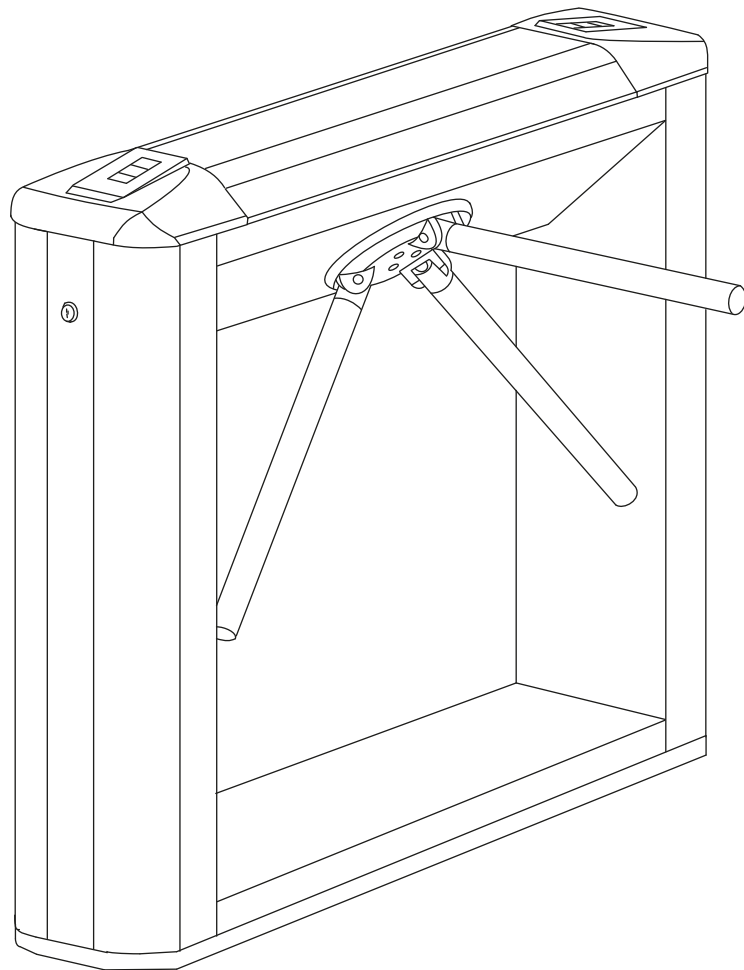


PERCo[®]

ASSEMBLY AND OPERATION MANUAL



TB-01.9A

EAC
CE

Electromechanical box tripod turnstile with automatic anti-panic barrier arms and built-in readers

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Dear Customer!

Thank you for choosing the turnstile made by PERCo.

You have purchased a high-quality product, which will serve you for many years to come, if you carefully follow installation and operation rules.

The Assembly and Operation Manual (hereinafter referred to as the *Manual*) contains the instructions on safe transportation, storage, installation, operation, and maintenance of the **TB-01.9A Electromechanical box tripod turnstile with automatic anti-panic barrier arms and built-in readers**.

The product must be installed by persons who have fully studied this Manual.

Abbreviations adopted in the Manual:

- ACS – access control system;
- CLB – control logic board;
- RC panel – remote control panel;
- WRC – wireless remote control.

1. APPLICATION

The **TB-01.9A Electromechanical box tripod turnstile with automatic anti-panic barrier arms and built-in readers** (hereinafter referred to as the turnstile) is designed to organize access to the facility by contactless identifiers.

The turnstile has two built-in multi-format readers, which support the Wiegand, Wiegand-26, Wiegand-37, Wiegand-42, and Wiegand-58 interfaces and allow the use of the following identifiers:

- proximity access cards or transponders of the HID / EM-Marin family with an operation frequency of 125 kHz with unique identifier (UID) reading;
- proximity access cards or transponders of the MIFARE family (ISO/IEC 14443 A) (ID, Classic, Plus, Ultralight, DESFire) with an operation frequency of 13.56 MHz with UID reading;
- NFC-enabled Android OS smartphones with reading of a unique identifier generated by the **PERCo. Access** application on a smartphone (installation and launch of the application is required);
- NFC-enabled Apple smartphones with reading of a unique identifier (Token) linked to a bank card (when several bank cards are linked, the Token of the currently active card is read).

The turnstile is equipped with a mechanism that lowers the barrier arm automatically at a command from an emergency passage unblocking device or upon power loss.

The number of turnstiles required to ensure fast and convenient pedestrian passage should be calculated based on the product's throughput rate (see Section 3). It is recommended to install one turnstile per 500 people working in one shift or assuming that the peak load totals 30 persons/minute.

2. OPERATING CONDITIONS

In terms of its resistance to environmental exposure, the turnstile complies with category NF4 (for operation in rooms with climate control) according to GOST 15150-69.

Operation of the turnstile is allowed indoors at an ambient air temperature from +1°C to +50°C and relative air humidity of up to 80% at +25°C.

3. TECHNICAL SPECIFICATIONS

Operating voltage	12±1.2 V DC
Consumption current	max. 6.0 A ¹
Power consumption	max. 72 W ²

¹ The manufacturer recommends using power supply units with an output voltage of 12 V DC and a maximum load current of at least 7 A.

² The turnstile's power consumption can rise to 72 W within 5 sec. after its power-up or upon removal of the *Fire Alarm* signal. In normal state, the power consumption does not exceed 30 W.

Throughput rate in the single passage mode	30 persons/min
Throughput rate in the free passage mode	60 persons/min
Passageway width	560 mm
Barrier arm rotation force	max. 3 kgf
Number of built-in readers	2
Types of applicable proximity cards (transponders)	<i>EM-Marin, HID, MIFARE,</i> smartphones with <i>NFC</i>
Card reading range at the nominal operating voltage:	
<i>HID, EM-Marin</i> cards	5-7 cm
<i>MIFARE</i> cards, smartphones with <i>NFC</i>	3-6 cm
Communication interface of readers.....	<i>Wiegand</i> ¹
RC-panel cable length ²	min. 6.6 m
Electric shock protection class	III (IEC 61140)
IP Code	IP41 (EN 60529)
Mean time to failure	min. 4 000 000 passages
Mean lifetime	8 years
Overall dimensions (L × W × H):	
with a lowered barrier arm	1170×240×1030 mm
with a barrier arm in the working position	1170×750×1030 mm
Net weight of the turnstile	max. 67 kg

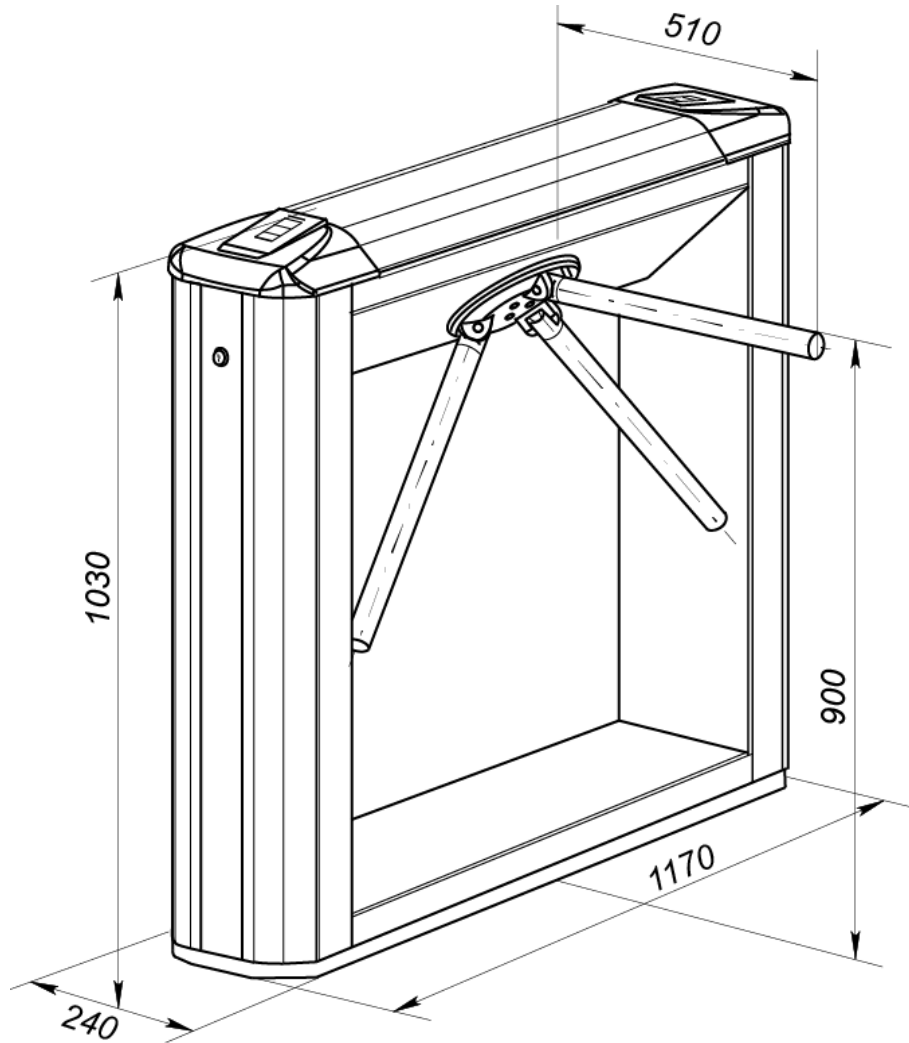


Fig. 1. Overall dimensions of the TB-01.9A turnstile

¹ *Wiegand, Wiegand-26, Wiegand-37, Wiegand-42, Wiegand-58.*

² The maximum allowable length of the RC-panel cable amounts to 40 m (to be supplied upon request).

4. DELIVERY SET

4.1. Standard delivery set

Basic equipment:

Turnstile housing with an installed flywheel and barrier arms	1
Key to a housing side cover lock	4
SW2.5 Allen key to a housing top cover	1
RC panel with a cable.....	1

Assembly and installation tools:

Self-adhesive cable tie mount	3
Non-releasable tie, 100 mm	6

Operational documentation:

Certificate	1
Assembly and Operation Manual	1

4.2. Additional equipment to be supplied upon request

WRC kit ¹	1
M10 anchor with bolt and washer	4

Technical data of additional equipment are stipulated in operational documentation supplied with the said equipment.

5. DESIGN AND OPERATION

5.1. Main features

- The turnstile can operate both as a stand-alone unit controlled via its RC panel or WRC and as part of an ACS via the ACS controller.
- The turnstile is equipped with 2 multi-format readers of proximity access cards, which feature indication blocks with mnemonic indicators.
- The ACS controller board can be installed on a special bracket inside the turnstile housing and connected to the turnstile's built-in readers via the *Wiegand* interface.
- The turnstile can operate in two control modes: pulse and potential.
- The turnstile housing is equipped with a device for automatic lowering of the barrier arm, which clears the passage and ensures evacuation of people if required. The passage is automatically opened if a command is sent from the fire and security system or by the operator using the *Fire Alarm* emergency passage unblocking device.
- In case of power loss, the passage automatically opens as the barrier arm automatically drops (moves to a vertical position).
- The rotary group of the barrier arms is equipped with a resetting mechanism, which ensures automatic return of the barrier arms to their initial position after each passage.
- Smooth and quiet operation of the resetting mechanism is ensured by a damper.
- Optical sensors, which monitor the rotation of the barrier arms and are built into the resetting mechanism, ensure correct passage registration.
- As part of a complex checkpoint, the turnstile can be used together with the **TBC-01.9A** model outfitted with a built-in card capture reader for collection of single-use access cards; the **TB-01.9A** and **TBC-01.9A** models have matching designs and dimensions.
- Installed in a line, several turnstile housings form a passage zone with no need to install extra railings.
- The turnstile is supplied with a safe operating voltage of up to 14 V.

¹ The WRC kit consists of a receiver, which is connected to the control board, and transmitters designed as radio fobs.

5.2. Design

The design of the turnstile is shown in Fig. 2. Numbers of the items hereinafter are given in accordance with Fig. 2 unless stated otherwise.

The turnstile consists of a turnstile housing with three barrier arms, which are hinged to a flywheel, and an RC panel (items 1-3, 4, and 9); the housing includes a built-in **CLB140** turnstile control board (hereinafter, the *control board*) and two card readers as well.

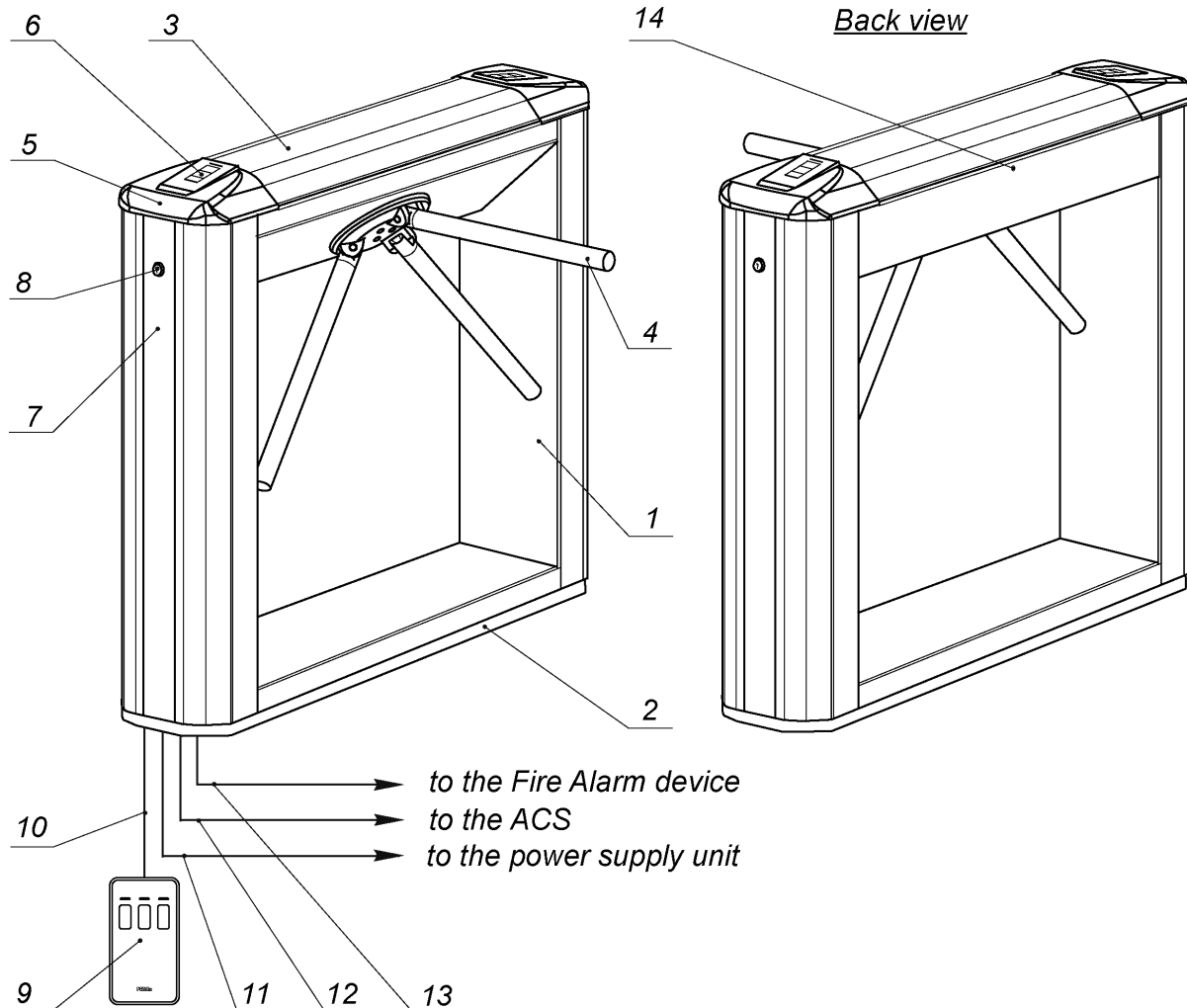


Fig. 2. Design of the TB-01.9A turnstile

- 1 – frame; 2 – base; 3 – top cover; (items 1-3 form the turnstile housing); 4 – barrier arm;
 5 – front cover with reader; 6 – indication block, 7 – turnstile housing side cover;
 8 – turnstile housing side cover lock; 9 – RC panel; 10 – RC-panel cable; 11 – power cable*;
 12 – ACS connection cable*; 13 – connection cable for the emergency passage unblocking
 (Fire Alarm) device*; 14 – set screw for the top cover

5.2.1. Turnstile housing

The turnstile housing consists of a frame (1), base (2), and top cover (3). At the front ends of the housing, there are side covers (7) fixed by locks (8). The side covers provide access to four holes in the turnstile housing base, through which it is fixed to the mounting surface with anchor bolts.

On top of the front ends, there are front covers (5) with indication blocks (6) and built-in proximity access card readers. Access to the housing's internal elements is provided through a removable top cover (3), which is fixed at the back with a set screw (14). The procedure for removing and installing the top cover is described in Section 6. The top cover must be closed if the turnstile is operating.

* Not included into the standard delivery set.

The turnstile housing contains a rotary group consisting of a resetting mechanism (a pusher, roller, and springs), control mechanism with optical rotation sensors for the barrier arms, and locking device, as well as an electromechanical unblocking device. In addition, the rotary group houses a rotary mechanism, which includes a damper, a rotation sensor disk, and a faceplate; the barrier arms are attached to the flywheel with hinged connection.

5.2.2. Indication block

To provide information about the current status of the turnstile, both front ends of the turnstile housing feature indication blocks (6), with a built-in reader on the internal side under each of them to enable access card reading. The indication block has 3 mnemonic indicators:

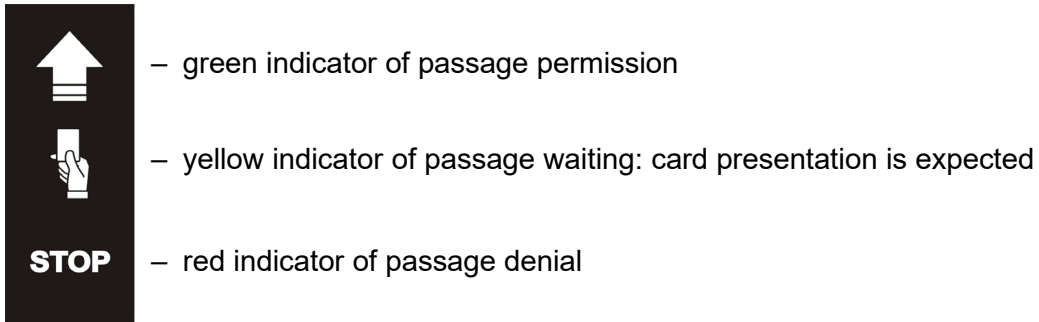


Fig. 3. Mnemonic indicators

5.2.3. RC panel

The RC panel (9) is designed as a small desktop device in a shockproof ABS plastic case and is intended for setting and indicating operation modes when the turnstile is controlled manually. The RC panel is connected to the board with a flexible multicore cable (10) via the **XT1.L** terminal block (see Fig. 5). The overall view of the RC panel is shown in Fig. 4.

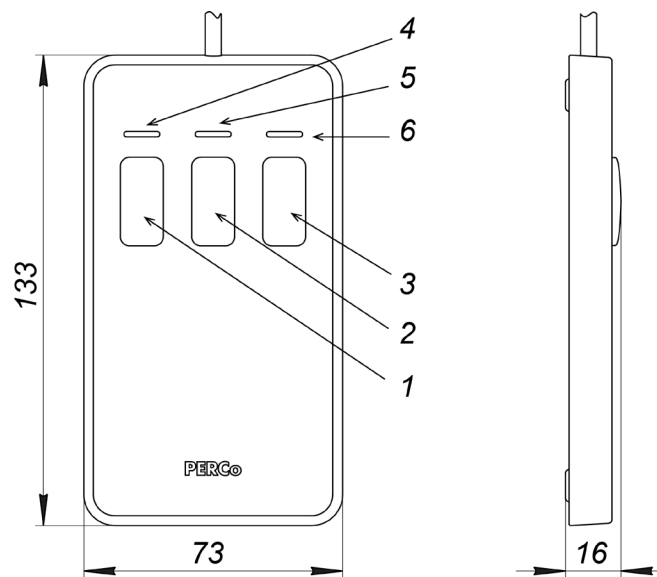


Fig. 4. Overall view and dimensions of the RC panel

- 1, 2, 3 – **LEFT**, **STOP**, **RIGHT** buttons for setting operation modes;
 4, 6 – green *Left* and *Right* indicators; 5 – red *Stop* indicator

There are three control buttons for sending commands on the RC front panel. The middle **STOP** button sends the *Passage denial* command. The **LEFT** and **RIGHT** buttons are used to send a command to unlock the turnstile for passage in the selected direction. LED indicators of the status of the turnstile’s rotary mechanism are located above the buttons. The red *Stop* indicator shows that both passage directions are blocked. Available control commands and RC panel indication for pulse and potential control modes are listed in Tables 6 and 7 respectively.

5.2.4. CLB control board

Inside the turnstile housing, there is a bracket outfitted with a CLB (see Fig. 5) and terminal blocks for connection of external devices. An RC panel, ACS outputs, WRC device (when used), intrusion detector (optional), and *Fire Alarm* emergency passage unblocking device are connected to the CLB. Connection lines of the power supply unit and signal lines of card readers are placed on the terminal blocks for connection of external devices. External devices are connected in accordance with the electrical connection layout (see Fig. 13).

The CLB microcontroller processes incoming control commands (*Unlock A*, *Stop*, *Unlock B*, and *Fire Alarm* inputs), tracks the status of optical sensors for rotation of barrier arms, and generates commands to the control mechanism relying on the received data. In addition, the microcontroller generates signals at the outputs: for indication on the RC panel (*Led A*, *Led Stop*, and *Led B* outputs), for external indication (*Light A* and *Light B* outputs), about passage made in the corresponding direction (*PASS A* and *PASS B*), about the turnstile's readiness to execute a new command (*Ready*), about the alarm (*Alarm*), and relays the signal of the current status of the intrusion detector (*Det Out*).

The CLB (see Fig. 5) contains:

- **X1 (LED)**, **X2 (SENS)**, **X3 (MOTOR)** connectors to connect indication board cables, a group of optical rotation sensors, and control mechanism with an electromechanical locking device;
- **XT1.L (In)** terminal block to connect the RC panel / WRC device / ACS controller inputs as well as the *Fire Alarm* emergency unblocking device;
- **XT1.H (Out)** terminal block to connect outputs that inform the ACS controller of the turnstile status;
- **XT3 (+12VDC)** terminal block to connect the turnstile's power supply unit;
- **XT4 (Light A)** and **XT5 (Light B)** terminal blocks to connect remote indicators (open/closed, one for each direction); by default, the indication of built-in readers is connected to those;
- **XT6 (AntiPanic)** terminal block to connect the electromagnet of the automatic lowering mechanism for the anti-panic barrier arm;
 - **J1** connector for the jumper that selects the control mode, namely, pulse or potential. By default, the jumper is installed, which activates the pulse mode. The potential control mode, with the jumper being removed, is used, as a rule, in ACS systems.
 - **J4** connector for the jumper that selects the passage waiting time value: 5 or 30 seconds. By default, the jumper is not installed, which activates the value of 5 seconds. The value of 30 seconds, with the jumper being installed, is used in special cases, e.g., when the turnstile operates in paid access systems, and it takes some time to perform a transaction.

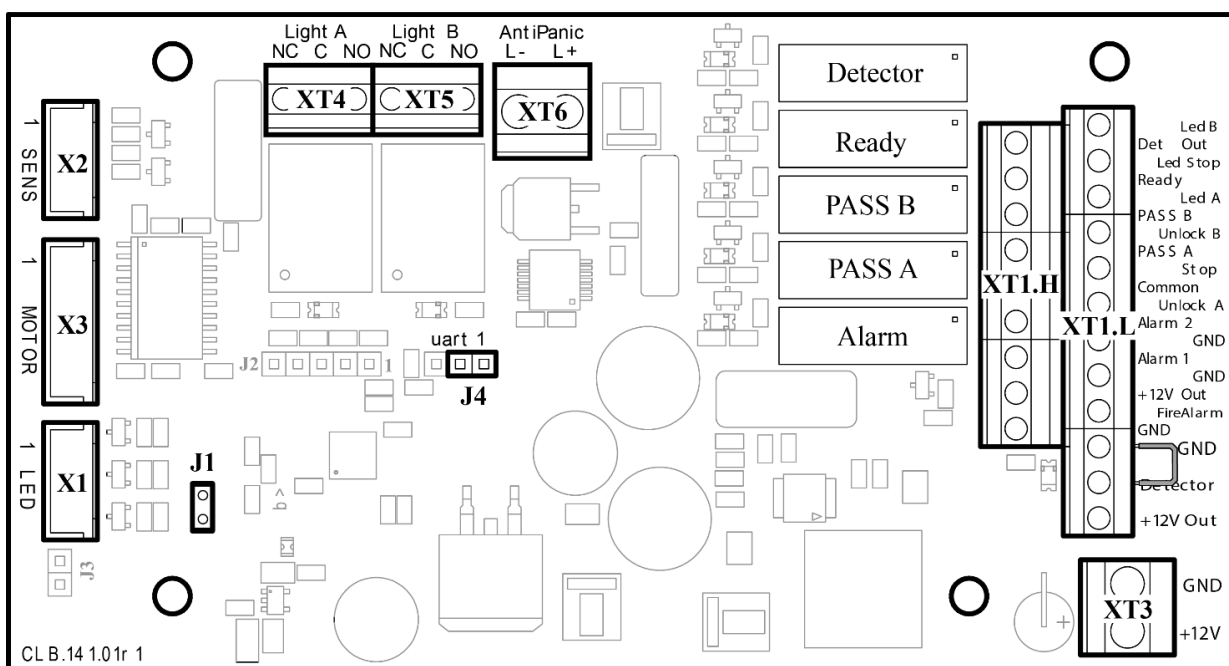


Fig. 5. Overall view of the CLB board

For convenience, the connection contacts of the turnstile's power supply unit and built-in readers are placed on the bracket on the **X1** terminal block. The connection is carried out in accordance with the connection layout of the turnstile and additional equipment (see Fig. 13). The turnstile is energized via a power cable (11).

5.2.5. Control signal parameters

The passage through the turnstile is controlled by a low-level signal relative to the *GND* contact sent to the *Unlock A*, *Stop*, and *Unlock B* inputs of the control board, while the control element can be a normally open relay contact or a circuit with an open collector output (see Fig. 6 and 7).

Emergency unblocking of the turnstile passage is carried out by removing a low-level signal relative to the *GND* contact from the *Fire Alarm* input of the control board. In this case, a normally closed relay contact or circuit with an open collector output can function as a control element. All control commands received at other inputs are ignored (Section 5.3.2). When a low-level signal is applied to the *Fire Alarm* input, the directions switch to the mode according to signal levels at the *Unlock A*, *Unlock B*, and *Stop* inputs.

The activation of intrusion detectors is monitored by removal of a low-level signal relative to the *GND* contact from the *Detector* input of the control board, while a normally closed relay contact or circuit with an open collector output can function as a control element in this case.



Note:

To generate a high-level signal at all input contacts (*Unlock A*, *Stop*, *Unlock B*, *Fire Alarm*, and *Detector*), 2 kOhm resistors connected to the +5 V voltage plane are used.

The control element must ensure the following signal characteristics:
 relay contact as the control element:

- minimum commutation current..... max. 2 mA;
- closed contact resistance (including the connection cable resistance) .. max. 300 Ohm;

circuit with an open collector output:

- voltage at the closed contact (low-level signal at the CLB input) max. 0.8 V.

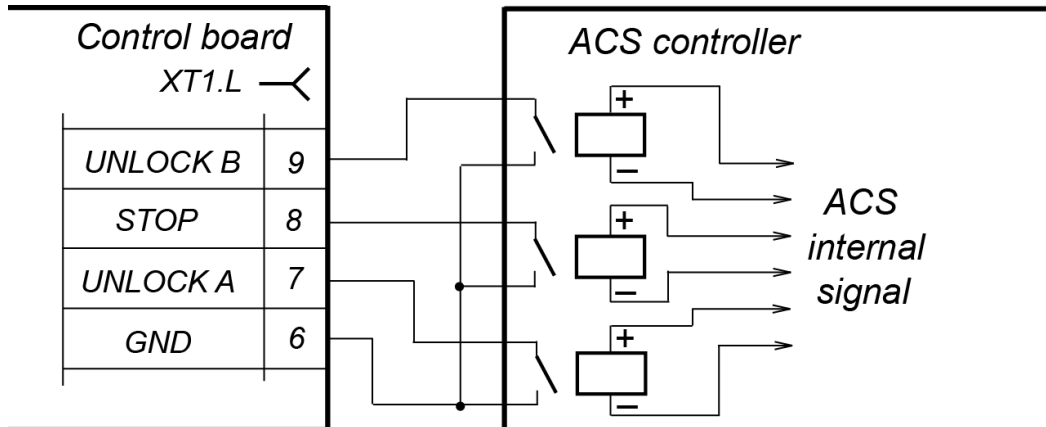


Fig. 6. Control elements of an external device: normally open relay contact

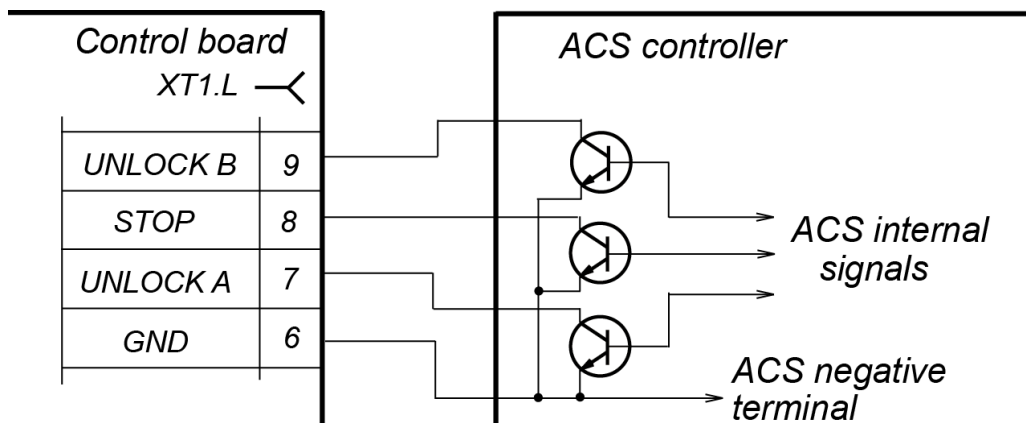


Fig. 7. Control elements of an external device: circuit with an open collector output

5.2.6. Control modes

There are two turnstile control modes, namely, pulse and potential. In both modes, the turnstile is controlled by sending commands (i.e., combination of control signals) to the standard control inputs: *Unlock A*, *Stop*, and *Unlock B* as well as to a special *Fire Alarm* control input. The selected mode determines the control command sending algorithm (see Tables 6 and 7).

The control mode is selected with a jumper on the **J1** connector of the control board. The location of the **J1** connector is shown in Fig. 5. By default, the jumper is installed, which activates the pulse control mode. To switch to the potential control mode, the jumper needs to be removed. The control mode will change as soon as the turnstile is switched on.



Attention!

The jumper may be installed and removed only when the turnstile is powered off.

The turnstile operation algorithm upon a special *Fire Alarm* signal is described in Section 5.3.2.

Pulse control mode

The pulse control mode is intended to control the turnstile via its RC panel, WRC, or ACS controller, outputs of which support the pulse control mode.

When a control command is sent to standard control inputs, the control signal must last for at least 100 msec.

The turnstile operation in pulse control mode is described in Table 6.

The algorithm of sending control commands in this mode is described in Appendix 1.

Potential control mode

The potential control mode is intended to control the turnstile via an ACS controller, outputs of which support the potential control mode.

When a control command is sent to standard control inputs, the control signal must last for at least 100 msec. The passage waiting time amounts to 5 seconds (by default, the **J4** jumper is not installed) or to 30 seconds (the **J4** jumper is installed) and does not depend on the control signal (pulse) duration.

Upon sending a low-level signal to the *Stop* input, both directions are blocked for as long as it is active, regardless of signal levels at the *Unlock A* and *Unlock B* inputs. Upon removing a low-level signal from the *Stop* input, the directions will switch to the modes according to signal levels at the *Unlock A* and *Unlock B* inputs.

The turnstile operation in potential control mode is described in Table 7.

The algorithm of sending control commands in this mode is described in Appendix 2.



Note:

To organize single passages in potential control mode, it is recommended to remove a low-level control signal from the *Unlock A / Unlock B* control input when activating the *PASS A / PASS B* relay output of the corresponding direction.

5.2.7. Turnstile operation algorithm

The turnstile operation algorithm in pulse control mode in case of a single passage in one of the directions:

1. A command (combination of control signals) to allow a single passage in one of the directions is sent from the control device (RC panel, WRC, ACS controller) to the control board inputs.
2. The CLB microcontroller on the control board processes the received combination of signals and generates a command for the turnstile control mechanism to unlock the rotary mechanism. The countdown of the unlocked state holding time starts.
3. The control mechanism unlocks the rotary mechanism to turn in the selected direction. Passage can be performed in the selected direction.
4. When a user passes through the turnstile, the microcontroller tracks the rotation angle of the barrier arms with optical rotation sensors of the control mechanism. If the rotation angle exceeds 67°, the fact of passage is registered. One of the relay outputs, *PASS A* or *PASS B*, corresponding to the passage direction, is activated. The microcontroller generates a command for the control mechanism to lock the turnstile's rotary mechanism.

5. When the passage is completed, i.e., after the barrier arms return to the closed position (turn at 120°), the turnstile's rotary mechanism is locked. The *PASS A / PASS B* relay output is normalized.
6. If the rotation of the barrier arms has not started, the locking command for the rotary mechanism is generated after the unlocked state holding time expires.
7. The turnstile is ready for the next passage.

5.3. Turnstile control devices

The turnstile can be operated from the following control devices: RC panel; WRC; ACS controller.

The above-mentioned devices can be connected to the turnstile separately, all simultaneously (in parallel) or in any combination with each other.



Note:

In case of parallel connection of the above-mentioned devices to the turnstile, their control signals might overlap. Should this happen, the turnstile will respond according to the combination of input signals that has been generated (Appendices 1 and 2).

5.3.1. RC panel connection

The RC panel is connected to the *GND*, *Unlock A*, *Stop*, *Unlock B*, *Led A*, *Led Stop*, and *Led B* contacts of the **XT1.L** terminal block of the control board with a flexible multicore cable (Fig. 13).

The standard orientation of the RC panel relative to the turnstile housing is shown in Fig. 8.

If the operator's workplace is located on the opposite side of the housing, then, for ease of use, it is necessary to swap RC-panel wires connected to the *Unlock A* and *Unlock B* contacts as well as to *Led A* and *Led B* respectively (Table 1).



Note:

The WRC is connected to the *Unlock A*, *Stop*, *Unlock B*, and *GND* contacts of the **XT1.L** terminal block. The WRC power supply is connected to the *+12V* contact of the **XT1.H** terminal block.

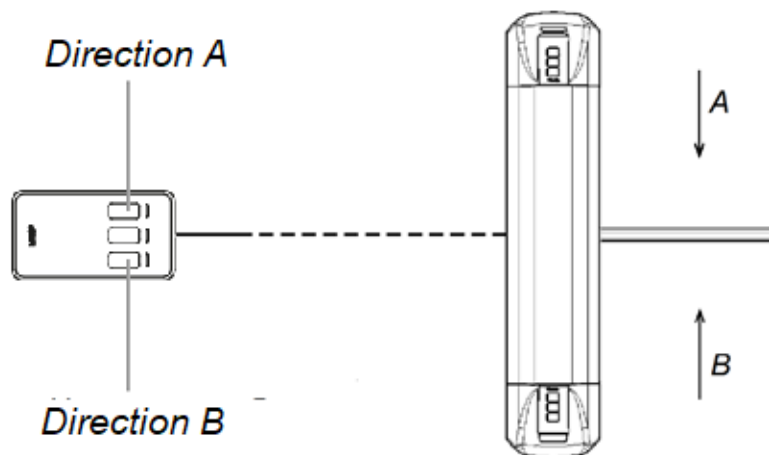


Fig. 8. Standard RC panel orientation relative to the turnstile housing

Table 1. Connection of RC-panel cable wires to the X1 terminal block for standard and reverse RC panel orientation

No.	Contact	RC panel orientation	
		Standard	Reverse
6	<i>GND</i>	black	black
7	<i>Unlock A</i>	white	green
8	<i>Stop</i>	blue	blue
9	<i>Unlock B</i>	green	white
10	<i>Led A</i>	yellow	red
11	<i>Led Stop</i>	orange	orange
12	<i>Led B</i>	red	yellow

5.3.2. Fire Alarm device

The *Fire Alarm* emergency passage unblocking device is connected to the *Fire Alarm* and *GND* contacts of the **XT1.L** terminal block of the control board according to the turnstile's electrical connection layout (Fig. 13).

If the *Fire Alarm* input is not used, a jumper wire needs to be installed between the *Fire Alarm* and *GND* contacts of the control board. This jumper is installed by default.

When a control signal is applied to the *Fire Alarm* input, the turnstile switches to the *Fire Alarm* emergency passage unblocking mode. In this mode, all incoming turnstile control commands are ignored. The turnstile's rotary mechanism is locked for rotation in both directions. The central barrier arm automatically falls under its own weight and takes the vertical position, clearing the passage. The following indication is displayed on the indication blocks simultaneously for both directions: alternating flashing of green (for 1.25 sec.) and red (for 0.25 sec.) indicators of the turnstile.

If the *Fire Alarm* signal is received by the turnstile while a user is passing through it, the *Fire Alarm* mode will be displayed on the indication blocks, but the locking of the rotary mechanism and the emergency passage opening will occur only after the barrier arm returns to the initial position.

After the *Fire Alarm* control signal is removed, the red passage denial indicator lights up on the indication blocks, and the turnstile switches to the standby mode with the lowered barrier arm. To continue its operation, the barrier arm needs to be moved to the initial (horizontal) position manually so that it is fixed.

5.3.3. Control via ACS

An ACS controller can be installed into the turnstile on a special bracket. In addition, the turnstile houses built-in multi-format proximity access card readers under the front plastic covers (5). When an identifier is presented to the reader, the identifier code is read and transmitted to the ACS controller, where it is processed, and a decision is made to allow or deny passage.

The readers are connected to the ACS controller via the *Wiegand* interface using the **X1** remote terminal block.

The ACS controller outputs are connected to the *Unlock A*, *Stop*, *Unlock B*, and *GND* contacts of the **XT1.L** terminal block of the control board. The ACS controller inputs are connected to the *Common*, *PASS A*, *PASS B*, *Ready*, and *Det Out* contacts of the **XT1.H** terminal block of the control board. The connection layout of the ACS controller is shown in Fig. 13.

5.4. Additional devices connected to the turnstile

5.4.1. Relay outputs

Connection to the relay outputs of the control board is performed through the corresponding contacts of the **XT1.H** terminal block of the control board. The following relay outputs are installed:

- *ALARM*: *Alarm 1* and *Alarm 2* contacts (Sect. 5.4.2),
- *PASS A*: *Pass A* and *Common* contacts (Sect. 5.2.7),
- *PASS B*: *Pass B* and *Common* contacts (Sect. 5.2.7),
- *READY*: *Ready* and *Common* contacts (Sect. 5.6),
- *DETECTOR*: *Det Out* and *Common* contacts (Sect. 5.4.2).

The relays have normally open contacts. At the same time, the *Common* contact for these relays is not connected to the negative terminal of the turnstile's power supply unit (it is galvanically isolated). In the initial (normalized) state, when the power supply unit is switched on, the *PASS A*, *PASS B*, *READY*, and *DETECTOR* relay contacts are closed (voltage is applied to the relay coil), and the *ALARM* relay contacts are open (voltage is not applied to the relay coil).

Voltage supply to the relay coil is indicated by lighting up of the relevant red LED on the control board near the corresponding relay (see Fig. 5).

The output stages for *PASS A*, *PASS B*, *Ready*, *Det Out*, and *Alarm* are the relay contacts with the following signal characteristics (see Fig. 9):

maximum commutation voltage	42 V DC
maximum commutation current	0.25 A
closed contact resistance	max. 0.15 Ohm

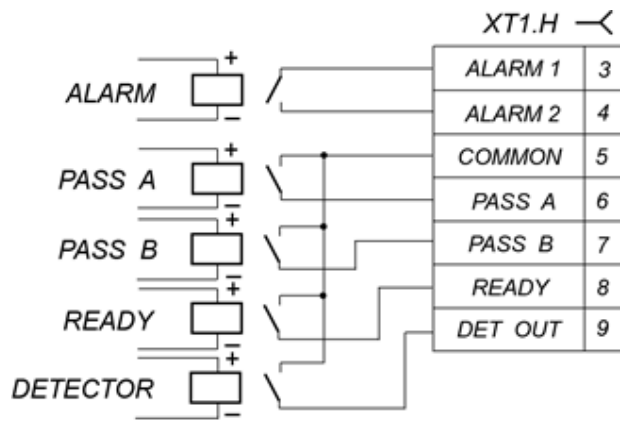


Fig. 9. Output stages for PASS A, PASS B, Ready, Det Out, and Alarm

5.4.2. Intrusion detector and siren



Attention!

It is not possible to install an intrusion detector inside the turnstile housing.

The intrusion detector is connected to the *Detector*, *GND*, and *+12V* contacts of the **XT1.L** terminal block of the control board. The parameters of the *Detector* input signals are specified in Section 5.2.5. The intrusion detector's current state is transmitted to the *DETECTOR* relay output (*Det Out* and *Common* contacts of the **XT1.H** terminal block).

The siren is connected to the *Alarm 1*, *Alarm 2*, *GND*, and *+12V* contacts of the **XT1.H** terminal block. The parameters of the *ALARM* relay output signals are specified in Section 5.4.1.

The *ALARM* output is activated if, in case the turnstile's rotary mechanism is locked (the *Passage denial* or *Both directions are closed* command has been given), the *Detector* input is activated, i.e., a control signal is received from the intrusion detector. The *ALARM* output is normalized 5 seconds after the activation or when any control command is received.



Note:

The control signal from the intrusion detector does not activate the *ALARM* output if the turnstile's rotary mechanism is unlocked for one of the directions or was locked less than three seconds ago.

5.5. Emergency passage unblocking

The turnstile passage is automatically unblocked when the operating voltage is removed, e.g., in case of failure of the connected power supply unit. In this case, the fixation of the central barrier arm is deactivated, and it moves under its own weight to the vertical position, automatically clearing the passage. The de-energized turnstile with the lowered barrier arm will remain in such a position until the operating voltage is restored. The turnstile is put into the active state in a way similar to the standard switching-on procedure.

The emergency passage unblocking is also activated by the *Fire Alarm* signal sent to the turnstile. The central barrier arm moves to the vertical position and clears the passage. Green passage permission indicators of the indication blocks light up simultaneously for both directions, alternately with flashing of red indicators. This indication is displayed until removal of the *Fire Alarm* signal. When it is removed, the red passage denial indicator will be activated on the indication blocks, and the turnstile will switch to the standby mode with the lowered barrier arm.

If the *Fire Alarm* command is sent to the turnstile while the flywheel with barrier arms is rotating, indicators of the indication block will display the *Fire Alarm* signal (alternate flashing of green and red indicators), but the passage will be opened only after the rotation of the flywheel is finished, as soon as the barrier arms reach the initial position.

After the power supply is restored or the *Fire Alarm* signal is removed, the barrier arm needs to be moved to the working position manually, after which the turnstile is ready for further operation in normal mode.

5.6. Operation contingencies and response to those

The turnstile is equipped with an alarm function to signal violations of the normal operation mode in case of unauthorized passage or delayed return of the barrier arms to their initial (closed) position. The rotation of the barrier arms is tracked by activating the optical sensor of the rotary group. The sensor is activated when the barrier arms turn at an angle of more than 8 degrees from the initial (closed) position.

- An unauthorized passage is the rotation of the barrier arms without sending a command to unlock the rotary group.
- A delay in the return of the barrier arms to their initial position is the passage zone staying in the open state for more than 30 seconds.

In each of these cases, the *READY* relay is activated (the voltage is removed from the relay coil), while the *Ready* and *Common* output contacts are opened (see Section 5.4.1). When the barrier arms return to their initial position, the *READY* relay is normalized (voltage is applied to the relay coil), and the *Ready* and *Common* output contacts are closed.



Note:

If the optical sensor of the barrier arms' rotary group becomes faulty, the *READY* relay is also activated until the malfunction is resolved.

6. MARKING AND PACKAGING

The turnstile has a marking label and sticker. The label can be found inside, on the rear side of the housing. It identifies the product's name, serial number, and date of manufacture. The sticker is located on the internal side of the top cover (3) and shows the general connection layout of the turnstile. To get access to the marking sticker and label, open the top cover (3). To do so, proceed as follows:

- Switch off power supply of the turnstile;
- Insert an SW2.5 Allen key into the hole in the rear part of the turnstile housing and use it to unscrew the set screw (14), which fixes the top cover (3), all the way out (see Fig. 10);
- Carefully lift the top cover (3) upwards by the rear edge and, turning it in the direction of the barrier arms, remove it from the turnstile housing. While removing the top cover, be careful not to damage the CLB located thereunder;
- Place the top cover on a flat steady surface.

Installation of the top cover back into its working position is carried out in reverse order, with observance of the aforementioned precautions. After mounting the top cover, use the key to return the set screw that fixes the top cover into its initial position. Turn on the turnstile's power supply unit to continue its operation.

The turnstile of the standard delivery set (see Section 4.1) is packed in a transportation box, which protects it against being damaged during transportation and storage.

Box dimensions (length × width × height) 132×40×110 cm
Box weight (gross).....max. 96 kg

7. SAFETY REQUIREMENTS

7.1. Installation safety

The turnstile shall be installed by the persons that have fully studied this Manual and have been instructed in safety, in compliance with general rules of electrical and installation works.



Attention!

- Only serviceable tools may be used for installation.
- All installation works may be performed only after the power supply unit is switched off and disconnected from the AC mains.
- Be especially careful and diligent when installing the turnstile housing before it is fixed, and prevent it from falling over.
- Before the first power-up of the turnstile, make sure that its installation and all connections have been carried out properly.

The power supply unit must be installed in accordance with safety measures stipulated in its operational documentation.

7.2. Operation safety

Observe general electrical safety rules when operating the turnstile.



Warning!

- Do not operate the turnstile under conditions that do not comply with the requirements of Section 2.
- Do not operate the turnstile at a power supply voltage different from that specified in Section 3.

The power supply unit must be used with observance of safety requirements specified in its operational documentation.

8. ASSEMBLY AND INSTALLATION

When installing the product, observe the safety rules stipulated in Sect. 7.1.

8.1. Installation details

Proper installation is crucial to the performance and service life of the turnstile. Installation shall be carried out by at least two specialists properly qualified as an installer and electrician. It is necessary to study this section carefully before the start of installation works and then follow the instructions specified herein.

Recommendations for preparation of the mounting surface:

It is recommended that you should:

- mount the turnstile on steady and level concrete (grade 400 or higher, strength class B22.5), stone or similar foundations with a thickness of at least 150 mm;
- level the mounting surface so that the fixing points of the turnstile housing lie in the same horizontal plane (check it with a level);
- apply embedded reinforcing elements (min. 400×400×300 mm) in case the turnstile has to be installed on a less steady foundation. A frame foundation can be applied as well.

Recommendations for the passage zone organization:

When passing through the turnstile, in case the turnstile is operated by the ACS controller, it is necessary to turn the barrier arms at least 70° to register a passage event. To ensure such an angle of rotation, please follow the recommendations given in Fig. 10 when organizing the passage zone.



Attention!

When installing the turnstile, it is necessary to leave a gap of at least 50 mm between the turnstile's rear side and the wall to ensure access to the set screw (14) that fixes the top cover (see Figure 10).

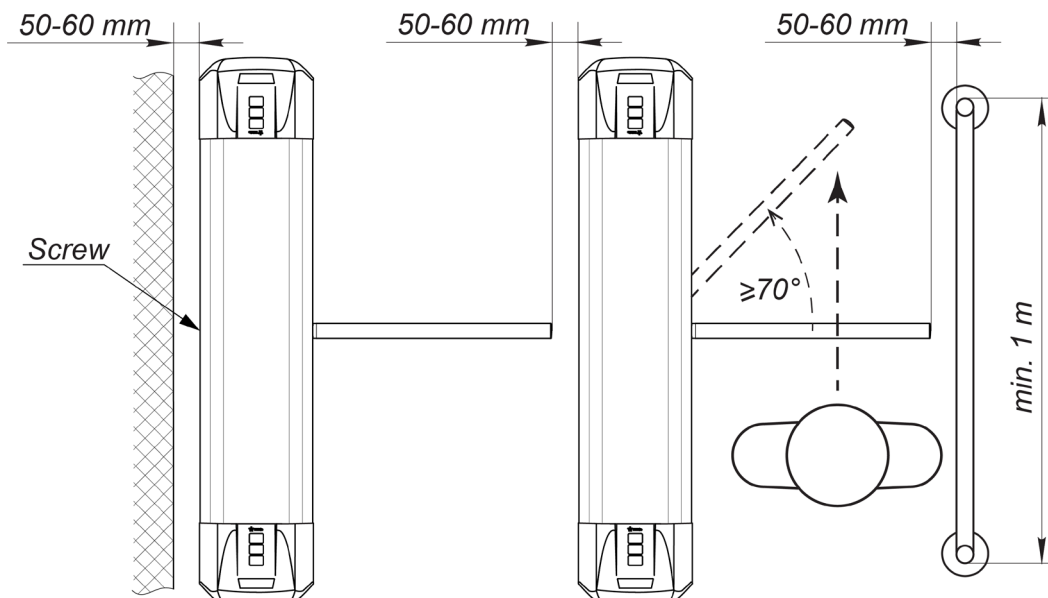


Fig. 10. Recommendations for the passage zone organization

The turnstile is equipped with a resetting mechanism for the barrier arms. In case of their rotation at an angle of more than 60°, the barrier arm is reset in the passage direction (in this case, the barrier arms cannot return to the initial position, and the return passage is blocked). If the barrier arms are turned less than 60°, they return to their initial position.

When organizing the passage zone, an additional emergency exit needs to be provided. For example, the **BH-02** anti-panic rotary railing section can be applied as such an exit (see Section 10 *Emergency response*).

8.2. Tools and equipment required for installation

- 1.2÷1.5 kW electric hammer drill;
- hard-alloy drill bit to create holes for anchor sleeves;
- floor chaser for cable ducts;
- straight-slot screwdriver No. 2;
- straight-slot screwdriver No. 5 (with a length of 150 mm);
- Phillips-head screwdriver No. 2;
- horn-type and socket wrenches: S17, S13, S10, S8, S7;
- SW2.5 Allen (Inbus) key;
- level;
- 2 m measuring tape;
- slide caliper.



Note:

It is allowed to use other equipment and measuring tools provided they ensure the required parameters and measurement accuracy.

8.3. Cable lengths

The maximum allowable length of the RC-panel cable 40 m

The maximum allowable length of the turnstile power cable depends on its cross-section and may not exceed:

- for a cable with a 1.5 mm² cross-section (AWG 15) 10 m
- for a cable with a 2.5 mm² cross-section (AWG 13) 15 m

8.4. Installation procedure



Attention!

The manufacturer shall not be liable for any damage caused by improper installation and declines any claims arising thereof in case the installation is not carried out in compliance with the instructions provided in this Manual.

Perform the following sequence of actions when installing the turnstile:

1. Unpack the turnstile and check the completeness of the delivery set.
2. Install the power supply unit in the required place in accordance with the instructions given in its operational documentation.
3. Make holes for anchor sleeves in the floor to fix the turnstile housing (Fig. 12). If it is necessary to lay cables under the floor surface, prepare a cable duct in the floor so that it leads to the area where these cables enter the turnstile housing. Install and fix the turnstile housing only after all cables have been laid inside the turnstile housing and in the cable duct. Cable routing inside the turnstile housing is shown in Fig. 11.
4. Insert anchor sleeves into the holes you have drilled so that they do not protrude from the floor surface.
5. Remove the turnstile housing side covers (7) by unlocking the locks (8) with a key. Mount the housing on the anchor sleeves and fix it with M10 bolts.
6. Remove the turnstile housing top cover (3) by unlocking the set screw (14) with an Allen key (see Sect. 6).
7. Connect the power cable (11) to the **X1.1** terminal block (see Fig. 13).

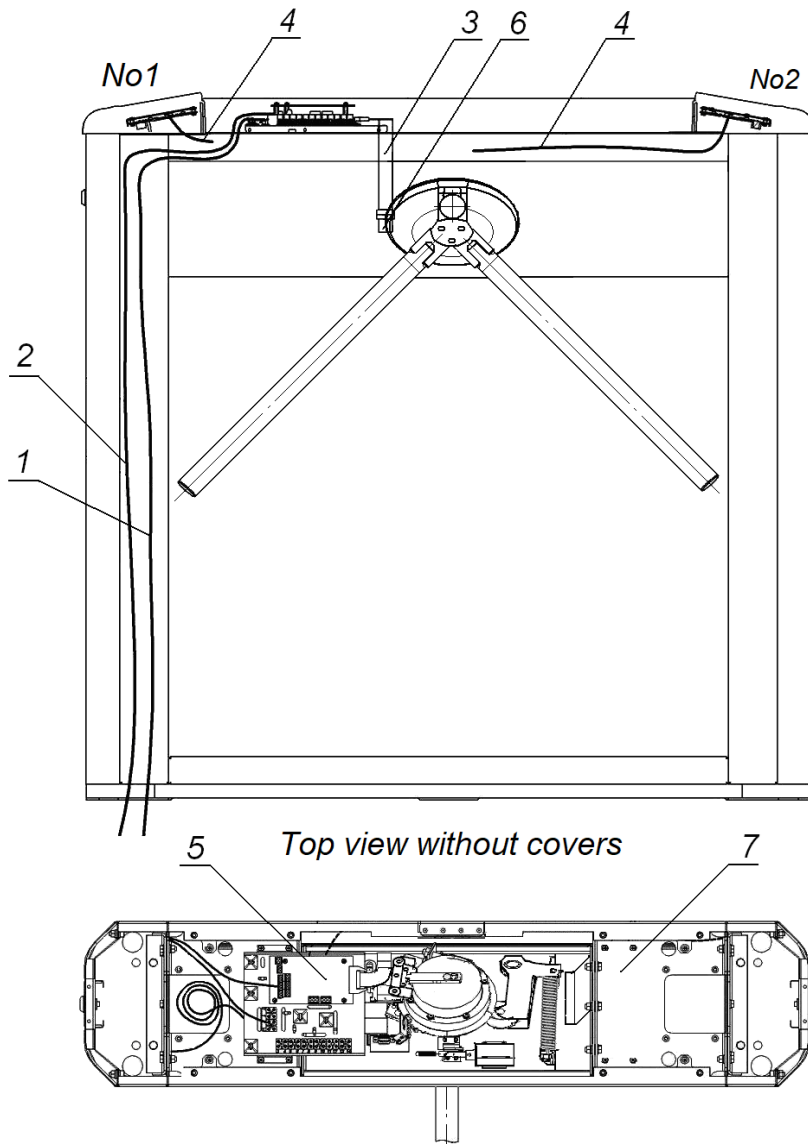


Fig. 11. Cable routing inside the turnstile housing

- 1 – power cable; 2 – cable from the RC panel / WRC device;
- 3 – control mechanism cable; 4 – cables of card readers No. 1 and No. 2;
- 5 – control board; 6 – rotary mechanism; 7 – bracket (for ACS controller installation)

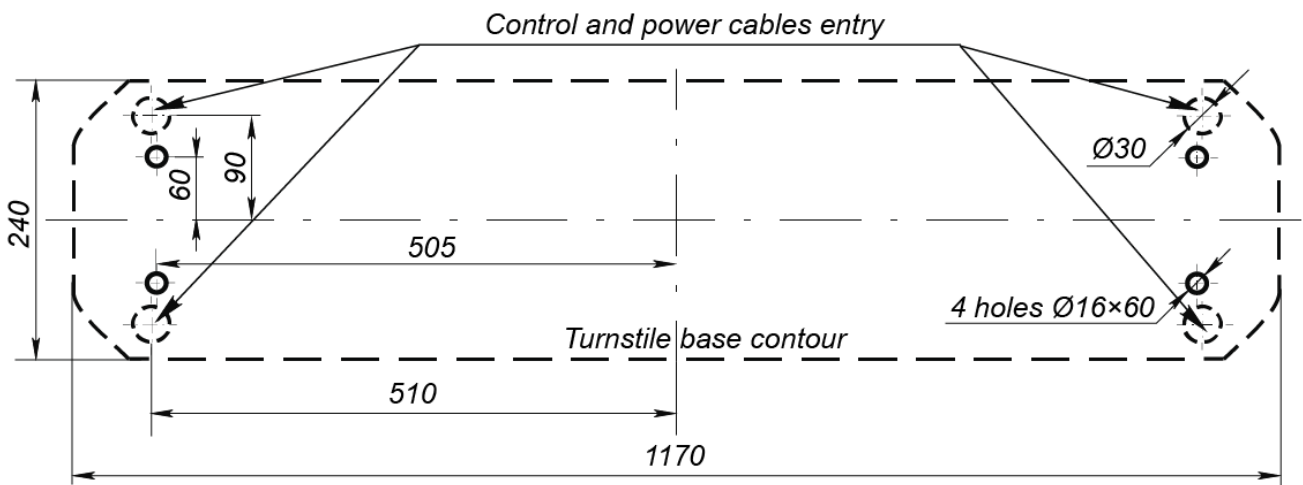


Fig. 12. Marking layout for the TB-01.9A turnstile housing installation

(The diameter and depth of the holes in the layout are indicated for anchors of the PFG IH 10 SORMAT type; when using other types of anchors, it is necessary to make holes with a size appropriate for those.)

8. Connect the RC-panel cable (10) to the **XT1.L** terminal block on the control board (Fig. 5).
9. Connect cables of other devices, if required, to corresponding terminal blocks of the control board (see Fig. 5 and Fig. 13).
10. Check the serviceability and accuracy of all the electrical connections.
11. Fix all the cables using self-adhesive cable tie mounts and non-releasable ties supplied as part of the standard delivery set.
12. After all the cables have been connected, and the turnstile housing has been fixed to the floor, install the top cover (3) (see Section 6) and the turnstile housing side covers (7) back in their place in reverse order to their removal.
13. Perform a test run of the turnstile as specified in Section 9.1.
14. After energizing the turnstile, move the barrier arm to the working position. The turnstile mechanism will automatically fix it in this position.
15. Check the turnstile operation using the RC panel and Table 6.

After the installation and testing are complete, the turnstile is ready to operate.

8.5. ACS controller installation

The turnstile design makes it possible to install the ACS controller board inside the turnstile housing. The ACS controller board is mounted on a bracket (7, Fig. 11). The maximum possible size of the controller board to be installed amounts to 160×150×35 mm.

The ACS controller is connected to the control board of the turnstile in accordance with Fig. 13.

8.6. Connection of built-in readers



Attention!

All the connections must be performed before the voltage is applied to the reader.

Data are transmitted from the readers via the *Wiegand* interface. The readers are connected to the ACS controller with a shielded cable in accordance with Fig. 13.

By default, data lines from the readers are placed on contacts of the **X1.2** remote terminal block (see Table 2).

Table 2. Contact functions of the X1.2 remote terminal block

No.	Function	Wire from the reader	
3	data line D0	green	Reader No.1
4	data line D1	white	
5	control line for the red light indication*	orange	
6	control line for the green light indication*	purple	
7	control line for the sound indication	brown	
8	common wire line	shield	
9	common wire line	shield	Reader No.2
10	control line for the sound indication	brown	
11	control line for the green light indication*	purple	
12	control line for the red light indication*	orange	
13	data line D1	white	
14	data line D0	green	

* By default, the control lines for LED indication of the readers are connected to the **XT4** and **XT5** terminal blocks of the control board (see Fig. 13). To exercise external indication control from the ACS controller, the orange and purple wires of the readers need to be disconnected from the **XT4** and **XT5** connectors of the control board and connected to the corresponding contacts of the **X1.2** remote terminal block.

The control command of the reader sound indication is a low signal level on the brown wire of the reader relative to the negative terminal of the power supply unit.

8.6.1. Indication mode selection for readers

The light indication mode of the readers, depending on control signals sent by the ACS controller, is selected using a red jumper wire on each control board of the built-in readers in accordance with Table 3. By default, the jumper is cut (the *Double line* mode).

Table 3. Reader indication

Control signals		Red jumper state / Reader indication mode	
Orange wire	Purple wire	Red jumper cut / <i>Double line</i> (by default)	Red jumper is not cut / <i>Single line</i>
0	0	red and green indicators are lit	green indicator is lit
0	HZ	red indicator is lit	green indicator is lit
HZ	0	green indicator is lit	red indicator is lit
HZ	HZ	yellow indicator is lit	red indicator is lit

0 – the control line is connected to the negative terminal of the power supply unit;
 HZ – high resistance on the control line (the line is not connected to the negative terminal of the power supply unit)



Note:

By default, the red jumper is cut. To change the indication mode to *Single line*, connect the red jumper together.

8.6.2. Selection of the reader output data format



Attention!

Changing the *Wiegand* output data format does not prevent reading cards of other formats and issuing the read code to the reader output. In this case, different codes can be issued in different formats.

The output data format of the *Wiegand* interface is selected using three jumper wires: yellow, blue, and white on each board of the built-in readers, in accordance with Table 4. By default, the white jumper is missing (cut), and the yellow and blue jumpers are in place (*Wiegand-26*).

Table 4. Settings of the reader output data format

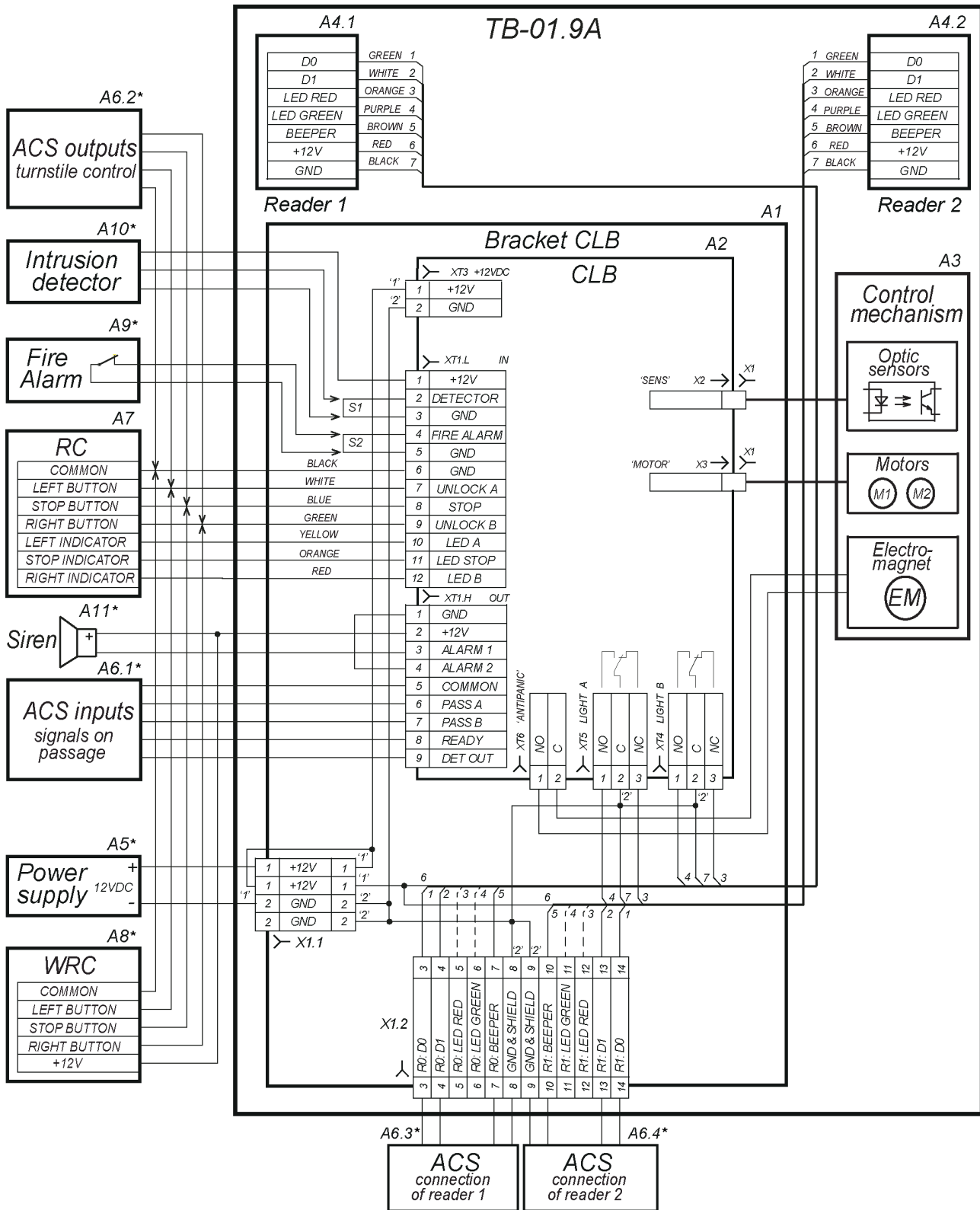
Jumper state			Reader output data format
yellow:	blue:	white:	
in place	in place	<i>cut</i>	<i>Wiegand-26</i>
in place	cut	<i>cut</i>	<i>Wiegand-34</i>
cut	in place	<i>cut</i>	<i>Wiegand-42</i>
cut	cut	<i>cut</i>	<i>Wiegand-58</i>



Note:

By default, the white jumper is cut. If you need to change the communication interface, connect the white jumper together.

8.7. Electrical connection layout of the turnstile



S1 - Jumper wire, installed when the emergency opening device (Fire Alarm) is not connected, installed by default
 S2 - Jumper wire, installed when the intrusion detector is not connected, installed by default

Fig. 13. Electrical connection layout of the TB-01.9A turnstile and additional equipment¹

¹ Elements of the layout are listed in Table 5. Elements of the layout with an asterisk (*) are not included in the standard delivery set.

Table 5. Elements of the electrical connection layout of the turnstile

Legend	Name	Quantity, pcs
A1	Bracket with the CLB board and terminal blocks	1
A2	CLB control board	1
A3	Control mechanism	1
A4.1, A4.2	Built-in <i>Wiegand</i> readers	2
A5*	Turnstile's power supply unit	1
A6.1 – A6.4*	ACS	1
A7	Remote control panel	1
A8*	Wireless remote control	1
A9*	Emergency unblocking device (<i>Fire Alarm</i>)	1
A10*	Intrusion detector	1
A11*	Siren	1
S1	Jumper wire. To be installed if no intrusion detector (A10) is connected. Installed by default	1
S2	Jumper wire. To be installed if no emergency unblocking device (FA, A9) is connected. Installed by default	1
X1.1 - X1.2	Remote terminal blocks	2

* This equipment is not included in the standard delivery set

9. OPERATION

When operating the turnstile, comply with safety measures in accordance with Section 7.2.



Warning!

- When cleaning the turnstile, do not use substances that may cause mechanical damage of its surfaces or corrosion of its parts.
- Do not move any objects with the size exceeding the passageway width through the passage zone.
- Do not jerk and hit any elements of the turnstile so as to prevent their mechanical deformation.
- Do not dismantle or adjust mechanisms ensuring operation of the turnstile.

9.1. Power-up

Follow these steps to power up the turnstile:

1. Check the accuracy of all the connections.
2. Make sure the upper barrier arm is in the emergency position, i.e., passage through the turnstile is open.
3. Connect the turnstile's power supply unit to the mains with the voltage and frequency specified in the certificate for the power supply unit. Switch on the turnstile's power supply unit. Yellow passage waiting indicators will light up on the indication blocks, and the red indicator above the **STOP** button will light up on the RC panel.
4. Move the upper barrier arm to its working position. The barrier arm should stay fixed in this position, which confirms that the voltage is applied to the electromagnet of the barrier arm's automatic lowering mechanism.

9.2. Turnstile operation in pulse control mode

After switching on the turnstile's power supply unit, the turnstile passage is open initially (the upper barrier arm is lowered). After the voltage is applied, the barrier arm needs to be moved to the working position.

See Table 6 for the operation modes set from the RC panel and for the corresponding indication. Passage directions are independent of each other, i.e., the passage mode selected for one direction does not change the passage mode set for the other direction.

The RC panel buttons and light indicators are shown in Fig. 4. Please note the following:

- In the *Single passage in the set direction* mode, the turnstile will automatically close after passage of a user in the selected direction. If the passage is not performed during the passage waiting time, the turnstile will automatically close as well.
- In the *Single passage in both directions* mode, after a single passage is made in one direction, the countdown of the passage waiting time resumes for the other direction.
- The *Single passage in the set direction* mode can be changed to the *Free passage* mode for the same direction or to the *Passage denial* mode;
- The *Free passage in the set direction* mode can be changed to the *Passage denial* mode only.

Table 6. Pulse control mode (the J1 jumper is installed)

Operation modes	Actions to do via the RC panel	Indication		Turnstile status
		on the RC panel	on the turnstile	
<i>Passage denial</i>	Press the STOP button on the RC panel	The <i>Stop</i> red indicator is on	Red indicators are on for both directions	The turnstile is locked for both directions
<i>Single passage in the set direction</i>	Press the LEFT / RIGHT button	The green <i>Left / Right</i> indicator of the chosen passage direction is on	The green indicator for the selected passage direction is on	The turnstile gets unlocked for a single user passing through in the selected direction, after which it locks again
<i>Single passage in both directions</i>	Press both LEFT and RIGHT buttons on the RC panel simultaneously	The two green indicators (<i>Left</i> and <i>Right</i>) are on simultaneously	Green indicators are on for both directions. After passage in each direction, the red indicator lights up for such a direction	The turnstile gets unlocked for a single passage in each direction, after which it locks for each direction respectively.
<i>Free passage in the set direction</i>	Press the STOP button and the LEFT / RIGHT button, depending on the chosen passage direction, simultaneously	The green <i>Left / Right</i> indicator of the chosen passage direction is on	The green indicator for the selected passage direction is on	The turnstile stays open in one of the directions until the mode is changed.
<i>Free passage in one direction and single passage in the opposite direction</i>	Set the <i>Free passage in the set direction</i> mode for one direction and the <i>Single passage in the set direction</i> mode for the other direction	The two green indicators (<i>Left</i> and <i>Right</i>) are on simultaneously	Green indicators are on for both directions. After a single passage, the red indicator lights up for the direction in which the passage has been made	The turnstile remains open in one of the directions until the mode is changed. In the opposite direction, the turnstile gets unlocked for a single passage, after which it locks again.
<i>Free passage</i>	Press all the 3 buttons (LEFT , STOP , RIGHT) on the RC panel simultaneously	The two green indicators (<i>Left</i> and <i>Right</i>) are on simultaneously	Green indicators are on for both directions	The turnstile remains open in both directions



Note:

Pressing a button on the RC panel sends a low-level signal to the relevant contacts (*Unlock A*, *Unlock B*, and *Stop*) of the **XT1.L** terminal block relative to the *GND* contact.

9.3. Turnstile operation in potential control mode

Turnstile operation modes are set via the RC panel and indicated in accordance with Table 7. It should be noted that passage directions are independent of each other, i.e., the passage mode selected for one direction does not change the passage mode set for the other direction.

If there is a low level on the contact of the corresponding passage direction by the time of passage, the turnstile will remain open in this direction.



Note for ACS outputs:

- High level – output relay contacts are open or the output transistor is closed;
- Low level – output relay contacts are closed or the output transistor is open.

Table 7. Potential control mode (the J1 jumper is removed)

Operation modes	What is required	Indication		Turnstile status
		on the RC panel	on the turnstile housing	
<i>Both directions are closed</i>	High level on the <i>Unlock A</i> and <i>Unlock B</i> contacts or low level on the <i>Stop</i> contact	The <i>Stop</i> red indicator is on	Red indicators are on for both directions	The turnstile is locked for both directions
<i>Direction is open</i>	Low level on the contact of the selected direction. High level on all other contacts	The green <i>Left / Right</i> indicator of the chosen passage direction is on	The green indicator for the selected passage direction is on	The turnstile gets unlocked for a single user passing through in the selected direction, after which it locks again
<i>Both passage directions are open</i>	Low level on the <i>Unlock A</i> and <i>Unlock B</i> contacts. High level on the <i>Stop</i> contact	The two green indicators (<i>Left</i> and <i>Right</i>) are on simultaneously	Green indicators are on for both directions	The turnstile remains open in both directions

9.4. Turnstile operation when controlled via ACS

When a registered access card is presented to a reader, the reader produces a short sound signal and transmits the access card code to the ACS controller. The ACS authorizes the user’s passage and sends a command to the control board, which opens the passage in the authorized direction. After the passage is made, the control board generates *PASS A* or *PASS B* signals, blocks the passage, and switches to the initial state, after which the turnstile is ready for the next operation cycle.

10. EMERGENCY RESPONSE



Attention!

In case of fire, natural disasters, and any other emergency situations, it is necessary to use emergency exits, complying with safety requirements, to evacuate people from the facility urgently. For example, the **BH-02** anti-panic rotary railing section can be applied as such an exit.

In emergencies and abnormal situations, such as power loss, the passage zone of the turnstile may serve as an additional emergency exit.

The turnstile can be switched to the *Fire Alarm* mode via an emergency passage unblocking device (fire alarm device, emergency button, etc.). In this mode, the barrier arm, blocking the passage zone, drops (takes the vertical position) and clears the passage in both directions; green (for 1.25 sec.) and red (for 0.25 sec.) indicators light up alternately on the indication blocks, and control commands from other devices and software are ignored (see Sect. 5.5).

In addition, the passage zone opens automatically when the turnstile's operating voltage is removed (lost).

11. TROUBLESHOOTING

Possible faults to be corrected by the customers themselves are listed in Table 8.

Table 8. Troubleshooting

Fault	Possible cause	Remedy
The power supply unit is switched on, but the turnstile does not function, and the RC-panel and turnstile housing indication is off	No operating voltage is applied to the control board	Switch off the turnstile's power supply unit from the AC mains, and remove the turnstile housing top cover. Check the integrity of the power cable and reliability of its connection to the control board's XT3 terminal block
The turnstile is not controlled in one of the directions, but there is light indication on the turnstile housing and RC panel	No control signal is sent to the control board for this direction	Switch off the turnstile's power supply unit from the AC mains, and remove the turnstile housing top cover. Check the integrity of the RC panel / WRC / ACS controller cable and reliability of its connection to the control board's XT1.L and XT1.H terminal blocks

In case of other faults and defects, please contact the PERCo Technical Support Department.

12. MAINTENANCE

The turnstile maintenance is required once a year and in case of any technical failures; the turnstile must be serviced immediately after repair works. Technical maintenance is to be carried out by qualified specialists after careful study of this Manual.

Technical maintenance procedure:

1. Disconnect the turnstile's power supply unit from the AC mains. This will automatically lower the upper barrier arm and open the passage.
2. Remove the turnstile top cover (3) from the turnstile housing as described in Section 6.
3. Lay the cover on a flat steady surface.
4. Inspect the resetting mechanism (a pusher, springs, and a roller), optical rotation sensors for the barrier arms, and a damper (see Fig. 14).
5. Remove possible contamination from a rotation sensor disk, located in the gap of the optical rotation sensors for the barrier arms, with an alcohol-gasoline blend applied with a clean cloth. Avoid ingress of dirt into working gaps of both optical rotation sensors for the barrier arms.
6. Lubricate the following friction units of the turnstile mechanism with machine oil (lubrication points are marked in Fig. 14):
 - the pusher lever of the resetting mechanism;
 - fixing points of the springs of the resetting mechanism;
 - rotation axes of the stoppers.



Attention!

Avoid ingress of the lubricant on the rotation sensor disk and the roller surfaces.

7. Check the reliability of the cable connections to the CLB terminal blocks and, if necessary, tighten the relevant cable-fixing screws with a screwdriver.
8. Check the reliability of the barrier arms' (4) fastening in the turnstile's hinge units and, if necessary, tighten the fixing screws.

9. Check the reliability of the tightening of four anchor bolts that fix the turnstile housing to the floor and, if necessary, tighten the anchor bolts.
10. Return the top cover (3) into its operating position (see Section 6) and fix it with a screw.
11. Energize the turnstile and move the barrier arm to its working position.
12. Check operation of the turnstile in accordance with Section 9.1 of this Manual.

After technical maintenance works and inspections are complete, the turnstile is ready for further operation.

In case of any defects revealed during technical maintenance, please contact the PERCo Technical Support Department (the PERCo TSD).

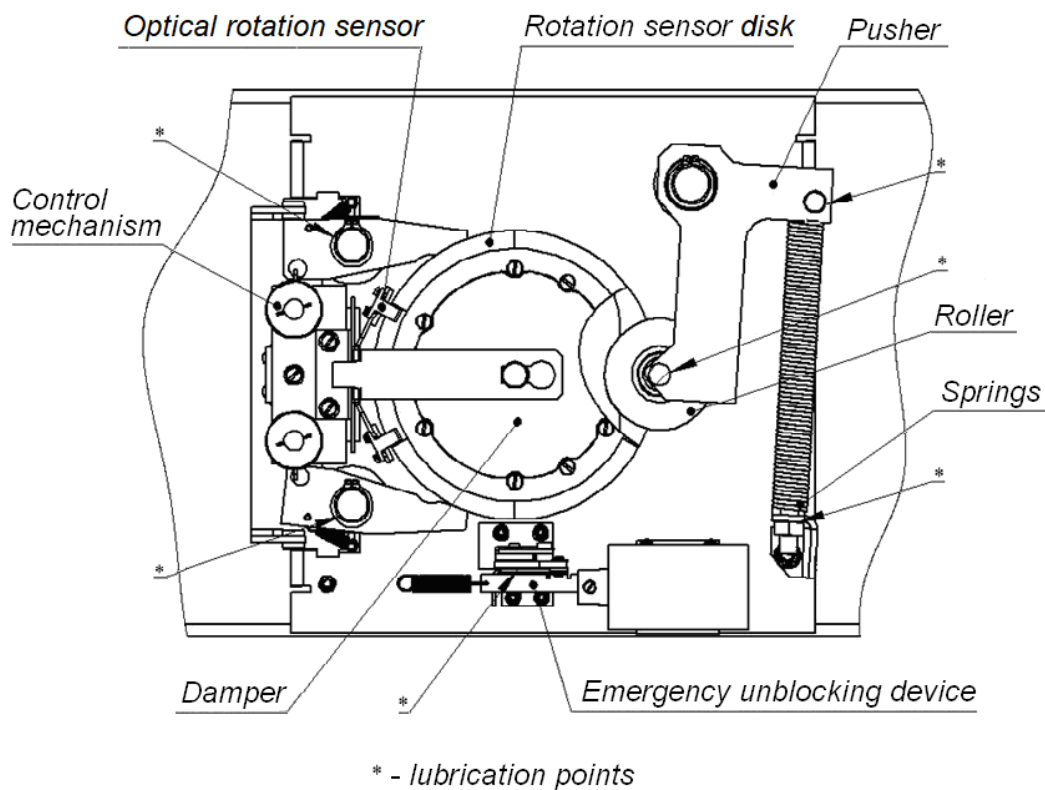


Fig. 14. Interior components of the turnstile mechanism

13. TRANSPORTATION AND STORAGE

The turnstile in the manufacturer's packaging is allowed to be transported only in closed transport (railway cars, containers, closed motor cars, ship holds, airplanes, etc.).

During storage and transportation, the boxes with the turnstiles may be stacked no more than 2 layers high.

The turnstile may be stored in dry indoor facilities at an ambient air temperature from -25°C to $+50^{\circ}\text{C}$ and relative air humidity of up to 80% at $+25^{\circ}\text{C}$.

After transportation or storage at temperatures below zero or at high air humidity, the turnstile needs to be kept in the packaging for no less than 24 hours prior to the start of installation works under normal climate conditions corresponding to its operating conditions (see Section 2).

Appendix 1. Control signal transmission algorithm in pulse control mode



Note:

For the RC panel:

- active front – pressing of the relevant button on the RC panel;
- low level – the relevant button on the RC panel has been pressed;
- high level – the relevant button on the RC panel is not pressed.

The command is a signal's active front (signal transition from a high level to a low level) at any of the contacts in the presence of the corresponding signal levels at other contacts. The following commands can be generated by sending a low-level signal to the *Unlock A*, *Stop*, and *Unlock B* contacts of the **XT1.L** terminal block relative to the *GND* contact:

Passage denial (the turnstile is locked for entry and exit)

The active front is at the *Stop* contact while there is a high level at the *Unlock A* and *Unlock B* contacts. Both passage directions are blocked at this command.

Single passage in direction A (open for passage of one person in the A direction)

The active front is at the *Unlock A* contact while there is a high level at the *Stop* and *Unlock B* contacts.

At this command, the A direction opens either for the passage waiting time, or until the passage has been made in this direction, or until the *Passage denial* command, and the status of the B passage direction does not change. The command is ignored if, at the time of its receipt, the status of the A direction is *Free passage*.

Single passage in direction B (open for passage of one person in the B direction)

The active front is at the *Unlock B* contact while there is a high level at the *Stop* and *Unlock A* contacts.

At this command, the B direction opens either for the passage waiting time, or until the passage has been made in this direction, or until the *Passage denial* command, and the status of the A passage direction does not change. The command is ignored if, at the time of its receipt, the status of the B direction is *Free passage*.

Single passage in both directions (open for passage of one person in each direction)

The active front is at the *Unlock A* contact while there is a low level at the *Unlock B* contact and a high level at the *Stop* contact, or the active front is at the *Unlock B* contact while there is a low level at the *Unlock A* contact and a high level at the *Stop* contact.

At this command, both passage directions open, each either for the passage waiting time, or until the *Passage denial* command is received. The command is ignored for the passage direction that is in the *Free passage* state at the time of its receipt.

Free passage in direction A (open for free passage in the A direction)

The active front is at the *Unlock A* contact while there is a low level at the *Stop* contact and a high level at the *Unlock B* contact, or the active front is at the *Stop* contact while there is a low level at the *Unlock A* contact and a high level at the *Unlock B* contact.

At this command, the A direction opens until the *Passage denial* command is received; the status of the B direction does not change.

Free passage in direction B (open for free passage in the B direction)

The active front is at the *Unlock B* contact while there is a low level at the *Stop* contact and a high level at the *Unlock A* contact, or the active front is at the *Stop* contact while there is a low level at the *Unlock B* contact and a high level at the *Unlock A* contact.

At this command, the B direction opens until the *Passage denial* command is received; the status of the A direction does not change.

Free passage (open for free passage in both directions)

The active front is at the *Unlock A* contact while there is a low level at the *Unlock B* and *Stop* contacts, or the active front is at the *Unlock B* contact while there is a low level at the *Unlock A* and *Stop* contacts, or the active front is at the *Stop* contact while there is a low level at the *Unlock A* and *Unlock B* contacts.

Both directions open at this command until the *Passage denial* command is received.

Appendix 2. Control signal transmission algorithm in potential control mode



Note for ACS controller outputs:

low level – either contacts of the output relay are closed or the output transistor is open;
high level – either contacts of the output relay are broken or the output transistor is closed.

Both directions are closed (the turnstile is locked for entry and exit)

There is a high level at the *Unlock A* and *Unlock B* contacts or a low level at the *Stop* contact. Both passage directions are blocked at this command.

Direction A is open (open for passage in the A direction)

There is a low level at the *Unlock A* contact while a high level is present at the *Stop* and *Unlock B* contacts.

At this command, the A direction opens until removal of a low-level signal from the A contact or until the *Both directions are closed* command is received. The status of the B direction does not change.

Direction B is open (open for passage in the B direction)

There is a low level at the *Unlock B* contact while there is a high level at the *Stop* and *Unlock A* contacts.

At this command, the B direction opens until removal of a low-level signal from the B contact or until the *Both directions are closed* command is received. The status of the A direction does not change.

Both directions are open (open for entry and exit)

There is a low level at the *Unlock A* and *Unlock B* contacts while there is a high level at the *Stop* contact.

Both directions open at this command until removal of a low-level signal from one of the contacts (A or B) or until the *Both directions are closed* command is received.

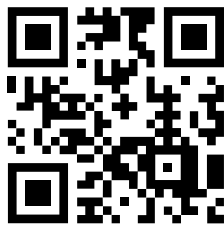
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