PERCo®

Electromechanical tripod turnstile with automatic anti-panic arms

TTR-10A

ASSEMBLY AND OPERATION MANUAL

CE EAC

Electromechanical tripod turnstile with automatic anti-panic arms

TTR-10A

Assembly and Operation Manual

CONTENT

Dear Customer,

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

Assembly and operation manual for the TTR-10A electromechanical tripod turnstile with automatic anti-panic folding arms (hereinafter - the *Manual*) contains data necessary for the utter use of the turnstile operating advantages. Packaging, installation and maintenance information is as well provided.

Installation and maintenance are to be executed by qualified personnel only, after studying this Manual carefully.

Abbreviations:

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

1 APPLICATION

TTR-10A electromechanical tripod turnstile with automatic anti-panic folding arms (hereinafter - the *turnstile*) is a motorized, weatherproof blocking device, designed as a part of paid access systems, including vehicles, as well as for managing the pedestrian flow at industrial enterprises, banks, administrative institutions, shops, train stations, airports, etc. For a more comfortable passage, the turnstile is equipped with an electric drive for smooth barrier arms rotation and provides the ability to quickly open the passage area in case of emergency.

The turnstile is made in three modifications:

- ***TTR-10AT*** with ***MT10.1*** bracket for mounting on vertical cylindrical racks (pipes, handrails), for example, in vehicles,
- ***TTR-10AK*** with ***MT10.2*** bracket for mounting on a vertical surface (wall),
- ***TTR-10AB*** with ***MT10.3*** mounting post for floor mount.

The number of turnstiles needed to ensure quick and convenient passageway is recommended to be determined upon calculation of the turnstile throughput rate (Sect. 3). The manufacturer recommends installing one turnstile according to the 500 people per shift criterion or based on the peak load of 30 people per minute.

24V DC output voltage power supply or rechargeable batteries are used to power the turnstile (for the range of permissible voltages, see Section 3 “Technical specifications”).

2 OPERATION CONDITIONS

The turnstile complies with GOST15150-69, category N1 (for an outdoor application) with regard to environmental exposure resistance.

The turnstile operation is allowed at temperature range from -40°C to +50°C (up to +55°C under the shelter) and at relative air humidity of up to 80% at +25°C.

The RC-panel, included in the standard delivery set, complies with GOST15150-69, category NF4 (operation in premises with climate control) with regard to environmental exposure resistance. Operation of the RC-panel is allowed at temperature range from +1°C to +40°C and at relative air humidity of up to 80% at +25°C.

3 TECHNICAL SPECIFICATIONS

Operating voltage ..... 22÷29V DC
Consumption current ..... max 5.5 A
Power consumption ..... 15÷150 W[1]
Turnstile throughput rate in the free passage mode ..... 60 persons/min
Turnstile throughput rate in the single passage mode ..... 30 persons/min

[1] Power consumption can reach 150 W only for a short time in certain turnstile conditions. The rest of the time, power consumption does not exceed 15 W.

Passage width ..... 500 mm
Arm rotation force ..... max 1.5 kgf
RC-panel cable length ..... 6.6[1] m
Ingress Protection Rating ..... IP54 (EN 60529)
Electric shock protection class ..... III (IEC 61140)
Vandal protection rating ..... IK09 (IEC 62262)
Vibration resistance rating ..... M28 and M29 (IEC 721-3-5)
Mean time to failure ..... min 3,000,000 passages
Mean lifetime ..... 8 years
Turnstile overall dimensions with barrier arm raised, see Fig. 1, 2, 3, 4 ,
turnstile without mounting bracket (post) ..... 613×800×696 mm
TTR-10AT modification with ***MT10.1*** bracket assembled ..... 613×800×746 mm
TTR-10AK modification with ***MT10.2*** bracket assembled ..... 613×800×714 mm
TTR-10AB modification with ***MT10.3*** mounting post assembled ..... 1055×800×760 mm
Turnstile net weight:
TTR-10AT, ***TTR-10AK*** modification ..... max 33 kg
TTR-10AB with ***MT10.3*** mounting post assembled ..... max 55 kg

4 DELIVERY SET

4.1 Standard delivery set

4.1.1 ***TTR-10AT*** modification

Basic equipment:
Turnstile housing and base assembled 1
Hub with barrier arms 1
RC-panel with cable 1
Box with a *MT10.1* mounting bracket (Fig. 14), includes**:**
Bracket base 1
Bracket back panel 1
Half-pipe clamps 2
M4×6 conical type screws 4
M6×40 cylinder type screws 8
Installation tools:
M8×25 screws with spring washers for mounting the hub 3
Anaerobic adhesive sealant for fixing the hub screws (20 ml) 1
SW3 Allen key 1
100 mm cable ties 5
M8 nuts 4
Flat washers *(*8) 4
Spring washers (8) 4
Technical documentation:
Certificate 1
Assembly and operation manual 1

4.1.2 ***TTR-10AK*** modification

Basic equipment:
Turnstile housing and base assembled 1
Hub with barrier arms 1
RC-panel with cable 1
Box with a *MT10.2* mounting bracket (Fig. 15), includes:
Assembled bracket 1
Installation tools:
M8×25 screws with spring washers for mounting the hub 3
Anaerobic adhesive sealant for fixing the hub screws (20 ml) 1
SW3 Allen key 1

[1] MAX allowed cable length – 40m (supplied on request).

100 mm cable ties 5
M8 nuts 4
Flat washers (8) 4
Spring washers (8) 4

Technical documentation:

Certificate 1
Assembly and operation manual 1

4.1.3 *TTR-10AB* modification

Basic equipment:

Turnstile housing, base and ***MT10.3*** mounting post assembled 1
Hub with barrier arms 1
RC-panel with cable 1

Installation tools:

M8×25 screws with spring washers for mounting the hub 3
Anaerobic adhesive sealant for fixing the hub screws (20 ml) 1
SW3 Allen key 1
100 mm cable ties 5

Technical documentation:

Certificate 1
Assembly and operation manual 1

4.2 Optional equipment supplied on request

WRC kit [1] 1
Intrusion detector 1
Siren 1
SORMAT anchor PFG IR 10-15 4

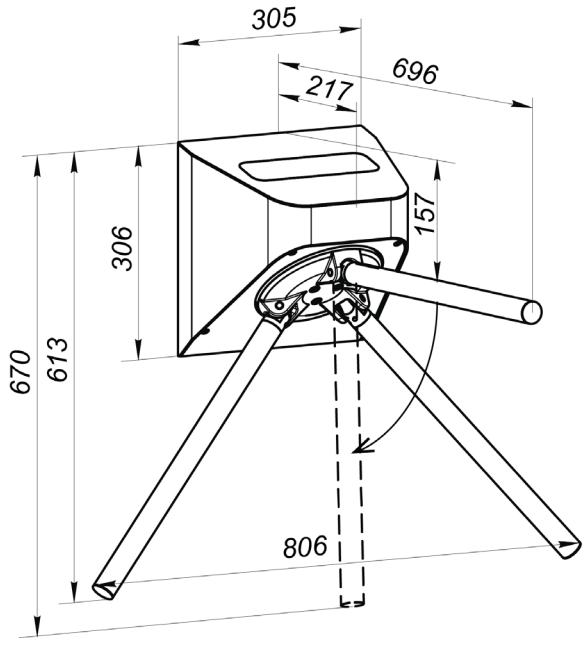


Figure 1. Turnstile overall view

[1] The WRC kit consists of a receiver connected to the control board and transmitters.

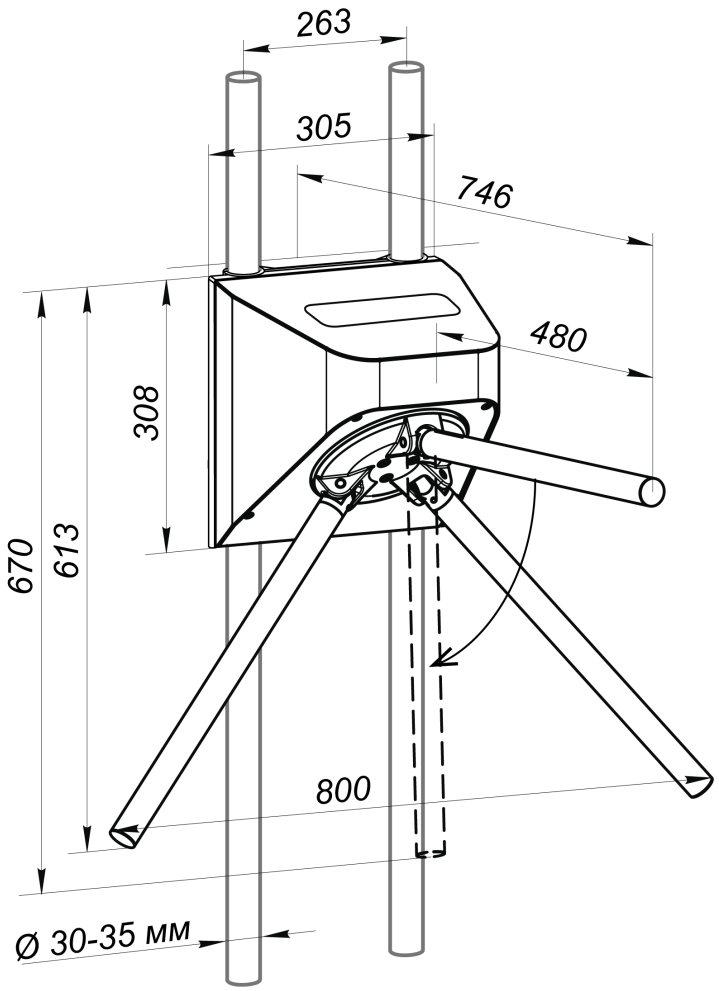


Figure 2. Overall dimensions of *TTR-10AT* modification with *MT10.1* bracket

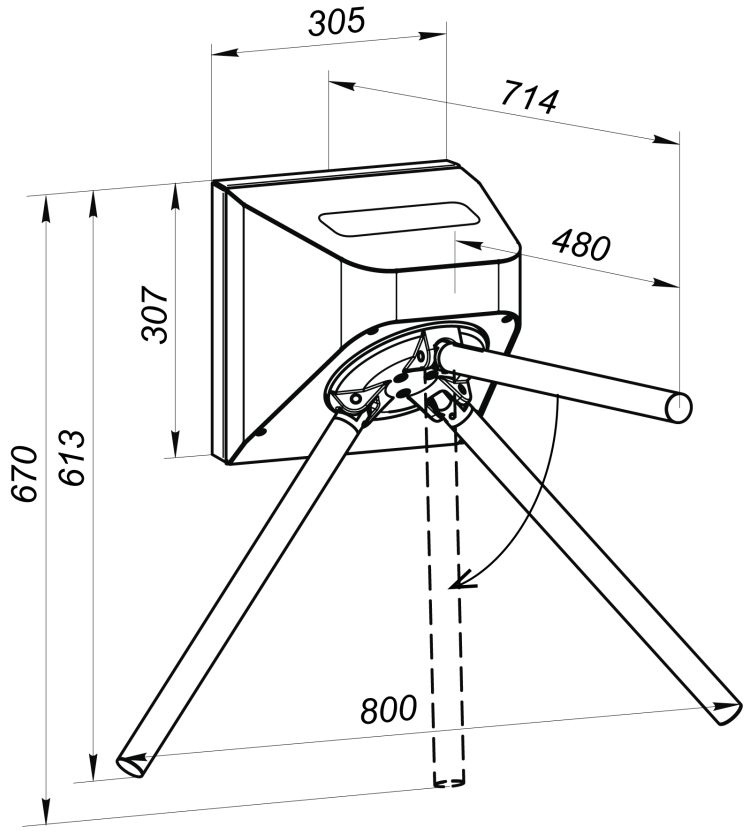


Figure 3. Overall dimensions of *TTR-10AK* modification with *MT10.2* bracket

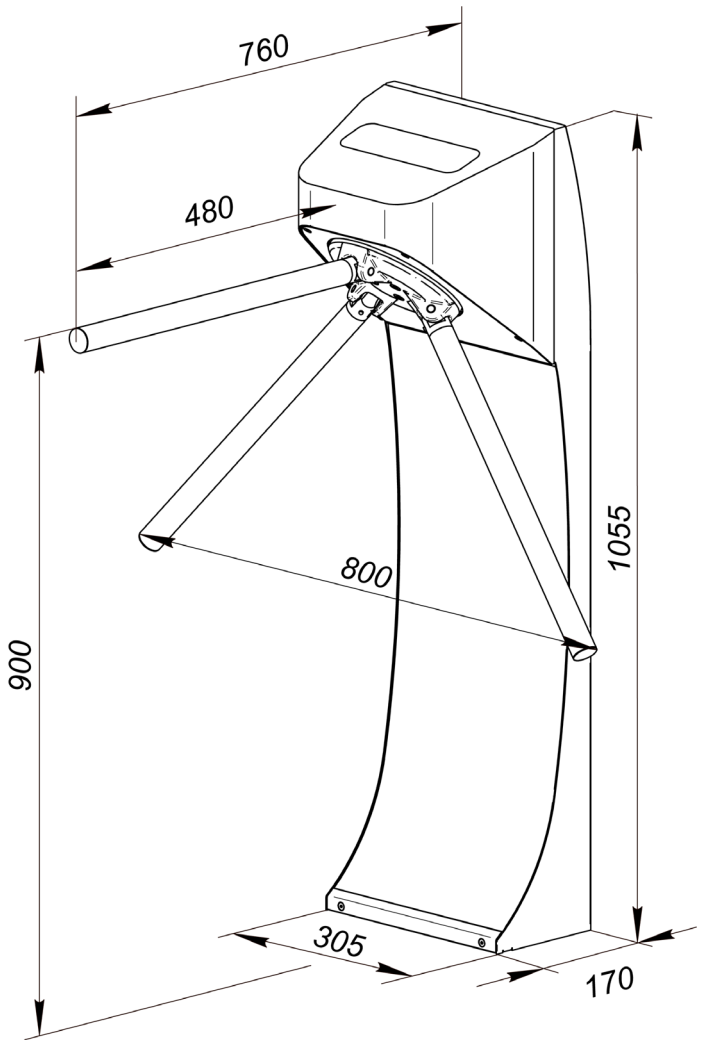


Figure 4. Overall dimensions *TTR-10AB* modification with *MT10.3* post

5 BRIEF DESCRIPTION

5.1 Main features

- The turnstile is designed to work both indoors and outdoors or inside vehicles. The turnstile housing is made of high quality stainless steel with polycarbonate insert.
- The turnstile can operate independently or with control devices: the RC-panel, WRC or ACS.
- The turnstile is equipped with automatic anti-panic folding arms. The barrier arm is set into vertical position at a power loss or by emergency unblocking device *Fire Alarm* signal.
- The turnstile is equipped with an operating mode indication. The turnstile provides an output for connecting an additional external display as well.
- The turnstile is equipped with relay inputs for an intrusion detector, a siren and the emergency unblocking *Fire Alarm* device (i.e. fire protection system) connection.
- The turnstile is equipped with an output for a power supply low voltage alarm connection.
- There are two modes for the turnstile control - a pulse control mode and a potential control mode.
- The turnstile mechanism provides automatic barrier arm rotation to the initial position after each pass.
- After the barrier arms are turned 60° or more, the reverse rotation is blocked.
- The rotor electric drive provides smooth and silent operation of the turnstile.
- The turnstile is supplied with safe 24V voltage.

5.2 Design

The design of the turnstile (Fig. 2). Numbers in brackets correspond to Fig. 2 and 3 of this Manual.

The turnstile comprises turnstile base (6), housing (1) LED indication unit (2), hub (4) with three barrier arms (3) and RC-panel. Additionally, depending on modification, the turnstile is equipped with a mounting bracket for cylindrical racks (for example, in vehicles), for wall mounting, or mounting post for installation on the floor. Optional equipment that is not included in the main delivery set is supplied on request.

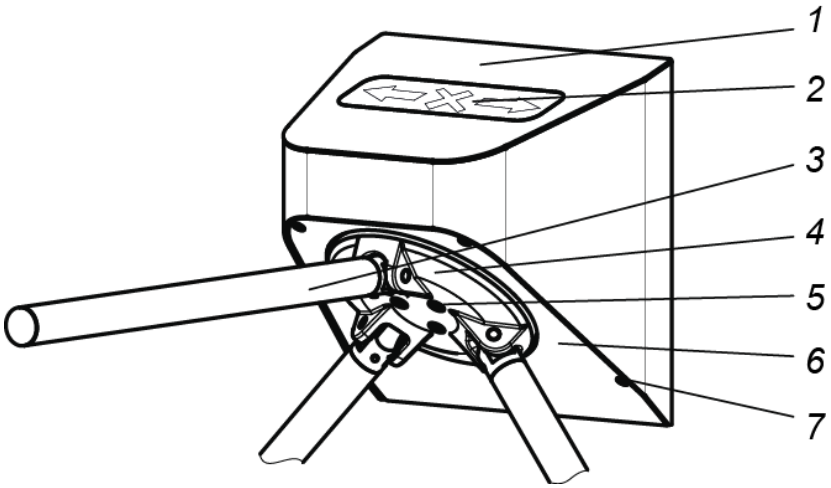


Figure 5. Turnstile components without a mounting bracket (post)

1 – turnstile housing; 2 – LED indication unit; 3 – barrier arm; 4 – hub;
5 – hub mounting screws; 6 – turnstile base; 7 – housing mounting screws

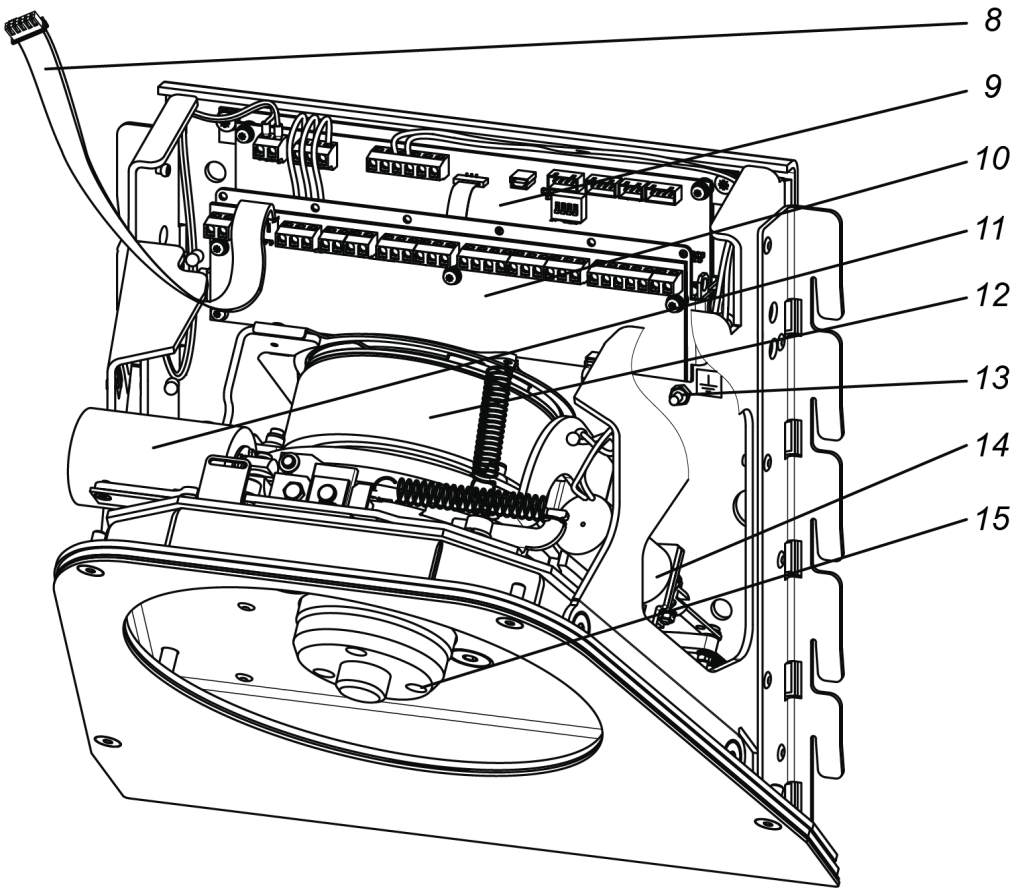


Figure 6. The internal turnstile components (with the housing and the hub removed)

8 – indication cable; 9 – control board; 10 – interface board;
11 – emergency unblocking device (*Fire Alarm)*; 12 – assembled drive;
13 – grounding point; 14 – blocking device; 15 – hub mounting holes

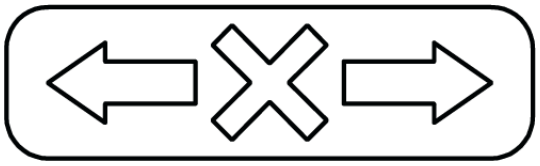
5.2.1 Turnstile housing and base

You can access the internal components of the turnstile by detaching the housing (1). The housing and the turnstile base are secured with four mounting screws (7) for SW3 Allen key. When operating the turnstile, the housing must be secured to the base. Inside the base under the housing are located (Fig. 3): the drive control board (9), interface board (10) and the turnstile mechanism, which includes:

- drive (12) assembled with electric motor and position sensor board;
- electromechanical blocking device (14) with optical sensors;
- emergency unblocking device (*Fire Alarm)* (11) (anti-panic function of automatic folding arms).

5.2.2 LED indication unit

The housing (1) contains LED indication unit (2) to inform about the turnstile current status and the established operation mode (Fig. 2 and 4). The display has three pictographic indicators:



passage permission indicator in one of the directions (green arrow) | passage denial indicator (red cross) | passage permission indicator in the other direction (green arrow)

Figure 7. LED indication unit

5.2.3 RC-panel

The RC-panel is designed as a small desktop device with a shockproof ABS plastic case and is intended for setting and indicating operating modes when the turnstile is operated manually. The RC-panel overall view (Fig. 5).

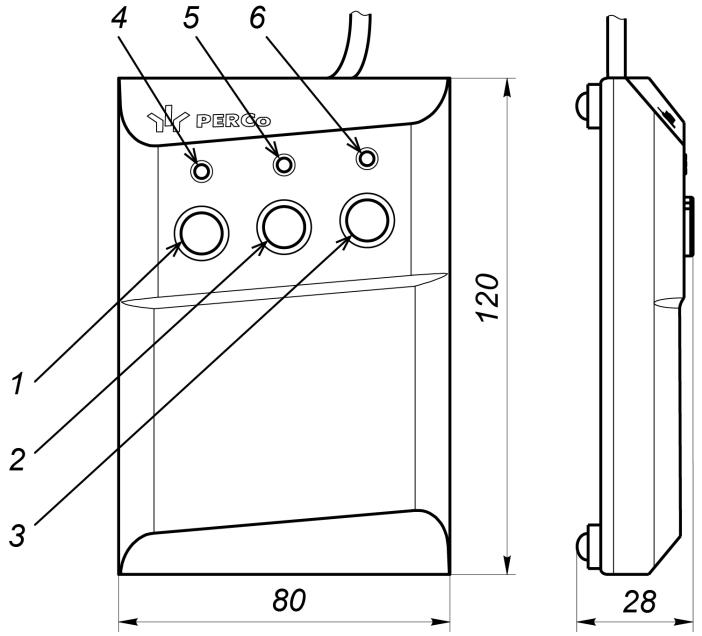


Figure 8. RC-panel design

1, 2, 3 – buttons **LEFT**, **STOP**, **RIGHT** for setting the control commands;
4, 6 – green indicators *«Left»*, *«Right»*; 5 – red indicator *«Stop»*

There are three control buttons on the RC front panel intended for setting the turnstile operating modes. The middle button on the RC-panel (hereinafter — the **STOP** button) is intended to set the turnstile to the *"Always locked"* mode. The left (**LEFT**) and the right (**RIGHT**) buttons are intended to unlock the turnstile for passage in the chosen direction. Above the buttons, there are LED indicators for the turnstile turning mechanism. A red "*Stop*" indicator indicates that both passage directions are blocked. Available control commands and indications on the RC-panel for pulse and

potential control modes are given in the Tables 5 and 6. The RC-panel is connected to the interface board in accordance with the connection layout (Sect. 5.3.1 and Fig. 17).

5.2.4 Control and interface boards

The control board (9) receives commands from the interface board (10) and controls the operation of the electric motor, the operation of the blocking device, and the emergency unblocking device.

All nodes of the turnstile mechanism are connected to the control board with internal wiring. A turnstile power source is connected to it with an external cable as well. Connection is made in accordance with the connection layout (Fig. 17). The appearance of the control board (9) (Fig. 6).

Control board elements:

- ***X1*** (***+24 GND***) – turnstile power supply connector block;
- ***X2*** (***POWER+CAN***) – socket to connect communication cable with interface board;
- ***X3*** (***Rotor Sensor***) – the rotor position sensor board connector block (part of the drive (12));
- ***X4*** (***A***, ***B***, ***C***) – connector block for connecting the electric motor phases (part of the drive (12));
- ***X5*** (***Lock Sensor***) – connector block for connecting the blocking device sensor optocouplers;
- ***X6*** (***USB UDP***) – USB port (not used during operation);
- ***X7*** (***ANTIPANIC***) – connector block to connect the electromagnet of automatic anti-panic unblocking device (anti-panic function of automatic folding arms);
- ***X8*** (***LOCK***) – connector block to connect the blocking device electromagnet;
- ***XP1*** – programming socket (not used during operation);
- ***XP2*** (***USB UPD***) – the jumper of the board software update via USB. If the jumper is fixed - the update mode is *ON*, if removed – the update mode is *OFF*;
- ***SA1*** (***CONTROL***) – a set of DIP switches for setting the electric drive, must be in the ***OFF*** position (not used during operation);
- ***PWR*** – green LED indicator for interface board power supply.

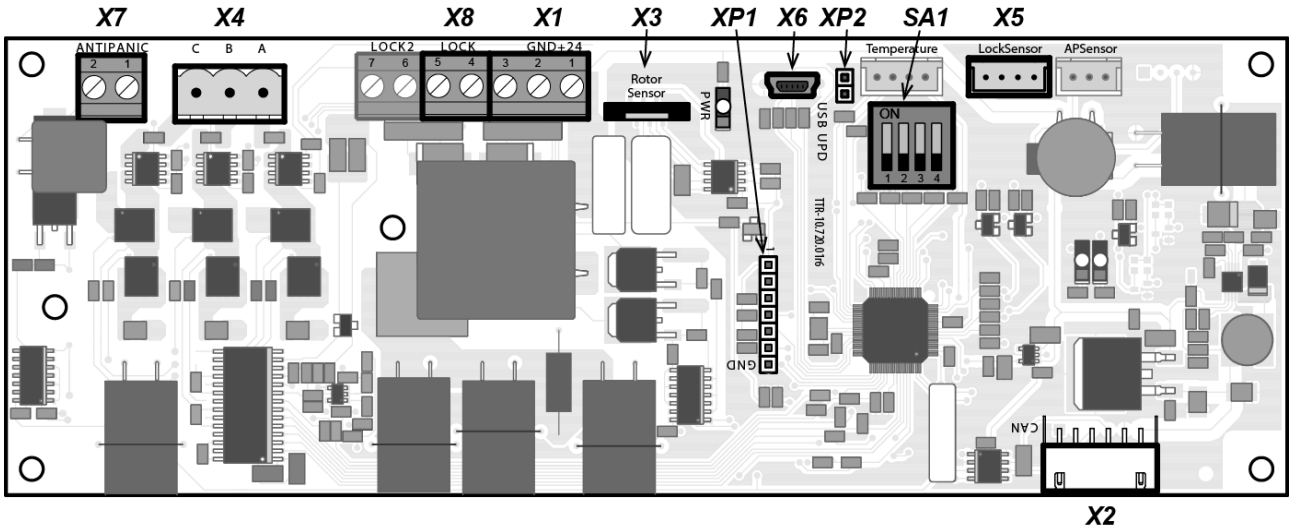


Figure 9. Control board

The interface board (10) processes the incoming commands (monitors the status of *contacts L, ST, R* and *FA (Fire Alarm),* reads information from the intrusion detector (*DKZP1* contact) and generates commands to the control board (9), as well as signals for external devices, for RC-panel indications (*Led A, Led ST* and *Led B*), for the barrier arms rotation in the corresponding direction (*Pass A* and *Pass B),* for the alarm output A1 – A2 (Alarm) and relays the signal about the current status of the intrusion detector (*DETECT*).

The following devices are connected to the interface board: RC-panel / WRC / ACS controller, emergency unblocking *Fire Alarm* device, remote display units and other optional equipment. Wired connection is made in accordance with the connection layout (Fig. 17).

The general view of the interface board (10) (Fig. 7).

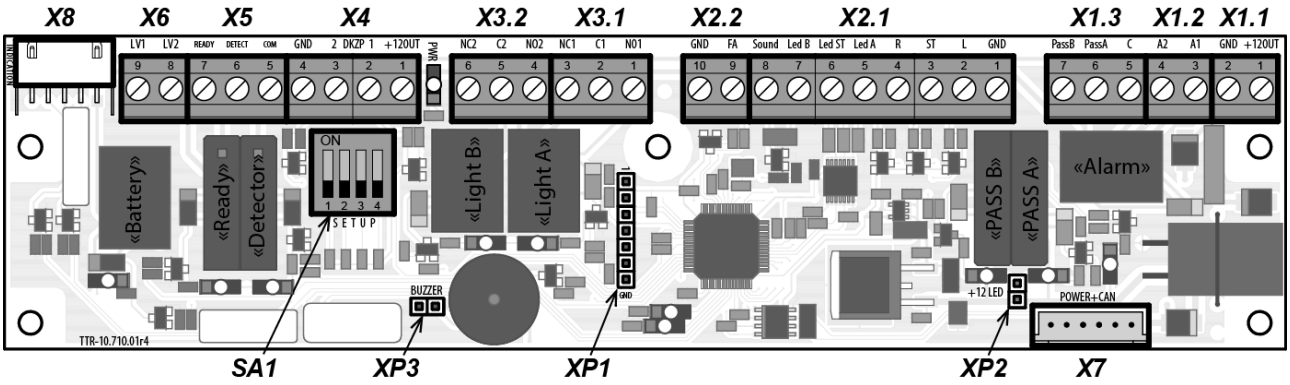


Figure 10. Interface board

Interface board elements:

- ***X1*** (***ACS***) – additional equipment power supply connector blocks (***X1.1***), siren connection (***X1.2***) and ACS controller inputs for PASS signals (***X1.3***);
- ***X2*** (***RC***) – connector blocks for connecting the RC-panel, WRC or ACS controller (***X2.1***), as well as emergency unblocking *Fire Alarm* device (***X2.2***);
- ***X3*** (***Light***) – connector blocks for connecting remote indicators (“open” / “closed”, ***X3.1*** – for direction *A*, ***X3.2*** – for direction *B*);
- ***X4-X6*** (***ADD***) – connector blocks for connecting additional equipment (***X4*** - for intrusion detector connection, ***X5*** - Ready and Detect signal outputs; ***X6*** - the alarm relay output for low voltage (low battery);
- ***X7*** (***CAN***) – socket for interface board and communication cable interconnection (9);
- ***X8*** (***INDICATION***) – indication cable connection socket (8);
- ***XP1*** – programming socket (not used during operation);
- ***XP2*** (***+12LED***) – the jumper of board outputs relay operation indication. If the jumper is fixed - indication is *ON*, if removed – indication is *OFF*;
- ***SA1*** (***SETUP***) – a set of DIP switches:
  1 – turnstile control mode selection: ***ON*** - pulse (set by default), ***OFF*** - potential,
  2 – barrier arms turn force value selection:
  - ***ON*** – hard (used when operating the turnstile in vehicles, in order to compensate for possible barrier arms shaking and vibration when the vehicle is moving),
  - ***OFF*** – soft (used when operating the turnstile on fixed surfaces, in rooms, offices, etc.), set by default.

  3, ***4*** – not used during operation, must be in the ***OFF*** position.
- ***PWR*** – green LED indicator for interface board power supply.

Table 1. Pin assignment of connector blocks

№	Legend	Assignment
Control board connector blocks		
X1 (POWER)		
1	*+24*	Turnstile power supply 24V DC, 9A
2	*GND*	
Interface board connector blocks		
X1(ACS)		
1	*+12OUT*	+12V power supply for additional equipment (siren)
2	*GND*	
3	*A1*	«Alarm» relay output (siren connection)
4	*A2*	
5	*C*	Common for PASS relay outputs

№	Legend	Assignment
6	*Pass A*	PASS A relay output (passage in A direction)
7	*Pass B*	PASS B relay output (passage in B direction)
		X2 (RC)
1	*GND*	General
2	*L*	Control input - passage A permission
3	*ST*	Control input - passage denial
4	*R*	Control input - passage B permission
5	*Led A*	Passage A permission indication output on the RC-panel
6	*Led ST*	Passage denial indication output on the RC-panel
7	*Led B*	Passage B permission indication output on the RC-panel
8	*Sound*	RC-panel sound signal output
9	*FA*	Emergency passage unblocking control input
10	*GND*	
		X3 (LIGHT)
1	*NO1*	Normally open contact of the external *Light A* output
2	*C1*	Common contact of the external *Light A* output
3	*NC1*	Normally closed contact of the external *Light A* output
4	*NO2*	Normally open contact of the external *Light B* output
5	*C2*	Common contact of the external *Light B* output
6	*NC2*	Normally closed contact of the external *Light B* output
		Remote connector blocks X4-X6 (ADD)
1	*+12OUT*	+12V output for additional equipment powering (intrusion detector)
2	*DKZP1*	Intrusion detector connection
3	*DKZP2*	
4	*GND*	
5	*COM*	Common for *DETECT* and *READY*
6	*DETECT*	*Det Out relay output* (intrusion detector status)
7	*READY*	*Ready* relay output (turnstile readiness)
8	*LV1*	The alarm relay output for low voltage (low battery)
9	*LV2*	

5.2.5 Control signals

Turnstile operation is performed by sending a control signal to *L, ST* and *R* ***X2*** connector block contacts on the interface board. The control signal is a low-level signal regarding the *GND* contact. Normally open relay contact or scheme with an open collector output can serve as a control element (Fig. 8 and 9).

Turnstile emergency unblocking is performed by a low-level signal release from *FA* connector of the ***X2*** connector block on the interface board regarding the *GND* contract. A normally closed relay contact or a scheme with an open collector output can serve as a control element. In this case all other incoming control commands are ignored. (Sect. 5.3.2)

Sending a low-level signal to *Fire Alarm* input, you put the turnstile directions into the mode according to the signal levels at the inputs *L, R,* and *ST*.

Intrusion detector activation is monitored by a low-level signal release from the *DKZP1* input on the interface board regarding the *GND* contact. A normally closed relay contact or a circuit with an open collector output can serve as a control element.

Note:

Use resistors with 1 kOhm strength, connected to *+3.3V* power line to generate a high-level signal on all input contacts (*L*, *ST*, *R*, *FA* and *DKZP*).

Control element is to provide the following characteristics of the signals:

control element – relay contact:

minimum switched current ..... max 2mA

closed contact strength (with regards to connecting cable strength) ..... max 300 Ohm

control element – scheme with an open collector output:

closed contact voltage (low-level signal, on the control board input) ..... max 0.8*V*

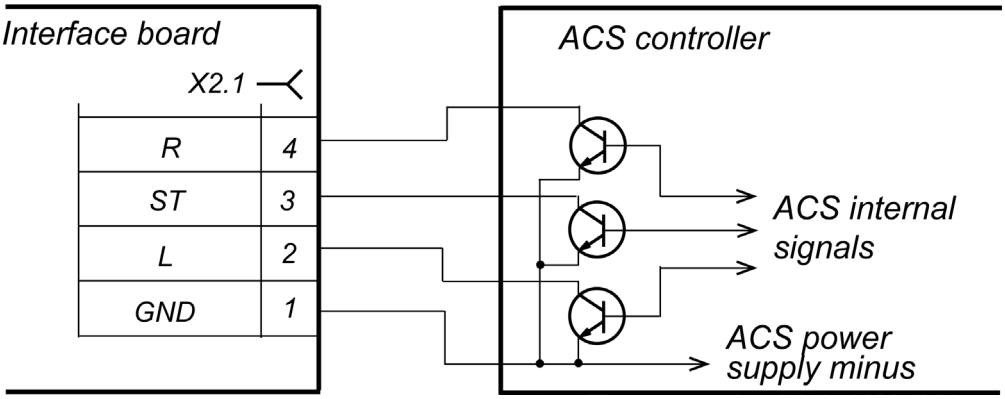


Figure 11. ACS control elements – normally open relay contact

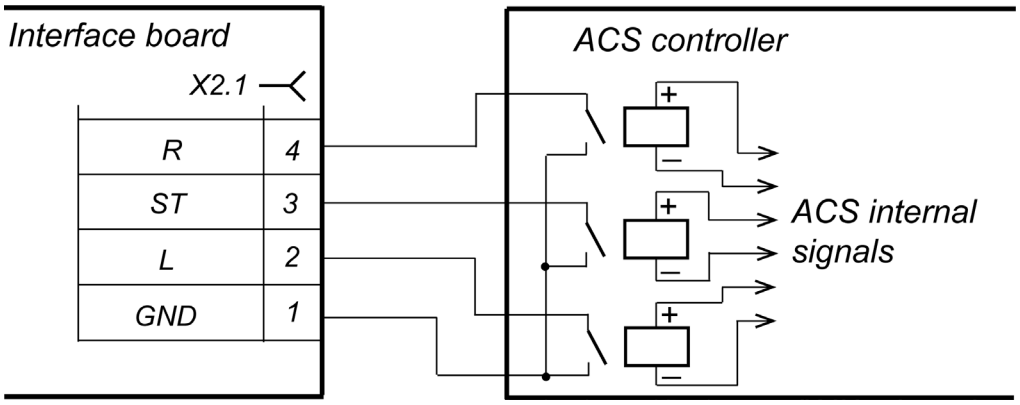


Figure 12. ACS control elements – scheme with an open collector output

5.2.6 Turnstile control modes

There are two turnstile control modes – pulse and potential. In both modes the turnstile is controlled by sending commands (i.e. control signals combinations) to *L*, *ST* and *R* control inputs and to a special *FA* control input. Control command sending algorithm changes depending on the chosen mode (Tables 5 and 6).

The control mode is set either ***ON*** or ***OFF*** by ***SA1 (SETUP)*** switcher on the interface board (10). Switcher location (Fig. 7). Shift the switcher into ***ON*** position to switch the turnstile into pulse mode. Shift the switcher into ***OFF*** position to switch the turnstile into potential control mode.

Caution!

Shift the switcher with de-energized equipment only.

Pulse control mode is used for turnstile operation from RC-panel, WRC and ACS controller with the outputs supporting pulse control mode.

Control signal duration at sending control command to control inputs is to be not less than 100ms. The initial passage waiting time is 8 sec., it is independent of control signal (pulse) duration.

The turnstile operation description for this mode is given in Table 5. Control command sending algorithm is given in Appendix 1.

Potential control mode is used for turnstile operation with ACS controller. The outputs of the ACS controller are to support potential control mode.

Control signal duration at sending control command to control inputs is 100ms. minimum. The passage waiting time is equal to low-level signal duration, i.e. if by the moment of passage completion in the permitted direction, there's a low-level signal on the input of this direction, the turnstile remains open in this direction.

The turnstile operation description for this mode is given in Table 6. Control command sending algorithm is given in Appendix 2.

By sending a low-level signal to *ST* input, both directions are locked in accordance to signal duration time, independently of signal levels on *L* and *R* inputs. Removing low-level signal from *ST* input, the directions shift into the modes, according to signal levels on *L* and *R* inputs.

The turnstile operation at the *FA* control input is described in Sect. 5.3.2.

5.2.7 Turnstile mechanism operation algorithm

Turnstile operation algorithm at pulse control mode in case of single passage in one of the directions:

1. Turnstile starting position - the drive is turned off, passage denial indicator is on, when you try to turn the barrier arms more than 5° in any direction, the blocking device blocks the hub, an alarm is turned on - passage through the turnstile is closed.
2. The command (combination of control signals) for single passage performance in one of the directions is sent from the control device (RC-panel, WRC, ACS controller) to the interface board inputs.
3. The microcontroller on the control board (9) processes the received combination of signals and creates a command for the turnstile mechanism to open the passage in the desired direction (blocking device opens).
4. The microcontroller monitors the barrier arms hub rotation sensor status, and counts the elapsed time since the button on the RC-panel, that corresponds to the passage permission in the desired direction, was pressed.
5. When the user turns the barrier arms 10° in the authorized direction, the microcontroller sends a signal to the drive to smoothly rotate the hub in the passage direction to the next starting position, thereby providing a comfortable passage in a given direction. When turning the barrier arms 60°, a *PASS A (B)* signal with a duration of 250ms. is generated (*PASS A (B)* and *Common* contacts open).
6. After turning the barrier arms 60°, the possibility of reverse rotation is blocked by both the electric drive and blocking device - it is now possible to move forward to the next starting position only.
7. In case of passage denial, i.e. if after 8 seconds from the moment of passage permission the barrier arms were not rotated 60° or more, the microcontroller generates a command to the control mechanism to block the further passage in this direction, while the drive will return the barrier arms back to original position.
8. When the barrier arms reach the initial position (120° rotation of the barrier arms or if the passage is denied by 0°), the microcontroller enters the standby mode.

In the "*Free passage* ..." operating modes, the algorithm remains the same, except the turnstile is not blocked at the end of the passage, but expects a new passage.

5.3 Operation devices

RC-panel / WRC or ACS controller can be used for turnstile operation. These devices can be connected to the turnstile separately, simultaneously (in parallel) or in any combination with each other.

Note:

In case several control devices are connected to the turnstile simultaneously there can be a control signal overlap. In this case the turnstile reaction will correspond to the reaction to the resulting input signal combination (Appendixes 1 and 2).

5.3.1 RC-panel connection

RC-panel is connected to *GND*, *L*, *ST*, *R*, *Led A*, *Led ST* and *Led B* contacts of the ***X2.1*** connector block (Fig. 17).

Standard RC-panel orientation regarding the turnstile post is stated in Fig. 10.

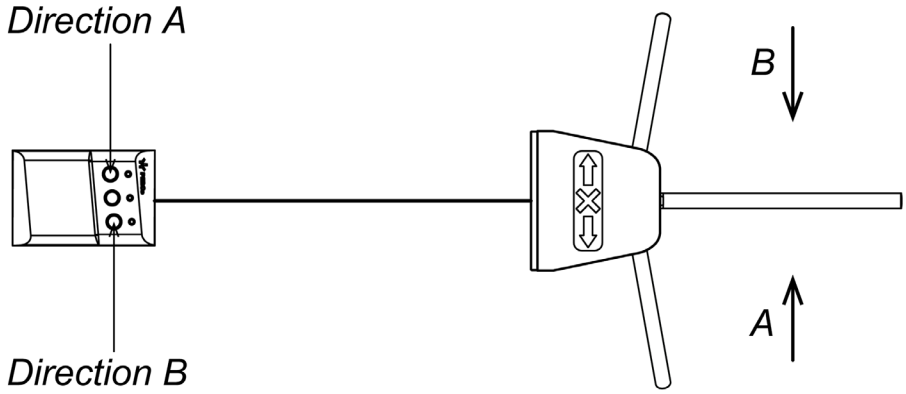


Figure 13. Standard RC-panel orientation regarding the turnstile post

If the operator is located on the opposite side regarding the turnstile post, it will be more convenient to shift the RC-panel wires, which are connected to *L and R* contacts, as well as *Led A* and *Led B* (Table 2).

Table 2. Connection of RC-panel cable wires to the X2.1 connector block for standard and reverse RC-panel orientation

№	Contact	RC-panel orientation	
		Standard	Reverse
1	*GND*	black	black
2	*L*	white	green
3	*ST*	blue	blue
4	*R*	green	white
5	*Led A*	yellow	red
6	*Led Stop*	orange	orange
7	*Led B*	red	yellow
8	*Sound*	brown	brown

Note:

WRC is connected to *L, ST, R* and *GND* contacts of the ***X2.1*** connector block on the interface board. WRC power supply can be connected to *+12OUT* contact of the ***X4*** connector block or ***X1.1*** connector block.

When the RC-panel buttons are pressed, the corresponding contact *L, ST* and *R* closes with the *GND* contact (i.e., a low-level signal formation relative to the *GND* contact).

Turnstile control using the WRC device is similar to that with RC-panel.

The buttons on the WRC tag act the same way as those on the RC-panel.

The WRC operation manual is supplied with the device.

5.3.2 Emergency unblocking device Fire Alarm

The emergency unblocking device is connected to the contacts *FA* and *GND* of the ***X2.1*** connector block on the interface board in accordance with the connection layout of the turnstile (Fig. 7 and 17).

If the *Fire Alarm* is not used, it is necessary to set a wire jumper between the *FA* and *GND* contacts. The jumper is installed upon delivery.

When a control signal is sent to the *FA* input, the turnstile switches to the *Fire Alarm* emergency free passage mode with all the incoming turnstile control commands ignored. The central barrier

arm automatically falls down under its own weight and takes up a vertical position, ensuring free passage. Both green direction arrows will flash, briefly changing to a red cross on the turnstile LED indication unit (2).

If the *Fire Alarm* signal is received while making a passage, the *Fire Alarm* flashing will be activated on the LED indication, but the emergency unblocking function will be activated only after the rotation is finished.

After the Fire Alarm control signal has been removed, the red passage denial indicator on the turnstile LED indication lights up, and the turnstile goes into standby mode. To continue working, the barrier arm must be manually fixed and set to the horizontal position.

Automatic anti-panic function is also activated at a power supply loss, e.g. in case of connected power supply unit breakdown.

5.3.3 Operation with an ACS controller

The turnstile can be an operating device as part of an ACS. The ACS controller outputs are connected to the *GND, L, ST, R* contacts of the ***X2.1*** connector block on the interface board. ACS controller inputs are connected to the contacts *C (Common), Pass A, Pass B* of the **X1.3** remote connector block. Connection is made in accordance with the connection layout of the turnstile (see Fig. 17).

If necessary, the controller inputs can be connected to the *READY*, *DETECT* and *COM* ***X5*** connector block contacts to monitor the corresponding turnstile conditions.

In the pulse control mode control over the turnstile with an ACS controller is similar to that with the RC-panel.

For organizing single passes in the potential control mode, it is recommended to remove the low-level control signal upon passage through the turnstile, i.e. at the beginning of the corresponding direction *PASS* signal.

5.4 Additional devices connectable to the turnstile

5.4.1 Relay outputs

Connection to the control board relay outputs is performed through the corresponding contacts of the ***X1*** and ***X5*** connector blocks on the interface board. The following relay outputs are installed:

- «Alarm»*:* contacts *A1* and *A2* (Sect. 5.4.2);
- «PASS A»*:* contacts *Pass A* and *C* (Sect. 5.2.7);
- «PASS B»*:* contacts *Pass B* and *C* (Sect. 5.2.7);
- «Not ready»*:* contact *READY* and *COM* (Sect. 5.5);
- «Detector»*:* contacts *DETECT* and *COM* (Sect. 5.4.2);
- «Battery»: contacts *LV1* and *LV2* (Sect. 5.5).

Relays “PASS A” (*Pass A* and *C* contacts), “PASS B” (*Pass B* and *C* contacts), “Detector” and “Not ready” (*DETECT, READY* and *COM* contacts) have normally open contacts when the power is off. Moreover, the *C* and *COM* contacts common to these relays are not connected to the turnstile power supply minus.

Relays “Alarm” (contacts *A1* and *A2*) and “Battery” (*LV1* and *LV2*) have normally open contacts when the power is off.

In the initial (inactive) state when the power is on, the “PASS A” and “PASS B” relay contacts are closed (voltage is applied to the relay coil), and the “Detector”, “Not ready”, “Alarm” and “Battery” relay contacts are open (voltage to relay coil is not applied).

The actuation / release of the “PASS A”, “PASS B”, “Ready”, “Detector”, “Alarm” and “Battery” relays can be determined by the light-on / off of the green indicators installed near the indicated relays (Fig. 7) (indicators work with the ***XP2*** jumper installed).

Pass elements for “PASS A”, “PASS B”, “Ready”, “Detector” - relay contacts (Fig. 11) with the following signal characteristics:

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

Pass elements for «Alarm» and «Battery» – relay contacts (Fig. 11) with the following characteristics:
maximum commutation DC voltage 30V
maximum commutation AC voltage 42V
maximum commutation AC/DC current 3
closed contact resistance ..... max 0.15 Ohm

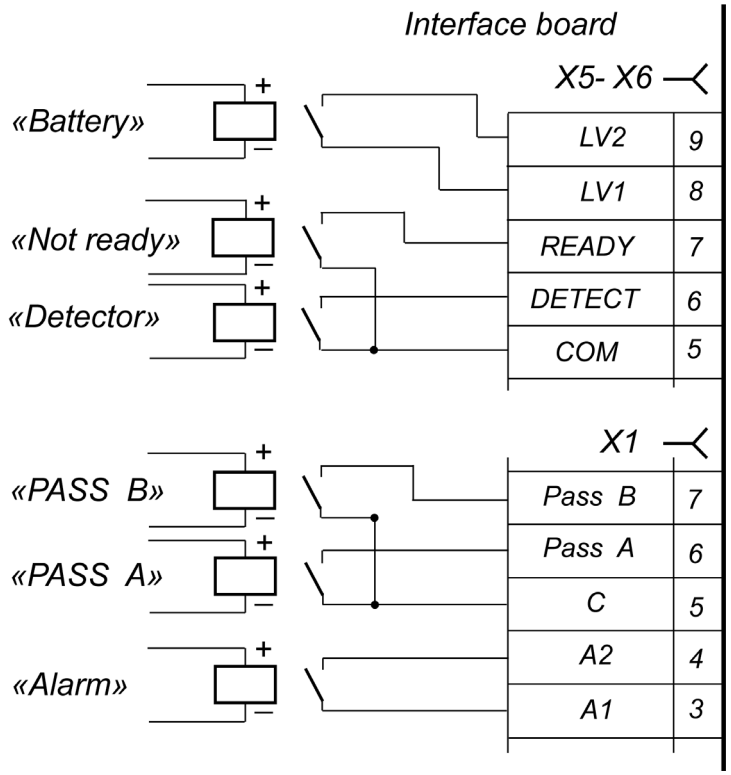


Figure 14. Pass elements PASS A, PASS B, Ready, Det Out and Alarm

5.4.2 Intrusion detector and siren

Caution!

Installation of the intrusion detector is made in accordance with the passage area layout and climatic resistance of the detector. No intrusion detector installation inside the turnstile post is possible.

The intrusion detector is connected to the ***X4*** connector block contacts, and the siren is connected to the ***X1*** connector block on the interface board (10) according to the connection layout (Fig. 7 and 17). There should be normally closed contacts on the intrusion detector. In case the intrusion detector is not connected, it is necessary to set a wire jumper between the contacts *DKZP1* and *GND* of the ***X4*** connector block. The jumper is installed upon delivery.

The siren is connected to the *Alarm 1, Alarm 2* and *GND* contacts and +12V of the ***XT1.H*** connector block. The parameters of the alarm relay output signals “Alarm” are indicated in Sect. 5.4.1.

If the turnstile is locked (the command “*Always Locked*” or “*Both passage directions are locked*” is given, Tables 5 and 6) the *DKZP1* input is activated and a signal comes from the intrusion detector, the “Alarm” output is activated. The "Alarm" output is disabled 5 sec. after activation or by executing of any received command. The signal from the intrusion detector is ignored for the period of authorized unblocking of the turnstile in either or both directions.

Note:

The control signal from the intrusion detector does not activate the *ALARM* output if the turnstile turning mechanism is unlocked in one of the directions or was blocked less than 3 sec. ago.

A signal about the intrusion detector current state is always transmitted to the *DETECT* contacts (relay "Detector") and *COM* of the ***X5*** connector block on the interface board (Fig. 7).

The parameters of the “Detector” relay output signals are indicated in Sect. 5.4.1.

5.4.3 Remote indicators

Remote indicators for corresponding passage directions are connected to ***X3 (LIGHT)*** connector blocks - *NO1, C1, NC1, NO2, C2, NC2.* The relay “Light A” (“Light B”) is activated (voltage is supplied to its winding) when the green arrow corresponding to this direction of passage is lit on the LED indication unit, and normalized (voltage is not supplied to its winding) when it is not lit. The fact of “Light A” and “Light B” relays operation can be determined by the state of the indicators that are installed near the indicated relays (Fig. 7) (this indication works when the ***XP2 (+12LED)*** jumper is installed).

Pass elements for “Light A” and “Light B” - relay transfer contacts (Fig. 12) with the following signal characteristics:

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

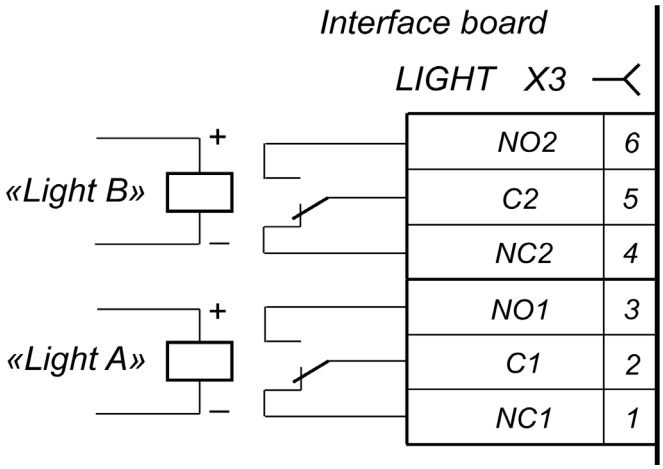


Figure 15. Light A and Light B pass elements

5.5 Operation contingencies and response

The turnstile is capable of providing information on the following operation contingencies:

1. Unauthorized access.
2. Passage delay for more than 10 sec.
3. Barrier arms rotation sensor failure.
4. Intrusion detector activation (Sect. 5.4.2).
5. Power failure (decrease below acceptable level)

In the cases 1-4, a special *Alarm* signal is generated by closing the *A1* and *A2* ***X1*** connector contacts. The "Alarm" relay output signals parameters are indicated in Sect. 5.4.1.

When eliminating the cause of the *Alarm* signal, the "Alarm" relay contacts open and the signal is removed.

An alarm lamp (buzzer) in the driver's cab can be connected to the output of the “Alarm” relay, alerting the turnstile emergency operation.

During operation, the microprocessor monitors the voltage supplied to the turnstile, and when the voltage is reduced (less than 21.8V), the "Battery" relay contacts (*LV1* and *LV2* of ***X6*** connector block on the interface board (10)) will be closed to each other, indicating a low supply voltage (low battery). With a subsequent increase in voltage to 23.6V, the "Battery" relay contacts *LV1* and *LV2* will open, thus indicating a nominal supply voltage (battery charge). The parameters of the “Battery” relay output signals are indicated in Sect. 5.4.1.

In case of a voltage drop below the threshold value for switching off the electronics (17V), the turnstile electronics will automatically disconnect from the power source. When voltage is restored above the threshold for switching the electronics on (18V), the turnstile electronics will automatically turn on.

6 MARKING AND PACKAGING

The turnstile has the marking on the inner surface of the side wall of the turnstile base. The label contains manufacturer's trademark and contact details, year and month of production, operating voltage and power consumption of the turnstile.

To get access to the label it is necessary to detach the turnstile housing (1) from the turnstile base in the following way:

1. Unscrew the four fixing screws of the housing (7) using the SW3 Allen key. The screws are located on the lower surface of the turnstile base, the hub side.
2. Lift the turnstile housing by the lateral faces to half the height of the turnstile base.
3. Separate the indication cable (8) from LED indication unit (2).
4. Detach the housing carefully and put it on a plain and steady surface.

The housing is mounted on the turnstile base in the reverse order. When lowering the housing, make sure that the indicator cable (8) folds forward and is not pinched by structural elements.

The complete delivery set of the turnstile (Sect. 4.1) is packed in a transportation box, which keeps it undamaged during the transportation and storage:

Modification *TTR-10AT*, *TTR-10AK*:

Transportation box dimensions (L×H×W) ..... 104×40×32 cm
Transportation box weight (gross) ..... max 58 kg

Modification *TTR-10AB*:

Transportation box dimensions (L×H×W) ..... 114×44×34 cm
Transportation box weight (gross) ..... max 70 kg

7 SAFETY REQUIREMENTS

7.1 Installation safety requirements

The turnstile installation must be carried out by specialists who have fully studied this manual and passed safety training, in accordance with the general rules for the implementation of electrical and installation work.

Warning!

- The power source or battery must be turned off and unplugged during installation of the turnstile.
- Only serviceable tools must be used for installation.
- Lay the cables in compliance with the electrical installations rules of operation.
- Before turning on the turnstile for the first time, make sure it's installed and connected correctly.

Power supply unit installation must be made in accordance with the safety rules given in its certificate.

7.2 Operation safety requirements

Follow general electrical safety rules when operating the turnstile.

It is prohibited!

- Do not use the turnstile under conditions that do not comply with the requirements of Section 2 of this Manual.
- Do not use the turnstile at supply voltage that does not comply with the requirements of Section 3 of the Manual.

The power supply unit should be used in compliance with its operational documentation.

8 INSTALLATION INSTRUCTIONS

Follow the safety requirements during the installation (Sect. 7.1).

Warning!

The manufacturer is not responsible for any damage to the turnstile or other equipment, as well as other damages caused by improper installation, and rejects any consumer complaints if the installation is performed in violation of the instructions given in this manual.

8.1 Installation details

The turnstile installation is a demanding operation, both performance and service life of the product largely depend on it. Installation must be carried out by at least two specialists qualified as an installer and an electrician. It is recommended to study this section carefully prior to installation, and follow the given instructions.

Installation surface recommendations:

The turnstile can be mounted on the cylindrical racks (vertical pipes) of the vehicle using the ***MT10.1*** bracket (for ***TTR-10AT*** modification), or on a strong vertical wall with the ***MT10.2*** bracket (for ***TTR-10AK*** modification), or on a concrete floor using the ***MT10.3*** mounting post (for ***TTR-10AB*** modification).

The ***MT10.1*** bracket must be installed on vertical (level-controlled) steel pipes with a diameter of 30-35 mm, and at least 2 mm of thickness, securely fixed to the floor (floor and ceiling) using flanges with a support area of at least 75 cm^2 each (mount flanges with three or four M8 bolts at least). The distance between the uprights at the bracket mounting location should be 263±1 mm.

MT10.2 mounting bracket should only be installed on the main walls of concrete buildings (grade 400 or higher) with at least 10 mm thickness, using at least four M8 or M12 anchor bolts. In this case, the bracket mounting points must resume in one vertical plane (control with a level).

Warning!

The turnstile installation height must be taken into account, when installing it on the brackets. The recommended turnstile installation height should be approximately 900-950 mm from the floor to the upper edge of the barrier arm.

The ***MT10.3*** mounting post must be installed on strong, even, stone or concrete (grade 400 or higher) or other bases with a thickness of at least 150 mm, using four M12 anchor bolts. In this case, the installation surface must be leveled the way the mounting points of the turnstile post are in the same horizontal plane (control with a level). When installing the turnstile post on a less solid base, it is necessary to use embedded foundation elements of at least 300×300×300 mm size. It is also possible to use a frame base.

Passage zone organization:

The turnstile is equipped with an electric drive for the barrier arms rotation. When rotated 5° or more, the barrier arms turn in the passage direction (when rotated 60° or more, the barrier arms cannot be returned to their original position, since the return passage is blocked). When rotated at an angle of less than 60° the barrier arms return to their original position in 8 sec. To ensure accurate tracking, when the turnstile is operated from an ACS, it is recommended to create the passage area in such a way that the barrier arms should turn in the passage direction by an angle of more than 60° (Fig. 13).

Follow the recommendations (Fig. 13) to ensure the required angle of rotation when installing the turnstile.

When organizing the passage area, it is recommended to arrange an additional emergency exit. For example, it can be the ***BH-02*** automatic rotary section (Sec. 9.4).

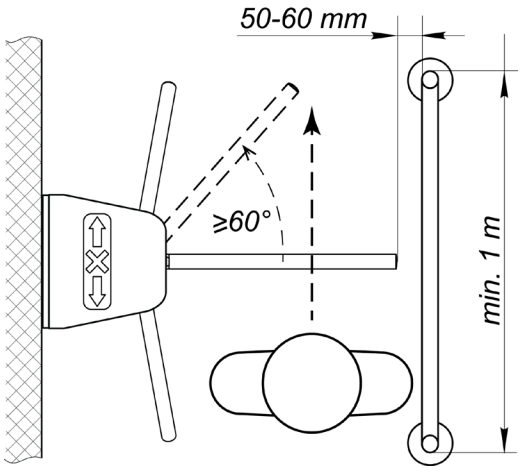


Figure 16. Passage area. Recommendations

8.2 Installation tools

Tools recommended for the turnstile installation:

- 1.2÷1.5kW hammer drill;
- Ø16 mm hard-alloyed drill bits;
- Floor chaser for electric raceway;
- Flat slot SL3×0.5 screwdriver;
- Horn-type and socket wrenches: S17, S13;
- Torque wrench (8 - 25Nm);
- SW3 Allen key (imbus);
- 90º set square;
- Level and measuring tape (2m);

Note:
Other tools that do not reduce the required quality of installation work are allowed.

8.3 Length of cables

Table 3. Cables, used at the installation

№	Equipment	Cable length, m, max	Cable type	Cross-section, mm^2, min	Example
1	Power supply	15	Twin cable	2.5	AWG 15; HO5VV-F 2×2.5
2	- *Fire Alarm* - Optional equipment	30	Twin cable	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	ACS controller	30	Six core cable	0.2	CQR CABS6 6×0.22c
5	Grounding	10	Single core cable	1.5	Copper wire 1.5 mm^2

8.4 Installation procedure

The turnstile connection layout is given in Fig. 17. The connector blocks location on the control (9) and interface (10) boards is given in Fig. 6 and 7. The cables used during installation and their maximum lengths are indicated in Sect. 8.3. The installation surface and passage area recommendations are given in Sect. 8.1. Follow this sequence of actions, when installing the turnstile:

1. Unpack the turnstile and check the completeness as per Sect. 4.
2. Install the turnstile power supply to its designated place in accordance with its operational documentation.
3. Route all cables in the cable ducts to the turnstile.
4. Remove the housing (1) from the turnstile base:
   - Unscrew the four fixing screws on the housing (7) using the SW3 Allen key. The screws are located on the lower surface of the turnstile base, the hub side.

- Lift the turnstile housing by the lateral faces to half the height of the turnstile base.
- Separate the indication cable (8), that connects the LED indication unit (2) and the interface board (10).
- Detach the housing carefully and put it on a plain and steady surface.

5. Install the mounting bracket or mounting post on the mounting surface.

Caution!

It is necessary to correctly determine the turnstile installation height, when marking the mounting of the ***MT10.1*** or ***MT10.2*** mounting brackets. The recommended turnstile installation height should be approximately 900-950 mm from the floor to the upper edge of the barrier arm.

a. Installation procedure for the ***MT10.1*** mounting bracket (***TTR-10AT*** modification) (Fig. 14):
   - On vertical racks (pipes, handrails), mark and cut holes for fastening bolts (eight Ø7 through holes perpendicular to the bracket plane) and for the cable entry (Ø20 in one or both racks). Use the turnstile bracket to mark the holes for cable entry if necessary.
   - When marking and installing the bracket, check the horizontal position using the level.
   - Pull the cables through the rack and through the corresponding bracket hole, the cable outlet from the hole must be at least 30 cm long.
   - Use four M4×6 conical type screws to fasten the bracket back panel to the base.
   - Use two pads and M6×40 cylinder type screws to fasten the bracket to the racks. Use the supplied anaerobic adhesive sealant for threaded connections fixation.

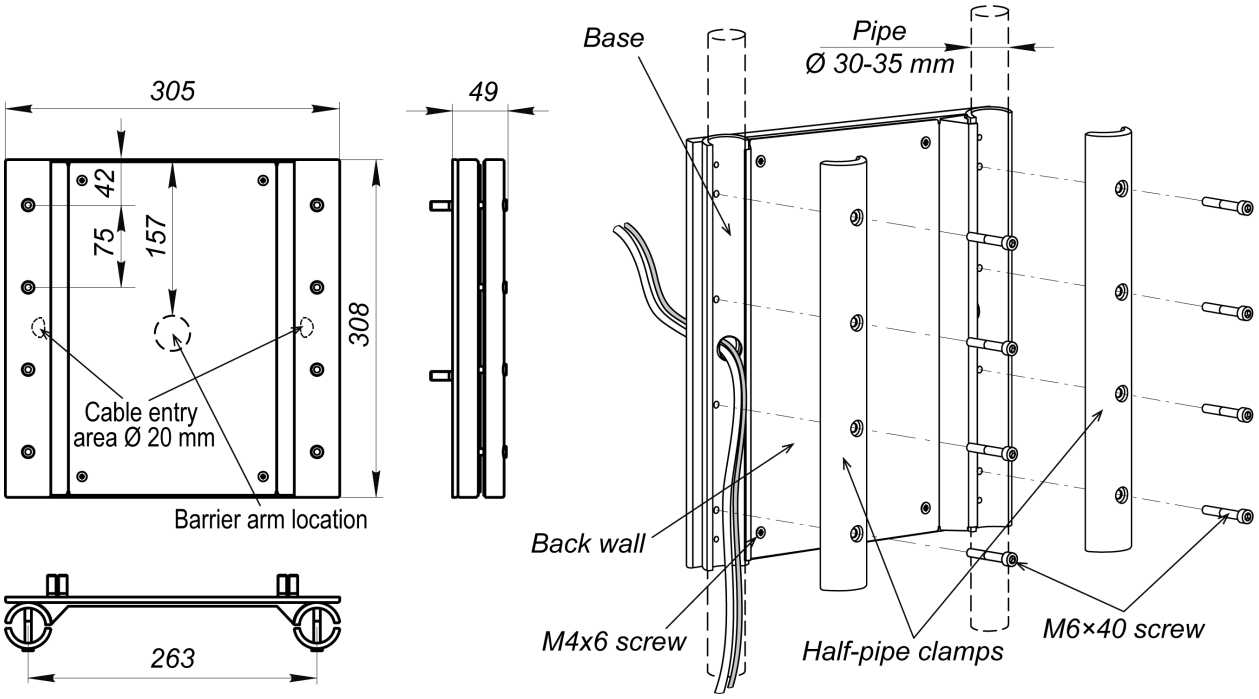


Figure 17. Dimensions and installation procedure for the *MT10.1* mounting bracket

b. Installation procedure for the ***MT10.2*** mounting bracket (***TTR-10AK*** modification) (Fig. 15):
   - Mark and cut the holes in the wall for the anchors to fix the turnstile and cable duct to the cable entry area. Use the turnstile bracket as a template to mark the holes if necessary.
   - Use a level to check the horizontal position of the bracket when marking and installing.
   - Pull the cables through the rack and through the corresponding bracket hole. The cable outlet from the hole must be at least 30cm long.
   - Use at least four anchor bolts to fix the bracket to the wall. The bracket has eight holes for M8 anchor bolts and four holes for M12 anchor bolts.

Note:

It is not recommended to mount the turnstile on the wall without using a standard bracket. In this case, the barrier arms will cling to the mounting surface during rotation or abut against it.

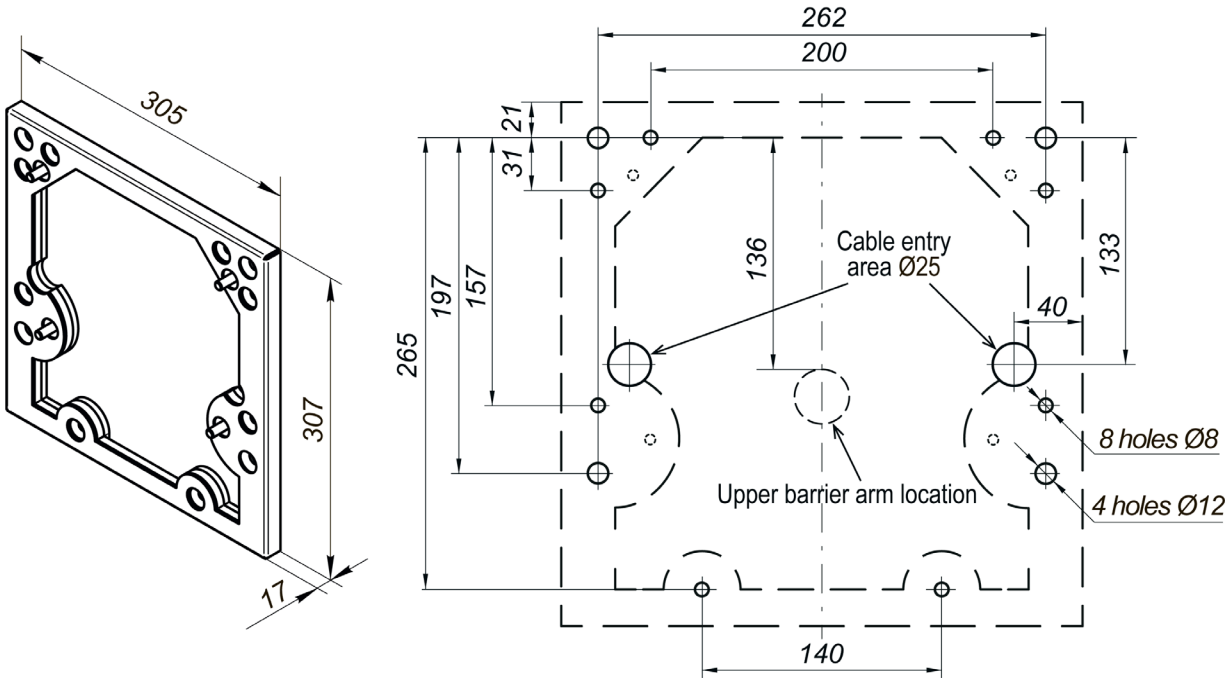


Figure 18. Dimensions and layout of holes on the wall for fixing the MT10.2 bracket

c. Installation procedure for the ***MT10.3*** mounting rack (for the ***TTR-10AB*** modification) (Fig. 16):
- Detach the post front panel by unscrewing the two bottom screws.
- Mark and make holes in the floor for anchor bolts to secure the post, route the cable duct to the cable entry area. Marking can also be done directly on the base of the mounting post.
- Route the cables through the cable duct to the entry area, the length of cable stock should be at least 1.3 meters.
- Fix the post to the installation surface with four PFG IR10-15 (SORMAT, Finland) anchor bolts.
- Put the cables inside the post and route them through the housing holes to the control and interface boards. Secure the cables inside the post with cable ties.
- Control the verticality of the post using the level.
- Put the front panel back and fix it with screws.

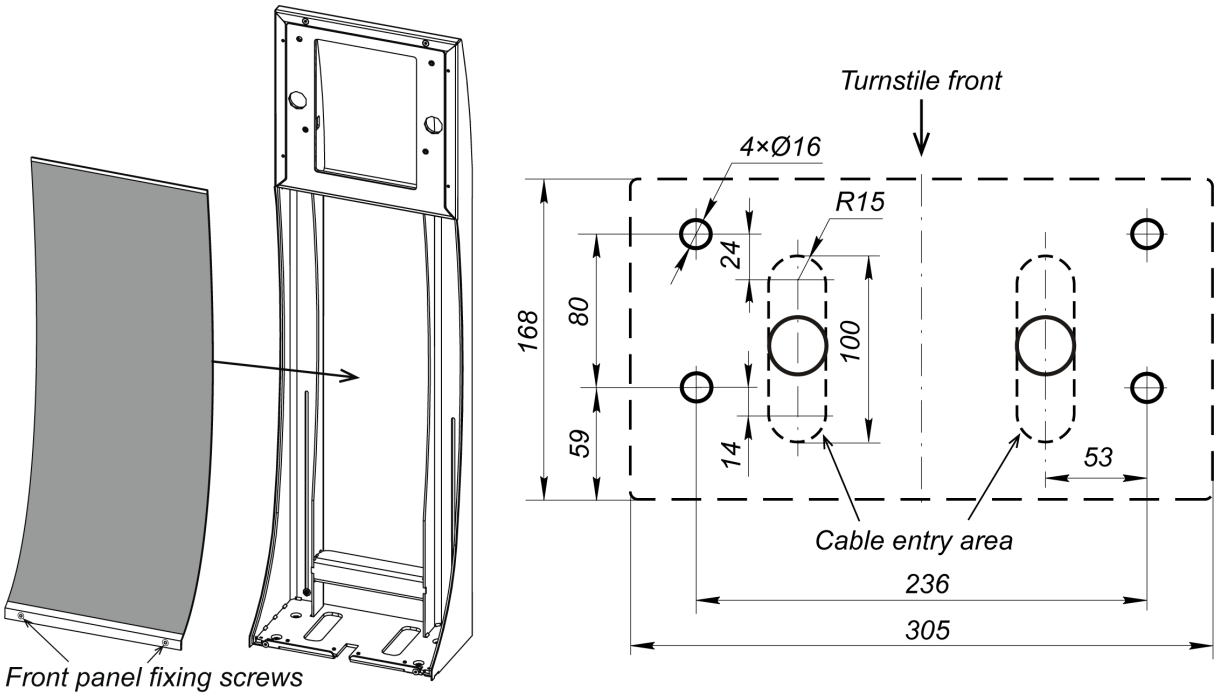


Figure 19. Design and layout of holes for MT10.3 mounting post

6. **For *TTR-10AT* and *TTR-10AK* modifications**. Route the cables into the corresponding hole in the turnstile base, install the turnstile base on the bracket pins and secure it with M8 nuts using an S13 wrench (10Nm tightening force). Seal the turnstile housing cable entry with isolon (polyethylene foam) or other.

Caution!

Fix and mount the turnstile after laying all the cables in the cable ducts. Be careful and prevent the turnstile from falling before it is fixed.

7. Connect the power cable from the turnstile power supply to ***X1*** connector block on the control board (9). Connect the ground wire to the grounding point (13) (Fig. 3). For connection ease, unscrew the two fixing screws a few turns on the sides of the interface board and push it towards you until it stops.
8. Connect the RC-panel (WRC or ACS controller) cable to the ***X2*** connector block on the interface board (Fig. 17).
9. Install and connect optional equipment if necessary: intrusion detector and siren; *Fire Alarm* emergency unblocking device, remote indicators, etc. (Fig. 17).
10. Check serviceability and accuracy of all the electrical connections in accordance with the diagram in Fig. 17. Slide the interface board back into place and tighten the lock screws. Carefully lay and secure all connected cables on a holed horizontal shelf with the supplied cable ties.
11. If it is necessary to set the turnstile to potential control mode, set the switch ***No. 1 SA1 (SETUP)*** on the interface board to the **OFF** position.
12. If the turnstile is installed in a vehicle, then set the barrier arms turn effort to “hard” - set the switch ***No. 2 SA1 (SETUP)*** on the interface board to the **ON** position.

Note:

The “hard” value of barrier arms turn effort is used when installing the turnstile in vehicles in order to compensate for possible jolting and vibration of the barrier arms during movement and causeless alarm activation, as a result. Also, this mode should be used if the turnstile is used outdoors in northern regions to compensate for grease thickening at low temperatures. In all other cases, it is recommended to use the “soft” value of barrier arms rotation for more comfortable passage.

13. Install the housing (1) on the turnstile base:
    - Insert the lower part of the housing hooks into the base grooves (6) and lower it half the height.
    - Connect the indication cable (8) to the turnstile LED-indication and to the ***X8 (INDICATION)*** connector on the interface board and put the housing all the way down. When lowering the housing, make sure that the indication cable (8) folds forward and is not pinched by structural elements. Correct housing installation does not require great physical effort.
    - Secure the housing with four screws (7) on the bottom of the base.
14. Install the hub (4) with barrier arms (3) in the following order:
    - Insert the hub into the appropriate mounting seat on the turnstile mechanism shaft.
    - Secure the hub with three screws with spring washers (5); preliminary, to fix the screws securely, apply a bit of the supplied sealant to the bottom of their threads. Tightening the screws should ensure reliable hub fixation relative to the turnstile mechanism shaft (without backlash and distortions). The tightening force of the hub screws is 15Nm.

Caution!

For correct hub installation, before final tightening of the screws, it is necessary to supply power to the turnstile, move the barrier arm to its horizontal position and use a square to set an angle of 90° in a horizontal plane between the arm and the turnstile base.

Run a test switch on of the turnstile (Sect. 9.1).

8.5 Connection layout

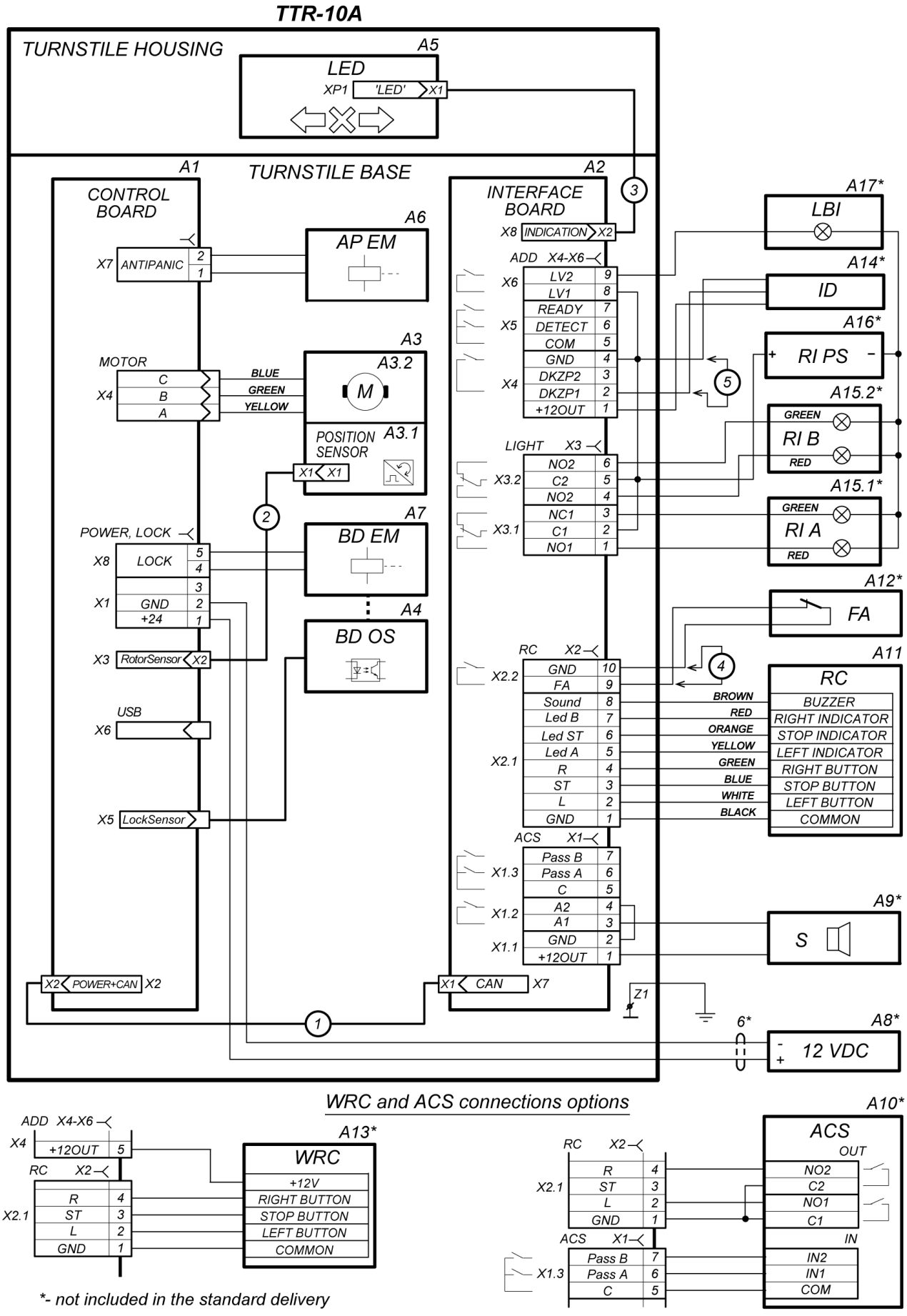


Figure 20. Connection layout

Table 4. Connection layout description

Legend	Name	Q-ty
A1	Control board	1
A2	Interface board	1
A3	Drive assembled	1
A3.1	Position sensor board	1
A3.2	Electric drive motor	1
A4	Blocking device optical sensors board	1
A5	LED indication unit	1
A6	“Anti-panic” device electric magnet	1
A7	Blocking device electric magnet	1
A8[1]	Turnstile power supply (battery) 24V	1
A9[1]	Siren DC 12V	1
A10[1]	ACS controller	1
A11[1]	RC-panel	1
A12[1]	Emergency unblocking device *Fire Alarm*	1
A13[1]	WRC	1
A14[1]	Intrusion detector	1
A15.1[1], A5.2[1]	Remote indicators for A and B directions (RI A, RI B)	2
A16[1]	Remote indicator power supply	1
A17[1]	Low battery indicator	1
1	CAN connection cable	1
2	The rotor position sensor connection cable	1
3	Indication cable	1
4[2]	Wire jumper if FA device is not installed (A12)	1
5[2]	Wire jumper if intrusion detector is not installed (A14)	1
6[1]	Turnstile power cable	1

9 OPERATION INSTRUCTIONS

Follow the turnstile operation safety requirements (Sect. 7.2).

It is prohibited!

- To move through the turnstile passage area any objects with dimensions exceeding the width of the passageway.
- To strike the turnstile components.
- To disassemble and adjust the turnstile nodes.
- To use abrasive or chemically active substances for cleaning of the turnstile external surfaces.

9.1 Power-up

Follow these steps when you power up the turnstile:

1. Connect the power cable of the turnstile power source to the network with the voltage and frequency indicated in the power source certificate.
2. Switch on the turnstile power supply. The turnstile automatically switches to “*Always locked”* in pulse control mode. The turnstile switches to “*Both directions locked”* in potential control mode. Red cross (passage denial) will appear on LED-indication. The indicator located above the **STOP** button will light up on the RC-panel.
3. Lift up the barrier arm (3). It will be fixed automatically.
4. Check the intrusion detector and siren operation (if included in the delivery set and installed accordingly). After the power-up wait until the test indicator (inside the intrusion detector) goes off (it takes 10-50 sec). Put your hand to the intrusion detector. The intrusion detector

[1] Supplied on request.

[2] The jumper is installed upon delivery.

activation will turn a continuous sound signal on. The sound will stop in 5 sec. To eliminate the sound signal, press any button on the RC-panel.

The turnstile is ready for operation.

9.2 Operating modes of the turnstile at pulse control mode

After switch on the power supply the turnstile is automatically switched to *"Always locked"* mode.

See Table 5 for the turnstile control modes and indication. Setting the operating modes for each direction is independent, i.e. setting the operating mode for one direction does not affect the operating mode for the opposite one.

The RC-panel overall view is given in Fig. 5:

- The *"Single passage in the set direction"* mode can be changed to the *"Always free"* mode for the same direction, or to the *"Always locked"* mode;
- The *"Free passage in the set direction"* mode can be changed to the *"Always locked"* mode only;
- In the *"Single passage in the set direction"* mode the turnstile will close automatically after a person's passage in the set direction. The turnstile will also close automatically, if the passage is not made within 5 sec.;
- In the *"Bi-directional single passage"* mode after the passage in one direction the countdown of the passage waiting time (5 sec.) for the opposite direction is recommenced.

Note:

Pressing the button on the RC-panel corresponds to the low-level signal supply to the ***X2*** connector block contacts (*L*, *R* and *ST*) on the interface board relatively to the *GND* contact.

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

Operating modes	Actions to do on RC-panel	Indication on		Turnstile status
		RC-panel	LED display	
"Always locked"	Press the **STOP**.	The red indicator "Stop" is on.	The red cross indicator is on.	The turnstile is locked in both directions.
"Single passage in the set direction"	Press the **LEFT** / **RIGHT** button.	The green indicator "*Left"* / "*Right"* is on.	Green arrow for the chosen passage direction is on.	The turnstile is unlocked for a single passage in the set direction. In the other direction, the turnstile remains blocked.
"Bi-directional single passage"	Press both the **LEFT** and **RIGHT** buttons simultaneously.	Both green indicators (*"Left"* and *"Right"*) are on.	Green arrows for both passage directions are on. After the passage, the green arrow for this direction goes out. After the second passage, the second arrow goes out and the red cross is on.	Regardless the order of passage, the turnstile is unlocked for sequential single passage in both directions.
"Free passage in the set direction"	Press the **STOP** button and **LEFT** or **RIGHT** simultaneously.	The green indicator of the chosen passage direction *"Left"* / *"Right"* is on.	Green arrow for chosen direction is on.	The turnstile is unlocked for passage in the set direction. In the other direction, the turnstile remains blocked.

Operating modes	Actions to do on RC-panel	Indication on		Turnstile status
		RC-panel	LED display	
"Free passage in the set direction and single passage in the opposite direction"	Set the "*Free passage in the set direction"* mode for one direction and "*Single passage in the set direction"* for the other.	Both green indicators (*"Left"* and *"Right"*) are on.	Green arrows for both passage directions are on. After the passage, set for single pass, green arrow goes out.	The turnstile is unlocked for free passage in the set direction. In the other direction, the turnstile unlocks for a single passage.
"Always free"	Press all 3 buttons simultaneously: LEFT, STOP and RIGHT.	Both green indicators ("Left" and "Right") are on.	Green arrows for each passage direction are on.	The turnstile is unlocked in both directions.

9.3 Operating modes of the turnstile at potential control mode

See Table 6 for the turnstile control modes and indication. Setting the operating modes for each direction is independent, i.e. setting the operating mode for one direction does not affect the operating mode for the opposite one.

If by the moment of passage through the turnstile the low level is present on the contact, corresponding to the set passage direction, the turnstile remains open in the set direction.

Table 6. Potential control mode (no J1 jumper)

Operating mode	Operating signal	Indication on		Turnstile status
		RC-panel	Post	
"Both passage directions are locked"	The high level on contacts *L* and *R* or low level on "*ST"* contact.	Red indicator "*Stop"* is on.	Red crosses for each passage direction are on.	The turnstile is locked.
"One of the passage directions is open"	The low level on the contact corresponding to the passage direction, the high level on the other contacts.	The green indicator of the chosen direction *"Left"* (*"Right")* is on.	Green arrow in the chosen passage direction and green line pictograms are on.	The turnstile is unlocked in the set direction.
"Both passage directions are open"	The low level on contacts *L* and *R*, high level on *"ST"* contact.	Both green indicators "Left" and "Right" are on.	Green arrows for both passage directions and green line pictograms are on.	The turnstile is unlocked in both directions.

Note:

For ACS outputs:

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

9.4 Actions in emergency

In emergency situations (for example, in the event of power supply failure), the turnstile passage area can be used as an additional emergency exit.

It is possible to turn the turnstile into *Fire Alarm* mode from the emergency unblocking device (fire alarm device, emergency button, etc.). In this mode, the turnstile barrier arm falls down (takes a vertical position) allowing the free passage in both directions, LED display shows the green (for 1.25 sec) and red (for 0.25 sec) indicators, control commands from other devices and software are ignored (Sect. 5.3.2).

The barrier arm is set into vertical position at a power loss as well.

Caution!

For urgent evacuation of people from facilities in case of fire, natural calamities or other emergencies, the additional emergency exit should be provided. Such emergency exit can be arranged with ***BH-02*** automatic anti-panic rotary section.

9.5 Troubleshooting

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

Table 7. Possible faults and solutions

Fault	Possible cause	Solutions
At the power-up the turnstile doesn't work, and there is no indication on the turnstile housing and the RC-panel.	No supply voltage to control board.	Switch off the turnstile power supply, detach the turnstile housing with the display unit from the turnstile base. Check the power cable serviceability and reliability of its connection to the ***X1*** connector block on the control board.
The turnstile is not controlled in one of the directions. The turnstile housing and RC-panel indication is on.	The interface board does not receive a control signal for this direction.	Switch off the turnstile power supply, detach the turnstile housing with the display unit from the turnstile base. Check the RC-panel / WRC / ACS controller cable serviceability and reliability of its connection ***X2*** connector block on the interface board.
When installed in a vehicle, an audible turnstile alarm is often triggered when the vehicle is moving.	The barrier arms turn force is set incorrectly. Shaking and vibration cause the independent barrier arms extreme positions.	Switch off the turnstile power supply, detach the turnstile housing with the display unit from the turnstile base. Set the ***No. 2 SA1 (SETUP)*** switch on the interface board to **ON.**

If the problem persists, we recommend you to contact your nearest ***PERCo*** service center. The list of ***PERCo*** service centers is given in the product certificate.

10 MAINTENANCE

The turnstile maintenance is required once a year or in case of technical failures. The maintenance should be performed by qualified personnel only.

Follow these steps, when performing scheduled maintenance:

1. Switch off the turnstile power supply. The barrier arm will fall down automatically.
2. Unscrew three M8 screws to remove the hub with the barrier arms.
3. Check security of the barrier arms (3) mounting to the hub and tighten the barrier arms fixing screws if needed.
4. Lubricate the hinge and triggers contact points in the hub, as well as barrier arms hinged attachment points. Use molybdenum grease.
5. Detach the turnstile housing (1) with LED indication from the turnstile base. Follow steps given in Sect. 6.
6. Remove dust from the surfaces and internal cavities of the turnstile mechanism with a vacuum cleaner and an air bulb.
7. Lubricate friction joints of the turnstile mechanism in the following points:
   - the rotation axis of the stopper lever (point **1**, Fig. 18) with ***Chain and Rope Lube Spray – WEICON*** or another with similar properties;
   - spring attachment points (points **2**, **3**, **4** in Fig. 18) with molybdenum grease;
   - emergency unblocking mechanism components (automatic lowering of the anti-panic barrier arm, (**5** in Fig. 18)) with ***Chain and Rope Lube Spray - WEICON*** or another with similar properties.
8. Check the reliability of the connector blocks cable connections on the control (9) and interface (10) boards. Tighten the cable fixing screws if necessary.

9. Check the reliability of the turnstile mounting. Tighten the nuts of the turnstile base if necessary.
10. Insert the lower part of the housing hooks into the base grooves (6) and lower it half the height. Connect the indication cable (8) to the turnstile LED-indication and to the ***X8 (INDICATION)*** connector on the interface board and put the housing all the way down. When lowering the housing, make sure that the indication cable (8) folds forward and is not pinched by structural elements. Secure the housing with four screws on the bottom of the base.
11. Install the hub (4) with barrier arms (3) in the following order:
    - Insert the hub into the appropriate mounting seat on the turnstile mechanism shaft.
    - Secure the hub with three screws with spring washers (5); preliminary, to fix the screws securely, apply a bit of the supplied sealant to the bottom of their threads.
    - Turn on the turnstile;
    - Move the barrier arm to its horizontal position and use a square to set an angle of 90° in a horizontal plane between the arm and the turnstile base;
    - Tighten the hub screws with 15Nm force.
12. Check the reliability of electromechanical barrier arm unblocking device by turnstile power on/off.

In case of any defects revealed during visual check please contact your nearest ***PERCo*** service center. The list of ***PERCo*** service centers is given in the product certificate.

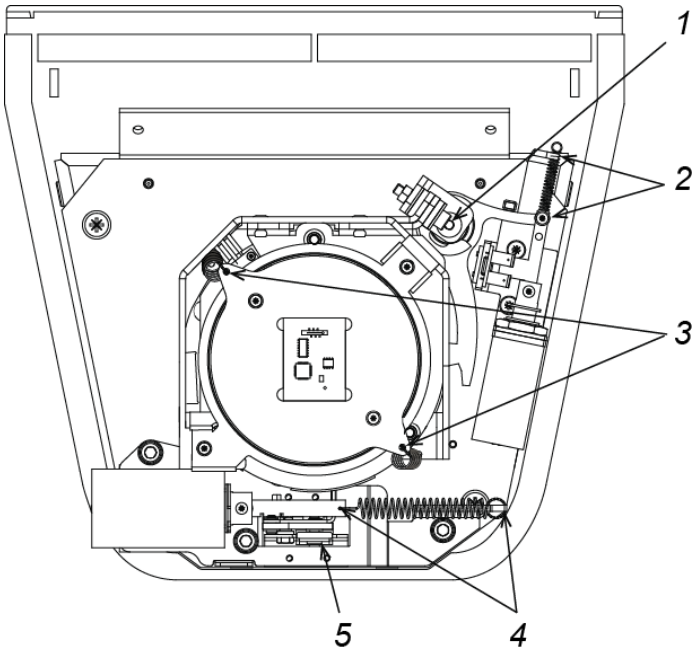


Figure 21. The turnstile mechanism maintenance

1 – lubrication point of the rotation axis of the stopper lever; 2 – stopper spring attachment points; 3 – brake spring attachment points; 4 – automatic anti-panic spring attachment points; 5 – automatic anti-panic mechanism

11 TRANSPORTATION AND STORAGE

The turnstile in the original packaging of the manufacturer should be transported in closed transport only (train cars, containers, closed trucks, holds, etc.), as well as on airplanes.

During storage and transportation, the boxes can be stacked no more than 3 layers high.

The storage of the turnstile is allowed indoors at ambient temperature from -40°C to +55°C and at relative air humidity up to 98% at +25°C.

After transportation or storage at temperatures below zero or at high air humidity, prior to the installation the turnstile must be kept in the original package for no less than 24 hours indoors at room temperature.

Appendix 1. Control signal algorithm at 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 active front (signal transfer from the high level to the low level) at any of the contacts at presence of the corresponding signal levels at the other contacts. The following commands can be formed by sending a low-level signal to the ***X2*** connector block contacts *L, ST* and *R* relatively to the contact *GND*:

"Always locked" (locked for entry and exit) - Active front is at the contact *ST* while there is a high level at the contacts *L, ST* and *R*. Both passage directions are locked at this command.

"Single passage in the direction A" (open for passage of one person in the direction **A**) - active front is at the contact *L* while there is a high level at the contacts *ST* and *R*. At this command the passage direction **A** opens either for 5 sec. or until the passage has been made in this direction or until the command *"Always locked",* the status of the passage direction **B** does not change at that. The command is ignored if at the moment of its receipt the status of the passage direction **A** is *"Always free".*

*"Single passage in the direction **B"*** (open for passage of one person in the direction ***B***) - active front is at the contact *R* while there is a high level at the contacts *ST* and *L*. At this command the passage direction ***B*** opens either for 5 sec. or until the passage has been made in this direction or until the command *"Always locked"*, the status of the passage direction ***A*** does not change. The command is ignored if at the moment of its receipt the status of passage direction ***B*** is *"Always free".*

"Bi-directional single passage" (open in both directions for 'one-by-one' passage) - active front is at the contact *L* while there is a low level at the contact *R* and a high level at the contact *ST*, or active front is at the contact *R* while there is a low level at the contact *L* and a high level at the contact *ST*. At this command both passage directions open either for 5 sec. each or until the passage has been made in the given direction or until the command *"Always locked"* is received. The command is ignored for the passage direction, which status at the moment of its receipt is *"Always free"*.

"Free passage in the direction A" (open for free passage in the direction ***A***) - active front is at the contact *L* while there is a low level at the contact *ST* and a high level at the contact *R*, or active front is at the contact *ST* while there is a low level at the contact *L* and a high level at the contact *R*. At this command the passage direction ***A*** opens until the command *"Always locked"* is received; the status of the passage direction ***B*** does not change at that.

"*Free passage in the direction **B"*** (open for free passage in the direction ***B***) - active front is at the contact *R* while there is a low level at the contact *ST* and a high level at the contact *L*, or active front is at the contact *ST* while there is a low level at the contact *R* and a high level at contact *L*. At this command the passage direction ***B*** opens until the command *"Always locked"* is received; the status of the passage direction ***A*** does not change at that.

"Free passage" (open for free passage in both directions) - active front is at the contact *L* while there is a low level at the contacts *R* and *ST*, or active front is at the contact *R* while there is a low level at the contacts *L* and *ST*, or active front is at the contact *ST* while there is a low level at the contacts *L* and *R*. The both directions open at this command until the command *"Always locked"* is received.

Appendix 2. Control signal algorithm at 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 open or the output transistor is closed.

"Both passage directions are locked" (locked for entry and exit) - there is a high level at the contacts *L* and *R*, or a low level at the contact *ST*. Both passage directions close at this command.

"The direction A is open" (open for passage in the direction ***A***) - there is a low level at the contact *L* while a high level at the contacts *ST* and *R*. At this command the direction ***A*** opens up to the low-level signal removal from the contact A or until the command *"Both directions locked"* is received. The status of the direction ***B*** does not change at that.

"The direction B is open" (open for passage in the direction ***B***) - there is a low level at the contact *R* while there is a high level at the contacts *ST* and *L*. At this command the direction ***B*** opens up to the low-level signal removal from the contact B or until the command *"Both directions locked"* is received. The status of the direction ***A*** does not change at that.

"Both directions are open" (open for entry and exit) - there is a low level at the contacts *L* and *R* while there is a high level at the contact *ST*. Both directions open at this command until the low-level signal removal from one of the contacts A (B) or until the command *"Both directions closed"* is received.

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