CONTROL DEVICE SLIDETRONIC HD

to control gravity self-closing fire gates

Producer: **Somati system s.r.o.**
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Manual for version 1.1

Content

1. POWER SUPPLY

Voltage system:	1 x 230 V, 50Hz, TN-S
Operating voltage:	24 VDC
Protection:	IP 54

Protection against electric shock is made according to ČSN 33 2000-4-41 by automatic disconnection of defective part from power supply and complementary connection.

Output performance parameters

Output brake max.	24 V/1 A (together with warning light max. 1,2A)
Output warning lights max.	24 V/1 A (together with brake max. 1,2A)
Output detectors	24 V (balanced loop 4,7 kΩ +/-20%)
Output relay	60V (AC/DC), 1A individually, in total max. 5A

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2. CONFIGURATION

Control device Slidetronic HD is primarily designed to control gravity self-closing fire gates produced by company Somati system s.r.o., especially for applications where additional safety devices or additional functions are required, such as when combined with conveyor systems. The control is also used when required higher output performance load, especially in case of hydraulic control of vertically sliding fire gates, where there is a higher magnet/ valve take-off.

Power supply of control circuits can be backed up by batteries - in additional accessories it is battery module FS, which enables to keep the gate in open position even during power failure. Batteries also secure power supply of all additional safety devices during gravitational closing after power failure. In case battery module is not connected, gravitational closing starts immediately after power failure. In case of connected battery module, gravitational closing starts if the power supply is not restored and battery voltage drops below the limit 24,5 V.

Operating panel and other equipment is placed inside the control box Slidetronic HD. And device wiring diagram is included in drawing documentation. Control box Slidetronic HD is supplied in two dimensional versions:

- Slidetronic HD Big in dims.: 230 x 300 x 130 mm (W x H x D) and weight 1,7 kg.
- Slidetronic HD Small in dims.: 250 x 200 x 100 mm (W x H x D) and weight 1,5 kg

Inputs and outputs of power and control circuits are led through PG grommets, which are standardly supplied non-slotted (packed inside the control box: 1pc PG 13,5 and 2pcs PG 9).

The battery module dimensions are 200 x 250 x 100 mm (W x H x D), weight 6 kg. Slidetronic HD is connected to the main switchboard by connection cable secured with auto fuse F 20 A.

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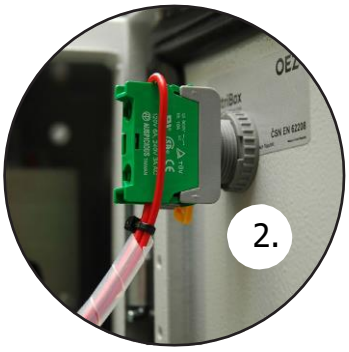
3. INSTALLATION AND SETTING

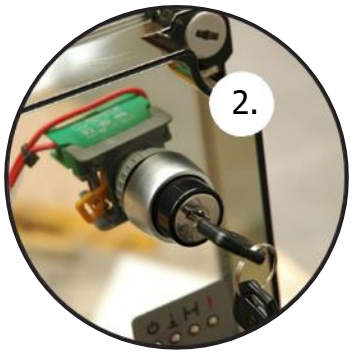
Before being put into service for the first time, connect only:

1. **Connect basic functional peripherals**.

   - **brake /magnet power supply** - terminal block X1 terminal „4" (0V), terminal „8" (+24V).
   - **Power cable** – terminal block X1 terminals L1, N, PE
   - **Limit switch position closed** (X1:5 a X1:9) NC contact. Originally supplied with a connector.
   - **Connect terminals FAS** (X2:+ and X2:10) NC contact (in case the contact is disconnected, gate is constantly closing by gravity). Originally supplied with a connector "fire contact".
   - **Connect terminals of lower safety sensor or connect safety device** (X2:+ a X2:2) NC contact (in case the contact is disconnected, gate closes only by holding permanently "totman"). Originally supplied with a connector.
   - **Other selected accessories (for details see point 4.)**

2. **Install key switch**. If part of the accessories. For transport delivered in disassembled state. (if the key switch is not delivered, there are terminals X2:+/12 with connector)





3. **If battery module is part of the delivery,** connect batteries to the control, battery is delivered in disconnected state – one battery connector is disconnected – connector is insulated with a cover, which has to be removed.

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4. CONNECTION OF OTHER EXTERNAL DEVICES

Control box Slidetronic HD is standardly equipped with keyboard buttons "START-STOP" and "DETECTOR RESET". By the "START-STOP" buttons the gate can be operated in "Dead Man" mode. For automatic operation (one-press start) downwards, it is necessary to connect terminals X2:+ and X2:2 (lower safety sensor) with a connector or a safety device.

Optical safety edge OSE on terminals X2:G and X2:W and X2:B. If the photocell is disconnected during closing (or if the OSE or contact edge is activated), the gate stops and attempts to close again after the set delay (see parameter options „4" and „5").

In case the „lower safety sensor" is permanently disconnected (or if the OSE or contact edge is activated), the gate can be closed in "Dead Man" mode.

It is also possible to connect safety contact edge of the system with closed loop under resistance (8,2 kΩ). The function is the same as for OSE and the "lower safety sensor". If the contact edge is not connected, terminals X2:39 and X2:40 has to be connected to the resistance 8,2kΩ. Without the resistance the automatic operation does not work.

The gate can be closed with a single button on the impulse controller (X2:7). When the button is pressed, the gate closes to its end position or stops after another press of the button (the function is the same as of the keyboard button "START-STOP").

When FAS (fire alarm system) is activated – contact between X2:+ and X2:10 is disconnected and gate is in alarm mode = the gate immediately closes by gravity (if there is not set a closing time for delayed closing – pre-flash).

During power failure the gate immediately starts closing, in case battery module is not connected. If the battery module is connected (terminals X3:B+ and X3:B-), the gate remains in open position according to the setting of parameter „8". If the parameter „8" is set on value „-", it is influenced by the battery capacity and the gate remains in its position for as long as the voltage on the battery backup does not drop below the limit 24,5 V (the period depends on the battery condition and charge), after the voltage drops below the limit then the gate closes into the lower end position like in alarm mode.

During the alarm closing, the gate can be stopped with the "STOP" button. The gate is stopped as long as the button is held. The "lower safety sensor" or the optical safety edge OSE stops the closing for a period according to the setting of additional parameters. (see parameter setting „Initial and other stopping time in alarm")

Function of audio and visual warning (Pre-flash) causes that during the set time on parameter „2" and „3, before the gate moves, the warning starts functioning (flash and siren = warning light). When using the function "Pre-flash" and "Dead Man" it is necessary to permanently hold the button "START-STOP" pressed and wait until the end of the set pre-flashing time, before the gate starts moving to the required position.

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IF SAFETY DEVICES (FUSES) IN CONTROL BOX ARE BLOWN, IT IS POSSIBLE TO TURN THEM ON ONLY ONCE – IF THEY ARE BLOWN ONCE MORE, IT IS NOT PERMITTED TO TURN THEM ON AGAIN.

IF THE PROCEDURE STATED IN THE TECHNICAL DOCUMENTATION IS NOT RESPECTED, IT MAY LEAD TO THE LOSS OF WARRANTY.

IN THE EVENT OF MALFUNCTION, FIRST IT IS NECESSARY TO DETECT POSSIBLE CAUSE OF THE MALFUNCTION AND REPAIR IT. AFTER THE MALFUNCTION IS REPAIRED, IT IS POSSIBLE TO TURN ON THE BLOWN FUSE AGAIN.

IT IS FORBIDDEN TO MANIPULATE WITH CIRCUITS OF THE CONTROL BOX AND CHANGE THEIR CONNECTIONS. IN THE EVENT OF FAILURE TO COMPLY WITH THIS CONDITION, IT IS NOT POSSIBLE TO APPLY WARRANTY ON THE CONTROL BOX.

CONTROL BOX CANNOT BE OPENED BY A PERSON WITHOUT APPROPRIATE TRAINING AND QUALIFICATION ACCORDING TO THE DECREE No. 50/1978, §6.

Operating temperature of the control box SLIDETRONIC HD is from +10° C to +35° C. If the temperature of environment drops below +10° C or gets over +35° C the control box cannot be in operation! When temperature gets over
+25° C or below +15°C it leads to shortening of the battery life.

In exceptional cases the control box SLIDETRONIC HD can be operated at lower temperatures (minimum operating temperature is -5° C), but the connection of input power supply has to be **permanently** provided to secure minimum heating of control circuits.

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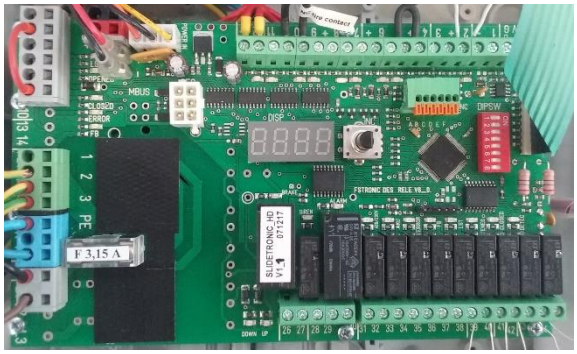
5. DESCRIPTION OF CONTROL AND TERMINAL BLOCKS

5.1. DIP switch

5.1.1. Description of DIP switch functions



DIP1 – activation of lower safety sensor on the indication LED.
DIP2 – without function
DIP3 – without function
DIP4 – without function
DIP5 – selects if the lock on the control panel only locks the panel buttons (Open /Close) or it also locks the external input 7 on the terminal block X2.
DIP6 – without function
DIP7 – without function
DIP8 – activation of safety edge OSE. In case safety edge OSE is not connected, it is necessary to cancel its signalization on the panel. If OSE is connected, then we have to activate its function.

Description of DIP SWITCH functions

position		**OFF**	**ON**
1	Lower safety sensor	ON	OFF
2	Without function		
3	Without function		
4	Without function		
5	Locking of external input 7	OFF	ON
6	Without function		
7	Without function		
8	Activation of OSE	OFF	ON

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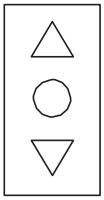
5.2. Description of functions on the control panel

a) buttons

- START-STOP = closing of gate
- RESET = detector reset
- START-STOP = closing of gate



b) key switch – lock

- lock of the control on the panel in position 0 = buttons "Open" and "Close" are blocked "

c) LED keyboard

LED ⏻ (green LED) = ON / OFF
Is ON, if the key switch is turned on, it flashes slowly during movement, when the pre-flashing countdown starts, it flashes quickly.

LED ⤓ (red LED) = OSE
Standardly is OFF, flashes when OSE is activated.

LED |↔| (yellow LED) = safety sensor
Standardly is OFF, flashes when safety sensor is activated.

LED ! (red LED) error(!)
Standardly is OFF, flashes when an alarm is activated.

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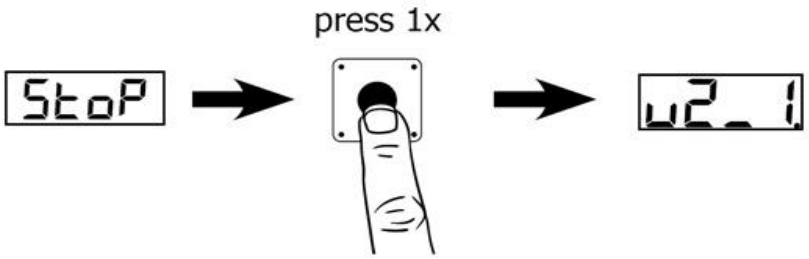
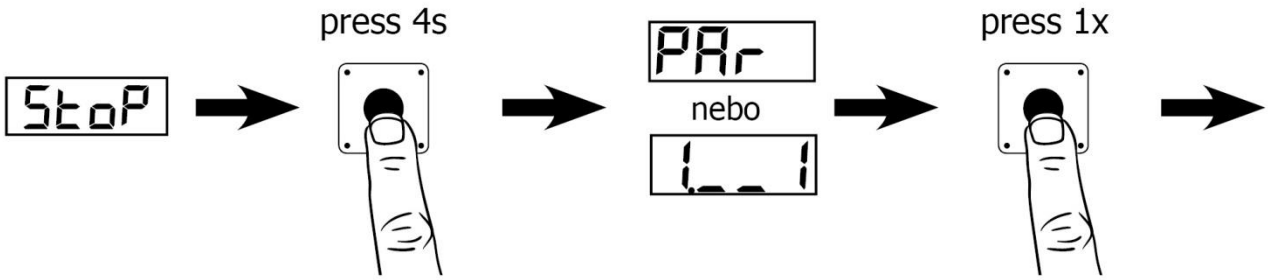
5.3. Description of functions on the display

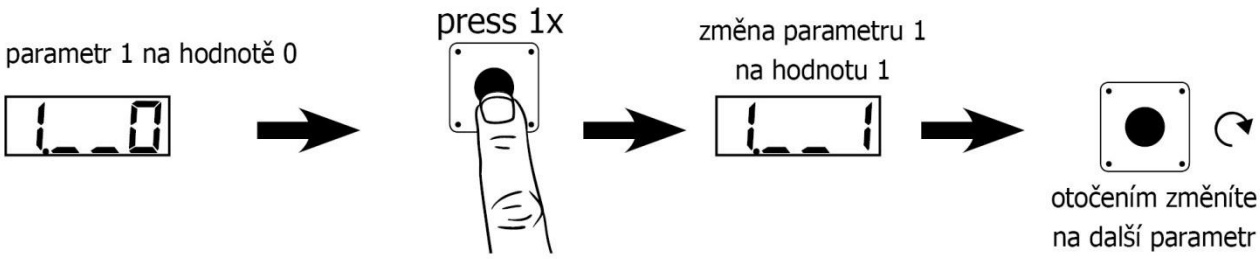
5.3.1. Managing the display menu



After pressing 1x the knob button you will display the current version of the program.



Description of setting of optional parameters on the display device. To enter the setup we have to hold knob button and after 4 seconds the display shows "Par" or directly the value of the parameter 1.



After displaying "Par"/ "the value of parameter 1", press the knob button to display individual parameters and their set value.

By turning the knob button you can display individual parameters with their set value and when pressing the knob button you can get to the editing mode and start to change the set value of the displayed parameter – the value of the parameter in editing mode flashes. The parameter value can be changed by turning the knob button and after reaching the required value, it can be saved by pressing the knob button. If you do not want to change the parameter value, leave the menu: by turning the knob until the display shows "ESC", then press the knob button and thus you confirm leaving the menu.

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5.3.2. Parameters and their values

„1" Parameter – Warning light

List of values:

- 0 = the warning light is active during movement or alarm (including the pre-flashing time), default value.
- 1 = the warning light is active only during alarm, for the entire duration of the alarm (including the pre-flashing time).
- 2 = the warning light is active during movement or alarm (without the pre-flashing time).
- 3 = the warning light is active only during movement in alarm (without the pre-flashing time).
- 4 = the warning light is active only during movement in alarm (including the pre-flashing time).

„2" Parameter – Pre-flashing time - alarm

Range of values: 0–999 second/s, default = 0.

„3" Parameter – Pre-flashing time – under normal operation

Range of values: 0–999 second/s, default = 0.

Note: When setting Parameter "1" Warning light on value 2, the pre-flashing time is running, only warning light is not active.

„4" Parameter – number of attempts to close

Range of values:

- 0-10 attempt/s, default = 0.

„5" Parameter – delay of closing attempts

Range of values: 3–30 second/s, default = 10.

„6" Parameter – time of gate movement

The brake/ magnet release time.

(the terminals X1:4, X1:8 power is removed).

- „-„ = unlimited release time, default value
- 1-300 second/s

„8" Parameter – battery discharge time

The time after which the gate closes during power failure and battery standby mode

Range of values:

- 0-30 minute/s, default = 10.
- „-„ = depends on battery condition and load

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„E" Parameter – delay of Smoke alarm

The time during which the gate remains in „Smoke" alarm, i.e. in position partly opened before it closes again. Range of values:

- 5–999 second/s, default = 10.
- „-„ = time without a limit.

„P" Parameter – cyclic braking

Enables to pulse the brake power when the gate moves. It functions only when power supply or batteries are present.

Range of values:

- 1–30, the brake cycles in impulses of 0,12 seconds for 1 to 3 seconds.
- „-„ = brake does not pulse, default value.

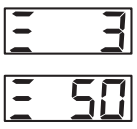
If we choose setting of parameter "P" and proceed to its setting by pressing the knob button, it is possible after pressing the "START-STOP" button on the keyboard, to move to the cycling of the braking according to the currently set parameter. The cycling can be stopped by pressing the "START-STOP" button again on the keyboard, safety devices are active.

„II" Parameter – cross-photocell

Allows you to set up the safety photocells (input X2:+ 2) for cross connection. Can be used two photocells with crossed rays under the gate. During closing the function of photocells is blocked after reaching the intermediate position, so that the passing gate leaf would not activate them. The intermediate position must be set correctly. If this parameter is set to value 1, then the photocell does not react between the lower and intermediate position (use in conveyor systems). Range of values:

- 0 = normal, default value.
- 1 = cross-photocell.

„_" Parameter *three horizontal dashes* **– service parameter**



Allows you to select the interval of the number of closing cycles, after which the control panel will signal the necessity of service, all LED on the keyboard are simultaneously flashing, see point 6.2.

- 1-50 thousand cycles, default = 3 (3=3000 cycles).

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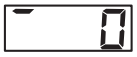
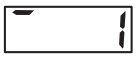


„_" Parameter *top dash* **– SMOKE input function**



Allows you to choose a different logic on input SMOKE (X2:43, X2:44).

- 0 = input of standard function SMOKE, default value.
- 1 = confirmation of closing – in this case, the input has the alarm confirmation function. In case the alarm is triggered and at the same time the inputs of safety devices are active (lower safety sensor, OSE, 8K2) standardly the set time of delayed closing is running – by activation of this input (disconnecting – connecting of the resistance 4K7) the gate starts automatically closing regardless of the set delayed closing time.

„_" Parameter *bottom dash* **– initial alarm braking time**

Allows you to select the length of the stop time in case of the FIRST activation of the safety device during closing in alarm.

- Range of values: 1–999 second/s, default = 10.

„_" Parameter *bottom and top dash* **– another alarm braking time**

Allows you to select the length of the stop time in case of the SECOND and EVERY OTHER activation of the safety device during closing in alarm.

- Range of values: 1–999 second/s, default = 10.

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6. COUNTER OF CYCLES ON CONTROL PANEL

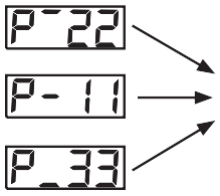
Control box SLIDTERONIC HD has built-in internal memory, from which it is possible to display the state of performed cycles of the gate. Counter is supplied after installation in reset mode. After replacement of some components or after the complete overhaul of the mechanical part of the gate, the counter status can be reset. This operation can be done only by a trained service technician, who is authorized to do the operation (it is necessary to record it into service book of the gate).

6.1. Displaying counter status

If the gate is in the "Stop" state, it is possible, by turning the knob button, to display individual cycle values one by one:

Operating counter – from putting into operation

P ¯XX	=	operating counter	XX -- --
P - XX	=	operating counter	-- XX –
P _XX	=	operating counter	-- -- XX



221133 cycles

Service counter – from the last service

S ¯XX	=	service counter	XX -- --
S - XX	=	service counter	-- XX –
S _XX	=	service counter	-- -- XX

Service counter – number of triggered alarms

A ¯XX	=	number or alarms	XX -- --
A - XX	=	number of alarms	-- XX –
A _XX	=	number of alarms	-- -- XX

6.2. Indication of the end of service interval

Control panel SLIDETRONIC HD is equipped with internal memory, which displays the end of the pre-set service interval by simultaneous and synchronized flashing of all diodes. Standard interval is pre-set on 3000 cycles or 1 year from the last service (or rather from putting into operation). In case of signalization of the end of service interval it is necessary to contact service organization to do the service inspection, which will check the gate and set the control to the standard operation mode, again. Even if the signalization of the end of service interval is activated, all control functions stay unchanged – only displaying of the alarms is affected by synchronized flashing of the service interval.

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7. FUNCTIONAL DISPLAY STATUS REPORT

7.1. Basic displayed values

1)  After reset.

2)  After reset it initializes.

3)  Stop.

4)  Closing.

5)  Closing "Totman".

6)  Waiting for automatic closing 88 = seconds.

7) 
 In position 1 flashing „A/L", i.e. alarm.

In position 2 is displayed:

- "F" - alarm from input FAS
- "b" if the time ended (discharged) or the battery voltage dropped and power supply is not present
- or nothing

In position 3 is displayed:

- "d" - alarm from detector input X2:41-X2:42
- or nothing

In position 4 is displayed:

- "S" - alarm SMOKE input X2:43-X2:44
- or nothing

8)  Waiting for closing after stopping by a safety device XX = seconds.

9)  In SMOKE alarm it goes into position SMOKE.

10)  SMOKE time countdown until alarm (e.g. 12 seconds).

7.2. Error report on functional display

 Error EEPROM – error of the internal memory after saving the parameter. It occurs, if the data do not correspond after the recording; can be reset by restarting the control box.

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8. TERMINAL BLOCK

8.1. Terminal block X1

L1, N, PE	power input 1 x 230 V TN-S
4	brake/magnet output **0 V**
5	input common for limit switches
6	input limit switch - middle position
7	input limit switch - opened
8	brake/magnet output **+24 V**
9	input limit switch - closed (supplied with a connector)

8.2. Terminal block X2

a) Side of the inputs (upper part of the terminal block X2)

Terminals marked „+" are common (+24 V), individual inputs are activated by connecting to „+".

OSE – optical safety edge

+ (B)	+12 V	(brown conductor, receiver and transmitter)
- (W)	0 V	(white conductor, receiver and transmitter)
O(G)	output	(green conductor, receiver and transmitter)

1	+24 V	for supplying photocells and external devices
-	0 V	for supplying photocells and external devices
2		lower NO contact of safety sensor for closing
+		+24 V
3		without function
4		without function
+		+24 V
5		stop, NO contact
+		+24 V
6		impulse close, NC contact
+		+24 V
7		impulse close-stop NC contact (start-stop-start-……)
+		+24 V
8		without function
+		+24 V
9		without function
+		+24 V
10		FAS NO contact
+		+24 V
11		reset NC contact – resets the unit
+		+24 V

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12	lock NC contact on the panel
+	+24 V

b) Side of outputs (lower part of the terminal block X2)

26	warning light 0 V
27	warning light +24 V
28	alarm NO
29	alarm NC
30	alarm COM
31	relay COM (for terminals X2:32 to X2:38)
32	without 230 V - switched when power supply is present
33	discharged battery – switched. If there is no voltage in the network, the relay opens when the time set in the parameter "8" has elapsed. The relay also opens when the battery voltage drops below 24,5 V. The relay closes again when the battery voltage reaches more than 25,6 V.
34	activation of safety devices OSE, lower safety sensor, 8K2, switched during activation
35	gate movement – switched if the brake/magnet power is disconnected
36	middle position 1 – switched in this position
37	opened - switched in this position
38	closed - switched in this position
39	contact edge 8k2 – 0 V (for connecting of contact edge closed loop 8,2 kΩ between X2:39 and X2:40)
40	contact edge 8k2 - +24 V (for connecting of contact edge closed loop 8,2 kΩ between X2:39 and X2:40)
41	detectors 0 V (for connecting of detectors closed loop 4,7 kΩ between X2:41 and X2:42)
42	detectors +24 V (for connecting of detectors closed loop 4,7 kΩ between X2:41 and X2:42).
	Function of "Smoke" alarm – when detector is activated, the gate closes into the set middle position and after the countdown of pre-set time it closes completely.
43	detectors for function of the "Smoke" alarm 0 V (for connecting of detectors closed loop 4,7 kΩ between X2:43 and X2:44)
44	detectors for function of the "Smoke" alarm +24 V (for connecting of detectors closed loop 4,7 kΩ between X2:43 and X2:44)

8.3. Terminal block X3

B+	input for connection of "+24V" battery module
B-	input for connection of "-24V" battery module

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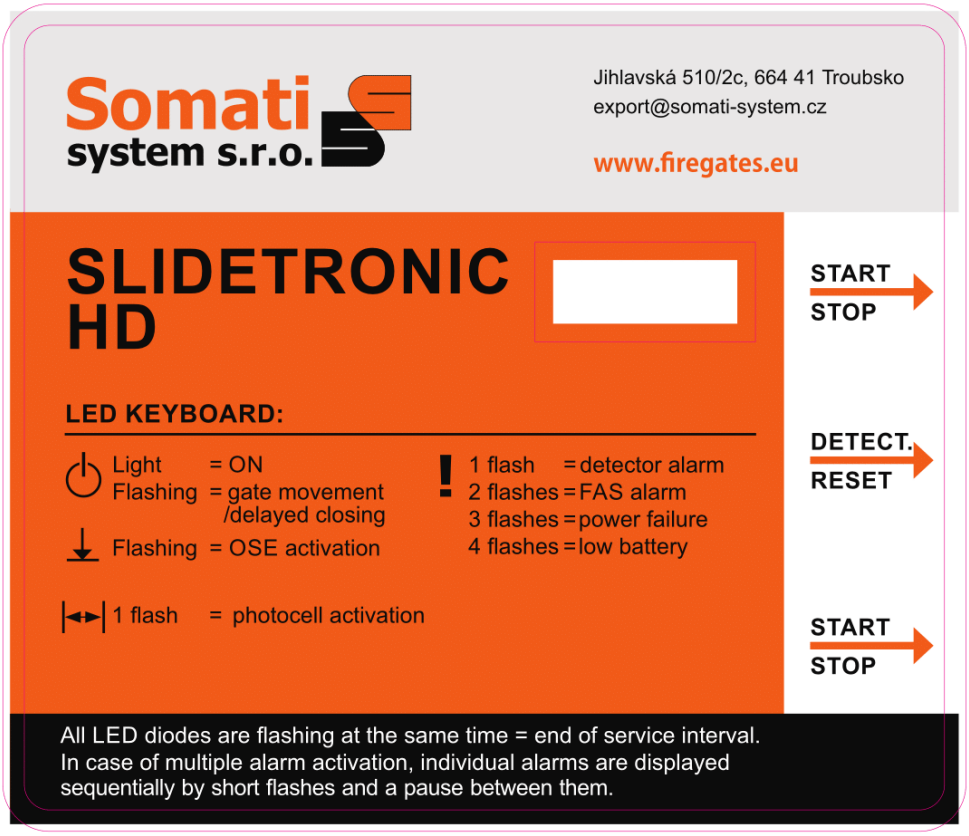
9. CONTROL PANEL

9.1. Description of the control panel



On control panel SLIDETRONIC HD is installed keyboard with buttons START-STOP, RESET. On the keyboard are also LED diodes, which display all current states of the control. This enables the gate operator to determine particular states and potential gate alarms.

9.1.1. Description of the diods:

(green LED) = ON / OFF
Is ON when the key switch is turned on, flashes slowly during movement, during countdown of the pre-flashing time flashes quickly.

(red LED) = OSE. Standardly, the diode is OFF and does not flash. If the diode flashes, the optical safety edge OSE was activated. If the OSE is not installed, the diode would be flashing all the time (can be deactivated by switching DIP 8 into position OFF).

(yellow LED) = safety sensor. Standardly, the diode is OFF and does not flash. If the diode flashes, the lower safety sensor (safety device) was activated. If the lower safety sensor is not installed, the diode would be flashing all the time (can be deactivated by switching DIP1 into position ON).

!

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(red LED) = alarm. Standardly the diode **!** is OFF and does not flash**.** If the diode flashes, one of the alarms was activated, see below.

9.1.2. Overview of alarms

- If the diode **!** does **1 short flash**, alarm from local detectors was activated. If the local detectors are installed, to cancel the alarm it is necessary to turn the key switch OFF and ON, again on the control panel or to press the RESET button = detect. RESET. If the alarm continues to be repeated, check the local detectors and their connection (resistance setting 4,7 kΩ between X2:41 and X2:42)

- If the diode **!** does **2 short flashes**, the FAS (fire alarm system) was activated (disconnection of contact X:+ and X210). The alarm is cancelled automatically – if the fire alarm system cancel the alarm, it is not necessary to do the RESET with the key switch or the RESET button.

- If the diode **!** does **3 short flashes**, power supply 230V has failed.

- If the diode **!** does **4 short flashes,** it signals poor battery, voltage of battery cells dropped below 24,5 V.

In case that several alarms are activated at the same time, they are displayed one by one by appropriate number of short flashes with a small pause between each displayed alarm (e.g. 1 short flash – pause – 2 short flashes. i.e. alarm from local detectors was activated and at the same time, the FAS (fire alarm system) was activated.

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10. REGULAR SERVICE

10.1. Control box

Component	Check	Performed operation	Cycle
Terminal block	Loose screws Loose connectors	Tighten	1year

10.2. Battery – required user maintenance

This chapter is related to the optional accessories – "battery module". The neglect of the maintenance can lead to the loss of function during power failure.

Component	Check	Performed operation	Cycle
Battery module/s	Time of holding the gate in open position until the battery is discharged – for at least 30minutes. Warranty for battery of safety devices is one year.	Disconnection of main power supply or **replacement of the batteries for new ones!**	1 year

As an additional accessory of control box SLIDERTONIC HD, it is possible to add battery module with hermetic PB batteries. To secure their safe operation the following conditions must be followed:

Precondition for reaching full life of the hermetic PB batteries is their proper charging (life of common types of batteries is approx. 5 years during optimal operating temperature 15-20°C). Charging is provided with charging circuit of SLIDETRONIC HD if the control panel is connected to power supply. In case of power failure longer than 2 hours, disconnect batteries by connector disconnection to avoid battery discharging due to the powering of control panel – it is necessary to insulate battery connector with a plastic cover (see point 3 – putting into operation) Under normal operating conditions, battery is hermetically sealed, no leak from safety plugs and battery can be operated in any position. To maintain function of the safety plugs (e.g. in case of charger failure) it is necessary to leave free space in front of the upper side containing safety plugs. Life of PB batteries can be also reduced if they are repeatedly fully discharged. If the battery is permanently fully discharged it may also cause its damage. New batteries are standardly supplied partially charged. Optimal storage temperature is 15-20°C. During storage the load has to be disconnected! Before storage, the battery has to be charged and during long-term storage (at the recommended temperature) it is necessary to recharge the battery at least every 9 months. If the storage temperature is higher it is recommended to recharge the batteries more often. Higher temperature significantly decreases the average life of PB batteries.

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10.3. Safety instruction for hermetic Pb batteries

- It is important to maintain correct polarity – do not switch the poles, keep contacts clean.
- Use them only for electrical appliances, which they are intended for.
- Hermetic Pb batteries cannot be replaced by common car or motorcycle batteries.
- If the battery is getting overcharged during using the original charger, the charger is damaged. Immediately stop using the defective charger and hand the charger over to professional service for repair.
- **For charging the Pb batteries it is not possible to use chargers for common car and motorcycle batteries or chargers for NiCd, NiMh or other types of batteries.**
- Protect the batteries against short-circuit, do not overload or heat the batteries, do not throw them into fire, do not open, deform or damage them.
- Put the old batteries in to the collection place.

If the batteries are damaged by improper use or **by failure to follow principles mentioned above, the warranty cannot be applied!** To determine the cause of the battery fault in order to claim warranty, the seller reserves the right to test the **conditions of the operation.** If improper conditions are found out, **the work connected with the control and measurement of the conditions will be charged**.

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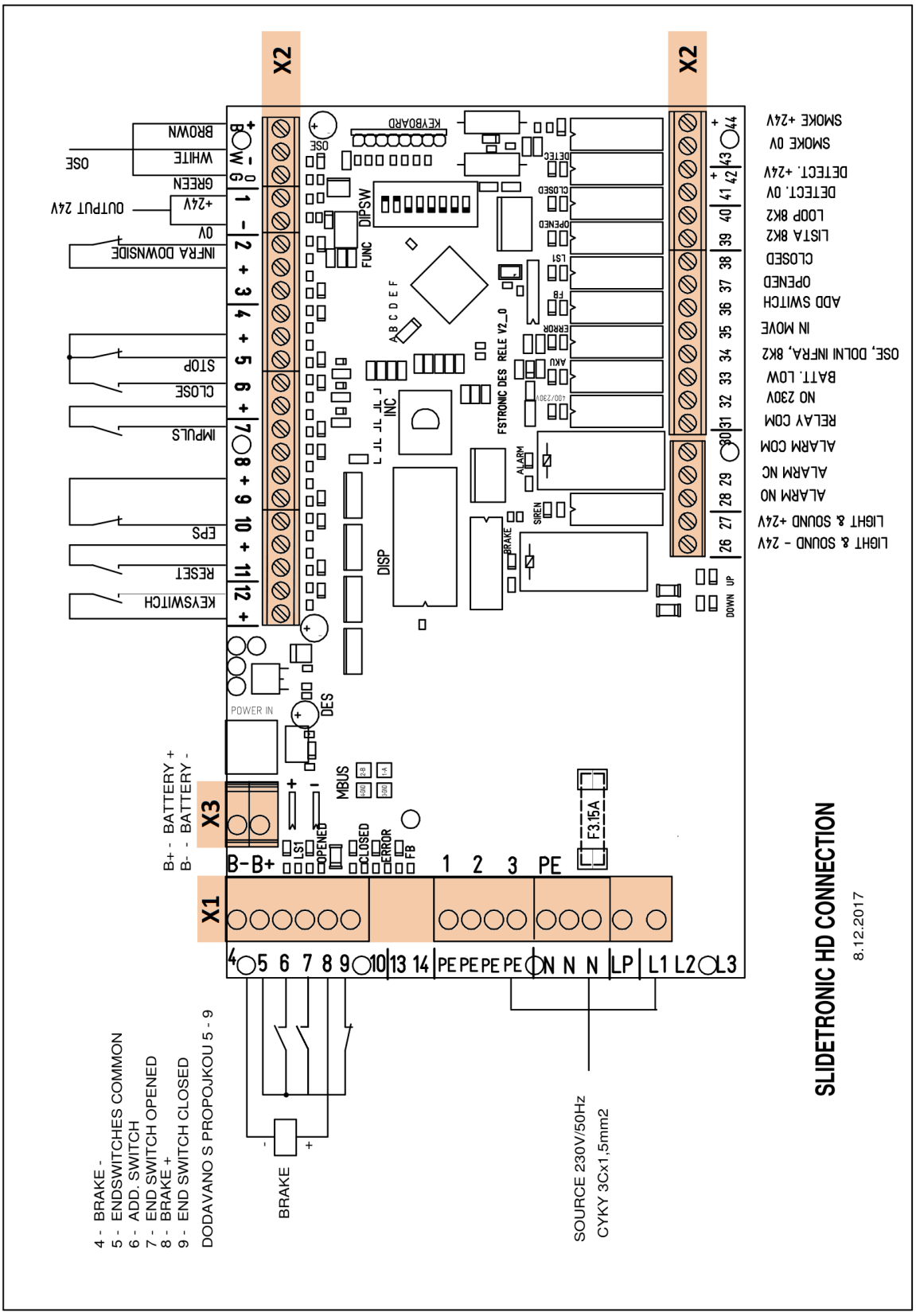
11. CIRCUIT DIAGRAMS

11.1. SLIDETRONIC HD – control board



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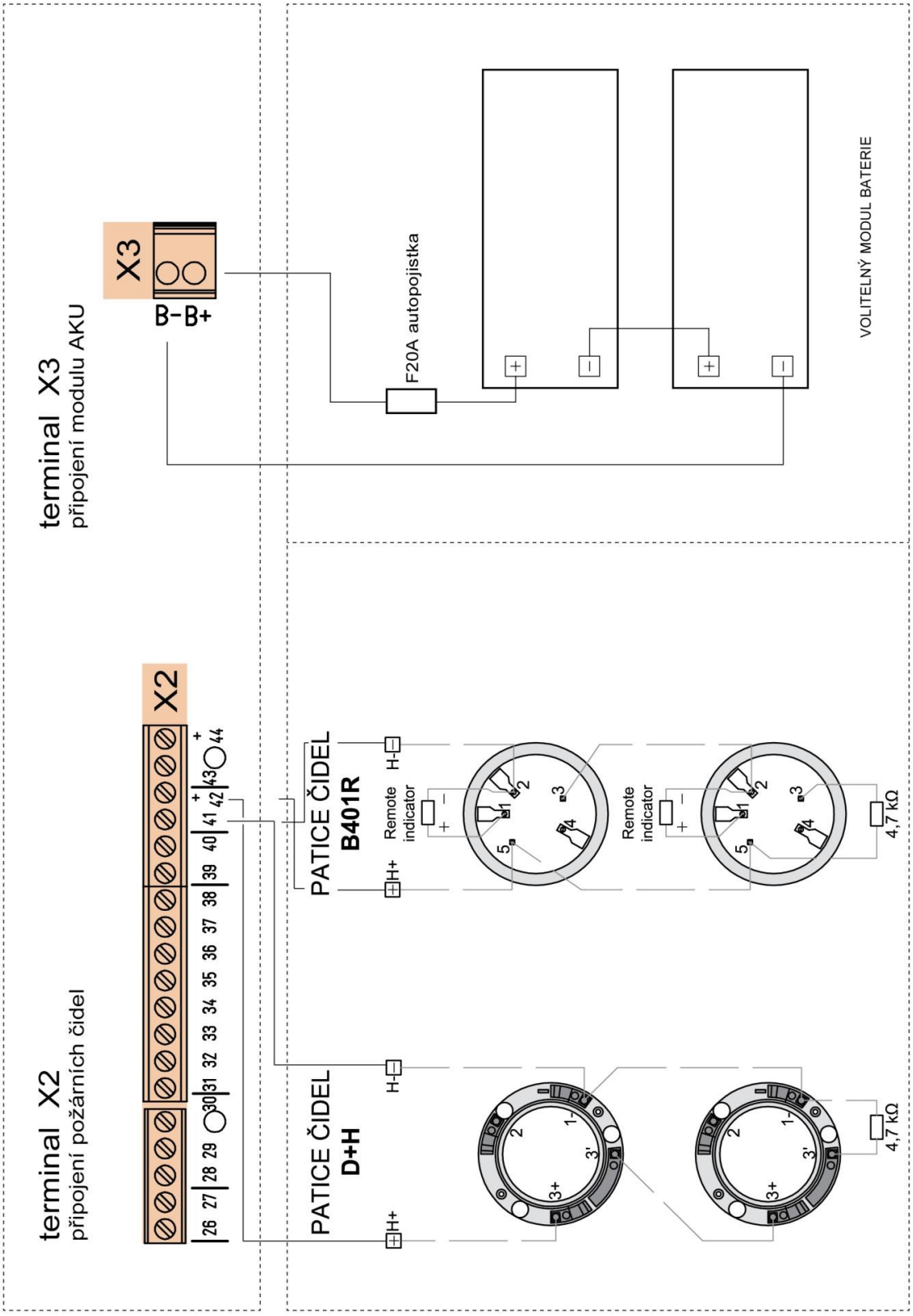
11.2. Slidetronic HD – detectors + battery module



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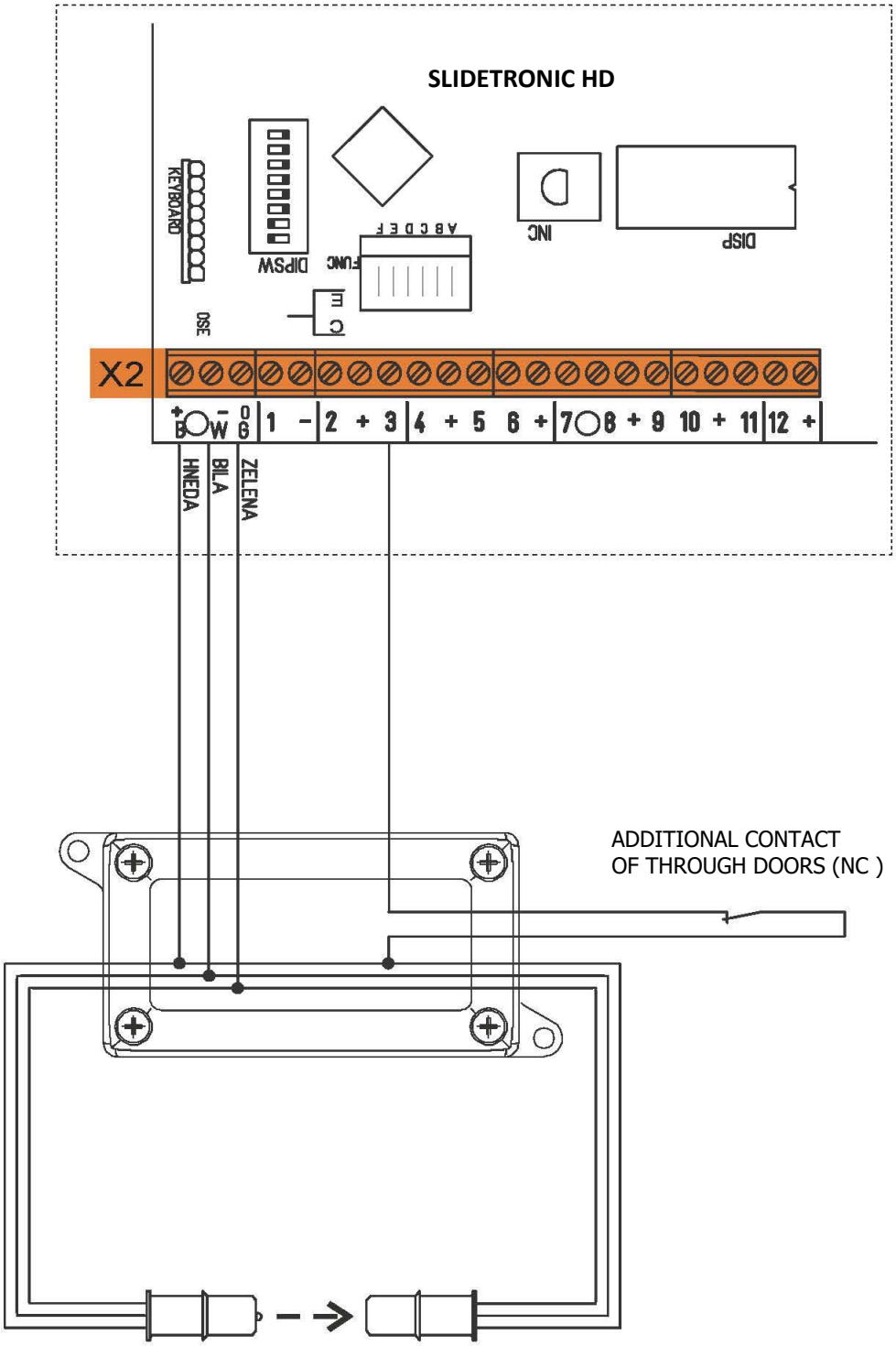
11.3. SLIDETRONIC HD – connection of OSE + passage door safety sensor

Connected by using a common 4-core spiral cable.



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