bottom board (process execution module). The top board with connecting blocks **XS1**, **XS2** fits in the connecting blocks **XP1**, **XP2** of the bottom board. The boards of the controller are shown on Figure 1 and 2. The purpose of bottom board connecting blocks is given in Table 1.

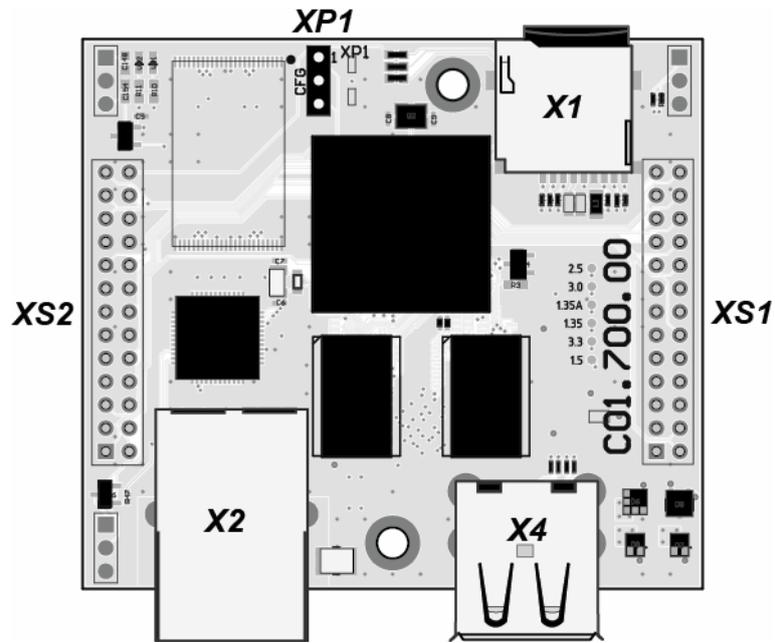


Figure 1. Controller top board

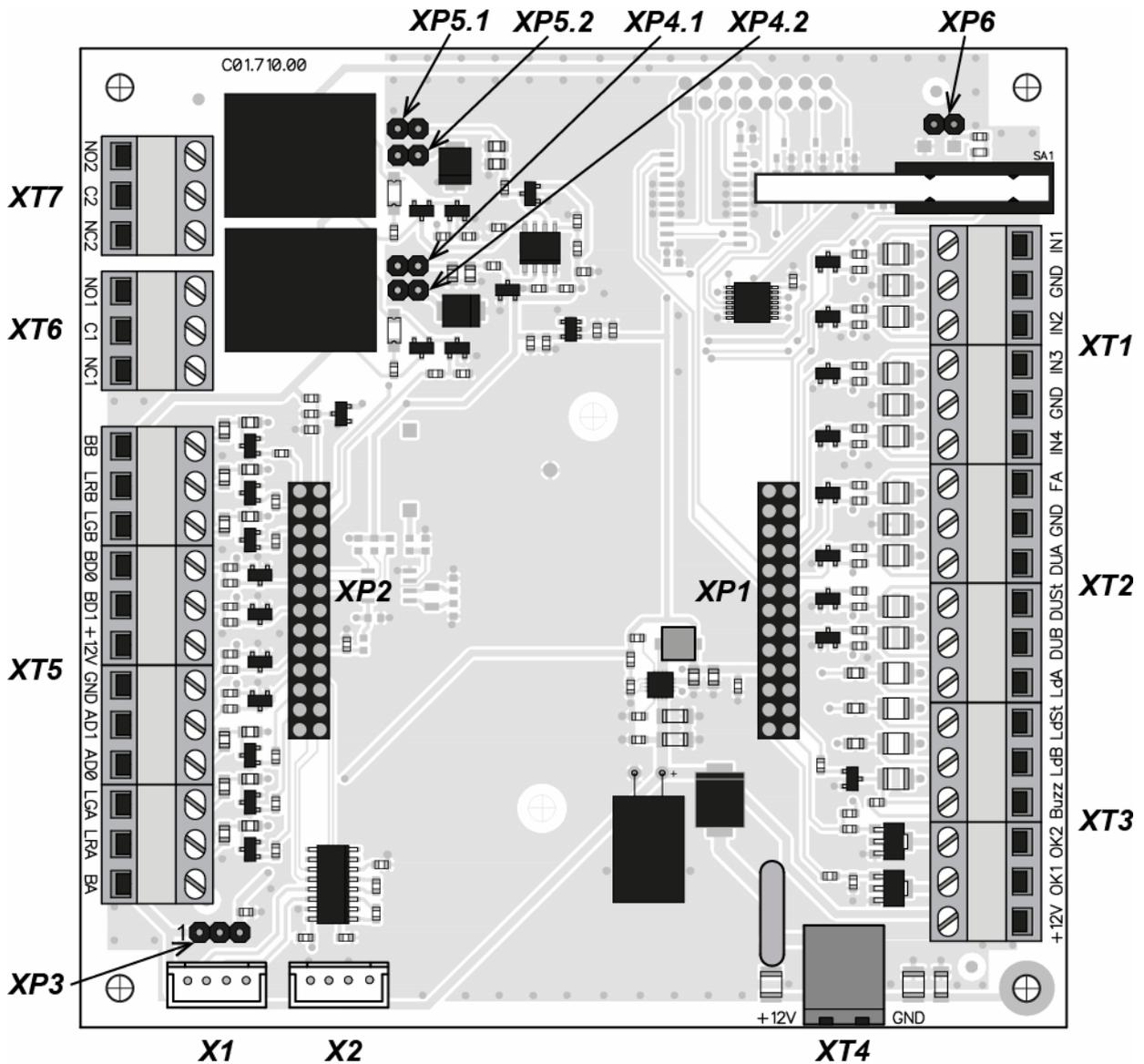


Figure 2. Controller bottom board

Table 1. The purpose of connecting blocks of the bottom board

Contact	Purpose	
Connector XT1 (Inputs)		
IN1	«Door sensor OD1» or «Input for PASS A signal»	
GND	«Common»	
IN2	«Door sensor OD2» or «Input for PASS B» or «Additional input»	
IN3	«Additional input»	
GND	«Common»	
IN4	«Additional input»	
Connector XT2 (RC)		
FA	«Input for emergency unlock devices (passage opening) <i>Fire Alarm</i> »	
GND	«Common»	
DUA	«Control input of the OD1 from the RC» or «Control input of direction A from the RC» or «Additional input»	
DUS _t	«Input STOP for the RC» or «Additional input»	
DUB	«Control input of the OD2 from the RC» or «Control input of direction B from the RC» or «Additional input»	
Ld A	«Output for indication of direction A on the RC» or «Additional output (TTL-level)»	
Ld St	«Output for indication STOP on the RC» or «Additional output (TTL-level)»	
Ld B	«Output for indication of direction B on the RC-panel» or «Additional output (TTL-level)»	
Buzz	«Output for sound indication on the RC»	
Connector XT3 (“open controller” outputs)		
+12V	«Output of +12V power for outputs <i>OK1</i> and <i>OK2</i> »	
OK1	«Additional output (<i>open collector</i>) »	
OK2	«Additional output (<i>open collector</i>) »	
Connector XT4 (PS)		
+12V	«Input of controller +12V power form external PS»	
GND		
Connector XT5 (Wiegand)		
BB	Reader B	Output “Sound indication” (Beeper Out)
LRB		Output “Red Led control” (Red Led Out)
LGB		Output “Green Led control” (Green Led Out)
BD0		Input “Data 0” (D0) (input “Data 0”)
BD1		Input “Data 1” (D1) (input “Data 1”)
+12V	«Output of +12V power for readers A and B» (summary no more than 0.5 A)	
GND		
AD1	Reader A	Input “Data 1” (D1) (input “Data 1”)
AD0		Input “Data 0” (D0) (input “Data 0”)
LGA		Output “Green Led control” (Green Led Out)
LRA		Output “Red Led control” (Red Led Out)
BA		Output “Sound indication” (Beeper Out)
Connector XT6 (OUT1)		
NO1	Normally open contact	«Relay control output OD1»
C1	Central contact	
NC1	Normally closed contact	
Connector XT7 (OUT2)		
NO2	Normally open contact	«Relay control output OD2» or «Additional output»
C2	Central contact	
NC2	Normally closed contact	

Controller has on the top board:

- **XP1** – connector for jumper installation that defines method of IP-address receiving (see Sect. 8.3);
- **X1** – microSD-card slot (installed not on every board model);
- **X2** – connector for the *Ethernet* cable;
- **X4** – double-sided connector for scanner connection via *USB* (bottom – USB1 connector, top – USB2 connector).

Controller has on the bottom board:

- **XP1, XP2** – connecting blocks for the top board;
 - **XP3** – connector for selecting the energizing type of scanners that are connected via *RS-232*. Select the variant according to service documentation of scanners:
 - jumper is in position 1-2 – +12 V power is supplied from controller to contact №6 of DB9 (*RS-232*) connectors which are placed on the controller housing;
 - jumper is in position 2-3 – +5 V power is supplied to contact №6 of DB9 connectors;
 - jumper removed – the power is not supplied to contact №6 of DB9 connectors (if scanner can be powered in a different way according to service documentation).



Important:

By default, the jumper is installed on **XP3** connector on 2-3 contacts (this provides +5 V of power).

- **XP4.1** and **XP4.2** – paired connector that is used for selection of lock which is connected to **XT6 (OUT1)** connector:
 - Jumpers pair are removed – standard electromechanical or electromagnetic lock,
 - jumpers pair are installed – locks of **LB-** or **LBP-**series are without installed door sensor (reed switch). The controller traces the passage on condition of the contact group of the lock;
- **XP5.1** and **XP5.2** – paired connector for selection the type of lock that is connected to **XT7 (OUT2)** connector (the selection of a lock type must be done the same way as a lock for **XT6** connector);
- **XP6** – connecting block for power indication on the housing.

5.3 Signals of inputs

5.3.1 Inputs IN1 – IN4

The controller provides status control of four inputs controlled by “dry contact” or “open collector” (*OK*): *IN1-IN4*. Connection to the inputs is performed via **XT1** connecting block of the controller bottom board (Figure 2 and 4).



Important:

To create a high-level signal on all input contacts *IN1 – IN4*, resistors with 2 kOhm resistance, connected to +3,3V power line, are used.

Inputs can be used for following connections:

- input *IN1*:
 - door sensor (reed switch) №1,
 - PASS1 output of a turnstile,
 - Optional equipment;

- input *IN2*:
 - door sensor (reed switch) №2,
 - PASS2 output of a turnstile,
 - Optional equipment;
- inputs *IN3*, *IN4*:
 - optional equipment.

Signals activation depends on description of their default status in **Normal status of contact** parameter (“**normal_state**”):

- If input is described as **Opened (“break”)**, it is activated by a turn-on of low-level signal relative to *GND* contact. In such case a normally opened relay contact or a scheme of open collector output may be a control element.
- If input is described as **Closed (“short”)**, it is activated by a turn-off of low-level signal relative to *GND* contact. In such case a normally closed relay contact or a circuit of open collector output may be a control element.



Important:

By default, Input *IN1* is configured as “**Closed**” after you select a controller configuration template. Selection of the templates «Two two-sided locks» or «Turnstile» will configure *IN2* input as **Closed**.

Control element “relay contact” shall provide following characteristics of signals:

Minimum commutating current max. 1 mA
 Closed contact resistance (with resistance of the connection cable) max. 300 Ohm

Control element of circuit with open collector output shall provide the following characteristics of signals:

Voltage at the closed contact (low-level signal at input of the controller) max. 0.8V

5.3.2 Inputs *DUA*, *DUS_t*, *DUB*, *FA*

The controller provides status control of four inputs under control of “dry contact” or “open collector” (*OK*): *DUA*, *DUS_t*, *DUB*, *FA*. Connection to the inputs is performed via *XT2* connecting block of the controller bottom board.



Important:

To create a high-level signal on all input contacts *DUA*, *DUS_t*, *DUB*, *FA*, resistors with 1 kOhm resistance, connected to +3.3V power line, are used.

Inputs can be used for following connections:

- input *FA*:
 - emergency unlock devices (passage emergency unlock) *Fire Alarm*;
- inputs *DUA*, *DUS_t*, *DUB*:
 - RC-buttons,
 - RC-panel (WRC-device),
 - optional equipment.

Activation and characteristics of signals of the control element are specified in the Sect. 5.3.



Important:

By default, after selecting any controller template from the Web-interface:

- input *FA* is set as **Closed**.
- inputs *DUA* and *DUB* is set as **Opened**.

Selection of the template «VCP» or «Turnstile» will configure input *DUS_t* as **Opened**.

5.4 Settings of output signals

5.4.1 Relay outputs OUT1, OUT2

The controller is equipped with four relay outputs *OUT1*, *OUT2*. Connection to the outputs is performed via *XT6*, *XT7* connecting blocks of the controller bottom board. Every output has a complex group of contacts: normally open *NO*, normally closed *NC* and common output *C*. Outputs may be used for (Figure 4):

- output *OUT1*:
 - as a control output of OD1,
 - as outputs to control optional equipment;
- output *OUT2*:
 - as a control output of OD2,
 - as outputs to control optional equipment.

Characteristics of output signals:

Maximum commutating voltage of direct current	max. 30 V
Maximum commutating voltage of alternate current	max. 42 V
Maximum commutated direct/alternate current	max. 5 A
Resistance of closed contact	max. 0.15 Ohm

Control outputs support potential and pulse operation modes of OD. Selection of mode is performed with **Operation mode of control output** (“**opt_mode**”) parameter of OD.

In **Potential** mode of OD:

- In case of single passage through OD, output *OUT* is activated for period that is specified by **Card analysis time** (“**analysis_time**”) parameter, or till the moment of passage.
- In case OD is set into ACM «*Open*» output is activated till the mode changed.

In **Pulse** mode of OD:

- In case of single passage through OD, output *OUT* is activated for period that is specified by **Pulse duration time OD** (“**impulse_time**”). In such case OD remains unlocked until the passage is performed.
- In case OD is set into ACM «*Opened*» output is activated for a period of time that is specified by **Pulse duration time OD**, and after that it will be activated each time for the same period in one second after the passage is performed and till the ACM changed.

Activation of inputs *IN1* – *IN2*, configured as door sensor or signal *PASS*, define that the passage was performed in the set direction.

5.4.2 Outputs OK1 and OK2

The controller is equipped with two outputs “open collector”: *OK1* and *OK2* (Figure 4). Connection to the outputs is carried out via *XT3* connecting block of the controller bottom board.

+12VDC supply is derived to the same connecting block for easy connection.

Outputs can be used for following functions:

- connection of light and sound alarm devices,
- sending of alarm notifications to central surveillance panel,
- connection of other optional equipment.

Characteristics of output signals:

Maximum commutation voltage of direct current	max. 30 V
Maximum commutated current	max. 0.25 A

5.4.3 Outputs Ld A, LdSt, Ld B

The controller is equipped with three outputs type «TTL» (chip 74LVC04 and resistor 200 Ohm): *Ld A*, *LdSt*, *Ld B*. Connection shall be performed to the contacts of **XT2** connecting block of the controller bottom board.

Outputs can be used (Figure 4):

- as outputs of connection of indication of the RC-panel,
- as outputs of control of other optional equipment.

Characteristics of output signals:

Maximum voltage of direct current max. 3 V
Maximum current max. 0.01 A

6 MARKING AND PACKAGING

The marking label of the controller is placed on the back of the housing. The marking label provides following information concerning the controller:

- trade mark and contact details of the manufacturer;
- name and number of model;
- serial number;
- date and month of manufacture;
- allowed power voltage range;
- consumption current.

The controller board contains labels with default MAC-address and IP-address of the controller.

The controller is packed into a paperboard box, preventing it from damages during transportation and storage.

7 SAFETY REQUIREMENTS

7.1 Installation safety requirements

Installation and technical maintenance of the controller shall be performed by qualified staff, after getting acquainted with the Operation manual and safety rules. Installation shall be performed in accordance with general electrical and work safety rules.



Attention!

- All connections and jumper installations should be carried out only when the equipment is powered off and power supply is disconnected.
- During mounting use only proper tools.
- Cabling shall be performed in accordance with general requirements for electrical equipment.
- Do not use the controller if it is not properly installed and connected.

7.2 Operation safety requirements

Operation shall be performed in accordance with general electrical and work safety rules.



Do not use!

- The controller under conditions that do not comply with the requirements of Section 2 of this Manual.
- The controller at supply voltage that does not comply with the requirements of Section 3 of this Manual.
- The device in hostile environment that contains acids, alkalis, oils etc.

Power supply should be used accordingly to safety rules given in the Operation manual.

8 INSTALLATION

Installation shall be performed in accordance with work safety noted in Sect. 7.1.

Installation should be done in accordance with local building requirements.

8.1 Cable lengths

Cables for mounting are shown in Table 2.

- Do not lay cables at a distance less than 50 cm from a source of electromagnetic interference.
- Crossing of all cables with power cables is allowed only at a right angle.
- Lengthening of cables shall be performed by soldering only.
- All cables, entering controllers, shall be fixed with plastic ties to self-adhesive cable tie mount, included into delivery set and installed inside the housing.
- After cables are laid, check if there are no line breaks and short circuits at all lines.
- It is not allowed to lay power cables for lock, sensor cables, remote control cables and reader cables at a distance more than 1 m from ground cables.

Table 2. Cables used for installation

No	Equipment	Cable length, m, max	Cable type	Cross section, mm ² min.	Cable example
1	Ethernet (IEEE 802.3u)	100	Four twisted pairs (starting from Category 5)	0,2	5e 4×2×0,52 F/UTP2-Cat5e
2	Reader, card capture reader <i>Wiegand</i> ⁶	30	Eight-core cable	0,2	CQR CABS8 8×0,22c
	Scanner via <i>RS-232</i>	15	Two twisted pairs	0,2	5e 2×2×0,52
	Scanner via <i>USB</i>	2	From the scanner package	-	-
3	PS	10	Twin cable	0,75	PVC 2×0,75 two-color
4	Door sensor (reed switch); Additional sensor (to input of the controller); Additional equipment (to output of the controller)	30	Twin cable	0,2	RAMCRO SS22AF-T 2×0,22 CQR-2
5	RC-panel	40	Eight-core cable	0,2	CQR CABS8 8×0,22c
7	OD – Lock	30	Twin cable	0,75	PVC 2×0,75 two-color
8	OD – Turnstile	30	Six-core cable	0,2	CQR CABS6 6×0,22c

⁶ The power to card capture reader is supplied by a separate cable: flat cord with sheath and outer sheath of PVC 2×0.75.

8.2 Installation order

Connection to the controller is performed in accordance with scheme shown on Figures 4 – 16 with the use of cables from Table 2. The position of connecting blocks on the controller's board is presented on Figure 2.

Installation of connected devices (turnstiles, locks, power supply, etc.) is performed according to the instructions given in technical documents of corresponding devices.

Keep the following sequence of actions during controller installation:

1. Unpack the box and check completeness of package contents according to Sect. 4.1. Make sure that the equipment is not mechanically damaged.
2. Define the place for installation of the controller. Location of the controller shall comply with operational conditions. When choosing a location, make sure that it will be convenient to perform service maintenance of the controller.



Attention!

Do not install the controller at a distance less than 1 m from a source of electromagnetic interference.

3. Mark and drill holes in the surface to install the controller and connect cables in accordance with Figure 3. Lay and mount communication cables, power cables and *Ethernet* cables to the location.

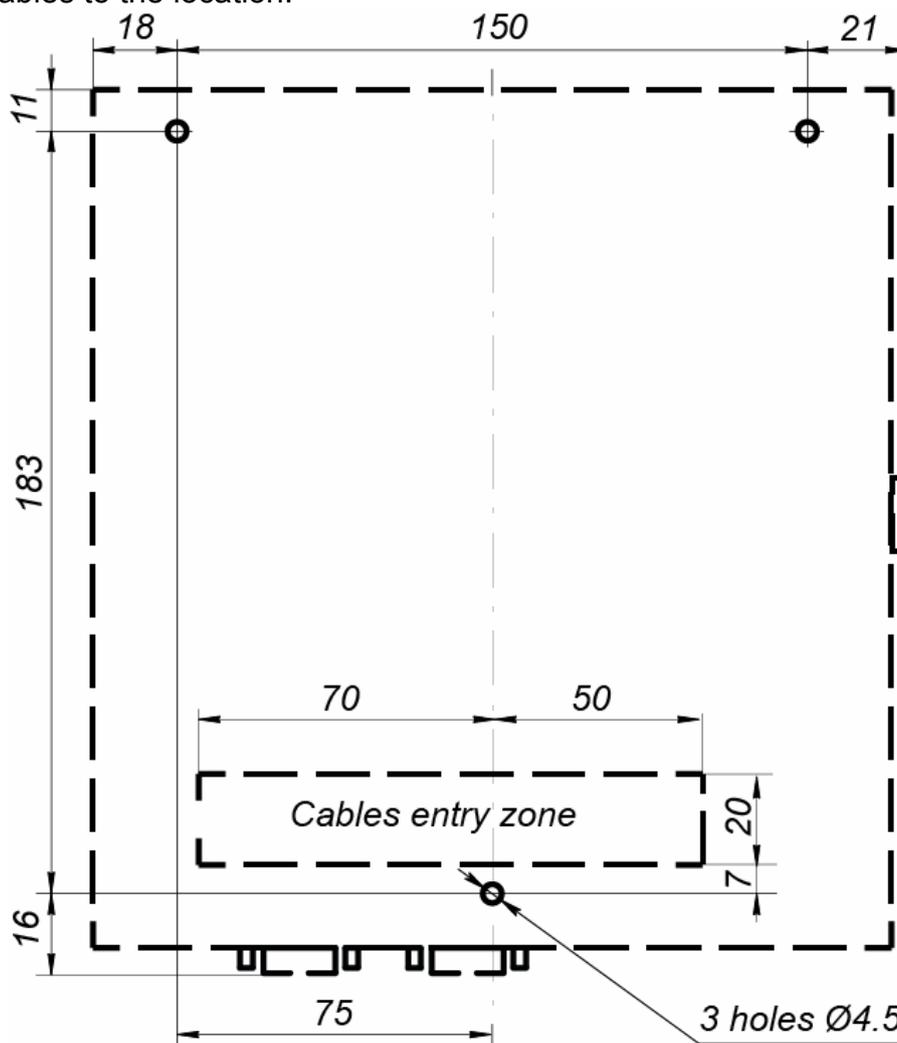


Figure 3. Marking of holes for the controller installation

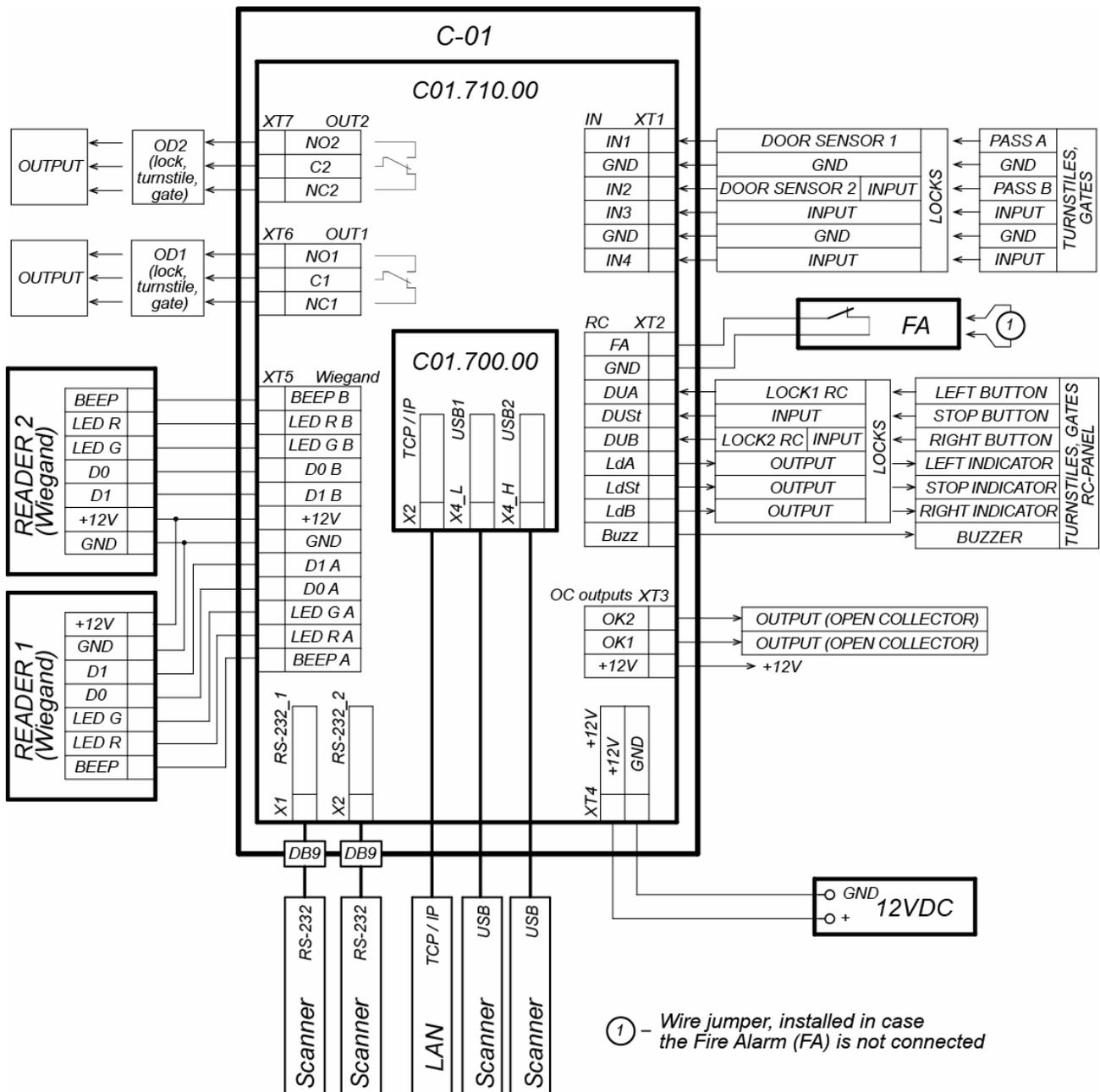


Figure 4. Common scheme of connections

4. Fix the controller with three screws through holes in the controller housing (use dowels from the delivery set if necessary).
5. Select the way to set IP-address of the controller (Sect. 8.3).
6. Connect *Ethernet* cable to **X2** connector of the top board of the controller.
7. Connect PS, connect cable from PS **XT4** connecting block of the controller in accordance with the scheme, shown on Figure 4.



Important:

The order of power connection of the controller via *PoE*-splitter is described in Appendix 2.

8. Connect necessary equipment to interfaces of readers and scanners (Sect. 8.4).

9. Connect the rest of necessary equipment. Follow the next recommendations in connection of:
- electromechanical (electromagnetic) locks and latches (Sect. 8.5);
 - turnstile (Sect. 8.6);
 - OD VCP (boom gates, gates etc.) (Sect. 8.7);
 - RC-panel (WRC device) (Sect. 8.8);
 - emergency unlock devices (passage emergency unlock) *Fire Alarm* (Sect. 8.9);
 - other optional equipment (Sect. 8.10).



Important:

Installation order of external verifying devices to the controller is described in Appendix 1 (an example of the alcohol detection device).

8.3 Method for obtaining an IP-address

The method of obtaining an IP-address of the controller is defined by installation or removing of the jumper on **XP1** connector of the IP-Stile controller top board. Location of the connector is indicated on the Figure 1.



Attention!

Installation or removal of the jumper has to be done only when the controller is switched off.

The following methods of obtaining an IP-address are available (see Table 3):

1. User mode. Jumper is removed.
 - When IP-address (Gateway, Subnet mask) has not been changed by user, the controller is operating with default factory settings: IP-address and MAC-address are indicated in the certificate of IP-Stile and on the controller board; subnet mask 255.0.0.0.
 - When IP-address (Gateway, Subnet mask) has been changed by user, then the controller will be operating with new settings without rebooting.



Important:

It is possible to configure network parameters of the controller via Web-interface or by using the SW. In this case the controller and the PC should work in the same subnet.

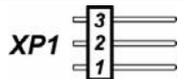
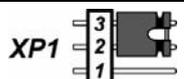
2. «IP MODE». Jumper is in 1–2 position.
 - Operation in networks with dynamic allocation of IP addresses, the controller obtains IP-address (Gateway, subnet mask) from DHCP-server.
3. «IP DEFAULT». Jumper is in 2–3 position.
 - Controller is operating with factory settings of IP-address and MAC-address are indicated in IP-Stile certificate and on the controller board; subnet mask 255.0.0.0.
 - authentication (password for access to the controller) is switched off when the jumper is installed, it is possible to set a new password.



Important:

User IP-address settings (gateway, subnet mask), will be saved in the controller memory if they were applied while switching to «*IP DEFAULT*» mode. Switching back to user mode (jumper is removed) will force controller to use settings for operation.

Table 3. Variants of jumper installation on XP1 connector

№	Jumper position on XP1 connector	IP-address obtaining method
1		User mode
2		«IP MODE»
3		«IP DEFAULT»

8.4 Connection of readers / scanners



Attention!

When connecting to several interfaces simultaneously the total current consumption of all connected readers and/or scanners must not exceed: 1.5 A for +5 V power supply voltage and 0.5 A for +12 V power supply voltage.

8.4.1 Connecting readers by using Wiegand interface

Readers should be connected correspondingly to the contacts of **XT5** connector in accordance with general connection scheme (Figure 4). It is necessary to select *Wiegand* value for «Communication interface» parameter (see Figure 6).



Important:

It is possible to use +12 V and GND contacts of **XT5** terminal block, the total current consumption of two connected readers must not 0.5 A.

8.4.2 Connecting scanners by using RS-232 interface

Scanners should be connected correspondingly to the contacts of DB9 (RS-232) connector that is located on the housing of the controller (see Figure 5). DB9 left connector should be connected to **X1** connector located on the bottom board of the controller, right connector – to **X2** connector (see Figure 4).

Bottom view

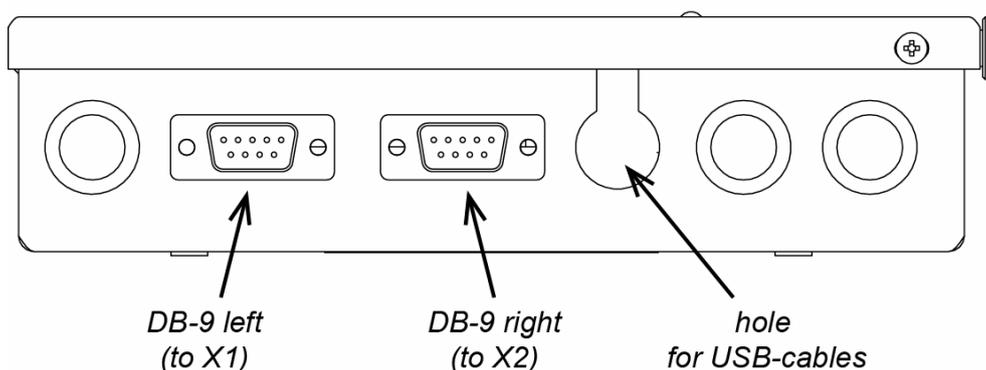


Figure 5. Location of DB-9 (RS-232) connectors on the housing

Parameter values of scanners that are connected via RS-232 interface:

- speed – 9600 bauds;
- parity check – no;
- flow control – no;
- 8-bit data, 1 stop-bit, 1 start-bit.

Depending on the type of scanner it is necessary to select «Barcode-RS-232» or «Barcode-RS-232B (without line spacing) value for «communication interface» parameter. (see Figure 6).



Important:

It is possible to supply power of +5 V or +12 V to scanners by using DB9 connectors located on the controller housing (contact №6). This can be done by installing a jumper on the correspondent contacts of **XP3** connector (see Sect. 5.2). The total current consumption of two connected scanners must not exceed: 1 A for +5 V or 0.5 A for +12 V.

8.4.3 Connecting scanners via USB interface

Connect scanners via *USB* interface by using **X4** connector located on the controller top board (USB double-sided connector: USB1 is located at the bottom, USB2 – at the top, see Figure 1). Use profiled hole for cabling into controller housing (see Figure 5).

Scanners that are connected via USB can operate with **C-01** controller or in keyboard emulation mode (selector value – «Barcode-USB (keyboard)»), or in virtual COM-port mode. In this case it is necessary to select «Barcode-USB» or «Barcode-USB (without line spacing) value for «communication interface» parameter (see Figure 6). It is necessary to switch off the awaiting for operational commands parameter if possible for scanners that operate in virtual COM-port mode.



Important:

Scanners are powered by *USB*, the total current consumption of every scanner should not exceed 0.6 A.

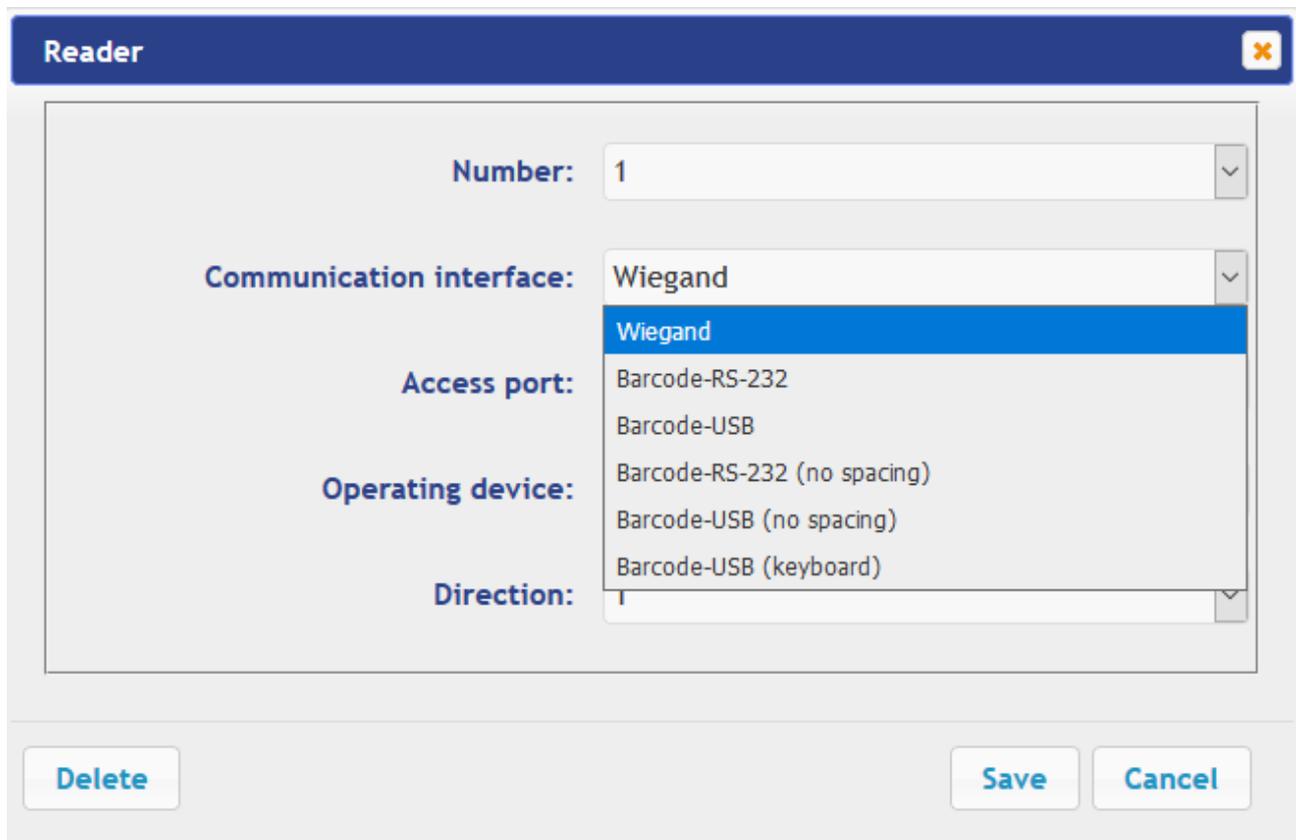
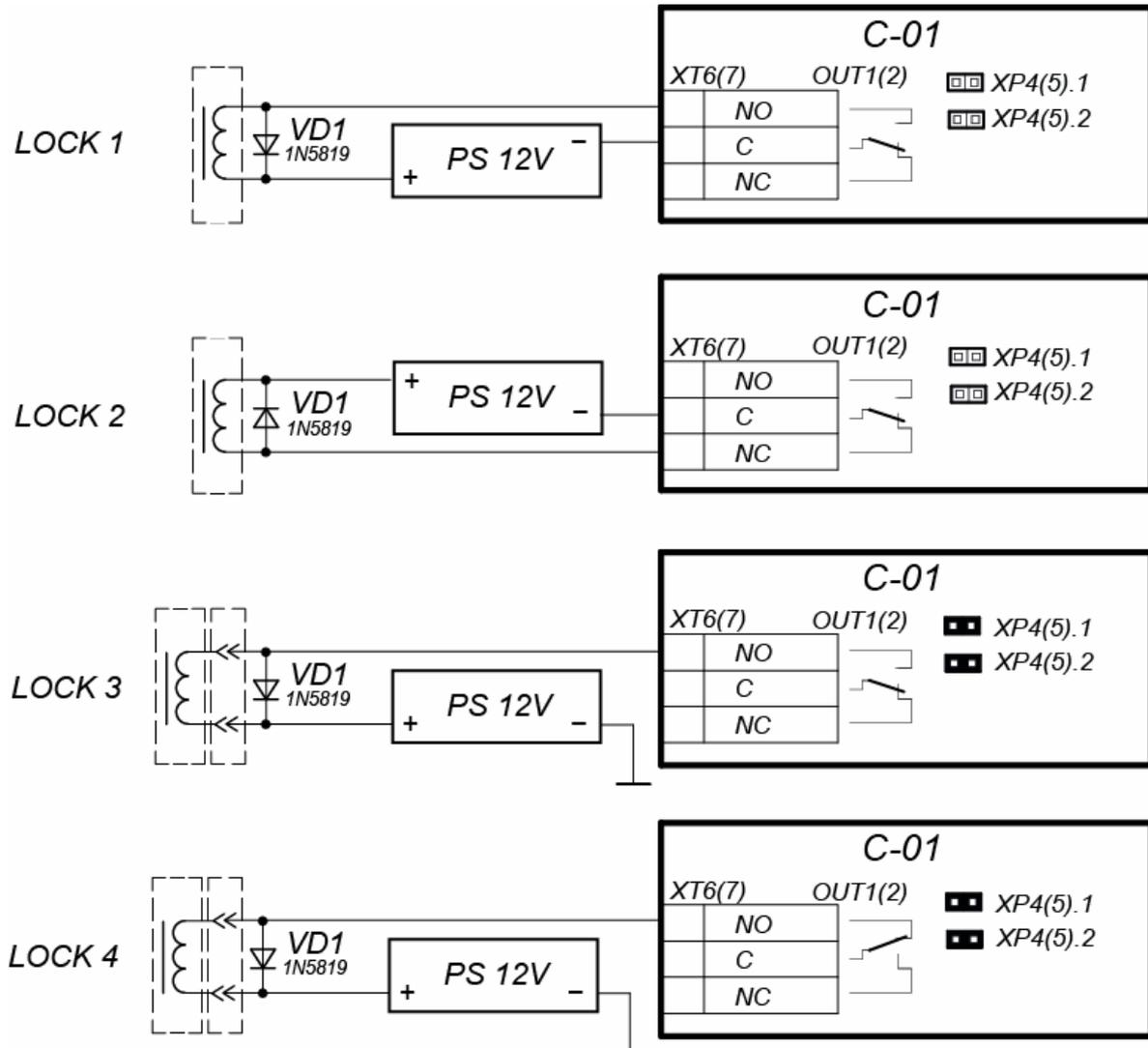


Figure 6. Selecting the type scanner in Web-interface

8.5 Connecting locks

When you connect the lock (latch) to the controller, follow the next recommendations:

1. To dissipate static electricity, is recommended to ground the housing or locking bar of the lock. In case of lock installation on a metal door, it is recommended to ground the door leaf. It is necessary to use the cable with cross section minimum 0.75 mm^2 .
2. Connect the lock (the latch) to **XT6** or **XT7** connecting blocks on the lower board of the controller is made in accordance with scheme (Figure 4).
3. If you need to connect remote control button, connect it to **XT2** of lower board of the controller (Figure 8).



Examples of connections:

LOCK 1 - electromechanical lock, opens when voltage is applied

*LOCK 2 - electromechanical / electromagnetic lock,
opens when the voltage is removed*

*LOCK 3 - lock series LB-72.1, LB-85.1, LBP-85.1,
opens when voltage is applied*

*LOCK 4 - lock series LB-72.2, LB-85.2, LBP-85.2,
opens when the voltage is removed
(parameter **Normal state "Closed" output of the OD**
must be in the meaning of **"Energize"**)*

Figure 7. Connection schemes of the locks



Attention!

- If the connected lock *is not equipped with built-in spark protection circuit*, it is necessary to use the suppressor from the delivery set or Schottky diode for operating current not less than 1A (1N5819). The suppressor is installed close to the lock (**VD1** on Figure 7).
- If the connected electromagnetic lock *is not equipped with demagnetizing circuit*, it is necessary to install a bidirectional suppressor from the delivery set (**VD1** on Figure 7).
- If the controller is connected via *PoE-splitter*, it is recommended to use only electromechanical locks with spark protection diodes (**VD1** on Figure 7), type 1N5819. The use of suppressor in such case is **FORBIDDEN**.

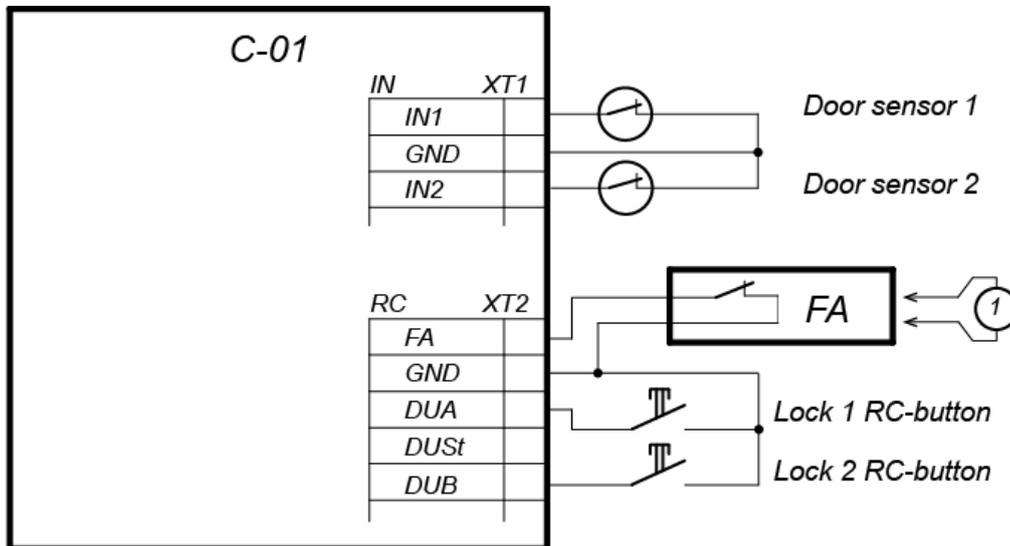
4. The reed switch is connected to **XT1** connecting block of lower board (Figure 8). The door sensor with the lock controlled by **OUT1** is connected to **IN1** input, **OUT2** to **IN2**, etc. The door sensor must be mounted that when the door is closed, the sensor can always actuate.



Important:

The locks **LB-**, **LBP-series** do not require mounting of the door sensor (the **C-01** controllers can trace the door opening based on the contact group of the lock). In this case, is necessary to installed jumpers on the lower board of the controller: for **OUT1** – **XP4.1** and **XP4.2**, for **OUT2** – **XP5.1** and **XP5.2** (see Figure 2).

5. Emergency devices *Fire Alarm* are connected to **XT2** connecting block of bottom board of the controller (in this case it is necessary to remove jumper by cord), see Figure 8 and Sect. 8.9.
6. Fix cables with plastic ties to self-adhesive cable tie mount, included into delivery set, by installing them inside of the controller the housing.



① – Wire jumper, installed in case the Fire Alarm (FA) is not connected

Figure 8. Connection scheme for RC-button and door sensors

8.6 Turnstile and electromechanical gates configuration



Important:

In software of **PERCo-Web** for operating device of the controller:

- The parameter of OD **Control output operation mode** for PERCo turnstiles should be in **Potential mode**.
- The parameter of OD **Passage registration** for swing gate **PERCo-WMD-05S** in SW **PERCo-S-20** should be in **On ID Card presentation**.

Follow the next recommendations to connect the turnstile (the gate) to controller:

1. To dissipate static electricity, is recommended to ground the housing of turnstile. It is necessary to use the cable with cross section minimum 0.75mm.
2. Connect the turnstile (the control unit of the turnstile) to **XT1**, **XT6**, **XT7** connecting blocks of the controller bottom board in compliance with the scheme (Figure 10).
3. Connect the swing gate (the control unit of the turnstile) to **XT1**, **XT6** and **XT7** connecting blocks of the bottom board of the controller in compliance with the scheme (Figure 9).
4. Connect RC-panel (or WC) to **XT2** connecting block of the lower board of the controller in compliance with the scheme (Figure 13).
5. Fix cables with plastic ties to self-adhesive cable tie mount, included into delivery set, by installing them inside the housing of the controller.



Important:

Connection scheme of power circuit of the controller and the turnstile (the gate) in case of connection via **PoE-splitter** is given on Figure 18.

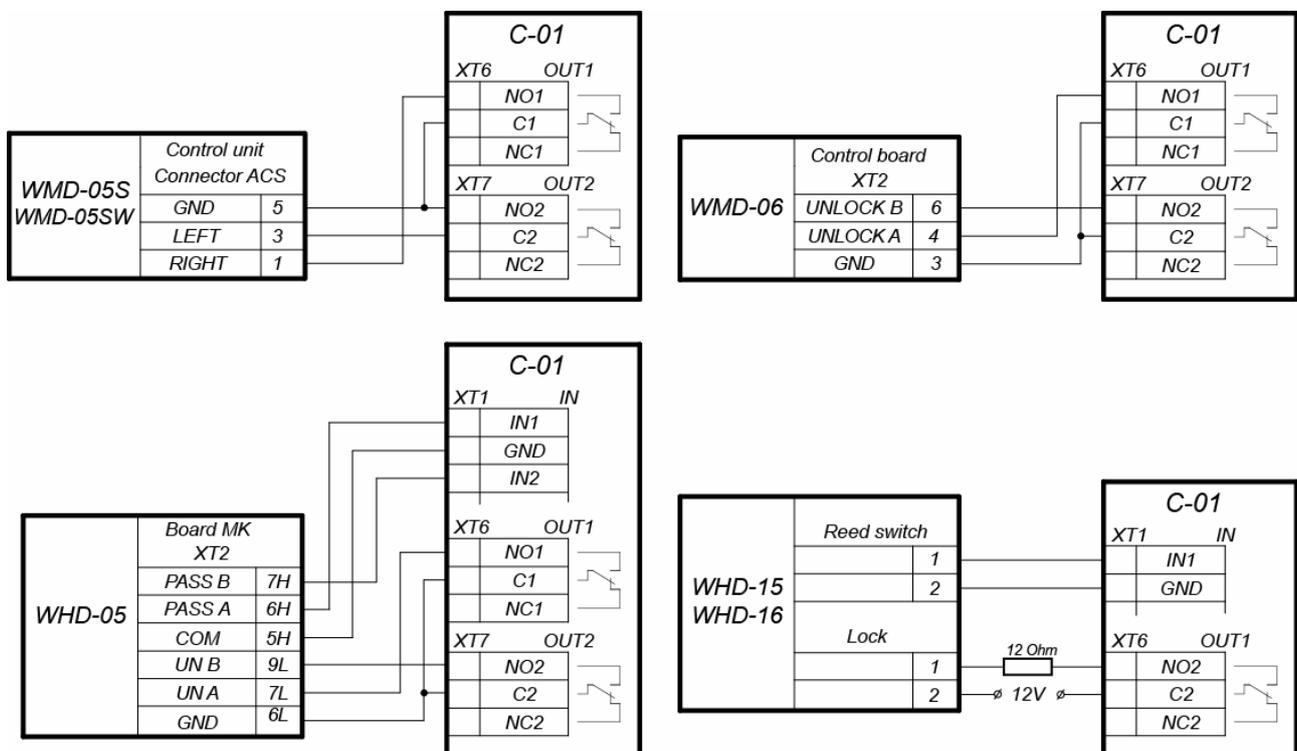
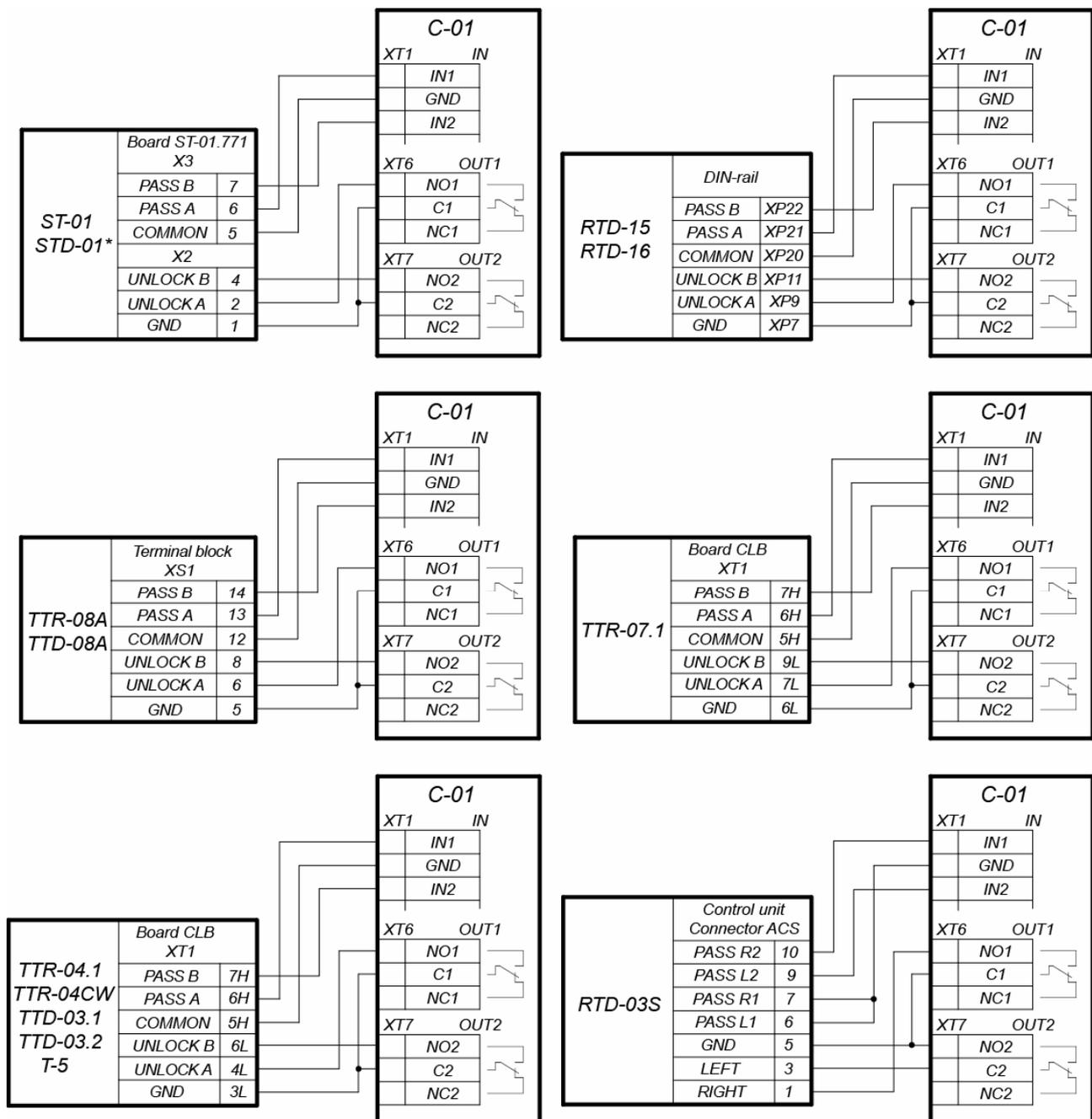


Figure 9. Connection schemes of the gates



* - for ST-01 (STD-01), the PASS A and PASS B outputs must be configured as normally open

Figure 10. Connection schemes of “Turnstile control” configuration

8.7 Connecting OD VCP

When installing a controller, is necessary to correspond with operation logic of control unit of vehicle checkpoint:

- Operation of control unit of vehicle checkpoint is performed via two relays - when passage is allowed *OUT1* relay is activated and held, sending “Open” signal. After a vehicle has passed through the checkpoint (detected by passage detector), or after waiting period is over, *OUT1* relay switches to normal, after that *OUT2* relay is activated for 1 sec, sending “Close” signal. Also, *OUT2* relay is activated for 1 sec by **Close** button of RC-panel.
- If **Automatic closing** function is turned on in the control unit of OD of vehicle checkpoint, operation from vehicle checkpoint is performed via one relay. When

passage is allowed *OUT1* relay is activated and held, sending “Open” signal. After a vehicle has passed through the checkpoint (detected by passage detector), or after waiting period is over, *OUT1* relay switches to normal, after that boom barrier is closed automatically (it is recommended to set a minimum possible waiting period for automatic closing). In such case *OUT2* relay it is not used.

Installation of OD of vehicle checkpoint to the controller is performed in accordance with instructions, given in technical documents of corresponding devices. Follow the next recommendations (the position of the connecting blocks on the controller board is indicated on Figure 2):

1. To dissipate static electricity is recommended to ground the housing of the OD. Grounding shall be performed with a cable with wire section not less than 0.75 mm².
2. General connection schemes of OD of vehicle checkpoint re given on Figure 11.

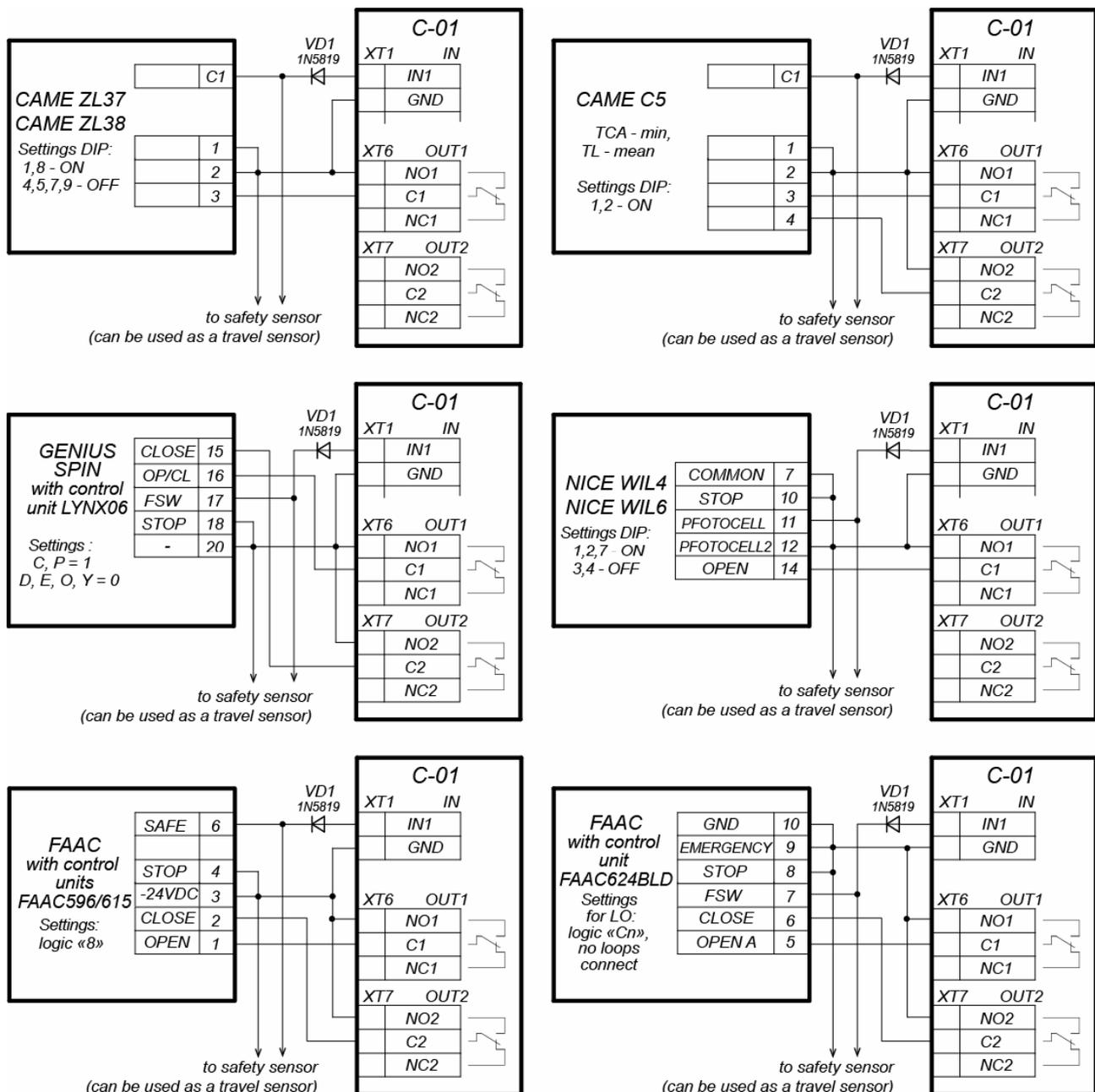


Figure 11. Connection scheme of boom barriers to the controller

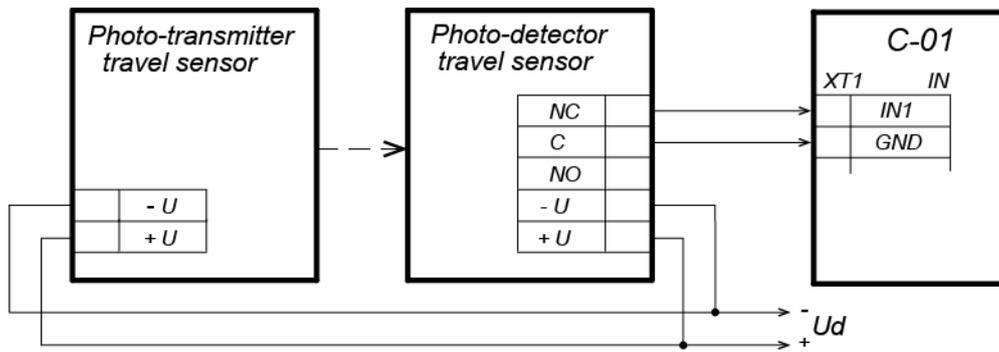


Figure 12. Connection scheme of passage sensors



Note:

- **Output normalization** parameter of OD shall be set into **After closing** mode.
- If operation is performed via one relay, **Automatic closing** function shall be turned on in the control unit of OD of vehicle checkpoint, in such case a minimum waiting period for automatic closing shall be set - **Regulation T.C.V.** (for CAME) and **PAUSE TIME** (for NICE).

3. Connect passage sensor to **XT1** connector block of the bottom board of the controller in accordance with the scheme, shown on Figure 12. Use cable №4 for connection (Table 2). If several sensors are connected, their outputs shall be turned on sequentially.

For *CAME* and *GENIUS* boom barriers infrared security sensors shall be used as passage sensors, connected to the control unit of ODs of vehicle checkpoint in a standard way. In such case they are connected to the controller of vehicle checkpoint with parallel connection.

For *NICE* and *FAAC* boom barriers the general principle of connection of infrared sensor to the controller of vehicle checkpoint is depicted in examples of connection schemes for control unit of corresponding model. Instead of **VD1** diode some other decoupling circuit might be needed.



Attention!

- To ensure correct passage detection of a vehicle with a trailer or other parts transparent for passage sensors, it is recommended to install several spaced-apart sensors, or to set value of **OD Control pulse duration/Recovery delay of passage sensors** parameter sufficient for passage of transparent part of a vehicle by the sensor.
- If there is no passage sensor is necessary, that the OD parameter **Passage registration** should be set in **On ID Card presentation** mode. In such case malfunction of OD of vehicle checkpoint is possible, due to the impossibility to choose the optimal passage period.

4. Fix cables with plastic ties to self-adhesive cable tie mount, included into delivery set, by installing them inside the housing of the controller.

8.8 RC-panel configuration

The controller in the relevant configuration allows connecting the RC-panel to control turnstiles or swing gates. To connect the RC-panel to the controller are used:

- Three inputs to control the passage: *DUA*, *DUS_t*, *DUB*;
- Four outputs to control the indication of the RC-panel: *LdA*, *LdSt*, *LdB*, *Buzz*.

The connection is made to contacts of **XT2** connecting block (Figure 13).

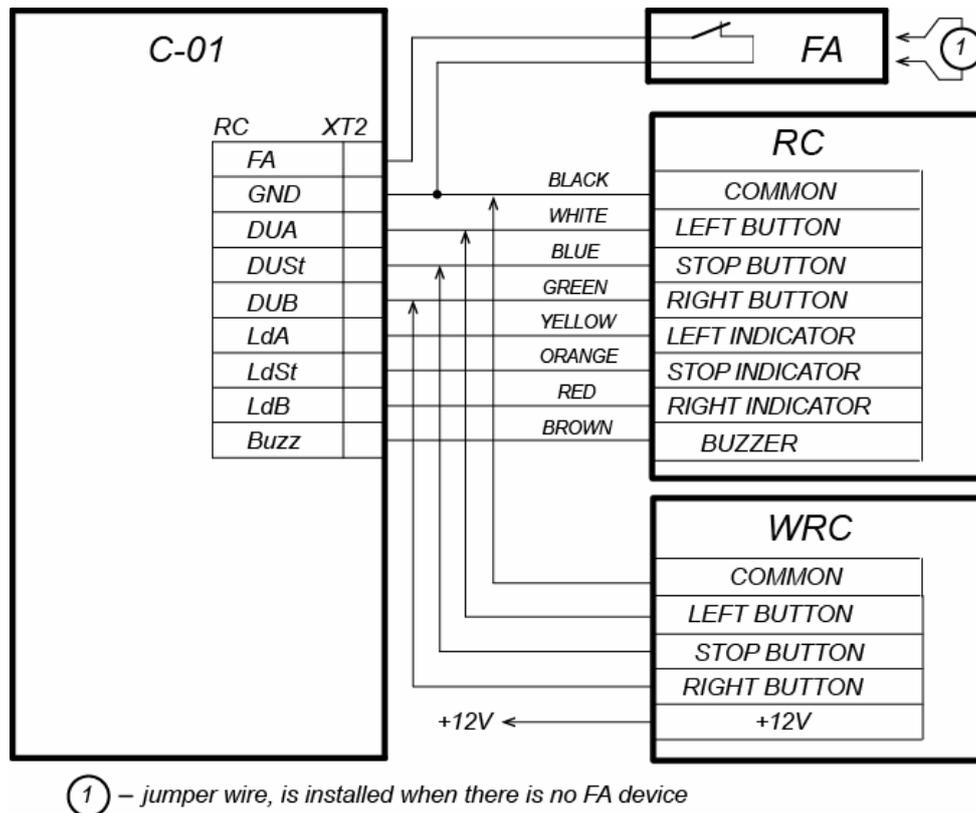


Figure 13. Connection scheme of RC-panel or WC of “Turnstile control” configuration

The inputs *DUA*, *DUS* and *DUB* in these configurations of the controller are activated by low-level signals (normally opened contact) regarding *GND* contact. Settings of signals that can be used for connection of the RC-panel are specified in Sections 5.3.2 and 5.4.3.

8.9 Connecting a Fire Alarm Device

In case of fire alarm or other emergency situation, there is possibility of automatic unlocking (passage opening) of all ODs connected to the controller board.

Emergency release (emergency passage opening) of ODs is produced by the command of the emergency device *Fire Alarm*. The emergency device *Fire Alarm* is connected to the input of the controller *FA* (contacts *FA* and *GND* of *XT2* connecting block, Figures 4, 8, 13). If the device *Fire Alarm* is absent, on the input should be installed jumper by cord (default installation). Settings for signal *FA* are indicated in Sect. 5.3.2. When the control signal is applied to the input *FA*, the controller operates in the mode *Fire Alarm*. In this mode, all connected devices open for passage in both directions. Other control commands are ignored.

8.10 Connection of optional equipment

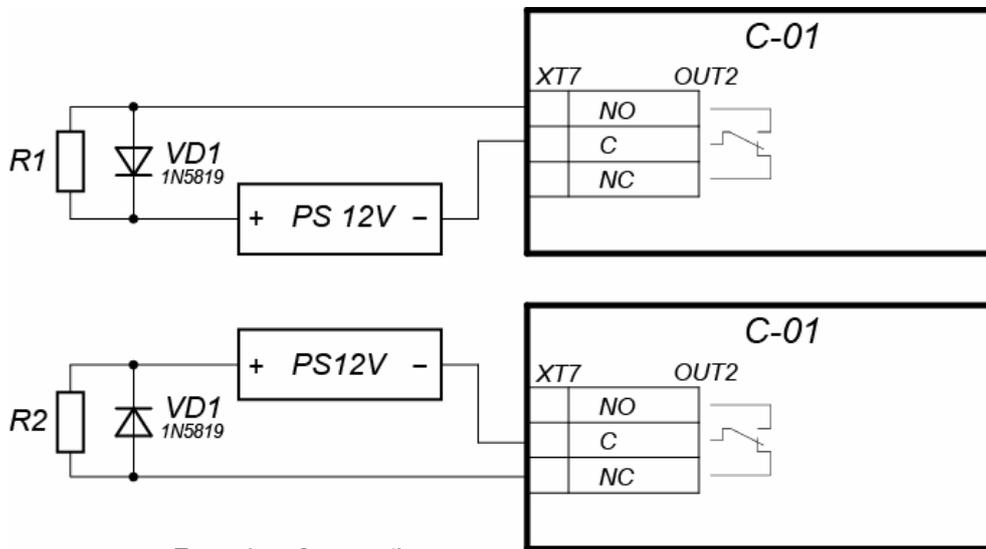
To connect optional equipment, follow the next recommendations:

1. The typical connection schemes of the optional equipment are shown on Figures 14, 15, 16.
2. To connect the optional equipment, use cable type №4 (Table 2).
3. Fix cables with plastic ties to self-adhesive cable tie mount, included into delivery set, by installing them inside the housing of the controller.



Attention!

To connect the optional equipment with inductive load (R_n) to the outputs, it is necessary to use spark protection diode (**VD1** on Figure 14). For example, Schottky diode for operating current not less than 1 A (1N5819).



Examples of connections:

R1 - additional equipment is activated when the voltage is applied

R2 - additional equipment is activated when the voltage is removed

Figure 14. Connection scheme of optional equipment to relay outputs of the controller

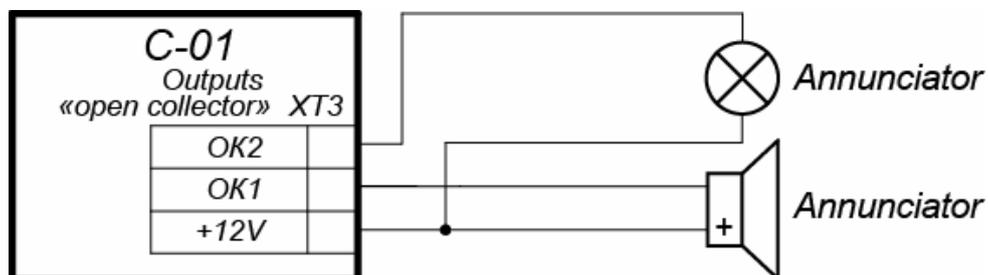


Figure 15. Connection scheme of optional equipment to “Open collector” outputs

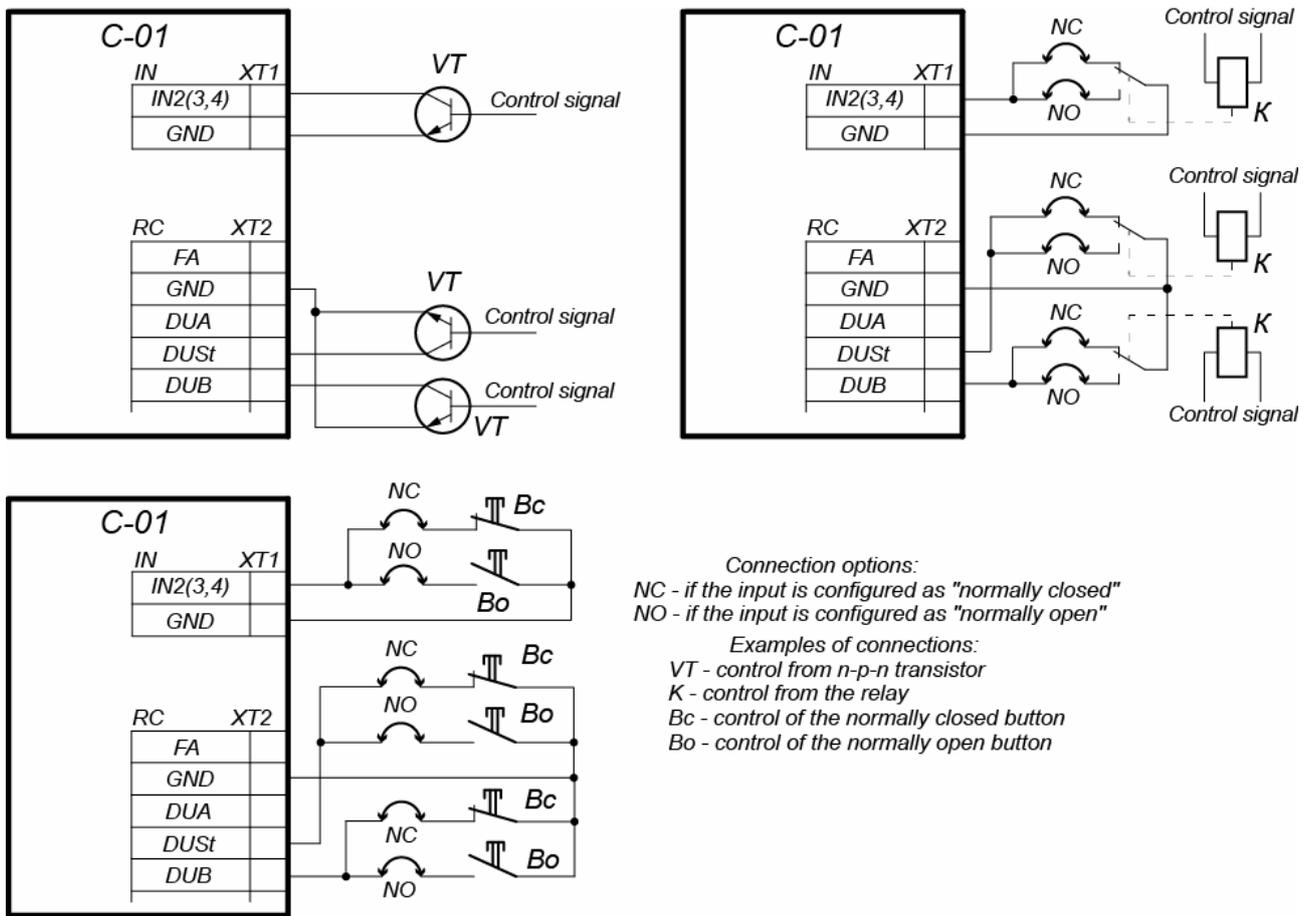


Figure 16. Connection scheme of optional equipment to controller inputs

9 CONFIGURATION

9.1 First start of the controller

To switch on the controller for the first time, follow the next recommendations:

1. Verify all connections (Sect. 8.2).
2. Connect PS to the supply line that provides voltage and frequency that are indicated in the service documentation.
3. Switch on the PS.
4. The indication of PS located on the housing will light up.
5. Check and configure network parameters of the PC that will be used for configuration and operation of the controller. It is important that PC and controller are in the same subnet so they can be connected via *Ethernet*. By default, **PERCo** controllers are using IP-addresses from 10-th subnet, that is why it is necessary to configure additional parameters TCP/IP of the PC IP-address: 10.x.x.x (x- random numbers) and subnet mask 255.0.0.0. There is no need to use such servers and services as DNS and WINS. Though, the controller should be connected to the same network segment or directly to the network card of the PC. After connection is done, you can change controller network parameters to parameters recommended by SW system administrator or by using the WEB-Interface.
6. Configure the controller. Controller configuration options are described in Sect. 9.2.

9.2 Controller configuration options

9.2.1 Configuration by means of application exchange protocol

Configuration of the controller is done by using a third-party SW and by means of application exchange protocol (see. *PERCo-C01 exchange protocol*). The working order of a third-party SW should be described in service documentation for this SW.

9.2.2 Using configuration templates from the Web-interface

There are three configuration templates that are available in the Web-interface of the controller (see Sect. 9.3) which are used for controller resources configuration and operating relevant ODs:

1. VCP (see Sect. 8.7).
2. Two two-sided locks (see Sect. 8.3).
3. Turnstile (see Sect. 8.6).



Attention!

Change of configuration template will lead to erasing of all previously set resources configuration and internal responses settings of the controller.



Note:

For «Two two-sided locks» configuration:

- It is possible to delete the second lock via Web-interface if it is not intended to be used (it is recommended to disconnect all physical contacts and readers that are associated with this lock).
- Configuration of controller resources for one-sided lock can be done via Web-interface (it recommended to delete the second reader of this lock after changing its type).

By default, the controller operates by using the «*Turnstile*» template.

9.3 Connecting to Web-interface of the controller

Launch browser (eg. *Internet Explorer* for *MS Windows* OS or *Safari* for *MacOS*), and type the controller IP-address in the URL bar. The controller Web-interface start page will appear.



Figure 17. Web-interface start page

1 – title bar; 2 – navigation menu; 3 – page working area



Important:

Description of the Web-interface and order of the primary configuration order are shown in Web-interface User manual (see Appendix 3).

10 SW UPDATING

SW updating can be done via controller Web-interface. Description of the updating process can be found in the Web-interface User manual.

11 OPERATION

When operating the controller, follow security measures indicated in Sect. 7.2.

11.1 ACM and controller operation algorithm



Important:

- In configurations «VCP» and «Two two-sided locks» change of ACM for VCP and locks shall be made simultaneously for both directions.
- Operation mode in configuration “Turnstile” is set independently for each direction.

The controller, which is operated as a part of ACS supports the following ACM (indication of ACS is given in the Tables 4 and 5):

ACM “Open” - the mode of free passage.

- OD will be unblocked before the change of ACM.
- Pressing of buttons of RC-panel and RC-button (“Exit”) are ignored.

ACM “Control” - the basic operation mode as a part of ACS.

- OD is blocked.
- When an access granting card is presented to the reader, OD is unblocked for PWP.

Change of ACM is done by command from the SW or Web-interface.



Attention!

If the server connection is lost while operating in ACM «Control», it will be possible to operate OD by using RC buttons or the RC. If data exchange is interrupted for more than N seconds (N should be configured by user via web interface), the «lost server connection» error will be registered.

It necessary to preconfigure the controller before using it (see Sect. 9). It is possible to change devices parameters of the current configuration by using Web-interface or exchange protocol (reader, OD, physical contact, internal response and network parameters).

Operation algorithm of the controller in various ACM⁷

1. **ACM «Control»:** OD is blocked, «ACM Control» is displayed (Sect. 11.2).

- After receiving the server command «open OD in direction...» OD will unlock in the desired direction for the PWP, «Access granted» message will be displayed on indicators (Sect. 11.2). OD will be blocked after the passage is performed, «*passage by the server command in direction...*» event will be generated, indicators will display «ACM Control» (Sect. 11.2).

If server sends «*block direction...*» command or RC STOP button is pushed before the passage is performed - OD will be blocked, «*passage denial by the server command in direction...*» or «*passage denial by the RC command in direction...*» event will be generated, indicators will display «ACM Control» (Sect. 11.2).

⁷ Controller can operate ACM indication only for readers that are connected via *Wiegand* interface (see Sect. 11.2). Variants of optional indication for other readers (scanners) – check the service documentation for the device.

If passage was not performed till expiration of PWP, then OD will be blocked, «*passage denial by the server command in direction...*» event will be generated, indicators will display «ACM Control» (Sect. 11.2).

- After pushing RC accept button OD will unlock in the desired direction for the PWP, indicators will display «Access granted» (Sect. 11.2). OD will be blocked after the passage is performed, «*passage by the RC command in direction...*» event will be generated, indicators will display «ACM Control» (Sect. 11.2).

If server sends «*block direction ...*» command or RC STOP button is pushed before the passage is performed - OD will be blocked, «*passage denial by the server command in direction...*» or «*passage denial by the RC command in direction...*» event will be generated, indicators will display «ACM Control» (Sect. 11.2).

If passage was not performed till expiration of PWP, then OD will be blocked, «*passage denial by the RC command in direction...*» event will be generated, indicators will display «ACM Control» (Sect. 11.2).

- After receiving an identification number from reader the controller sends it to server and awaits the correspondent command⁸:

- If server sends «*access denial*» command, or if server didn't respond during PWP, then «*Access denied*» message will be displayed for 1 second and «ACM Control» message will be indicated (Sect. 11.2).

- If server sends «*Access granted for identifier №...*» command, then OD will be unlocked in the desired direction for the PWP, indicators will display «Access granted» (Sect. 11.2). OD will be blocked after the passage is performed, «*passage with identifier № ... in direction ...*» event will be generated, indicators will display «ACM Control» (Sect. 11.2).

If server sends «*block direction ...*» command or RC STOP button is pushed before the passage is performed - OD will be blocked, «*passage denial by the server command for identifier № ... in direction...*» or «*passage denial by the RC command for identifier № ... in direction...*» event will be generated, indicators will display «ACM Control» (Sect. 11.2).

If passage was not performed till expiration of PWP, then OD will be blocked, «*passage denial for identifier № ... in direction...*», indicators will display «ACM Control» (Sect. 11.2).

- If server sends «*Access granted for identifier №... with identifier withdrawal*» (if *Wiegand* card capture reader is connected to the controller), the controller will activate «*Withdraw card*» output for the **Card withdrawal period** (the indication that informs about withdrawal readiness will light up on the card capture reader) and awaits «*Card withdrawn*» signal from card capture reader. After receiving the signal, the controller will normalize «*Withdraw card*» output, OD will be unlocked in the desired direction for the PWP, indicators will display «Access granted» (Sect. 11.2)⁹.

⁸ All RC command are ignored when the identifier number has been sent to the server and till it has responded.

⁹ It is necessary to configure additional inputs and outputs and specify the internal responses of the controller in order to use it with the card capture reader.

OD will be blocked after the passage is performed, «*passage with withdrawal of identifier № ... in direction...*» event will be generated, indicators will display ACM «Control» (Sect. 11.2).

If server sends «*block direction...*» command or RC STOP button is pushed before the passage is performed - OD will be blocked, «*passage denial by the server command with withdrawal of identifier № ... in direction...*» or «*passage denial by the RC command with withdrawal of identifier № ... in direction...*» event will be generated, indicators will display «ACM Control» (Sect. 11.2).

If passage was not performed till expiration of PWP, then OD will be blocked, «*passage denial with identifier withdrawal № ... in direction...*» event will be generated, indicators will display «ACM Control» (Sect. 11.2).

If server «*block direction ...*» command received or the RC STOP button is pushed before the «*Card withdrawn*» signal has been received from the card capture reader, the «*Withdraw card*» output will be normalized, «*passage denial by the server command withdrawal of identifier № ... in direction...*» or «*passage denial by the RC command without withdrawal of identifier № ... in direction...*» event will be generated.

«*Withdraw card*» output will be normalized and «*passage denial without withdrawal of identifier № ... in direction...*» event will be generated if the controller will not receive «*Card withdrawn*» signal from card capture reader.

2. ACM «Open»: OD is blocked; indicators display «ACM Open» (Sect. 11.2). Commands sent by server and RC are ignored.

- When any type of passage is performed - «*passage in direction...*» event will be generated.
- After receiving identifier number the controller sends it to server and awaits the correspondent command:
 - If server sends «*Access denied*» command, or if server didn't respond during PWP, indicators will display «*Access denied*» message for 1 second and then will display «ACM Open» message (Sect. 11.2).
 - If server sends «*Access granted for identifier № ...*», then «*Access granted*» message will be displayed by indicators (Sect. 11.2). If the passage has been performed through OD during PWP, then «*passage with identifier № ... in direction...*» event will be generated, indicators will display «ACM Open» message (Sect. 11.2).

If passage was not performed till expiration of PWP, then «*passage denial with identifier № ... in direction...*» event will be generated, indicators will display «ACM Open» message (Sect. 11.2).

11.2 Indication of ACS and controller configurations



Important:

Controller operates indication of ACM only for readers that are connected via *Wiegand* interface. Controller does not control indication when the identifier number is detected. Optional indication of readers (scanners) configuration can be found in service documentation for these devices.

Indication for readers that use *Wiegand* interface is given in Tables 4 and 5:

Table 4. Indication of readers with one two-colored indicator

Controller status	double line		single line	Sound (sec.)
	Red	Green		
Lost server connection	5 hz in antiphase		5 hz red / green	off
ACM Control	on	off	Red	off
ACM Open	off	on	Green	off
Access granted	off	on	Green	0,5
Access denied	on	off	Red	1
<i>FireAlarm</i> input activation	Off	1,3 s / 0,2 s ¹⁰	1,3 s green / 0,2 s red	off

Table 5. Indication of readers with three one-colored indicators

Controller status	Red	Green	Yellow	Sound (sec.)
Lost server connection	5 hz in antiphase			off
ACM Control	on	off	off	off
ACM Open	off	on	off	off
Access granted	off	on	off	0,5
Access denied	on	off	off	1
<i>FireAlarm</i> input activation	off	1,3 s green / 0,2 s yellow		off



Note:

- After the access is granted, indication is turned on for PWP, or until the passage is performed.
- When access is denied indication is turned on for 1 second.

¹⁰ Blinking (going off briefly) – 1.3 seconds is on, 0.2 seconds is off.

12 TROUBLESHOOTING

The elimination of possible malfunctions listed below is made by the buyer. If the fault persists, we recommend you to contact one of the service centers of **PERCo** company. A list of service centers is given in the Certificate.

Before the diagnostics you need to open the housing of the controller.

Each relay output of the controller is equipped with diagnostic LED indicator for convenience. The turn on/off of LED indicators identifies that relay is activated/deactivated.

12.1 The controller doesn't work

Possible causes of the controller malfunction:

1. **Loose of terminal screws** in terminal blocks of the controller board – tighten the screws with the screwdriver.
2. **Malfunction of power source** of the controller – check the power source.
3. **Malfunction of connection lines** used to connect various devices (reader, indication block with infrared detector, lock, turnstile, door sensor, remote control button, siren, etc.) to the controller – check connection lines.
4. **Identical addresses of connected devices are set** – set different addresses. Check the connection of address lines.
5. **Failure of devices connected to the controller** – check the operation of devices.
6. **Failure of radioelectronic components**, installed on the controller board – contact **PERCo** service in order to replace this board.

12.2 Failure of communication with PC

Possible causes of this malfunction:

1. **Network settings in the computer are missing** – set IP-address and subnet mask of the computer. The controller shall be connected either directly to network connector of network card of the computer or to the same Hub / Switch the computer is connected to.
2. **Invalid password of the controller**. Check the password entered in the software.
3. **Malfunctions of the computer** (software, databases etc.).

To detect this malfunction, start the command:

```
ping x.x.x.x, where x.x.x.x – is the IP-address of the controller.
```

If there is a communication, you will see lines similar to the following:

```
Reply from x.x.x.x: bytes=32 time<10ms TTL=128
```

If there is no communication (response), check routing settings of your network.

4. **Malfunctions of equipment of Ethernet network**, installed between the computer and the controller: hub, switch and other network equipment including communication cables.

To detect this malfunction, start the command:

```
ping x.x.x.x -l 576, where x.x.x.x – is the IP-address of the controller.
```

If there is a communication and standard minimal packets (576 bytes) are not fragmented, you will see lines similar to the following:

```
Reply from x.x.x.x: bytes=576 Time<10ms TTL=128
```

In such case IP-packets are not fragmented to the size less than 576 bytes and the selected connection shall be operative.

If the positive answer is not received, the problem might be with network switching equipment that fragments IP-packets to the size less than 576 bytes. Check settings of

this equipment, enlarge the size of *MTU*. This parameter is usually specified as *MaxMTU* or *IPMTU*.

5. **If several variants of switching are possible**, use command: `ping x.x.x.x -l 576 -t`

By switching with various variants, look at response time and choose the connection with the fastest response.

6. **Malfunctions of the controller.** Failure of elements providing connection via *Ethernet* interface (*IEEE 802.3*).

To detect this malfunction, have a look at two indicators, installed *8P8C (RJ45)* connector of *Ethernet* connection:

- *LINK* – connection:
 - Green light is on – the controller detects connection to *Ethernet* network,
 - Green light is off – the controller does not detect connection to *Ethernet* network;
- *ACT* – data exchange:
 - Yellow light is blinking – the controller detects data exchange via *Ethernet* network,
 - Yellow light is off – the controller does not detect data exchange via *Ethernet* network.

If the controller does not detect connection to *Ethernet* network (light indicators are off), connect it to the cable that connects the other controller or computer.

If the controller still does not detect connection to *Ethernet* network or the communication is not reestablished, contact **PERCo** service in order to repair this controller.

13 MAINTENANCE

It is necessary to perform technical maintenance of the controller. Periodicity of technical maintenance shall be provided according to the regulation №1 (see Table 6) – once per six months. In case of failures - the execution of maintenance work should be done after failures have been fixed. Technical staff performing maintenance of the controller shall be acquainted with construction and operating procedures of the controller. All works shall be done by high-skilled electricians. Information about scheduled maintenance is recorded in the log of maintenance.

Please refer to Sect. 7 “Safety requirements” of this Manual when performing technical maintenance.

All control and measuring equipment should be calibrated. Maintenance of other devices of the system, such as locks, turnstiles, swing gates, security detectors, power supply, etc. refer to operating manuals for these devices.

Table 6. List of maintenance works according to the regulations №1 (checklist №1)

Work	Procedure	Devices, instrument, equipment	Norms and events
1 External inspection, cleaning of the controller	1.1 Disconnect power supply from AC current, clean up the controller and power supply surface from dust, dirt and damp.	Rags, brush, flat brush	There should not be traces of dirt and damp.
	1.2 Remove the controller and power supply housing, clean up surface from dust and damp. Measure the voltage of the extra power supply. In case you may charge or replace the battery.	Screwdriver, rags, flat brush, measuring device.	The voltage should correspond battery passport data (not less than 12.6 V).
	1.3 Remove dust, dirt, corrosion from the surface of connecting blocks, jumpers and protectors.	Rags, flat brush, gasoline	It should not be corrosion and dirt.
	1.4 Verify compliance of the denomination and the condition of the fuses.		
	1.5 Verify connection of external circuits to connecting blocks of the controller.	Screwdriver.	It should conform to the scheme of the external connections.
	1.6 Tighten the screws on the connecting blocks where the mount is loose.	Screwdriver.	Restore connection, if the wire is broken off. Replace the wire, if insulation is damaged
2 Operability test	2.1 Check of the controller in accordance with the Sect. 11.1 and the configuration of the resources.		Indication on the controller, corresponding to events (Sect. 11.2). Formation of signals at the outputs according to their configuration.

14 TRANSPORTATION AND STORAGE

The controller in the original package should be transported in closed freight containers or in other closed type cargo transport units.

The storage of the controller is allowed indoors at ambient temperature from -20°C to +40°C and at relative air humidity up to 98% at +25°C.

APPENDICES

Appendix 1. Instruction on connection of alcohol detector

It is possible to connect to the controller the alcohol detection device (hereinafter *breathalyzer*) to monitor the temperance of employees and visitors when they enter and/or leave the company (one breathalyzer is for one direction of passage).

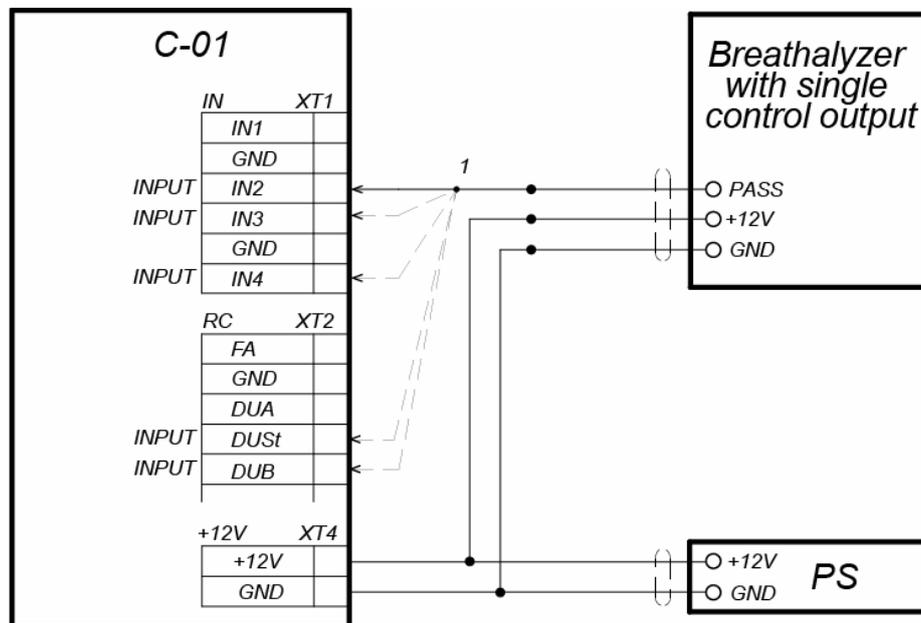
Operation of the controller with the breathalyzer is possible only after configuring inputs in Web-interface or in a third-party SW.



Important:

Controller does not take part in data processing. It only sends the status of inputs to a third-party SW, which provides the execution of algorithm for operating with breathalyzer.

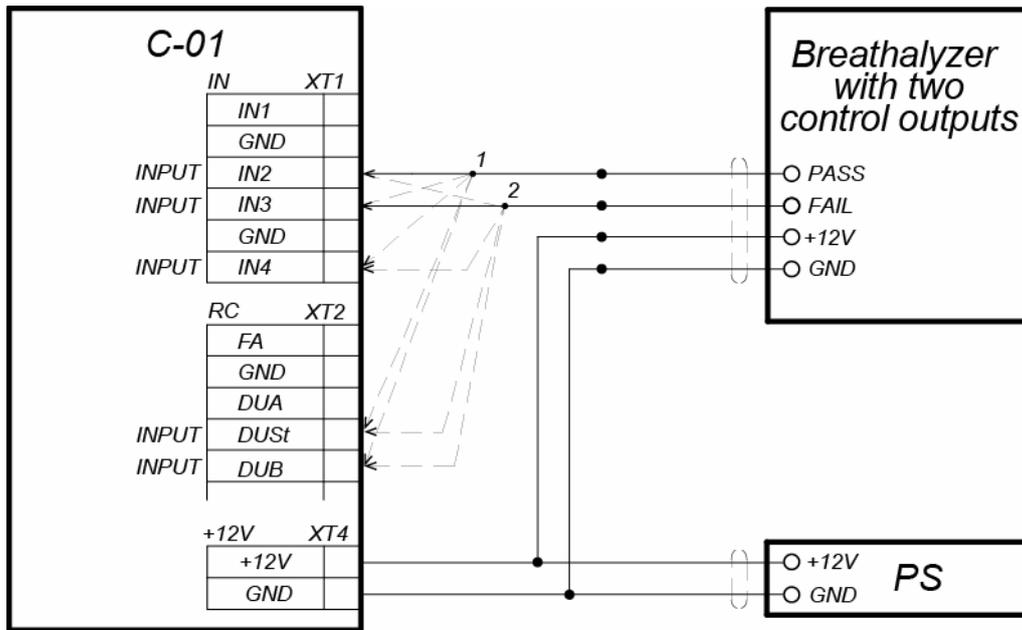
The breathalyzer has single control output where the signal PASS is removed. The scheme on Figure 19 is used to connect the breathalyzer (any free input is used in the current configuration of the controller).



1 - any free controller input is used to connect

Figure 19. Connection scheme of the breathalyzer

The breathalyzer has two control outputs where the signal PASS and FAIL are removed. The scheme on Figure 20 is used to connect the breathalyzer (two different free inputs are used in the current configuration of the controller).



1, 2 - for connection, two different controller inputs from any free are used

Figure 20. Connection scheme of the breathalyzer

Appendix 2. Instruction on connection of the controller through PoE-splitter



Attention!

- Instruction provided refers to the splitters included in supplementary equipment delivery set.
- Total power consumption of the controller and of all the devices powered by it should not exceed 12 W. It is also recommended to leave min 10% reserve power.

Splitter description

PoE-splitter (hereinafter – *splitter*) is designed for energizing equipment, connected via *Ethernet* network. Splitter operates with any network commutators (hereinafter – *Switch*), supporting technology of electric power transmission via *PoE* twisted pair wire and compatible with *IEEE 802.3af* standard.

Splitter is designed as a block of electronics in a plastic housing featuring the following outputs:

Con 1 – output for *Ethernet* cable from *Switch* connection;

Con 2 – output for *Ethernet* controller cable connection from the power receiving device;

Con 3 – power output for device power cable connection.



Important:

For some models of splitters output voltage is chosen with the switcher. Operating with **PERCo** equipment it is necessary to turn the switcher into “12V” mode.

Requirements for connecting devices

The characteristics of power consumption of the controller when connected through splitter shall meet the following requirements:

Admissible value of supply voltage, <i>V</i>	12±1,2
Minimum total current, <i>mA</i>	min 120
Maximum total current consumption (12 V), <i>A</i>	max 1
Maximum total power consumption, <i>W</i>	max 12

In order to avoid exceeding the total power consumption is not recommended to provide power from the controller to connected optional equipment (siren, passage sensors, etc.).

The controller powered from the splitter can be connected up to two readers, scanners and OD. It is possible to use up to two electromechanical locks or one of the turnstiles indicated in Table 7.

Table 7. OD with power connection through PoE-splitter

Types of controller configurations	OD
«Controller to control the locks»	Electromechanical lock (LC , LB and LBP -series – up to 2pcs).
«Controller to operate the turnstile»	Turnstile with power consumption no more than 9W T-5 TTR-04.1 TTD-03.1 TTD-03.2

Appendix 3.

C-01 Controller Web-interface. User Manual

CONTENTS

1. CONNECTION TO WEB-INTERFACE OF THE CONTROLLER.....	45
2. SETTING	46
2.1. Change of network setting of the controller	46
2.2. Change of server IP-address and encryption parameters	46
2.3. Setting of the access password of the controller	47
3. CONFIGURATION.....	47
3.1. The choice of the controller configuration	47
3.2. Configuration of the settings of the controller resources	48
3.2.1. Operating devices	48
3.2.2. Physical contacts (inputs and outputs)	48
3.2.3. Readers	50
3.2.4. The reading format of the card identifiers	52
4. CONTROL OF OPERATING DEVICE.....	53
5. STATUS	53
6. FIRMWARE UPGRADE	54
7. UPGRADING KEYS FOR ENCRYPTION OF INCOMING CONNECTION	55

1. CONNECTION TO WEB-INTERFACE OF THE CONTROLLER

Connection between the controller and the computer is performed via *Ethernet* interface (IEEE 802.3).

To connect the controller to Web-interface:

1. Open Web-browser (e.g. *Internet Explorer*).



Note:

Web-interface was tested with the Web-browsers: *Microsoft IE* version 10 or higher, *Google Chrome* version 32 or higher, *Mozilla Firefox* version 32 or higher, *Opera* version 30 or higher, *Microsoft Edge* and for *MacOS Apple Safari* 9 or higher. If you use other browsers and outdated versions, malfunctions of the Web-interface can appear.

2. Enter in the address bar IP-address of the controller and press the button **Enter** on the keyboard. If necessary, enter the access password to the controller. By default, there is no password.
3. After that the main Web-page of the controller interface is opened:



At the home page are displayed the model, configuration, network settings of the controller and the version of embedded software.

On the page, you can select following:

1. The title bar if he page contains **PERCo** trademark and buttons to select the language of Web-interface. By clicking on the **PERCo** company logo you navigate to the main page from other sections of Web-interface.
2. Sidebar of the Web-interface navigation. The panel has the following structure:

<i>"Parameters"</i>	<i>"Network"</i>	
	<i>"Server"</i>	
	<i>"Password"</i>	
<i>"Configuration"</i>	<i>"Template"</i>	
	<i>"Edit"</i>	<i>"Operation devices"</i>
		<i>"Physical contacts"</i>
		<i>"Readers"</i>
		<i>"Internal responses"</i>
<i>"OD control"</i>		
<i>"Status"</i>		
<i>"Service"</i>		

3. Working area of the page.

2. SETTING

2.1. Change of network setting of the controller

The controller has following configurations by default (they are specified in the certificate of the device and on the labels on the controller):

- MAC-address 00-25-0B-xx-xx-xx, where xx – is a number from 00 to FE;
- IP-address 10.x.x.x, where x – is a number from 0 to 254;
- Subnet mask 255.0.0.0.

To change network settings of the controller (only in user mode, Sect. 8.3 of Operation manual):

1. Click consistently in the Web-interface menu: **Parameters** → **Network**. The page with working area will be opened:

IP-address: . . .
Mask: . . .
Gateway: . . .

2. In the input fields **IP-address:**, **Mask:**, **Gateway:** the new values of network settings of the controller.
3. Click **Save** button. New network settings will be saved in the controller.

2.2. Change of server IP-address and encryption parameters

To change the server IP-address which will be used for controller connection (outgoing connection):

1. Click consistently in the Web-interface menu: **Parameters** → **Server**. The page with working area will be opened:

Server address:
Encryption: ▾

2. Enter the server x.x.x.x IP-Address in the **Server address** field, where x is a number from 0 to 254. The outgoing connection port is fixed to 1234. I.e. a third-party server must open TCP-port 1234.
3. Select «Encryption» → «No» option if you don't need the encryption, otherwise select the "SSL" option. Particular encryption type SSL/TLS will be defined by the server which is connected to the controller.



Note:

This type of encryption doesn't depend on the incoming connection encryption type. I.e. it is possible that incoming connection uses the encryption (e.g. browser connects via https), and outgoing connection – does not. And vice versa.

4. Click **Save** button. The controller will send connection requests with the server by using the specified IP-address and TCP-port 1234.

2.3. Setting of the access password of the controller

By default, access password of the controller is not specified. To change or set the new password:

1. Click in the Web-interface menu: **Parameters** → **Password**. The page with working area will be opened:

New password:

Confirm password:

2. In the **New password:** field enter the new password of the controller, in the **Confirm password:** field enter the password again to confirm the correct input.
3. Click the **Save** button. The new password will be saved in the controller.

3. CONFIGURATION

3.1. The choice of the controller configuration



Attention!

If you change the configuration, the previous configuration and at the internal responses of all resources of the controller will be deleted. In the new template for the resources of the controller is installed default configuration. The list of downloaded access cards, related user information, rights and parameters of access remain the same.

To change the configuration of the controller:

1. Click in the Web-interface menu: **Parameters** → **Template**. The page with working area will be opened:

Template

Turnstile
Two two-sided locks
VCP

2. The controller configurations are presented in dropdown list of working area of the page. Select the required configuration.
3. The controller configuration will be changed. Change the configuration template can take several seconds. A pop-up information window of the following type appears for a few seconds:

The screenshot shows the PERCo web interface. At the top, there is a blue header with the PERCo logo and a notification box that says "The template Turnstile has been applied". Below the header, there is a sidebar menu with options: Parameters, Network, Server, Password, Configuration, Edit, OD control, Status, and Service. The "Configuration" menu is expanded, showing a dropdown list with "Template" selected. The main content area shows the "Template" configuration page with a dropdown list containing "Turnstile", "Two two-sided locks", and "VCP".

3.2. Configuration of the settings of the controller resources

3.2.1. Operating devices

To configure settings of the controller resources to control OD:

1. Click consistently in the Web-interface menu: **Configuration** → **Edit** → **Operating devices**. The page with working area will be opened:

Number	OD type
1	Two-sided lock
2	One-sided lock

2. To change settings of the OD or to delete it from the list, click in the working area of the page on the line with his name, to add a new OD to the list - click the **Add** button. The window **Operating device** will appear:

Operation device
✕

Number:

OD type:

Passage registration:

Card analysis time:

OD unblocking critical time:

OD outputs control mode:

OD outputs normalization:

Recovery of traffic sensor:

Card withdrawal time:

Wait for card presentation response from the server:

Delete
Save
Cancel

3. In the opened window make the necessary changes of settings for corresponding resources.
4. Click the **Save** button. The window will be closed, changed settings will be passed to the controller.
5. To remove the OD from the configuration, in the window **Operating device** click the button **Delete**. The OD will be deleted.
6. To exit the window **Operating device** without saving the changes, click the **Cancel** button or the **Close** button .

3.2.2. Physical contacts (inputs and outputs)

When setting the controller resource parameters, one of the configuration templates for the inputs and outputs involved in controlling the selected type of OD is set corresponding parameters and functions and the OD number and the direction of the passage through OD to which this physical contact is attached.

Inputs and outputs that are not involved in the selected configuration template are not listed by default in the list of physical contacts, but they are available for adding to the list and further adjusting their parameters.

To configure the settings of the controller inputs and outputs:

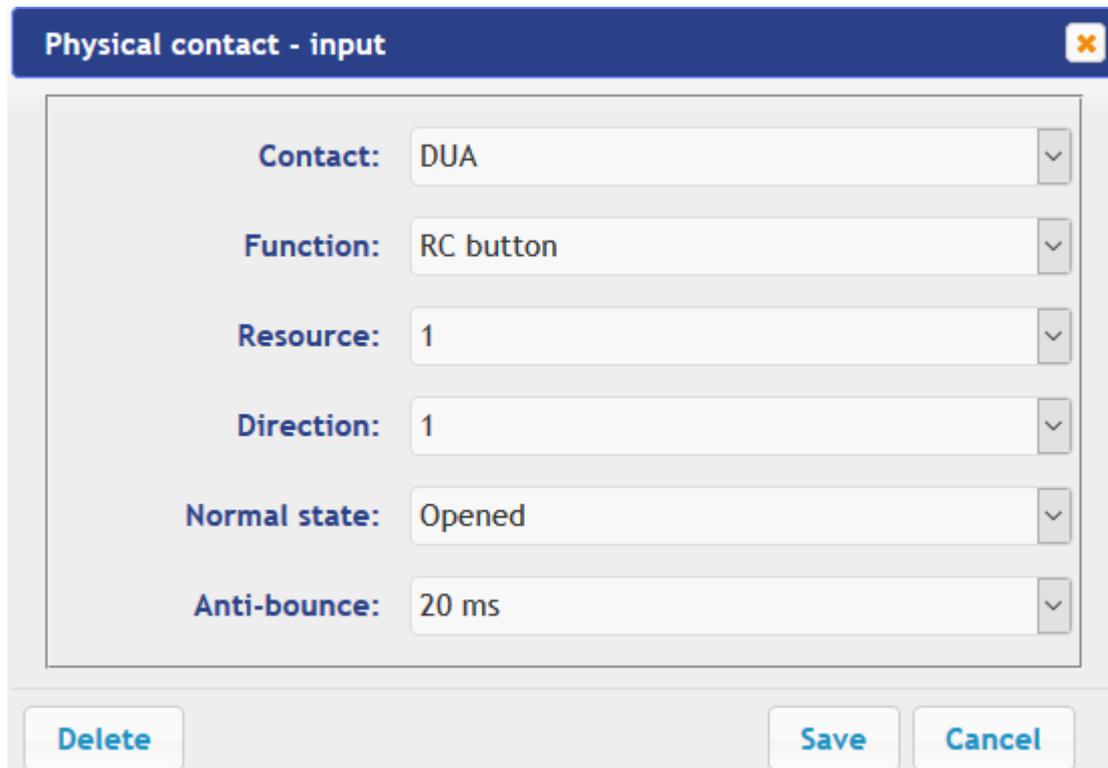
1. Click consistently in the Web-interface menu: **Configuration** → **Edit** → **Physical contacts**. The page with working area will be opened:



Contact	Function	Resource	Direction	Normal	Status
DUA	RC button	1	1	Opened	Normal
DUB	RC button	1	2	Opened	Normal
DUS _t	RC button	1		Opened	Normal
FA	Fire alarm input	1		Closed	Normal
In1	Pass signal	1	1	Closed	Active
LdA	RC indication output	1	1	Powered	Normal
LdB	RC indication output	1	2	Powered	Normal
LdSt	RC indication output	1		Powered	Active
NO1/C1/NC1	OD control output	1	1	Not powered	Normal
NO2/C2/NC2	OD control output	1	2	Not powered	Normal

The **Status** column displays the current state (at the time of opening the page) of the contact - **Active** / **Normal**.

2. To change the parameters of a physical contact or delete it from the list, click on the line with its name in the work area of the page; to add a new input or output to the list - click one of the buttons **Add input**, **Add output**. The **Physical contact Input (Output)** window opens.



Physical contact - input

Contact: DUA

Function: RC button

Resource: 1

Direction: 1

Normal state: Opened

Anti-bounce: 20 ms

Delete **Save** **Cancel**

3. In the opened window make necessary changes of the settings:
 - the **Contact** selector contains the name of the physical contact in accordance with its designation on the controller board;
 - the **Function** selector sets the function of the contact;
 - the **Resource** selector specifies the number of the resource to which the physical contact is attached (OD number / standard input number);
 - the **Direction** selector specifies the direction of the resource to which the physical contact is attached (only for the resource involved in the control of the OD);
 - the **Normal state** selector sets the normal state of the contact - **Opened** or **Closed** for inputs and **Powered** or **Not powered** for outputs;
 - the **Anti-bounce** selector sets the "anti-bounce" time for the inputs. It is recommended for buttons, switches, reed switches to choose a time of "anti-bounce" of the order of 50 - 100 ms, for signals generated by devices (for example, turnstile passage sensor) - about 10 - 20 ms.
4. Click the **Save** button. The **Physical contact** window will be closed, the changed settings of inputs (outputs) will be passed to the controller.
5. To delete a physical contact from the configuration list, click the **Delete** button. The **Physical contact** window will be closed; the physical contact will be deleted.
6. To exit from the **Physical contact** window without saving changes, click the button **Cancel**. Also, it is possible to close the window using the **Close** button .

3.2.3. Readers

In all controller configurations for each direction of every OD is determined one reader (scanner). Optionally, it is possible to add in the configuration optional readers (scanners) for the directions of passage through the OD. For one direction can be installed two or three readers (scanners) working in parallel. It can be useful, for example, when connecting the card capture reader, organizing the vehicle checkpoint to accommodate the readers at different levels (for cars and trucks), etc. Totally, to the controller can be connected up to 6 readers (scanners).

To configure the settings of the reader:

1. Click consistently in the Web-interface menu: **Configuration** → **Edit** → **Readers**. The page with working area will be opened:

Number	Communication interface	Access port	OD	Direction
1	Wiegand	1	1	1
2	Wiegand	2	1	2

- To change the parameters of the reader or to delete it from the list, click in the working area of the page on the line with its name, to add the reader in the list click the **Add** button. The **Reader** window will be opened:

The image shows a 'Reader' configuration window with the following settings:

- Number: 1
- Communication interface: Wiegand
- Access port: 1
- Operating device: 1
- Direction: 1

Buttons at the bottom: Delete, Save, Cancel.

- In the opened window make the necessary changes of the settings:
 - the **Number** selector specifies the number of added reader;
 - the **Communication interface** selector specifies the type of reader;
 - the **Connection port** selector specifies the port number of the reader / scanner connection – **1** or **2**. For Wiegand readers, port **1** corresponds to the set of contacts with the suffix "A", port **2** corresponds to the set of contacts with the suffix "B" on the lower controller board (see Assembly & Operation Manual, Sect. 8.4.1). For scanners with RS-232 interface, port **1** corresponds to the left DB-9 connector on the controller case (**X1** on the bottom board), port **2** corresponds to the right DB-9 (**X2** on the bottom board) (see Assembly & Operation Manual, Sect. 8.4.2). For scanners with USB interface, port **1** corresponds to the lower USB connector, port **2** corresponds to the upper USB connector on the controller top board (see Assembly & Operation Manual, Sect. 8.4.3);
 - the **Operating device** selector specifies the number of the OD to which the reader is attached;
 - the **Direction** selector sets the direction of the OD to which the reader is attached.
- Click the **Save** button. The **Reader** window will be closed, changed Settings will be passed to the controller, added reader with assigned number will be added in the list.
- To remove the reader from the configuration, click the **Delete** button. The **Reader** window will be closed; the reader will be removed from the list.
- To exit from the **Reader** window without saving changes, click the button **Cancel**. Also, it is possible to close the window using the **Close** button

3.2.4. The reading format of the card identifiers

To set internal responses of the controller:

1. Click consistently in the Web-interface menu: **Configuration** → **Edit** → **Internal responses**. The page with working area will be opened:

Number	Source			Receiver		
	Type	Number	Direction	Type	Number	Direction
1	Input activation	1	1	Activated output	1	1
2	OD unblocking	1	1	Normalized output	1	1

2. To add the new response, click the **Add** button, to change the settings of internal response or delete it, click in the working area of the page on the line with the response name. The **Internal response** window will be opened:

Internal response
✕

Number:

Source type:

Source number:

Source direction:

Receiver type:

Receiver number:

Receiver direction:

Response type:

Response time:

Delete
Save
Cancel

3. In the opened window make the necessary changes of the settings:
 - the **Number** selector sets the number of response (from 1 to 30);
 - the **Source type** selector specifies the launch condition of the controller response;
 - the **Receiver type** selector specifies the controller response under condition of the responses launch;
 - **Source number (Receiver number)** and **Source direction (Receiver direction)** selectors determine numbers and directions of corresponding resources of the controller which are sources (receivers) of the response;
 - **Response time** and **Response characteristics** selectors set corresponding settings of the response.
4. Click the **Save** button. The **Internal response** window will be closed; the changed settings will be passed to the controller.
5. To remove the response from the list, click the **Delete** button. The **Internal response** window will be closed; the internal response will be deleted.
6. To exit the window Internal response (number) without saving changes, click the **Cancel** button. Also, it is possible to close the window using the **Close** button .

4. CONTROL OF OPERATING DEVICE

To control the operating device and change the operation mode in the direction with associated reader, make following:

1. Click in the Web-interface menu: **OD control**. The page with working area will be opened:

Number	OD type
1	Turnstile

2. Click in the working area of the page on the line with OD, to which it is necessary to issue the control command. The control window with selected OD will be opened:

OD operation
✕

Unlock period: ▼

Direction: ▼

Unlock type: ▼

ACM "Open"

ACM "Control"

Block

Unblock

3. Using the buttons at the bottom part of the window, give the necessary command. The control window will be closed; the command will be passed to the controller. To close the window without submitting command is possible with the **Close** button ✕.

5. STATUS

To view the controller status and status of all his resources click in the Web-interface **Status** menu. The page with working area will be opened:

Object	Status
Housing	opened
Jumper IP Default	removed
Jumper IP Mode	removed
OD 1, direction 1	Passage sensor is normalized, OD is breached, ACM Control
OD 1, direction 2	Passage sensor is normalized, OD is breached, ACM Control

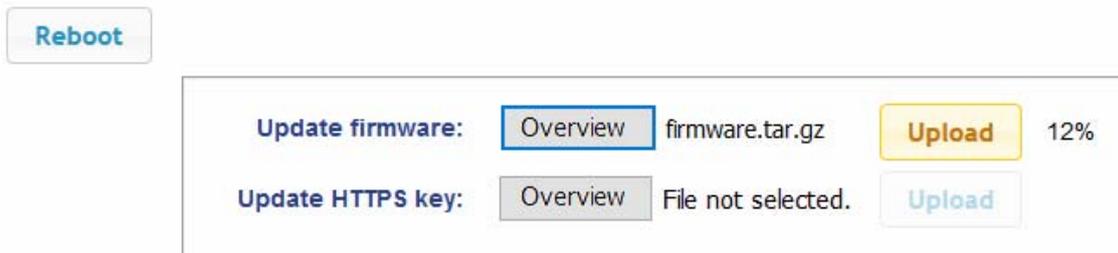
6. FIRMWARE UPGRADE

To update the firmware of the controller:

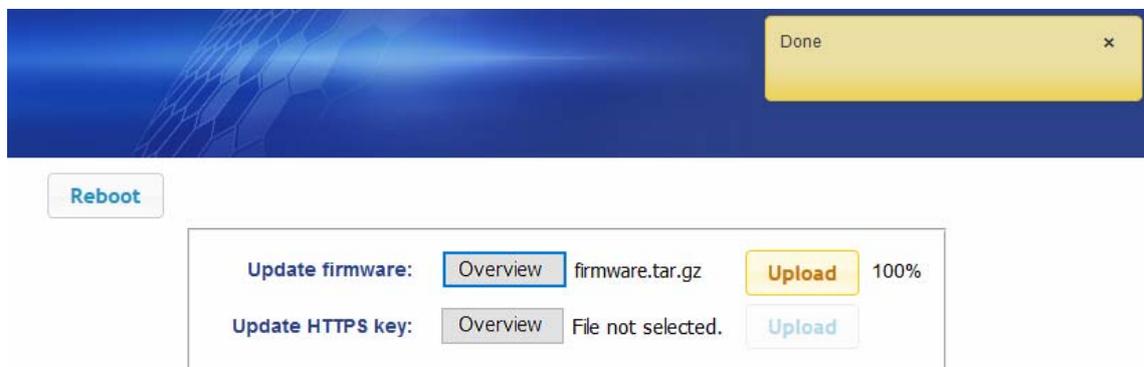
1. Click in the Web-interface **Service** menu. The page with working area will be opened:



2. To update the firmware of the controller, on the **Update firmware** line, click **Overview** for the location of the firmware file and click the **Upload** button. The transfer of the "firmware" file to the device will begin. To the right of the **Upload** button, the download process appears as the percentage of the downloaded file:



3. When the download is complete, the progress bar disappears and a pop-up window appears with the text "Done". The firmware file for the device was successfully downloaded:



4. Click **Restart**. A pop-up window appears with the text "Device reboots". The device will restart and firmware update.
5. The process of rebooting and updating the firmware takes to several tens of seconds. During the process, pop-up windows may appear with a text about the problem with the socket. At the end of the firmware update process, a pop-up window will appear with the text "Socket ready".

7. UPGRADING KEYS FOR ENCRYPTION OF INCOMING CONNECTION

To update encryption keys:

1. Click in the Web-interface **Service** menu. A page with working area will be opened:



2. To update the encryption keys, use in the "**Update HTTPS key**" line the **Overview** button to locate the keys file and click the **Upload** button. The file will be transferred to the device. To the right of the **Upload** button, the download process appears as the percentage of the downloaded file.
3. When the download is complete, the progress bar disappears and a pop-up window appears with the text "Done". The keys file for the device was successfully downloaded.

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