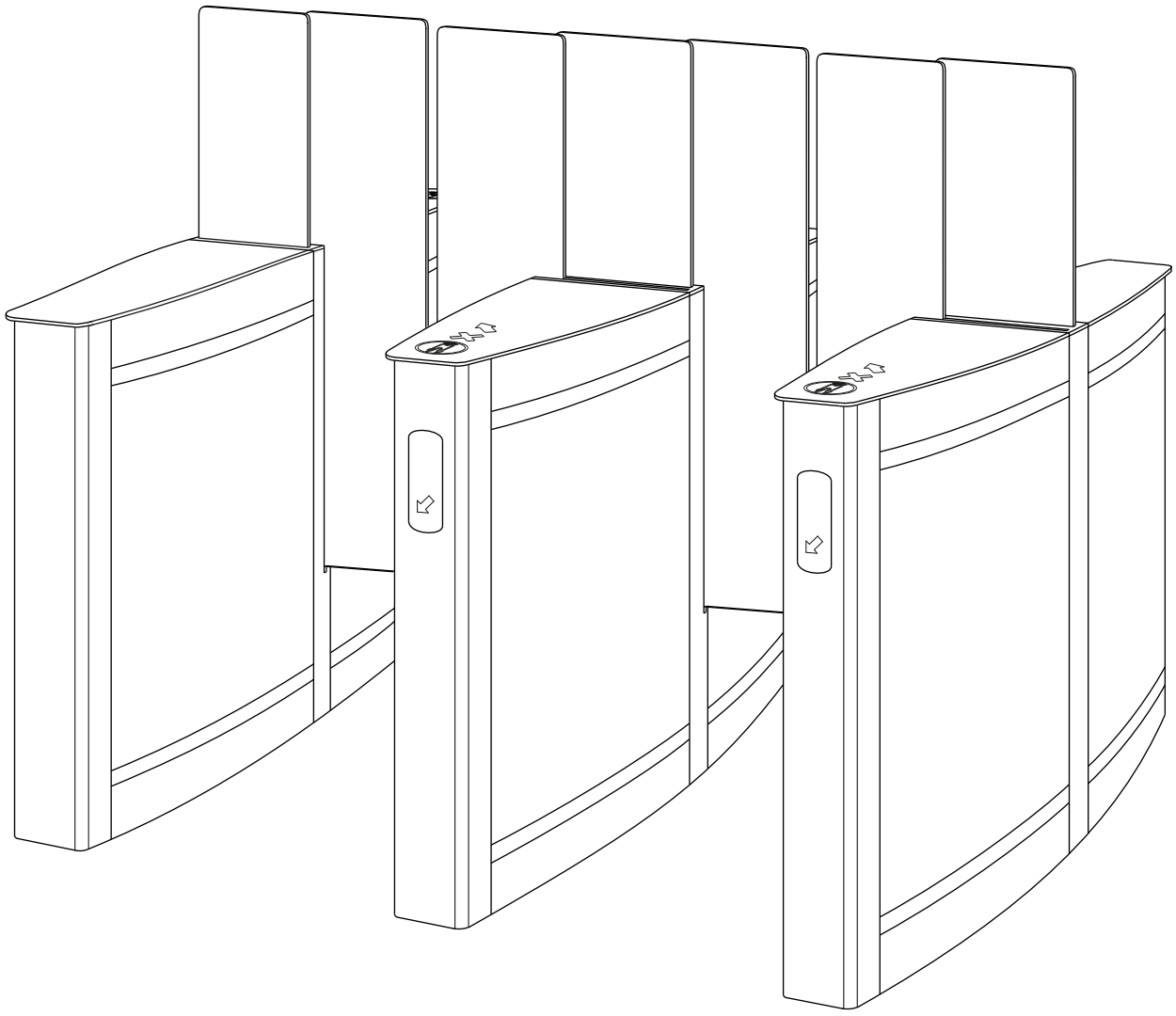
PERCo®

ASSEMBLY AND OPERATION MANUAL



ST-02, STD-02

EAC
CE

Speed gate and double-sided section

CONTENTS

Dear Customer!

Thank you for choosing the turnstile made by PERCo.
You have purchased a high-quality product, which will serve you for many years to come, if you carefully follow installation and operation rules.

The Assembly and Operation Manual for the *ST-02* Speed gate and *STD-02* Double-sided section (hereinafter referred to as *the Manual*) contains the instructions on safe transportation, storage, installation, operation, and maintenance of the above-mentioned products. The products must be installed by persons who have fully studied this Manual.

Abbreviations adopted in the Manual:

PS – power supply;
RC panel – remote control panel;
WRC – wireless remote control;
ACS – access control system.

In view of continuous improvement of its products, the Manufacturer reserves the right to modify, without prior notice, the product design without degrading its technical specifications.

1 APPLICATION

The ***ST-02* Speed gate** (hereinafter referred to as *the speed gate*) is a blocking device with sliding panels and is designed for managing pedestrian flows at checkpoints of administrative buildings, at banks, shops, railway stations, airports, etc. The speed gate is produced in two main versions: ***ST-02.600*** with a passageway width of 600 mm and ***ST-02.900*** with a passageway width of 900 mm.

The speed gate consists of two sections: ***ST-02.600/M*** (***ST-02.900/M***) (hereinafter, the *Master* section) and ***ST-02.600/S*** (***ST-02.900/S***) (hereinafter, the *Slave* section). The standard delivery set of the speed gate allows arrangement of one passage zone.

If there is a need to increase the number of passage zones, ***STD-02* Double-sided sections** (hereinafter, the *double-sided section*) can be purchased. Each double-sided section forms one extra passage zone. The double-sided section has two main versions: ***STD-02.600*** for the organization of passageways with a width of 600 mm and ***STD-02.900*** for the organization of passageways with a width of 900 mm.

A checkpoint with passageways of different widths (600 and 900 mm) can be organized with the use of the ***ST-02.600/900*** version (includes the *Master* and *Slave* sections with panels of different widths and can be supplied as a separate order), and the ***STD-02.900*** double-sided section can be configured so that the outreach distance of one of the sliding panels is reduced to be suited to a 600 mm wide passage zone.

Note:

Access card readers produced by ***PERCo*** (***IR13***, ***IR19***, ***IR19 OEM***) and third-party manufacturers can be installed inside the speed gate's sections. Access card readers **are not included** in the standard delivery set**!** Readers are to be selected, purchased, and installed in the product by the customer (installer) with due consideration for the checkpoint design as well as for ACS and management controller characteristics. Readers must meet the following requirements:

overall dimensions..... max. 230×72×32 mm
ID reading range ..... min. 40 mm

In addition, an ACS controller can be embedded inside the speed gate section. Its dimensions need to be limited to ..... max. 160×140×40 mm

2 OPERATING CONDITIONS

In terms of its resistance to environmental exposure, the speed gate complies with GOST (State Standard) 15150-69, category NF4 (operation in premises with climate control).

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

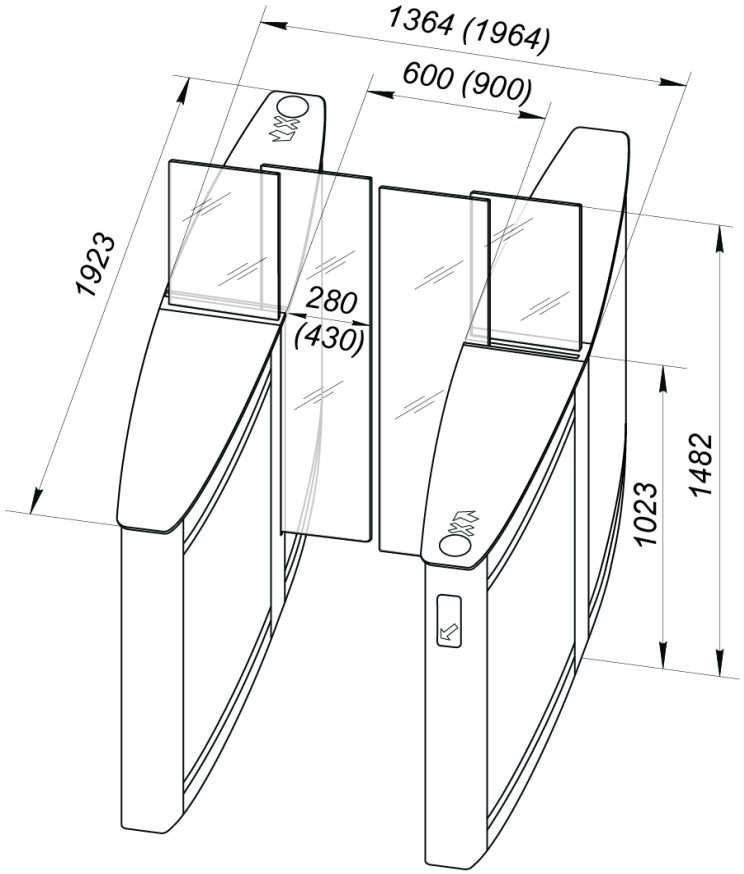


Figure 1. Overall speed gate dimensions

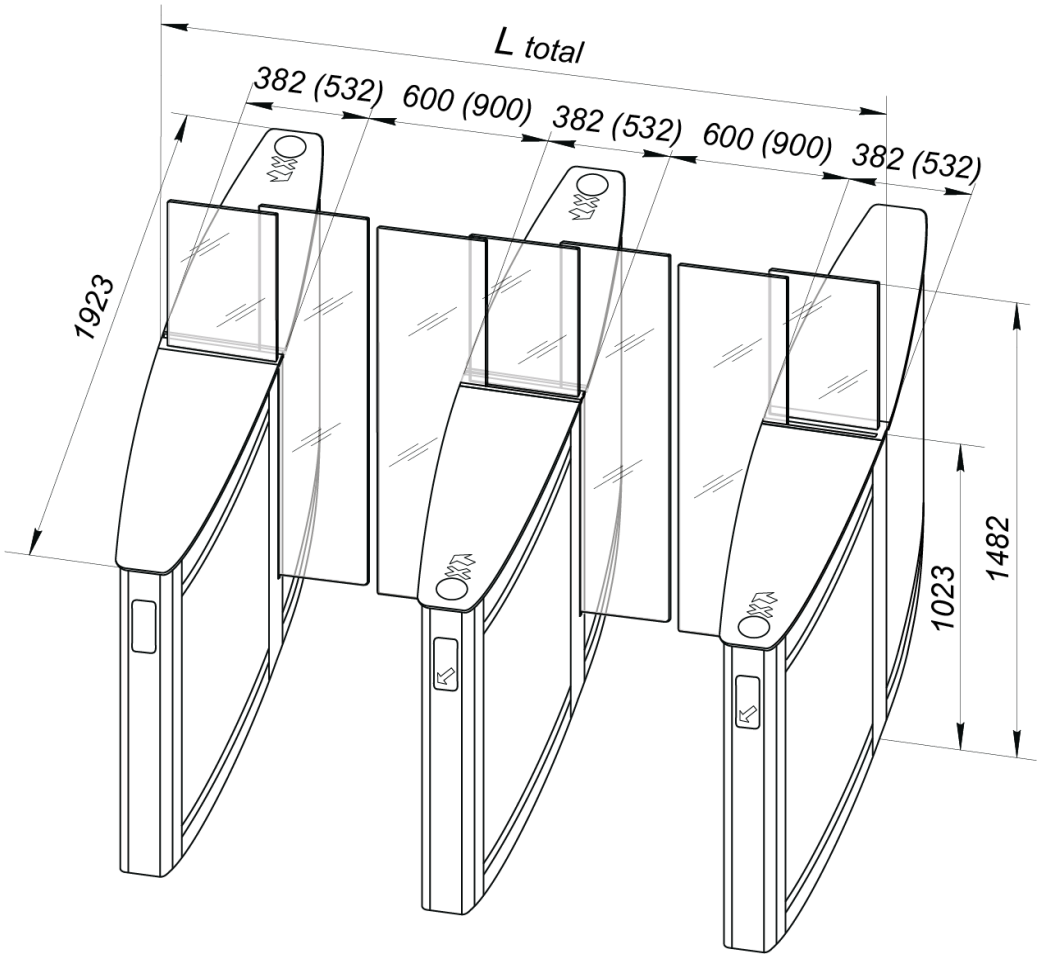


Figure 2. Overall dimensions of the speed gate if several passage zones are arranged

3 TECHNICAL SPECIFICATIONS

Nominal operating voltage ..... 24 V DC
Allowable operating voltage[1] ..... 20-28 V DC
Maximum consumption current ..... max. 8.5 A[2]
Power consumption[3] ..... max. 204 W
Throughput rate in the single passage mode ..... up to 60 persons / min
Passageway width*:*
ST-02.600 ..... 600 mm
ST-02.900 ..... 900 mm
Number of intrusion detectors installed:
upper level 30
lower level 30
RC panel cable length[4] ..... min. 6.6 m
IP Code ..... IP41 (EN 60529)
Electric shock protection class ..... III (IEC 61140)
Mean time to failure ..... min. 4 000 000 passages
Mean lifetime ..... min. 8 years
Overall dimensions of the speed gate (length × width × height)[5]*:*
ST-02.600..... 1923×1364×1482 mm
ST-02.900..... 1923×1964×1482 mm

Note:

Use the following formula to calculate the total width of the speed gate with double-sided sections when several passage zones are arranged (see Fig. 2):

L_{total}= 600N + 382n + 900M + 532m (mm), where:

N – number of passage zones with a width of 600 mm,
n – number of ***ST-02.600/M(S)*** and ***STD-02.600*** sections,
M – number of passage zones with a width of 900 mm,
m – number of ***ST-02.900/M(S)*** and ***STD-02.900*** sections.

Weight (net)*:*
ST-02.600/M (***ST-02.600/S)*** section ..... max. 198 kg
ST-02.900/M (***ST-02.900/S)*** section ..... max. 224 kg
STD-02.600 double-sided section ..... max. 228 kg
STD-02.900 double-sided section ..... max. 230 kg
sliding panel ***for ST-02.600***, ***STD-02.600*** ..... max. 9 kg
sliding panel ***for ST-02.900***, ***STD-02.900*** ..... max. 13 kg
filling glass for ***ST-02.600***, ***STD-02.600*** ..... max. 5 kg
filling glass for ***ST-02.900***, ***STD-02.900*** ..... max. 7 kg

4 DELIVERY SET

4.1 Standard delivery set

4.1.1 *ST-02* Speed gate

Main equipment:
Master[6] section 1
Slave[1]section 1
glass top cover 4
filling glass 2
glass sliding panel 2

[1] In case of the use of standby power supply units such as batteries, etc.
[2] For the speed gate, the manufacturer recommends using power supply units with an output voltage of 24V DC and a maximum load current of at least 10 A.
[3] Consumption current and power consumption are specified for each ***ST-02*** or ***STD-02*** product separately.
[4] The maximum length of the RC-panel cable amounts to 40 m (to be supplied upon request).
[5] The overall dimensions of the speed gate with one or more passage zones are shown in Fig. 1, 2.
[6] All sections are supplied with dismounted sliding panels, side panels, filling glass, glass top covers, and central inserts.

side panel 4
central insert 2
RC panel with cable 1
intersectional cable kit (DC and CAN cables) 1
jumper 3
FSS-5 board retainer 4
adjusting plate, 1 mm 4
adjusting plate, 1.5 mm 8
self-adhesive rubber pad with mnemonic image 2

Operational documentation:
Certificate 1
Assembly and Operation Manual 1

Packaging:
transportation boxes No. 1 and No. 2 for the *Master* section 2
transportation boxes No. 3 and No. 4 for the *Slave* section 2

4.1.2 *STD-02* Double-sided section

Main equipment:
double-sided section[1] 1
glass top cover 2
side panel 2
filling glass 1
glass sliding panel 2
central insert 1
RC panel with cable 1
intersectional cable kit (DC and CAN cables) 1
jumper 3
FSS-5 board retainer 4
adjusting plate, 1 mm 2
adjusting plate, 1.5 mm 4
self-adhesive rubber pad with mnemonic image 2
accessories for installation of the sliding panel outreach limiter[1]:
stop 2
M4×8 screw 6

Operational documentation:
Certificate 1

Packaging:
transportation boxes No. 1 and No. 2 2

4.2 Additional equipment

The following additional equipment can be supplied upon request in addition to the standard delivery set:

IR13, ***IR19*** or ***IR19 OEM*** Access card readers ..... 2 per passage zone
Galvanized M10 anchor with DIN7984 bolt and washer ..... 6 for each section
WRC device kit[2] 1
Safety stickers (2 pcs in a set):
SG1 Yellow circle ..... 1 set for one passage zone
SG2 Matt ring ..... 1 set for one passage zone

5 DESIGN AND OPERATION

5.1 Main features

- The speed gate can operate in two main modes:

[1] Only for ***STD-02.900***. It limits the sliding panel outreach to 280 mm and is used to arrange a 600 mm wide passageway.

[2] The WRC kit consists of a receiver, connected to the control board, and transmitters designed as radio fobs.

  - **normally closed mode** – sliding panels of the speed gate have been drawn together so that, when the power is turned off, the sliding panels remain in the closed position and, if necessary, can be moved apart manually (as they are not locked);
  - **normally open mode** – sliding panels of the speed gate have been moved apart so that, when the power is turned off, the sliding panels remain in the open position and do not block the passage.
- In normally closed mode, it is possible to set an additional operation mode in the preselected direction, namely, **Automatic opening in the selected direction**: the sliding panels automatically open for each passage through the speed gate and close after the passage. The mode can be set only for one direction; the second direction remains in the main operation mode.
- In all operation modes, the speed gate sends an alarm signal if the passageway is occupied for more than 30 seconds.
- Intrusion detectors are installed on two levels throughout the length of the speed gate passage zone. This allows you to track the user's position within the passageway and also allows several users moving in the same direction to be in the passageway at the same time.
- If necessary, the number of zones for passage through the speed gate can be increased by installing ***STD-02*** double-sided sections.
- It is possible to organize a checkpoint with passage zones of different widths: 600 and 900 mm. For this purpose, the following products are available: ***ST-02.600/900*** (to be supplied upon request) and ***STD-02.900*** with a sliding panel outreach limiter installed on one side.
- When organizing several passage zones, front indication blocks allow the user to choose the correct zone for passage in the required direction in advance, when approaching the speed gate.
- The speed gate supports two control modes: pulse and potential.
- The speed gate can function both as an operating device included in an ACS and as a standalone unit controlled by the operator from its RC panel.
- An external ACS controller and proximity access card readers can be embedded inside the speed gate section under the glass top cover.
- The speed gate's glass top cover features a built-in indication block, which comprises a passage permission indicator, passage denial indicator, and indicator for the access card presentation area.
- Remote indication blocks can be connected to duplicate the passage permission / denial indication.
- A sound alarm (siren) can be connected to the speed gate in order to warn the operator about unauthorized passage attempts.
- Automatic emergency unblocking of the passage is enabled upon receipt of the *Fire Alarm* command. The *Fire Alarm* command can be sent by a security and fire alarm device or by the operator using an emergency button (hereinafter referred to as the emergency passage unblocking device).
- Speed gate parts are made of polished stainless steel. The sliding panels and filling glass are made of tempered glass with a thickness of 8 mm.

5.2 Design

The speed gate's design is shown in Fig. 3; the double-sided section's design is shown in Fig. 4 . The numbers of the parts are stated in the Manual in accordance with Fig. 3 and 4.

The speed gate consists of two sections, *Master* and *Slave*, as well as an RC panel (11). The *Slave* section is connected to the *Master* section via two DC and CAN connection cables (9, 10).

Each section has a sliding panel (1) and fixed filling glass (2).

To increase the number of passage zones, double-sided sections need to be installed. Each double-sided section is also equipped with an RC panel (11). It has two sliding panels (1): on the *Master* side and *Slave* side. Each sliding panel is operated by its motor drive. The *Slave* section of the speed gate (the *Slave* side of the next double-sided section) is connected to the *Master* side with two connection cables (9, 10) from the delivery set of this speed gate (double-sided section) (see Fig. 4).

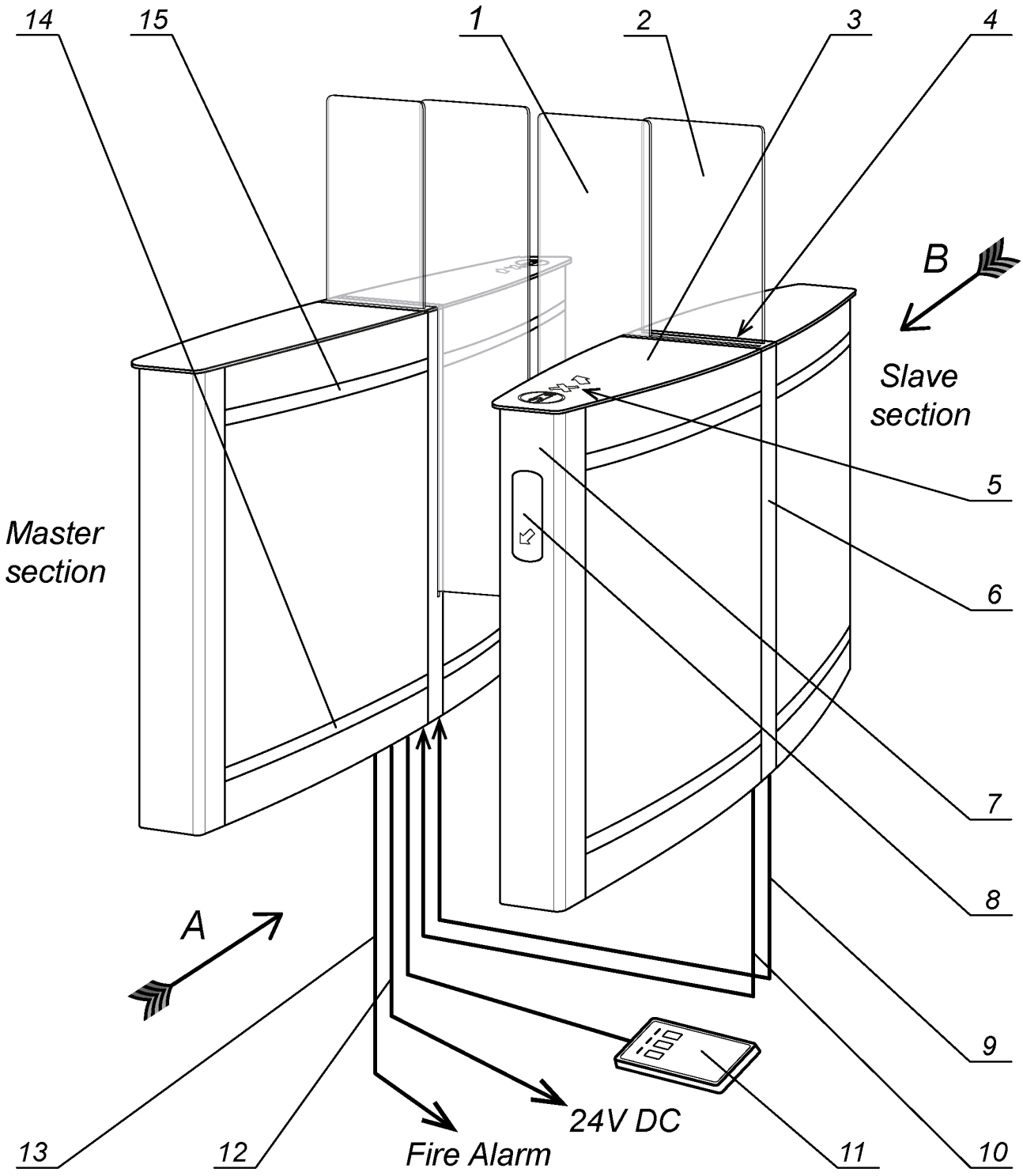


Figure 3. Overall view and design of ST-02

1 – glass sliding panel; 2 – filling glass; 3 – glass top cover; 4 – central insert; 5 – upper indication block;
6 – side panel; 7 – front panel; 8 – front indication block; 9 – DC connection cable;
10 – CAN connection cable; 11 – RC panel with cable; 12 – power supply cable[1];
13 – *Fire Alarm*[1] device cable; 14 – lower level of intrusion detectors;
15 – upper level of intrusion detectors

[1] Not included in the standard delivery set.

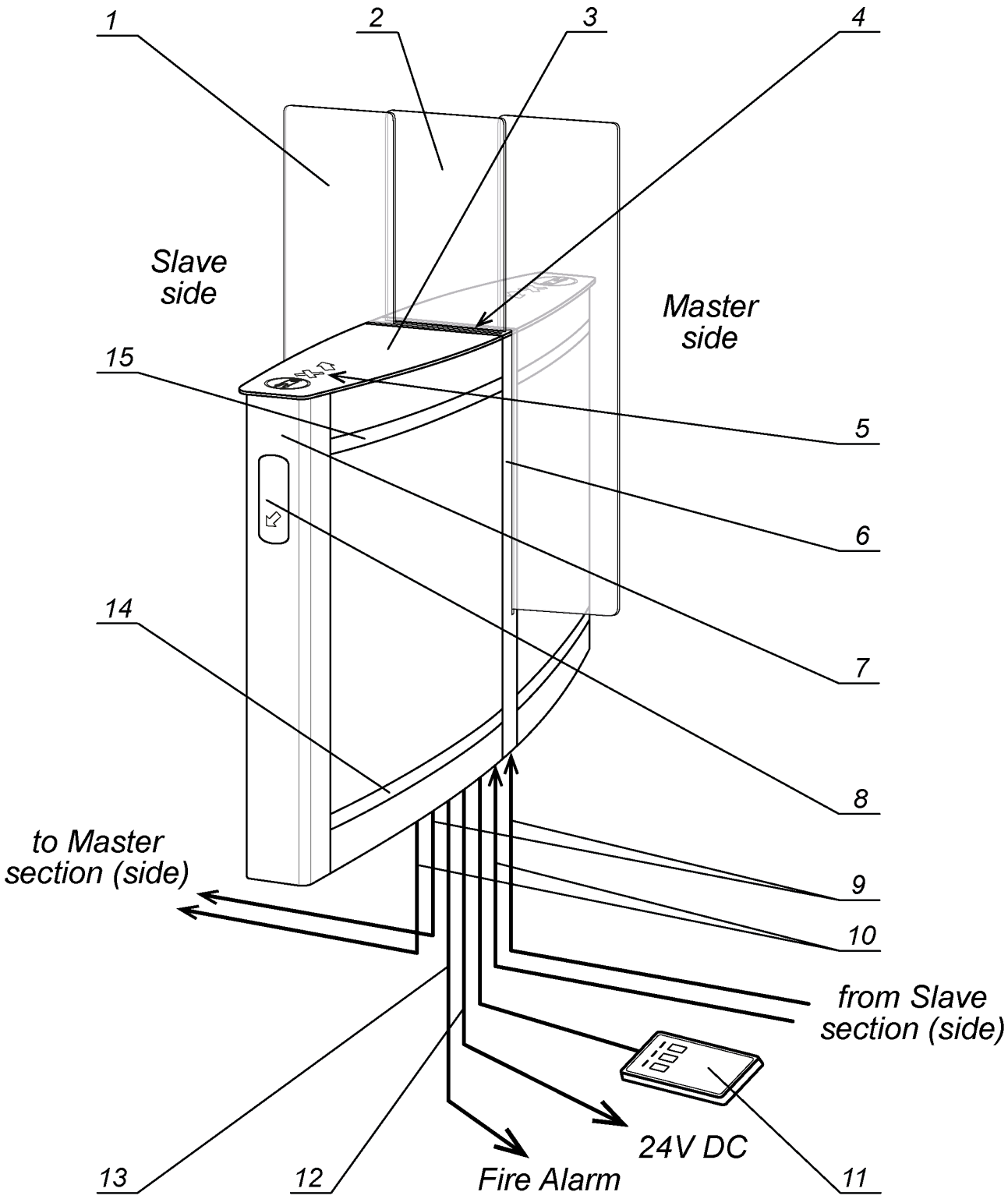


Figure 4. Overall view and design of STD-02

1 – glass sliding panel; 2 – filling glass; 3 – glass top cover; 4 – central insert;
5 – upper indication block; 6 – side panel; 7 – front panel; 8 – front indication block;
9 – DC connection cable[1]; 10 – CAN[1] connection cable; 11 – RC panel with cable;
12 – power supply cable[2]; 13 – *Fire Alarm*[2] device cable;
14 – lower level of intrusion detectors; 15 – upper level of intrusion detectors

[1] One pair of DC and CAN cables is taken from the delivery set of an adjacent product.
[2] Not included in the standard delivery set.

5.2.1 Section

Each section constitutes a single structure. There are two glass top covers (3) that cover the top of the section. Between the glass covers on top of the section, there is a central insert with grooves for a sliding panel (sliding panels) and for filling glass. The fixing points of glass sliding panels (1) and filling glass (2) to the sections are covered by side panels (6) from two sides. ***ST–02*** has side panels of two types – one is solid, and one has a groove for the sliding panel; as for the ***STD-02*** double-sided section, both its side panels have grooves for the sliding panels.

An upper indication block (5) is built into one of the glass top covers at the front end of the section (the double-sided section features two upper indication blocks in both top covers). The block includes a passage permission indicator (green arrow), passage denial indicator (red cross), and indicator of the access card presentation area ("hand with a card" pictogram).

The section front ends are covered with front end panels made of stainless steel (7). One of the front end panels (7) features a front indication block (8), which indicates the passage direction or passage denial (white arrow or red cross). Both front end panels of the double-sided section are equipped with indication blocks.

The glass sliding panel (1) is driven by a mechanism equipped with a motor drive and located inside the section.

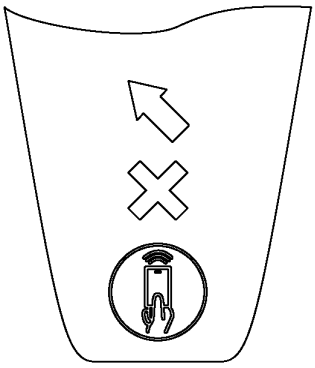
Intrusion detectors, which monitor the passageway, are located under plastic inserts on the sides of the section and form two levels, the lower one (14) and upper one (15).

The ***ST02.-30.771*** control board (hereinafter, the *control board*) is installed under one of the glass covers of the *Master* section (or section side; see Fig. 20). Power supply units, an RC panel (WRC receiver), *Fire Alarm* device, and, if necessary, other additional equipment, as well as connection cables from the *Slave* section (section side), are connected to the control board through a remote terminal block (Fig. 7).

5.2.2 Indication blocks

The following indication blocks are installed on each speed gate section:

- The upper indication block (5) is installed on one of the glass top covers (in case of ***STD-02*** – on both section top covers). It includes a white indicator (hand with a card) for the access card presentation area, a green indicator (arrow) lighting up when the passage is allowed in this direction, and a red indicator (cross) lighting up when the passage is denied:

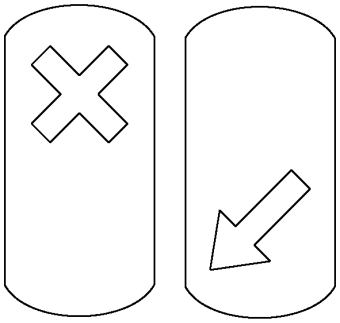


– green passage permission indicator

– red passage denial indicator

– white indicator for the card presentation area

- The front indication block (8) on the front end panels is designed to indicate the direction of passage through the speed gate. It constantly displays either a white arrow or a red cross:



– red passage denial indicator

– white indicator for the passage direction

The front block indication type is selected when installing the speed gate by connecting the front indication block cable to the corresponding connector of the indication control module (located under

the speed gate top cover inside the housing, Fig. 19). By default, the cable is connected to the ***ARROW*** connector, which enables the display of the white arrow. It is necessary to remove the glass top cover (3) in order to access the indication control module (see Fig. 26).

5.2.3 RC panel

The RC panel (11) is a small desktop device in a housing made of impact-resistant ABS plastic. The RC panel is designed to enable the operator to send commands when controlling the speed gate manually. The overall view of the RC panel is shown in Fig. 5.

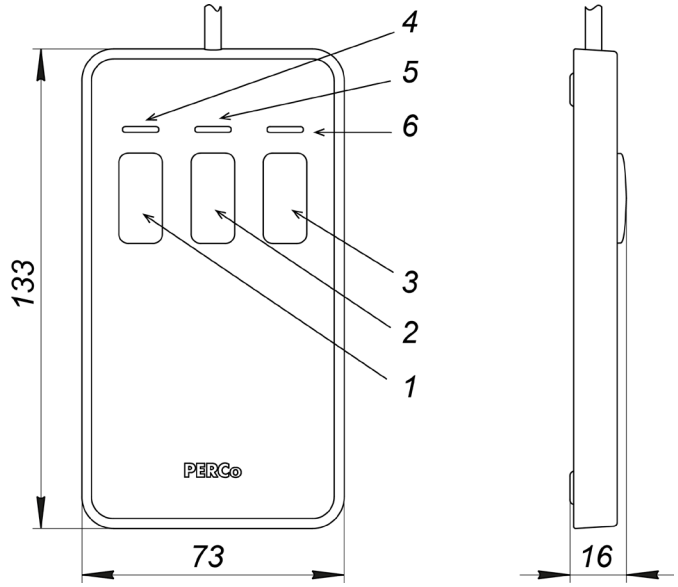


Figure 5. Overall view and dimensions of the RC panel

1, 2, 3 – **LEFT**, **STOP**, **RIGHT** buttons for sending control commands;
4, 6 – green *Left* and *Right* LED indicators; 5 – red *Stop* LED indicator

There are three buttons for sending commands on the RC front panel. The middle **STOP** button sends the *Passage denial* command. The **LEFT** and **RIGHT** buttons are used to send a command to open the passage in the selected direction. LED indicators of the passage direction status are located above the buttons. The red *Stop* indicator shows that both passage directions are closed. The available control commands and RC panel indication for pulse and potential control modes are listed in Table 5 and Table 6 respectively.

5.2.4 Control board

The speed gate control board (Fig. 6) is located in one of the housing openings under the glass top cover of the *Master* section (see Fig. 20); the board is protected against external influences with a metal cover with four screws. All input and output signals of the control board, excluding relay outputs that control additional remote indicators (***X4*** connector), are brought out to the contacts of the remote terminal block with a DIN rail (Fig. 7, Sect. 5.2.5).

The control board is equipped with a microcontroller, which processes incoming control commands transmitted to the *Unlock A*, *Stop*, *Unlock B,* and *Fire Alarm* control inputs, monitors the status of optical sensors, and generates commands for the motor drive of the speed gate's sliding panels relying on the received data.

In addition, the microcontroller generates signals on the outputs of the control board: for RC panel indication (*Led A*, *Led Stop,* and *Led B* outputs), for remote indication (*Light A* and *Light B* outputs), about the passage registration in the corresponding direction (*PASS A* and *PASS B*), about the alarm (*Alarm*).

Elements of the control board:

Connectors for jumpers:

- ***XP1 (Program)*** – service connector.
- ***XP2 (Mode1)*** – connector for switching the speed gate to the normally open operation mode (see Section 5.2.8). By default, the jumper is not installed, which corresponds to the normally closed operation mode.

- ***XP3 (+12V)*** – connector for switching on LED indication on the control board. By default, the jumper is installed, which implies that the indication is switched on.
- ***XP4 (Update)*** – connector for switching the control board to the built-in software update mode via the USB interface. By default, the jumper is removed.
- ***XP6 (BUZZ)*** – connector on the control board for buzzer activation. The buzzer duplicates the sound indication of the RC panel and siren activation. By default, the jumper is installed, which activates the buzzer.
- ***XP7 (Mode2)*** – connector for selecting the normal or enhanced control mode for passage through the speed gate. The delivery set includes an installed jumper, which corresponds to the normal control mode so that the “safe” zone, where the user’s presence keeps the sliding panels open, is the whole space between the speed gate sections. If the enhanced control mode is activated (jumper removed), the “safe” zone is limited to a narrow area adjacent to the sliding panels of the speed gate.

Switches:

- ***Pulse*** – switches the speed gate to the pulse control mode. By default, the switch is ***ON***, which corresponds to the pulse operation mode of the speed gate.
- ***Size1***, ***Size2*** – by default, both switches are set to the position corresponding to this type of the speed gate; it is forbidden to change their position during operation!
- ***Test 1*** – is not used. The switch must be ***OFF*** during operation.
- ***Test 2*** – for turning on LED indication on the intrusion detector boards. By default, the switch is turned ***OFF***, which deactivates the indication.
- ***R1*** – for switching to the *Automatic opening in the selected direction* mode (see Sect. 5.2.9). By default, the switch is turned ***OFF***.
- ***R2*** – for selecting the authorized passage direction in the *Automatic opening in the selected direction* mode if the ***R1*** switch is ***ON***. By default, the switch is in the ***OFF*** position, which corresponds to direction A.

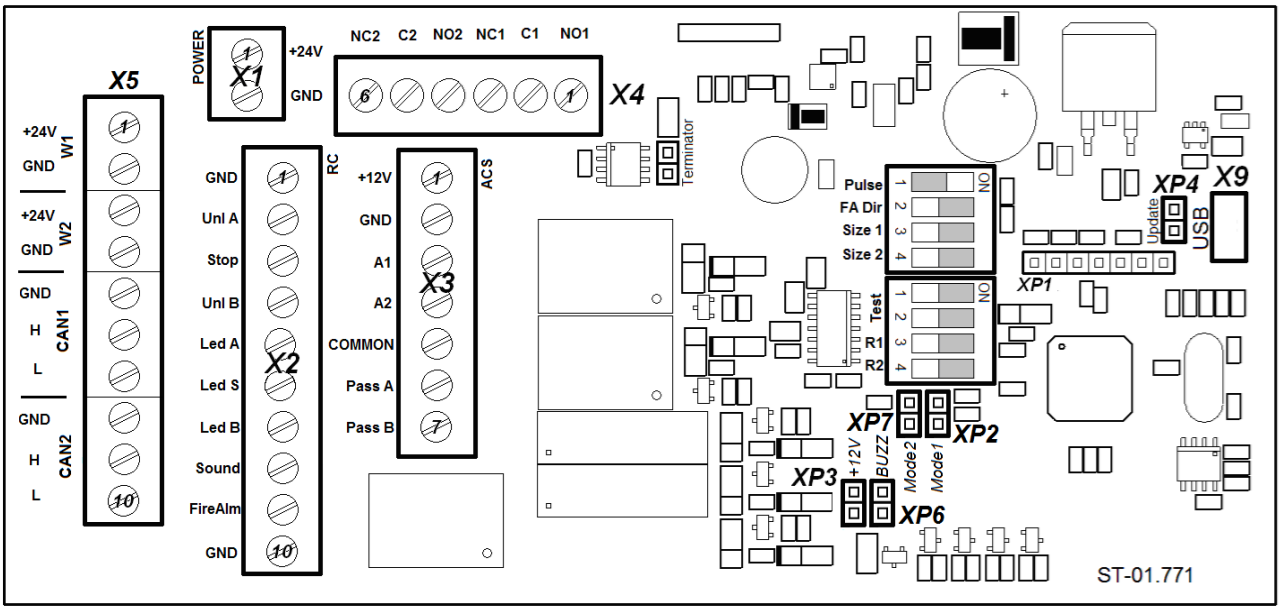


Figure 6. Control board overview

5.2.5 Remote terminal block (DIN rail)

Input and output signals from the control board of the *Master* section are brought out to contacts of the remote terminal block (DIN rail) (Fig. 7), which greatly simplifies the connection of the speed gate.

The remote terminal block is located at the bottom, under the side panel of the *Master* section (section side) on the inner side of the passageway. The appearance of the remote terminal block, as well as the contact numbering, are shown in Fig. 7. The contact functions of the remote terminal block are specified in Table 1.

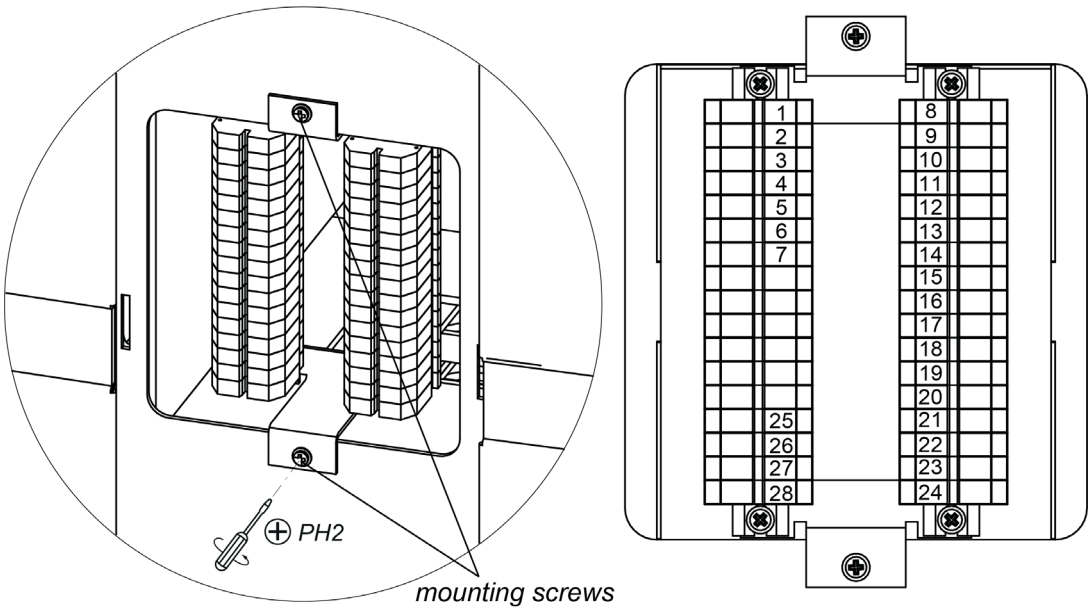


Figure 7. Overview of the remote terminal block

Table 1. Contact functions of the remote terminal block

No.	Contact	*Master* section	*Slave* section
1	*+24V*	External power supply connection	Not used
2	*GND*		
3	*+24V*	Power supply to the *Slave* section (DC cable connection)	Power supply from the *Master* section (DC cable connection)
4	*GND*		
5	*GND*	CAN cable connection	CAN cable connection
6	*H*		
7	*L*		
8	*GND*	Common (RC panel connection)	Not installed
9	*Unlock A*	A direction control input	
10	*Stop*	Passage denial control input	
11	*Unlock B*	B direction control input	
12	*Led A*	A direction indication output on the RC panel	
13	*Led Stop*	Passage denial indication output on the RC panel	
14	*Led B*	B direction indication output on the RC panel	
15	*Sound*	RC panel sound signal output	
16	*Fire Alarm*	Control input for emergency passage unblocking	
17	*GND*		
18	*+12V*	+12V output for power supply to additional devices	
19	*GND*	Common	
20	*Alarm1*	Siren connection output	
21	*Alarm2*		
22	*Common*	Common for the *PASS A* and *PASS B* outputs	
23	*PASS A*	*PASS A* output (passage in the A direction)	
24	*PASS B*	*PASS B* output (passage in the B direction)	
25	*RF*	Spare contact for built-in reader connection	Spare contact for built-in reader connection
26			
27			
28			

The *Slave* section uses a similar remote terminal block to connect the power supply and section drive control cables, DC (9) and CAN (10), as well as, if necessary, the connection cable for a reader to be integrated.

Apart from that, in addition to the contacts listed in the table, the DIN rail includes unused and unnumbered contacts, which can be used to connect other additional devices to the speed gate.

5.2.6 Control signal parameters

Passage through the speed gate is controlled by sending control signals to the *Unlock A*, *Stop*, and *Unlock B* inputs. The control signal is a **sending a low-level signal** to the *Unlock A*, *Stop,* and *Unlock B* contacts relative to the *GND* contact. A normally open relay contact or circuit with an open collector output can serve as a control element (Fig. 8 and 9).

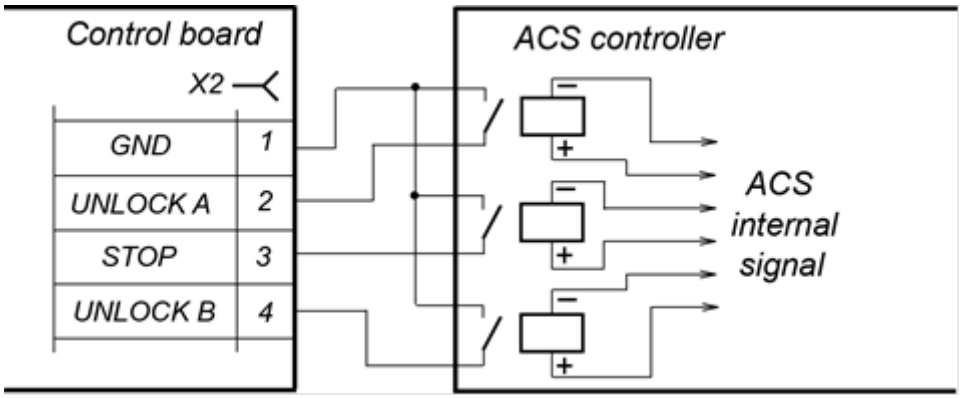


Figure 8. Control elements of the external device – normally open relay contact

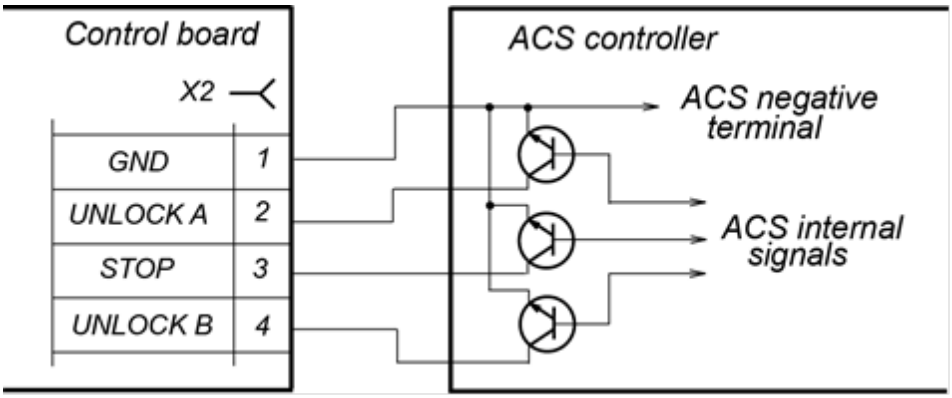


Figure 9. Control elements of the external device – circuit with an open collector output

The emergency unlocking of the speed gate is enabled by sending a control signal to the *Fire Alarm* input. The control signal is **removal of a low-level signal** from the *Fire Alarm* contact relative to the *GND* contact. A normally closed relay contact or circuit with an open collector output can serve as a control element. In this case, all control commands sent to other inputs are ignored. When a low-level signal is sent to the *Fire Alarm* input, the *Passage denial* command is automatically sent, and the speed gate's sliding panels get closed (see Section 5.3.2).

Note:

In order to generate a high-level signal at all input contacts (*Unlock A*, *Stop*, *Unlock B*, *Fire Alarm*), it is necessary to use *1 kOhm* resistors connected to a *+3.3 V* voltage plane.

The control element must ensure the following signal characteristics:

control element – relay contact:

minimum commutation current ..... max. 4 mA

closed contact resistance

(including the connection cable resistance)..... max. 200 Ohm

control element – circuit with an open collector output:

closed contact voltage (low-level

signal, on the control board input) ..... max. 0.8 V

5.2.7 Control modes

There are two speed gate control modes, namely, pulse and potential. In both modes, the speed gate is controlled by sending commands (i.e., control signal combinations) to the *Unlock A*, *Stop,* and *Unlock B* control inputs and to a special *Fire Alarm* control input. The control command sending algorithm changes depending on the selected mode.

Attention!

You may change switch positions as well as remove and install jumpers on speed gate boards only when the speed gate is switched off.

The control mode is selected by the ***Pulse*** switch located on the speed gate control board (see Fig. 6). By default, the switch is turned ***ON***, which activates the pulse control mode of the speed gate.

In order to switch the speed gate to the potential control mode, move the switch to the ***OFF*** position. The control mode will be changed after the speed gate is switched on.

Pulse control mode

The mode is used to control the speed gate by using its RC panel, WRC device, and ACS controller with outputs that support the pulse control mode.

The speed gate operation in pulse control mode is described in Table 5.

The control signal duration when sending a control command to control inputs must amount to at least 100 ms. The default passage waiting time totals 8 seconds and does not depend on the control signal (pulse) duration.

The control command sending algorithm, which is a combination of control signals, is given in Appendix 1. The control command is an active front of the control signal (signal transition from a high level to a low level) at any of the control inputs (*Unlock A*, *Unlock B,* and *Stop*), in case there are corresponding signal levels at other inputs.

Note:

If control signals are sent from the RC panel / WRC device, the signal's active front is enabled by pressing a relevant button on the RC panel. The pressed state of the button corresponds to a low level of the signal; and the unpressed state corresponds to a high level of the signal.

Potential control mode

The mode is used to control the speed gate via the ACS controller with outputs that support the potential control mode. The speed gate operation in potential control mode is described in Table 6.

The control signal duration when sending a control command to control inputs must amount to at least 100 ms. The passage waiting time is equal to the control signal duration, i.e., if, by the time of passage in the permitted direction, there is a low-level signal at the input of this direction, then the speed gate remains open in this direction.

The control command sending algorithm is given in Appendix 2. Upon sending a low-level signal to the *Stop* input, both directions are blocked for as long as it is active, regardless of signal levels at the *Unlock A* and *Unlock B* inputs. The directions switch to the modes according to signal levels at the *Unlock A* and *Unlock B* inputs when a low-level signal is removed from the *Stop* input.

Note:

When the speed gate is operated from the ACS controller, a high level of the control signal corresponds to open contacts of the controller output relay or the closed output transistor. A low level corresponds to closed contacts of the output relay or to the open output transistor.

5.2.8 Speed gate operation algorithm

The speed gate supports two main operation modes:

1. Normally closed mode (the ***XP2 (Mode1)*** jumper is not installed):
   - the sliding panels of the speed gate passage zone are closed; the speed gate passage zone is permanently blocked;
   - the sliding panels automatically open in case of an authorized passage and automatically close after the passage;

- in case of power disconnection (failure), the sliding panels remain in the closed position and, if necessary, can be manually moved apart (as they are not locked).

2. Normally open mode (the ***XP2 (Mode1)*** jumper is installed):
   - initially, the sliding panels of the speed gate passage zone are open; the passage zone is permanently unblocked;
   - the sliding panels automatically close and block the passage in case of an unauthorized passage attempt; they automatically reopen as soon as the passage zone is cleared;
   - in case of power disconnection (failure), the sliding panels remain in the open position and do not hinder free passage through the speed gate.

The speed gate operation algorithm in the pulse control mode for a single passage in one of the directions:

1. A command (combination of control signals) to allow a single passage in one of the directions is sent from the control device (RC panel, WRC device, ACS controller) to the control board inputs.
2. The microcontroller installed on the control board processes the received combination of signals, generates a command to the speed gate's actuating mechanism to open the passage zone, and activates passage permission indication.
3. Passage in the selected direction is authorized. In the normally closed operation mode, the sliding panels move apart. The **Unlocked state holding time** countdown starts (8 seconds by default).
4. The fact of passage is registered when the user enters the passageway. One of the relay outputs, *PASS A* or *PASS B,* depending on the passage direction, is activated for 250 ms. The user's position in the passage zone is monitored by means of intrusion detectors.

Note:

In order to prevent user contact with the sliding panels, a "safe" zone is allocated inside the passage zone. When the user is in such a zone, the opening or closing of the sliding panels is blocked. Under the normal control mode (the MODE2 jumper is installed by default), the "safe" zone is the whole passage zone of the ***ST-02*** speed gate, and if the enhanced control mode is activated, with the MODE2 jumper being removed, the "safe" zone is limited to a required narrow area adjacent to the sliding panels of the speed gate.

5. After the user passes through the opened sliding panels and gets beyond the "safe" zone, the control board microcontroller will send a command for the speed gate's actuating mechanism to close the passage and will deactivate the passage permission indication. In the normally closed operation mode, the sliding panels will get closed.
6. If, while the user is moving through the passage zone, another user's passage is authorized **in the same passage direction**, the sliding panels will not get closed, and the new user will be able to follow the first one immediately.

Note:

To increase the throughput rate, arrangement of separate passage zones for each direction is recommended. Passage directions for each passage zone are indicated with arrows on the front indication blocks.

7. If the user does not enter the passageway during the **Unlocked state holding time**, the microcontroller on the control board will generate a command for the speed gate's actuating mechanism to block the passage zone. In the normally closed operation mode, the sliding panels will close.

The speed gate operation algorithm in the pulse control mode in case of an unauthorized passage attempt in one of the directions:

1. When the user enters the passage zone, intrusion detectors register an unauthorized passage attempt.
2. The microcontroller installed on the control board processes the received combination of signals and switches to the alarm mode. The sound alarm will be activated to indicate an unauthorized passage attempt. In the normally open operation mode, the speed gate's sliding panels will be drawn together and block the passage.

3. The microcontroller will deactivate the alarm mode after the user leaves the passage zone. The sound alarm will be switched off. In the normally open operation mode, the speed gate's sliding panels will move apart and open the passage zone.

In the potential control mode, the speed gate operation algorithm depends on commands of the external ACS controller. For the correct speed gate operation, the passage permission control signal from the ACS controller must be removed after receiving a signal from the *PASS* output of this direction.

5.2.9 *Automatic opening in the selected direction* mode

This is an additional speed gate operation mode designed to organize a special passage mode, when it is necessary to ensure free entry (or exit), provided that the sliding panels are closed in the initial position, and to prevent unauthorized passage in the opposite direction at the same time (for example, at the checkpoint of the shop's salesroom, etc.).

Attention!

The *Automatic opening in the selected direction* mode is relevant only for the normally closed speed gate operation mode (see Sect. 5.2.8).

This mode is activated by means of the ***R1*** and ***R2*** switches located on the speed gate control board (see Fig. 6, Sect. 5.2.4).

Attention!

The position of switches may be changed only when the speed gate is switched off.

The mode allows you to organize free passage through the speed gate in one pre-selected direction, with automatic opening and closing of the sliding panels for passage. If passage is authorized from the opposite direction (by means of the RC panel, WRC device or ACS controller), the *Automatic opening in the selected direction* mode switches off for the duration of this passage.

The speed gate operation algorithm in this mode:

1) In the initial state, if the passage zone is not occupied in the direction chosen for the *Automatic opening in the selected direction* mode, the green passage permission indicator is lit, and the red passage denial indicator is lit for the opposite direction. Commands sent by pressing an RC panel button or from the ACS controller for passage permission in the direction chosen for the *Automatic opening in the selected direction* mode are ignored.
2) The intrusion detectors send a command to the speed gate controller to open the sliding panels if a user walks through the passage zone in the direction chosen for the *Automatic opening in the selected direction* mode. The speed gate's sliding panels open for passage in this direction; then, after the passage is completed, the intrusion detectors send a command to the controller to close the sliding panels, and the sliding panels automatically close behind the user. The indication remains in its initial state.
3) When passing through in the direction opposite to that chosen for the *Automatic opening in the selected direction* mode, the speed gate operation algorithm is similar to its usual algorithm (Sect. 5.2.8). In case of such authorized passage, the *Automatic opening in the selected direction* mode is switched off for the passage duration (passage waiting time). If the *Free passage* mode is applied for this direction, then the *Automatic opening* mode is switched off the whole time while the *Free passage* mode is active.
4) All other situations such as simultaneous passage attempts in both directions, are considered abnormal, and in case of their occurrence, the controller will generate an emergency signal and command to close the sliding panels.

5.3 Speed gate control devices

The speed gate can be controlled by the following devices: the RC panel / WRC device, ACS controller, and *Fire Alarm* device. These devices can be connected to the speed gate separately, simultaneously (in parallel) or in any combination with each other.

In case several control devices are connected to the speed gate simultaneously, their control signals might overlap. In this case, the speed gate will operate according to the command generated by the signal combination (see Appendices 1 and 2).

5.3.1 RC panel connection

The RC panel is connected with a flexible multicore cable to the *Unlock A*, *Stop*, *Unlock B*, *Led A*, *Led Stop*, *Led B, Sound,* and *GND* contacts of the remote terminal block in accordance with the electrical connection layout of the speed gate (see Fig. 17).

Note:

When the speed gate operates as part of an ACS, it is recommended that the RC panel should be connected to the ACS controller in accordance with the controller's operational documentation.

The WRC receiver is connected to the *Unlock A*, *Stop*, *Unlock B,* and *GND* contacts of the remote terminal block or, when installed inside the speed gate, directly to the control board via the corresponding contacts of the ***X2*** connector. The power supply of the WRC receiver is connected to the *+12V* contact of the remote terminal block or ***X3*** connector of the control board.

The standard RC panel orientation in respect of the sections is shown in Fig. 10. If the operator's workplace is located on the opposite side relative to the *Master* section, then it will be more convenient to swap the RC-panel wires connected to the *Unlock A* and *Unlock B* contacts, as well as to *Led A* and *Led B* respectively (see Table 2).

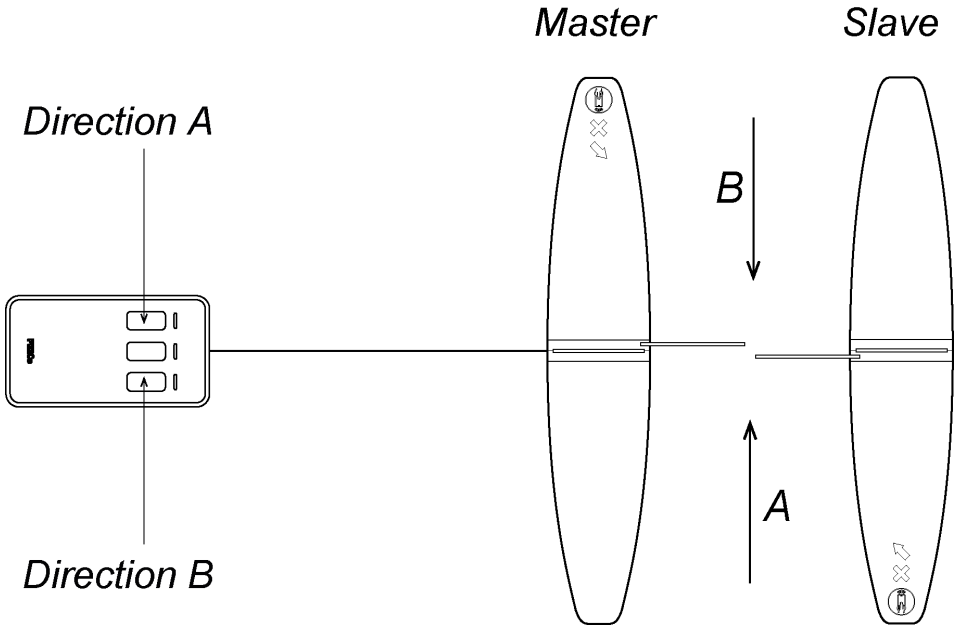


Figure 10. Standard RC panel orientation in respect of speed gate sections

Table 2. Connection of RC-panel cable wires to the remote terminal block

No.	Contact	RC panel orientation	
		Standard	Reverse
8	*GND*	black	black
9	*Unlock A*	white	green
10	*Stop*	blue	blue
11	*Unlock B*	green	white
12	*Led A*	yellow	red
13	*Led Stop*	orange	orange
14	*Led B*	red	yellow
15	*Sound*	brown	brown

5.3.2 *Fire Alarm* device

The *Fire Alarm* emergency passage unblocking device is connected to the *Fire Alarm* input (*Fire Alarm* and *GND* contacts of the remote terminal block) in accordance with the electrical connection layout of the speed gate (Fig. 17).

If the *Fire Alarm* input is not used, a jumper wire needs to be installed between the *Fire Alarm* and *GND* contacts. By default, this jumper is installed.

If a control signal is sent to the *Fire Alarm* input and held for at least 2 seconds[1], the speed gate switches to the *Fire Alarm* mode. In this case:

- if the speed gate's sliding panels have been closed, then they will open and remain open for free passage in both directions in all operation modes;
- green passage permission indicators of upper indication blocks switch on in the flashing mode with an interval of 1.25 seconds simultaneously for both directions;
- all the incoming speed gate control commands are ignored.

After the *Fire Alarm* signal is removed, the sliding panels of the speed gate will stay open for another 3 seconds, after which the sliding panels will close, and the speed gate will return to the normal operation mode.

If a control signal is received at the *Fire Alarm* input while passage is in the progress, the sliding panels will remain open in this direction until the signal is removed.

5.3.3 Operation via ACS

Functioning as part of the ACS, the speed gate can serve as an operating device. The speed gate can be equipped with built-in proximity card readers under the glass top cover.

ACS controller outputs are connected to the *Unlock A*, *Stop*, *Unlock B,* and *GND* contacts of the remote terminal block or, when installed inside the speed gate, directly to the control board via the corresponding contacts of the ***X2*** connector. ACS controller inputs are connected to the *PASS A*, *PASS B,* and *Common* contacts of the remote terminal block or ***X3*** connector of the control board. The connection is carried out in accordance with the electrical connection layouts of the speed gate (see Fig. 17 and 18).

5.4 Optional devices connected to the speed gate

The following outputs are available on the speed gate control board for connection of optional devices:

- *PASS A, PASS B* – for connection to ACS controller inputs (see Sect. 5.4.1).
- *ALARM* – for siren connection (see Sect. 5.4.2).
- *Light A* and *Light B* – for connection of remote indication blocks (see Sect. 5.4.3).

5.4.1 PASS outputs

The *PASS A* and *PASS B* relay outputs have normally closed contacts. The *Common* relay contact is not connected to the negative terminal of the speed gate's power supply unit. In the normalized state, no voltage is applied to the relay coil.

The outputs are activated upon registration of passage through the speed gate in the corresponding direction. During the activation process, voltage is applied to the relay coil, and relay contacts get closed. The fact of voltage supply to the relay coil can be determined by lighting up of the red LED light on the control board near the corresponding relay (if the jumper is installed on the ***XP3 (+12V)*** connector of the control board).

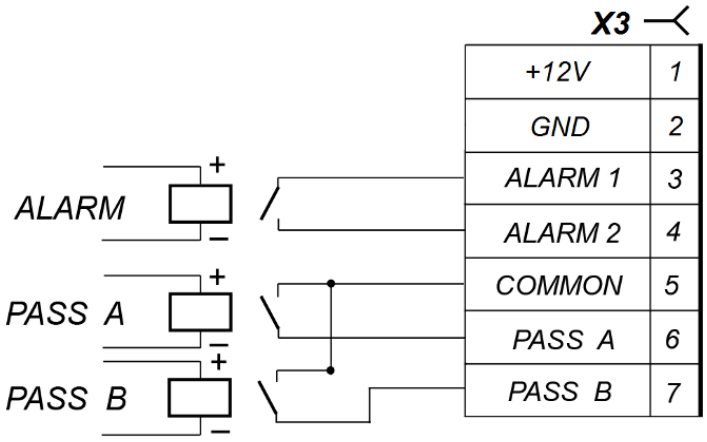


Figure 11. Output stages for PASS A, PASS B, and Alarm

[1] If the *Fire Alarm* signal lasts for less than 2 seconds, the speed gate will not switch to the *Fire Alarm* mode and will remain in normal operation mode.

Output stages – relay contacts (Fig. 11) with the following signal characteristics:
maximum commutation DC voltage ..... 42 V
maximum commutation current ..... 0.25 A
closed contact resistance ..... max. 0.15 Ohm

5.4.2 Siren

A siren is connected to the *ALARM* relay output of the control board via the *ALARM 1*, *ALARM 2*, *GND*, and *+12V* contacts of the remote terminal block in accordance with the electrical connection layout of the speed gate (Fig. 17).

In the normalized state, no voltage is applied to the relay coil, and the relay contacts are open. The output is activated when intrusion detectors register an unauthorized passage attempt, as well as when the speed gate switches to the *Emergency* mode (see section 9.4). During the activation process, voltage is supplied to the relay coil, and relay contacts get closed. The fact of voltage supply to the relay coil can be determined by lighting up of the red LED light on the control board near the corresponding relay (if the jumper is installed on the ***XP3 (+12V)*** connector of the control board).

The output stage – relay contacts (Fig. 11) with the following signal characteristics:
maximum commutation DC voltage ..... 42 V DC
maximum commutation current..... 0.25 A
closed contact resistance ..... max. 0.15 Ohm

The maximum consumption current of the siren when it is connected to the *+12V* contact of the remote terminal block should not exceed 0.3 A.

5.4.3 Remote indication blocks

Remote indication blocks for corresponding passage directions are connected to the *LIGHT A* and *LIGHT B* outputs. The outputs feature a complete set of contacts: *NO* normally open, *NC* normally closed, and *C* common outputs. Connection to the outputs is performed via corresponding contacts of the remote terminal block.

Upon indication of passage permission in the A/B direction, the LIGHT *A* / *LIGHT B* relay of the corresponding direction is activated (its coil is energized), and it is normalized upon passage denial indication. The fact of power supply to the relay coil can be determined by lighting up of the red LED light on the control board located near the corresponding relay.

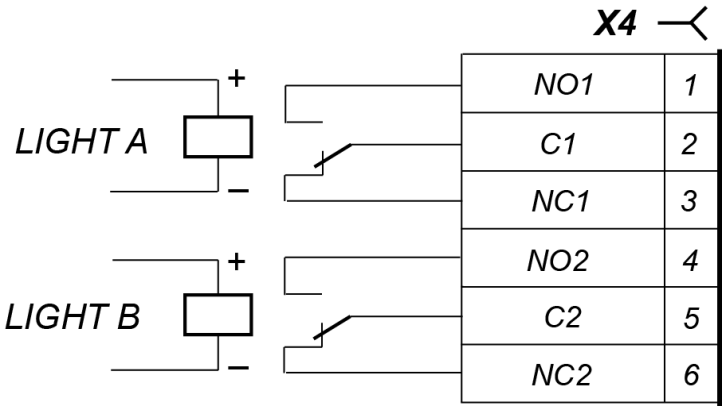


Figure 12. Output stages for Light A and Light B

The output stages for *LIGHT A* and *LIGHT B* are relay changeover contacts (see Fig. 12) with the following signal characteristics:
maximum commutation voltage ..... 30 V DC
maximum commutation voltage ..... 42 V AC
maximum commutation current..... 3 A DC / AC
closed contact resistance ..... max. 0.15 Ohm

6 MARKING AND PACKAGING

Each speed gate section features a marking label on the internal surface of the section under the side panel (6) (see Fig. 3 and 4). The label identifies the product's name, serial number, and date of manufacture. The ***STD-02*** double-sided section has additional stickers that indicate the side of the section (*Master* or *Slave*) and are located under the side panels.

Apart from that, the *Master* section and the double-sided section have a sticker located on the inner surface of the side panel (6). It demonstrates the speed gate's electrical connection layout, which is similar to that shown in Fig. 17.

The speed gate in the standard delivery set is packed in transportation boxes, which protect it from being damaged during transportation and storage. Parts and fasteners of each section are supplied in two boxes, fastened together as an assembly. The total number of boxes (assemblies) depends on the ordered delivery set.

Overall dimensions of transportation boxes (length × width × height)*:*

ST-02.600:
box No.1, box No.3 ..... 205×45×121 cm
box No.2, box No.4 ..... 131×45×27 cm

STD-02.600:
box No.1 ..... 205×45×121 cm
box No.2 ..... 131×45×27 cm

ST-02.900:
box No.1, box No.3 ..... 205×60×121 cm
box No.2, box No.4 ..... 131×60×27 cm

STD-02.900:
box No.1 ..... 205×60×121 cm
box No.2 ..... 131×60×27 cm

Weight (gross) of transportation boxes*:*

ST-02.600:
box No.1, box No.3 ..... max. 255 kg each
box No.2, box No.4 ..... max. 55 kg each

STD-02.600:
box No.1 ..... max. 268 kg
box No.2 ..... max. 58 kg

ST-02.900:
box No.1, box No.3 ..... max. 265 kg each
box No.2, box No.4 ..... max. 65 kg each

STD-02.900:
box No.1 ..... max. 280 kg
box No.2 ..... max. 68 kg

7 SAFETY REQUIREMENTS

7.1 Installation safety

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

Attention!

- **All installation works may be carried out only when all power supply units, including main and backup (emergency) ones, are switched off and disconnected from the mains!**
- Only serviceable tools may be used for installation.
- The speed gate sections are heavy and require at least 4 people for their unpacking and movement. Installation of glass top covers and sliding panels as well as replacement of filling glass are to be carried out by at least two persons.
- The use of protective gloves is mandatory! Housing parts made of stainless steel may have sharp edges.
- Be especially careful and diligent when installing the speed gate sections before they are fixed, and prevent them from falling over.
- **Be careful not to insert your fingers into technological slots and holes of the housing in order to avoid injuries, and use special tools instead until the speed gate is fully assembled!**
- Make sure that installation of the speed gate and all connections have been performed properly before you turn the speed gate on for the first time.

Power supply units shall be installed in accordance with safety measures stipulated in their operational documentation.

7.2 Operation safety

Observe general electrical safety rules when operating the speed gate.

Attention!

- Do not operate the speed gate in conditions that do not comply with the requirements given in Sect. 2.
- Do not operate the speed gate at a PS unit voltage different from that specified in Sect. 3.

Power supply units must be used with observance of safety requirements specified in their operational documentation.

8 ASSEMBLY AND INSTALLATION

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

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

Attention!

The speed gate is a sophisticated technical device, **so please perform the installation operations by consistently following the installation instruction described in Sect. 8.4 all the time** to avoid the need to repeat those operations.

8.1 Installation details

To prepare the mounting surface, it is recommended that you should:

- mount the speed gate sections on a steady and level concrete (grade 400 or higher, strength class B22.5), stone or similar foundation with a thickness of at least 150 mm.
- level the mounting surface so that all the fixing points of the speed gate section lie in the same horizontal plane (check it using a level).
- apply embedded reinforcing elements with the minimum dimensions of 450×450×200 mm in case the speed gate section has to be installed on a less steady foundation.

8.2 Tools and equipment required for installation

It is recommended to use the following tools and equipment for the speed gate installation:

- two crowbars (or pipe sections with a diameter of up to 28 mm) to move the sections of the speed gate;
- 1.2÷1.5 kW electric hammer drill;
- hard-alloy drill bit to create holes for anchor sleeves;
- floor chaser for cable ducts;
- straight-slot screwdrivers;
- PH1, PH2 Phillips-head screwdrivers;
- S8, S13 horn-type socket wrenches;
- SW3, SW4, SW5, SW8 Allen keys;
- rubber mallet;
- level;
- 2 m measuring tape.

Note:

It is allowed to use other equipment and measuring tools that meet the required parameters.

8.3 Cable lengths

The cables to be used for installation are listed in Table 3.

Table 3. Cables used during the installation

No.	Equipment to be connected	Cable length, m, max.	Cable type	Cross-section, mm², min.	Cable example
1	Power supply unit of the speed gate	10	Twin wire	1.5	AWG 15; HO5VV 2×1.5 two-tone
		20	Twin wire	2.5	AWG 13; HO5VV 2×2.5 two-tone
2	- *Fire Alarm* device - Additional equipment to the control board's input or output	30	Twin wire	0.2	RAMCRO SS22AF-T 2×0.22 CQR-2
3	RC panel	40	Eight core cable	0.2	CQR CABS8 8×0.22 c
4	ACS controller	30	Six core cable	0.2	CQR CABS6 6×0.22 c

8.4 Installation procedure

Attention!

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

The installation operations are described with due consideration for recommendations stipulated in Sect. 8.1; installation and disassembly of separate parts of the speed gate are detailed in Sect. 8.7. Equipment and tools required for installation are listed in Sect. 8.2. Types of cables to be used for installation are listed in Sect. 8.3. Marking layouts of the mounting surface are provided in Sect. 8.5. Electrical connection layouts are shown in Sect. 8.6.

The item numbers are stated in accordance with Fig. 3 and 4.

In the course of the installation, refer to a video tutorial for assembly and installation of ***ST-02***, which is available on the PERCo website at www.perco.ru.

Attention!

- The speed gate sections are heavy. Speed gate sections may be moved only with the use of installation tools by special lugs located at the front ends of the section under the front end panels; do not try to lift them by holding their glass top covers or other elements of the housing!
- Speed gate sections may be installed and fixed only after all necessary cables have been laid in cable ducts and inside the sections.
- Be especially careful while removing the parts of the speed gate sections before fixing the sections on the mounting surface. Prevent the sections from falling down and their parts from being damaged.

Perform the following sequence of actions when installing the speed gate:

1. Install the power supply unit into the required place in accordance with the instruction given in its operational documentation.
2. Determine the installation locations for the *Master* and *Slave* sections and, if necessary, for double-sided sections. In particular, it is necessary to mind the rule for mutual arrangement of sections: the sliding panel of the *Master* section (side of the double-sided section) should always be placed opposite the panel of the *Slave* section (side of the double-sided section). The *Master* or *Slave* side of the ***STD-02*** Double-sided section can be identified by means of stickers located under the side panels (6).

3. Mark and drill holes for anchor sleeves on the mounting surface to fix speed gate sections and double-sided sections in accordance with the layouts presented in Fig. 13-15 and with due consideration for the checkpoint design. Use a hard-alloy drill bit to drill holes.

Note:

It is acceptable to use the base of the section as a template for marking holes. To do this, you must first unpack the section and remove its base (see below, paragraph 7).

Attention!

When installing the sections, it is necessary to leave a gap of at least 70 mm between the side of the section and the wall in order to ensure convenient installation.

4. Prepare cable ducts in the floor:
   - ducts for cabling from external devices (power supply unit (12), RC panel (11) or ACS controller, *Fire Alarm* (13) device, and other additional equipment) to holes for entry into the *Master* section and for entry into the double-sided sections;
   - ducts that connect cable entry holes of the opposite sections (sides of the double-sided section) of one passage zone – for routing DC (9) and CAN (10)[1] connection cables, and, if required, in case of installation of built-in readers, a cable for connecting a reader from the *Slave* section to the ACS controller (RF cable on layouts in Fig. 16 and Fig. 18).

Attention!

Passage zones that are limited by one-sided sections and/or sides of double-sided sections are separate functional devices that are not directly connected to each other.

The *Master* and *Slave* sides of one double-sided section are electrically independent as they belong to different passage zones.

5. Lay all required cables in the cable ducts (see above, paragraph 4).
6. Insert the anchor sleeves into the holes you have drilled so that they are flush with the floor surface.
7. Unpack the *Master* section (***ST-02/M***, boxes No.1 and No.2).

Note:

Box No. 1 (3) consists of a bottom, to which a section of the speed gate is fastened with transport bolts, and a top box. To unpack the box, it is necessary to remove box No. 2 (No. 4) fixed on it from above, then unscrew the screws around the perimeter of the bottom, and separate the top box. Then, it is enough to unscrew the screws from one of the side covers of the box so that the top box can be easily removed in parts.

In order to take the section off the bottom of the transportation box:
   - Remove the front end panels (7) (see Sect. 8.7.1, Fig. 19). Be careful not to damage the connection cable of the front indication block (8)!
   - Remove the section from its base (see Fig. 20) and place it on a flat, stable surface. Move the section by using two crowbars inserted into special lugs on the front ends of the speed gate; the work must be done by four persons!
   - Unscrew the base from the bottom of the box and remove it.
8. Install the base of the *Master* section on the anchor sleeves. Pull out the ends of all cables connected to the section through the cable entry hole located in the base of the *Master* section.
9. Secure the base of the *Master* section on the mounting surface with six M10 anchor bolts and washers.
10. Install the *Master* section on the base, having pulled connection cables inside the section in advance. Secure the section to the base with four M8 set screws by using an SW4 Allen key (see Fig. 20). If there is a need to make cabling inside the section housing more convenient, one or two removable parts of the housing can be disconnected and extended along the longitudinal axis (see Section 8.7.3, Fig. 21).
11. Check the vertical position of the section with a level; the section must not deviate from the vertical in the longitudinal plane by more than 0.5º. Use the special screws at the base of the

[1] Included in the standard delivery set.

section for alignment (you will need to remove the section from the base to access them). It is allowed to use mounting gaskets.

Note:

Paragraphs 12 – 14 below are applicable in case additional ***STD-02*** double-sided sections are installed.

12. Unpack and install the double-sided section. Perform actions specified in paragraphs 7 – 11, and align the double-sided section so that its *Slave* side (indicated on the section sticker) is located opposite the installed *Master* section.
13. Pull cables for controlling the second passage zone inside the section through the cable entry hole located in the base of the double-sided section (from the *Master* side): from the power supply unit, from the RC panel or ACS controller, from the *Fire Alarm* device, and additional equipment. Route the DC and CAN cables from the *Slave* section in the same manner.
14. If necessary, install other double-sided sections (paragraphs 14 to 16).
15. Unpack and install the *Slave* section (***ST-02/S***, boxes No.3 and No.4). Follow the steps specified in paragraphs 7 – 11.

Note:

The following paragraphs 16 to 21 shall be carried out for each individual passage zone in turn.

16. Remove the two screws that secure remote terminal blocks at the bottom of the *Master* and *Slave* sections (sides of the sections) to the housing (see Fig. 7) and take them out; be careful not to damage the internal wiring that leads to the remote terminal blocks!
17. Take out the external connection cables from the inside of each section (side of the section) and connect them to the remote terminal block in accordance with the speed gate's electrical connection layout (see Fig. 17). Insert and secure the remote terminal block in place. Carefully lay down the connected cables inside the housing of the section.

Note:

DC and CAN connection cables are to be connected to remote terminal blocks of the speed gate sections in accordance with their core marking.

18. If necessary, install access card readers and an ACS controller – card readers are mounted on special brackets located inside the sections under the top indication blocks of the top covers or directly on the indication blocks from below (***IR19 OEM***); the ACS controller is mounted in the opening of the section housing under the speed gate top cover by means of self-adhesive retainers from the delivery set (see Fig. 20).

Attention!

By default, it is possible to install the ACS controller and access card readers manufactured by ***PERCo*** inside the speed gate section.
If equipment by third-party manufacturers is used, it must meet the following requirements:

- overall ACS controller dimensions,
  (length × width × height) ..... max. 160×140×40 mm
- overall reader dimensions,
  (length × width × height) ..... max. 230×72×32 mm
- ID reading range ..... min. 40 mm
  (**stable reading of cards tapped on the speed gate cover is not guaranteed if the reading range of the installed readers is less than 40 mm**).

In order to maximize the reading range, the readers should be located as close to the top surface of the speed gate's glass cover as possible. For this purpose, the height of the bracket installed can be adjusted by using two fixing screws (located under the bracket shelf). To make the adjustment more precise, it is recommended that prior to this, the top cover (3) with the top indication block should be temporarily installed in its place, and the front end panel should be removed (7).

As a matter of convenience, inputs and outputs of the built-in ACS controller can be connected not to the DIN rail contacts, as shown in the layout (Fig. 17), but directly to the corresponding

contacts of the control board (***X2*** and ***X3*** connectors, Fig. 6). An example of the connection layout is shown in Fig. 18 .

Note:

It is recommended to install the ACS controller with its *Ethernet* connector facing the direction of the sliding panel's motor drive to ease access to it in the future.

Use double-sided adhesive tape to secure the readers. Carefully route the cables from the readers to the ACS controller (to the point of cable entry from the ACS controller) by using standard slots in parts of the section housing. Use self-adhesive pads and cable tie mounts to secure the cables.

Attention!

Do not route connection cables and wiring through the speed gate's actuating mechanism inside the housing of the section in order to avoid its failure!

19. Check that all electrical connections are correct and safe.
20. Check that the jumpers and switches on the speed gate control board have been installed and positioned correctly (see Section 5.2.4). Set the speed gate control mode (*pulse* or *potential*) by using the ***Pulse*** switch located on the control board, and the speed gate operation mode (*normally open* or *normally closed*) by using the ***XP2 (Mode1)*** jumper.
21. Unpack the glass sliding panels (1), filling glass (2), glass top covers of the sections (3), central inserts (4), and side panels (6) (boxes No.2 and No.4).
22. Install parts of all the sections in the following order (see Sect. 8.7):
    - Install the front end panels (7) (see Sect. 8.7.1, Fig. 19). The panel with the front indication block (8) must be mounted on the section side with the indication control module, and the corresponding connection cable must connect the indication control module and the front indication block (see Fig. 19). The connection cable connected to the ***ARROW*** connector of the indication control module will enable the display of the white arrow on the front indication block. The cable connected to the ***CROSS*** connector will activate the display of the red cross.
    - Mount the central insert (4) (see Sect. 8.7.4, Fig. 22).
    - Mount the filling glass (2) (see Sect. 8.7.5, Fig. 23).
    - Mount the sliding panels (1) (see Sect. 8.7.6, Fig. 24).

Note:

If there is a need to reduce the distance of the sliding panel outreach from the housing of the ***STD-02.900*** Double-sided section (for arrangement of a passageway with a width of 600 mm on one side), it is required to mount a sliding panel outreach limiter and install a jumper on the motor drive board of the sliding panel (see Sect. 8.7.9).

    - Install the side panels (6) (see Sect. 8.7.7, Fig. 25).
    - Mount the glass top covers (3) (see Sect. 8.7.8, Fig. 26); the top cover with the upper indication block (5) must be mounted on the section side with the indication control module; prior to this, the appropriate connection cable needs to be connected from the indication control module to the upper indication block (see Fig. 19).
23. Perform a test run for each passage zone of the speed gate according to Sect. 9.1.
24. Check the operation of all passage zones of the speed gate jointly by sending control commands from RC panels (see Sect. 9.2, 9.3).

The speed gate is ready for operation as soon as its installation and testing are finished.

8.5 Marking layouts for the mounting surface[1]

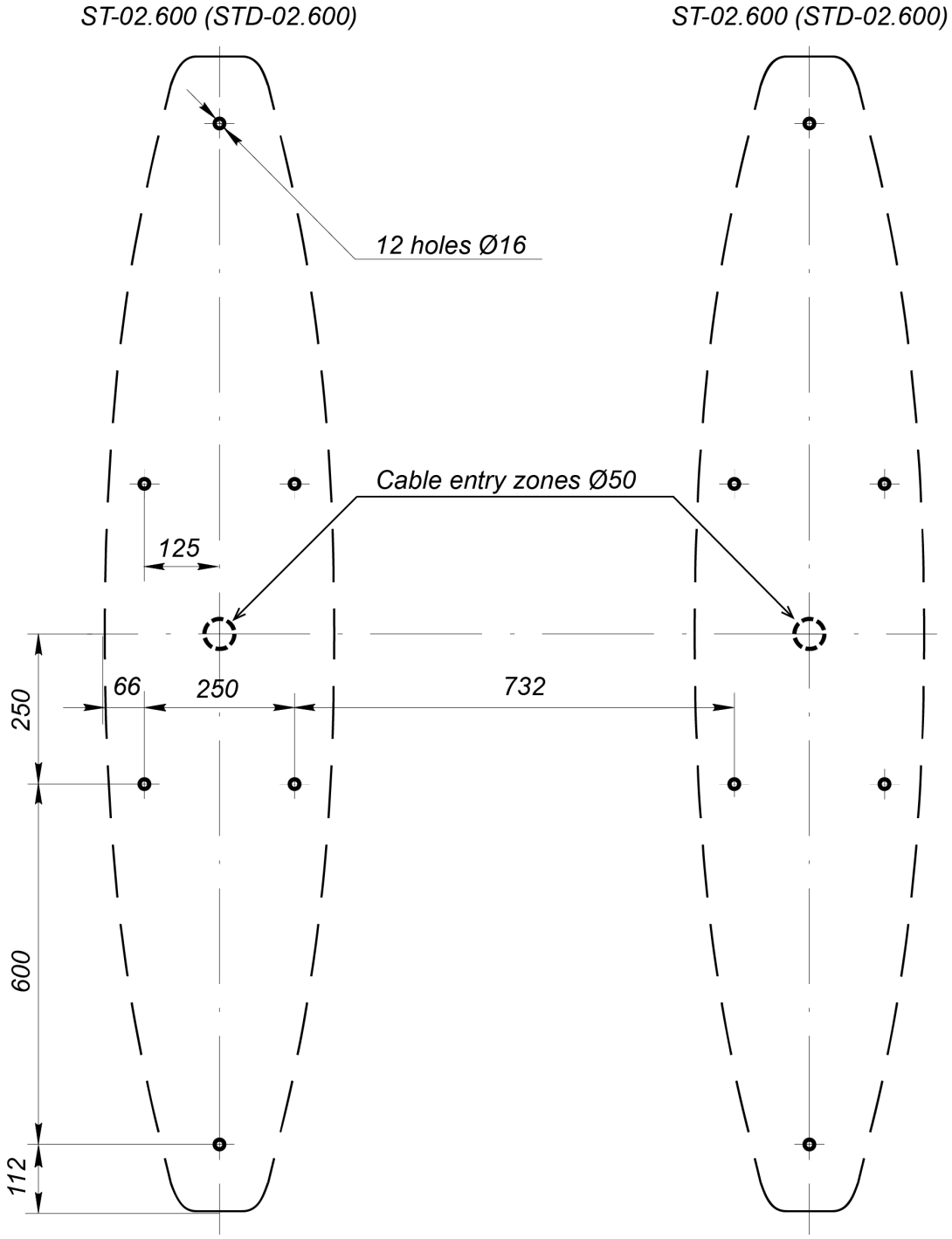


Figure 13. Marking layout for installation of the speed gate sections with a passageway width of 600 mm (ST-02.600, STD-02.600)

[1] The size of the holes in the layouts is indicated for anchors of the PFG IH 10 SORMAT type; when using other types of anchors, it is necessary to make holes of a diameter and depth appropriate for those.

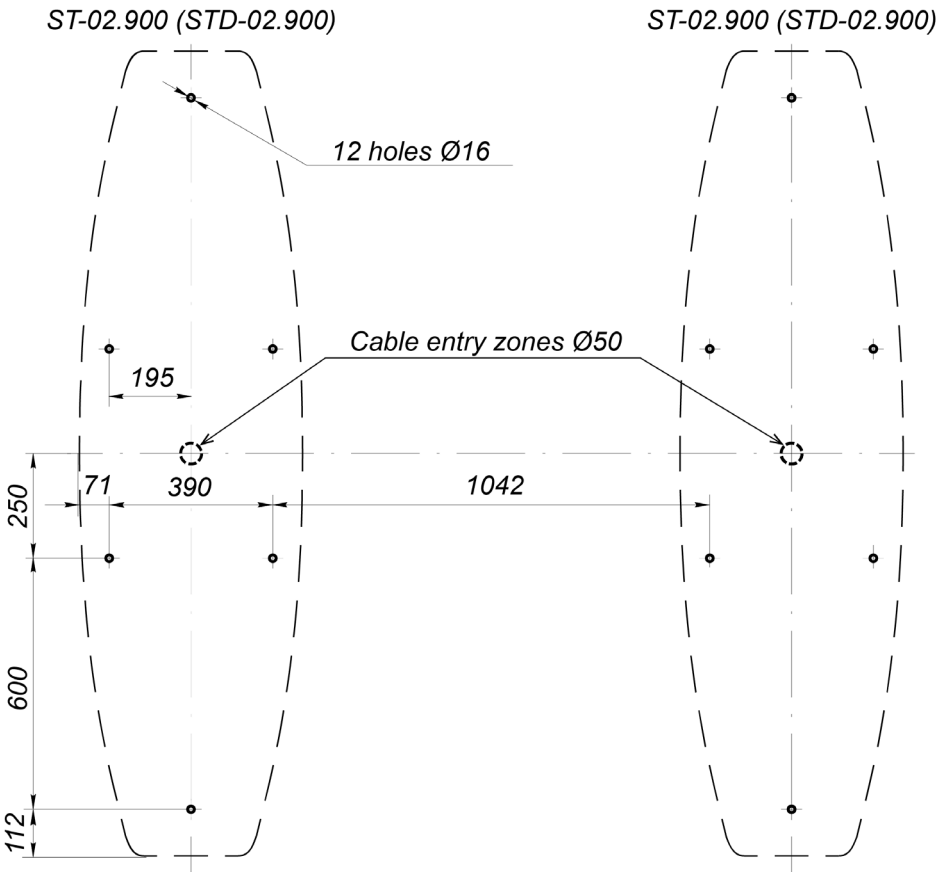


Figure 14. Marking layout for installation of the speed gate sections with a passageway width of 900 mm (ST-02.900, STD-02.900)

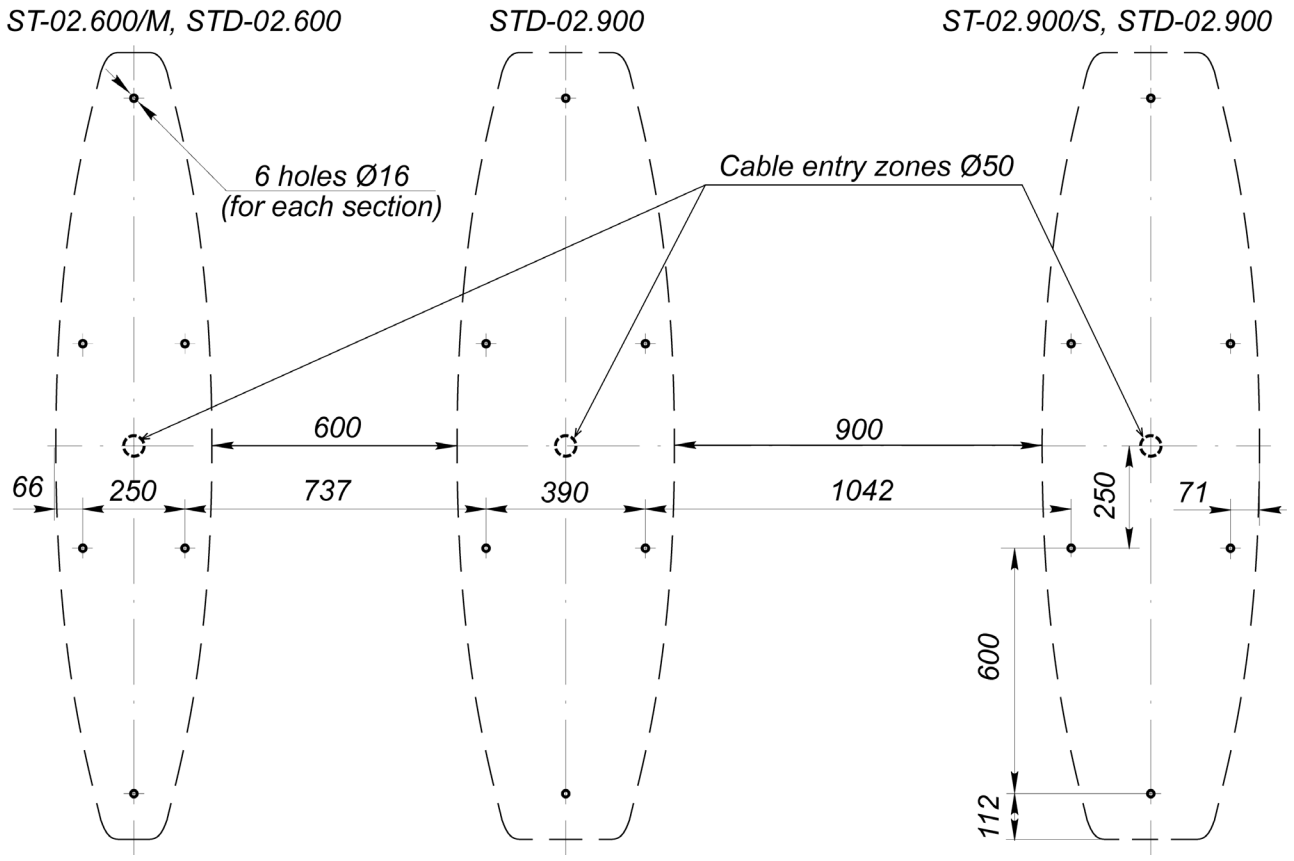


Figure 15. Marking layout for joint installation of the speed gate sections with different passageway widths

8.6 Electrical connection layouts of the speed gate

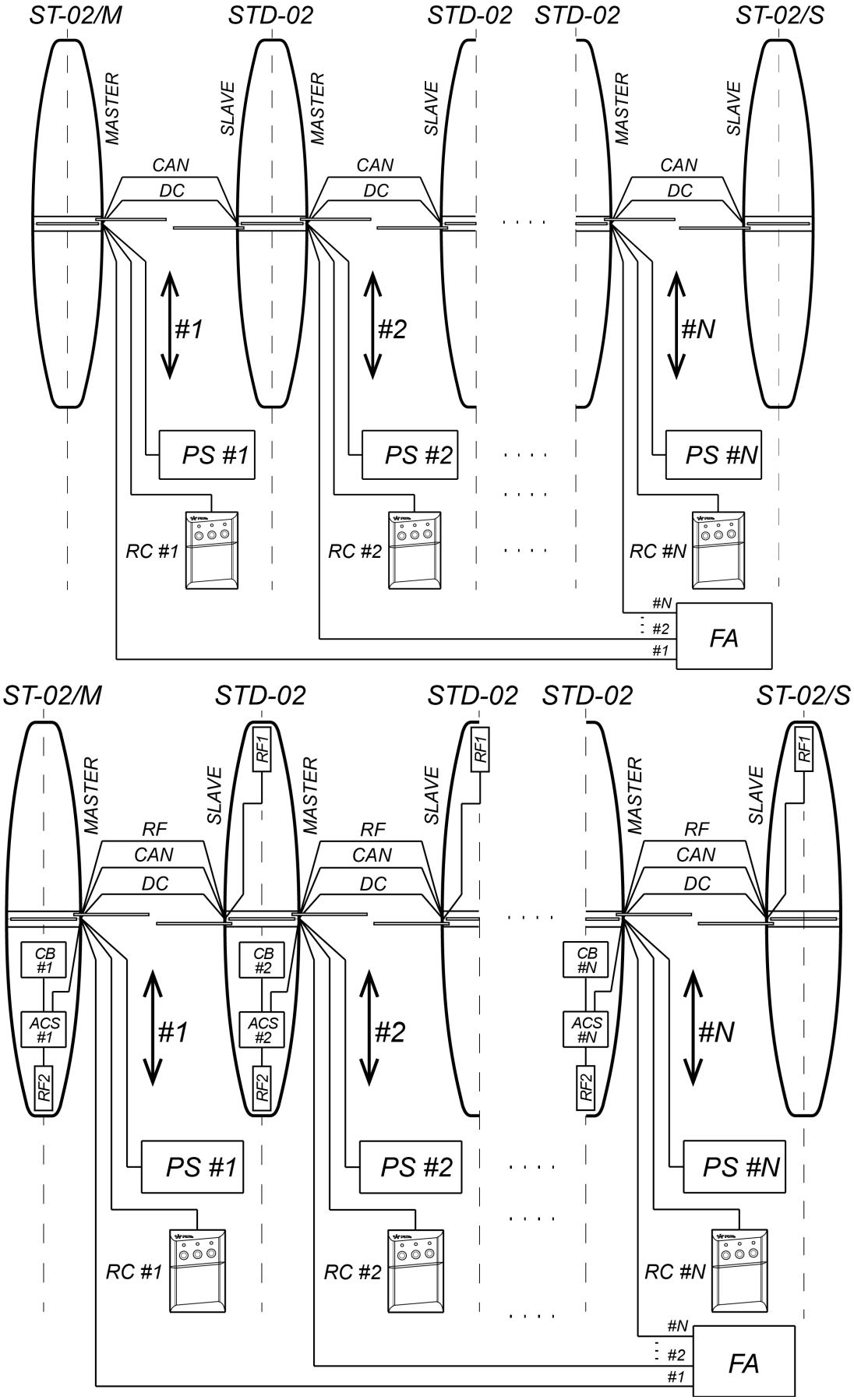
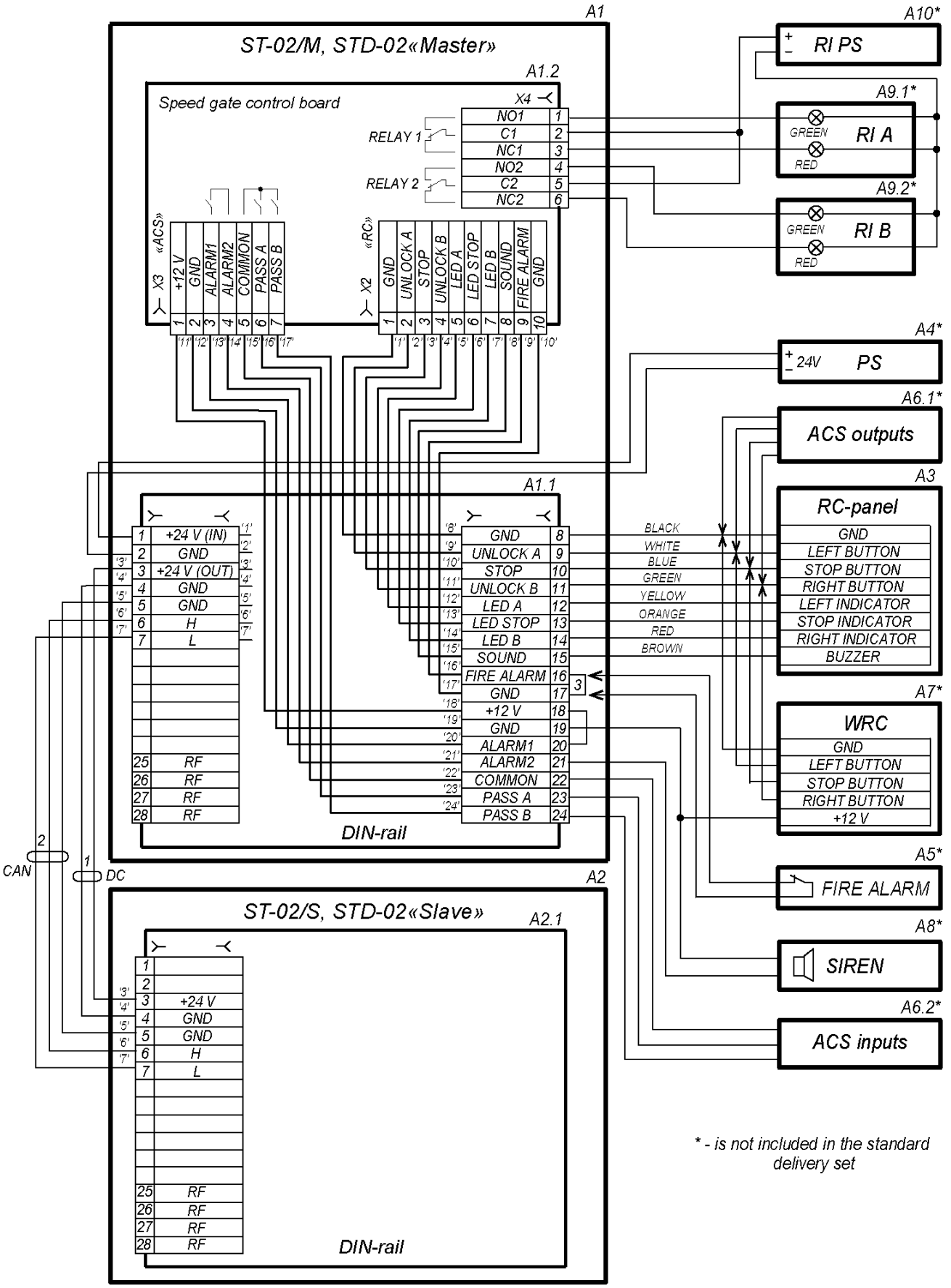


Figure 16. Connection layouts of the ST-02 Speed gate and STD-02 Double-sided sections for arrangement of a checkpoint with several (N) passage zones



Attention! The Slave section (side of the section) must be powered ONLY by the ST-01.771 board of the Master section with the use of standard DC cable No.1.

Standard CAN cable No.2 may be extended only to a maximum total length of 5 m; otherwise, correct operation of the product is not guaranteed!

Figure 17. Electrical connection layout of the speed gate

Table 4. List of the elements of the speed gate's electrical connection layout

Legend	Name	Quantity, pcs
A1	*Master* section (side of the section)	1
A1.1	Remote terminal block (DIN rail) of the *Master* section	1
A1.2	Control board	1
A2	*Slave* section (side of the section)	1
A2.1	Remote terminal block (DIN rail) of the *Slave* section	1
A3	RC panel	1
A4[1]	Speed gate's power supply unit	1
A5[1]	Device for sending the *FireAlarm* command	1
A6[1] (A6.1, A6.2)	ACS controller	1
A7[1]	WRC device	1
A8[1]	12V DC siren	1
A9.1[1], A9.2[1]	Remote indication block	2
A10[1]	Power supply unit for remote indicators	1
A11[1]	RF1 and RF2 access card readers	2
1	DC connection cable	1
2	CAN connection cable	1
3	Jumper wire in case there is no *FireAlarm* device installed (A5). Installed by default.	1

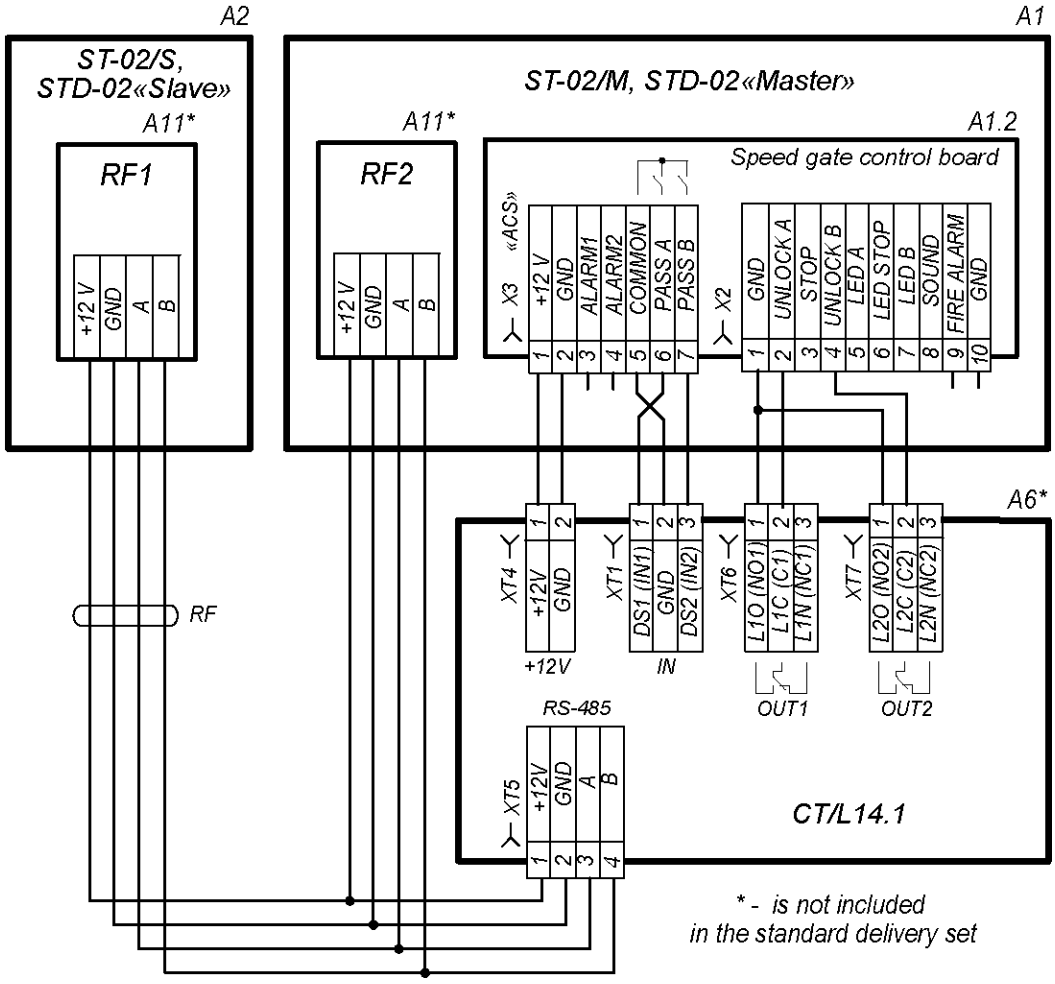


Figure 18. Example of connection of the CT/L14.1 ACS controller to the speed gate

[1] The equipment is not included in the standard delivery set.

8.7 Assembly and disassembly of speed gate parts and elements

Attention!

Parts of the speed gate housing are made of polished stainless steel and glass. Be careful and diligent; to prevent the parts from falling and being damaged, place them on an even and steady surface with the outside facing upwards, and protect them from scratches.

8.7.1 Removal and installation of the front end panel

Follow these steps to remove each of the two front end panels (7) of the section:

1. Slide the panel up along the front end side of the section in order to release it from the hooks (it is allowed to use a large flat screwdriver inserted into the slot at the bottom of the panel as a lever), then carefully move it away from the section (see Fig. 19) for about 10 cm. Be careful not to damage the connection cable!
2. Disconnect the cable connector from the front indication block board and remove the panel; put the panel on a flat surface with the outside facing upwards.

Front end panels are installed in reverse order; it is allowed to use a rubber mallet (only on the top edge!).

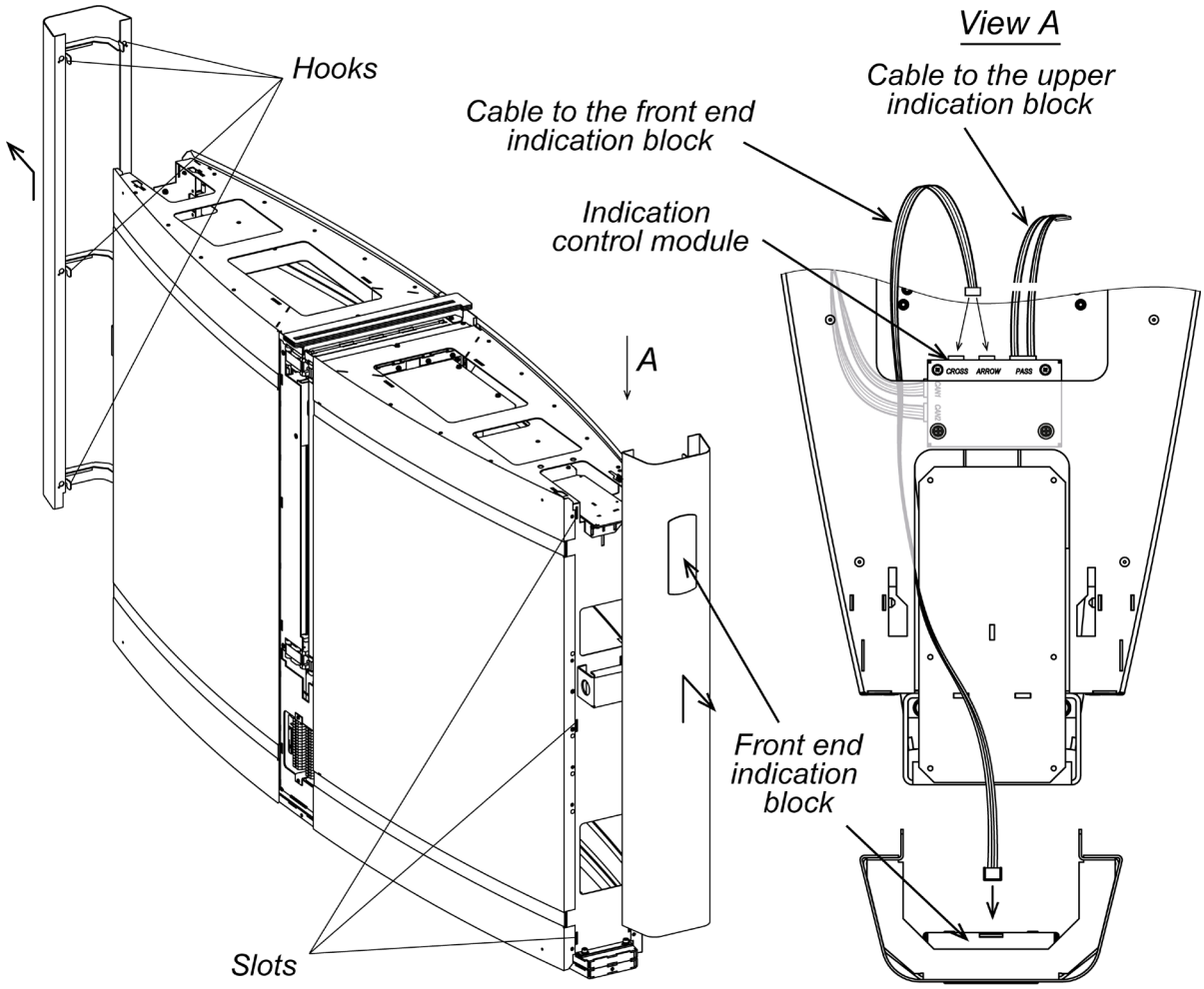


Figure 19. Removal of the front end panel

8.7.2 Removal of the section from its base

Follow these steps to remove the section from its base:

1. Unscrew four M8 screws all the way out with an SW4 Allen key (see Fig. 20).
2. Remove the section from its base. The section is heavy, so move it by using two crowbars inserted into special lugs on the front ends of the speed gate; the work must be done by four persons!
3. Place the section on a flat, steady surface.

The section is installed on its base in reverse order.

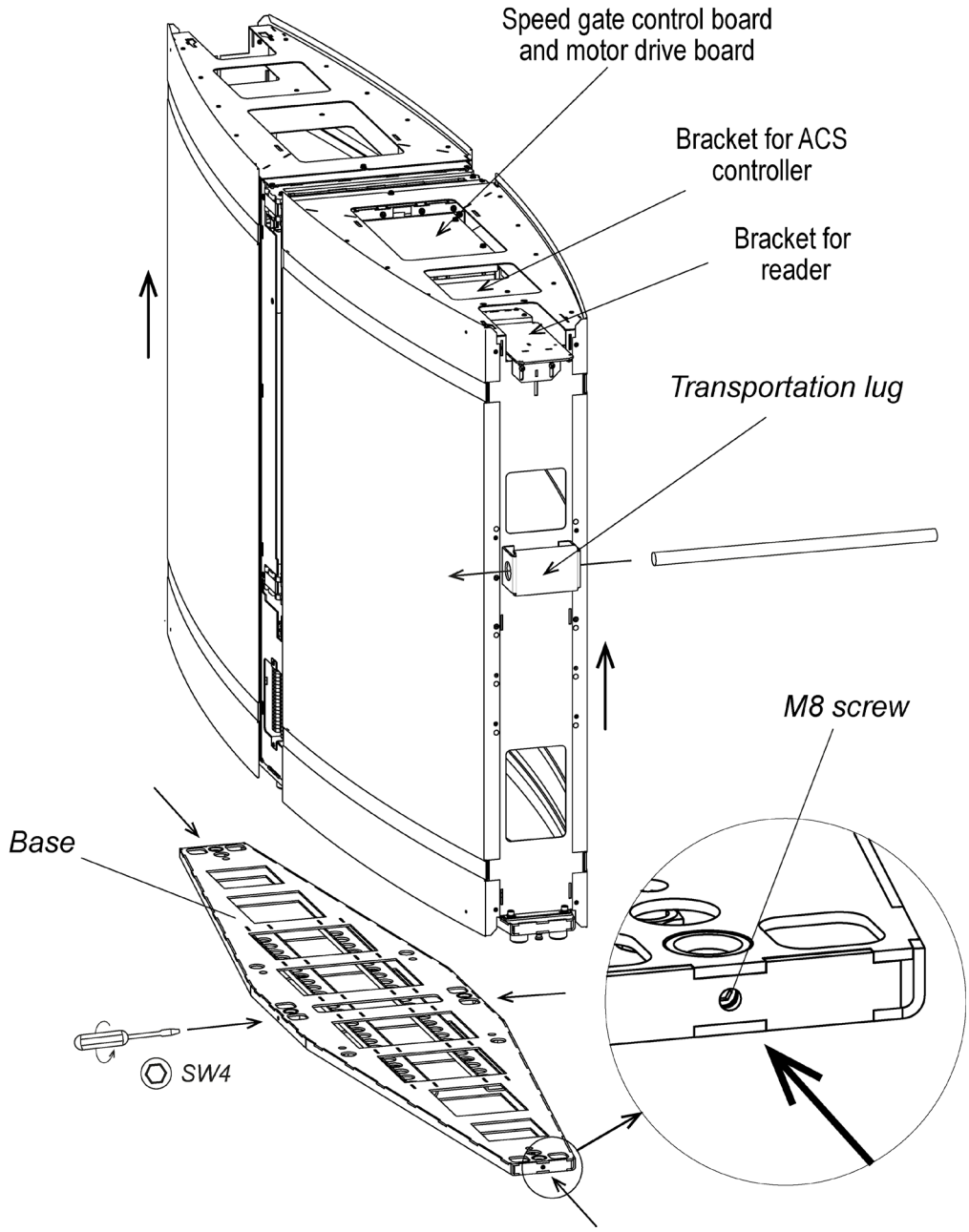


Figure 20. Removal of the section from its base

8.7.3 Removal and installation of the removable part of the section housing

It may be necessary to remove one of the two removable parts of the housing (or both parts simultaneously) in order to route the connection cables inside the speed gate housing (e.g., to the built-in controller or reader) (see Fig. 21). For this purpose, use an SW5 Allen key to unscrew two M6 screws, located at the bottom of the section front end; unscrew the M5 screw located on top of the center near the drive part of the speed gate with the use of a PH2 Phillips-head screwdriver, and then carefully pull the removable part of the section towards yourself along the longitudinal axis for 5-10 cm by the transportation lug in order to avoid damage of the speed gate's internal wiring. You will first need to disconnect the internal wiring connectors if it becomes necessary to extend the removable part of the housing to a greater distance.

Connect the internal wiring connectors after you have laid the connection cables, then slide (with a jerk) the removable part of the housing into place, and tighten the fixing screws. Be careful not to damage the connection cables and internal wiring!

Adjusting plates can be installed between the removable part of the housing and the base; they are fixed with M6 screws (Fig. 21) and designed to align the gaps between the side panels of the speed gate (Sect. 8.7.7). If the gaps need to be adjusted additionally, extra plates can be removed or, on the contrary, added (extra plates are included in the standard delivery set).

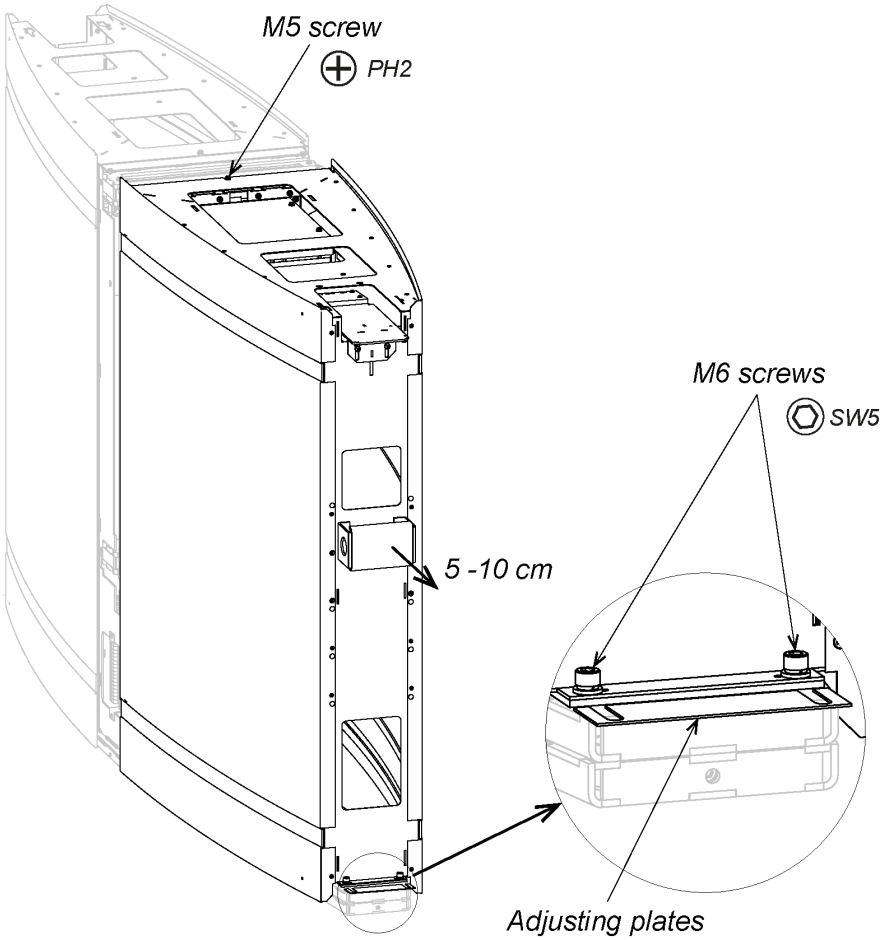


Figure 21. Removable part of the speed gate housing

8.7.4 Installation and removal of the central insert

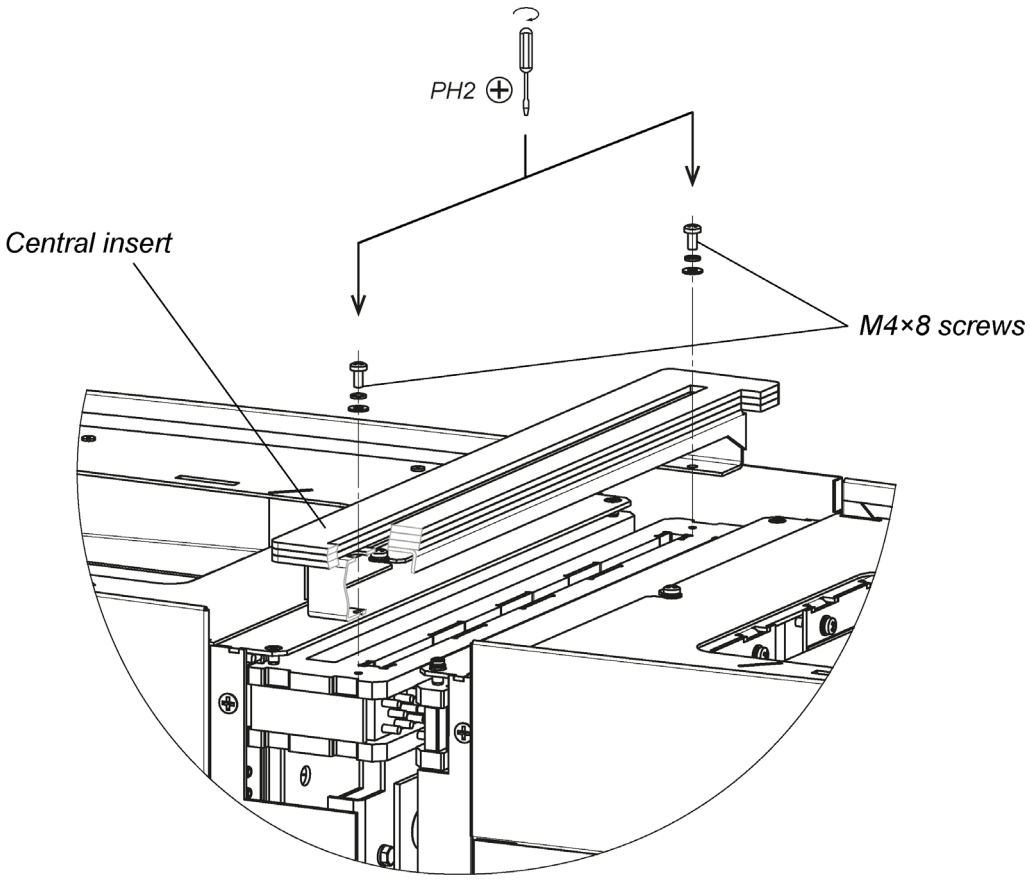


Figure 22. Installation of the central insert

Follow these steps in order to mount the central insert:

1. Take the central insert from the delivery set, and mount it into place, making sure that its grooves are positioned in accordance with the location of the sliding panels.
2. Screw in two M4×8 screws with washers (see Fig. 22) using a PH2 Phillips-head screwdriver (the screws are installed by default).

The central insert is removed in reverse order.

8.7.5 Installation and removal of filling glass

Attention!

In order to avoid injuries, **ensure** to disconnect the speed gate from the main and standby power before carrying out the works!

Follow these steps to install the filling glass:

1. Loosen two M5 glass-fixing screws that are located under the central insert (4) on each side by using an S8 horn-type wrench (see Fig. 23).
2. Carefully install the filling glass with the side featuring curly cutouts on the sides into the gap that is located in the center of the central insert down all the way in.
3. Check that the glass is installed upright and align it if necessary. Tighten the fixing screws.

The filling glass is removed in reverse order.

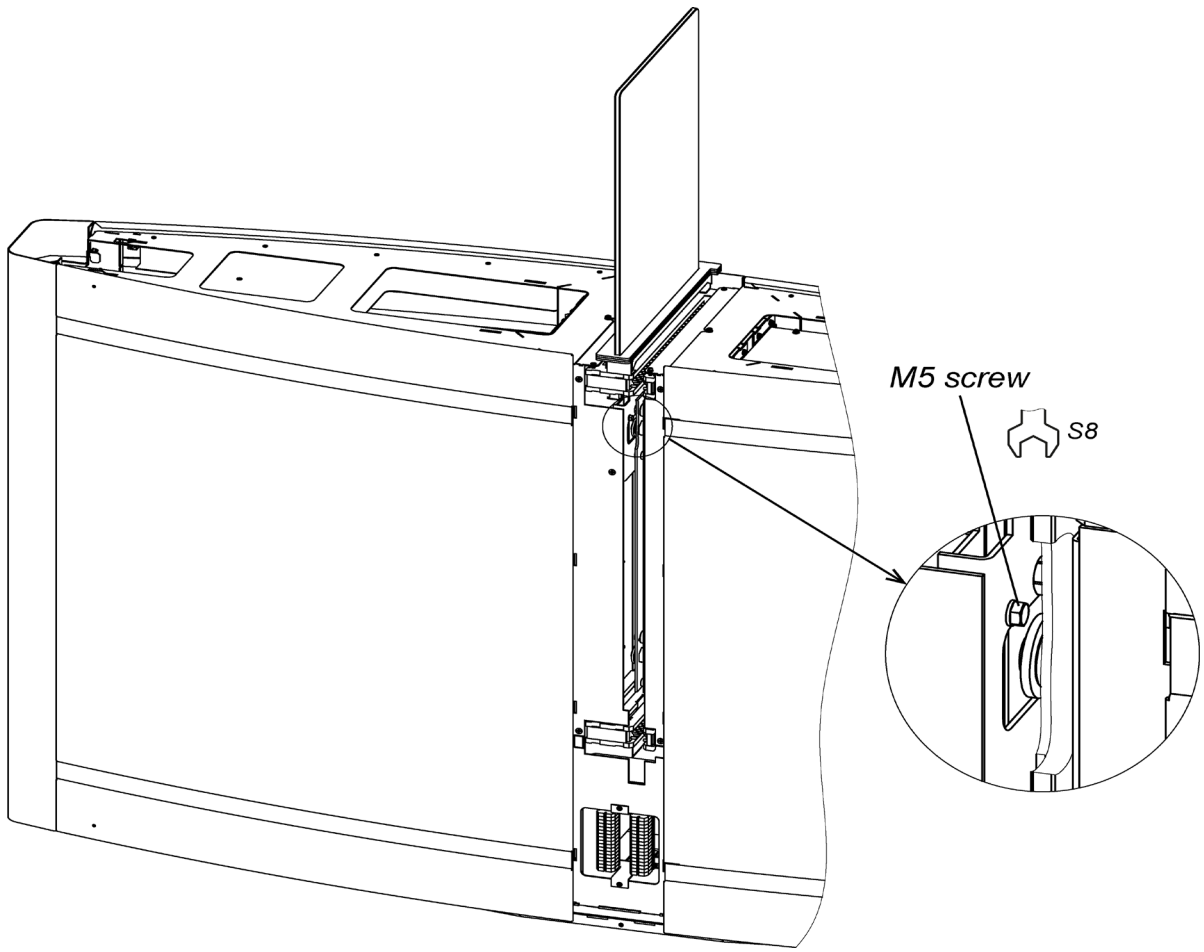


Figure 23. Removal of filling glass

8.7.6 Installation and removal of the sliding panel

Attention!

Be careful! When you turn on the power of the speed gate, the sliding panels' motor drive is automatically activated; thus, in order to avoid injuries, make sure that there are no tools, fingers, clothing items, as well as other foreign objects left therein before the power-up!

Follow these steps to install the sliding panel (2) on the speed gate section:

1. Apply power to the speed gate and wait for a few seconds. The motor drive will operate according to the calibration algorithm and move the sliding panel's mounting bracket to the position closest to the exit point from the section housing.

   It is also possible to tighten the bracket by using a long screwdriver or other suitable tool through the upper gap between the central insert and the housing without powering the speed gate up.
2. Loosen four M8 bolts on the top and bottom of the two fastenings of the sliding panel by using an S13 horn-type wrench (see Fig. 24).
3. Holding the mounting bracket near the exit point from the housing, take the sliding panel (the work must be done by two persons!) and gently slide it with the side slots into the gap in the section housing. Insert the sliding panel with two large shaped slots in the corresponding fastenings by moving it forward and down.
4. Adjust the vertical position of the sliding panel and tighten the mounting bolts.
5. Switch the speed gate off.

The sliding panel is removed in reverse order.

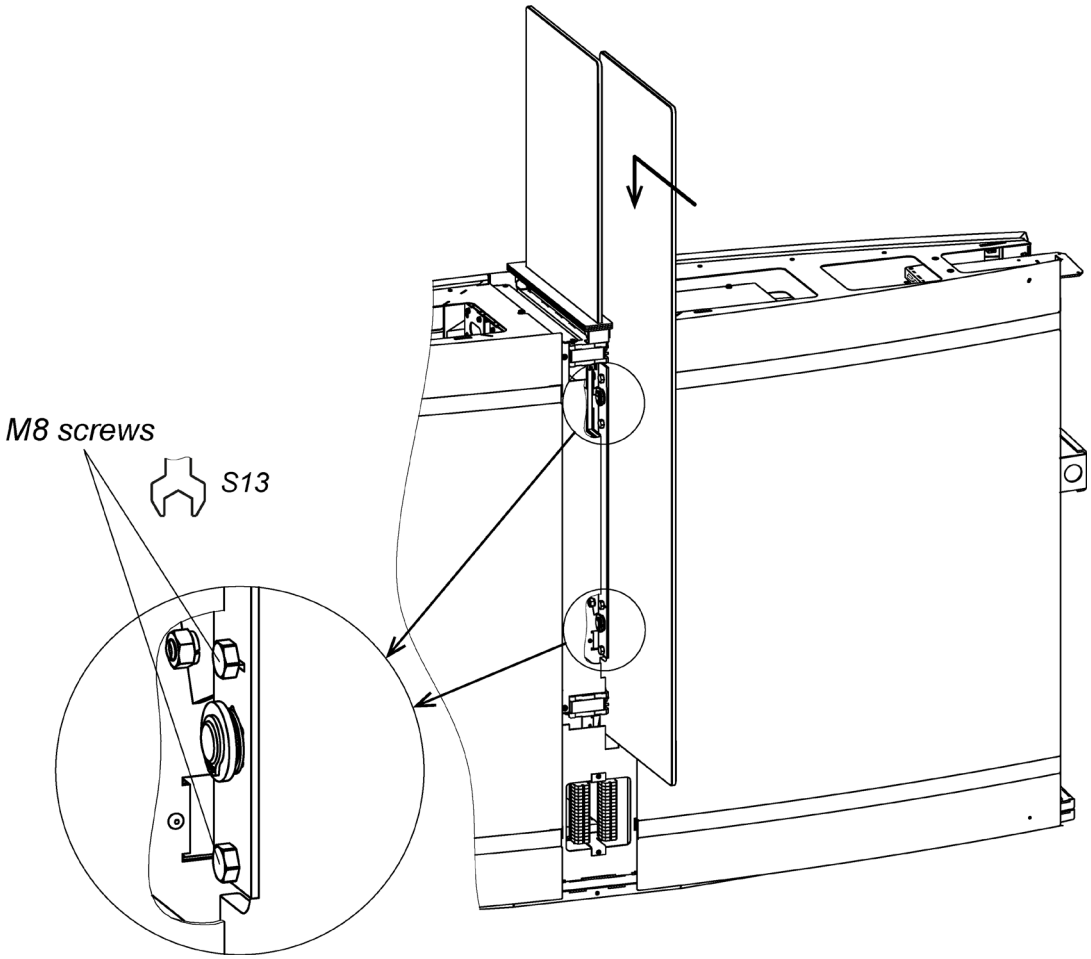


Figure 24. Installation of the sliding panel

8.7.7 Installation and removal of side panels

There are two types of side panels of the speed gate, namely, external (fixed on the sections on the outside of the speed gate) and inner ones (fixed on the sections from the passageway side). Inner side panels, unlike external ones, have cutouts for the sliding panels. Both side panels of the ***STD-02*** Double-sided section are inner.

The side panels are fixed to the sections by means of spring hooks; the inner panel is additionally fixed to the housing from above by two M3×8 screws with washers (installed by default in the required place, see Fig. 25). Align the spring hooks on the panel into the corresponding slots of the section housing and carefully mount the panel into its location until it stops. Check the entire perimeter of the panel to make sure the hooks are fully seated in the slots.

After installing the panels, check the evenness of the gaps between them and the speed gate housing; if necessary, the gaps can be regulated with adjusting plates (see Section 8.7.3).

The side panels are removed in reverse order.

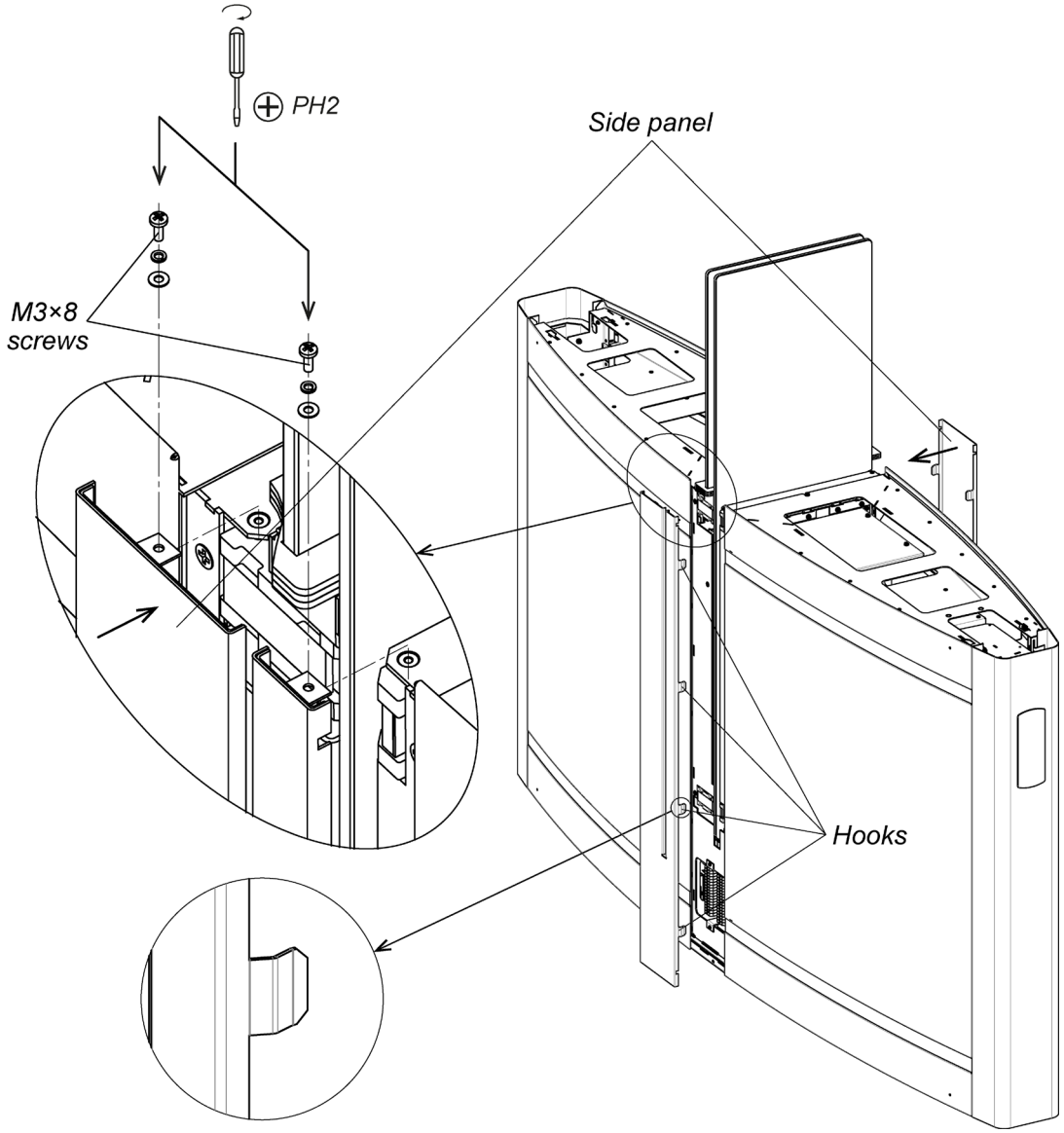


Figure 25. Installation of the side panels

8.7.8 Installation and removal of glass top covers of sections

The top of the section housing is covered with two glass top covers (4). Follow these steps in order to install each cover:

1. Unscrew two M6×16 set screws all the way out by using an SW3 Allen key through the holes on top of one of the section front ends (see Fig. 26).
2. Take the glass top cover of the section, place it on top of the section front end, pull it out a few millimeters from the central insert towards yourself so that the hooks at the bottom of the cover get into the corresponding slots in the speed gate housing, and gently slide it into place until it stops.

Note:

Covers with the upper indication block must be installed on the side of the section with the indication control module; prior to this, the appropriate connection cable needs to be connected from the indication control module to the upper indication block, see Fig. 19, 26.

3. Tighten the set screws up to the stop.

Glass top covers of the sections are removed in reverse order.

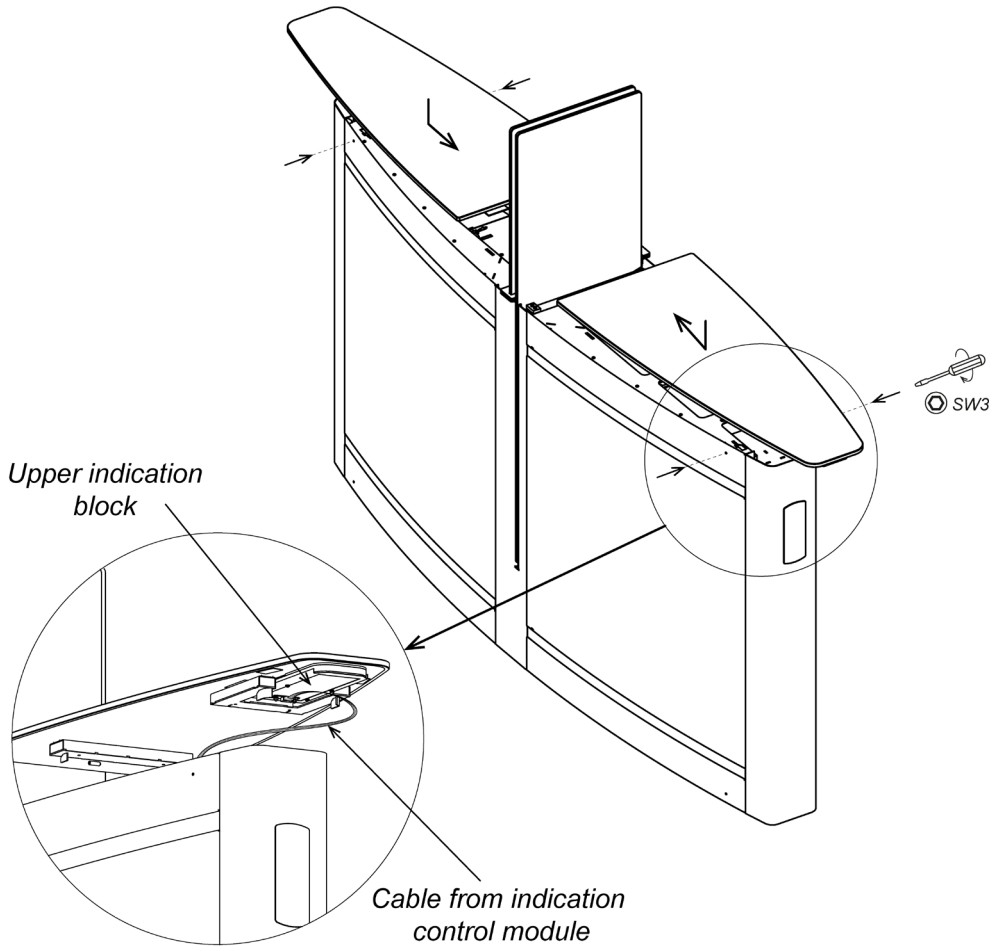


Figure 26. Installation of the glass top cover of the section

Attention!

During long-term and intensive operation of the speed gate with built-in card readers, scratches and scuff marks can appear on the glass surface of its top covers either due to presentation of access cards (as well as contact with wallets, bags, wristbands, watches, rings, sand, etc.) or due to cleaning agents with abrasive particles.

Such damage is not a warranty case.

In order to prevent or remove such damage, the manufacturer has provided self-adhesive rubber pads for card presentation areas as part of the speed gate delivery set (see Fig. 27). Moreover, the customer can avail themselves of the services of special companies dealing with professional glass polishing or purchase new covers for replacement from PERCo.

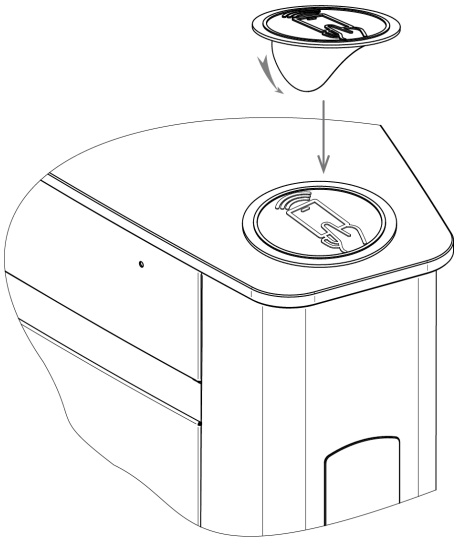


Figure 27. Gluing a rubber pad on the glass top cover

8.7.9 Passageway width reduction for the *STD-02.900* section

Design of the ***STD-02.900*** Double-sided section allows you to reduce the outreach distance of the sliding panel from the housing to 280 mm in order to arrange a 600 mm wide passage zone on one side.

To do this, the sliding panel outreach limiter needs to be mounted in the following manner:

1. Turn off the power of the speed gate.
2. Install two special stops from the delivery set on the section housing and secure each with three M4×8 screws (see Fig. 28).
3. Install a jumper from the delivery set on the ***XP3 Mode*** connector of the motor drive board for this sliding panel (see Fig. 29).

Note:

The sliding panel's motor drive board is located under the glass top cover of the speed gate, on the right side of the sliding panel and inside the opening of the section housing, see Fig. 20 (together with the control board for the *Master* side).

4. Turn on and check the operation of the speed gate for each of the passage zones separately.

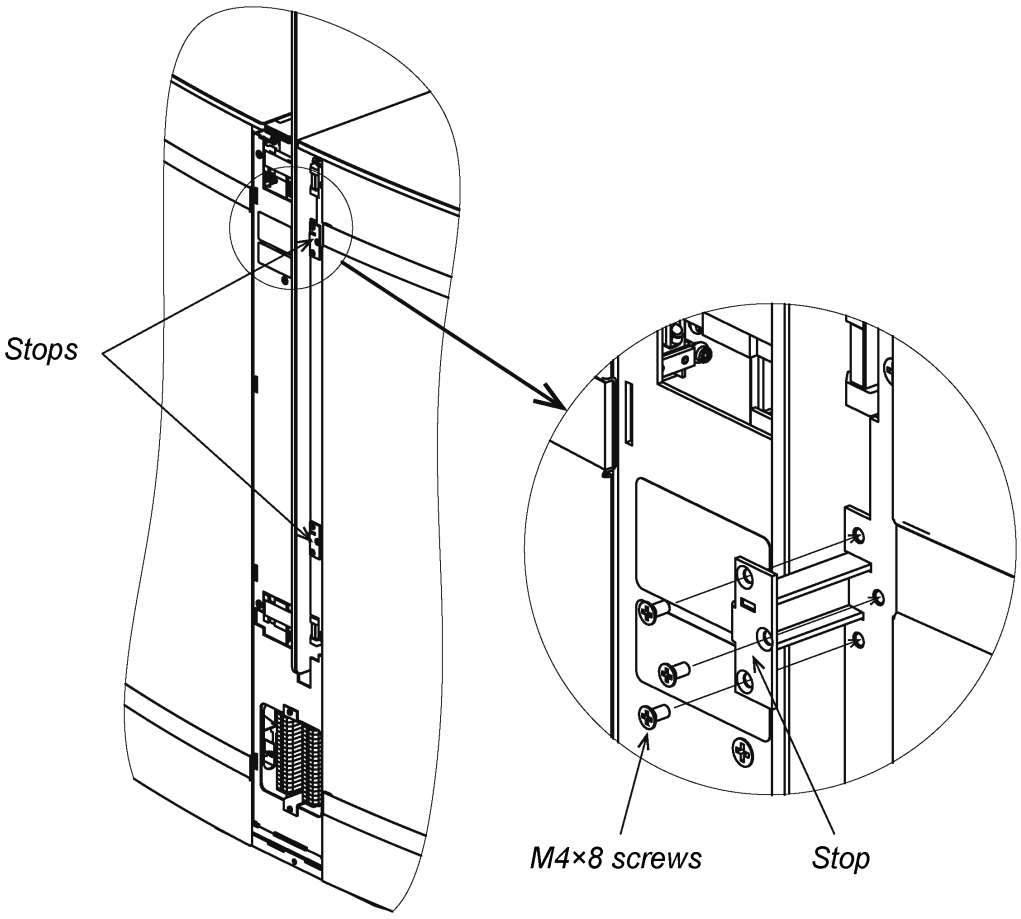


Figure 28. Installation of stops of the sliding panel outreach limiter

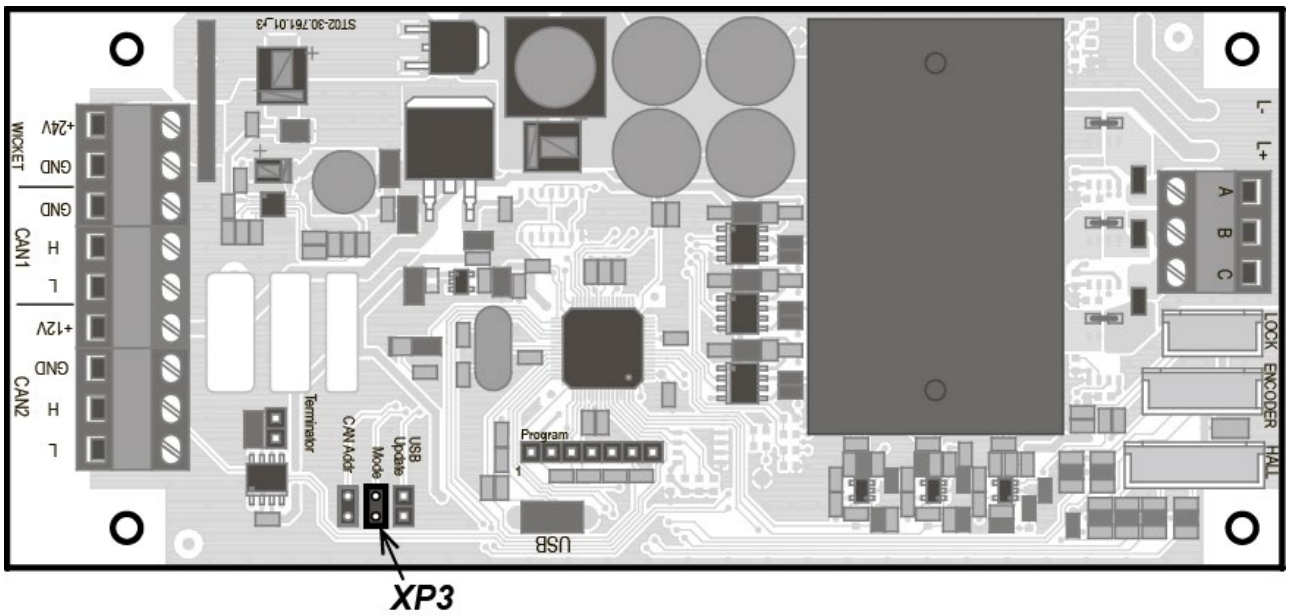


Figure 29. Motor drive board

9 OPERATION

When operating the speed gate, comply with safety measures in accordance with Sect. 7.2.

Attention!

- Do not move any objects with the size exceeding the passageway width through the passage zone.
- Do not jerk and hit any elements of the speed gate.
- Do not dismantle or adjust mechanisms ensuring the speed gate operation.

Recommendations for cleaning and maintenance of stainless steel:

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

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

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

9.1 Power-up

Attention!

Before powering the speed gate up, make sure that the passage zone is free, and nothing prevents the sliding panels from closing.

Follow these steps to power up the speed gate:

1. Connect the speed gate's power supply unit via its mains cable to the mains socket with the voltage and frequency specified in the certificate for the power supply unit.
2. Switch on the power supply unit of the speed gate. The speed gate's sliding panels are automatically brought to the initial position.
3. The *Passage denial* command is sent automatically in pulse control mode, and the *Both directions closed* command in potential control mode (see Table 5 and Table 6). The speed gate is ready for operation.

9.2 Pulse control mode

Speed gate control commands are sent from the RC panel and indicated on the speed gate's sections in accordance with Table 5. Passage directions are independent of each other, i.e. a command sent for one direction does not change the state of the opposite passage direction.

The RC panel buttons and light indicators are shown in Fig. 5. Please note the following:

- After sending the *Single passage in the set direction* command, speed gate intrusion detectors track the presence of a user in the passageway. After completing the passage, the speed gate automatically switches to the *Passage denial* state.
- After sending the *Single passage in the set direction* command, if the passage has not been performed or if no other command has been sent, then the speed gate will automatically switch to the *Passage denial* mode upon expiry of the **Unlocked state holding time** (8 seconds by default).
- After sending the *Single passage in the set direction* command, if the passage has not been performed yet, the same command can be sent repeatedly for this direction, and the **Unlocked state holding time** countdown starts again.
- After sending the *Single passage in the set direction* command, the *Free passage* command cannot be sent for the other direction and will be ignored.
- After sending the *Free passage in the set direction* command, only the *Passage denial* or *Single passage in the set direction* command can be sent for the opposite direction, and all other commands will be ignored.

Table 5. Pulse control mode (*Pulse* switch is *ON*)

Command	RC-panel operator actions[1]	Indication		Speed gate status	
		RC panel	Indication blocks of top covers	Normally closed mode	Normally open mode
Passage denial	Press the **STOP** button	The red *Stop* indicator is on	Red cross for both directions	The sliding panels are closed	The sliding panels are open; they close upon a passage attempt
Single passage in the set direction	Press the **LEFT** or **RIGHT** button	The red *Stop* indicator and the green *Left* or *Right* indicator for the set direction are on	Green arrow for the set direction, red cross for the other direction	The sliding panels open for a single passage in the selected direction and close after the passage	The sliding panels are open for a single passage in the selected direction and remain open after the passage
Free passage in the set direction	Press two buttons simultaneously: **STOP** and **LEFT** or **STOP** and **RIGHT**	The green *Left* or *Right* indicator for the set direction is on	Green arrow for the set direction, red cross for the other direction	The sliding panels are open for free passage in the selected direction until a new command is sent	
Free passage	Press all three buttons simultaneously: **LEFT**, **RIGHT**, and **STOP**	Two green indicators*, Left* and *Right,* are on at the same time	Green arrow for both directions	The sliding panels are open for free passage in both directions until a new command is sent	

[1] Control of the speed gate via the WRC device is similar to its control via the RC panel. Buttons on the radio fob of the WRC device implement the same functions as the RC-panel buttons.

9.3 Potential control mode

Speed gate control commands are sent and indicated in accordance with Table 6. Passage directions are independent of each other, i.e. a command sent for one direction does not change the state of the opposite passage direction.

Table 6. Potential control mode (*Pulse* switch is *OFF*)

Commands	Required to ensure	Indication		Speed gate status	
		RC panel	Indication blocks of the top covers	Normally closed mode	Normally open mode
Both directions closed	High level on the *Unlock A* and *Unlock B* contacts (or low level on the *Stop* contact)	The red *Stop* indicator is on	Red cross for both directions	The sliding panels are closed	The sliding panels are open; they close upon a passage attempt
Direction open	Low level on the contact of the selected direction. High level on all other contacts.	The green *Left* or *Right* indicator for the set direction is on	Green arrow for the set direction, red cross for the other direction	The sliding panels are open for passage in the selected direction	
Both directions open	Low level on the *Unlock A* and *Unlock B* contacts. High level on the *Stop* contact	Two green indicators, *Left* and *Right*, are on simultaneously	Green arrow for both directions	The sliding panels are open for passage in both directions	

9.4 Emergency response

9.4.1 *Emergency* mode

If there is any obstacle to free closing of the speed gate's sliding panels, the speed gate will automatically switch to the *Emergency* mode. The mode is required to avoid motor drive failure caused by overheating.

In case if an obstacle prevents the sliding panels from closing, three attempts to close the sliding panels will be made with an interval of 3 seconds. If the obstacle is not removed after this, then the speed gate will switch to the *Emergency* mode. In the *Emergency* mode, the speed gate's sliding panels can be moved apart manually, which allows you to easily remove the obstacle from the passage zone. In this case, all three light indicators of the RC panel are flashing, and a continuous audio signal is sounding.

The *Emergency* mode will be switched off automatically after the obstacle is removed, and the passage zone of the speed gate is cleared.

9.4.2 *Fire Alarm mode*

In case of dangerous situations in the territory of the facility, the passage zone of the speed gate can be used as an additional emergency exit.

It is possible to switch the speed gate to the *Fire Alarm* mode via an emergency passage unblocking device (fire alarm device, emergency buttons, etc.). In this mode, if the speed gate sliding panels have been closed, then they will open and remain in this state in all operation modes for free passage in both directions; in addition, green passage permission indicators of the indication blocks switch on in the flashing mode simultaneously in both directions; control commands from other devices and software are ignored (see Sect. 5.3.2).

In addition, the sliding panels of the speed gate can be moved apart manually (they are not locked) in case of power disconnection (failure).

Attention!

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

10 MAINTENANCE

Maintenance of the speed gate is carried out only by the manufacturer.

Attention!

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

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

It is recommended to use liquid non-abrasive cleaners that contain ammonia to clean the sliding panels from dirt.

11 TRANSPORTATION AND STORAGE

The speed gate may be stored in dry indoor facilities at an ambient air temperature from -40°C to +50°C and relative air humidity of up to 80% at +15°C. The storage premises must be free of acid and alkali vapors as well as corrosive gases.

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

It is not allowed to stack boxes during transportation and storage.

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

Appendix 1. Command transmission algorithm in pulse control mode

Passage denial (locked for entry and exit) – active front at the *Stop* contact while there is a high level at the *Unlock A* and *Unlock B* contacts. Both directions are blocked upon receiving this command.

Single passage in direction A (open for passage of one person in direction A) – active front at the *Unlock A* contact while there is a high level at the *Stop* and *Unlock B* contacts. This command opens the A direction either for 8 seconds, or until the passage is made in this direction, or until the *Passage denial* command, and the B direction remains unchanged. The command is ignored if the A direction is in the *Free passage* mode at the time of its receipt.

Single passage in direction B (open for passage of one person in direction B) – active front at the *Unlock B* contact and a high level at the *Stop* and *Unlock A* contacts. This command opens the B direction either for 8 seconds, or until completion of the passage in this direction, or until the *Passage denial* command, and the A direction remains unchanged. The command is ignored if the B direction is in the *Free passage* mode at the time of its receipt.

Free passage in direction A (open for free passage in direction A) – active front at the *Unlock A* contact while there is a low level at the *Stop* contact and a high level at the *Unlock B* contact, or active front is at the *Stop* contact while a low level is at *Unlock A* and a high level at *Unlock B.* This command opens the A direction until the *Passage denial* command, and the B direction remains unchanged.

Free passage in direction B (open for free passage in direction B) – active front at the *Unlock B* contact while there is a low level at the *Stop* contact and a high level at the *Unlock A* contact, or active front is at the *Stop* contact while a low level is at *Unlock B* and high level at *Unlock A*. This command opens the B direction until the *Passage denial* command, and the A direction remains unchanged.

Free passage (open for free passage in both directions) – active front is at the *Unlock A* contact while there is a low level at the *Unlock B* and *Stop* contacts, or active front is at the *Unlock B* contact while there is a low level at the *Unlock A* and *Stop* contacts, or active front is at the *Stop* contact while a low level is at the *Unlock A* and *Unlock B* contacts. This command opens both directions until the *Passage denial* command is received.

Appendix 2. Command transmission algorithm in potential control mode

Both directions closed (locked for entry and exit) – high level at the *Unlock A* and *Unlock B* contacts or a low level at the *Stop* contact. Both directions close upon receiving this command.

Direction A is open (open for passage in the A direction) – low level at the *Unlock A* contact while there is a high level at the *Stop* and *Unlock B* contacts. This command opens the A direction until a low-level signal is removed from the A contact, or until the *Both directions are closed* command is received, and the B direction remains unchanged.

Direction B is open (open for passage in the B direction) – low level at the *Unlock B* contact while there is a high level at the *Stop* and *Unlock A* contacts. This command opens the B direction until a low-level signal is removed from the B contact, or until the *Both directions are closed* command is received, and the A direction remains unchanged.

Both directions are open (open for passage in both directions) – low level at the *Unlock A* and *Unlock B* contacts while there is a high level at the *Stop* contact. This command opens both directions until a low-level signal is removed from one of the A (B) contacts, or until the *Both directions are closed* command is received.

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