



«TiSO-PRODUCTION» Company

**SERVO-OPERATED  
WAIST-HIGH TURNSTILE  
T3.XCC.XO**



**OPERATION MANUAL  
AUIA.090 OM**

2013

# CONTENTS

|   | Page |
|---|------|
| INTRODUCTION.....   | 3    |
| 1 DESCRIPTION AND OPERATION.....  | 5    |
| 1.1 General Information and Designation.....  | 5    |
| 1.2 Specifications.....   | 6    |
| 1.3 Configuration and Completeness of Delivery.....   | 6    |
| 1.4 Design and Operation.....   | 7    |
| 1.5 Instrumentation, tools and accessories.....   | 8    |
| 1.6 Marking.....  | 8    |
| 1.7 Packing.....  | 9    |
| 1.8 Description and operation of controller as component of the turnstile.....  | 9    |
| 2 INTENDED USE.....   | 17   |
| 2.1 Operating limitations.....  | 17   |
| 2.2 Layout and installation.....  | 17   |
| 2.3 Preparation for use.....  | 18   |
| 2.4 Contingency actions.....  | 19   |
| 3 MAINTENANCE.....  | 19   |
| 3.1 General instructions.....   | 19   |
| 3.2 Safety measures.....  | 19   |
| 3.3 Maintenance procedure.....  | 19   |
| 4 ROUTINE MAINTENANCE.....  | 20   |
| 4.1 General instructions.....   | 20   |
| 4.2 List of possible malfunctions.....  | 20   |
| 4.3 Post repair checkout.....   | 20   |
| 5 TRANSPORTATION AND STORAGE.....   | 20   |
| 6 UTILIZATION.....  | 21   |
| 7 MANUFACTURER’S WARRANTY AND CONDITIONS OF INTERMEDIATE<br>MAINTENANCE.....  | 21   |
| Appendix A Design, overall and installation dimensions of the servo-operated waist-<br>high turnstile T3.XCC.XO ..... | 22   |
| Appendix B Control panel and connection diagram.....  | 24   |
| Appendix C Wiring diagram of the turnstile T3.XCC.XO.....   | 26   |

## INTRODUCTION

This Operation Manual (hereinafter referred to as the OM), combined with certificate, covers servo-operated turnstile (hereinafter referred to as the turnstile). The Operation Manual contains information about design, specifications, installation, proper operation and maintenance of the turnstile.

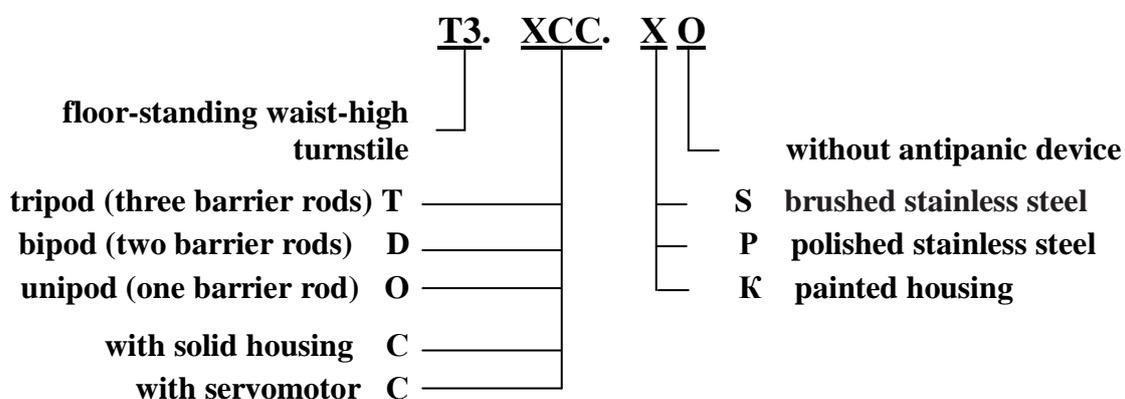
This Operation Manual is prepared in compliance with the specification requirements TU U 31.6-32421280-004:2010.

The turnstile should be serviced only by the qualified staff having the relevant class of permit to work with electrical facilities with voltage up to 1000V, who carefully studied this Operation Manual, obtained safety instructions and trained for operation and maintenance of the turnstile.

Reliability and durability of the turnstile operation is provided with observation of modes and conditions of transportation, storage, installation and operation. So, fulfillment of all requirements specified in this document is mandatory.

Due to regular upgrading of the turnstile its design can be modified without degradation of parameters and its quality.

Depending on the purpose and design features of the turnstile, the following pattern of product reference designation is accepted:



Example of reference designation of the servo-operated «TRIPOD» type turnstile with solid housing from brushed stainless steel when the turnstile

T3.TCC.SO TU U 31.6-32421280-004:2010 is ordered.

Example of reference designation of the servo-operated «DUOPOD» type turnstile with solid housing from brushed stainless steel when the turnstile

T3.DCC.SO TU U 31.6-32421280-004:2010 is ordered.

Example of reference designation of the servo-operated «MONOPOD» type the turnstile with solid housing from brushed stainless steel when the turnstile

T3.OCC.SO TU U 31.6-32421280-004:2010 is ordered.

## **WARNINGS TO THE CUSTOMER ON SAFE OPERATION OF THE TURNSTILE**

These warnings are designed for ensuring of safety during operation of the turnstile to prevent violation of safety characteristics by improper installation or operation. These warnings are aimed at drawing attention of the customer to safety problems.

### **GENERAL WARNINGS**

Safety measures and requirements specified in this in this OM must be observed:

- the turnstile must be connected to ground loop prior to operation;
- the turnstile should be connected to AC network with parameters specified in the paragraph 1.2 «Specifications»;
- inspection, adjustment and repair should be performed only after the turnstile is deenergized.

After purchasing of the turnstile it should be unpacked and its integrity should be checked. In case of doubt in integrity of the turnstile it should not be used and the customer should refer to the supplier or to the manufacturer.

Packing accessories (wooden pallet, nails, clips, polyethylene bags, cardboard etc.) as potential sources of hazard must be removed to unacceptable place prior to proper use of the turnstile.

As electric shock protection device the turnstile is related to 01 protection class according to the GOST (State Standard) 12.2.007.0-75 and is not intended for operation in explosive and firehazardous areas by the «Rules for design of electrical installations».

Using of the turnstile for unintended purpose, improper installation, nonobservance of conditions of transportation, storage, installation and operation specified by this OM, may result in damage to people, animals or property for which the manufacturer is not responsible.

# 1 DESCRIPTION AND OPERATION

## 1.1 General Information and Designation

1.1.1 Name of product: Servo-operated turnstile

Climatic version: NF4

1.1.2 The turnstile is designed for arrangement of individual access at ski resorts, access points of industrial enterprises, banks, stadiums, administrative facilities etc. under actuation of control signals (arrived from magnetic card readers, keypad etc.) of access control system or manually (from manual control panel).

Traffic flow capacity of the turnstile without personal identification is at least 25 persons per minute.

1.1.3 Dimensions and weight of the turnstile correspond to the values specified in the Table 1.

Table 1

| Designation of modification | Dimensions, mm |     |     | Max. weight, kg |
|-----------------------------|----------------|-----|-----|-----------------|
|                             | H              | L   | W   |                 |
| T3.TCC.SO                   | 932            | 785 | 780 | 45              |
| T3.TCC.PO                   |                |     |     |                 |
| T3.TCC.KO                   |                |     |     |                 |
| T3.DCC.SO                   | 932            | 785 | 339 | 45              |
| T3.DCC.PO                   |                |     |     |                 |
| T3.DCC.KO                   |                |     |     |                 |
| T3.OCC.SO                   | 932            | 785 |     | 45              |
| T3.OCC.PO                   |                |     |     |                 |
| T3.OCC.KO                   |                |     |     |                 |

1.1.4 The parameters defining operation conditions according to GOST 15150-69 and GOST 12997-84 are specified in the Table 2.

Table 2

| Operation conditions                   | For climatic version | Parameter value  |
|--|----------------------|--|
| Ambient temperature                    | NF4                  | +1°C to + 40°C   |
| Relative humidity                      |                      | 80 % at + 25°C   |
| Ambient temperature allowable pressure |                      | 84 to 106,7kPa   |
| Transportation temperature range       |                      | - 40°C to + 50°C   |
| Storage temperature range              |                      | + 5°C to + 40°C  |
| Group of mechanical application        |                      | L3   |
| Altitude above sea level               |                      | up to 2000 m   |
| Environment                            | NF4                  | Explosion-proof, does not contain current-conducting dust, aggressive gases and vapours in concentration destroying isolation and metals, disturbing normal operation of the equipment installed in turnstiles |
| Installation site                      |                      | In enclosed spaces in the absence of direct impact of precipitations and solar radiation   |
| Running position                       |                      | Vertical, deviation from vertical position no more than 1° to any side is tolerated  |

1.1.5 Reliability indices:

- Mean time to repair (without delivery time of spare parts, tools and accessories) – at most 6 hours;
- Mean time to failure – at least 1 500 000 accesses;
- Mean service life between overhauls – at least 10 years.

## 1.2 Specifications

Principal parameters of the turnstile are specified in the Table 3.

Table 3

| Parameter description                                   | Unit measure | Parameter value    |
|---|--------------|--------------------|
| Traffic flow capacity in free access mode is at least   | man/min.     | 60                 |
| Traffic flow capacity in single access mode is at least | man/min.     | 25                 |
| Max. passage width                                      | mm           | 560                |
| Supply voltage:   |              |                    |
| – AC power supply (primary)                             | V<br>Hz      | 100÷240<br>~ 50/60 |
| – DC power supply (secondary)                           | V            | 12                 |
| Max. power consumption                                  | V·A          | 75                 |
| Index of protection according to GOST 14254-96          | –            | IP41               |

## 1.3 Configuration and Completeness of Delivery

1.3.1 Design of servo-operated waist-high turnstile includes the following principal devices and components:

- housing with cover;
- post with cover;
- two LED displays;
- barrier rods (their number depends on modification);
- servomotor;
- control desk.

Optionally the turnstile can be completed with battery.

Design, overall and installation dimensions of the turnstile are specified in the Appendix A.

The turnstile modifications are manufactured from:

- polished stainless steel (reference designation T3.XCC.PO);
- brushed stainless steel (reference designation T3.XCC.SO);
- carbon steel subject to painting (reference designation T3.XCC.KO).

The base modification is made from brushed stainless steel.

### 1.3.2 Completeness of Delivery

For convenience of delivery the turnstile is supplied ready-to-install with dismantled barrier rods.

The turnstile is delivered by one package. Separately packed components are enclosed to the turnstile packing, dimensions of which are 450x1200x400mm.

Completeness of delivery is specified in the Table 4.

Table 4

| Name of product                     | Product designation/parameters | Quantity, piece | Notes   |
|-------------------------------------|--------------------------------|-----------------|---|
| Servo-operated waist-high turnstile | T3.____CC.____                 | 1 kit           | To be delivered ready-to-install with dismantled barrier rods |
| <u>Components</u>                   |                                |                 |   |

|               |   |   |                              |
|---------------|---|---|------------------------------|
| Control desk  | Power Supply Unit<br>AD-55A             | 1 | Components of control desk   |
|               | Controller of motor<br>PCB.201.01.00.00 | 1 |                              |
|               | Controller<br>PCB.112.21.20.00          | 1 |                              |
| Control panel | AUIA.114.02.00.00                       | 1 | –                            |
| Mounting kit  | Redibolt 92F112A2-0<br>(12×120 M10)     | 4 | Anchor with jacket and screw |
| Certificate   | AUIA.090 PS                             | 1 | –                            |
| Packing       | –                                       | 1 | –                            |

## 1.4 Design and operation

### 1.4.1 Turnstile design

1.4.1.1 The turnstile housing 1 is a metal structure installed on the post 5 which is mounted by its support on plain surface by means of Redibolt (see the Appendix A). Status of the turnstile is displayed by LEDs 9 built in the turnstile housing. Constantly lit red LED means initial state. When command to open is arrived, signal is transformed to green arrow from the side of permitted access.

1.4.1.2 At the top of the turnstile housing highly reliable servomotor 2 with electromagnet brake is mounted. Hub with barrier rods is installed on the servomotor shaft. One of the barrier rods is located horizontally barring the turnstile access.

1.4.1.3 The turnstile's actuator, shown in the Figure 1, provides reliable locking of barrier rods due to worm-drive of gear motor 6.

1.4.1.4 Inside turnstile post (see the Appendix A), under removable cover 6, the plates are fixed on which power supply unit, controllers, terminal blocks to be connected to 220V network and to control device are installed. Controller controls the turnstile's motor, analyzing signals from speed and position sensors, and furthermore provides motor overload protection. Receiving control commands from peripherals (control panel, ACS (Access Control System) etc.) controller controls LED displays and generates feedback signals for ACS.

1.4.1.5 External control panel has the following functions: single entry and e exit, locking of entry and exit, free entry and exit.

### 1.4.2 Principle of operation

1.4.2.1 Turnstile operating modes:

- 1) single access in the direction «A» or «B»;
- 2) locking;
- 3) free access in the direction «A» or «B».

1.4.2.2 In the initial state, when solenoid of operating mechanism is energized, barrier rods are locked from turning and access is barred.

1.4.2.3 When permission command for access in the direction «A» or «B» comes to controller green arrow is lit on LED display in the appropriate direction and barrier rods are unlocked. Servomotor is actuated and turns barrier rods in the appropriate direction when barrier rod is manually gently pushed in the direction of access. After pedestrian turnstile access barrier rods continue to smoothly turn forward (turn additionally) gradually slowing down and when the definite angle is reached they are locked by electromagnetic brake of operating mechanism, when 120° (for tripod), 180° (for bipod) and 360° (for unipod) rotation angle is reached.

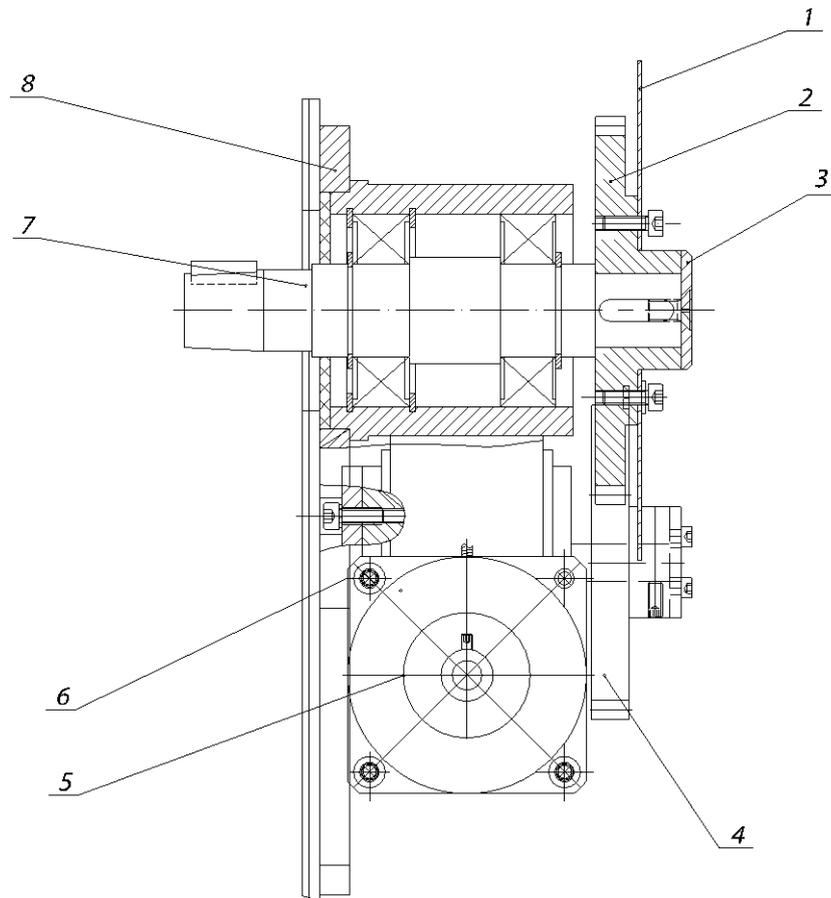
More detailed description of the turnstile operating modes is given in the paragraph 1.8 «Description and operation of controller as component of the turnstile».

1.4.2.4 The turnstile 12V DC power voltage is provided by power supply unit.

1.4.2.5 The turnstile's wiring diagram is shown in the Appendix C.

### 1.5 Instrumentation, tools and accessories

Dedicated tools are required for installation of the turnstile (multi-purpose measurement instrumentation and installation tools are enough).



- |                 |                 |
|-----------------|-----------------|
| 1 – optodisks;  | 5 – brake;      |
| 2 – gear wheel; | 6 – gear motor; |
| 3 – washer;     | 7 – shaft;      |
| 4 – pinion;     | 8 – base plate  |

Figure 1 – Actuator of the turnstile

### 1.6 Marking

1.6.1 Marking of turnstiles to be delivered within Ukraine is in Ukrainian language and for export delivery in English.

Each turnstile is marked as follows:

- name of manufacturer and trade mark;
- each turnstile is equipped with identification plate containing the following data;
- reference designation of turnstile modification;

- index of protection;
- serial number;
- value of voltage, type of current, frequency and current consumption;
- weight, kg;
- marks of conformity to  $\text{Ⓢ}$ ,  $\text{CE}$ ;
- date of manufacture;
- inscription «MADE IN UKRAINE».

Marking plate is located on the turnstile housing.

1.6.2 Marking of transportation packing contains as follows:

1) Information inscriptions:

- turnstile reference designation;
- dimensions of cargo package in centimeters;
- gross weight in kg;
- net weight in kg;
- volume of package in cubic meters;

2) Handling marks:

- «Fragile. Handle with Care»;
- «Keep dry»;
- «Centre of gravity»;
- «Top».

1.6.3 Shipping documentation is packed with bag from polyethylene film. Marking is applied on insert from cardboard or paper.

## 1.7 Packing

1.7.1 The turnstile is delivered ready-to-install.

Types of packing:

- consumer packaging (corrugated cardboard case);
- transportation packaging (cases from wood-fiber board or crates).

The turnstile is fixed from displacement in the middle of transportation package with blocking lumbers. Cushion pads are placed between the turnstile and lumbers.

1.7.2 Shipping documentation sealed in a bag from polyethylene film is enclosed to the turnstile packing.

## 1.8 DESCRIPTION AND OPERATION OF CONTROLLERS AS COMPONENT OF THE TURNSTILE

1.8.1 Purpose of the controller PCB.201.01.00.00

Controller is designed to control motor of motorized turnstile as well as to obtain commands from the controller PCB.112.21.20.00.

### 1.8.2 Controller PCB.201.01.00.00

1.8.2.1 The Controller is assembled on the (85x70)mm card, on which electronic components and connectors for external connections are installed.

13 LED s are installed on controller card. Their purpose is as follows:

- 8 LEDs indicate condition of inputs «IN1» ÷ «IN8».
- «POWER» LED indicates availability of supply voltage 5V.
- 4 LEDs indicate condition of outputs for connection of motor.

24 terminals are installed on the card: 2 of them are designed for external connections, the rest are designed for connection to turnstile units or are standby.

1.8.2.2 Specifications

Specifications of controller are shown in the Table 5.

Table 5

| Parameter description  | Parameter value |
|--|-----------------|
| Number of inputs   | 8               |
| Number of outputs  | 8               |
| Type of input  | logical         |
| Type of output GRN1, RED1, GRN2, RED2  | open collector  |
| Logical «1» voltage  | (3,7÷5)V        |
| Logical «0» voltage  | (0÷1,7)V        |
| Peak voltage applied to inputs «IN1»÷«IN8», maximum                            | 15V             |
| Peak voltage switched by outputs «GRN1», «RED1», «GRN2», «RED2»                | 30V             |
| Peak current switched by outputs «GRN1», «RED1», «GRN2», «RED2»                | 2A              |
| Peak voltage switched by outputs «-MG1», «-MG2»                                | 50V             |
| Peak current switched by outputs «-MG1», «-MG2»                                | 5A              |
| Peak voltage switched by outputs «MOT1», «MOT2»                                | 27V             |
| Peak current switched by outputs «MOT1», «MOT2»                                | ≤ 4A            |
| Controller supply voltage  | (10÷27)V        |
| Consumption current when outputs «MOT1» and «MOT2» are OFF                     | ≤0,15A          |
| Climatic modification and placement category of according to the GOST 15150-69 | NF4             |

Appearance of controller is shown in the Figure 2.

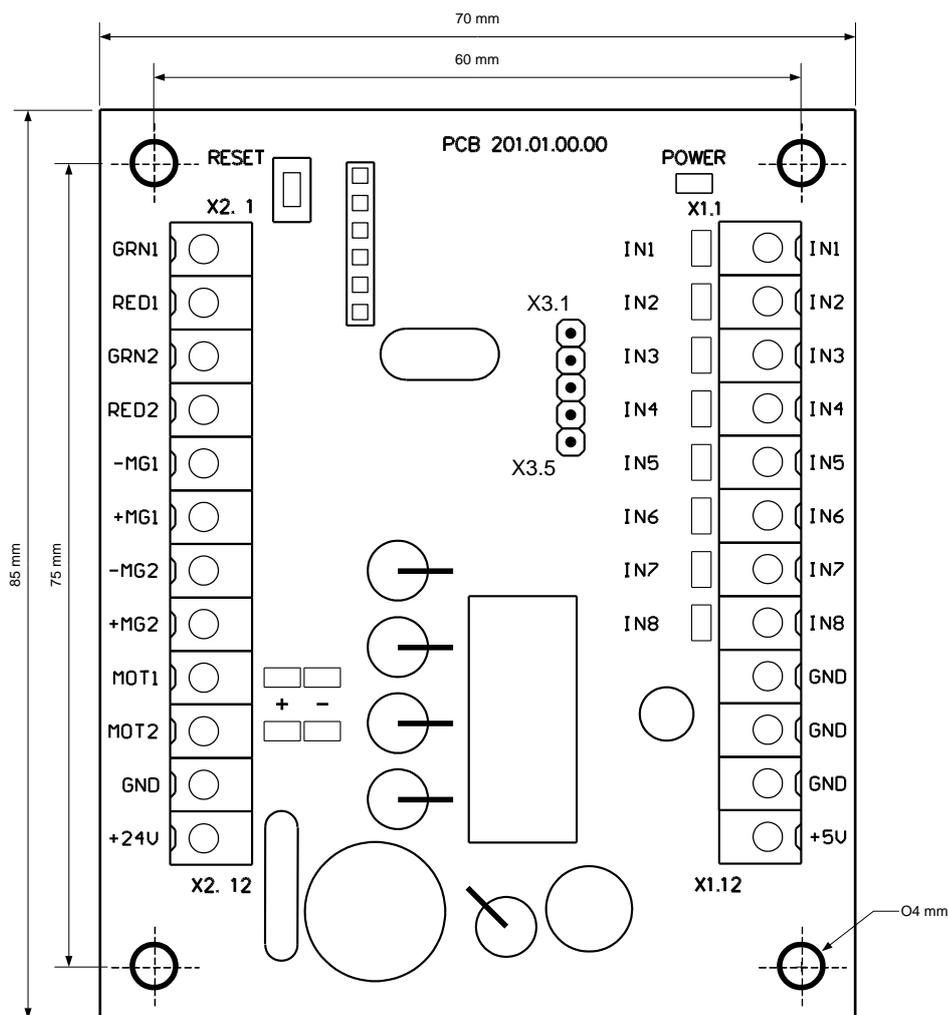


Figure 2: Appearance of the controller PCB.201.01.00.00

### 1.8.2.3 Description of operation

1.8.2.3.1 The controller operates according to the program fed into the memory of microprocessor. The turnstile mechanism is controlled depending on commands coming from the controller PCB.112.21.20.00.

Purpose of controller's contacts designed for connection to peripherals is shown in the Table 6.

Table 6

| Connector/<br>contact<br>No | Designation | Direction | Description   | Signal parameters<br>and description  |
|-----------------------------|-------------|-----------|---|---|
| X1/1                        | IN1         | ENTRY     | Not applicable  | 1) logical «0» (0÷1,7)V;<br>2) logical «1» (3,7÷5)V;<br>3) active level of signal –<br>logical «0»;<br>4) voltage on open<br>input ≤ 5V |
| X1/2                        | IN2         | ENTRY     | Not applicable  |   |
| X1/3                        | IN3         | ENTRY     | Not applicable  |   |
| X1/4                        | IN4         | ENTRY     | Not applicable  |   |
| X1/5                        | IN5         | ENTRY     | To be connected to rotor position<br>sensor and motor speed sensor              |   |
| X1/6                        | IN6         | ENTRY     |   |   |
| X1/7                        | IN7         | ENTRY     |   |   |
| X1/8                        | IN8         | ENTRY     |   |   |
| X1/9                        | GND         |           | «-» of power supply<br>(common wire)  |   |
| X1/10                       | GND         |           |   |   |
| X1/11                       | GND         |           |   |   |
| X1/12                       | +5V         | EXIT      | Not applicable  |   |
| X2/1                        | GRN1        | EXIT      | Not applicable  |   |
| X2/2                        | RED1        | EXIT      | Not applicable  |   |
| X2/3                        | GRN2        | EXIT      | Not applicable  |   |
| X2/4                        | RED2        | EXIT      | Not applicable  |   |
| X2/5                        | -MG1        | EXIT      | Not applicable  | 1) type of output – open<br>collector;<br>2) peak voltage on privacy<br>key – 50V;<br>3) peak current of public key<br>– 5A             |
| X2/6                        | +MG1        | EXIT      | Not applicable  |   |
| X2/7                        | -MG2        | EXIT      | Connection of electromagnetic<br>brake winding                                  | 1) type of output – open<br>collector;<br>2) peak voltage on privacy<br>key – 50V;<br>3) peak current of public key<br>– 5A             |
| X2/8                        | +MG2        | EXIT      | Connection of electromagnetic<br>brake winding<br>(cathode of protective diode) |   |
| X2/9                        | MOT1        | EXIT      | Connection of motor   | 1) voltage (10÷27)V;<br>2) current ≤ 4A   |
| X2/10                       | MOT2        | EXIT      |   |   |
| X2/11                       | GND         |           | «-»of power supply<br>(common wire)   |   |
| X2/12                       | +24V        | ENTRY     | «+»of power supply<br>(controller energizing)                                   | 1) voltage (10÷27)V;<br>2) current ≤ 4A   |

### 1.8.3 Turnstile controller PCB.112.21.20.00

1.8.3.1 Controller is assembled on card (104x68)mm and designed for installation into the turnstile housing or power supply box.

19 LEDs are mounted on controller card. Their purpose is as follows:

- 5 LEDs initiate state of inputs for peripheral connections «INP1» ÷ «INP5»;
- LED «POWER» initiates availability of power voltage 5V;
- LED «OPERATE» initiates operability of microprocessor;
- 7 LEDs initiate state of outputs for peripheral connections «OUT1» ÷ «OUT7»;
- 3 LEDs «SENSOR» initiate state of rotor position sensor;
- LEDs «RX» and «TX» initiate respectively reception and transmittance in serial port.

40 connecting terminals are mounted on card, 14 of which are designed for peripheral connections. The rest of them are standby or designed for connection to the turnstile units.

#### 1.8.3.2 Specifications

Controller appearance is shown in the Figure 3.

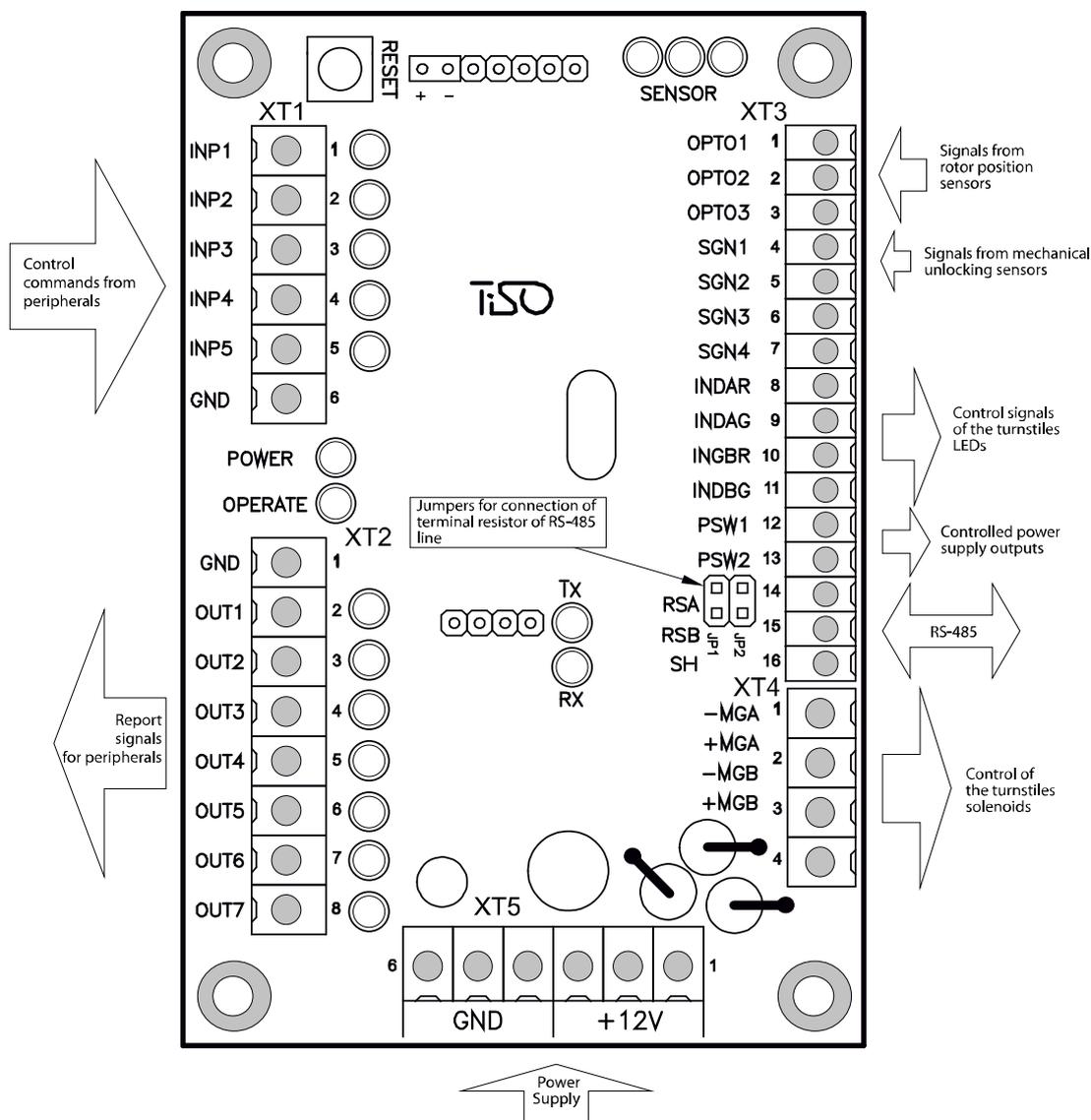


Figure 3 – Appearance of the controller PCB.112.21.20.00

Controller features are specified in the Table 7.

Table 7

| Parameter description  | Parameter value |
|--|-----------------|
| Number of inputs for reception of control commands                       | 5               |
| Number of inputs for connection of rotation sensors                      | 7               |
| Type of inputs   | logical         |
| Type of outputs  | open collector  |
| Voltage of logical «1»   | (3÷5)V          |
| Voltage of logical «0»   | (0÷2,2)V        |
| Maximum peak voltage supplied to the inputs «INP1» ÷ «INP5»              | 15V             |
| Peak voltage switched by transistors of signal outputs                   | 50V             |
| Peak current switched through signal outputs                             | 0,1 A           |
| Power supply voltage of controller                                       | (9÷15)V         |
| Peak consumption current   | 0,15A           |
| Number of signal reception and transmission serial ports (RS-485)        | 1               |
| Climatic version and category of location according to the GOST 15150-69 | NF4             |

### 1.8.3.3 Description of operation

The controller operates according to the program entered into the microprocessor memory. The turnstile's mechanism and LED display is controlled according to control commands and status of rotor position sensors, based on the logic entered into the program. Control commands can be transmitted through RS-485 (from control panel) or logical inputs (by closing and opening of inputs «INP1» ÷ «INP5» on «GND»).

Controller (along with the turnstile) can be in the «INITIAL STATE» (closed for access) or in the following access modes:

- «SINGLE ACCESS IN ONE DIRECTION»;
- «FREE ACCESS IN ONE DIRECTION»;
- «LOCKING OF ACCESS».

Other operating modes are combinations of various or similar modes in different directions:

- Single access in one direction and any mode in opposite direction.
- Free access in one direction and any mode in opposite direction.
- Locking of access in one direction and any mode in opposite direction.
- «PANIC» function.

#### 1.8.3.3.1 «INITIAL STATE»

Controller is in this mode, if there are no commands «OPEN A/B» and the turnstile's rotor is set to the point 0°.

In this mode solenoids lock rotor: Denied red LED is lit in both directions.

#### «SINGLE ACCESS IN ONE DIRECTION»

In this mode controller unlocks rotor through solenoid in one direction with possibility of revolving to 120°/180°/360°. It enables access of one pedestrian through the turnstile.

Controller is switched to «SINGLE ACCESS IN ONE DIRECTION», if in the «INITIAL STATE» it receives «OPEN A/B» command (i.e. active level of signal is sent to the input «INP4» or «INP5»). In this case the turnstile is open within action period of signal. The command can also be sent through RS-485. Then start of rotor rotation is expected prior to the end of delay of «WAITING FOR START OF ACCESS».

Sequence of controller operations after reception of «OPEN A/B» command is as follows:

- Delay of «WAITING FOR START OF ACCESS» is initiated (Factory setting 5 sec.).
- Controller deenergizes solenoid and rotor is unlocked in the relevant direction.
- LEDs are switched from red to green according to authorized access.

Then two alternatives of events are possible:

- 1) First alternative: If within active status of «OPEN /B» («INP4»/«INP5») or during delay of «WAITING FOR START OF ACCESS» rotation of rotor is not started, then controller is reset to «INITIAL STATE»;
- 2) Second alternative: If in the above mentioned cases rotation of rotor is started, then current is delivered to motor winding via outputs «MOT1» and «MOT2» (X2/9 and X2/10) and barrier rods rotate in the relevant direction. Current, rotation speed and barrier rod position are controlled during rotation:
  - When rotor rotates to 6°, the output signal «ACCESS A/B IS OCCUPIED» («OUT5») becomes active. Output signal «START OF ACCESS A/B» («OUT1» or «OUT2») becomes active. LED display is switched from green to red indicating that access is occupied.
  - When rotor rotates to 54°/80°/162° the output signal «START OF ACCESS A/B» («OUT1» or «OUT2») is removed. Delay of «WAITING FOR START OF ACCESS» is reset.
  - When rotor rotates to 64°/96°/192°, the signal «DETECTION OF ACCESS A/B» appears.
  - After turnstile access by pedestrian barrier rods continue to rotate smoothly forward (turning additionally), gradually slowing down, and when the turning angle 120°/180°/360° is reached, barrier rods are kept in this position by means of servomotor and electromagnetic brake.
  - When rotor rotates to 120°/180°/360°, the signals «ACCESS A/B IS OCCUPIED» («OUT5») and «DETECTION OF ACCESS A/B» («OUT3» or «OUT4»), are cleared and then availability of «TO BE OPENED A/B» («INP4» or «INP5») command, conforming to the applicable direction, is checked. If by this moment the command remains active by this moment, controller goes to «FREE ACCESS» mode.

#### 1.8.3.3.2 «FREE ACCESS IN ONE DIRECTION»

In this mode rotor can easily rotate in direction of free access. In the «FREE ACCESS» mode green LED of the relevant direction is blinking.

In this mode transition of controller is occurred in two cases:

- First: when the «OPEN A/B» (input «INP4» or «INP5») command is kept in active status at the moment of crossing by rotor the point 120°/180°/360° at the termination of «SINGLE ACCESS».
- Second: after reception of the «FREE ACCESS» command in the relevant direction through RS-485.

After switching of controller to «FREE ACCESS» mode, output signals of «OCCUPIED ACCESS», «ACCESS DETECTION» of the relevant direction are generated as described in the section 1.8.3.3.1.

Exit of this mode in «INITIAL STATE» is taken place after cancellation of the «OPEN A/B» command or reception of the «FREE ACCESS CANCELLATION» command through RS-485. But it will take place not instantly and only when rotor reaches one the starting points 0°, 120° or 240°, i.e. if the free access cancellation arises during the started access it will be completed as free.

#### 1.8.3.3.3 «AUTHORIZATION OF SINGLE ACCESS IN TWO DIRECTIONS»

Since the turnstile having one rotor cannot be rotated in two directions simultaneously, controller can only unlock rotor in two directions and after access in one of directions is stated, the reverse direction will be closed.

Controller is switched to this mode if in the «INITIAL STATUS» it simultaneously acquires «OPEN A» and «OPEN B» commands. The second signal also can come during the time when the first signal is already active but rotation of rotor did not start yet.

In this case:

- 1) Controller unlocks rotor in two directions through electromagnets.
- 2) Switches both LEDs from red to green.
- 3) Initiates two delays of «WAITING FOR START OF ACCESS A and B» for each access individually, which are counted from the moment of acquisition of commands.
- 4) After rotor is revolved to 6° in any side, LED is switched to red.

Then controller is operating as described in the chapter «SINGLE ACCESS IN ONE DIRECTION».

If during active status of the «OPEN A» and «OPEN B» signals or during «WAITING FOR START OF ACCESS» rotor has not been revolved in any side to the angle more than 6°, controller is switched to the «INITIAL STATE».

#### 1.8.3.3.4 «PANIC FUNCTION»

The turnstile is switched to «PANIC» state:

- After keeping of active state on the input («INP5» «PANIC») more than 1,5 sec;
- After sending of «PANIC» command by means of control panel (command is sent after «PANIC» button to be kept during more than 7 sec.).

After activation of «PANIC» function the barrier rod which is in horizontal position, will be lowered, the output («OUT7» «PANIC») will be switched to active state during action of function.

Barrier rod is lowered after power supply is fed to magnet from the output («PSW1» «PANIC»).

«PANIC» function is canceled:

- After release of active state on the input («INP5» «PANIC»);
- After sending of command «CANCELATION of «PANIC» from control panel (repeated pushing of «PANIC» button);
- After reset by «RESET» button located on controller card.

#### 1.8.3.3.5 «LOCKING OF ACCESS»

Locking function can be activated only by control panel.

After activation of «LOCKING OF ACCESS A or B» the turnstile's rotor blocked in the relevant direction and enable access commands will be ignored in locked direction; Locked direction is indicated by blinking red color.

Controller's contacts designed for connection of peripherals are shown in the Table 8.

Table 8

| Connector /contact No. | Description                    | Direction | Designation  | Signal description and parameters  |
|------------------------|--------------------------------|-----------|--|--|
| XT1/1                  | INP1 («PANIC»)                 | ENTRY     | «SWITCH TO PANIC STATE» command  | 1) logic «0» (0÷2,2)V;<br>2) logic «1» (3÷5)V;<br>3) active level of signal (factory setting) – logical «0»;<br>4) voltage on open input < 5V                                    |
| XT1/2                  | INP2                           | ENTRY     | Not applicable   |  |
| XT1/3                  | INP3                           | ENTRY     |  |  |
| XT1/4                  | INP4 («OPEN A»)                | ENTRY     | «OPEN FOR SINGLE / FREE ACCESS» command. Free access is appeared when entry is kept in active state after rotor reaches the angle 120°/180°/360° |  |
| XT1/5                  | INP5 («OPEN B»)                | ENTRY     |  |  |
| XT1/6                  | GND (common)                   |           |  |  |
| XT2/1                  | GND (common)                   |           |  |  |
| XT2/2                  | OUT1 («START OF ACCESS A»)     | EXIT      | Signal is generated by controller when rotor revolves from 6° to 54° in the relevant direction   | 1) type of output – open collector;<br>2) peak voltage on public key 55V;<br>3) peak current of public key 100mA;<br>4) resistance of public key (5÷7)Ohm;<br>5) active level of |
| XT2/3                  | OUT2 («START OF ACCESS B»)     | EXIT      |  |  |
| XT2/4                  | OUT3 (DETECTION OF ACCESS A»)  | EXIT      | Signal is generated by controller when rotor revolves from 64° to 120°/180°/360° in the relevant direction                                       |  |
| XT2/5                  | OUT4 («DETECTION OF ACCESS B») | EXIT      |  |  |
| XT2/6                  | OUT5 («ACCESS IS OCUPIED»)     | EXIT      | Signal is generated by controller when rotor   |  |

|        |                 |       |   |   |
|--------|-----------------|-------|---|---|
|        |                 |       | revolves from 6° to 120°/180°/360° in any direction                             | signal (factory setting) – logical «0»  |
| XT2/7  | OUT6 («ERROR»)  | EXIT  | Signal is generated by controller when violation of operation logic is detected |   |
| XT2/8  | OUT7 («PANIC»)  | EXIT  | Signal is generated by controller when «PANIC» function is activated            |   |
| XT3/1  | OPTO1           | ENTRY | It is used for acquisition of data about the turnstile's rotor position         | 1) logical «0» (0÷2,2)V;<br>2) logical «1» (3÷5)V;<br>3) active level of signal (factory setting) – logical «0»;<br>4) voltage on open input < 5V             |
| XT3/2  | OPTO2           | ENTRY |   |   |
| XT3/3  | OPTO3           | ENTRY |   |   |
| XT3/4  | SGN1            | ENTRY | Not applicable  |   |
| XT3/5  | SGN2            | ENTRY |   |   |
| XT3/6  | SGN3            | ENTRY |   |   |
| XT3/7  | SGN4            | ENTRY |   |   |
| XT3/8  | INDAR           | EXIT  | It is used for the turnstile's indication control                               | 1) type of output – open collector;<br>2) peak voltage on privacy key 30V;<br>3) peak current of public key 2A;<br>4) resistance of public key 0,1Ohm         |
| XT3/9  | INDAG           | EXIT  |   |   |
| XT3/10 | INDBR           | EXIT  |   |   |
| XT3/11 | INDBG           | EXIT  |   |   |
| XT3/12 | PSW1 («PANIC»)  | EXIT  | Not applicable  | 1) type of output – open emitter;<br>2) voltage on output in ON state 12V;<br>3) peak current consumed from output 1A;<br>4) resistance of public key 0,25Ohm |
| XT3/13 | PSW2 («SENSOR») | EXIT  | Not applicable  |   |
| XT3/14 | RSA             |       | It is used for data transmission through the serial port                        | Interface RS-485  |
| XT3/15 | RSB             |       |   | Interface RS-485  |
| XT3/16 | SH              |       |   | RS-485 SHIELD   |
| XT4/1  | - MGA           | EXIT  | Not applicable  | 1) type of output – open collector;<br>2) peak voltage on public key 50V;<br>3) peak current of public key 9A;<br>4) resistance of public key 0,11Ohm         |
| XT4/3  | - MGB           | EXIT  |   |   |

|       |              |  |                |  |
|-------|--------------|--|----------------|--|
| XT4/2 | + MGA        |  | Not applicable |  |
| XT4/4 | + MGB        |  |                |  |
| XT5/1 | GND (common) |  |                |  |
| XT5/2 | GND (common) |  |                |  |
| XT5/3 | GND (common) |  |                |  |
| XT5/4 | + 12V        |  |                | 1) supply voltage<br>12V;<br>2) consumption<br>current < 150mA |
| XT5/5 | + 12V        |  |                |  |
| XT5/6 | + 12V        |  |                |  |

## 2 INTENDED USE

### 2.1 Operation limitations

2.1.1 The turnstile must be used in the environment specified in the p. 1.1.4 of this document subject to the specifications listed in the section 1.2.

#### 2.1.2 IT IS PROHIBITED:

- 1) **UNINTENDED USE OF THE TURNSTIL** (see the section 1 «DESCRIPTION AND OPERATION»);
- 2) **TO USE THE TURNSTILE UNEARTHED;**
- 3) **TO USE HEATING PIPES AND RADIATIONS AS WELL AS PIPES OF CENTRAL WATER SUPPLY FOR EARTHING;**
- 4) **TO REPAIR AND ADJUST WITHOUT DEENERGIZING;**
- 5) **TO RELOCATE THE OBJECTS EXCEEDING THE PASSAGEWAY WIDTH THROUGH THE TURNSTILE ACCESS AREA;**
- 6) **TO JERK AND IMPACT ON BARRIER RODS, LED DISPLAY OR OTHER PARTS THE PRODUCT, WHICH MAY CAUSE THEIR MECHANICAL DEFORMATION OR DAMAGE.**

2.1.3 It is not allowed to use the turnstile:

- at the presence of mechanical rattle in movable parts of the turnstile;
- when metalwork of the turnstile and its components and accessories are mechanically damaged.

#### 2.1.4 List of special conditions of operation

- Mean time of the turnstile access (in single access mode) equals to 2,4 sec.
- The force applied by accessor to barrier rod should not exceed 60N.

**ATTENTION: MANUFACTURER WARNS OF NECESSITY TO KEEP SEALS OF THE MANUFACTURER ON THE TURNSTILE'S COMPONENT PARTS!**

### 2.2 Layout and installation

2.2.1 The turnstile and other components of delivery kit are delivered to the installation site in the factory packing. The turnstile should be unpacked only on installation site.

2.2.2 Preparation of the turnstile for installation (dismounting) and commissioning should be performed according to this OM with mandatory observation of the safety measures specified in p. 2.1 and general electrical safety code.

2.2.3 The turnstile is installed in the following sequence:

- inspect the turnstile for integrity, absence of visual damages and defects;
- verify the turnstile's completeness;
- prepare installation site: surface should be plain, hard and without defects (corrugations, overlaps etc.);
- mark the hole drilling places according to the Appendix A. The turnstile should be installed and fixed only after all electric cables are pulled. The turnstile is fixed with Redibolt (anchor with jacket and screw). Make sure that the installed turnstile is stable and vertical;

- earth the turnstile, connect power cable to the turnstile and control panel according to the wiring diagram (see Appendix B);
- install dismountable barrier rods on the shaft of the turnstile operating mechanism. Verify rotation of barrier rods. The hub should be easily rotated manually with uniform friction.

During installation of the turnstile it is necessary to take into account that horizontally located barrier rod should be on the distance not more than (50±100)mm from the passage creator (any surface perpendicular to horizontally located barrier rod: railing module, wall etc.).

## 2.3 Preparation for use

### 2.3.1 Commissioning instructions

Prior to energizing of the turnstile:

- 1) make sure of proper connection and good condition of all connecting cables;
- 2) clear the area of the turnstile's barrier rod rotation from foreign particles.

When mains cable of power supply unit is connected to the network the solenoids of the turnstile's control mechanism are energized; barrier rods are locked from rotation in both directions and one of barrier rods is located horizontally barring access.

The turnstile is set in initial state: ENTRY and EXIT red LED display («><» is lit).

### 2.3.2 Required inspections

2.3.2.1 When the turnstile is commissioned it is necessary to perform inspections specified in the Table 9. During inspections the wiring diagram according to the Appendix C and the control panel according to the Appendix B should be used.

Table 9

| Operation Mode   | Mode Setting  | LED Display   |
|--|---|---|
| 1 Turnstile is closed in both directions (initial state)                 | –   | Red LED is lit  |
| 2 Single access in one direction   | Push the «SINGLE» access button to access in selected direction («A» or «B»)  | Green arrows of single access is lit in the authorized direction and red arrow is lit in opposite direction   |
| 3 Single access in both directions                                       | Push both «SINGLE» access buttons to access in two directions («A» or «B»)  | Green arrows of single access are lit in both directions  |
| 4 Free access in one direction   | Push the «FREE» access button to access in the selected direction («A» or «B»)  | Green arrow of free access in the selected direction is blinking and red arrow is lit in opposite direction   |
| 5 Free access in both directions   | Push both «FREE» access buttons to access in two directions («A» or «B»)  | Green arrows of authorized free access are blinking in both directions  |
| 6 Single access in one direction and free access in opposite direction   | Push the «SINGLE» access button to access in the selected direction and «FREE» access button to pass in opposite direction                  | Green arrow is lit in the single access direction and green arrow is blinking in free access direction        |
| 7 Single access in one direction and locked access in opposite direction | Push the «SINGLE» access button to access in the selected direction («A» or «B») and the «LOCK» button to lock access in opposite direction | Green arrow is lit in the single access direction and red arrow is blinking in the locked access direction    |
| 8 Free access in one direction and locked access in opposite direction   | Push the «FREE» access button to access in selected direction («A» or «B») and the «LOCKING» button to lock access in opposite              | Green arrow is blinking in the free access direction and red arrow is blinking in the locked access direction |

|   |  |  |
|---|--|--|
|   | direction  |  |
| 9 Locked access in one direction  | Push the «LOCKING» button to lock access in selected direction («A» or «B»)* | Red arrow of locked access in one selected direction is blinking |
| 10 Locked access in both directions   | Push both «LOCKING» button to lock access in two directions («A» or «B»)**   | Red arrows of locked access in both directions are blinking      |
| * In this case other control panel buttons of single and free access in selected direction are locked |  |  |
| ** In this case all control panel buttons of single and free access in both directions are locked     |  |  |

2.3.2.2 When the turnstile is inspected it is ready for long-term operation.

## 2.4 Contingency actions

For emergency evacuation (in case of fire, acts of God etc.) and providing free access the turnstile must be unlocked from control panel by sending the relevant command.

## 3 MAINTENANCE

### 3.1 General instructions

3.1.1 Commissioning and subsequent maintenance of the turnstile should be performed only by the staff to be in charge of the turnstile.

3.1.2 The turnstile can be serviced only by the staff having the relevant electrical safety qualification level according to the national requirements.

3.1.3 The turnstile can be installed and operated only by the qualified safety instructed staff having the relevant class of permit to work with electrical facilities with voltage up to 1000V, awaring of this OM, design and the turnstile's principle of operation.

### 3.2 Safety Measures

3.2.1 During maintenance of the turnstile the relevant safety measures, specified in p. 2.1, must be observed.

**IT IS FORBIDDEN TO USE DEFECTIVE APPLIANCES, TOOLS, FUSES, INSTRUMENTATION SERVICE LIFE OF WHICH EXPIRED. MEASURING DEVICES, WHICH TERM OF CHECKING EXPIRED.**

3.2.2 When instrumentations are prepared for operation it is necessary to comply with the safety requirements specified in instrumentation instruction manuals.

### 3.3 Maintenance procedure

3.3.1 Maintenance of the turnstile includes preventive measures which are taken according to established frequency to maintain the turnstile in operational condition, decreasing of component wearing and prevention of faults and malfunctions.

3.3.2 Daily and periodic maintenance of the turnstile are recommended.

Normally the daily maintenance is carried out before the beginning of work or during operational timeout and includes visual inspection of the turnstile's housing, and, if required, mechanical troubleshooting, elimination of corrosion and pollution from the surface.

**IT IS FORBIDDEN TO USE ABRASIVE AND CHEMICALLY ACTIVE SUBSTANCES DURING CLEANING OF CONTAMINATED EXTERNAL SURFACES OF THE PRODUCT.**

3.3.3 Periodic maintenance is performed at least twice a year and includes as follows:

- visual inspection of the turnstile's housing, control mechanism and other components for absence of corrosion, warps and other mechanical defects and pollutions;

- checking of tightness of the turnstile's screw tightening;
- remedy of faults and malfunctions;
- lubrication with the lubricant OKB-122-7 according to GOST 18179-90 or engine oil of control mechanism locking levers, if necessary.

## 4 ROUTINE MAINTENANCE

### 4.1 General instructions

Possible malfunctions of the turnstile listed in the Table 10 are remedied by customer. More complicated malfunctions are remedied by manufacturer's representative.

**ATTENTION: INSPECTION, CLEANING, REPAIR OF THE TURNSTILE'S COMPONENTS MUST BE PERFORMED ONLY AFTER DEENERGIZING OF THE TURNSTILE!**

### 4.2 List of possible malfunctions

List of possible malfunctions and their remedies are specified in the Table 10.

Table 10

| Symptom   | Possible cause                     | Remedy   |
|---|------------------------------------|--|
| 1 Mechanism does not provide the turnstile's locking                          | Lack of voltage on solenoids       | 12V voltage to be checked in the circuit of solenoids. If voltage is lower than 12V refer to the point 2 of this table |
|   | Electric circuit is broken         | Malfunction to be discover and remedied  |
|   | Solenoid is out of order           | Solenoid to be replaced  |
|   | Adjustment of solenoid is violated | Solenoid to be adjusted  |
| 2 Lack of 12V voltage   | Power supply unit is out of order  | Power supply to be replaced  |
|   | Electric circuit is broken         | Malfunction to be discover and remedied  |
| 3 When mains power supply is OFF, the turnstile does not operate from battery | Battery is discharged              | Battery should be serviced according to its operation instruction  |

### 4.3 Postrepair checkout

After repair the turnstile's operating capacity is checked according to p. 2.3.2.

## 5 TRANSPORTATION AND STORAGE

5.1 It is forbidden to subject the turnstile to jerks and impacts during storage. For lifting and handling of the turnstile it is necessary to use transportation trolleys. In storage facility there should not be aggressive gases and vapours causing corrosion. Storage ambient temperature should not be below +5°C and higher than +40°C and relative humidity should not be more than 80% at the temperature 20°C.

5.2 The ready-to-install turnstile is transported in railway or special containers, closed vehicle, waterborne (in ship's hold) according to the transportation regulations related to the relevant mode of transport.

Transportation on open platforms is allowed. In this case the packed turnstile should be covered with canvas. Ambient temperature during transportation should not be lower than - 40°C and higher than +50°C.

After transportation or storage of the turnstile at negative temperatures or increased humidity the turnstile should be kept indoor with normal climatic conditions without original packing within 12 hours before commissioning:

- 1) ambient temperature: + 15°C to +35°C;
- 2) relative humidity: 45% to 80 %;
- 3) atmospheric pressure: 84,0 to 106,7 kPa (630-800 mm Hg).

## 6 UTILIZATION

The turnstile does not contain hazardous materials and special measures are not required for utilization.

## 7 MANUFACTURER'S WARRANTY

7.1 The manufacturer guarantees good state and declared quality of the turnstile if conditions of transportation, storage, installation and operation are observed by the client.

7.2 The warranty period of the turnstile from the date of sale is 12 months, unless otherwise specified by mutual agreement.

Manufacturer:  
«TiSO-PRODUCTION» Company  
72 Yamskaya str., 03680, Kiev, Ukraine  
Tel.: +38 (044) 461-79-69  
Tel./Fax: +38 (044) 586-46-47  
E-mail: [export@tiso.ua](mailto:export@tiso.ua), [log1@tiso.ua](mailto:log1@tiso.ua)  
[www.tiso-turnstiles.com](http://www.tiso-turnstiles.com)

Our equipment complies with requirements of the European Standards:

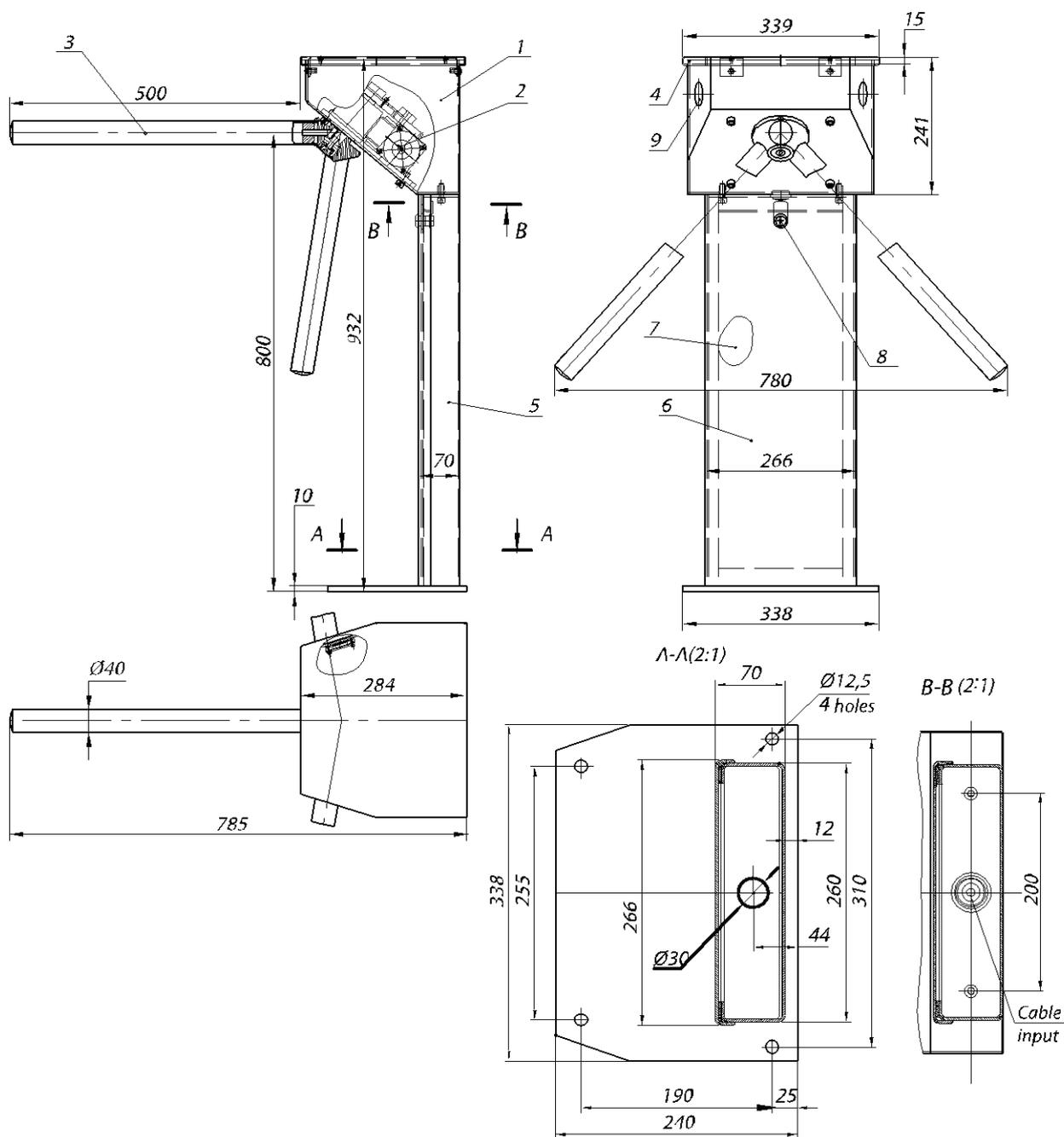
EN ISO 12100:2010; EN 614-1:2006+A1:2009; EN 1037:1995+A1:2008; EN 60204-1:2006; EN 953:1997+A1:2009; ISO 3864:1995; EN ISO 13857:2008; EN ISO 13849-1:2006; EN 1088:1995; EN ISO 13732-1:2008

and is in conformity with requirements of the following EC Directives:

2004/108/EC; 2006/95/ EC; 2006/42/ EC



Appendix A  
 Design, overall and installation dimensions of the turnstile



- |                    |                    |
|--------------------|--------------------|
| 1 – housing;       | 5 – post;          |
| 2 – servomotor;    | 6 – post cover;    |
| 3 – barrier rod;   | 7 – control panel; |
| 4 – housing cover; | 8 – lock;          |
|                    | 9 – LED display    |

Figure A.1 – Appearance of the «TRIPOD» type turnstile

Appendix A (continued)  
Design, overall and installation dimensions of the turnstile

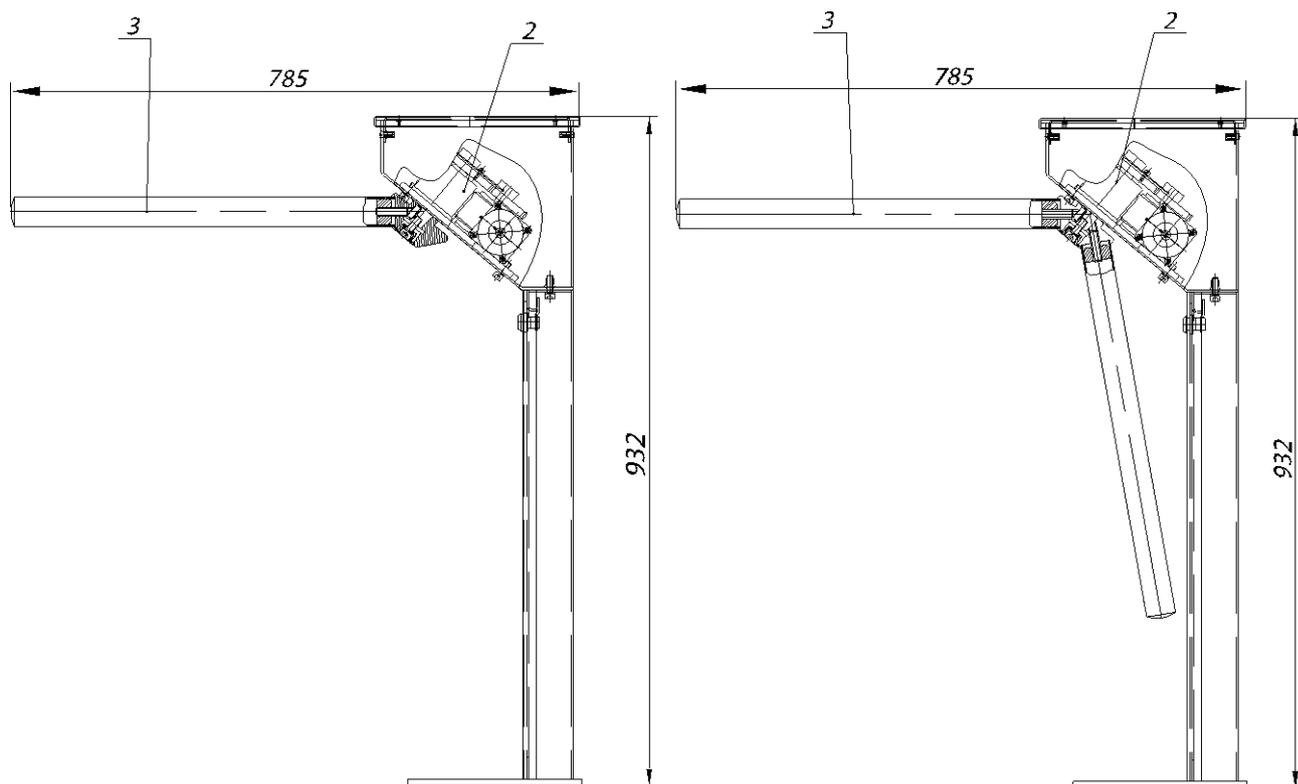
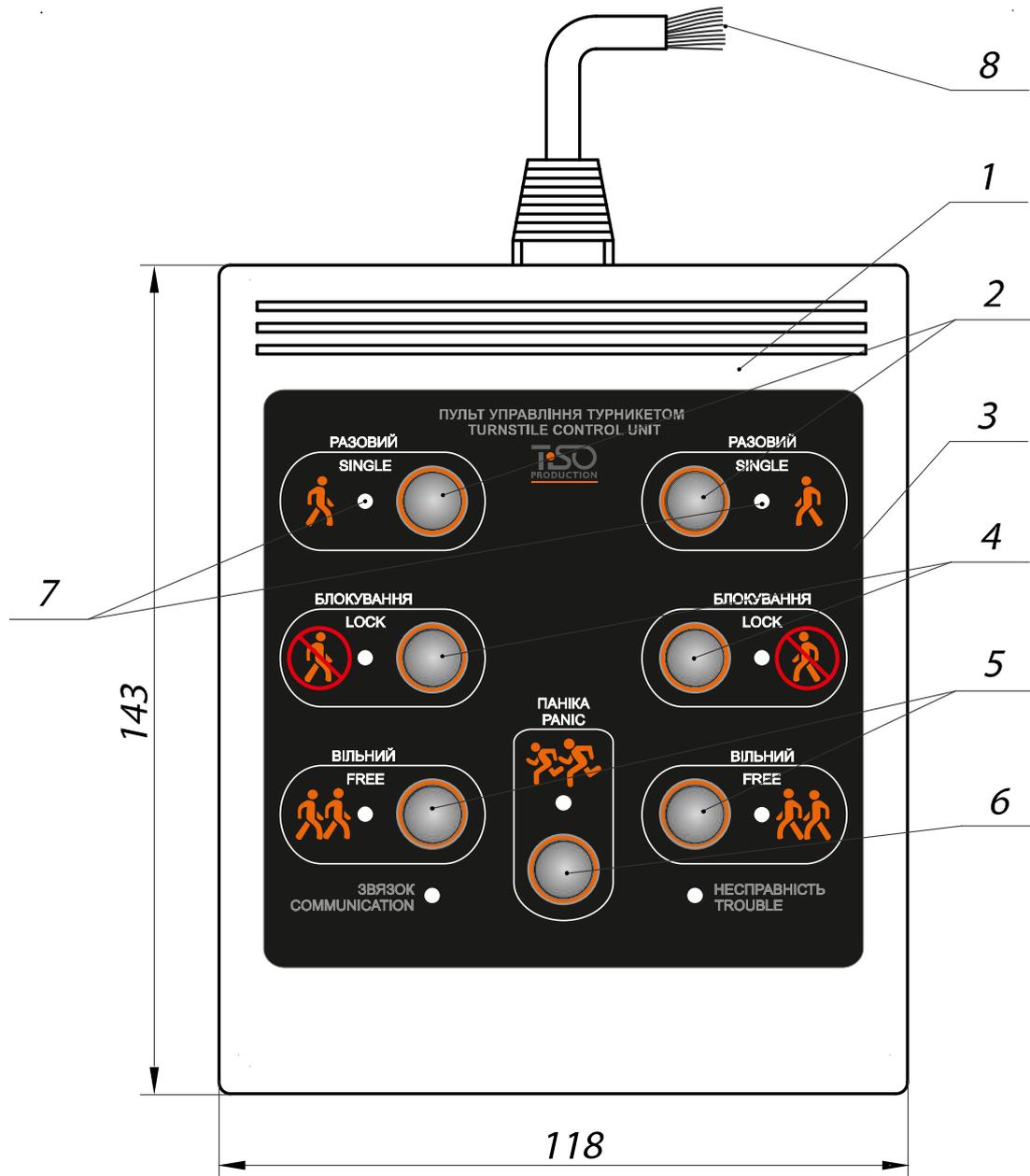


Figure A.2 – Appearance of the «MONOPOD» and «DUOPOD» type turnstiles  
(the rest can be seen in the Figure A.1)

Appendix B  
Control panel and connection diagram



- |  |  |
|--|--|
| 1 – housing;                             | 5 – «FREE ACCESS» mode control button; |
| 2 – «SINGLE ACCESS» mode control button; | 6 – «PANIC» mode control button;       |
| 3 – front plate;                         | 7 – access direction LED display;      |
| 4 – «LOCKING» mode control button;       | 8 – controller connection terminals    |

Figure B.1 – Control panel AUIA.114.02.00.00

Appendix B (continued)  
Control panel and connection diagram

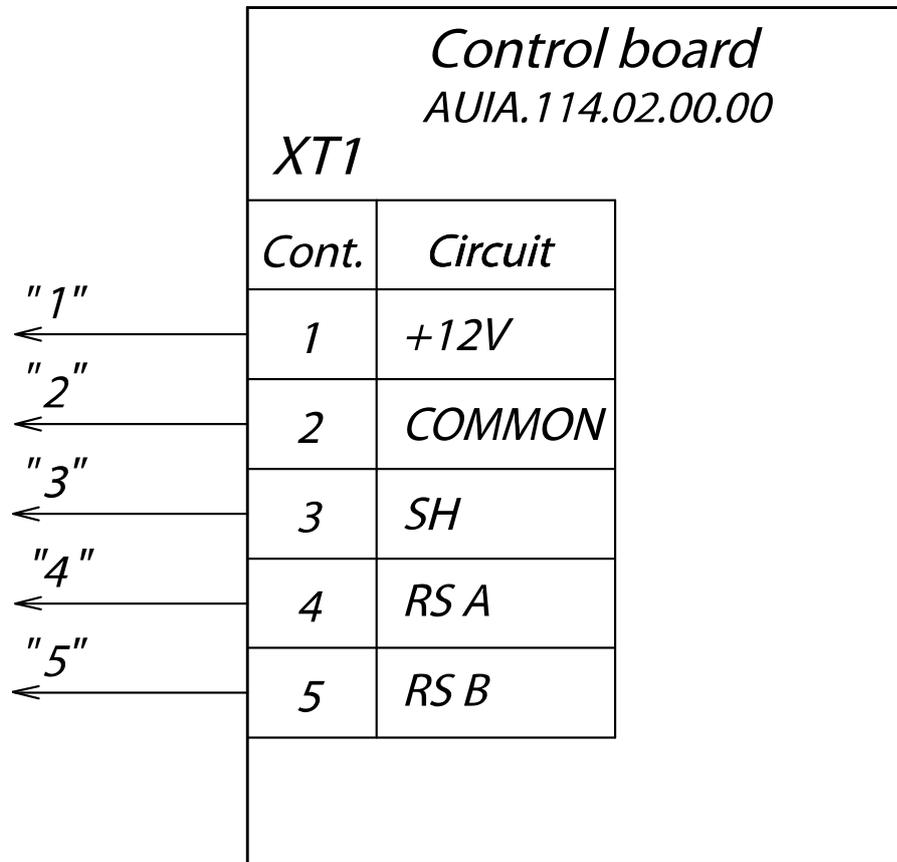


Figure B.2 – Connection diagram of the control panel  
AUIA.114.02.00.00

Appendix C  
Wiring Diagram of Servo-Operated Turnstile

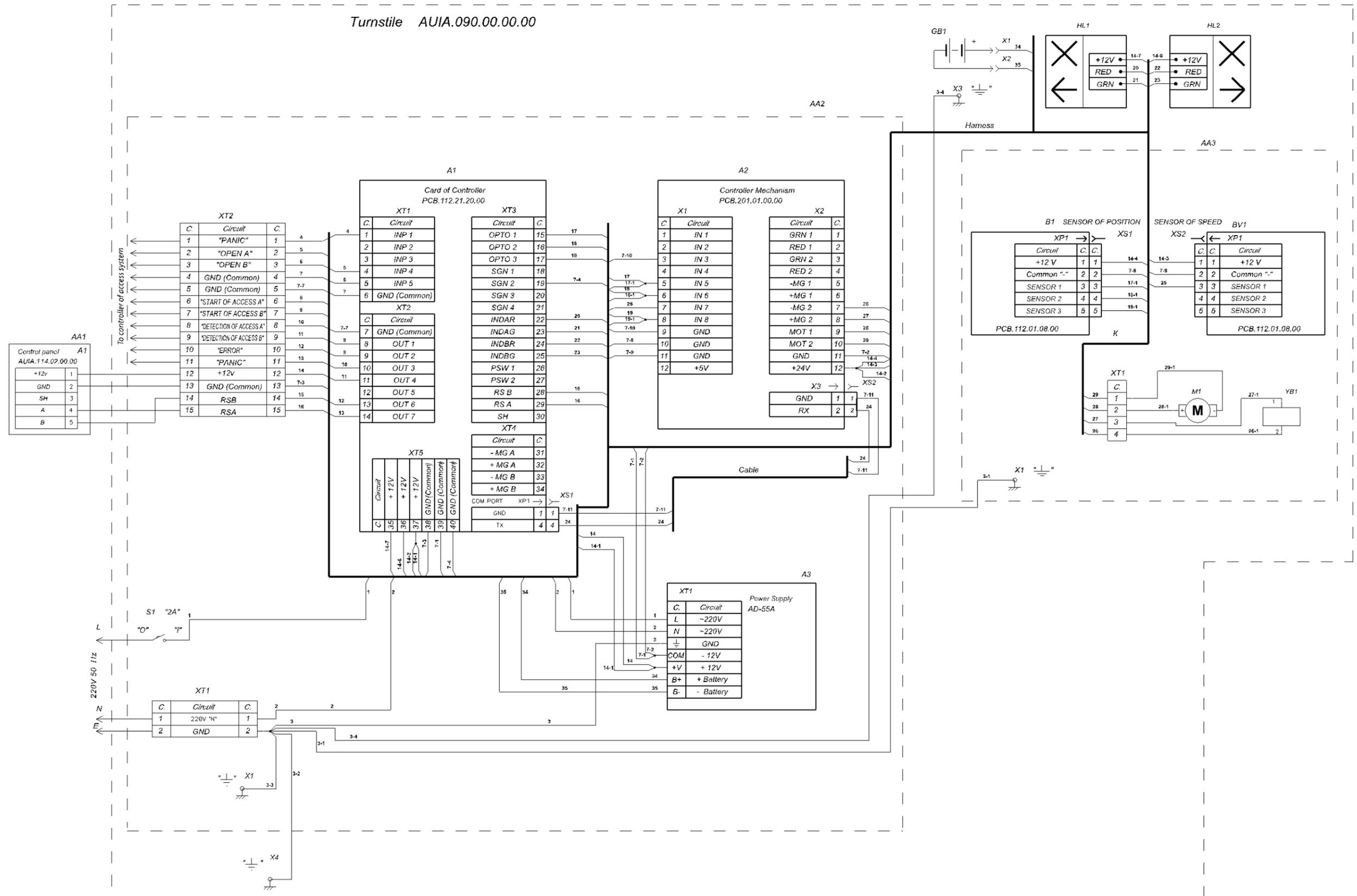


Figure C.1 – Wiring diagram of the turnstile