

Operating and Installation Manual

Automatic Sash Controller

SC500



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SCHNEIDER Elektronik GmbH hereby declares that the device

AUTOMATIC SASH CONTROLLER SC500

complies with the basic requirements of the European Council Directive for electromagnetic compatibility (89/336/EEC) and the CE Marking Directive (93/68/EEC).

You may request a copy of the declaration of conformity at the address given below.

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SAFETY INSTRUCTIONS

1.0 SAFETY INSTRUCTIONS

Before installing and using the **SC500 automatic sash controller**, please read and follow this operating and installation manual carefully.

- Installation and wiring may only be done by qualified specialists.
- Check whether the operating voltage shown on the nameplate corresponds with the supply voltage at the site where the device will be installed.
- During installation, wiring and operation, recognised technical precepts, particularly regulations regarding safety and accident prevention, must be followed.
- The device should only be returned to the manufacturer for repair in the original box.
- **When you see the symbol CAUTION, we recommend that you pay careful attention to the explanatory text and notes.**



ELECTRICAL CONNECTION

- The electrical connection must be done by a qualified electrician in accordance with the safety precautions.
- The following rules and regulations must be followed:
 - VDE guidelines**
 - Local power supplier regulations**
 - Manufacturer wiring instructions and terminal connection plans**
- Connect the SC500 fume hood controller to its own, separate circuit to protect against overload.
- Do not do any electrical work on the device when the power supply is switched on.
- **Follow the safety regulations at all times:**
 - **Disconnect the SC500 automatic sash controller**
 - **Ensure that the controller cannot be switched on again**
 - **Ensure that the controller is voltage-free**

OPERATING SAFETY

- Do not use the SC500 device immediately after bringing it from an unheated room into a warm room. Condensation on the electronic circuits can lead to severe damage. The device reaches room temperature after approximately 2 hours.
- Only place the controller in a dry room on a firm, flat surface, (e.g., the roof of the fume hood) or screw it to the side wall of the fume hood.
- **Always pull the mains plug or disconnect the device from the power supply** if objects or fluids have permeated the device or if you notice a smell or smoke. Have the manufacturer check the device.
- **Always pull the mains plug or disconnect the device from the power supply if the case or lid of the device has to be opened.**



PROPER USE

- The SC500 automatic sash controller is intended solely for automatic closing of sashes on fume hoods.
- Do not use the SC500 automatic sash controller in areas that are vulnerable to explosion.

CE-NOTE

The SC500 automatic sash controller complies with the safety requirements of the electromagnetic compatibility law and the EC Low Voltage Directive and therefore has a CE marking.

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FUNCTIONAL DESCRIPTION	2.0
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With the automatic sash controller SC500, SCHNEIDER offers a product for additional safety and energy savings in the laboratory environment.

A passive infrared movement detector (PIR) constantly monitors the work area in front of the fume hood. If no operating personnel are directly in front of the fume hood, the fully automatic sash closing process is started following an adjustable closing delay time (10 seconds to 30 minutes).



The containment of a fume hood is at its highest when the sash is closed. Significant energy savings can be achieved if the exhaust air volume is simultaneously reduced by use of the control system FC500.

An infrared light barrier mounted on the handle bar stops the sash automatically if an obstruction is detected during the closing process.

The motor-driven drive unit consists of the cable deflection pulleys and the drive roller as well as a maintenance-free servo motor and a safe magnetic clutch.

Diversity factor and energy efficiency

Whenever possible, the automatic sash controller moves the fume hood sash into the closed position.

In the case of air controlled fume hoods, a diversity factor of approximately 50-60% can be calculated when planning the ventilation technology, whereby the investment and operating costs of the entire plant can be considerably reduced. Thus energy savings of 50% can be achieved.

Ease of use and safety

A foot switch for the UP function increases ease of use and can optionally be connected.

The sash can be opened or closed manually at any time. Manual intervention in the automatic closing process is also safely possible at any time. As the sash is usually closed, the safety of the laboratory personnel is considerably improved.

The lowering delay time of the sash can be extended by pressing the optionally connectable time extension button during setup.

Via the external control panel (not included in the scope of delivery. Please order additional fittings separately) the sash can be electromotively opened or shut with the buttons UP, DOWN, STOP.

OPERATING PANEL	2.1
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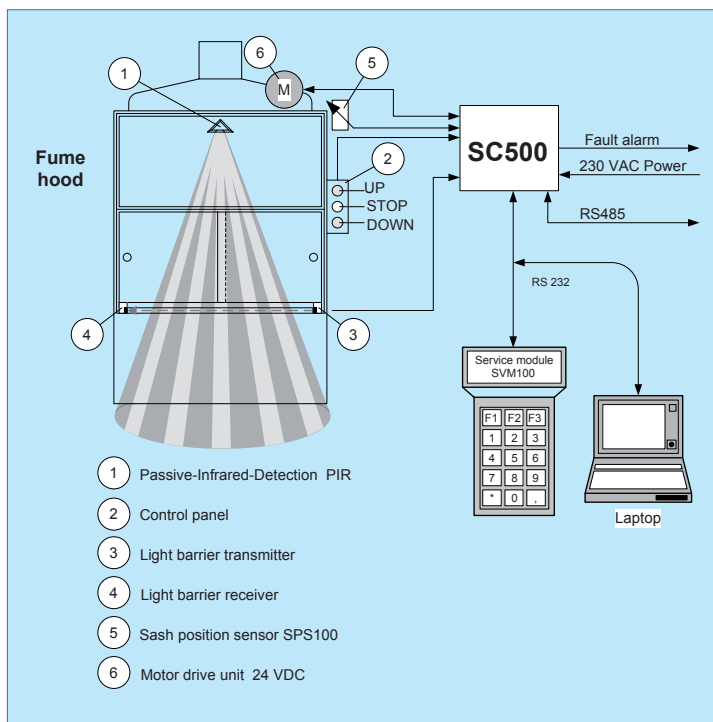


Via the external foot switch (not included in the scope of delivery. Please order additional fittings separately) the sash can be electromotively opened.

FOOT SWITCH	2.2
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2.3 FUNCTIONAL DIAGRAM



2.4 PERFORMANCE FEATURES

- Microprocessor controlled automatic closing system for fume hood sashes
- Integrated power supply 230V AC or 115V AC
- All system data are saved mains voltage failure-safe in the EEPROM
- Programming of all system values via service module SVM100 or laptop software PC2500
- Automatic adjustment of the sash position via touch control mode (UP, DOWN, STOP), foot switch or manually
- Automatic adjustment of the sash position directly via touch control mode on the window (UP, DOWN)
- 10 freely selectable speeds with soft stop
- Motor current monitoring with automatic shutoff (manual intervention)
- Monitoring of closing time
- Teach-in mode for easy commissioning of different fume hood types
- Start of the closing process via passive infrared movement detector
- Monitored closing process via infrared light barrier and automatic shutoff on obstruction recognition
- Reduced cabling effort through the use of a 2-wire light barrier using both sash cables is possible
- Lowering delay time adjustable from 10 sec to 30 min
- Optionally connectable time extension button for extending the lowering delay time (fume hood setup)
- Automatic, electronic adjustment of the drive when free movement of the sash is changed
- Programming of the system via the FAZ on the fume hood (RS 485 – together with the FC-500 controller)
- Improvement in safety and reduction of the air requirement by the predominant operating state sash closed
- Suitable for all fume hood constructions, independent of the opening or closing method

Independent of the automatic sash closing the sash can be operated manually at any time.

1. Manual operation (Option: touch control mode = off)

If the sash is in a stationary position, it can be manually pushed up or down using the handle bar on the sash. The drive unit and the sash are decoupled when the sash is in a stationary position.

2. Motor-driven opening or closing of the sash (Option: touch control mode = on)

If the sash is manually pushed in the direction UP or in the direction DOWN, the internal electronics recognise the direction and open or close the sash via the motor (see points 3 and 4).



3. Motor-driven opening of the sash (via UP button)

Briefly press the UP button or (optionally) the foot switch. The sash is opened and automatically stops in the position TOP or at the stopping point Centre (if 3 stopping points have been programmed). Briefly pressing the UP, DOWN or STOP button immediately halts the movement of the sash. The upwards movement is monitored for obstructions with the emitter/receiver light barrier (see Recognition of obstructions).

4. Motor-driven closing of the sash (via DOWN button)

Briefly press the DOWN button. The sash is closed and automatically stops in the position BOTTOM (limit switch BOTTOM). Briefly pressing the UP, DOWN or STOP button immediately halts the movement of the sash. The downwards movement is monitored for obstructions by the emitter/receiver light barrier (see Recognition of obstructions).

5. Automatic closing

The lowering delay time is freely programmable from 10 sec. to 30 min. If no activity on the fume hood is registered by the time the lowering delay time has expired, the sash automatically closes and stops in the BOTTOM position. As soon as a person is detected in the working area of the fume hood by the passive infrared sensor (PIR), the sash movement immediately stops (programmable). The downwards movement is monitored for obstructions by the emitter/receiver light barrier (see Recognition of obstructions).

6. Recognition of obstructions

If the sash is in the process of moving downwards, the area directly below the handle bar is monitored with an emitter/receiver light barrier. The sash is automatically halted if this signal is interrupted by reaching into the working area or by objects that reach out from the interior.

If a recognised obstruction has led to the sash closing process being stopped, automatic closing is deactivated. Automatic closing is activated again by pressing the UP or DOWN button or by manually pushing the sash at least 3 cm, that is, normal operation is again ensured. The deactivation of automatic closing after recognition of an obstruction takes place for safety reasons. It is also possible to program other reactivation criteria.

7. Button extension time

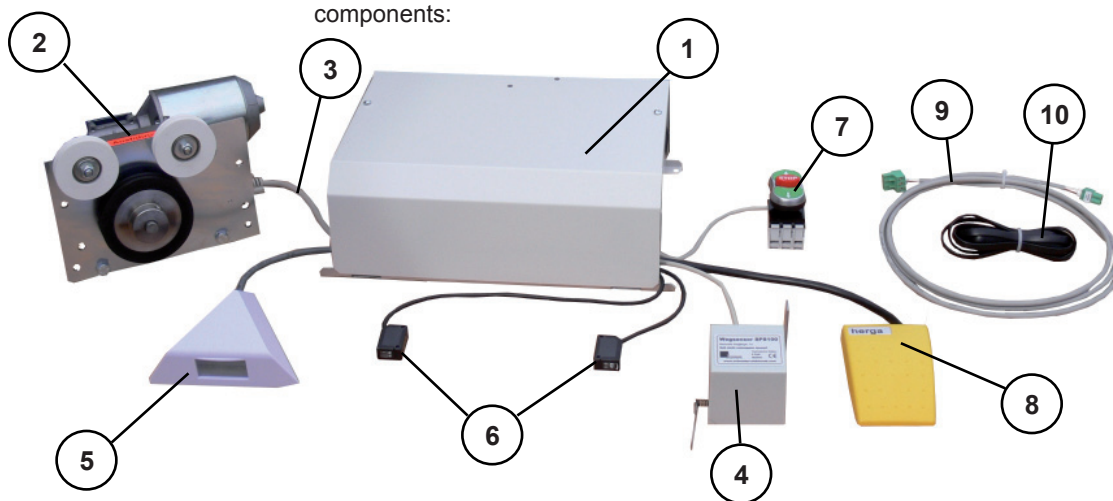
By pressing the TIME EXTENSION button the lowering delay time of the sash is extended by a programmable time interval (1...30 minutes). By repeatedly pressing this button the time period is summed up internally (max. 4 additions).

If, for example, the fume hood must be equipped with new devices or if the sash should not be closed for a prolonged period, it makes sense to use this function. A maximum extension of the lowering delay time of 4 x 30 minutes = 2 hours may be achieved.

3.0 SCOPE OF DELIVERY INSTALLATION AND SETUP INSTRUCTIONS

SCOPE OF DELIVERY
AUTOMATIC SASH CONTROLLER SC500

The automatic sash controller SC500 (full construction) includes the following components:



Pos.	Units	Object
1	1	Control electronics in casing with power supply (230V AC or 115V AC)
2	1	Motor drive unit with clutch
3	1	3m connection cable motor drive unit
4	1	Sash position sensor SPS100
5	1	Passive infrared sensor
6	1	Infrared light barrier transmitter/receiver for registering objects during the closing process
7	1	Additional accessory: Panel UP/STOP/DOWN (please order separately. Cable not included)
8	1	Additional accessory: Foot switch for opening the sash (please order separately)
9	1	Additional accessory: Interconnection to FC500 for SPS100 (sash position sensor) signal
10	1	Additional accessory: Interconnection to FC500 for parameterise the SC500 via FC500 functional display socket

NOTE



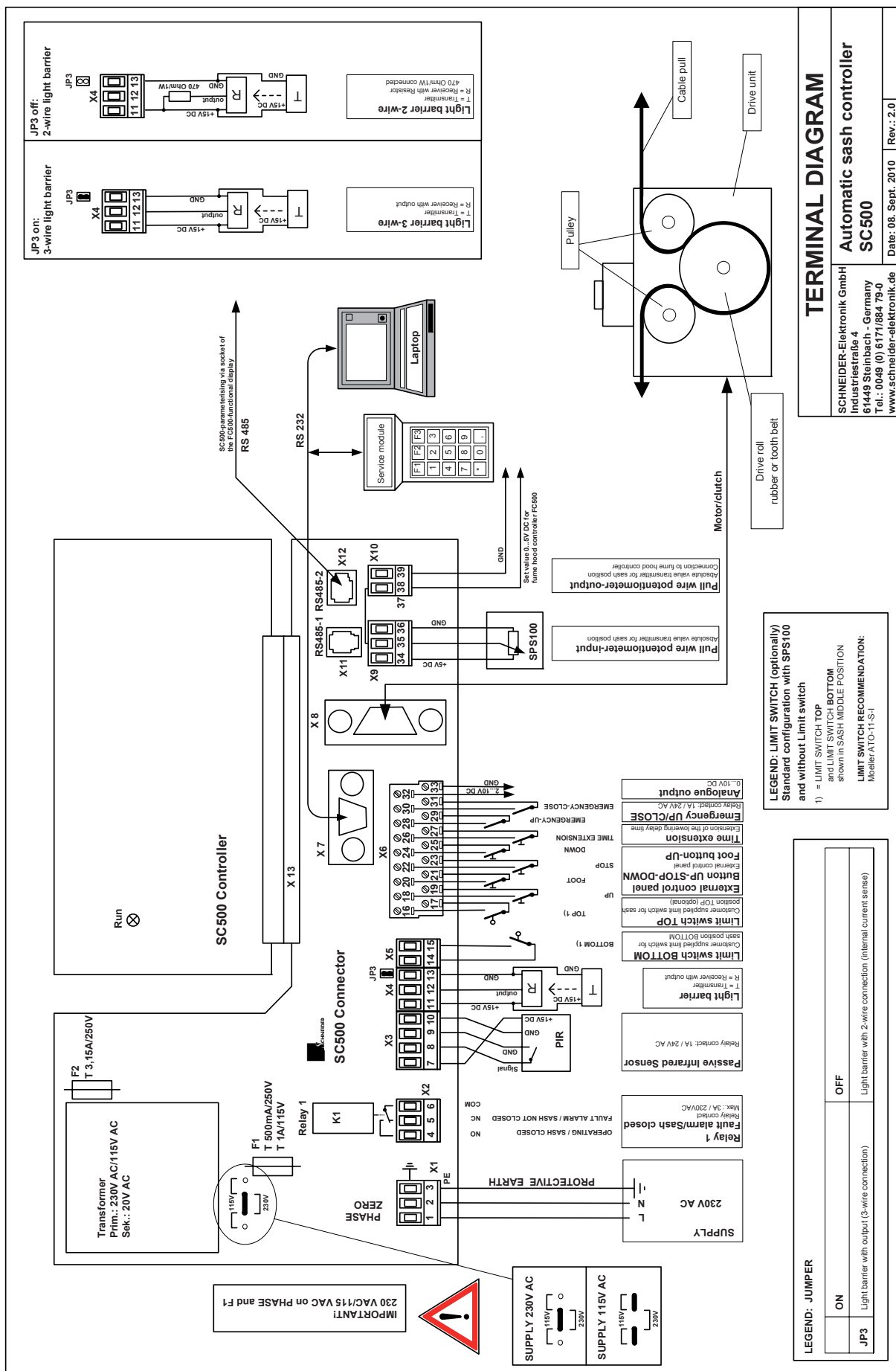
The following mounting methods are permissible for the SC500 automatic sash controller:

Control electronics

- Mounted level on the roof of the fume hood controller (horizontal mounting position). Always with the lid facing upwards.
- Screwed to the wall of the fume hood (vertical mounting position).

Motor drive unit

- Mounted level on the roof of the fume hood controller (horizontal mounting position).
- Screwed to the wall of the fume hood (vertical mounting position). Angle brackets are optionally included.



INSTALLATION

5.0 INSTALLATION • THE FIRST SIX STEPS

STEP 1

5.1 OPEN THE CASE LID

Unscrew both screws on the case lid of the control electronics and lift off the lid.

STEP 2

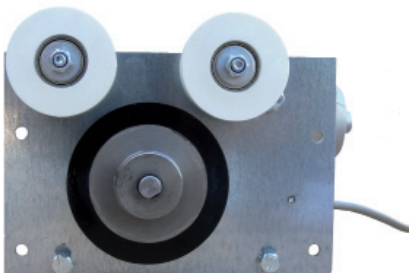
5.2 MOUNT THE DRIVE UNIT

The drive unit consists of the motor, the clutch and the encoder. Depending on the model, the sash is driven by the sash cable (version with rubber roller) or by the drive belt (version with toothed belt disk) or directly by the drive axle.

Ensure that the drive unit is safely and securely fixed to the fume hood side wall. Please bear in mind that the sash cable is subject to forces of approx. 1000 N.

The sash cable must run directly into the deflection pulley of the motor drive unit, wind round the drive roller (version with rubber roller) and then run directly out of the deflection pulley and be directly connected to the counterweight.

Attach the 15-pole connection cable of the drive unit to the X6 plug on the controller board.



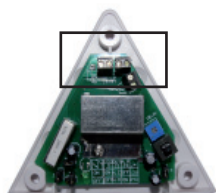
STEP 3

5.3 MOUNT THE PASSIVE INFRARED SENSOR

The passive infrared sensor (movement detector) monitors the working area of the fume hood. If no movement is detected, the sash is automatically closed after the programmed lowering delay time.

Mount the passive infrared sensor in such a way that the detection range of the sensor encompasses the area in front of the fume hood, so that the user is safely detected (see PIR100 data sheet in Appendix A).

Connect the passive infrared sensor in accordance with the data sheet and connect the cable to terminals X3.7 to X3.10 (see terminal diagram).



STEP 4

5.4 MOUNT THE INFRARED LIGHT BARRIER

The emitter/receiver light barrier is mounted on the left and right below the sash handle bar and monitors the closing process of the sash. Measuring probes or cables that lead out of the fume hood are recognised with a resolution of $\geq 1\text{mm}$ and immediately stop the automatic sash closing process.

Mount the light barrier (emitter and receiver) in additional protective casing (e.g. rectangular tube) to avoid mechanical damage.

The emitter and receiver must be mounted in such a way that the light beam of the emitter comes into contact with the receiver at right angles approx. 2 cm below the sash handle bar. In order that the light beam can be focussed and register even small objects ($\geq 1\text{mm}$), the 2 covers included in the delivery must be mounted in front of the emitter and the receiver. Light reflections on the handle bar (e.g. gloss paint) must be avoided at all costs, as otherwise the obstruction cannot be registered.



Connect the infrared light barrier in accordance with the data sheet and connect the cable to terminals X4.11 to X4.13 (see terminal diagram).

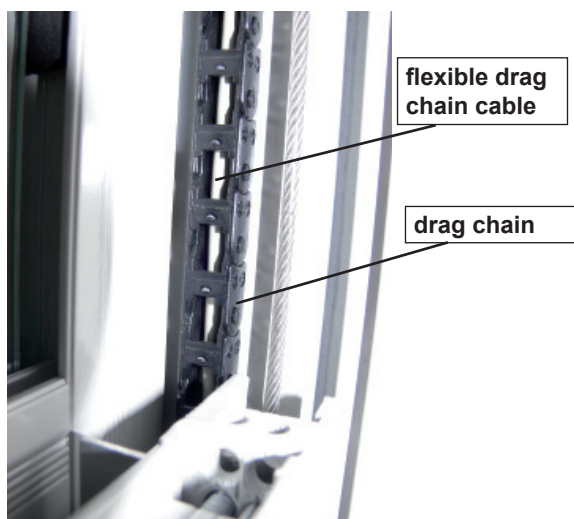
**3-WIRE LIGHT BARRIER (STANDARD)
LIGHT BARRIER CABLE ROUTING**

As the light barrier is situated on the sash handle bar, it is moved together with the sash. The light barrier cable presents a problem here. To ensure safe functioning, a suitable construction must protect the light barrier cable from mechanical damage during movement of the sash.



Depending on the construction at the customer site, this may be a suitable cable winding device or a highly flexible spiral cable wound around the sash cable. The important thing is that the cable is sufficiently taut when the sash is open and thus cannot be crushed or mechanically damaged.

Light barrier cable (flexible drag chain cable) in drag chain



Light barrier cable (flexible spiral cable) twisted around sash wire



2-WIRE LIGHT BARRIER WITH POWER SUPPLY VIA BOTH SASH CABLES (LEFT AND RIGHT)

A simple solution to the problem of the light barrier cable can be to use a 2-wire light barrier instead. Here only the supply voltage of the light barrier is required (+15V and GND) and recognition takes place via the current (ca. 10 mA = light barrier not switched, approx. 100 mA = light barrier switched).

The supply voltage is directed over the left and right sash cables which must electrically isolated from one another. If this construction is possible on your fume hood, please contact us for more details.

The controller board is already equipped for 2-wire operation (remove JP3) and thus considerably aids the recognition of obstructions on the fume hood sash.



	STEP 5.5.1
5.5.1	MOUNT THE SASH POSITION SENSOR SPS100



The sash position sensor SPS100 provides a stable analogue output, dependent on the vertical opening of the sash with app. 1 mm resolution . This voltage signal is absolutely stable and suitable for use as a control signal for the automatic sash controller SC500. In parallel the analogue output of the sash position sensor SPS100 is available as leading signal for the fume hood controller FC500.

The sash position sensor must be mounted stationery and the steel wire should preferably be fitted to the sash counterweight or fitted directly onto the sash frame. The potentiometer (linear position sensor) must always be mounted in such a way that the position sensor steel wire can be easily coiled up. The steel wire must run freely and must not be diverted or allowed to run over edges.

Attach the 3 core sash position sensor cable to terminal block X9 (see terminal diagram). During the self test procedure the sash position sensor is checked and calibrated.

The installation with the sash position sensor SPS100 is much better than the installation with the limit switch bottom (see step 5.5.2) because with the sash position sensor the absolute sash position is always available.

	STEP 5.5.2 (ALTERNATE TO 5.5.1)
5.5.2	MOUNT THE LIMIT SWITCH BOTTOM



Alternating to step 5.5.1 (sash position sensor SPS100) a customer-supplied limit switch can be mounted. The customer-supplied limit switch (not included in the scope of delivery) is for recognition of the sash position in the position BOTTOM (sash shut = limit switch shut).

Adjust the customer-supplied limit switch correctly, connect it in accordance with the data sheet and connect the cable to terminals X5.14 and X5.15 (see terminal diagram).

The installation with the sash position sensor SPS100 (see step 5.5.1) is much better than the installation with the limit switch bottom because with the sash position sensor the absolute sash position is always available.

The combination with the limit switch is in function only if the motor drive unit is equipped with an internal incremental encoder.



CAUTION!
 Ensure that limit switches with sufficient hysteresis are used.
 Connect the limit switch as a normally open contact (sash shut = limit switch shut).
Recommended switch: Moeller ATO-11-S-I or equivalent

STEP 6	
CONNECT THE POWER SUPPLY	5.6

The electrical connection must be done by a qualified electrician in accordance with the safety precautions and the VDE guidelines.

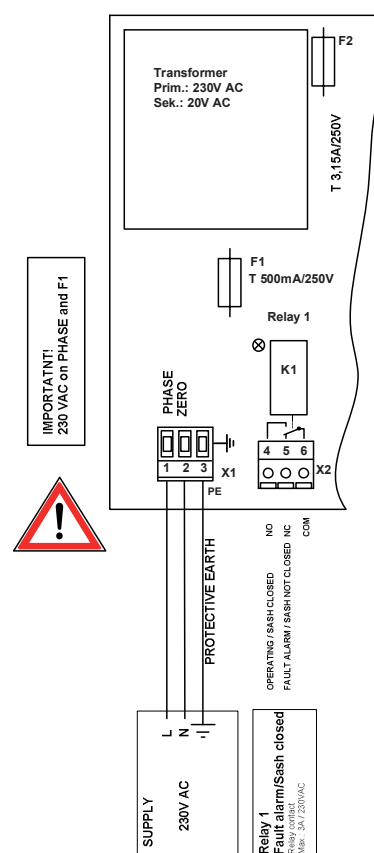
Connection to the mains power generates the power supply for the control electronics. Check whether the operating voltage shown on the nameplate corresponds with the supply voltage at the site where the device will be installed (230V AC or 115V AC).

Important! 

You must ensure that the PHASE (L), NEUTRAL (N) and EARTH are correctly connected!


Ensure proper protection against short circuiting!

- Follow the safety regulations at all times:
 - Disconnect the power supply
 - Ensure that the controller cannot be switched on again
 - Ensure that the controller is voltage-free
 - Before connecting the power supply you must ensure that the Jumper JP1 and JP2 are in correct position for the appropriate supply voltage 230V AC or 115V AC (see terminal diagram)
 - Connect the power supply (230 VAC or 115V AC) with a 3x1.5mm² cable



After the power supply has been switched on, the RUN LED on the SC500 CPU board must flash (see Terminal diagram on page 9). 

The components required for the basic functions have now been connected.

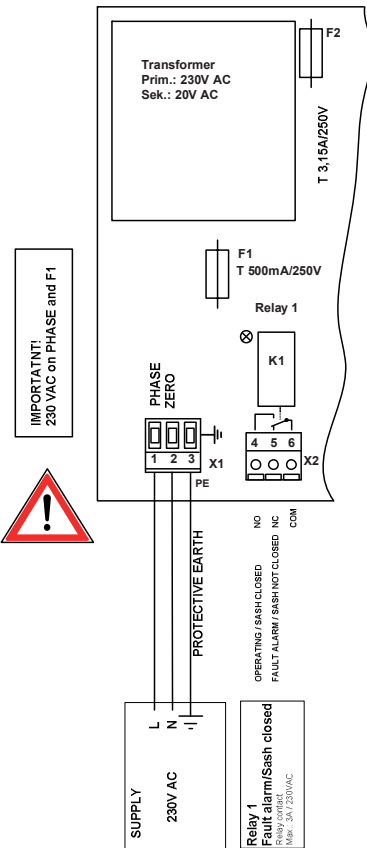
If no additional functions or relay outputs are required, you can continue with the programming instructions (chapter 7.0). After all important parameters have been set in accordance with chapter 7.0 and the self test has been carried out successfully, the SC500 sash controller is ready for use. 

The terminal connections for the additional functions and relay outputs are described in chapter 6.0.

6.0 CONNECTION OF ADDITIONAL FUNCTIONS

6.1 CONNECTION RELAY OUTPUT

Relay K1 can either be programmed as a malfunction notification relay or as a parallel switching relay to the limit switch BOTTOM for the status "Sash SHUT".



Programming as a malfunction notification relay

In the case of a group alarm, the malfunction notification relay (K1) drops out and thus signals the malfunction status. Malfunctions may be, for example, a timeout during the closing process, mains voltage failure and internal errors.

Programming as a window SHUT relay:

Relay K1 pulls in when the sash is closed and the limit switch BOTTOM is pressed. Via this contact it is possible, for example, to activate 2 point control (FC500-K) in order to reduce the exhaust air volume flow when the sash is shut.

The maximum ohmic contact load of the K1 relay is 3 A (230V AC).

Important!

Ensure that connected consumer loads are properly protected against short-circuiting.

6.2 CONNECTION EXTERNAL CONTROL PANEL

The external control panel PAN100 can optionally be connected and has the buttons UP, DOWN and STOP.



Pressing this button starts the corresponding upward or downward movement of the sash. Pressing the STOP button immediately halts the movement of the sash.

Connect the buttons in accordance with the data sheet and connect the cables to the following terminals (see terminal diagram):

UP button	Terminals	X6.18 and X6.19
DOWN button	Terminals	X6.24 and X6.25
STOP button	Terminals	X6.22 and X6.23

6.3 CONNECTION EXTERNAL FOOT SWITCH

An external foot switch can optionally be connected and improves ease of use. The FS100 foot switch is identical in its function with the UP button.



Connect the foot switch in accordance with the data sheet and connect the cable to terminals X6.20 and X6.21 (see terminal diagram).

By pressing the TIME EXTENSION button the lowering delay time of the sash is extended by a programmable time interval (1...30 minutes). By repeatedly pressing this button the time period is summed up internally (max. 4 additions).

EXTERNAL BUTTON TIME EXTENSION	6.4
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If, for example, the fume hood must be equipped with new devices or if the sash should not be closed for a prolonged period, it makes sense to use this function. A maximum extension of the lowering delay time of 4 x 30 minutes = 2 hours may be achieved.



Connect the customer-supplied button in accordance with the data sheet and connect the cable to terminals X6.26 and X6.27 (see terminal diagram).

On terminals X6.30 and X6.31, the function EMERGENCY SHUT can be carried out via an external relay contact. The infrared light barrier is ignored (no recognition of obstructions) and the sash is immediately closed automatically at the highest speed. This function can be activated, for example in an emergency, directly via an on-site button, fire extinguishing equipment or the BMS together with an FC500 controller.

EMERGENCY SHUT	6.5
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On terminals X6.28 and X6.29, the function EMERGENCY OPEN can be carried out via an external relay contact. The sash is immediately opened automatically. This function can be activated, for example in an emergency, directly via an on-site button or the BMS together with an FC500 controller.

EMERGENCY OPEN	6.6
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The customer-supplied limit switch (not included in the scope of delivery) is reserved for special functions and is not required for standard operation.

LIMIT SWITCH TOP	6.7
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Adjust the customer-supplied limit switch correctly, connect it in accordance with the data sheet and connect the cable to terminals X6.16 and X6.17 (see terminal diagram).

The analogue voltage is available as a measurement value for the sash position on terminals X6.32 (2...10V DC) and X6.33 (GND) (sash open = 10V, sash shut = 2V). The voltage range is programmable.

ANALOGUE OUTPUT	6.8
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The analogue output serves as a setpoint (sash position) for the FC500 fully variable controller and can be connected directly.

The SPS100 pull wire potentiometer can be connected directly to terminal X7. This signal is passed through to terminal X8 and also serves as a setpoint (sash position) for the FC500 fully variable controller.

PULL WIRE POTENTIOMETER	6.9
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With the SC500 sash controller, the SPS100 pull wire potentiometer (not included in the scope of delivery) is reserved for special functions and is not required for standard operation.

6.10

**SERIAL
INTERFACE RS485**

The SC500 automatic sash controller has an RS485 serial interface, which can be connected to plugs X11 and X12.

If the RS485 interface of the FC500 controller is directly connected to plug X11, programming of the automatic sash controller can be done via the function display interface (RS232) of the controller.

With this RS485 connection, the FC500 controller and the SC500 automatic sash controller can be programmed via the interface of the function display (with SVM100 service module or PC2500).

6.11

**SERIAL
INTERFACE RS232**

The RS232 serial interface is available on plug X7. Via this plug, programming of the SC500 automatic sash controller can be done directly (with SVM100 service module or PC2500).

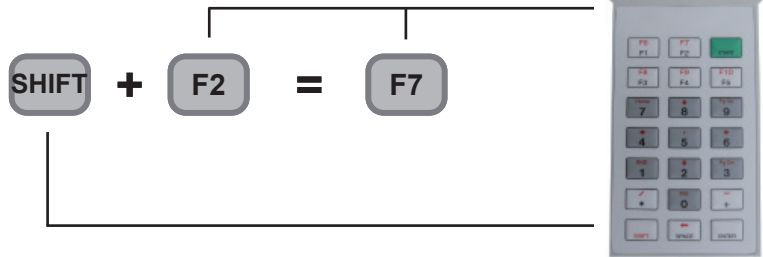


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SVM100 OPERATION

The programming functions of the SVM100 service module are clearly structured. The necessary buttons are described on this page.

To select the function buttons marked in red, press the SHIFT key and the desired button at the same time.



- Select the next flashing menu line.
▼
- Select the previous flashing menu line.
▲
- Select the next 4 menu lines (the first menu line flashes).
PgDn
- Select the previous 4 menu lines (the first menu line flashes).
PgUp
- Select the flashing menu line, confirm the entry and return to the previous (sub-) menu line (one level higher).
ENTER
- Increase the displayed value by one increment (+1, +10).
+
- Reduce the displayed value by one decrement (-1, -10).
SHIFT + + = -
- Cancel the self-test.
SPACE
- Function keys F1 to F10 for direct selection of a menu item. F1 to F5 are pressed directly, SHIFT and F6 to F10 must be pressed simultaneously.
F1 ... F10
- Go to the beginning of the parameter setting list (first menu line).
Home
- Go to the end of the parameter setting list (last menu line).
END
- Cancel the current menu and restart. This is the same as switching on the service module.
START

The individual menu items are clearly structured in groups (left-aligned display line) (e.g. Actual values & setpoints, System values, etc.). The following groups are available:

CHAPTER	SC500 PARAMETER LIST (Groups) VIA SVM100 SERVICE MODULE
7.1	Actual values and setpoints
7.2	System values
7.3	Time parameters
7.4	Options
7.5	Test functions
7.6	Local functions

The groups and their individual menu items are described in the respective chapters.

7.1 Actual values & setpoints



A	c	t	.	v	.	&	S	e	t	p	o	i	n	t	s
P	o	s	i	t	i	o	n								
D	e	v	i	c	e	s	t	a	t	u	s				
S	l	o	w	s	w	i	t	c	h	i	n	g			
N	o	.	s	t	o	p	.	p	o	i	n	t	s		
S	t	o	p	.	p	t	.	C	e	n	t	r	e		

With the menu group **Actual values- & setpoints** all actual value and setpoint parameters can be displayed and programmed.

Pressing the keys  or  directly selects

the individual menu items and the flashing menu item is selected with the key

 The value assignment of the selected menu item

is done with the  and  keys (see page 19).

7.1.1 Position

With this menu item the current sash position is displayed.

When the flashing menu item Position is selected with the ENTER key, the following may be displayed (depending on the sash position):

	P	o	s	i	t	i	o	n							
				5		%									
E	N	T	E	R	-	>	M	e	n	u					

Sash fully open = 100%, sash fully shut = 0%. This menu item is used for checking the sash position against internal recording and should be carried out after first-time use for control purposes.

Pressing the ENTER key returns you to the menu item **Position**.

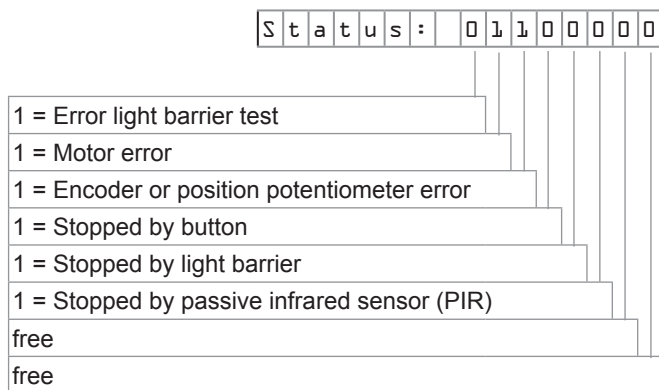
7.1.2 Device status

With this menu item the current device status is displayed.

When the flashing menu item **Device status** is selected with the ENTER key, the following may be displayed (depending on the status of the device):

	S	t	a	t	u	s	S	C	5	0	0				
S	t	a	t	u	s	:	0	1	1	0	0	0	0		
E	N	T	E	R	-	>	M	e	n	u					

The assignment of the status bits is as follows:



With this menu item switching to slow movement is programmed. Switching to slow movement is always carried out when the sash approaches the selected stopping point.

Switching to slow movement	7.1.3
----------------------------	-------

Switching point during slow movement	Value range: 0 ... 20 %
	Factory setting: 5 %

With this menu item the number of stopping points for motor-driven movement of the sash is programmed. In the case of 2 stopping points, the sash only stops at TOP or BOTTOM.

Number of stopping points	7.1.4
---------------------------	-------

In the case of 3 stopping points, when the sash is **OPENED via the motor**, it moves to an additional, third stopping point, the position of which is freely programmable. When the sash is **SHUT via the motor**, this 3rd stopping point is ignored, i.e. the sash moves directly to the sash position BOTTOM.

Number of stopping points	Value range: 2 or 3 stopping points
	Factory setting: 2 stopping points

With this menu item the position of the stopping point Centre (3rd stopping point) is programmed. The position of the third stopping point is specified as a percentage (%) of the full opening height, measured from the position of the closed sash (shut = 0 %).

Stopping point Centre	7.1.5
-----------------------	-------

Position centre stopping point	Value range: 10 ... 90 %
	Factory setting: 50 %

Quick reference:



The meaning of the menu items described on these two pages as well as the value range and the unit of the actual values and setpoints are described in the following table:




Actual values & setpoints		
Position	Sash position	Display of the sash position 0 ... 100 [%]
Device status	Status SC500	Device status SC500 ON =1, OFF =0 Status: 00110000
Slow switching	Switching to slow movement	Switching point during slow movement 0 ... 20 [%]
No. stopping points	Number of stopping points	Sash stopping points during motor-driven movement: 2 or 3
Stopping pt. Centre	Stopping point Centre	Position of the centre stopping point 10...90 [%]

7.2 System values

S	y	s	t	e	m	v	a	l	u	e	s								
S	p	e	e	d															
L	i	g	h	t	b	a	r	r	i	e	r								
L	i	g	h	t	b	a	r	.	t	y	p	e							
S	o	f	t	w	a	r	e	v	e	r	s	i	o	n					
S	e	r	i	a	l	n	u	m	b	e	r								

With the menu group **System values** all system parameters can be displayed and programmed.

Pressing the keys  or  directly selects the individual menu items and the flashing menu item is selected with the key

 The value assignment of the selected menu item is done with the  and  keys (see page 19).

7.2.1 Speed



With this menu item the speed of the motor-driven movement of the sash is programmed. Speed 5 should be selected as the standard speed.

Speed 10 (fastest speed) should only be selected for walk-in fume hoods (the sash has farther to move).

Speed	Value range:	1 . . . 10
	Factory setting:	5

Pressing the ENTER key returns you to the menu item **Position**.

7.2.2 Light barrier



With this menu item you can specify whether a light barrier is mounted on the sash handle bar and whether it should be activated for the recognition of obstructions (YES/NO).

The light barrier is used for monitoring the automatic sash closing process (see also Recognition of obstructions on page 7). The controller can be operated with (YES) or without (NO) a light barrier. When it is operated without a light barrier (NO), there is no recognition of obstructions, i.e. there is no shutoff when the sash encounters during its downward movement, for example, objects that reach out from the interior.

Light barrier present	Value range:	Yes or No
	Factory setting:	Yes



The light barrier must be correctly adjusted and connected, otherwise the sash cannot be moved by the motor.

The light barrier can be temporarily set to NO (= switched off) so that possible errors can be found more quickly. When the light barrier is switched off, normal motor operation is possible.

CAUTION! It is essential to switch the light barrier on again (light barrier = YES)

Light barrier type 7.2.3

With this menu item you can specify whether the light barrier that is mounted on the sash handle bar is light switching or dark switching.

Light switching means that the light barrier switches when the beam of light is not interrupted. Dark switching means that the light barrier switches when the beam of light is interrupted. This function can usually be set on the light barrier itself (receiver).

Make sure that the light barrier type corresponds with the programmed light barrier function.



Light barrier switching	Value range:	light or dark
	Factory setting:	light

Software version 7.2.4

This menu item displays the software version of the connected device.

When the flashing menu item **Software version** is selected with the ENTER key, the following may be displayed (depending on the software version):

S	o	f	t	w	a	r	e	V	e	r	s	i	o	n
								1	.	0	c			
								S	C	5	0	0		
								E	N	T	E	R		

Serial number 7.2.5

With this menu item you can program, if necessary, an eight digit serial number. When the flashing menu item **Serial number** is selected with the ENTER key, the following may be displayed (depending on the serial number):

		S	e	r	i	a	l	n	u	m	b	e	r					
								1	2	3	4	5	6	7	8			
		0	-	9										E	N	T	E	R

An 8 figure, client-specific, user-defined serial number can be entered with the keys 0 to 9. The numbers are entered at the right and are moved from right to left and confirmed with the ENTER key and saved mains voltage-failure safe.

The serial number is saved on the SC500 controller board. It may be, for example, the delivery date or any other type of serial number and enables unique identification and traceability of the controller board.

Quick reference



The meaning of the menu items described on these two pages as well as the value range and the unit of the actual values and setpoints are described in the following table:




System values		
Speed	Speed of motor-driven movement	Sash movement speed: 1...10
Light barrier	Light barrier present	Light barrier present on the sash handle bar for recognition of obstructions: YES/NO
Light bar. type	Light barrier type	light or dark switching
Software version	SC500 version	Display software version of the SC500 controller.
Serial number	read/write	Read or assign the serial number 00000000...99999999

7.3 Time parameters

T	i	m	e	p	a	r	a	m	e	t	e	r	s
P	I	R		d	e	l	a	y					
E	x	t	e	n	s	i	o	n					

With the menu group **Time parameters** all time parameters of the SC500 controller can be programmed and displayed.

Pressing the keys  or  directly selects the individual menu items and the flashing menu item is selected with the key

 The value assignment of the selected menu item is done with the  and  keys (see page 19).

7.3.1 PIR delay

With this menu the delay time (lowering delay time) is programmed. The delay time specifies the time that will elapse before the sash is automatically closed. The delay time starts when the user has left the active monitoring area of the PIR sensor (passive infrared sensor).

After the delay time has elapsed, the automatic closing process begins.

Delay time automatic closing	Value range:	10...1800 s
	Factory setting:	300 s

The minimal adjustment takes place in increments or decrements of 10.

7.3.2 Extension

With this menu item the lowering delay time is programmed. This is a temporary time interval (1 ... 30 minutes) that prolongs the PIR delay time when the TIME EXTENSION button is pressed.



The lowering delay time is extended only once immediately after the TIME EXTENSION button is pressed. When this button is pressed several times in succession, the time interval is summed up internally (max. 4 additions), making it possible to achieve a maximum extension of the lowering delay time of 4 x 30 minutes = 2 hours (see also Time extension button on page 7).

Extension interval PIR	Value range:	1...30 min
	Factory setting:	15 min

Quick reference:

The meaning of the menu items described on this page as well as the value range and the unit of the actual values and setpoints are described in the following table:



Time parameters		
PIR delay	Delay time automatic closing	Delay time (lowering delay time) for automatic closing [10 ... 1800 s]
Extension	Extension interval PIR	Extension of the lowering delay time [1 ... 30 min]




left blank for notes

7.4 Options

0	p	t	i	o	n	s													
T	o	u	c	h	c	o	n	t	.	U	P								
T	o	u	c	h	c	o	n	t	.	D	O	W	N						
T	e	s	t	l	i	g	h	t	b	a	r	.							
L	i	m	i	t	s	w	.	B	O	T	T	O	M						
L	i	m	i	t	s	w	.	T	O	P									
S	t	o	p	p	e	d	b	y	P	I	R								
R	e	s	t	a	r	t	1												
R	e	s	t	a	r	t	2												
O	u	t	p	u	t	s	i	g	n	a	l								
R	e	l	a	y	s														
S	w	i	t	c	h	t	y	p	e										
W	i	n	d	o	w	h	e	i	g	h	t								

With the menu group **Options** special configurations and functionality of the SC500 controller can be programmed and displayed.

Pressing the keys  or  directly selects the individual menu items and the flashing menu item is selected with the key

 The value assignment of the selected menu item is done with the  and  keys (see page 19).

7.4.1 Touch control UP

With this menu item the touch control for the UP function is programmed. If the sash is manually pushed in the direction UP, the internal electronics recognise the direction and open the sash via the motor. The sash automatically stops in the position TOP or at the stopping point Centre (if 3 stopping points have been programmed).

Touch control on opening	Value range:	Yes or No
	Factory setting:	No

7.4.2 Touch control DOWN

With this menu item the touch control for the DOWN function is programmed. If the sash is manually pushed in the direction DOWN, the internal electronics recognise the direction and close the sash via the motor. The sash automatically stops in the position BOTTOM.

Touch control on closing	Value range:	Yes or No
	Factory setting:	No

7.4.3 Test light barrier

With this menu item, you can specify whether the light barrier should be automatically tested before each closing process.

With a **light switching** light barrier (preferred setting) a function test of the light barrier can be carried out before each motor-driven closing of the sash. This involves temporarily switching off the light barrier and checking that no input signal is present. This internal test and monitoring function prevents incorrect interpretations of the light barrier signal when there is a short-circuit in the signalling lines or scattered light (reflections).

This internal test considerably improves operating safety.

Light barrier test	Value range:	Yes or No
	Factory setting:	No

Limit switch bottom 7.4.4

With this menu item you can specify whether a BOTTOM limit switch is present.

The BOTTOM limit switch is obligatory at the customer site and must always be installed.



Limit switch down present	Value range:	Yes or No
	Factory setting:	Yes

Limit switch top 7.4.5

With this menu item you can specify whether a TOP limit switch is present.

The limit switch TOP is supplied by the customer and is not included in a standard installation. It is only required for special operating modes.

Limit switch top present	Value range:	Yes or No
	Factory setting:	No

Stopped by PIR 7.4.6

With this menu item the behaviour of the sash during automatic closing is programmed.

If the sash is automatically closed and the movement detector (PIR) is activated during the closing process, with this option you can select whether the closing process is cancelled (sash stops immediately) or brought to an end (sash is closed).

Stopped by PIR during automatic closing	Value range:	Yes or No
	Factory setting:	No

Restart 1 7.4.7

With this menu item restart process 1 is programmed.

This is used when the SC500 is stopped during its downward movement by an interruption of the light barrier. When automatic movement of the sash starts again, the window can either continue to move downwards or can first move upwards 2 cm.

Restart with move up 2cm	Value range:	Yes or No
	Factory setting:	Yes

Restart 2 7.4.8

With this menu item restart process 2 is programmed.

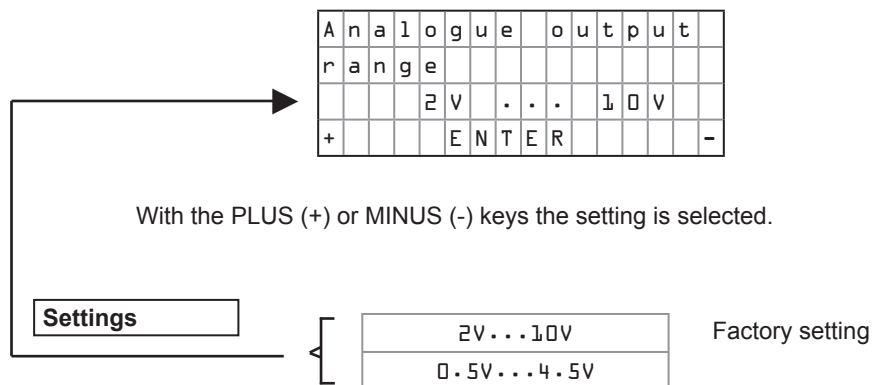
This is used when the SC500 is stopped during its downward movement by an interruption of the light barrier. Renewed automatic movement can be activated with this menu item so that it is only carried out when the sash is manually pushed at least 3 cm, or only when no manual movement of the sash takes place.

Restart only after movement	Value range:	Yes or No
	Factory setting:	Yes

7.4.9 Output signal

With the menu item the voltage range of the output signal is programmed.

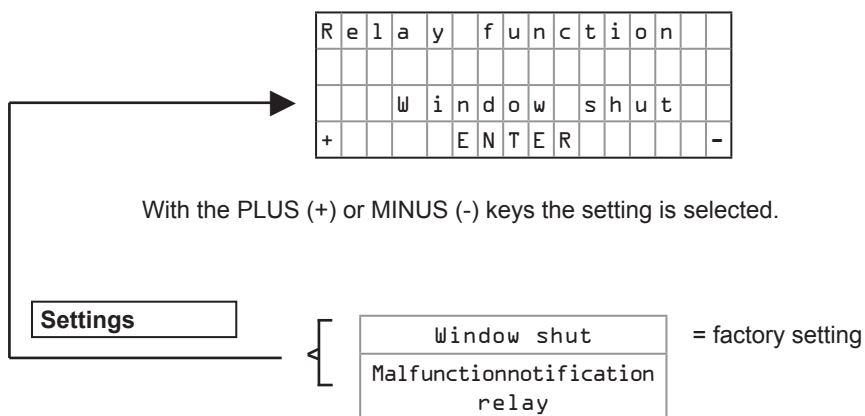
The analogue voltage on terminals X6.32 (2...10V DC) and X6.33 (GND) is emitted in proportion to the sash position (sash open = 10V oder 4.5V, sash closed = 2V or 0.5V). The analogue output serves as a setpoint (sash position) for the fully variable FC500 controller and can be connected directly.



7.4.10 Relay

With this menu item the K1 relay is defined.

The relay can either be programmed as a malfunction notification relay or as a window BOTTOM relay. When the sash is closed and the limit switch BOTTOM is pressed, the K1 relay pulls in in the Window shut mode.



7.4.11 Switch type

This menu item (Switch type) defines the contact type (N.O. = normally open or N.C. = normally closed) and the switching operation of the light barrier.

When the flashing menu item **Switch type** is selected with the ENTER key, the following is displayed:

F 1 :	L S B	F 2 :	L S U
F 3 :	E O	F 4 :	E S
F 5 :	P I R	F 6 :	L B
F 7 :	T E		

With the function keys F1 to F7 the contact type (N.O = normally open or N.C. = normally closed) of the corresponding switch or the light barrier is defined.

The meaning of the function keys F1 to F7 as well as the value range are displayed in the following table:

Options			
Switch type			
F1:	LSB	Limit switch bottom	Contact type N.O. (normally open) or N.C. (normally closed)
F2:	LST	Limit switch top	Contact type N.O. (normally open) or N.C. (normally closed)
F3:	EO	EMERGENCY OPEN	Contact type N.O. (normally open) or N.C. (normally closed)
F4:	ES	EMERGENCY SHUT	Contact type N.O. (normally open) or N.C. (normally closed)
F5:	PIR	Presence detector	Contact type N.O. (normally open) or N.C. (normally closed)
F6:	LB	Light barrier	Contact type N.O. (normally open) or N.C. (normally closed)
F7:	TE	Time extension	Contact type N.O. (normally open) or N.C. (normally closed)

The contact type definition is confirmed with the ENTER key and you are returned to the menu item **Switch definition**.

With this menu item the window height is programmed.

Window height	7.4.12
----------------------	---------------

This function is used for controlling the speed. In walk-in fume hoods (window height = 2 m) the speed of movement is somewhat faster than with bench fume hoods (window height = 1 m).

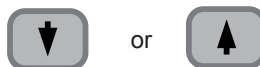
Window height	Value range:	0.5...2.0 m
	Factory setting:	1.0 m

7.5 Test functions

T	e	s	t	f	u	n	c	t	i	o	n	s		
S	e	l	f	-	t	e	s	t						
S	t	a	t	u	s	s	e	l	f	t	e	s	t	
D	e	v	i	c	e	s	t	a	t	u	s			

With the menu group **Test functions** the self-test can be carried out (this is essential before the SC500 automatic sash controller is used for the first time) and hardware test routines can be displayed.

Pressing the keys



or

directly selects the individual menu items and the flashing menu item is selected with the key



The value assignment of the selected menu item

is done with the



and



keys (see page 19).

7.5.1 Self-test



CAUTION!

It is essential to carry out a **SELF-TEST** before the SC500 automatic sash controller is used for the first time or when the controller board or drive unit has been replaced.

Proper functioning of the SC500 automatic sash controller cannot be guaranteed until the **SELF TEST** has been performed successfully.



With this menu item (Self-test) the self-test is carried out before the SC500 automatic sash controller is used for the first time. This self-test checks all sensors and actuating elements.

The person who starts up operation of the controller is requested to position the sash at two different heights (2 stages), to define the direction of movement with the service module and to start certain test functions.

When the self-test has been completed, the main functions have been checked and the SC500 automatic sash controller is ready for operation.

The following prerequisites must be fulfilled for a successful self-test:

Prerequisites for the self-test

1. All relevant parameters must be correctly set and adjusted to the corresponding fume hood type (see Parameter settings (Chapter 7) and Quickstart (Chapter 8)).
2. The cabling must have been carried out correctly.
3. Mounting of the drive unit must be mechanically stable and the rubber drive roller must secure the sash cable in such a way that it cannot slip, thus ensuring that the sash can be opened automatically (**CAUTION! Select the correct cable size for the sash**).

When the flashing menu item **Self test** is selected with the ENTER key, the following is displayed:

T	e	a	c	h	-	I	n	S	C	5	0	0		
W	i	n	d	o	w	o	p	e	n	3	0	c	m	
s	e	t				=	F	3						
C	a	n	c	e	l		=	S	P	A	C	E		

Pressing the F3 key starts the self-test (first position the sash at approx. 30 cm), pressing the SPACE key cancels the self-test and you are returned to the menu item Self-test.

The SELF-TEST now runs fully automatically in 3 stages, each with different sash positions. The three sash positions are:

Stage 1	Sash open approx. 30 cm
Stage 2	Sash fully shut
Stage 3	Sash fully open

Self-test of the SC500 automatic sash controller in 3 stages

Manually open the sash to 30 cm and confirm with the F3 key (start self-test). The sash now moves automatically for approx. 1 s in a specific direction (UP or DOWN, depending on which side the drive unit is mounted). Confirm the observed motor-driven direction of movement UP or DOWN with the F7 or F8 key.

Self-test Stage 1

Confirm the observed motor-driven direction of movement UP or DOWN with the F7 or F8 keys.

T	e	a	c	h	-	I	n	S	C	5	0	0		
U	p	w	a	r	d	s		=	F	7				
D	o	w	n	w	a	r	d	s	=	F	8			
C	a	n	c	e	l			=	S	P	A	C	E	

As soon as the SELF TEST has completed the 1st stage, you are asked to manually close the sash completely and to confirm with the F1 key. The sash now moves upwards for approx. 1 s.

Self-test Stage 2

Manually close the sash and confirm with the F1 key.

T	e	a	c	h	-	I	n	S	C	5	0	0		
W	i	n	d	o	w	f	u	l	l	y				
s	h	u	t			=	F	1						
C	a	n	c	e	l			=	S	P	A	C	E	

As soon as the 2nd stage is completed, you are asked to fully open the sash. When the sash has been fully opened, confirm this by pressing the F5 key. The sash is now moved downwards via the motor and switches off in the shut position. The SELF-TEST is now complete. Check the status Self-test and check when the BOTTOM limit switch has been recognised.

Self-test Stage 3

Manually open the sash and confirm with the F5 key. The sash moves downwards into the shut position. The self-test is now complete.

T	e	a	c	h	-	I	n	S	C	5	0	0		
W	i	n	d	o	w	f	u	l	l	y				
o	p	e	n			=	F	5						
C	a	n	c	e	l			=	S	P	A	C	E	

A successful self-test requires less than 1 minute.

Check the BOTTOM limit switch and the TOP limit switch (if mounted)!
 The BOTTOM limit switch must always be mounted at the client site, while the UP limit switch is only mounted for special operating modes. The self-test automatically recognises the limit switch. Both limit switches always take precedence over the encoder position when the sash is stopped. The BOTTOM limit switch is for automatic correction of the encoder position, if this has been displaced because the steel cable or the drive belt has slipped, and ensures that the downwards movement is stopped in the shut position.



7.5.2 Status self-test

With this menu item (Status self-test) the current test status is displayed, which improves transparency of the test progress.

Self-test successful

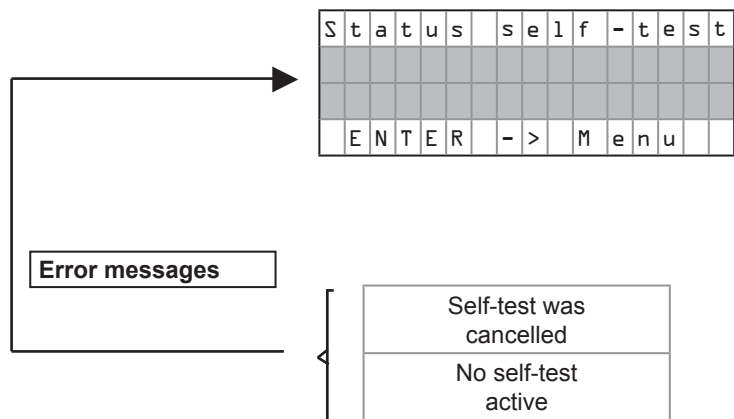
When the self-test has run successfully, the following is displayed:

S	t	a	t	u	s		s	e	l	f	-	t	e	s	t
S	e	l	f	-	t	e	s	t							
s	u	c	c	e	s	s	f	u	l						
E	N	T	E	R		-	>		M	e	n	u			



The SC500 automatic sash controller is now ready for operation. Check the passive infrared sensor function by manually opening the sash and leaving the area of the sensor. After the programmed PIR time delay, the sash must close automatically.

Error messages after the self-test



left blank for notes

7.5.3 Device test

With this menu item (Device test) the digital inputs, analogue inputs, analogue outputs and the servo motor can be separately displayed and tested.

T	e	s	t	f	u	n	c	t	i	o	n	s		
S	e	l	f	-	t	e	s	t						
S	t	a	t	u	s	s	e	l	f	t	e	s	t	
D	e	v	i	c	e	t	e	s	t					

When the flashing menu item **Device test** is selected with the ENTER key, the following is displayed:

F 1 :	D	i	g	i	t	a	l	I	N		
F 2 :	A	n	a	l	o	g	I	N			
F 3 :	A	n	a	l	o	g	O	U	T		
F 4 :	M	o	t	o	r						

The desired test function is selected with the function keys F1 to F4.

7.5.3.1 Display digital inputs

Pressing the F1 key displays the digital inputs and the following is displayed (example):

1	1	2	3	4	5	6	7	8	
	0	0	0	0	1	1	0	0	3
	1	2	3	4	5	6	7	8	
	0	0	-	-	-	-	-	-	

The meaning of fields 1 ... 3 is as follows:

	Display	Meaning	Description digital input	Terminal (Signal)	Terminal (GND)	from	to
Field 1	1	Digital input 1	Limit switch TOP	X6.17	X3.9	0	1
	2	Digital input 2	UP button	X6.19	X3.9	0	1
	3	Digital input 3	DOWN button	X6.25	X3.9	0	1
	4	Digital input 4	STOP button	X6.23	X3.9	0	1
	5	Digital input 5	EMERGENCY OPEN	X6.29	X3.9	0	1
	6	Digital input 6	EMERGENCY SHUT	X6.31	X3.9	0	1
	7	Digital input 7	Light barrier	X4.12	X3.9	0	1
	8	Digital input 8	Limit switch BOTTOM	X5.14	X3.9	0	1
Field 2	1	Digital input 9	Button Time extension	X6.27	X3.9	0	1
	2	Digital input 10	Passive infrared sensor (PIR)	X3.8	X3.9	0	1
	3	-					
	4	-					
	5	-					
	6	-					
	7	-					
	8	-					

Legend Field 3

0 = no current on the input (0V) or contact open
 1 = Current on the input (24V DC) or contact closed

Pressing the ENTER key returns you to the menu item **Device test**.

Pressing the F2 key displays the analogue inputs and the following is displayed (example):

Display analogue input analogue output	7.5.3.2
---	----------------

A	n	a	l	o	g	u	e	I	n				
W	:	0	.	0	V			A	:	0	.	5	V
E	:			x	x	x							
E	N	T	E	R	-	>	M	e	n	u			

The meaning of the abbreviations is as follows:

Field	Display	Meaning	Description	Terminal (Signal)	Terminal (GND)	from	to
W:	1.5V	Analogue input	Sash position sensor SPS100	X9.35	X9.36	0.0V	5.0V
A:	0.5V	Analogue output	Output value analogue output	X6.32	X6.33	0.5V or 2V	4.5V 10V
E:	xxx	Encoder input	Dependent on the sash position	-	-	000	999

Pressing the ENTER key returns you to the menu item **Device test**.

Pressing the F3 key displays the analogue output and the following is displayed (example):

Display analogue output	7.5.3.3
------------------------------------	----------------

A	n	a	l	o	g	u	e	0	u	t			
1	:	0	.	5	V								
E	N	T	E	R	-	>	M	e	n	u			

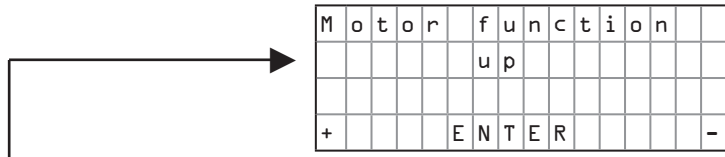
The meaning of the abbreviations is as follows:

Field	Display	Meaning	Description analogue output	Terminal (Signal)	Terminal (GND)	from	to
1:	0.5V	Analogue output	Proportional to sash opening 0.5V...4.5V or 2V...10V	X6.32	X6.33	0.5V	10.0V

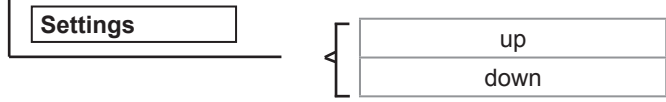
Pressing the ENTER key returns you to the menu item **Device test**.

7.5.3.4 Motor test

Pressing the F4 key carries out the motor test (damper motor) and the following is displayed (example):



The motor control can be programmed with the PLUS (+) and MINUS (-) keys. The following settings are available for selection:



The sash is now moved UP or DOWN via the motor.



Pressing the ENTER key returns you to the menu item **Device test**.




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7.6 Local function

L	o	c	a	l	f	u	n	c	t	i	o	n		
U	s	e	r	l	e	v	e	l						

With the menu group **Local functions**, specific functions for the service module, such as the user level, can be selected.

Pressing the keys  or  directly selects the individual menu items and the flashing menu item is selected with the key

 The value assignment of the selected menu item is done with the  and  keys (see page 19).

9.6.1 User level

With this menu item (User level) the SVM100 service module access rights to the individual parameters are defined.


When the flashing menu item **User level** is selected with the ENTER key, the currently set user level of the SVM100 service module is displayed. The new user level is selected with the PLUS (+) and MINUS (-) keys and confirmed with the ENTER key.

User level 0 or 1 can be selected.

User level 0

User level 0 is only intended for the display of actual value and setpoint parameters and no changes can be made in this mode.

CAUTION!
User level 1
Only suitable for experienced and trained specialists.



At user level 1 all parameters of the controller can be changed and overwritten. Improper use and incorrect programming can lead to errors or even to the failure of the entire system. The controller must then be put into operation again.

User level 1 is only suitable for experienced and trained specialists.

Changing the user level

User level 1 is password protected and can only be selected if the correct password is entered. If the password is not entered correctly, it is not possible to change from user level 0 to 1.

If you are qualified/authorised to program the controller at user level 1, you can request the password at the following address:

SCHNEIDER Elektronik GmbH
 Industriestraße 4
 61449 Steinbach • Germany
 Phone: +49 (0) 6171/88 479-0 • Fax: +49 (0) 6171/88 479-99
 e-mail: info@schneider-elektronik.de
 Internet: http://www.schneider-elektronik.com

SCHNEIDER Elektronik GmbH accepts no liability for incorrect programming of the parameters at user level 1.

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8.0 SC500 Parameter liste (Quick Reference)

Groups	Menu 1	Chapter	Page
Actual values & setpoints		7.1	20
	Position	7.1.1	20
	Device status	7.1.2	20
	Switching to slow movement	7.1.3	21
	Number of stopping points	7.1.4	21
	Stopping point Centre	7.1.5	21

Groups	Menu 1	Chapter	Page
System values		7.2	22
	Speed	7.2.1	22
	Light barrier	7.2.2	22
	Light barrier type	7.2.3	23
	Software version	7.2.4	23
	Serial number	7.2.5	23

Groups	Menu 1	Chapter	Page
Time parameters		7.3	24
3 ▶	PIR delay	7.3.1	24
	Extension	7.3.2	24
	Buzzer duration	7.3.3	

Groups	Menu 1	Menu 2	Meaning	Chapter	Page
Options				7.4	26
	Touch control UP			7.4.1	26
	Touch control DOWN			7.4.2	26
	Test light barrier			7.4.3	26
	Limit switch bottom			7.4.4	27
	Limit switch top			7.4.5	27
	Stopped by PIR			7.4.6	27
	Restart 1			7.4.7	27
	Restart 2			7.4.8	27
	Output signal			7.4.9	28
	Relay			7.4.10	28
	Switch type			7.4.11	28
		F1: LSB	Limit switch bottom		
		F2: LST	Limit switch top		
		F3: EO	EMERGENCY OPEN		
		F4: ES	EMERGENCY SHUT		
		F5: PIR	Presence detector		
		F6: LB	Light barrier		
		F7: TE	Time extension		

Groups	Menu 1	Menu 2	Meaning	Chapter	Page
Test functions				7.5	30
1 ▶	Self-test			7.5.1	30
2 ▶	Status self-test			7.5.2	32
	Device test			7.5.3	34
		F1: Digital IN	Display digital inputs	7.5.3.1	34
		F2: Analogue IN	Display analogue inputs	7.5.3.2	35
		F3: Analogue OUT	Display analogue output	7.5.3.3	35
		F4: Motor	Motor test	7.5.3.4	36

Groups	Menu 1	Chapter	Page
Local functions		7.6	38
	User level	7.6.2	38



It is essential to carry out and check steps 1 ▶ to 3 ▶ before first-time use.

9.0 SC500 Troubleshooting errors

Error:	Motor-driven drive unit not working.
Cause:	230V AC power supply not connected or faulty.
Correction:	Ensure that the correct supply voltage is connected and check the series fuse.
Check:	Check with a multimeter on the supply terminal whether the correct supply voltage 230V AC is available. When the supply voltage is switched on the green RUN LED flashes on the controller board.
Cause:	Fuses on the controller board are faulty.
Correction:	Check all connections for correct cabling. Replace fuse F1 and/or F2. It is essential to use the same fuse type with the correct safety voltage.
Check:	When the supply voltage is switched on, the green RUN LED on the controller board flashes.
Note:	It is essential to remove the device from the current before the fuses are replaced.
Cause:	Connection cable from the drive unit to the controller not connected or faulty.
Correction:	Check the connector on the drive unit and the controller board to make sure that it is securely fixed and has good contact and secure it mechanically. Replace faulty cable.

Error:	UP/DOWN/STOP button not working
Cause:	Connection cable from the external control panel to the controller board is faulty or wrongly connected.
Correction:	Check the terminal connection of the connection cable for the UP, DOWN and STOP buttons and connect it correctly.
Check:	Check with a multimeter on the input terminal whether the correct button is connected by pressing the button.
Note:	The external control panel has potential-free contacts for the UP, DOWN and STOP functions.
Cause:	230V AC or 115V AC power supply not connected or faulty.
Correction:	Ensure that the correct supply voltage is connected and check the series fuse.
Check:	Check with a multimeter on the supply terminal whether the supply voltage 230V AC or 115V AC is present. When the supply voltage is switched on the green RUN LED on the controller board lights up.
Cause:	Fuses on the controller board are faulty.
Correction:	Check all connections for correct cabling. Replace fuse F1 and/or F2. It is essential to use the same fuse type with the correct safety voltage.
Check:	When the supply voltage is switched on, the green RUN LED on the controller board flashes.
Note:	It is essential to remove the device from the current before the fuses are replaced.
Cause:	Connection cable from the drive unit to the controller is not connected or is faulty.
Correction:	Check the connector on the drive unit and the controller board to make sure that it is securely fixed and has good contact and secure it mechanically. Replace faulty cables.

Error:	The sash stops during upward or downward movement, even though the light barrier is not interrupted by an obstruction.
Cause:	Emitter and receiver optics of the light barrier are dirty.
Correction:	Clean the emitter and receiver optics of the light barrier.
Check:	Check with a multimeter on the input terminal whether the light barrier switches.
Cause:	Light barrier cable is faulty or the cabling is disconnected.
Correction:	Replace the faulty light barrier. Analyse the cause of the cable defect and ensure that the automatic cable rewind for the light barrier cable is working correctly.
Check:	The control LED on the receiver light barrier must light up and react to an interruption of the light beam. Check with a multimeter on the input terminal whether the light barrier switches.
Note:	Poor construction of the light barrier cable rewind can result in the light barrier cable being crushed or otherwise damaged and can lead to a short circuit or disconnection of the cable.
Cause:	Light beam of the light barrier is misaligned.
Correction:	Adjust the light beam of the emitter and receiver unit and check whether the covers are installed.
Check:	The control LED on the receiver light barrier must light up and react to an interruption of the light beam. Check with a multimeter on the input terminal whether the light barrier switches.
Note:	If the light barrier is not securely fixed, the light beam may be incorrectly aligned (e.g. due to mechanical impact).
Cause:	Sensitivity of the receiver light barrier is not set correctly.
Correction:	Set the sensitivity of the receiver light barrier to the correct value with a potentiometer.
Check:	The control LED on the receiver light barrier must light up and react to an interruption of the light beam. Check with a multimeter on the input terminal whether the light barrier switches.
Cause:	Passive infrared sensor (PIR) not switching correctly.
Correction:	Check the sensitivity of the passive infrared sensor (PIR) and set it correctly.
Check:	The control LED on the passive infrared sensor must light up when a person is in the monitoring area of the sensor and must go out when a person is not the monitoring area.
Note:	Check the passive infrared sensor for correct mounting.
Cause:	Loose connection in the connection cable from the drive unit to the controller.
Correction:	Check the connector on the drive unit and the controller board to make sure that it is securely fixed and has good contact and secure it mechanically. Replace faulty cables.

Error:	Automatic closing process not working.
Cause:	Passive infrared sensor (PIR) not switching correctly.
Correction:	Check the sensitivity of the passive infrared sensor (PIR) and set it correctly. Check the relay output of the passive infrared sensor (PIR) and the terminal connection on the controller board.
Check:	The control LED on the passive infrared sensor must light up when a person is in the monitoring area of the sensor and must go out when a person is not the monitoring area.
Note:	Check the passive infrared sensor for correct mounting.
Cause:	Check the emitter and receiver optics of the light barrier.
Correction:	Clean the emitter and receiver optics of the light barrier.
Check:	Check with a multimeter on the input terminal whether the light barrier switches.
Note:	Thoroughly check the light barrier for faulty cables or misalignment and make sure that the correct sensitivity is set.



Maintenance of the SC500 automatic sash controller should be done at the same time as the yearly fume hood maintenance.

During yearly fume hood maintenance, among other things the sash cable guide and friction on the drive unit must be checked and then a function test must be carried out.

Check the button functions UP, DOWN, STOP and the foot switch (if present). Check the stopping points BOTTOM, CENTRE and TOP using the motor.

Check that the passive infrared sensor is functioning correctly and start the automatic closing process of the sash after the sash has been manually opened.

Check the light barrier function during downwards movement.

Then select the menu item **Actual value position** in the SVM100 service module and check whether the displayed value corresponds with the actual position of the sash.

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TECHNICAL DATA

11.0 Technical data

■ General

Nominal voltage (see terminal diagram for correct Jumper position od JP1 and JP2)	230V AC/50/60Hz/+/-15% 115V AC/50/60Hz/+/-15%
Fuse F1 (230V AC)	500mA/250V delay fuse
Fuse F1 (115V AC)	1A/115V delay fuse
Fuse F2	3.15A/250V delay fuse
Max. power input	80 VA
Operating temperature	+5 °C to +40 °C
Humidity	max. 80 % relative, non-condensing

■ Controller case

Protection type	IP 20
Material	sheet steel
Colour	blue
Dimensions (LxWxH)	(290 x 208 x 100) mm
Weight	approx. 3.2 kg
Terminals	screw terminal 1.5 mm ²

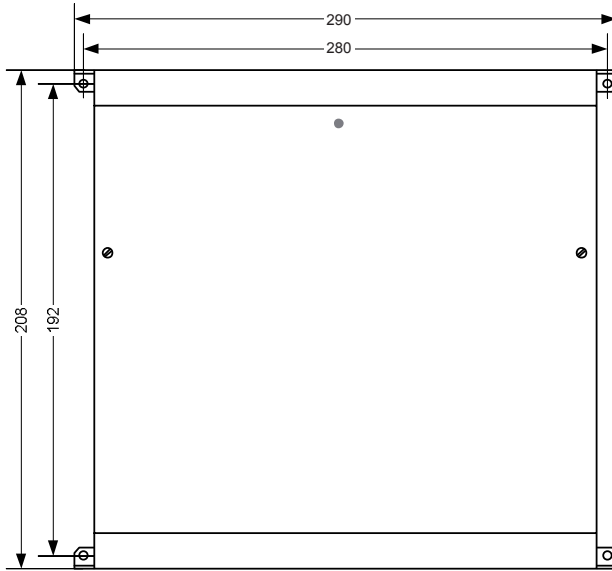
■ Drive unit

Weight	approx. 4.6 kg
Dimensions (WxHxD)	(200 x 200 x 180) mm
Torque motor	approx. 3 Nm
Torque magnetic clutch	approx. 7 Nm

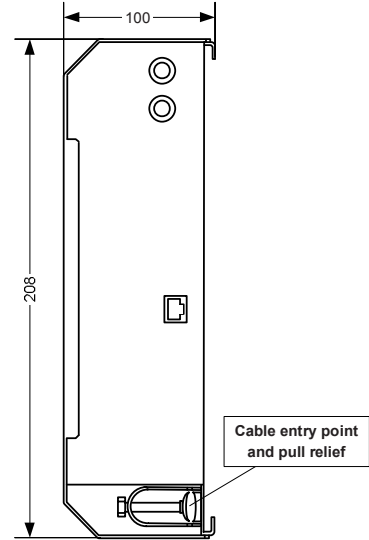


The buttons UP, DOWN, STOP and the foot switch are available as additional accessory (not included in the standard scope of delivery).

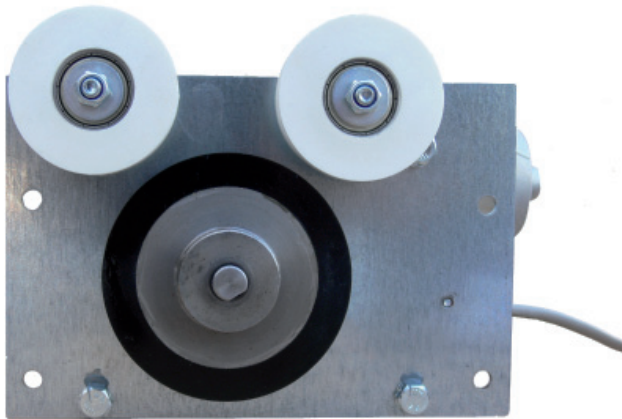
Case SC500: Top view



Case SC500: Side view



Drive unit SC500: Front view



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U**V****W****X****Y****Z**

A1 FIRST TIME USE

1.1 REQUIRED RESOURCES

For first time use you need the following:

Quantity	Item
1	Service module SVM100 or laptop with PC software PC2500 installed (USB stick)
1	Screwdriver for terminals
1	Multimeter (V, A, Ohm)
1	Operating and mounting instructions (if necessary, download these from the website www.schneider-elektronik.de)

1.2 MOUNTING THE COMPONENTS

Mount the components in accordance with the operating and mounting instructions (5.1 to 5.4, steps 1 to 5, page 10 ff.) and, for the moment, do not attach the passive infrared sensor (PIR) and light barrier (IRL 100) components.

Manually check the sash to make sure that it can easily be moved.

1.3 BASIC WIRING OF THE COMPONENTS

For first time use, it is easier to carry out "basic" or "minimal" wiring and then run the self-test. After a successful self-test, the additional components such as the passive infrared sensor (PIR) and the light barrier are connected one after the other and their functions are tested individually.

BASIC / MINIMAL WIRING for first time use		
from	to	plug
Motor drive unit	SC500 control electronics	X8
Path sensor SPS100	SC500 control electronics	X9
Power supply 230V AC	SC500 control electronics	X1

If you already have sufficient experience with the SC500 product, you can of course fully wire all components in accordance with the operating and mounting instructions (5.1 to 5.6, steps 1 to 6, page 10 ff.) and then proceed immediately to commissioning.

1.4 CARRY OUT SELF TEST

Carry out the self-test in accordance with the operating and mounting instructions (see page 30 ff.).

1.5 PASSIVE INFRARED SENSOR (PIR) WIRING

Correctly wire the passive infrared sensor (PIR) with X3.7 to X3.10 in accordance with the terminal diagram and measure the supply voltage on the PIR supply terminals (+15V DC). Set up the PIR in accordance with Appendix A2 of the operating and mounting instructions.



All jumpers J1 to J4 must be connected on the PIR (make: Paradoor).

The green LED at the bottom of the PIR must light up when a person is detected and goes out as soon as no one is in the sensor area of the PIR.



If no passive infrared sensor (PIR) is connected, connect the wire jumper from terminal X3.8 to X3.9, otherwise the automatic sash closing will not work.

So that testing the automatic sash closing does not take up too much time, the PIR time delay is first changed to 10 s (see operating and mounting instructions, 7.3.1 PIR delay, page 24).

TEST PIR (10 s)	1.6
-----------------	-----

Open the sash, leave the sensor area (the green LED on the PIR goes out) and wait 10 s. After 10 s, the sash closes automatically.

Connect the infrared light barrier in accordance with the data sheet and connect the cable to terminals X4.11 to X4.13 (see terminal diagram).

LIGHT BARRIER WIRING	1.7
----------------------	-----

It is essential to follow the mounting instructions for the light barrier (see operating and mounting instructions, 5.4 step 4, page 10 ff.). Here are a few mounting examples for 3-wire operation (standard).



For 3-wire operation, the JP3 jumper must be connected (via terminal X4), while for 2-wire operation the JP3 jumper must be removed!

The following settings are necessary in order to activate the light barrier (see operating and mounting instructions, 7.2.2 Light barrier, page 22, 7.2.3 Light barrier type, page 23).

LIGHT BARRIER SETTINGS	1.8
------------------------	-----

It is essential to ensure that the set light barrier type (light or dark) corresponds with the switch setting on the light barrier (receiver) (light or dark). The light barrier SA1E-TN1 included in the delivery is always light switching (light barrier type = light).

Adjust and set the light barrier in accordance with the operating and mounting instructions in Appendix 4 and Appendix 5.

LIGHT BARRIER ADJUSTMENT	1.9
--------------------------	-----

Open the sash and during the automatic closing process, interrupt the light barrier (make sure that the PIR does not detect any movement and that the sash automatically stops (see setting 7.4.6 Stopped by PIR, page 27)). The sash must come to a stop immediately when the light barrier is interrupted.

LIGHT BARRIER TEST	1.10
--------------------	------

The PIR delay time for the start of the automatic closing process should now be set to the operating value (e.g. 300 s = 5 min) (see operating and mounting instructions, 7.3.1 PIR delay, page 24).

OPERATING SETTINGS	1.11
--------------------	------

If desired, touch control can now be activated (see operating and mounting instructions, 7.4.1 Touch control UP, page 26, 7.4.2 Touch control DOWN, page 26).



IMPORTANT!

When mounting the movement detector, make sure that it is not pointed directly towards a source of strong heat (for example, radiators, etc.). This could cause problems with the detector's sensitivity and could also lead to false alarms.

Opening the detector

Take a narrow screwdriver and insert it into the small notches at the bottom of the rear side of the detector. Then carefully lever the rear panel out of its fastening.

Mounting:

Pierce the cable bushing at the desired position and feed the cable through it. In order to achieve a full coverage area for the detector, it is possible to increase the distance between the detector and the wall using the enclosed distance sleeves. Make sure that nothing confines the detection area. Now connect the detector to the cables. If you want to control a door opener with the transistor output, ensure that the maximum current does not exceed 2ADC. (Note: The factory setting for the transistor output is programmed as NC, like the relay output, i.e.: the resting position of the transistor output is at earth.)

To close the case, place the front panel with the surface first on the rear panel and carefully press it on. To open the case again, carefully pull on the raised part directly in front of the lens.

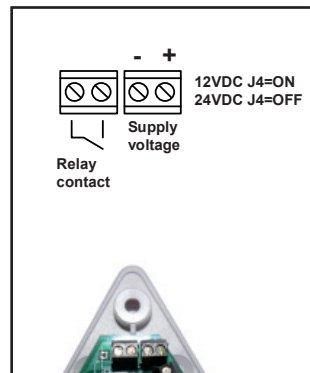
Setting the beam angle

It is possible to change the beam angle of the detector from the predefined setting of 0° to 10°. To do this, you must remove the lens fastening from its position and turn the lens 180° so that both notches of the lens are aligned with the notches of the case. Now return the lens fastening to its original position.

Setting the alarm duration

The duration of the alarm can be determined using the potentiometer at the top of the detector (opening times for door opener). To increase the time, turn the potentiometer clockwise. To reduce the time, turn it in the other direction.

Terminal connection:



Jumper

Paradoor has four jumper.

- Jumper 1: open = LED On
closed = LED Off
- Jumper 2: closed = relay contact is NC
open = relay contact is NO
- Jumper 3: should be always closed
- Jumper 4: closed = voltage 12VDC
open = voltage 24VDC

■ Technical data	
Supply voltage	24V DC = Jumper 4 open 12V DC = Jumper 4 closed
Range	6 m
Sensor angle	80°
Beam angle	0° or 10°

Order code: PIR100

Product description

The sash sensor (linear position sensor) provides a stable voltage signal (0...10V DC), dependent on the vertical opening of the sash. This voltage signal is absolutely stable and failure-free and is therefore exceptionally suitable for use as a control signal for the automatic sash controller SC500. In parallel the analogue output of the sash position sensor SPS100 is available as leading signal for the fume hood controller FC500.

The following operating modes can be implemented:

- fully variable control **FC500-V**
- position sensor control **FC500-W**

With the FC500-V fully variable controller, the AFS100 flow sensor is also required, for example, to register the opening positions of slide windows.

The internal static differential pressure transmitter for limiting and controlling the exhaust air volume flow is also required for the operating modes fully variable control (FC500-V) and position sensor control.

Measurement of the sash movement is absolute and very exact (tolerance $\pm 3\text{mm}$) and is directly and immediately available as a stable demand signal.

This considerably increases the speed and performance of the entire control process. The stable demand signal now results in a demand requirement when the sash is moved (manually or electrically via the automatic sash closing system), whereby the durability of the servo motor is considerably increased.

The control curve can be individually adapted to the fume hood by programming the volume flows V_{MIN} , V_{MED} und V_{MAX} accordingly.

In unfavourable air flow conditions, the sash position sensor is clearly a better choice than the flow sensor and should be used instead of the flow sensor.

Mounting the sash position sensor SPS100

The sash sensor cable should preferably be fitted to the sash counterweight or fitted directly onto the sash frame. The potentiometer (linear position sensor) must always be mounted in such a way that the position sensor cable can be easily coiled up. The cable must run freely and must not be diverted or allowed to run over edges. The cable path (ejection length) between sash fully shut and sash fully open must be at least 60 cm.

Measuring range sash position sensor

According to the measuring range there are two different types available:

Type	Measuring range
SPS100	0...1000 mm
SPS200	0...2000 mm



Sash position sensor: SPS100

IMPORTANT!

The position sensor must be mounted with the utmost care. Do not pull the position sensor cable to its fullest extent and do not let the cable snap back. This could destroy the potentiometer and coiling mechanism.

Electrical connection of the SPS100 sash position sensor

Attach the 3 core sensor cable to terminal block X9 on the terminal board with a screw terminal. The connection to the fume hood controller FC500 has to be done via terminal block X10.

The electrical connection must be done by a qualified electrician in accordance with the safety precautions. The following rules and regulations must be followed:

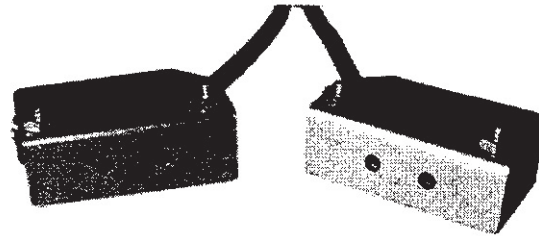
- VDE guidelines***
- Local power supplier regulations***
- Manufacturer wiring instructions and***
- Manufacturer terminal connection plans***

Performance features

- Sash position sensor with linear position measurement
- Measuring range 0...1m (SPS100), 0...2 m (SPS200)
- Standardised analogue output signal
- Free programming of the control curve via the volume flows V_{MIN} , V_{MED} and V_{MAX}

Technical data	SPS100/SPS200
■ sash position sensor	
Measuring principle	static, pull wire potentiometer
Measuring range SPS100	0...1000 mm
Measuring range SPS200	0...2000 mm
Tolerance	$\pm 3\text{mm}$
Analogue output	0...5V DC
Response time	<math>< 1\text{ms}</math>

Sensitivity Adjustment
of the Photoelectric Sensor SA1E-TN1



Mount the sensor with the included aperture plates to detect small targets.

Step	Operation	Trimmer	Indicators	Adjustment
1			GREEN ORANGE	With no target, turn the trimmer at the receiver to „MAX“. With the receiver in place, move the transmitter up/down and right/left. Set the transmitter at the midpoint of the range where the green and the orange LED are lit. Secure the transmitter and adjust the receiver position in the same way.
2			GREEN ORANGE	Turn the trimmer counterclockwise from „MAX“ until the green LED turns off. Assume the position as Point A.
3			GREEN ORANGE	Set the trimmer midway between point A and „MAX“. Confirm sensor operation with a small target (e.g. a pencil). Is the target detected, the orange LED turns off.
4			GREEN ORANGE	If the target isn't detected, maybe there are reflective surfaces nearby the sensor (eg. the plate of the sash window). Then turn the trimmer counterclockwise towards point A until the target is detected reliably.

INSTRUCTION SHEET

Photoelectric Sensor

SAFE Series

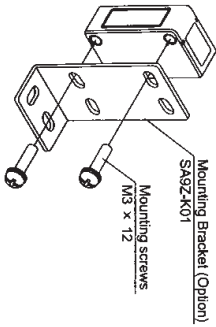
Confirm that the delivered product is what you have ordered. Read this instruction sheet to make sure of correct operation. Make sure that the instruction sheet is kept by the end user.

SAFETY PRECAUTIONS
CAUTION
 Caution notices are used where inattention might cause personal injury or damage to equipment.

1 Type
 SAFE-□□□□

- blank: Cable (1m)
- 2M : Cable (2m)
- 5M : Cable (5m)
- C : Connector (M8)
- 1 : Light ON / 2 : Dark ON
- N : NPN Output / P : PNP Output

- T : Through-beam(Infrared LED)
- TA : Through-beam(Fred LED)
- P : Polarized retro-reflective
- D : Diffuse-reflective
- N : Small beam-reflective
- G : Convergent reflective



2 Installation

- Do not apply excessive impact on the sensor during the installation process, so as to prevent damage or deterioration in the degree of protection.
- To install the sensor, tighten the mounting screws to a torque of 0.5N·m or less.

3 Specifications

Detection System	Through-beam	Polarized retro-reflective	Diffuse-reflective	Small beam-reflective	Convergent reflective
TYPE	SAIE-TN1	SAIE-TAN1	SAIE-DN1	SAIE-NN1	SAIE-GN1
Output	Dark ON	SAIE-TAN2	SAIE-DN2	SAIE-NN2	SAIE-GN2
PNP Output	SAIE-TP1	SAIE-TAP1	SAIE-DP1	SAIE-NP1	SAIE-GP1
Dark ON Output	SAIE-TP2	SAIE-TAP2	SAIE-DP2	SAIE-NP2	SAIE-GP2
Light Source	Infrared LED	Red LED	Red LED	Red LED	Infrared LED
Power Voltage	12 to 24V DC Ripple p-p: 10% maximum (Operating range 10 to 30V DC)				
Current Consumption	Emitter : 15mA maximum Receiver : 20mA maximum	30mA maximum			
Sensing Range	10m	2.5m (Reflector : IAC-MSR8) *1)	700mm (White paper 200×200mm) *1)	50 to 150mm (White paper 200×200mm) (Spot diameter approx. 10mm (Detection distance 100mm))	5 to 35mm (White paper 100×100mm)
Control Output	Open collector output (NPN / PNP output selectable)				
Protection Circuit	Load voltage : 30V DC maximum, Load current : 100mA maximum, Voltage drop : 1.2V maximum Reverse polarity protection, Load short circuit protection				
Response Time	1 ms maximum				
Ambient Temperature	Operating : -25 to +55 °C, Storage : -40 to +70 °C (no freezing and condensation)				
Ambient Humidity	Operating : 35 to 85% RH, Storage : 35 to 85% RH (no condensation)				
Degree of protection	IP67 (IEC60529)				
Material	Housing : PC/FRBT, Lens : PC (PMMA), Polarized retro-reflective type: Display : PC				
Cable	∅3.5mm, 3-core/2-core for emitter or through-beam type, 0.2mm ² , 1m/2m/5m cable type				
*1)	Maintain at least the following distance between the sensor and reflector. Tape type reflectors (IAC-RS1/RS2) : 150mm, Other reflectors (IAC-R5/RS6/R7/□/R8) : 100mm				

4 Notes for Operation

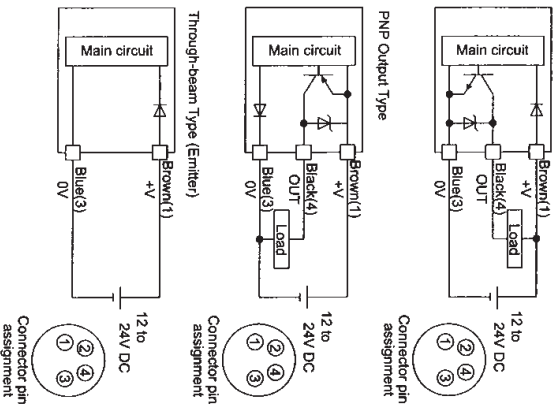
- Do not use the sensor during the transient time of 100 ms after turning on the power supply.
- If the sensor and the load are connected to different power supplies, the sensor must always be turned on first.
- Do not install the sensor outdoors, nearby induction device, or heat source. Choose locations free from frequent vibrations, shocks, dust, toxic gases, water, oil, and chemicals, so as to prevent malfunctions and damage.
- Do not expose the sensor to sunlight or other direct light projections.
- Do not use the sensor with drops of water remaining on the lens or aperture of slits.

CAUTION

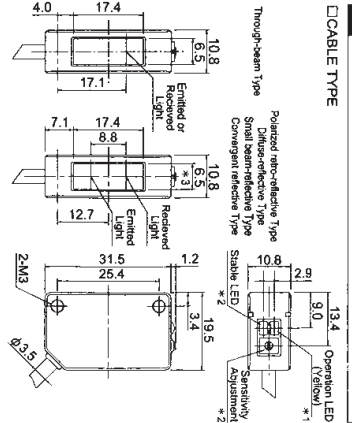
- Do not connect the sensor to AC power supply, so as to prevent explosion and burning.

5 Wiring

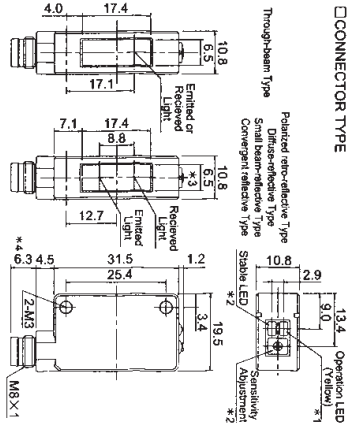
- Turn off the power supply before wiring.
- Connect correctly to prevent damage.
- The power voltage must not exceed the rated range.
- When using a switching power supply, be sure to ground the FG (frame ground) terminal.
- Do not install the sensor wiring in the same conduit with high-voltage lines and power lines.
- Cable extension is allowed up to 100m using a cable type with core wires of 0.3mm² or more.
- To connect the sensor with connector cable, tighten connector to a torque of 0.5N·m or less.



6 Dimensions



CONNECTOR TYPE



- * 1 Power LED for the through-beam type emitter.
- * 2 Not incorporated on the through-beam type emitter.
- * 3 5.2mm on the polarized retro-reflective type.
- * 4 18mm with the connector cable (SA9Z-CMRK-4□) connected.

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