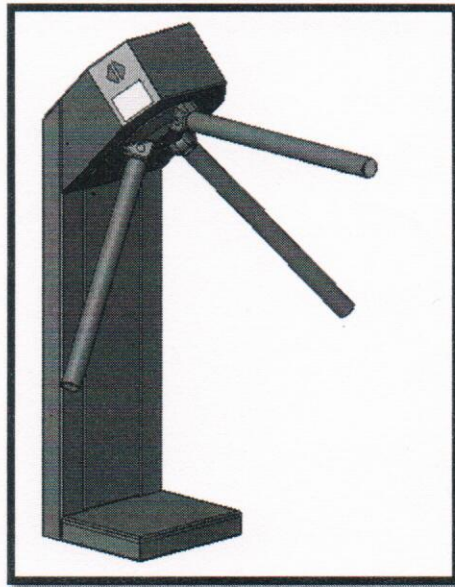




User Manual for Turnstile “EXPO”





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This User Manual applies to mechanically driven tripod-type turnstile "EXPO" (further – the turnstile) and is used for learning the equipment, ensuring its proper exploitation, transportation and storage.

The mounting and maintenance of the turnstile should be executed by people completely studied this User Manual and having proper qualification.



1. General information

1.1. Purpose of the equipment

1.1.1. Mechanically driven tripod-type turnstile "EXPO" is used for controlling people flow at control posts of industrial enterprises, banks, administrative buildings, shops, stations, airports etc.

1.1.2. The turnstile can work in manual mode with the use of control panel (autonomously) as well as in the complex of access control and management system (ACMS).

1.1.3. The turnstile operates after the commands for the controller.

1.1.4. Operating conditions:

- Environment air temperature – from -30° C till 45° C;
- Relative air humidity – not more than 95% in the temperature of 25° C;
- Air pressure – 84...106,7 kPa (630...800 millimeters of mercury);
- Air should not contain dust, oil vapors, fuel and corrosion-active agents in the quantities exceeding their maximum permissible dose.

1.2. Technical characteristics

1.2.1. Supply voltage of the turnstile (direct current), V	24±3
1.2.2. Power consumption, Wt, not more than	30
1.2.3. Climatic execution by the State Standard 15150-69	УХЛ3.1
1.2.4. Protection class by the State Standard 14254	IP42
1.2.5. Overall dimensions of the turnstile, mm	
Length	300
Width	350
Height	360
1.2.6. Width of entrance blocking, mm	530
1.2.7. Net weight, kg	25
1.2.8. Working capacity, persons/minute	
Free passing mode	60
Controlled passing mode	15
1.2.9. Average trouble-free life, passes, not less than	1500000
1.2.10. Average life-time, years	10



switched on automatically during power supply fallout or by external managing signal.

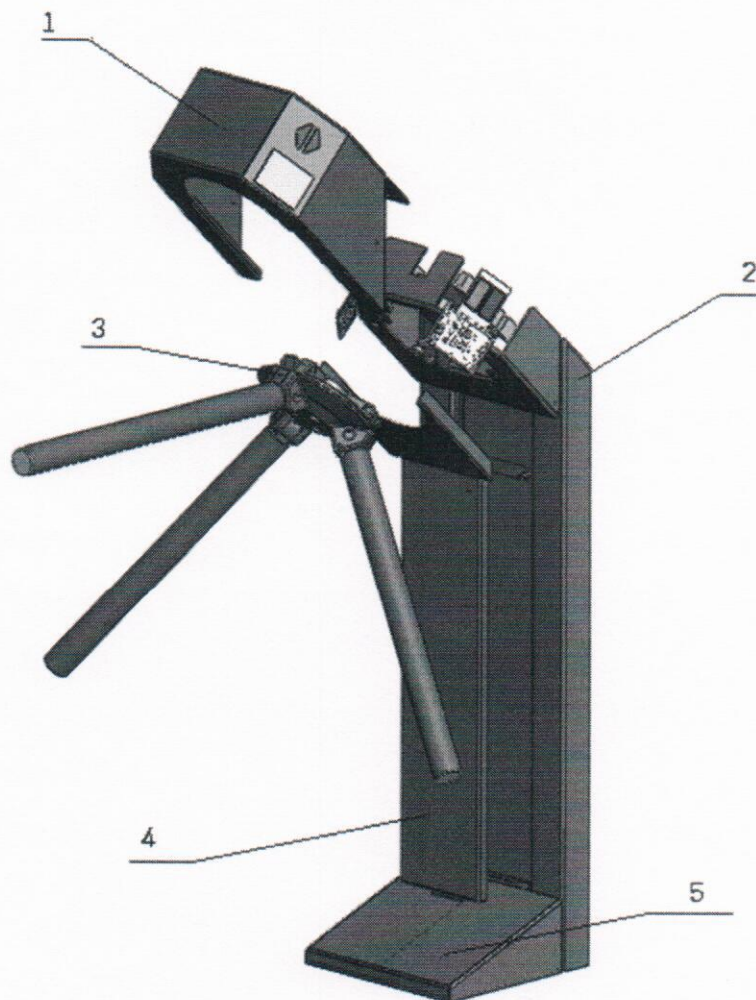
One of the arms is always in the horizontal position blocking the passing; it means that the turnstile works in the mode of “normally closed”.

The controller of the turnstile makes it possible to work in two modes: autonomous work by the commands of control pendant or work in the complex of ACMS.

On the case of the turnstile lighting indicators “allowed/not allowed passing” are situated.

4.2. Structure of the turnstile

4.2.1. General view of the turnstile (pic. 1) is fabricated structure made of following parts: upper case (1) and turnstile case (2) that contain mechanism of tripod rotating (3), the front panel (4) and down panel (5).



Picture 1. General view of the turnstile

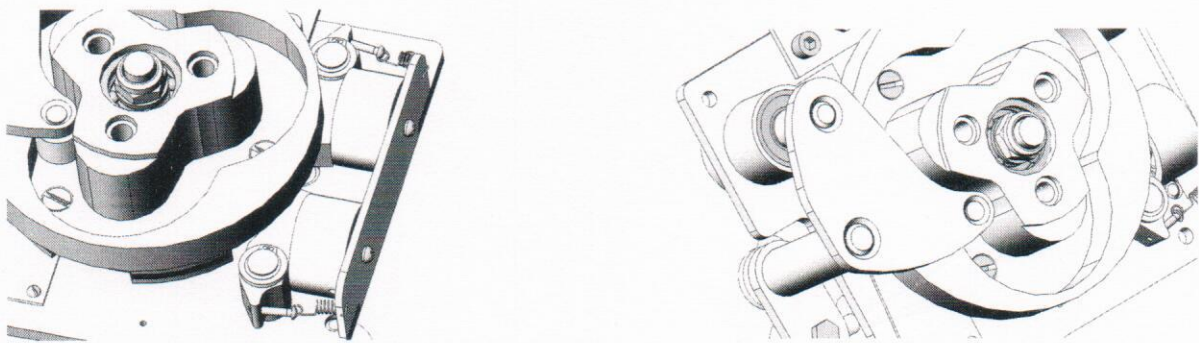
Four anchor bolts (included to the delivery set) are used for mounting the turnstile on the ground and the set of anchor bolts and screws are used. The length of the screws are chosen subject to the quality of floor cover and can be 60-150 mm.



For laying cable communications for connection of the turnstile to the power supply and to the control board (or Access control and management system) plastic corrugated pipes are used (mechanical strength more than 750 Newton).

4.2.2. Mechanically driven mechanism of the tripod rotating (pic. 2) ensures turning the arm to the 120° angel, protects unauthorized passing through the turnstile and consists of a Mechanical drive that turn the occlusive arm to the starting position. Drop-arm unit while receiving the signal drops the occlusive arm in the case of emergency, in the case of people's life and health threat and also in the case of power supply fallout. For the accurate adjusting two regulation screws are used. The turnstile works in the "normally closed" mode; that means that rotation of the tripod can not be executed without managing signal that switches on the electromagnet and pulling the lock out of the barrel.

After turning the arm of the tripod on 60° the spring of drive is turning the tripod to 120° and return proper spring takes the lock back to the starting position.

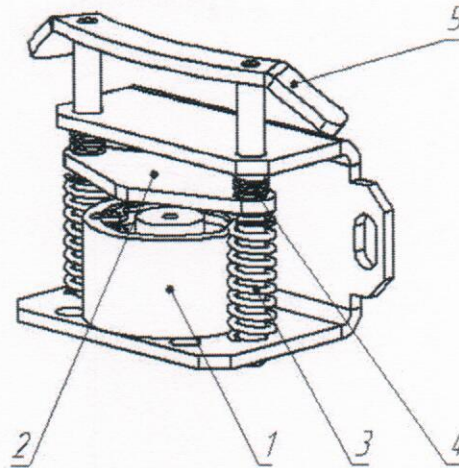


Picture 2. Mechanically driven mechanism

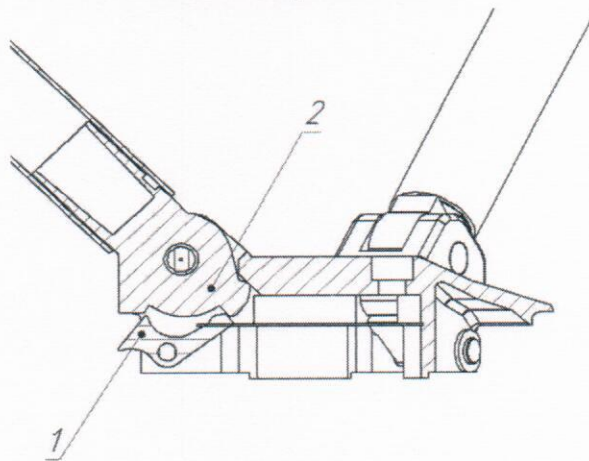
4.2.3. Drop-arm unit (pic. 3) is intended to drop occlusive arm in the case of disconnection of the turnstile from the power supply or in the case of emergency (special command of the control board). Electromagnet is always switched on and attracts the plate (2) that in turn using compensating springs (3) and (4) holds the push bar (5). When the electric supply interrupts the push bar moving by springs hits the pin (1) (pic. 4) that disengages from the slot of the rod (2). After the electric supply is recommenced the electric drive switches on and the rod automatically set into the working position.

In the lower part of the mechanism (pic. 5) tripod position sensors (3) and code wheel (4) are situated, they are used to indicate the direction of the movement (entrance/exit) and tripod arm position.

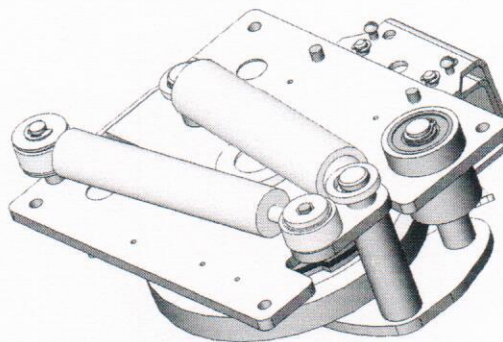
Pulling the drive belt is conducted by the screw (1) and after each pulling is fixed by the screw (2).



Picture 3. Drop-arm unit



Picture 4. Tripod



Picture 5. Mechanically driven mechanism. Bottom view

4.3. The controller of the turnstile

4.3.1. The controller is installed behind the side cover of the case (pic. 1).

Connection circuit of the controller is shown on the pic. 6. To the controller following devices are connected:

- Two electromagnets. They are related to the signals: Block – blocking (allowance) of the entrance (exit); Panic – signal that manages the

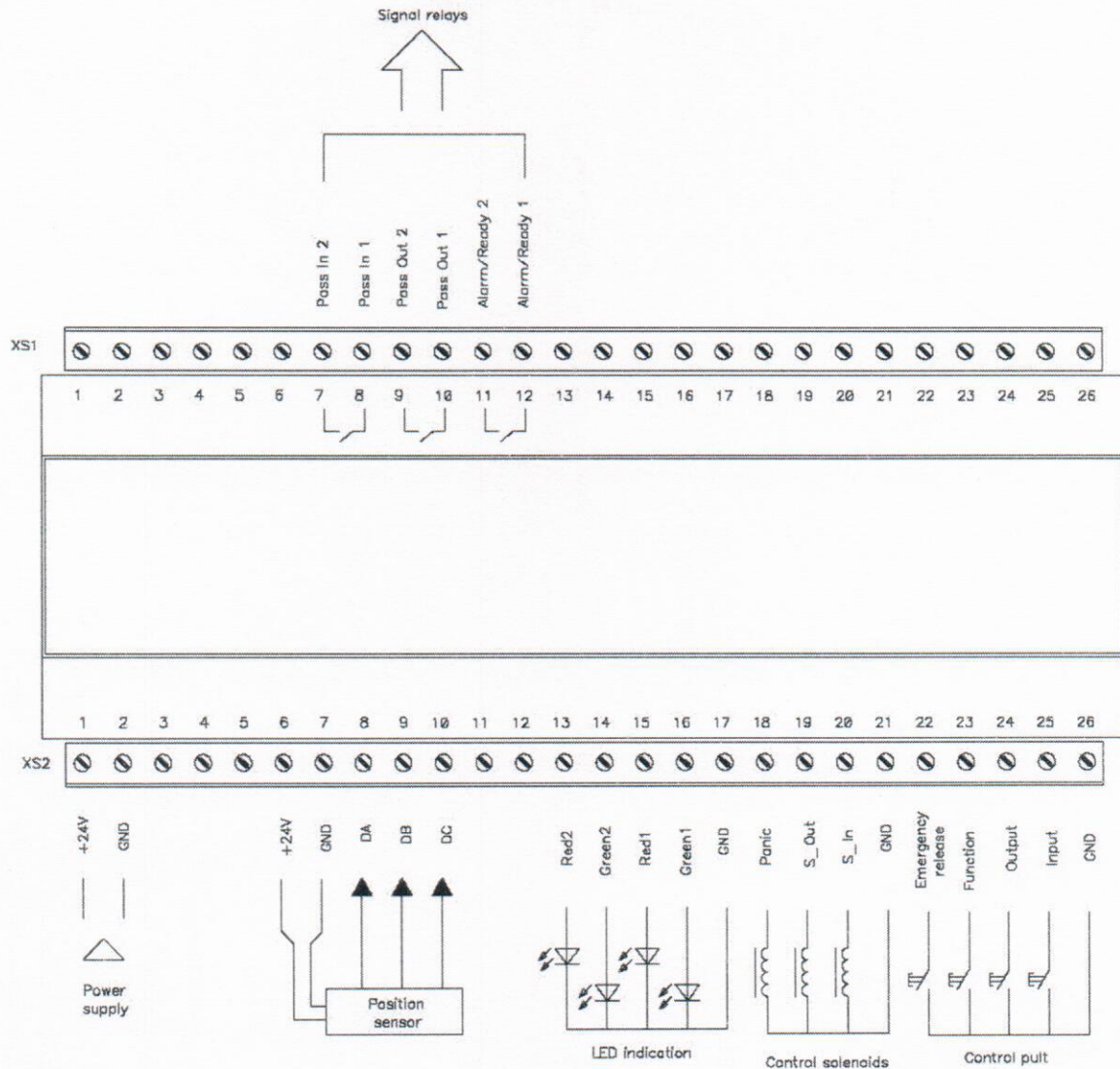


electromagnet included to the drop-arm mechanism and holding the arm of the tripod. After the switching on of the drop-arm electromagnet the arm of the tripod is on the starting (horizontal) position automatically;

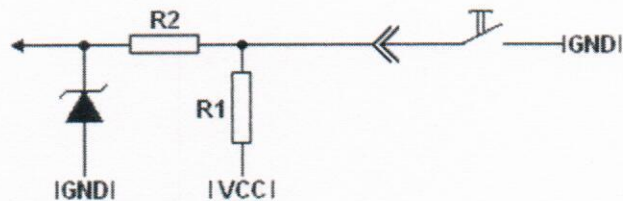
- Tripod position sensors that give signals DB, BC. With the use of these sensors the control tripod position is executed;
- Lighting indication – consist of two groups, the first one (Red1 and Green1 signals) shows the conditions of the entrance (passing is allowed or disallowed) and the second one (Red2 and Green2 signals) – the conditions of the exit;
- Electromotor of the direct current.

The controller of the turnstile has four managing signals (forming by the control board or ACMS): Entry – single passing-in; Exit – single passing-out; Alarm – drop-arm; Function – switching to the starting position (giving this command together with the signals Entry or Exit settles the free passing-in or passing-out mode – look at clause 5.3 “Working modes”).

Circuit representation of the managing inputs (XP2, contacts 22-25 on the pic. 6) is showed on the pic. 7.



Picture 6. Connection circuit of the controller

Picture 7. Circuit representation of the managing input
(for signals Entry, Exit, Function, Alarm)

4.3.2. The controller of the turnstile produces following signals for upper level of the access control and management system (see also the table 1):

- Pass In – in the reset state the contacts of the relay are broken. When the person executes the passing-in, after turning the arm to the 20° the contacts of the relay are closed and after completion of passing (turning



the tripod to the starting position) the contacts of the relay are broken. Thereby single passing-in is indicated.

- **Pass Out** – in the reset state the contacts of the relay are broken. When the person executes the passing-out, after turning the arm to the 20° the contacts of the relay are closed and after completion of passing (turning the tripod to the starting position) the contacts of the relay are broken. Thereby single passing-out is indicated.

In the case signal Alarm is given to the controller simultaneous closing of the relay contacts of Pass In and Pass Out is executed. Breaking the contacts of the relays Pass In and Pass Out is executed after repeated giving of the Alarm signal.

- **Ready** – in the reset state the contacts of the relay are broken. This signal is used by the controller to inform the ACMS about: 1) delay in passing through the turnstile more than 20 seconds; 2) the tripod is not returned to the starting position.

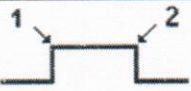
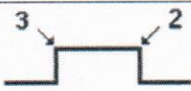
In the case of delay during passing through more than 20 seconds the signal Ready is formed as following. If during 20 seconds after the start of the passing through (turning of the tripod on 20°, activation of one of the sensors) the tripod does not turn to the right direction and does not turn back to the starting position the contacts of the relay are closed (starting of the signal Ready).

After turning the tripod back to the starting position the contacts of the relay are broken (ending of the signal Ready and Pass In/Pass Out).

It's possible when during switching on the turnstile the tripod for any reasons couldn't settle to the starting position or the turnstile is on the starting position and somebody tries to turn the arm of the tripod forcibly. In this case after 7 seconds one signal Ready is given (the contacts of the relay are closed). After turning the tripod back to the starting position the contacts of the relay are broken (ending of the signal Ready).

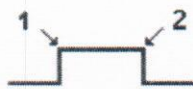
Table 1

Forming of the signals for upper level of the ACMS

Working mode (conditions)	Relay (signal) Pass In	Relay (signal) Pass Out	Relay (signal) Ready
Single passing-in			
Single passing-out			



Delay more than 20 seconds during passing-in			
Delay more than 20 seconds during passing-out			
Emergency exit			
Free passing-in			
Free passing-out			
Delay more than 7 seconds of turning the tripod back to the starting position			



- closing of the contacts by some event.

- breaking of the contacts by some event.

To the upper level of the ACMS the following events can be signaled:

1. Turning the arm of the tripod on 20° while allowance of the passing-in;
2. Turning the tripod back to the starting position;
3. Turning the arm of the tripod on 20° while allowance of the passing-out;
4. Ending of the 20 seconds time period (waiting for turning the tripod back to the starting position);
5. Giving the command Alarm (switching on drop-arm function);
6. Repeated giving the command Alarm (switching off drop-arm function);
7. Ending of the 7 seconds time period (waiting for turning the tripod back to the starting position).

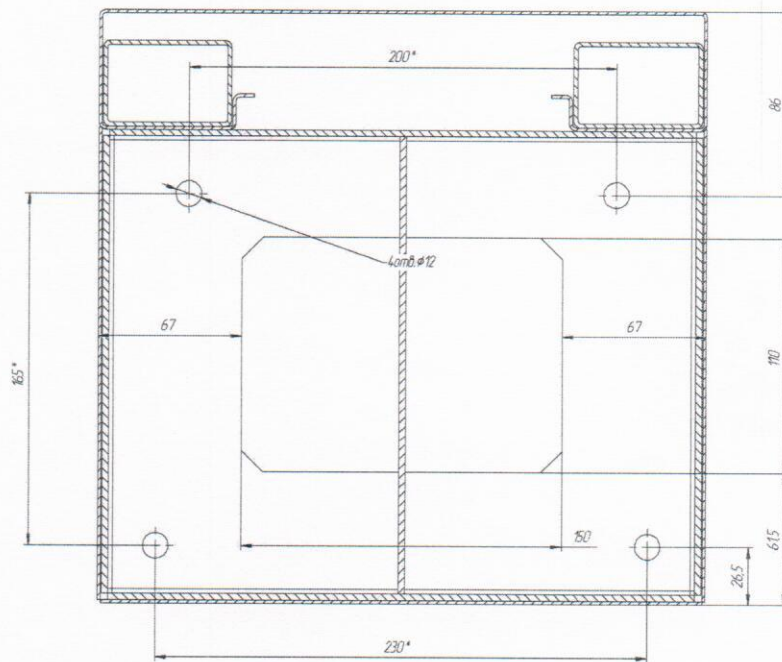
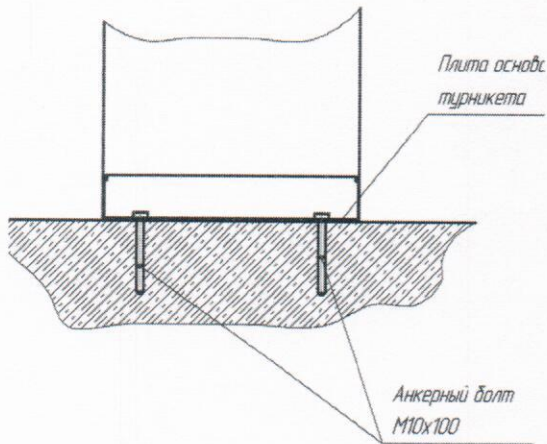
The contacts of the relay transmit signals of the following parameters:

- Maximum voltage of the direct current 24 V
- Maximum switching current 0,5 A
- Closed contact resistance, not more than 0,15 Ohm



5. Mounting, installation and connecting

5.1. Mounting of the turnstile.



Picture 8. Mounting of the post of the turnstile to the basement

The turnstile should be mounted on the strong and smooth concrete bases. Mounting of the turnstile to the wall (pic. 8) is executed by four anchor bolts and mounting girders (2 for each post). During mounting of the turnstile the electric supply cables, connection cables to the control board, connection cables to the



external controller of the ACMS are laid. The place of installing the external managing controller of the ACMS should not be further than 20 meters from the turnstile.

The mounting of the turnstile should be done in the following order:

- Unpack the turnstile, check the package contents;
- Prepare 4 holes on the wall for anchor bolts and slot for cabling;
- Lay the plastic pipes, make cabling.

For connecting the turnstile following cables are needed:

- Power cable – 2 wires ($d > 1,5 \text{ mm}^2$ each);
- Control board cable – 8 wires ($d > 0,22 \text{ mm}^2$ each) or another cable in accordance with ACMS requirements;
- Cable of the output signals for managing controller of the ACMS – 8 wires ($d > 0,22 \text{ mm}^2$ each) or another cable in accordance with connection circuit of managing controller of the ACMS).

Install the turnstile, fixate it to the base.

Mount the tripod to the mechanism

Connect the power cables, control board cables, external managing controller cables in accordance with pic. 6.

Cover and fixate by bolts covers of the turnstile and basement.

5.2. Preparing to operation.

Before switching on the turnstile it's necessary to ensure in rightness of all connections, good condition of connection cables by visual examination and correctly installed tripod (symmetrically to basis).

Clear the tripod rotation zone from foreign objects.

Connect power cable of the power supply to the electrical network 220V/50Hz.

For dead-load stress relief it's recommended to connect the case to the ground loop.

Mounting of tripods after switching electric supply must be made handly position. The arm is fixated in the horizontal position after that the turnstile comes to starting position.

Warning: do not switch on the turnstile without mounted tripod.

5.3. Working modes of the turnstile.

Mounting of tripods after switching electric supply must be made handly position. The arm is fixated in the horizontal position after that the turnstile comes to starting position.



The following working modes can be formed by giving low-level signals (GND) width 40 msec to the contacts 22-25 of input XP2 (pic. 6):

The starting position of the turnstile – is formed by giving the signal Function by the ACMS (or short pushing the button “Function”) while other signals are not active (or released buttons of the control board). This command blocks the passing through the turnstile in both directions, red lights are active on both side covers.

Single passing-in – is formed by giving the signal Entry by the ACMS (or short pushing the button “Entry”) while other signals are not active (or released buttons of the control board).

In this working mode the passing-in is opened for one person. During 7 seconds the turnstile waits for starting the passing (turning the arm on 20°), if it's not happened the indication begins red and the entry is blocked. If the passing has begun but has not completed within 20 seconds the indication begins red, the entry is blocked and the signal Ready is transmitted to the upper level (as the signal Pass In is already transmitted) and the turnstile waits for turning the tripod back to the starting position (table 1). In the case of normal (without ceasing) beginning and ending of the passing the signal Pass In is transmitted to the upper level, the indication on the entry side begins red and the entrance is blocked.

Exit of this working mode can be executed by:

- 1) Giving the signal Function (pushing the button “Function”) and turning the turnstile to the starting position;
- 2) Giving the signal Alarm and turning to the working mode “Emergency exit”.

The signal Entry is ignored if:

- 1) The turnstile is in the Free passing-in mode;
- 2) The turnstile is already in the Single passing-in mode;
- 3) The tripod of the turnstile is not at the starting position;
- 4) The turnstile is in the Emergency exit mode.

Single passing-out – is formed by giving the signal Exit to the ACMS (or short pushing the button “Exit”) while other signals are not active (or released buttons of the control board).

In this working mode the passing-out is opened for one person. During 7 seconds the turnstile waits for starting the passing (turning the arm on 20°), if it's not happened the indication begins red and the exit is blocked. If the passing has begun but has not completed within 20 seconds the indication begins red, the exit is



blocked and the signal Ready is transmitted to the upper level (as the signal Pass Out is already transmitted) and the turnstile waits for turning the tripod back to the starting position (table 1). In the case of normal (without ceasing) beginning and ending of the passing the signal Pass Out is transmitted to the upper level, the indication on the exit side begins red and the exit is blocked.

Exit of this working mode can be executed by:

- 1) Giving the signal Function (pushing the button "Function") and turning the turnstile to the starting position;
- 2) Giving the signal Alarm and turning to the working mode "Emergency exit".

The signal Exit is ignored if:

- 1) The turnstile is in the Free passing-out mode;
- 2) The turnstile is already in the Single passing-out mode;
- 3) The tripod of the turnstile is not at the starting position;
- 4) The turnstile is in the Emergency exit mode.

Emergency exit – is formed by giving the signal Alarm by the ACMS (or short pushing the button "Alarm") while other signals are not active (or released buttons of the control board).

In this working mode disconnection of the electromagnet is done and the occlusive arm of the turnstile is dropped. Simultaneously the signals Pass In and Pass Out are transmitted to the upper level and indication lights begin green. It's allowed uncontrolled passing through the turnstile in both directions. This command is given in the case of emergency or threat of people's lives and health.

After repeated giving the signal Alarm the signals Pass In and Pass Out are ceased, the tripod makes full turn, the occlusive arm is fixated at the horizontal position and the turnstile comes to the starting position.

While the turnstile is in this working mode the signals Entry, Exit and Function are ignored.

Free passing-in – is formed by giving the simultaneous signals Entry and Function by the ACMS (or short simultaneous pushing the buttons "Function" and "Entry") while other signals are not active (or released buttons of the control board).

This working mode allows uncontrolled passing-in for any quantity of people. After each passing-in the signal Pass In is transmitted to the upper level.

Exit of this working mode can be executed by:

- 1) Giving the signal Function (pushing the button "Function") and turning the turnstile to the starting position;



- 2) Giving the signal Alarm and turning to the working mode "Emergency exit".

While the turnstile is in the Free passing-in mode the signal Entry is ignored.

Free passing-out – is formed by simultaneous signals Exit and Function by the ACMS (or short simultaneous pushing the buttons "Function" and "Exit") while other signals are not active (or released buttons of the control board).

This working mode allows uncontrolled passing-out for any quantity of people. After each passing-out the signal Pass Out is transmitted to the upper level.

Exit of this working mode can be executed by:

- 1) Giving the signal Function (pushing the button "Function") and turning the turnstile to the starting position;
- 2) Giving the signal Alarm and turning to the working mode "Emergency exit".

While the turnstile is in the Free passing-out mode the signal Exit is ignored.



5.4. Working modes settings:

Single passing-in

- 1) Give the signal Entry;
- 2) Delay 40 msec or more;
- 3) Stop the signal Entry;
- 4) Delay 40 msec or more.

Single passing-out

- 1) Give the signal Exit;
- 2) Delay 40 msec or more;
- 3) Stop the signal Exit;
- 4) Delay 40 msec or more.

Emergency exit

- 1) Give the signal Alarm;
- 2) Delay 40 msec or more;
- 3) Stop the signal Alarm;
- 4) Delay 40 msec or more.

Starting position of the turnstile

- 1) Give the signal Function;
- 2) Delay 40 msec or more;
- 3) Stop the signal Function;
- 4) Delay 40 msec or more.

Free passing-in

- 1) Give the signal Entry;
- 2) Delay 40 msec or more;
- 3) Give the signal Function;
- 4) Delay 40 msec or more;
- 5) Stop the signals Entry and Function;
- 6) Delay 40 msec or more.

Free passing-out

- 1) Give the signal Exit;
- 2) Delay 40 msec or more;
- 3) Give the signal Function;
- 4) Delay 40 msec or more;



- 5) Stop the signals Exit and Function;
- 6) Delay 40 msec or more.

Free passing-in and passing-out

Variant 1

- 1) Give the signal Exit;
- 2) Delay 40 msec or more;
- 3) Give the signal Entry;
- 4) Delay 40 msec or more;
- 5) Give the signal Function;
- 6) Delay 40 msec or more;
- 7) Stop the signals Exit, Entry and Function;
- 8) Delay 40 msec or more.

Variant 2

- 1) Give the signal Entry;
- 2) Delay 40 msec or more;
- 3) Give the signal Exit;
- 4) Delay 40 msec or more;
- 5) Give the signal Function;
- 6) Delay 40 msec or more;
- 7) Stop the signals Exit, Entry and Function;
- 8) Delay 40 msec or more.



6. Technical maintenance

Technical maintenance of the turnstile is executed in order to ensure failure-free operation during exploitation period.

While executing the technical maintenance safety requirements should be met that are mentioned in the clause 3 of this User Manual.

Recommended types and periodicity of technical maintenance (TM) are mentioned in the table 2.

Table 2

Types and periodicity of TM

Type	Periodicity	Average labour consumption, hours
TM-1	Every 3 months	0,5
TM-2	Every 6 months	1

TM-1 includes following works:

- Visual examination of external damages;
- Visual examination of connection and net cables;
- Removal of dust and dirt from the external and internal parts of the case and the mechanism;
- Clearance of the electronic board of the control unit of the turnstile: the face of the board clear of dust and dirt with the use of dauber and then clean with the napkin of soft fabric saturated with spirit;
- Examining of the working modes of the turnstile in accordance with the table of this User Manual.

TM-2 includes following works:

- Works of TM-1;
- Examining of the units fastenings, cables and details of the turnstile;
- Examining of the strength of screw connections on the case and on the mechanism.

Rate of application for technical maintenance per one turnstile per year:

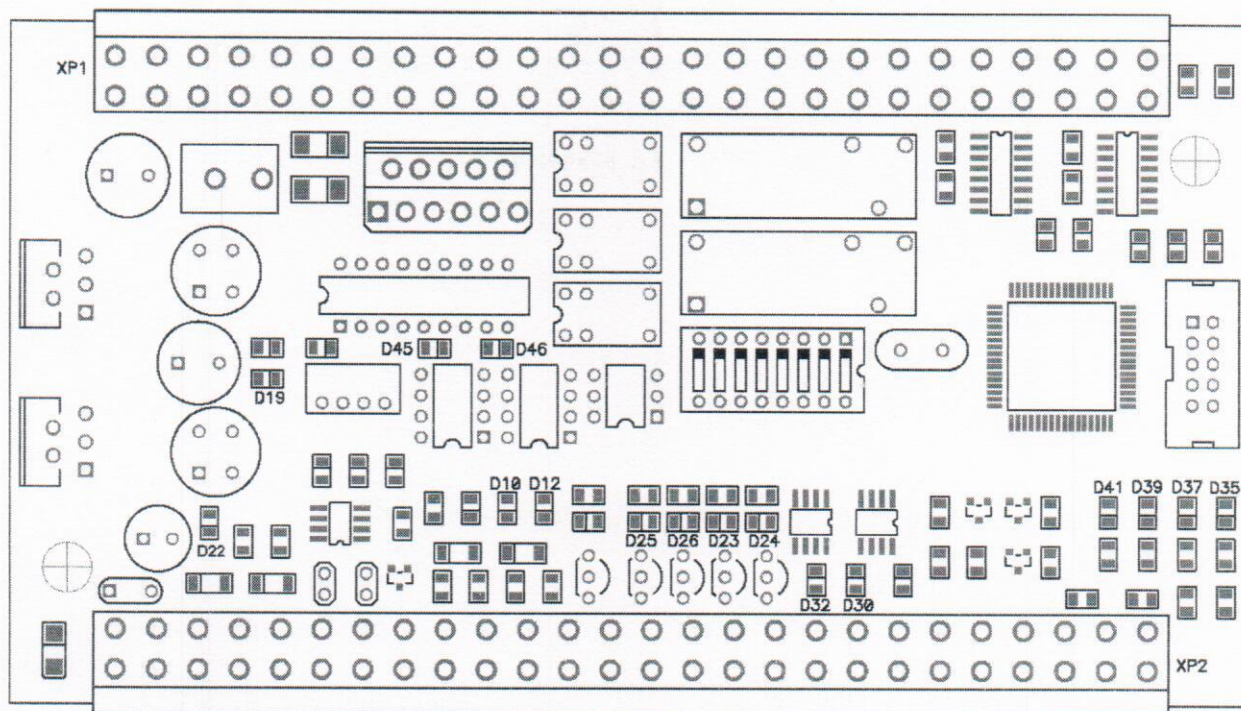
- Spirit – 0,5 l
- Cotton – 0,5 m².



7. Possible malfunctions and removal methods

7.1. Troubleshooting of the controller

Purposes of the signal light diodes (pic. 9) is mentioned in the table 3.



Picture 9. Controller of the turnstile

Table 3

Purposes of the signal light diodes.

Name	Purpose
D10	Indication of transmitting the signal DB from the tripod position sensor. If the light diode is on the signal DB is transmitted.
D12	Indication of transmitting the signal DC from the tripod position sensor. If the light diode is on the signal DC is transmitted.
D19	Indication of presence of power supply to the processor (5V). If the light diode is on the power 5V is supplied.
D22	Indication of presence of input voltage 24V. If the light diode is on the voltage 24V is supplied.
D23	Indication of giving signal Red1 (light indication at the entrance, red light). If the light diode is on the Red1 signal is transmitted. This signal switches on LED "Red" for entrance.
D24	Indication of giving signal Green1 (light indication at the



	entrance, green light). If the light diode is on the Green1 signal is transmitted. This signal switches on LED "Green" for entrance.
D25	Indication of giving signal Red2 (light indication at the entrance, red light). If the light diode is on the Red2 signal is transmitted. This signal switches on LED "Red" for exit.
D26	Indication of giving signal Green2 (light indication at the entrance, green light). If the light diode is on the Green2 signal is transmitted. This signal switches on LED "Green" for exit.
D30	Indication of transmitting the signal Block. If the light diode is on the signal Block is transmitted. This signal switches on the electromagnet of the blocking (allowance) of the passing.
D32	Indication of transmitting the signal Panic. If the light diode is on the signal Panic is transmitted. This signal switches on the electromagnet of the drop-arm unit and the arm of the tripod should be fixated horizontally after the full turn.
D35	Indication of transmitting the signal Entry by the ACMS (or pushing relative button). If the light diode is on the signal Entry is transmitted (or the button is pushed).
D37	Indication of transmitting the signal Exit by the ACMS (or pushing relative button). If the light diode is on the signal Exit is transmitted (or the button is pushed).
D39	Indication of transmitting the signal Function by the ACMS (or pushing relative button). If the light diode is on the signal Function is transmitted (or the button is pushed).
D41	Indication of transmitting the signal Alarm by the ACMS (or pushing relative button). If the light diode is on the signal Alarm is transmitted (or the button is pushed).
D45	Indication of transmitting signal to the control circuit about counterclockwise rotation of the tripod. If the signal is off the light diode is on. If the light diode blinks (1 kHz) the signal is transmitted.
D46	Indication of transmitting signal to the control circuit about clockwise rotation of the tripod. If the signal is off the light diode is on. If the light diode blinks (1 kHz) the signal is transmitted.



After supplying the power 24V to the controller of the turnstile the tripod makes full turn and the occlusive arm is fixated horizontally, the turnstile comes to the starting position when the following light diodes should be on: D10, D12, D19, D22, D23, D25, D32, D45, D46.

The list of possible malfunctions of the controller and the remedies is in the table 4.

Table 4

List of possible malfunctions and the remedies

Trouble	Cause	Remedy
After power-up the turnstile does not work, no light diode on the controller is on.	1. Faulty power cable. 2. Wrong power cable connection ("+" and "-" are confused).	Examine the rightness of connection, power cable and remedy troubles.
After transmitting the signal Entry (pushing the button "Entry") indication on the entry doesn't light green, the turnstile doesn't allow passing-in.	1. Faulty button "Entry". 2. Faulty of cable connecting the control board and the controller. 3. The tripod of the turnstile is not in the starting position. 4. Tripod position sensor is broken.	Examine if the D10 and D12 diodes are on. If one of the diodes is off the tripod should be turned to the starting position or examine tripod position sensors. If D10 and D12 are on and the turnstile does not react on pushing button "Entry" examine D35 diode at the moment of pushing the button. If D35 doesn't light examine the connection between control board and the controller.
After transmitting the signal Entry (pushing the button "Entry") indication on the entry begins green, but the turnstile doesn't	1. Faulty in electromagnet that opens passing-in direction. 2. Faulty of cable connecting the mechanism and the controller.	Examine if the D30 diode is on after transmitting the signal Entry (pushing the button "Entry"). If it is on then examine the connection between mechanism and the



allow passing-in.		controller and also the electromagnet that opens passing-in direction.
After transmitting the signal Exit (pushing the button "Exit") indication on the exit doesn't light green, the turnstile doesn't allow passing-out.	1. Faulty button "Exit". 2. Faulty of cable connecting the control board and the controller. 3. The tripod of the turnstile is not in the starting position. 4. Tripod position sensor is broken.	Examine if the D10 and D12 diodes are on. If one of the diodes is off the tripod should be turned to the starting position or examine tripod position sensors. If D10 and D12 are on and the turnstile does not react on pushing button "Exit" examine D37 diode at the moment of pushing the button. If D37 doesn't light examine the connection between control board and the controller.
After transmitting the signal Exit (pushing the button "Exit") indication on the exit begins green, but the turnstile doesn't allow passing-out.	1. Faulty in electromagnet that opens passing-out direction. 2. Faulty of cable connecting the mechanism and the controller.	Examine if the D30 diode is on after transmitting the signal Exit (pushing the button "Exit"). If it is on then examine the connection between mechanism and the controller and also the electromagnet that opens passing-out direction.
After simultaneous transmitting of the signals Function and Entry (Exit) the turnstile is not in the Free passing mode	1. Faulty of the button "Function" or the button "Entry" ("Exit"). 2. Faulty of the cable connecting the control board and the controller.	Examine if the light diodes D35 and D39 (D37 and D39) after simultaneous pushing the buttons "Function" and "Entry" ("Function" and "Exit"). If one of the light diodes is off or both are off examine the connection between the control board