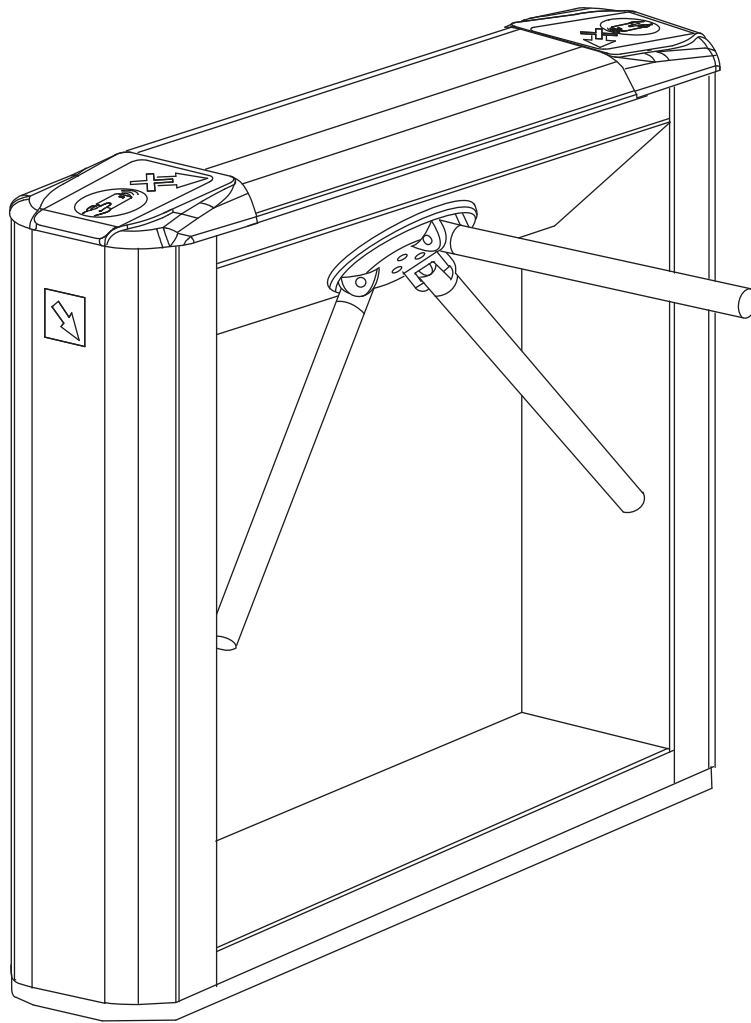


PERCo[®]

ASSEMBLY AND OPERATION MANUAL



TTD-08A

EAC
CE

Electromechanical box tripod turnstile with automatic anti-panic barrier arms

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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) for the **TTD-08A Electromechanical box tripod turnstile with automatic anti-panic barrier arms** contains the instructions on safe transportation, storage, installation, operation, and maintenance of the said product.

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

Abbreviations adopted in the Manual:

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

1 APPLICATION

The **TTD-08A Electromechanical box tripod turnstile with automatic anti-panic barrier arms** (hereinafter referred to as the turnstile) is designed to organize a two-way access point for the controlled area. The housing of the turnstile is made of stainless steel. Outdoor application is allowed.

Thanks to its modern design and functionality, which meet the most discerning requirements for safety and ease of use, the model falls into the upmarket category of products.

The number of turnstiles required to ensure fast and convenient pedestrian passage should be calculated based on the product's throughput rate as per 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.



Note:

Access card readers manufactured by PERCo (**IR13, IR19, IR19 OEM**) and third-party manufacturers can be installed inside the turnstile. Readers are to be selected, purchased, and installed in the product by the customer (installer) with due consideration for the checkpoint design as well as for ACS and management controller characteristics. Access cards readers are not included in the standard delivery set of the turnstile!

Readers made by third-party manufacturers must meet the following requirements:

- Overall dimensions (L × W × H) max. 155×90×30 mm
- ID reading range min. 50 mm

It is possible to install an ACS controller inside the turnstile as well. Limitations on its overall dimensions: max. 250×130×35 mm

2 OPERATING CONDITIONS

In terms of its resistance to environmental exposure, the turnstile complies with GOST 15150-69, category N1 (for outdoor application). Operation of the turnstile is allowed at an ambient air temperature from –20°C to +50°C (when used under shelter – to +55°C) and relative air humidity of up to 80% at +25°C.

The remote control panel, which is included in the turnstile delivery set, in terms of resistance to environmental exposure, complies with GOST 15150-69, category NF4 (operation in rooms with climate control). Operation of the remote control panel is allowed at an ambient air temperature from +1°C to +40°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
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
RC-panel cable length ³	min. 6.6 m
IP Code.....	IP54 (EN 60529)
Electric shock protection class	III (IEC 61140)
Mean time to failure	min. 4 000 000 passages
Mean lifetime	8 years
Overall dimensions (L × W × H):	
with a lowered barrier arm	1166×240×1016 mm
with a barrier arm in the working position	1166×750×1016 mm
Net weight of the turnstile	max. 70 kg

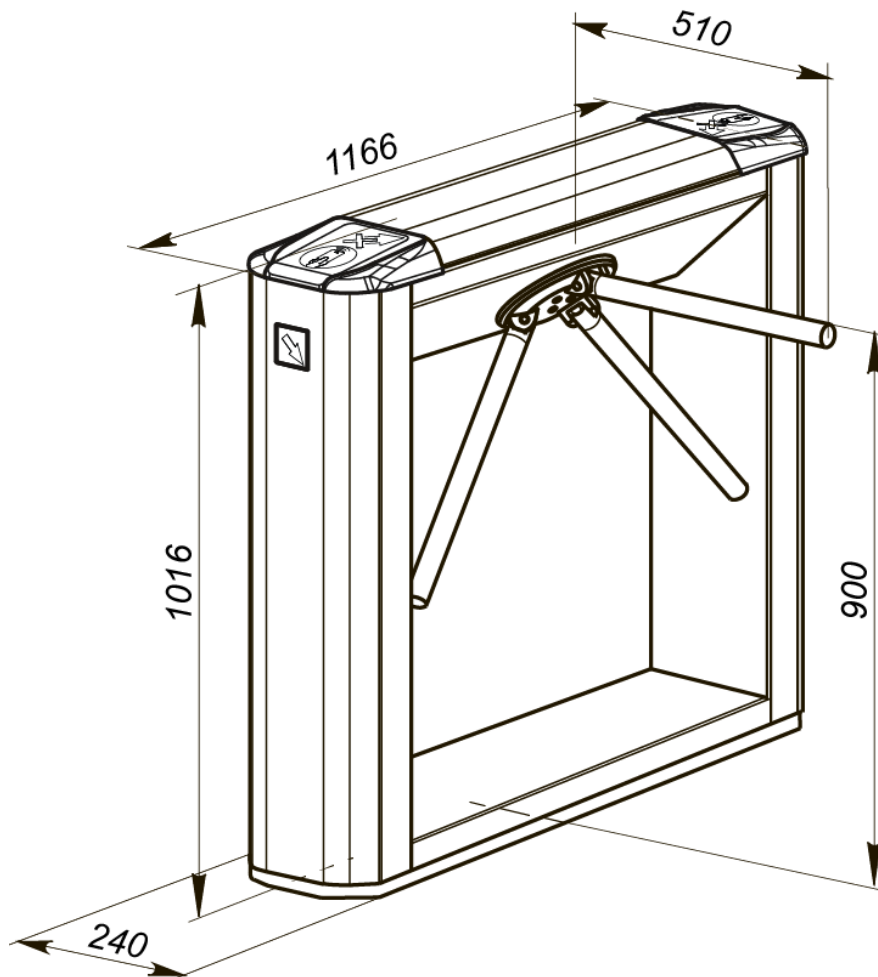


Figure 1. Overall dimensions of the TTD-08A turnstile

¹ For the turnstile, 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 power consumption can rise to 72 W within 5 sec. following its power-up or upon removal of the *Fire Alarm* signal. In normal state, the power consumption does not exceed 30 W.

³ 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
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
FSS-5 self-adhesive PCB pillar	4

Operational documentation:

Certificate	1
Assembly and Operation Manual.....	1

4.2 Additional equipment to be supplied upon request

WRC kit ¹	1
IR13 or IR19 or IR19 OEM access card readers	2
Anchor with M10 bolt and washer	4

5 DESIGN AND OPERATION

5.1 Main features

- The turnstile is designed both for indoor and outdoor application (see Section 2). The turnstile housing is produced from high-quality stainless steel with ABS plastic inserts.
- Proximity access card readers can be installed beneath side covers of the turnstile.
- The turnstile can be operated both as a stand-alone unit controlled via its RC panel or WRC and as part of an ACS (if readers are installed).
- The turnstile is equipped with an emergency passage unblocking mechanism. The passage automatically opens in case of power loss or if the *Fire Alarm* command is sent. The *Fire Alarm* command can be sent from the security and fire alarm system or by the operator (hereinafter referred to as the emergency passage unblocking device).
- The turnstile houses 2 built-in LED indication blocks, which display operation modes and are installed in side covers. In addition, the turnstile has additional passage direction indication on its side panels.
- The turnstile has outputs for connection of remote indicators.
- The turnstile has outputs for connection of an external intrusion detector and siren.
- The turnstile supports two control modes: pulse and potential.
- The rotary mechanism 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.
- When the barrier arms are turned more than 60°, their reverse rotation is blocked.
- Smooth and quiet operation of the turnstile is ensured by a damper of the rotary mechanism of the barrier arms.
- Optical sensors, which monitor the rotation of the barrier arms and are built into the turnstile, ensure correct passage registration.
- The turnstile is supplied with a safe operating voltage of up to 14 V.
- Installed in a line, several turnstile housings form a passage zone with no need to install extra railings.

¹ The WRC kit consists of a receiver, which is connected to the turnstile control board, and transmitters designed as radio fobs, with an operating range of up to 40 m.

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. The overall dimensions of the turnstile housing are shown in Fig. 1.

The turnstile comprises a turnstile housing (1), installed flywheel with three barrier arms (5), and RC panel (12). The barrier arms are hinged to the flywheel. The turnstile housing is fixed to the floor with 4 anchor bolts through holes in the turnstile housing base (2).

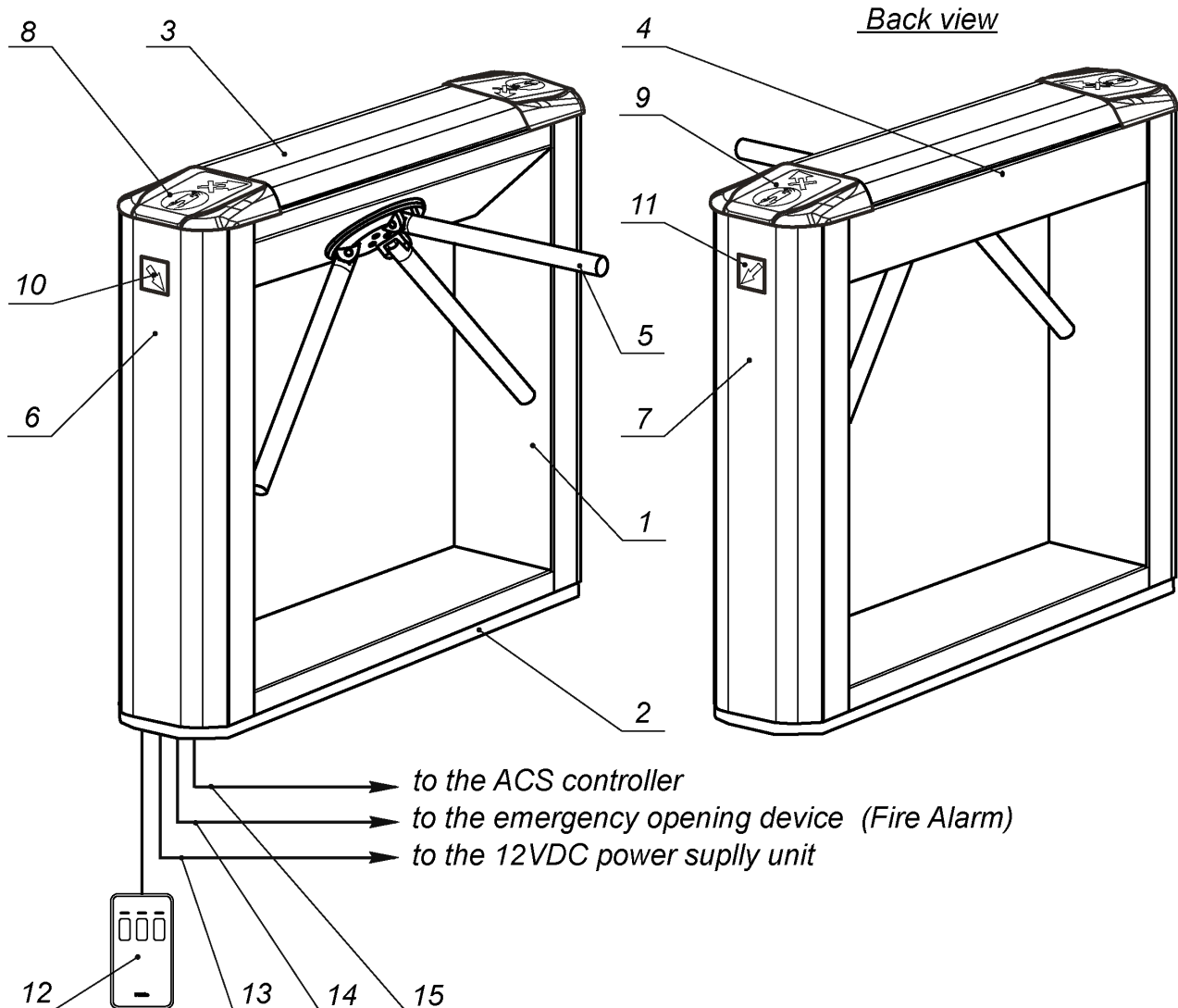


Figure 2. Design of the TTD-08A turnstile

Standard delivery set:

- 1 – housing; 2 – base; 3 – top cover; 4 – set screw for the top cover; 5 – barrier arm;
- 6, 7 – turnstile housing side panels; 8, 9 – side covers with indication blocks;
- 10, 11 – passage direction indicators; 12 – RC panel with cable

Not included in the standard delivery set:

- 13 – power cable; 14 – cable for the emergency passage unblocking device (*Fire Alarm*);
- 15 – ACS controller connection cable.

5.2.1 Turnstile housing

Internal elements of the turnstile housing are accessed through a removable top cover (3). The cover is fixed to the housing with a set screw (4). During operation of the turnstile, the top cover must be closed. Under the top cover, there is a bracket with the **CLB.140** control board (hereinafter, the control board) and the **XS1** remote terminal block.

Both front sides of the turnstile housing feature side covers with built-in indication blocks (8, 9). The covers are rigidly fixed to side panels (6, 7). Under the side covers, turnstile indication boards are

located. The side panels of the turnstile feature additional passage direction indicators, under which passage indication boards are placed. If the side panels, assembled with top covers, are removed, access is gained to four holes in the housing base (2) in order to fix the turnstile to the mounting surface.

To access the rotary group of barrier arms, it is necessary to remove the control board bracket.

The rotary group consists of (see Fig. 16):

- control mechanism with optical sensors tracking the rotation angle of the barrier arms, which help to register the fact of passage correctly;
- rotary mechanism, which includes:
 - resetting mechanism of the barrier arms (a pusher, springs, and a roller), which automatically resets the barrier arms to the initial position after every passage;
 - damper, ensuring smooth and silent operation of the rotary mechanism;
 - locking device, preventing the possibility of an unauthorized passage;
- electromagnetic mechanism for emergency passage opening.

5.2.2 Indication block

To provide information about the current status and selected operation mode of the turnstile, both side covers of the turnstile housing feature indication blocks (see Fig. 3). Each indication block has 3 mnemonic indicators:

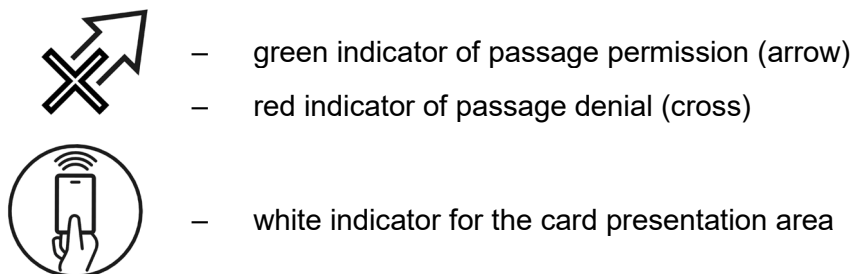


Figure 3. Indication block

5.2.3 RC panel

The RC panel (12) 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 overall view of the RC panel is shown in Fig. 4.

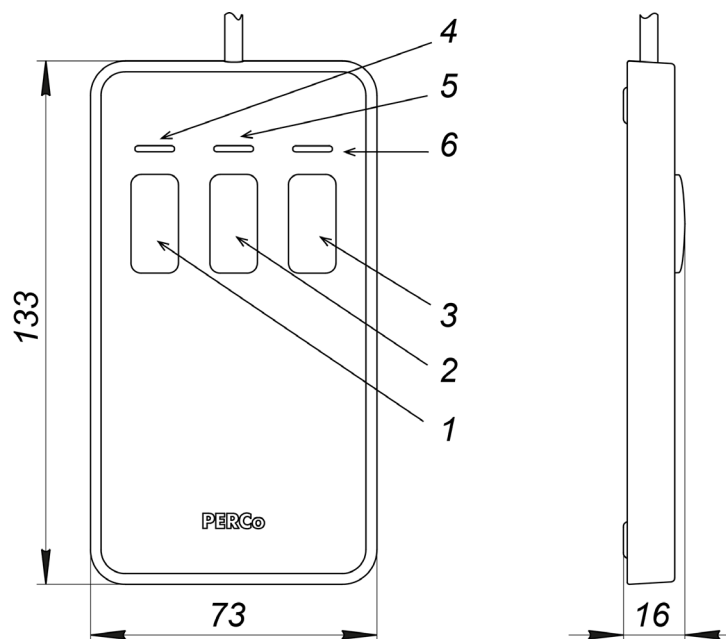


Figure 4. Overall view and dimensions of the RC panel

- 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 5 and 6 respectively.

5.2.4 Control logic board

The turnstile control board (see Fig. 5) and the **XS1** remote terminal block are fixed on the bracket located inside the housing. To access the board, it is necessary to remove the turnstile cover, following the instructions of Section 6.

The control board contains a microcontroller, which processes incoming control commands (*Unlock A*, *Stop*, *Unlock B*, and *Fire Alarm* inputs), tracks the status of optical sensors for rotation of the barrier arms, and generates commands for the control mechanism of the turnstile 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*).

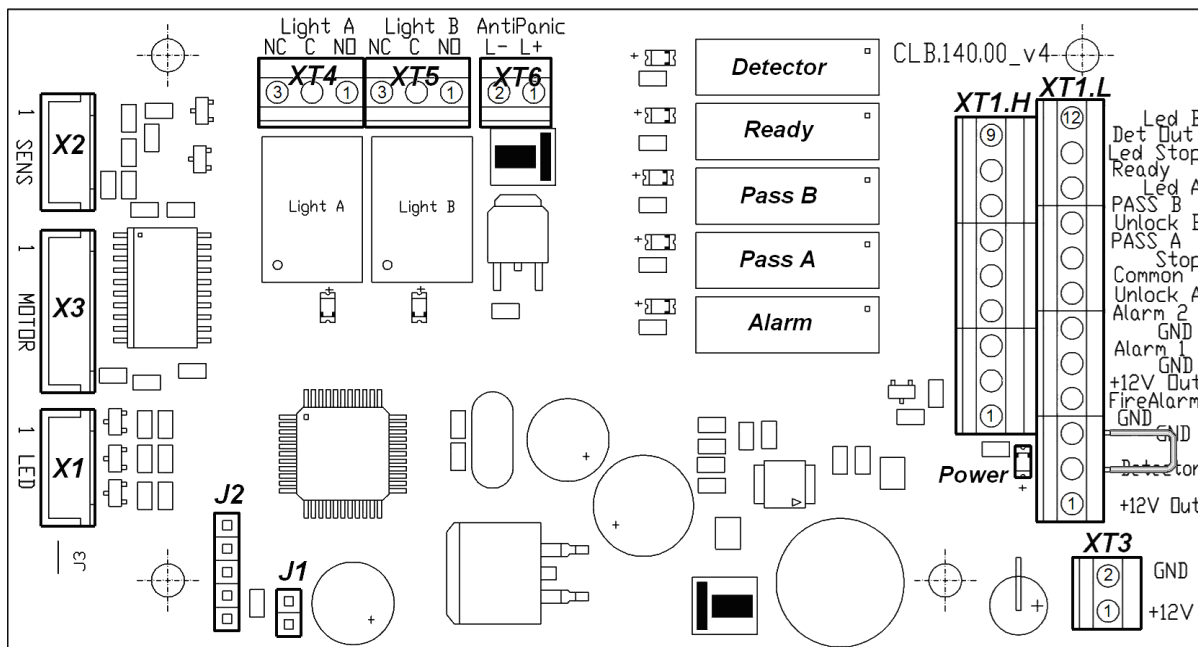


Figure 5. Control logic board (CLB)

The CLB (Fig. 5) includes:

- **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 such control devices as an RC panel and WRC, control outputs of the ACS controller as well as an emergency unblocking device (*Fire Alarm*) and intrusion detector (see Sections 5.3.1, 5.3.2, 5.4.1).
- **XT1.H (Out)** – terminal block for connection to control board outputs (see Section 5.4.1).
- **XT3 (+12VDC)** – terminal block to connect the turnstile's power supply unit.
- **XT4 (Light A)** and **XT5 (Light B)** – terminal blocks to connect “open/closed” remote indicators, one indicator for each direction (see Section 5.4.3).
- **XT6 (AntiPanic)** – terminal block to connect the electromagnet of the emergency passage unblocking mechanism.
- **J1** – connector for the jumper that selects the turnstile control mode. By default, the jumper is installed, which activates the pulse mode. To switch to the potential control mode, you need to remove the jumper (see Section 5.2.6).
- **J2** – connector for programming, which is not used during operation.
- **Power** – LED indicator of power supply to the control board.

Table 1. Contact functions of terminal blocks

No.	Contact	Function of the contact
XT1L (In)		
1	+12V	Connection of +12 V power supply for the intrusion detector
2	Detector	Input for connection of the intrusion detector
3	GND	Common
4	Fire Alarm	Control input for emergency unblocking of the passage
5	GND	
6	GND	Common
7	Unlock A	Control input – opening of direction A
8	Stop	Control input – passage denial
9	Unlock B	Control input – opening of direction B
10	Led A	RC panel indication output – opening of direction A
11	Led Stop	RC panel indication output – passage denial
12	Led B	RC panel indication output – opening of direction B
XT1H (Out)		
1	GND	Common
2	+12V	+12 V output for power supply to additional equipment
3	Alarm 1	Siren connection output
4	Alarm 2	
5	Common	Common contact for the <i>PASS A</i> and <i>PASS B</i> outputs
6	Pass A	<i>PASS A</i> relay output (passage in direction A)
7	Pass B	<i>PASS B</i> relay output (passage in direction B)
9	Ready	<i>READY</i> relay output (turnstile readiness)
10	Det Out	<i>DET OUT</i> relay output (intrusion detector status)
XT3 (+12VDC)		
1	+12V	Connection of an external power supply unit
2	GND	
XT4 (Light A)		
1	NO	Normally open contact of the control output for remote indication A
2	C	Common contact of the control output for remote indication A
3	NC	Normally closed contact of the control output for remote indication A
XT5 (Light B)		
5	NO	Normally open contact of the control output for remote indication B
6	C	Common contact of the control output for remote indication B
7	NC	Normally closed contact of the control output for remote indication B
XS1 remote terminal block on the bracket		
1	+12V	Connection of an external power supply unit (+12 V)
2	GND	
3	Fire Alarm	Control input for emergency unblocking of the passage
4	GND	
5	GND	Common
6	Unlock A	Control input – opening of direction A
7	Stop	Control input – passage denial
8	Unlock B	Control input – opening of direction B
9	Led A	RC panel indication output – opening of direction A
10	Led Stop	RC panel indication output – passage denial
11	Led B	RC panel indication output – opening of direction B
12	Common	Common contact for the <i>PASS A</i> and <i>PASS B</i> outputs
13	Pass A	<i>PASS A</i> relay output (passage in direction A)
14	Pass B	<i>PASS B</i> relay output (passage in direction B)

For convenience, the connection contacts of the turnstile's power supply unit and control devices are placed on the bracket on the **XS1** terminal block. The connection is carried out in accordance with the connection layout of the turnstile and additional equipment (see Fig. 12). The turnstile is energized via a power cable (13).

5.2.5 Parameters of control signals

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 и 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 incoming control commands received at other inputs are ignored (see 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 the intrusion detector is monitored by removal of a low-level signal relative to the *GND* contact from the *Detector* input of the control board. 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.

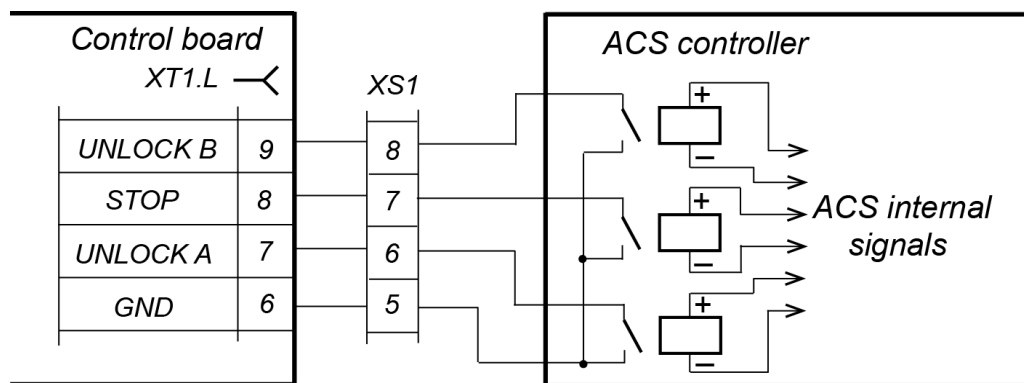


Figure 6. Control elements of an external device: normally open relay contact

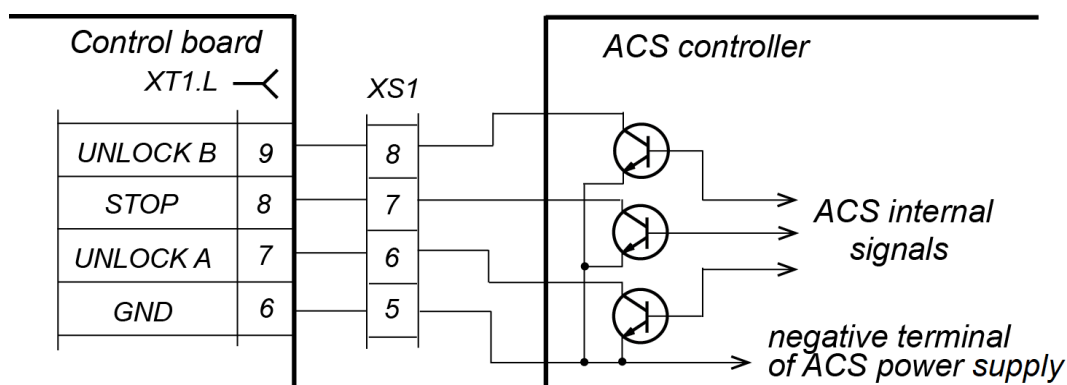


Figure 7. Control elements of an external device: circuit with an open collector output

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 as the control element:

voltage at the closed contact

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

5.2.6 Control modes of the turnstile

Two control modes of the turnstile are available: pulse and potential. In both modes, the turnstile is controlled by sending commands (i.e., combination of control signals) to 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 5 and 6).



Attention!

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

The control mode is selected by removal / installation of 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. In order to switch to the potential mode, remove the jumper. The control mode will change as soon as the turnstile is switched on.

Pulse control mode

The mode is used to control the turnstile via its RC panel, WRC, and 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 passage waiting time amounts to 5 seconds and does not depend on the control signal (pulse) duration.

The turnstile operation in pulse control mode is described in Table 5. The algorithm of sending control commands in this mode is described in Appendix 1.

When a low-level signal is removed from the special *Fire Alarm* control input, the turnstile switches to the *Fire Alarm* mode, and all incoming turnstile control commands are ignored in this case (see Section 5.3.2).

When a low-level signal is applied to the *Fire Alarm* input, the *Passage denial* command is sent, and the turnstile's rotary mechanism is locked.

Potential control mode

The mode is used to control the turnstile using the 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 is equal to the control signal duration: if there is a low-level signal at the input for the authorized direction by the time of passage in this direction, then the turnstile will stay open in this direction.

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 6. 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 advisable 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 the 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) to the control board inputs.
2. The 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 for rotation in the selected direction. Passage in this direction becomes possible.
4. When a user passes through the turnstile, the microcontroller tracks the rotation angle of the barrier arms with optical 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, becomes active. The microcontroller generates a command for the control mechanism to lock the turnstile's rotary mechanism.
5. After the passage is complete, i.e. after the barrier arms are reset to the closed position (120° rotation), 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, then the locking command for the rotary mechanism is generated after the unlocked state holding time expires (5 seconds from receipt of the command by default).
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, in any combination with each other, or all simultaneously (in parallel).



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 signals that has been generated (App. 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 **XS1** remote terminal block with a flexible multicore cable in accordance with the electrical connection layout of the turnstile (see Fig. 12).

The standard orientation of the RC panel relative to the 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 (see Table 2).

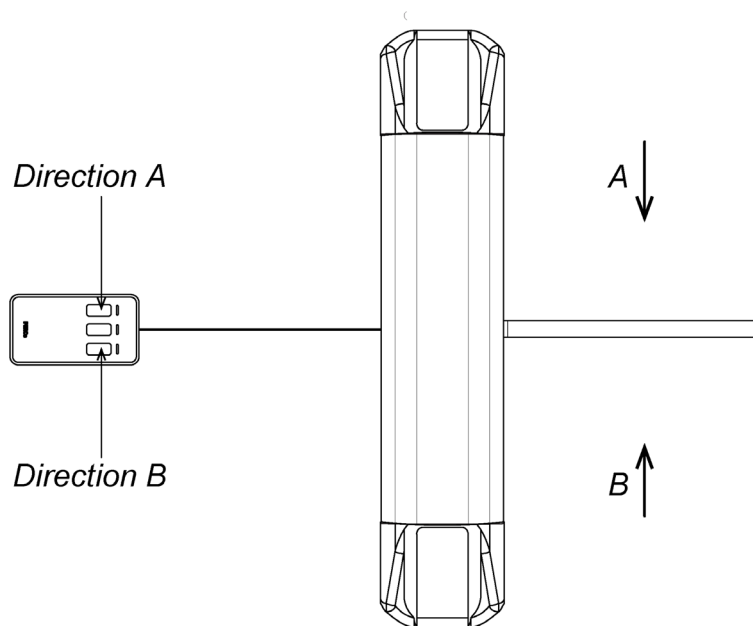


Figure 8. Standard RC panel orientation relative to the turnstile housing



Note:

The WRC is connected to the *GND*, *Unlock A*, *Stop*, and *Unlock B* contacts of the **XS1** remote terminal block. Power supply of the WRC is connected to the +12V contact of the **XS1** terminal block.

Table 2. Connection of RC-panel cable wires to the XS1 terminal block for standard and reverse RC panel orientation

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

5.3.2 Fire Alarm device

The emergency passage unblocking device is connected to the *Fire Alarm* (3) and *GND* (4) contacts of the **XS1** remote terminal block in accordance with the turnstile's electrical connection layout (see Fig. 12).

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 and cannot rotate in both directions. The central barrier arm automatically falls by gravity and takes a vertical position, clearing the passage. The following indication is displayed on the indication blocks simultaneously for both directions: alternate flashing of green (for 1.25 sec.) and red (for 0.25 sec.) turnstile indicators.

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 operation, the barrier arm needs to be moved to the horizontal position manually so that it is fixed.

5.3.3 Control via ACS

The turnstile can be used as an operating device when working as a part of the ACS. The turnstile can be equipped with built-in proximity access card readers under plastic side covers.

The ACS controller outputs are connected to the *GND*, *Unlock A*, *Stop*, and *Unlock B* contacts of the **XS1** remote terminal block.

The ACS controller inputs are connected to the *Common*, *PASS A*, and *PASS B* contacts of the **XS1** remote terminal block and to the *Ready* and *Det Out* contacts of the **XT1.H** terminal block of the control board. The connection is carried out in accordance with the turnstile's electrical connection layout in Fig. 12.

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. The following relay outputs are installed:

- *ALARM*: *Alarm 1* and *Alarm 2* contacts (see Section 5.4.2),
- *PASS A*: *Pass A* and *Common* contacts (see Section 5.2.7),
- *PASS B*: *Pass B* and *Common* contacts (see Section 5.2.7),
- *READY*: *Ready* and *Common* contacts (see Section 5.5),
- *DETECTOR*: *Det Out* and *Common* contacts (see Section 5.4.2).

The *Pass A*, *Pass B*, and *Common* contacts are placed on the **XS1** remote terminal block as well.

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) condition, 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, installed on the control board near the corresponding relay (see Fig. 5).

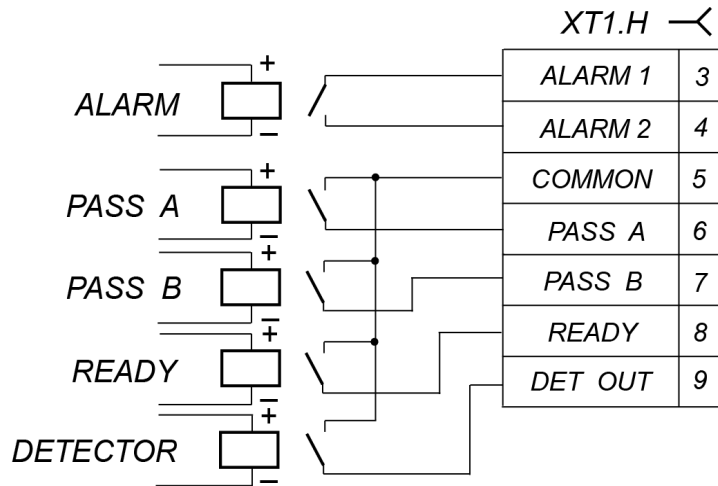


Figure 9. Output stages for PASS A, PASS B, Ready, Det Out, and Alarm

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

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

5.4.2 Intrusion detector and siren



Attention!

Installation of an intrusion detector inside the turnstile housing is not possible.

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 *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.

5.4.3 Remote indicators

Remote indication blocks for corresponding passage directions are connected to the *Light A* and *Light B* outputs. The outputs are outfitted with a full group of contacts: normally opened *NO*, normally closed *NC*, and common *C*. Connection to the outputs is performed through the **XT4** and **XT5** terminal blocks respectively.

If passage in direction *A/B* is permitted, the *Light A / Light B* relay of the corresponding passage direction is activated (its coil gets energized), and if passage is denied, the relay gets stabilized.

Voltage supply to the relay coil is indicated by lighting up of the red LED, installed on the control board near the corresponding relay.

The output stages for the *Light A* and *Light B* relays are changeover relay contacts (Fig. 10) with the following signal characteristics:

- maximum commutation voltage 30 V DC
- maximum commutation voltage 42 V AC
- maximum commutation AC/DC current..... 3 A
- closed contact resistance max. 0.15 Ohm

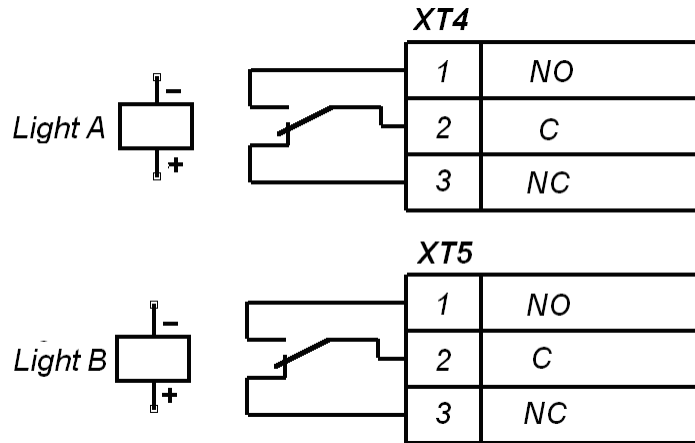


Figure 10. Output stages for Light A and Light B

5.5 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 activation of 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 relay coil is deenergized), 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 (the relay coil is energized), 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 fault is repaired.

6 MARKING AND PACKAGING

The turnstile has a marking label and sticker. The label can be found inside the turnstile housing, under the top cover (3). It contains 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. To do so, proceed as follows:

1. Switch off power supply of the turnstile.
2. Insert an SW2.5 Allen key from the delivery set into the hole in the rear part of the turnstile housing and use it to unscrew the set screw (4), which fixes the top cover (see Fig. 11).
3. Holding the rear edge of the top cover, carefully lift it and, turning it in the direction of the barrier arms, remove it from the turnstile housing.
4. 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. After its installation, use the key to return the set screw into its initial position and fix the top cover. Turn on the power supply unit and move the upper barrier arm into the working position to continue the turnstile's operation.

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

Box dimensions (length × height × width) 132×110×40 cm
 Box weight (gross) max. 97 kg

7 SAFETY REQUIREMENTS

7.1 Installation safety

The turnstile shall be installed only 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 the safety rules stipulated in its operational documentation.

7.2 Operation safety

Observe general electrical safety rules when operating the turnstile.



Warning!

- Do not use the turnstile under conditions that do not comply with the requirements of Section 2.
- Do not use 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 serviceability 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.



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 (4) that fixes the top cover (see Figure 11).

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.

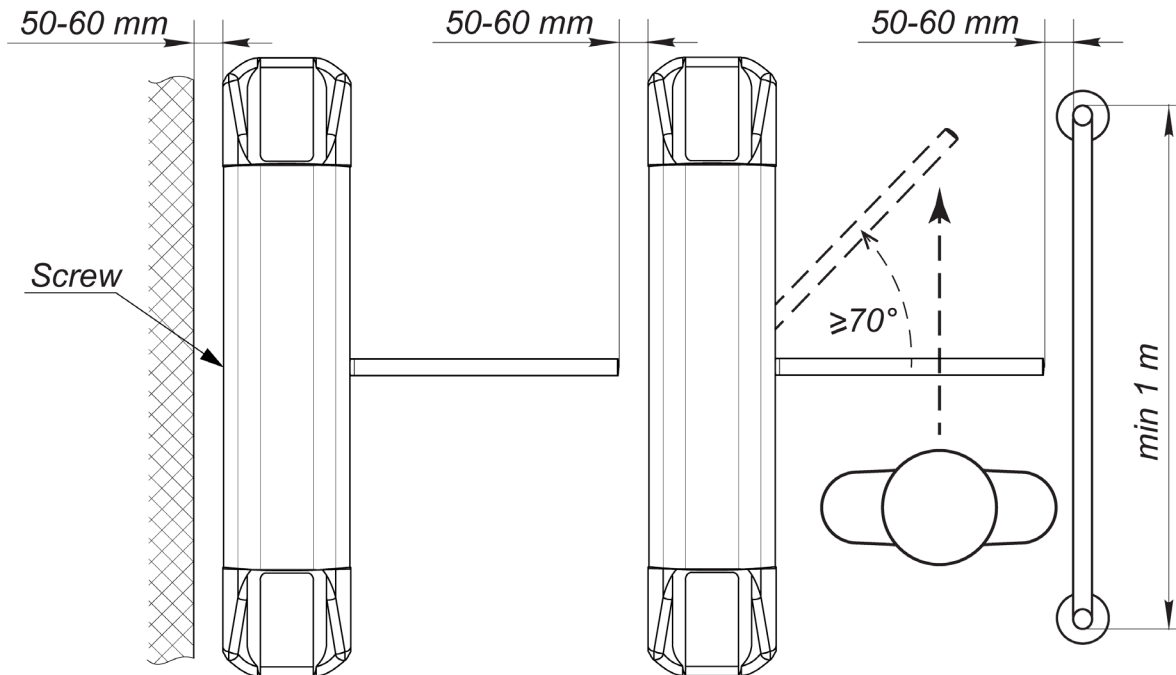


Figure 11. Recommendations for the passage zone organization

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. 11 when organizing the passage zone.

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 (ref. Section 10) can serve as such an exit.

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 screwdrivers No.2 and No. 5 (150 mm);
- Phillips-head screwdriver No.2;
- horn-type and socket wrenches: S17, S13, S10, S8, S7, S5.5;
- SW2.5 Allen (Inbus) key;
- level;
- measuring tape (2 m);
- 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

Cables used for installation are listed in Table 3.

Table 3. Cables used during the installation

No.	Equipment to be connected	Maximum cable length, m	Cable type	Minimum cross-section, mm ²	Example of the cable
1	Power supply unit	10	Twin wire	1.5	AWG 15; HO3VV-F 2×1.5 bi-colored
		15	Twin wire	2.5	AWG 13; HO5VV-F 2×2.5 bi-colored
2	- Fire Alarm - Additional equipment	30	Twin wire	0.2	RAMCRO SS22AF-T 2×0.22 CQR-2
3	RC panel	40	Eight core cable	0.2	CQR CABS8 8×0.22c
4	WRC	40	Six core cable	0.2	CQR CABS6 6×0.22c
5	ACS controller	30			

8.4 Connection layout of the turnstile and additional equipment

Table 4. Elements of the connection layout of the turnstile and additional equipment

Legend	Name	Q-ty, pcs
A1	Control mechanism	1
A1.1	Rotation sensor group	1
A1.2	Electromotors	1
A1.3	Electromagnet assembly	1
A2, A3	Assembled side panels with side covers	2
A2.1, A3.1	Indication boards (jumpers are in the L position on IM1, and in the R position on IM2)	2
A2.2, A3.2	Boards of direction indication (jumper is in the L position on MDI1, and in the R position on MDI2)	2
A4	Bracket with the CLB and XS1 remote terminal block	1
A5	CLB.140 control logic board	1
A6	RC panel	1
A7 ¹	WRC device	1
A8 ¹	ACS controller	1
A9 ¹	Turnstile's power supply unit, 12 V DC	1
A10 ¹	Intrusion detector	1
A11 ¹	Siren, 12 V DC	1
A12 ¹	Emergency passage unblocking device (<i>Fire Alarm</i>)	1
A13.1 ¹ , A13.2 ¹	Remote indicators	2
A14 ¹	Power supply unit of the remote indicators	1
XS1	Remote terminal block (<i>Klemsan 1/12</i>)	2
1	Power cable	1
2	Control cable	1
3	Indication cable	1
4, 5	Cables of the boards of direction indication	2
6	Cable for connection of indication boards	1
7	Jumper wire. Installed when no <i>Fire Alarm</i> device (A12) is connected. Installed by default	1
8	Jumper wire. Installed when no intrusion detector (A10) is connected. Installed by default	1

¹ Not included in the standard delivery set.

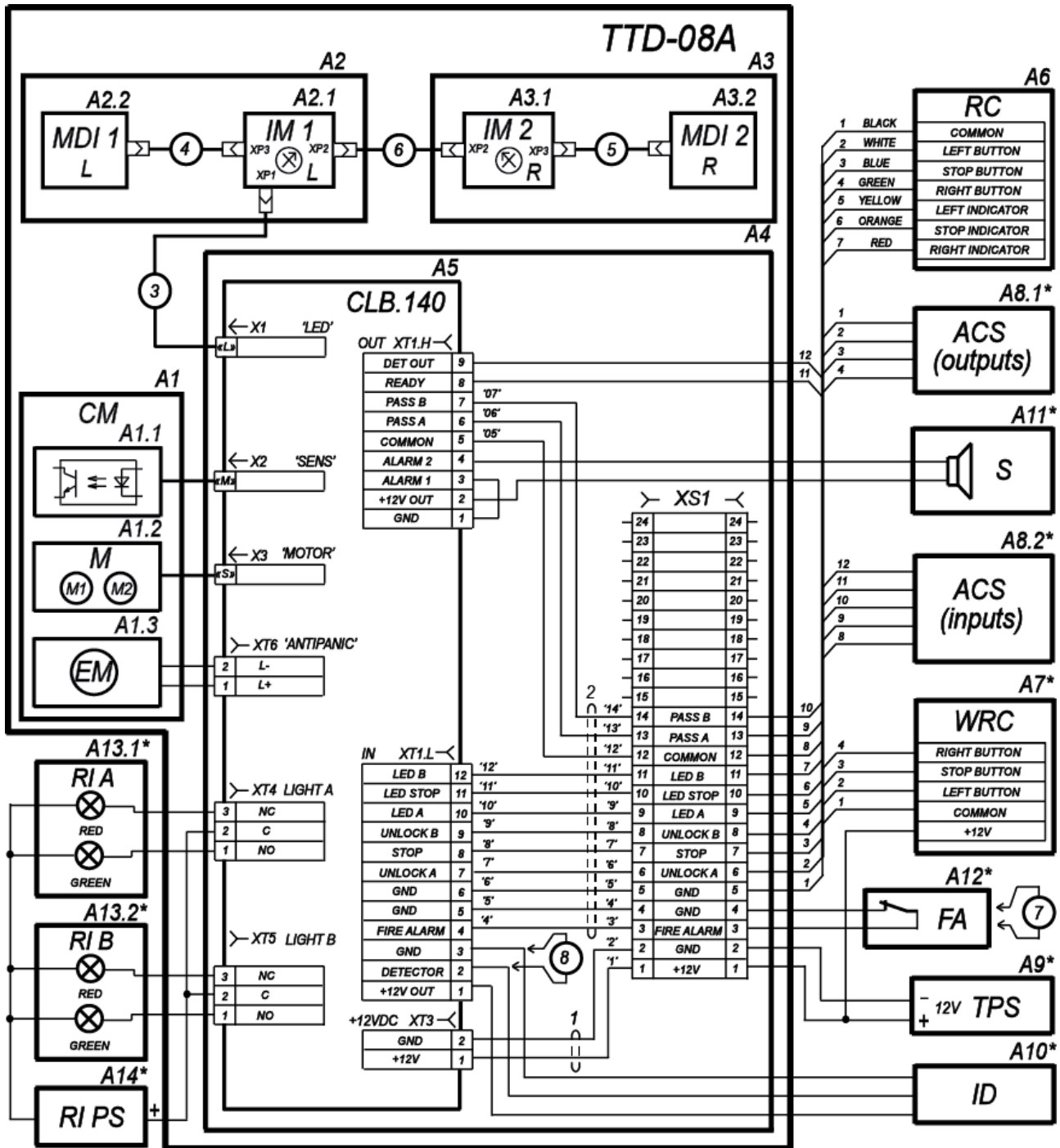


Figure 12. Connection layout of the TTD-08A turnstile and additional equipment¹

8.5 Installation procedure



Attention!

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

Installation procedures are described with due consideration for recommendations stipulated in Section 8.1. Equipment and tools required for installation are listed in Section 8.2. Types of the cables used during installation are listed in Section 8.3. Connection layouts of the turnstile and additional equipment are given in Section 8.4. Item numbers are stated in accordance with Fig. 2.

¹ Elements of the layout are listed in Table 4. Elements marked with an asterisk (*) are not included in the standard delivery set.

Perform the following sequence of actions when installing the turnstile:

1. Unpack the turnstile and check the completeness of the delivery set as per Section 4.
2. Install the turnstile's power supply unit in its place in accordance with its operational documentation.
3. Drill holes for anchor sleeves in the floor to fix the turnstile housing in accordance with Fig. 13.

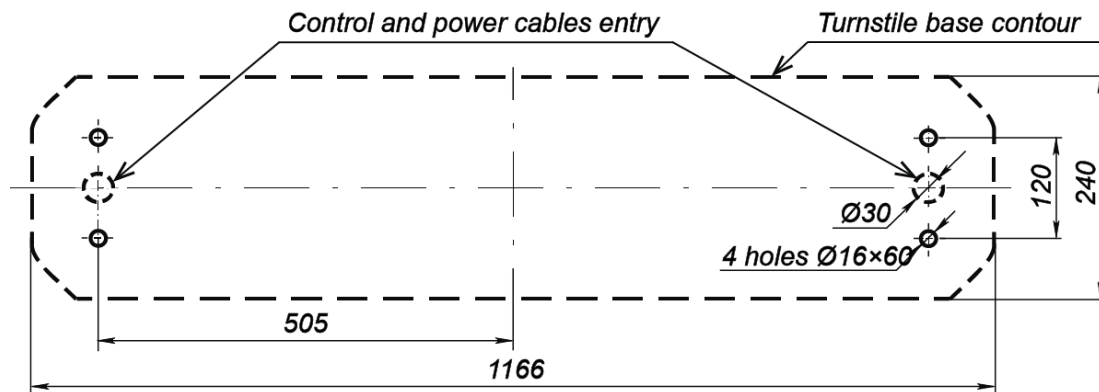


Figure 13. Marking layout for the TTD-08A turnstile housing installation¹

4. 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. Cable routing inside the turnstile housing is shown in Fig. 14.



Attention!

- It is necessary to leave enough length of cables connected to the remote terminal block and control board to enable removal of the bracket and provide access to the rotary group of the barrier arms.
- Install and fix the housing only after all the cables have been laid inside the turnstile housing and in the cable duct.

5. Insert anchor sleeves into the holes you have drilled so that they do not protrude from the floor surface.
6. Remove the turnstile housing top cover (3) (ref. Section 6).
7. Remove the turnstile housing side panel (7), assembled with a cover (9). For this purpose:
 - Loosen two screws (2 in Fig. 15).
 - Move the side panel away from the housing and disconnect the cable, connecting indication boards (8 on Fig. 14), from indication board IM2, located under the cover.
 - Remove the side panel and carefully put it on a flat steady surface.
8. Remove the turnstile housing side panel (6), assembled with a cover (8). For this purpose:
 - Loosen two screws (1 in Fig. 15).
 - Move the side panel away from the housing and disconnect the cable that connects indication boards (8 in Fig. 14) as well as the indication cable, running from the control board (7 in Fig. 14), from indication board IM1 (located under the top cover).
 - Remove the side panel and carefully put it on a flat steady surface.
9. Mount the housing on anchor sleeves and fix it with M10 bolts through the holes in the housing base.
10. Connect the power cable (13) to the **XS1** remote terminal block (ref. Fig. 12).
11. Connect the cable of the RC panel (12) to the **XS1** remote terminal block.
12. If needed, connect cables from other devices to corresponding terminal blocks of the control board.
13. If needed, install the ACS controller in the place provided for this purpose. If the ACS controller dimensions do not exceed 250×130×35 mm, it can be installed inside the turnstile housing under the top cover on the main bracket (10 in Fig. 14); to do this, use PCB pillars on self-adhesive cable tie mounts from the delivery set.

¹ The diameter and depth of the holes in the layout are indicated for anchors of the PFG IR 10-15 SORMAT type; when using other types of anchors, it is necessary to make holes with a size appropriate for those.

14. If needed, install access card readers on special brackets at the ends of the housing (9 in Fig. 14).



Note:

The turnstile design enables installation of **IR13**, **IR19** and **IR19 OEM** readers made by **PERCo** as well as readers made by third-party manufacturers. Access card readers are not included in the standard delivery set! Readers are to be selected, purchased, and installed in the product by the customer (installer) on their own. Readers made by third-party manufacturers must meet the following requirements:

overall dimensions (L x W x H)	max. 155×90×30 mm
ID reading range	min. 50 mm

The brackets have holes for mounting **IR13** and **IR19** readers. If other types of readers need to be installed, they can be mounted on the brackets using double-sided adhesive tape or by drilling holes where required. The brackets are removable to simplify the installation process; to remove the bracket, unscrew two M3 nuts located under this bracket with an S5.5 horn-type wrench. **IR19 OEM** readers are installed directly on the turnstile's indication blocks from below on double-sided adhesive tape; the installation location should be selected so that the readers do not hinder the installation of the side panel with its cover back in their place. Use free contacts (15 - 24) of the **XS1** remote terminal block to connect the readers.

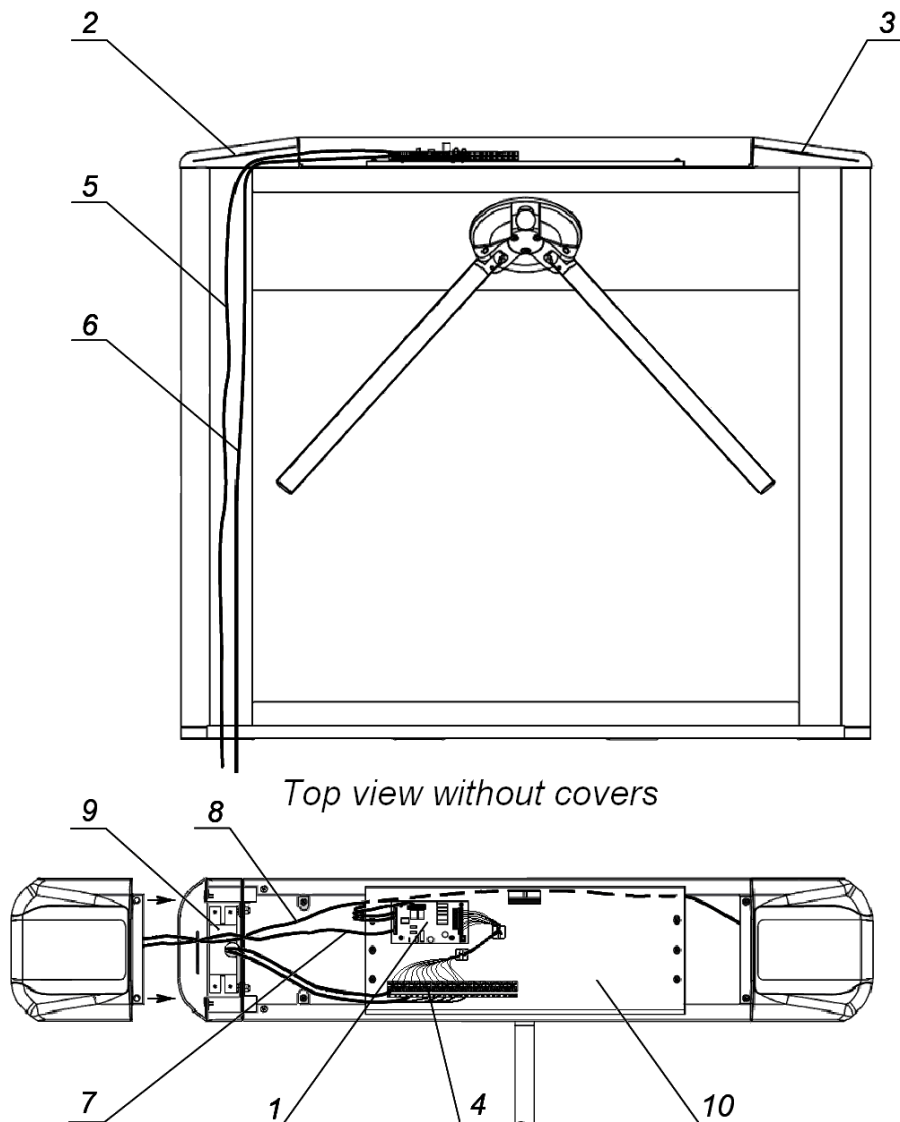


Figure 14. Cable routing inside the housing

- 1 – CLB.140 control board; 2 – IM1 indication board; 3 – IM2 indication board;
- 4 – **XS1** remote terminal block; 5 – power cable; 6 – cable from the RC panel (WRC device);
- 7 – indication cable from the control board to IM1 (3 on Fig. 12);
- 8 – cable from IM1 to IM2 (6 on Fig. 12); 9 – bracket for reader installation;
- 10 – ACS controller installation zone

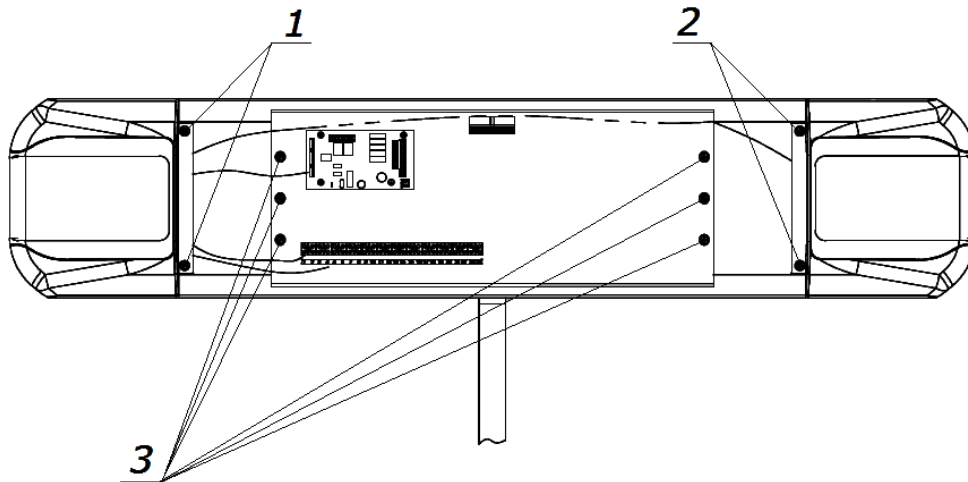


Figure 15. Layout of fixing screws

1, 2 - screws for fastening side panels with covers,

3 - screws for fastening the bracket with the control board and remote terminal block

15. Install side panels (6, 7), assembled with top covers (8, 9), back in place in reverse order to their removal. Be sure to connect cables to the indication blocks.
16. Fix all the cables using self-adhesive cable tie mounts and non-releasable ties supplied as part of the standard delivery set.
17. If the turnstile is supposed to function in potential control mode, remove the jumper from the **J1** connector (see Fig. 5).
18. Check the serviceability and accuracy of all the electrical connections.
19. Install the top cover (3) back in place in reverse order to removal.
20. Perform a test run of the turnstile as specified in Section 9.1.
21. Check the turnstile operation using the RC panel in accordance with Section 9.2 or 9.3, depending on the selected control mode.

After its installation and testing have been completed, the turnstile is ready for operation.

9 OPERATION

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



Warning!

- 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.



Recommendations for cleaning and maintenance of stainless steel:

The anti-corrosion effect of stainless steel depends on the state of the thin oxide layer on its surface. Therefore, soft lint-free napkins and cloths as well as non-abrasive neutral detergents should be used for its cleaning and maintenance. It is not allowed to use coarse and stiff sponges, brushes, and other items that can scratch the product surface. Avoid cleaners containing chlorides, ammonia, and other reagents that can damage the oxide film.

To remove tough stains from stainless steel, use non-abrasive products specially intended for this purpose according to their instructions (for instance, *E-NOX Clean* or similar).

After treatment, wash off the remaining detergents with clean water and wipe the treated surfaces dry. During the product operation, the use of special stainless steel protection products, containing neutral oils (for instance, *Glutoclean* or similar), is recommended.

If the turnstile is meant to be installed outdoors, it is necessary to minimize possible ingress of precipitation and road chemicals.

9.1 Power-up

Follow these steps to power up the turnstile:

1. Check the accuracy of all the connections.
2. Connect the power supply unit to the mains with the voltage and frequency specified in its certificate.
3. Switch on the power supply unit. Red passage denial 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

The turnstile control commands are sent from the RC panel, and their indication is displayed in accordance with Table 5. Passage directions are independent of each other, i.e., a command sent for one direction does not change the status of the opposite passage direction.



Note:

Pressing a button on the RC panel sends a low-level signal to the relevant contacts (*Unlock A*, *Unlock B*, or *Stop*) of the **XS1** remote terminal block relative to the *GND* contact.

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 5 seconds, 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, which totals 5 seconds, resumes for the opposite 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 only to the *Passage denial* mode.

Table 5. Pulse control mode (the J1 jumper is installed)

Command	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 on the RC panel	The green <i>Left / Right</i> indicator of the chosen passage direction is on	The green indicator for the chosen 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 chosen passage direction is on	The turnstile stays open in one of the directions until the mode is changed

Command	Actions to do via the RC panel	Indication		Turnstile status
		on the RC panel	on the turnstile	
<i>Free passage in the set 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 authorized single passage direction	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 on the RC panel simultaneously: LEFT , STOP , and RIGHT	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

9.3 Turnstile operation in potential control mode

The turnstile control commands are sent, and their indication is displayed in accordance with Table 6. Passage directions are independent of each other, i.e., a command sent for one direction does not change the status of the opposite direction.

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



Note for ACS outputs:

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

Table 6. Potential control mode (the J1 jumper is removed)

Commands	Control signal	Indication		Turnstile status
		on the RC panel	on the turnstile	
<i>Both passage 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</i> / <i>Right</i> indicator of the chosen passage direction is on	The green indicator for the chosen 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

10 EMERGENCY RESPONSE

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 a 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. 5.3.2).

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



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.

11 TROUBLESHOOTING

Possible faults that can be cleared by the users themselves are listed in Table 7.

Table 7. Troubleshooting

Fault	Possible cause	Remedy
The power supply unit is switched on, but the turnstile does not function, and there is no light indication on the turnstile housing and the RC panel	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 XS1 and XT3 terminal blocks
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 XS1 terminal block

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

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. The maintenance is to be carried out by a properly qualified mechanic only after careful study of this Manual. The item numbers are specified in accordance with Fig. 2 unless expressly stated otherwise.



Attention!

To prevent damage and to maintain the appropriate quality of the coating, one needs to clean the surface of the turnstile from dirt regularly, at least once a quarter.

Recommendations on how to clean stainless steel can be found in Section 9.

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 flywheel with the barrier arms by unscrewing three M8 screws.
3. Lubricate points of contact between the triggers and hinge in the flywheel as well as hinged attachment points of the barrier arms with machine oil.
4. Remove the turnstile top cover (3) from the turnstile housing as described in Section 6 and place it on a flat steady surface.
5. To access the rotary group of the turnstile's barrier arms, remove the bracket with the control board and remote terminal block. For this purpose: unscrew 6 screws (3 on Fig. 15), which fix the bracket on the turnstile housing, and carefully move the bracket aside without damaging connected cables.

6. Inspect the rotary group of the barrier arms: its resetting mechanism (a pusher, springs, and a roller), optical rotation sensors for the barrier arms, and damper (see Fig. 16).
7. 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 the working gaps of both optical rotation sensors.
8. Lubricate the following parts of the rotary group:
 - rotation axes of the pusher lever (17 in Fig. 16), roller (15 in Fig. 16), and stoppers (11, 12 in Fig. 16) with the **Chain and Rope Lube Spray – WEICON** lubricant;
 - parts of the emergency passage unblocking mechanism (4 in Fig. 16) with the **Chain and Rope Lube Spray – WEICON** lubricant.
 - attachment points of the resetting springs (20, 21 in Fig. 16) with machine oil.



Attention!

Avoid ingress of the lubricant on the rotation sensor disk and roller surfaces when cleaning and lubricating the rotary group of the barrier arms.

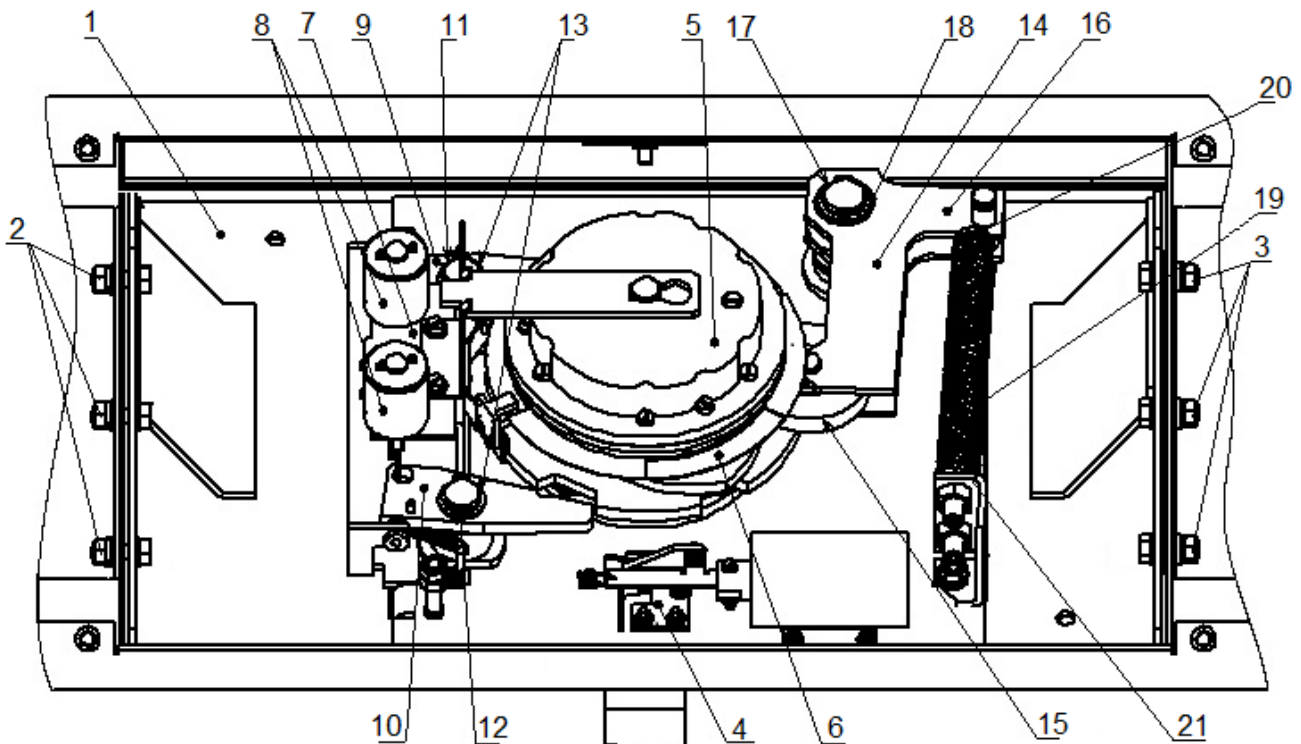


Figure 16. Rotary group of the turnstile's barrier arms

- 1 – base of the rotary group; 2, 3 – nuts fixing the base to the housing;
 4 – emergency passage unblocking mechanism; 5 – damper; 6 – rotation sensor disk;
 7 – control mechanism; 8 – electric motor of the stopper unit; 9, 10 – stopper;
 11, 12 – stopper axis; 13 – locking washers of stopper axes; 14 – pusher;
 15 – roller; 16 – pusher lever; 17 – lever axis; 18 – locking washer of the lever axis;
 19 – springs; 20, 21 – attachment points of the springs

9. Install the bracket with the control board and remote terminal block in reverse order to removal.
10. Install the flywheel with the barrier arms in reverse order to removal.
11. Check the reliability of the cable connections to the CLB terminal blocks and, if necessary, tighten the relevant cable-fixing screws with a screwdriver.
12. Check the reliability of the barrier arms' (5) fastening in the hinged units of the turnstile and, if necessary, tighten the fixing screws.
13. Remove side panels (6, 7), assembled with top covers (8, 9), in a manner specified in Section 8.4. Check the tightness of the four anchor bolts securing the turnstile housing to the floor and, if necessary, tighten them.

14. Install side panels (6, 7), assembled with top covers (8, 9), back in their place in reverse order to removal.
15. Return the top cover (3) into its operating position in reverse order to removal and fix it with a screw.
16. Energize the turnstile and move the barrier arm to its working position.
17. Check operation of the turnstile in accordance with Section 9 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).

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 -40°C to $+55^{\circ}\text{C}$ and relative air humidity of up to 98% 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 its packaging for no less than 24 hours prior to the start of installation works under normal climate conditions corresponding to its operating conditions.

Appendix 1. Command 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 has not been 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* (or *XS1* remote) 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 5 sec., 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 5 sec., 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 5 sec., or until the passage has been made in this direction, 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. Command 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.

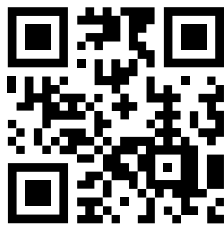
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