



SUSB

Control and monitoring unit

Valid from week of manufacture 10/2009.
Software version 2.3



Description

The SUSB is a control and monitoring unit designed to control various types of fire/smoke dampers and fans in a flexible way. The SUSB is based on a modern powerful microprocessor, so it can meet all the requirements of a building installation.

General

- 8 different operating modes can be selected
- 2 damper groups, max. 4 dampers
- 2 detector groups
- 2 fan groups
- Built-in locking of fans
- Real time clock with battery backup
- Preconfigured for easy installation
- External input for central fire alarm system
- Dampers can be closed via external inputs
- Function test button
- Damper position indication
- Expansion units available
- Compact plastic case
- Rack installation
- Integrated transformer
- 24 V supply to actuator

Maximum configuration.

Up to four actuators (dampers) can be connected in 2 groups. The distribution between groups can be 2+2 or 3+1. Expansion units can be installed for an unlimited number of dampers, although they will all be controlled by the same function. In principle, any number of smoke detectors can be connected, but the number is often limited by the difficulty in maintaining this kind of solution. Detectors can be connected to the SUSB via two separate loops. An external monitoring unit can also be connected.

Installation

Designed for wall installation or DIN rail mounting. Mounting details is needed for DIN rail mounting.

Supply voltage

230 VAC 50 Hz 30VA. Protected with 2A at least.

Protection class

IIP65.

Ambient temperature

Max +30°C, min 0°C.

Weight

1,5 Kg

Accessories

- DIN rail mounting.
- Expansion unit for 4 dampers. (SUSB-E)
- Expansion unit for 8 dampers. (SUSB-E8)

Outputs

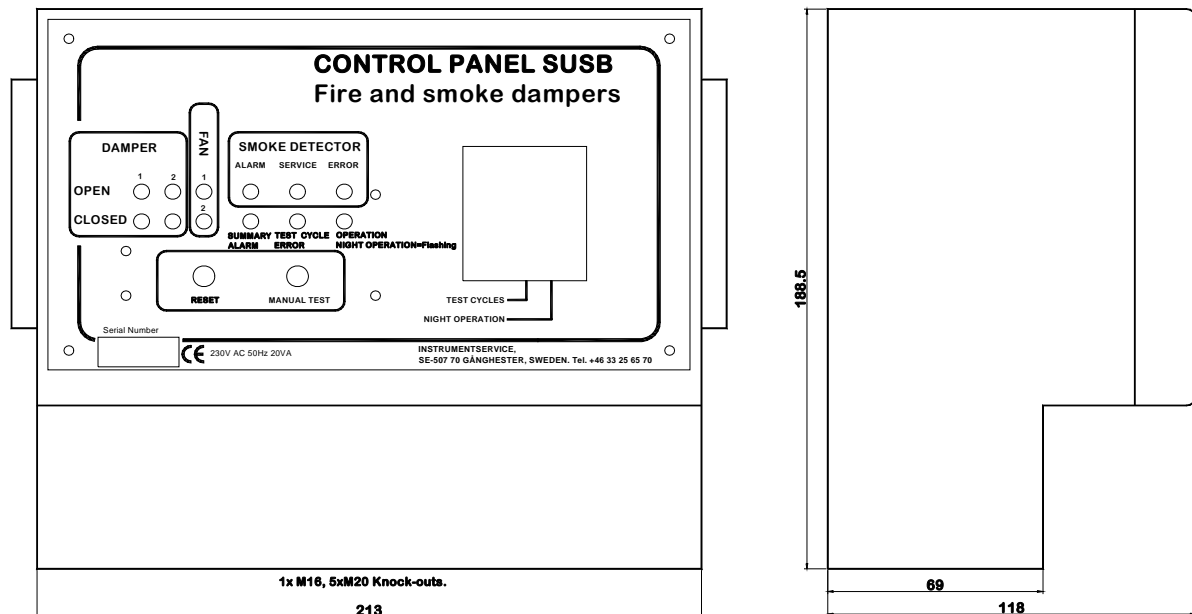
- Sum alarm. Voltage-free changeover contact 1A max 60VA. Terminal number 10,11,12.
- Triggered smoke detector shared by all fire zones. Voltage-free changeover contact max 1A max 60VA. Terminal number 7,8,9.
- Fan 1. Voltage-free changeover contact max 10A / 250V. Terminal number 13,14,15.

- Fan 2. Voltage-free changeover contact max 10A / 250V. Terminal number 16,17,18.

Inputs

- Smoke detector 1. Terminal DET1 +,-
- Smoke detector 2. Terminal DET2 +,-
- NIGHT. Terminal 3,4. Night mode. Normally closed.
- EXT. Terminals 5,6. External control unit. For example, opening the circuit has the same effect as a triggered smoke detector (both groups affected) Normally closed.
- Expansion unit. Terminal 20,21,22.

Size



The 8 modes

The SUSB is designed to handle fire/smoke dampers in normal ventilation systems and fire ventilation systems, either independently or in combination. In the event of fire, the ventilation system must usually be stopped and the fire ventilation system started. It must also be possible to move the dampers in different directions depending on the function. There is a choice of eight different modes. Valid from serial number: 0452801.3

Mode 1.

(Jumpers B, C, D OFF)

Used to control up to two fire/Smoke dampers from two smoke detector loops while locking two fans. The entire unit can be thought of as duplicating the function so that two fire zones can be handled. The function test is adjusted so that both groups are tested separately but are started at the same time. Night mode affects both zones, including all dampers and fans.

Mode 2.

(Jumper B ON)

One fire zone is handled via one detector loop, and up to four fire dampers in one group. Detector 2, damper 2 and fan lock 2 are not used. The function test is adapted. Night mode affects all dampers and the fan.

Mode 3.

(Jumper C ON)

This mode works like mode 2 but both detector loops and both damper inputs are users. Fan locks 1 and 2 are used, and are connected in parallel. Valid from serial numbers ending in 1.5. The unused detector input must be terminated with a 2200 ohm 1 W resistor.

Mode 4.

(Jumpers B and C ON)

Intended for fire ventilation. The two zones are handled separately. When one of the detector loops signals an alarm, the dampers are opened and the relevant fire ventilation fan is started. If smoke is detected by the other detector circuit, the damper in that group is moved immediately, but there is a 10 second delay before the fan starts. This delay is only active if a start signal is received from both the detector loops at the same time. This feature means that large fire ventilation fans are never started simultaneously, simplifying dimensioning of the electricity network. The function test involves opening the dampers, starting the fans 30 seconds later, then continuing the test until the end of the programmed test time. The system then returns to normal mode. From serial number 9020811.2, the fan test can be skipped by programming the control timer with a test time of 1 minute. This prevents the fire ventilation fans ever starting. Night mode has no effect in this mode.

Mode 5.

(Jumper D ON)

Same as mode 4 but the fans are function tested once a month. The dampers are function tested as usual, every 48 hours unless specified otherwise.

Mode 6.

(Jumpers B and D ON)

Combination mode. Damper group 1 is used for fire/smoke dampers and for locking the ventilation system for fan 1. Damper group 2 is used for evacuation dampers and the fire ventilation fan is connected to fan 2. The detector inputs are linked and must be connected. The unused detector input is terminated with a 2200 ohm 1 W resistor.

Damper group 1 is used for dampers that are to be closed when a detector is triggered. Damper group 2 is used for dampers that are to be opened when a detector is triggered. Fan 1 is stopped when a detector is triggered, and fan 2 is started. The function test involves closing the fire damper, opening the evacuation damper, locking the ventilation system and starting the fire ventilation fan. The test ends when the programmed time is reached. Night mode only affects damper group 1 and fan 1. The function test in night mode involves opening the evacuation damper, opening the fire damper, closing the fire damper and starting the fire ventilation fan, and continues to the end of the test time. The fire ventilation fan is then stopped and the evacuation damper is closed. From serial number 9020811.2, the fire ventilation fan test can be skipped by programming the control timer with a test time of 1 minute. This prevents the fire ventilation fans ever starting.

Mode 7.

(Jumpers C and D ON)

Same as mode 4 but fan 2 (fire ventilation fan) is function tested once a month. The dampers are function tested as usual, every 48 hours unless specified otherwise.

Mode 8.

(Jumpers B, C and D ON)

This mode is designed to handle an evacuation damper and a fire ventilation fan, but a normal fan output is also provided. Both smoke detector inputs can be used, but they are linked to form a zone. The function is as follows: On start-up, the evacuation dampers move to the closed position, Fan 1 start. When a detector is triggered, Fan 1 is stopped and the evacuation dampers move to the closed position. Fan 2 starts 10 seconds after smoke is detected even if the dampers have moved to the open position. Fan 1 is stopped in the function test. After 30 seconds the dampers move to the

open position. (The 30-second delay can be removed by setting jumper E.) Every 16th test sequence (once a month) the fire ventilation fan (Fan 2) starts running and continues until channel 1 of the clock is closed. When the clock opens, Fan 2 stops, the dampers close and Fan 1 starts. In the other 15 test cases, Fan 2 does not start, regardless of how the timer is programmed. Immediately after the dampers are opened, they are closed and returned to the normal position.

Function test during night mode.

In night mode, the function test can be run without special programming. The SUSB detects the damper positions and carries out the function test in the other direction. The fans are only affected if they are fire ventilation fans.

Priority.

If an alarm (triggered detector or external fire alarm) is received during the function test, the test is ended and the unit immediately switches to alarm state.

Fan control

Intelligent and integrated fan control is provided. There are two fan control outputs that are used differently in the 8 modes.

If the ventilation system is connected, the fan receives the stop signal as soon as smoke is detected. For controlled, non-acute operation, for example in a function test, the fan is given 30 seconds to reduce its speed before any damper is closed.

The fire ventilation fans can be controlled from 1 or 2 outputs on the SUSB. If two fans are connected, they are started with a 10 second interval if a detector is triggered. In a function test, the interval is 30 seconds. This prevents an unnecessarily high starting current if both fans start simultaneously.

The clock.

The control clock has two channels. Channel 1 controls a function test, if there is one, and channel 2 controls night mode. See the relevant mode for the particular function. If the SUSB is supplied without a clock, the function test can be run manually using the button on the front panel. In modes 4, 5, 6 and 7, the fire ventilation system can be tested for the on time programmed in the clock. From serial number 9020811.2, the fire ventilation fan test can be skipped by programming the control timer

with a test time of 1 minute. This prevents the fire ventilation fans ever starting. ON at the clock means the start of the test. OFF means the end of the test. In channel 2 ON means that night mode is active. The clock automatically switches between summer/winter time and is preset for a function test at 01:00 on Monday, Wednesday, Friday and Sunday.

Installation.

230 V 50 Hz

Must be connected via fixed cables to a group fuse of at least 2A. The isolating switch must be positioned close to the unit. The SUSB is built with reinforced insulation, so no ground is necessary.

Relay outputs

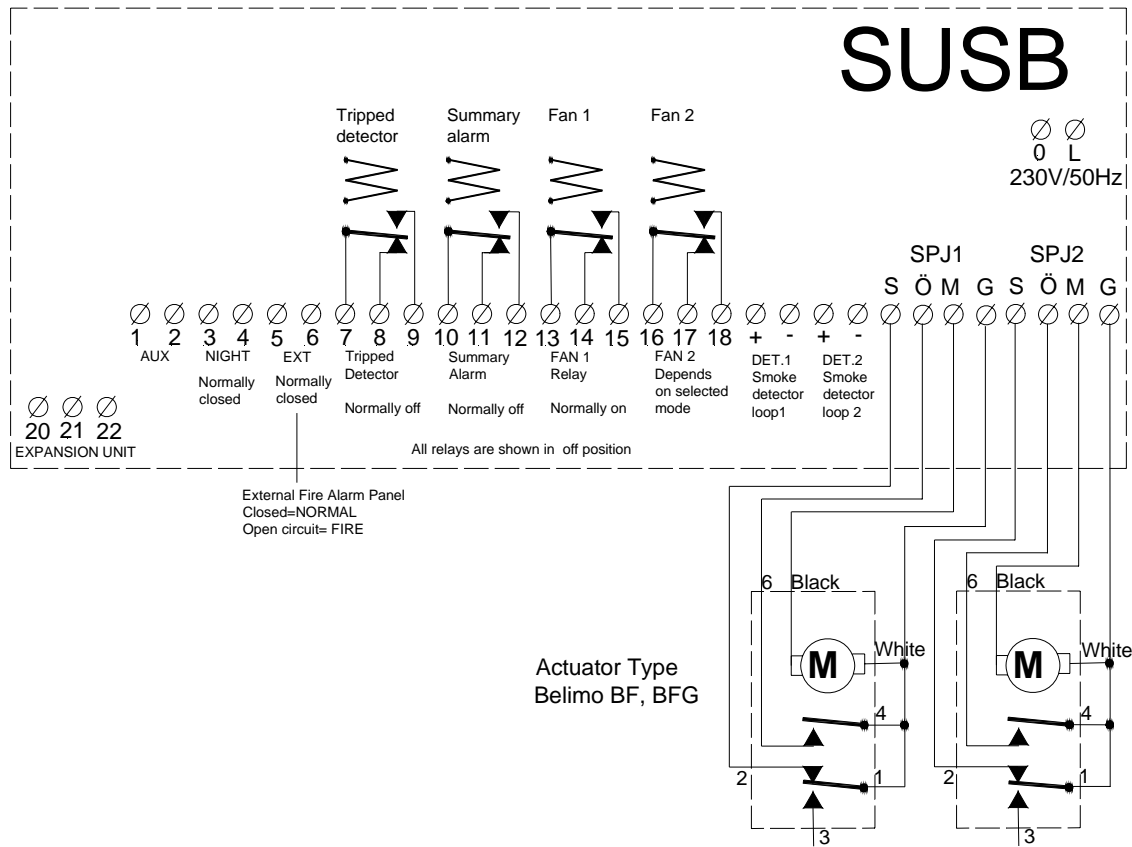
All relays are shown in the open position. Fans 1 and 2 are normally activated (mode 3). In an alarm, the summary alarm is activated and 10-12 closes for example.

Damper connection

Fire/smoke dampers are connected as shown in the diagram below.

If evacuation dampers are used, they must be connected with Ö and S reversed compared to the figure above. Evacuation dampers are normally closed, and are opened if there is an alarm. The damper motor closes the damper and the spring return opens it. **This only applies to modes 4, 5, 6, 7 and 8.**

Connection diagram



Connection of external units. *N.B.* Connection wires of older belimo was S1, S2, S3 and so on. Corresponding marking are 1,2,3 and so on in the drawing above. Drawing is in power off condition.

Smoke detector inputs

The two smoke detector inputs are designed for a loop resistance of 2200 ohm (terminating resistor). Depending on the selected mode, one or both detector circuits are connected. If the mode selected has both circuits active, unused detector inputs are terminated with a resistor connected directly to the terminal. 2200 ohm, power at least 1W. See also the description of the modes.

Expansion unit

Terminals 20-21-22 are used to connect an expansion unit. A connection drawing can be found in the documentation for the expansion unit. Dampers forming part of damper group 1 can be connected to the expansion unit. No expansion unit can be connected to damper group 2.

Cable type for connections

The smoke detectors are connected with twisted-pair cable separated from other parts. Telephone type cable is used, with no particular requirements in terms of area.

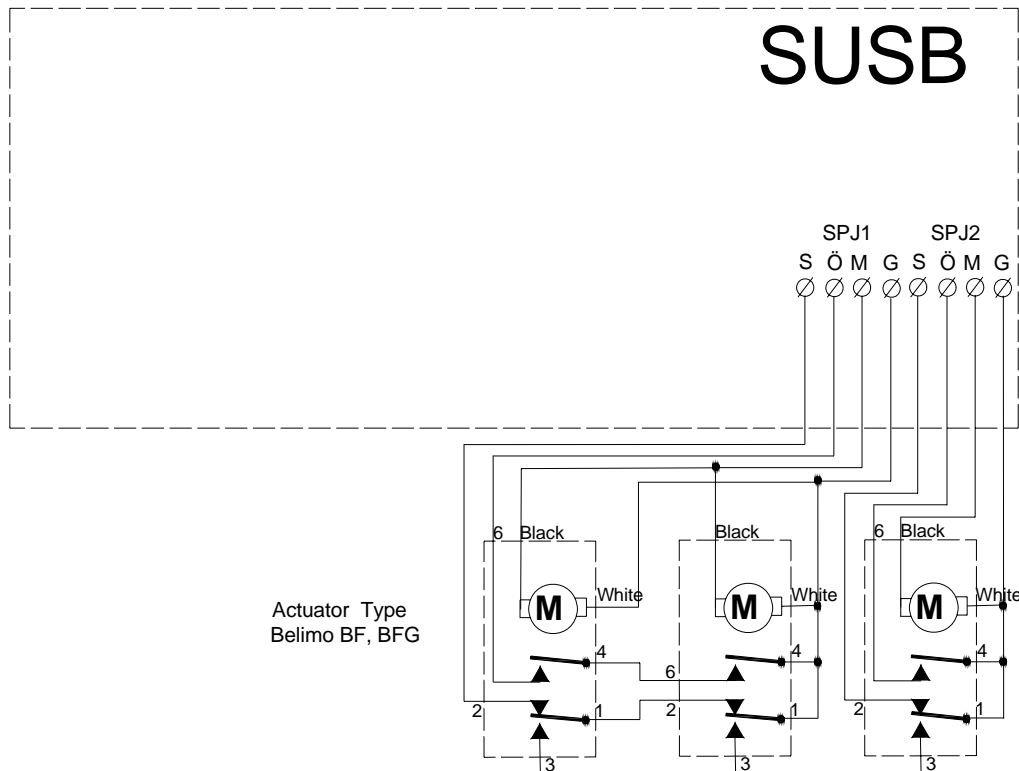
For example, the actuator can be connected with EKKX 1*4*0.5 if the distance between the actuator and the SUSB is less than 100 metres. If the distance is greater, a larger area is required, especially for the G wire but also for M. DC resistance must not exceed 8 ohm.

Fuses

There is a 160 mA fuse on the motherboard. To access the fuse, remove the four screws in the corners of the front panel. Carefully place the panel to one side – there is a fuse holder at the bottom right. This is the primary fuse.

A self-healing electronic fuse is provided as a secondary fuse to protect the damper motors, etc. If this fuse is tripped, it resets automatically if the SUSB is switched off for five minutes.

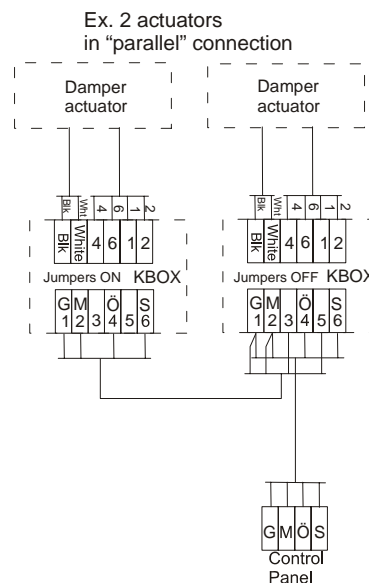
Parallel connection of dampers



Parallel connection of damper at connection DAMPER 1 and single connection at DAMPER 2.

KBOX for easy connection.

The connection box is used to connect Belimo actuators to 4-wire control and monitoring equipment, for example KSUB, SUSB and SUSB-E. It is also easy to use the connection box to create parallel connections. The box is available with or without a test button to operate dampers manually. For more information and drawing. See description of KBOX.



Time-switch



The time switch has two channels. Channel C1 is used for the test cycle and channel C2 is used for switching between day and night operation. The time switch has a battery backup, which will secure approx six years operation without mains voltage. To save energy the time-switch uses a so-called sleep-mode i.e. the display will be deactivated if it has been idle for 15 minutes. The display will be activated again by pressing any of the buttons.

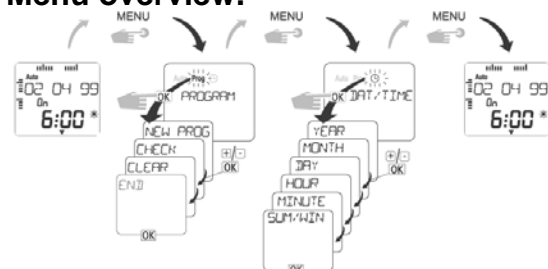
The time switch is pre-set at delivery. Channel C1 (test cycle) is programmed to start at 1 AM on Mondays, Wednesdays, Fridays and Sundays.

Settings

If RES-button is pressed (by using a pointed object and pressing the button for 1 second) or if the battery is changed during power failure, all programming will be erased.

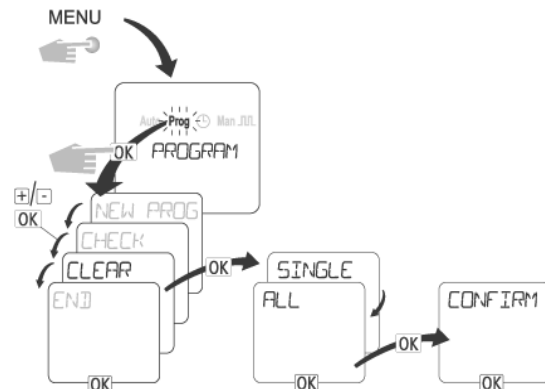
- Follow the instructions in the time-switch menu. Language, year, month, day and time has to be re-entered. After that the programmes for channel C1 and C2 have to be entered.

Menu overview.



Deletion of programmed values

It is possible to delete the different program steps, either in single steps or the whole program. If a program is deleted, the programming of the pulse is also deleted. This is self-explanatory as you step through the menu.



Graphic of programming.

Settings for test cycle (Channel C1)

The settings for the test cycle are Sundays at 1 AM in the example below.

- Press the menu-button. (prog is flashing)
- Press OK
- NEW PROG is flashing, press OK
- The number of free memory locations will be shown for a second, and then C1 will start flashing. Press OK.
- ON is flashing. Press OK.
- HOUR is shown. Select time for the test cycle. In our case "1". Press OK.
- MINUTE is shown. Select "00". Press OK
- MONDAY is flashing. Select SUNDAY by pressing +. Press OK.
- COPY is flashing. Press +
- STORE is flashing. Press OK
- NEW PROG is flashing. Press OK.
- CREATE is flashing. Press OK and repeat instruction 4 –10 above to set the OFF time to 01.01.

Press MENU and programming is complete.

The time switch generates a pulse for one minute, which is sufficient to start the test cycle.

Check the settings for test cycle

Press the menu-button and select Prog. Select CHECK and step through the program.

Summer and wintertime

Summer and wintertime is set automatically according to the European standard. The settings can be altered or the feature can be switched off.

Settings for day and night operation (Channel C2)

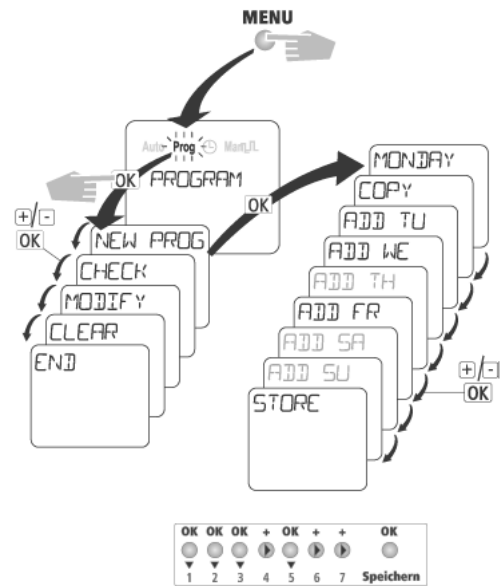
The settings for day and night operation are 8 PM and 6.30 AM as in the example below.

1. Press the menu-button. Prog is flashing. Press OK
2. NEW PROG is flashing, press OK
3. Select C2 and press OK.
4. Select ON and press OK.
5. HOUR is shown. Step to "20" and select it by pressing OK.
6. MINUTE is shown. Select "00". Press OK"
7. MONDAY is flashing. Press OK.
8. COPY is flashing. Press OK.
9. Press OK six times. STORE will disappear and NEW PROG will start flashing. (ON is now set to 20.00 for all days in the week)
10. Press OK create a new program. The number of free memory locations will be shown for a second, and then C1 will start flashing. Select C2 OFF by pressing +. Press OK.
11. HOUR is shown. Select "6". Press OK"
12. MINUTE is shown. Select "30". Press OK"
13. MONDAY is flashing. Press OK.
14. COPY is flashing. Press OK and follow instruction 9

The fire dampers will close when the time switch turns to ON for channel C2. The diode indicating "Operation" will start flashing to indicate night operation. The night operation settings can easily be programmed to include all Saturdays and Sundays.

- Note 1: The time-switch reads the ON/Off position continuously (it keeps track of the current position between the on and off positions) and sets the position for each change i.e. the time switch remain ON if a second program turns the position to ON
- Note2: The day value for night operations are different i.e. starting Monday 20.00 and finishes Tuesday 06.30.

Understanding and use



Graphic of programming.

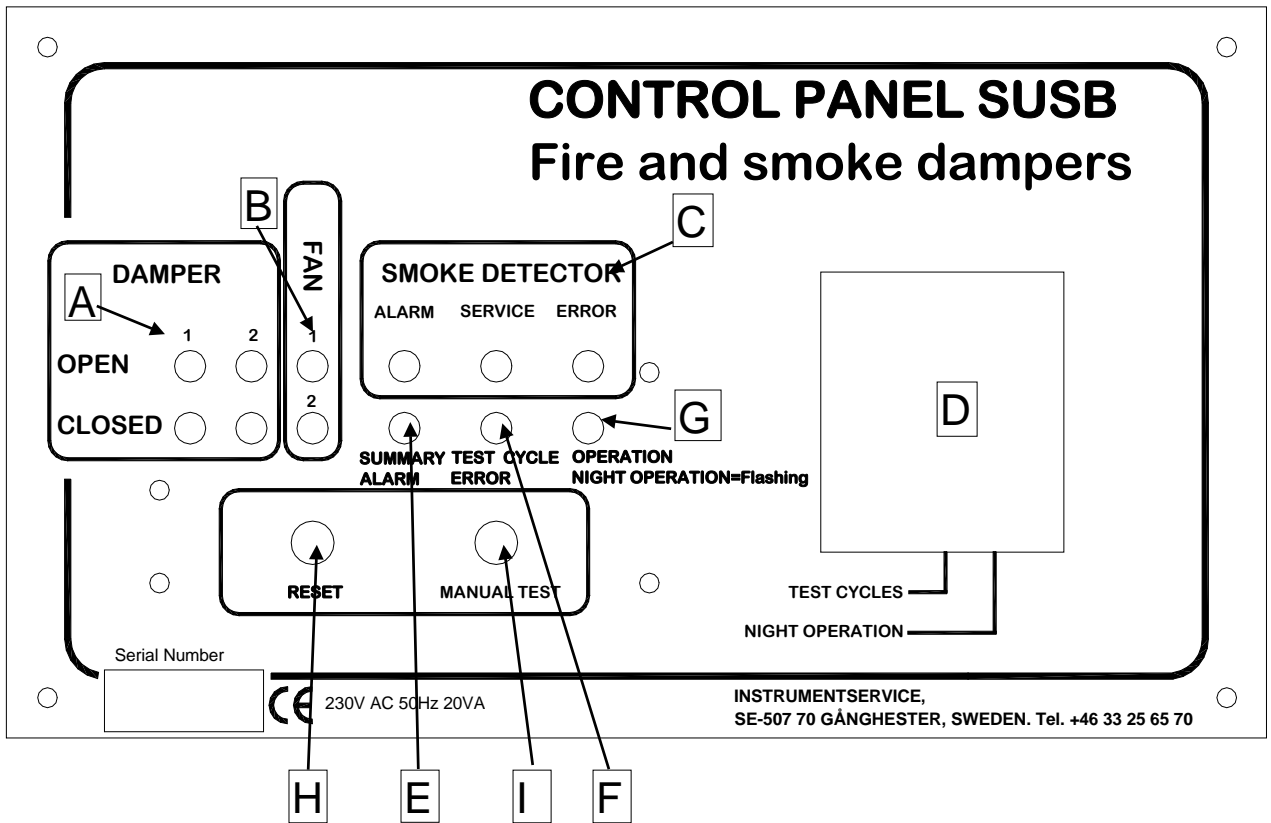
Manual control of the automatic functions

The test cycle will be started automatically by pressing the "+" and "-" buttons simultaneously twice. The dampers will close and the green diode indicating open damper will switch off on the monitoring and control unit. After a few minutes the dampers will open and all green LED:s should indicate open damper. This will be reversed in the case of evacuation dampers.

The manual function need to be switched off for normal operation. Check that channel C1 is in the OFF position. If not press the "+" and "-" buttons simultaneously

Manual closure of fire dampers without an alarm (night operation)

To be able to test the fire dampers without sending out an alarm signal, the "+" and "ok" buttons should be pressed simultaneously. The fire dampers will close when the time switch is set to ON for channel C2 and the LED displaying Operation on the control panel will flash. The fire dampers will open when the time switch is set to OFF and the LED displaying Operation will turn on.



Indicators and buttons

A Dampers

Green or red LED indicates open or closed dampers respectively
The damper groups are numbered 1 and 2.

B Fans

The two fan controls are indicated with separate LEDs, which light when the relevant relay is closed.
See the relevant mode for the function of both fan control outputs.

C Smoke detectors

The two smoke detector loops are indicated with different patterns using the same set of LEDs.

Detector 1 is indicated with the following pattern: on 0.1 seconds off 0.9 seconds

Detector 2 is indicated as follows: on 0.9 seconds off 0.1 seconds.

If both detectors are indicated or if the EXT input is used for an external monitoring unit and alarms, the LEDs are constantly lit.

Alarm

Red LED indicates:

- Smoke detector triggered.
- EXT input activated.

Service

Yellow LED indicates that the connected smoke detectors are dirty. The smoke detector has a yellow LED, which lights with the service alarm. The indication is delayed by one hour to prevent false alarms. When the alarm is reset, the delay is deactivated to make it

possible to confirm immediately that the alarm has been cleared.

Error

Red LED indicating a break in the detector loop. If there is a break, the dampers and fan are stopped in modes 1-3 and modes 6 and 7. The function is the same as if a detector indicates smoke, but the alarm LED does not light.

The patterns used to determine which of the two loops is faulty are the same as for service alarms.

D Weekly timer switch

The control clock has two channels. Channel 1 is for the function test time. Channel 2 is for night operation time.

E Summary alarm

The summary alarm is indicated by the red LED and the associated relay output is closed when the following events occur:

- Smoke detector 1 or 2 triggered.
- EXT input activated. (Jumper F=OFF)
- Break in any of the cable loops.
- Error during function test.
- Service alarm in any of the detector loops.
- Damper in incorrect position during normal operation.

F. Function test error.

The LED shows that the function test has not completed successfully. The following are tested for errors.

- The dampers in both damper groups close within 30 seconds.
- The actuator contacts are correctly closed with the dampers in the closed position.
- The dampers open within 200 seconds.
- The actuator contacts are closed with the damper in the open position.

G. Operation

Green LED showing that the unit is receiving power and indicating day/night mode.

Constant = day mode. Flashing = night mode.

H. Reset

Button to reset the entire alarm. While the button is pressed, the detector outputs are disconnected to allow any triggered smoke detectors to be reset.

I. Manual test

Press the button to start the function test according to the defined mode. This function requires that clock channel 1 is not active. OFF must appear in the clock window for channel 1. The function test is limited in modes 4, 5, 6, 7 and 8 because the fire ventilation fan does not start unless the button is held down for at least 1.5 minutes. (The function test normally uses the clock if there is one)

Manual night mode.

To activate night mode, press the right arrow and the OK button on the clock. To reset, press the same buttons again.

Description of jumpers.

The jumper panel is in the connection area on the left.

- A Excludes fan locking in external night mode. (Only from serial numbers ending in 1.4)
- B Selects the operating mode, together with C and D.

- C Selects the operating mode, together with C and D.
- D Selects the operating mode, together with B and C.

Overview of jumpers.

Mode	Jumper B	Jumper C	Jumper D
1. 2-4 Dampers, 2 Zones, 2 Damper groups	OFF	OFF	OFF
2. 1 Damper, 1 Zone, 1 Damper group	ON	OFF	OFF
3. 2-4 Damper, 2 det.loops (1 Zone), 2 Damper groups	OFF	ON	OFF
4. Smoke evacuation, 2 Zones, 2 Damper groups	ON	ON	OFF
5. Smoke evacuation, 2 Zones, 2 Damper groups. Smoke evacuation fan test one per month.	OFF	OFF	ON
6. Combination, 2 det.loops (1 Zone) 1+1 Damper groups	ON	OFF	ON
7. Combination, 2 det.loops (1 Zone) 1+1 Damper groups. Smoke evacuation fan test one per month.	OFF	ON	ON
8. Smoke evacuation, 2 det. loops (1 zone), and 2 Damper groups. Smoke evacuation fan test one per month.	ON	ON	ON

E =ON means that the fans are not stopped for a function test. Use this setting if the unit is operating at the periphery of a ventilation system. Only affects the ventilation system, not fire ventilation. Only active in modes 1, 2, 3, 6 and 7. Note that high pressure can build up in the duct system if this jumper is on if the monitored/controlled dampers are located in the main duct. In mode 8, the jumper is used to suppress the 30-second delay in order reliably stop the fan in the function test.

H =ON means automatic reset when input 5,6 is closing.

F =ON means 0second delay before dampers are closing in Night mode or test.

G =ON means 5 minutes delay before dampers are closing in Night mode or test.

Troubleshooting

"ERROR" LED lights or flashes.

Look at the pattern of flashing to identify the affected detector loop. Detector 1 is indicated with the following pattern: On 0.1 seconds off 0.9 seconds. Detector 2 is indicated as follows: on 0.9 seconds off 0.1 seconds. If both loops are affected, the ERROR LED is constantly lit
Check:

- The terminating resistor in the last detector of the loop with the problem. It should be 2200 ohm, 1W.
- If the input is not used, a resistor of 2200 ohm must be installed to replace the detectors.
- Break in cable
- Loose contact in the detector bases.
- Check the connections to the detectors.
- Polarity!

"SERVICE" LED lights or flashes. Look at the pattern of flashing to identify the affected detector loop See above under the ERROR LED.

Check:

- For dirt on one or more detectors. Indicated by a yellow LED on the affected detector if the detector has a service alarm function. Vacuum-clean or, in the worst case, replace the detector head.

"ALARM" LED lights. Check:

- That the EXT input is jumpered or closed by an external control unit.
- For a short-circuit in one of the detector loops.
- An alarm from a detector is indicated with an LED on the detector.

"TEST CYCLE ERROR" LED lights.

Check:

- That the right numbers of dampers are connected for the selected mode. Only mode 2 can be used with one damper, which must be connected to SPJ1.
- That the dampers open and that the green LED shows open.
- Carry out a manual function test and check that the dampers close within 30 seconds.

The red LED lights up. The dampers must then open within 200 seconds and the green LED lights up. The function is reversed for evacuation dampers.

- That the dampers are correctly connected. In particular, take care that G and M are not the wrong way round.

"SUMMARY ALARM" LED lights.

Check:

- For other alarms indicated by the LEDs.
- That no damper has closed incorrectly.
- That the dampers are correctly connected. In particular, take care that G and M are not the wrong way round.
- That any expansion unit has at least one damper connected in damper group 1

The dampers do not open.

Check:

- That there are no other alarms on the front panel.
- That the correct mode is selected. In some cases, the normal position of dampers may be closed.
- That the damper motor is connected correctly.
- That the electronic fuse has not tripped. If it has, switch off the power to the SUSB for around 5 minutes to cool/reset.

A manual reset is required after an automatic function test

The "fan lock" output has probably been connected to the wrong input in the ventilation system, which has locked itself as a result.

A manual reset is required after night mode

Requirement: night mode signal from ventilation system to SUSB.

Locking may occur if night mode is indicated by the SUSB, which then sends a stop signal to the system via fan lock. This locking may be bypassed by setting jumper A. The fans are still locked if a smoke detector is triggered and during the function test.

Disposal of old Electrical & Electronic Equipment (Applicable throughout the European Union and other European countries with separate collection programs)



This symbol, found on your product or on its packaging, indicates that this product should not be treated as household waste when you wish to dispose of it. Instead, it should be handed over to an applicable collection point for the recycling of electrical and electronic equipment. By ensuring this product is disposed of correctly, you will help prevent potential negative consequences to the environment and human health, which could otherwise be caused by inappropriate disposal of this product. The recycling of materials will help to conserve natural resources. For more detailed information about the recycling of this product, please contact your local city office, household waste disposal service or retail store where you purchased this product.