



# SUSA

## CONTROL AND MONITORING UNIT



Valid from week of manufacture 2015.10 and serial number 150800281.0

### Description

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

### General

- 2 damper groups, max. 4 dampers.
- 2 detector groups.
- 2 fan groups.
- Built-in locking of fans.
- Automatic damper test.
- Separate test of smoke extraction fan.
- Smoke extraction fan functions.
- Real time clock with battery backup.
- Separate clock for smoke extraction fan test.
- Pressure sensor can be connected for the smoke extraction fan.
- External input for central fire alarm system.
- Dampers can be closed via external inputs.
- Damper position indication.
- Connection for classic expansion units SUSB-E and SUSB-E8.
- Network connection for intelligent expansion units.
- Modbus RTU network connection for central monitoring.
- Log function for all fault types.
- 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 used for an unlimited number of dampers. There are two expansion unit types – the classic type (SUSBx), which does not support individual control and monitoring, and the intelligent type (KSUx) in which each damper group can be controlled individually. The maximum number of slaves for the intelligent type is 32. With the KSUE, the maximum number of damper groups is 256 + 2 in the SUSA. The number of smoke detectors should be limited to 5 per connection. Detectors can be connected to the SUSA via two separate loops. There are additional detector inputs if intelligent expansion units are used.

### Installation

Designed for wall or rack installation. A simple assembly kit is required for rack installation.

### Power supply

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

### Protection class

IP65. For outdoor installation, a polycarbonate case is available for an extra charge.

### Ambient temperature

Max +30°C, Min 0°C.

### Weight

1.5 kg

# INSTALLATION INSTRUCTIONS

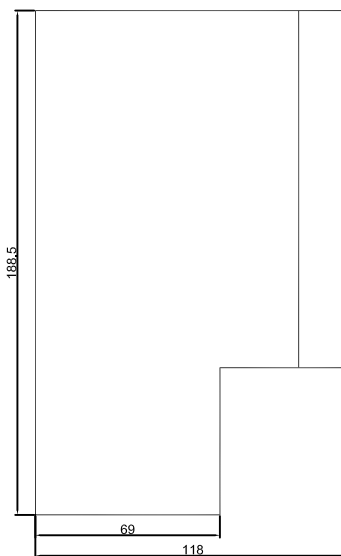
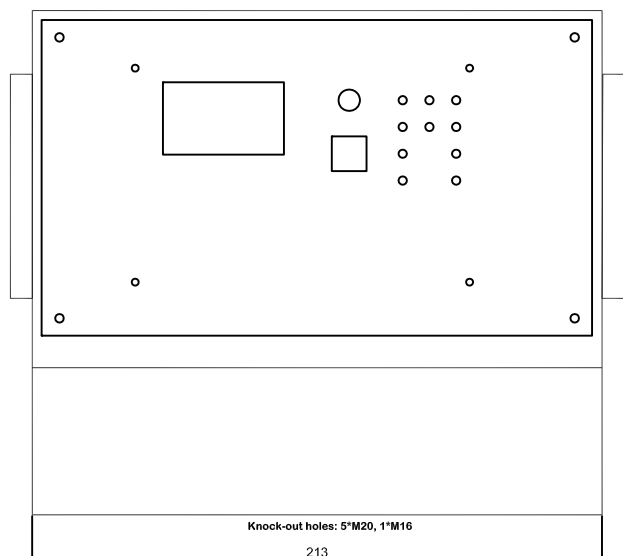
## Accessories

- Assembly kit for rack installation.
- Expansion unit for 4 dampers (SUSB-E).
- Expansion unit for 16 dampers (SUSB-E8).
- Expansion unit for 4 dampers (KSUB).
- Expansion unit for 4 dampers (KSUBlight).
- Expansion unit for 16 dampers (KSUE).
- etc.

## Outputs

- B-alarm (sum alarm). Voltage-free changeover contact 1 A max 60 VA. Terminal numbers 30-31-32.
- A-alarm (triggered smoke detector) shared by the two loops. Voltage-free changeover contact 1 A max 60 VA. Terminal numbers 12-13-14.
- Fan lock 1. Voltage-free changeover contact max 10 A / 250 V. Terminal numbers 37-38-39.
- Fan lock 2. Voltage-free changeover contact max 10 A / 250 V. Terminal numbers 40-41-42.

## Dimensions:



## Function test in night mode

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

## Priority handling

If an alarm (triggered detector or external fire alarm) is indicated during the function test, the test is ended and the unit immediately switches to alarm state. Communication errors to intelligent expansion units (slave units) are treated as fire alarms except that the relay for triggered detector is not closed. Communication errors to classic expansion units are often indicated as a B-alarm.

## Fan control

Intelligent and integrated fan control is provided. There are two fan control outputs that are used differently depending on the configuration.

## Inputs

- Smoke detector 1. Terminals 4-5.
- Smoke detector 2. Terminals 6-7.
- PRES. Terminals 28-29. Pressure monitor from smoke extraction fan. Normally jumpered.
- NIGHT. Terminals 26-27. Night mode. Normally jumpered.
- EXT. External control unit. Opening the circuit has the same effect as a triggered smoke detector. (Both groups affected) Terminal numbers 8-9. Normally jumpered.
- AUX. Input for momentary stop of test. Terminal numbers 10-11.
- Expansion unit classic. Terminals 22-23-24-25.
- Expansion unit. Network. Terminals 19-20-21.
- Modbus RTU. Network. Terminals 1-2-3.

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 an adjustable delay of 0 to 600 seconds to reduce its speed before any damper is closed. The delay is also used for cooling.

The fire ventilation fans can be controlled from 1 or 2 outputs on the SUSA. If two fans are connected, they are started with a 15 second interval if a detector is triggered. In a function test, the interval is 15 seconds. This prevents an unnecessarily high starting current if both fans start simultaneously.

**Control clock**

The control clock governs the function test (if there is one). The clock automatically switches between summer/winter time and is preset for a function test starting at 01:00 on Monday and then every other day. A function test can be set to run every day, every other day, every third day, etc. After six days the frequency switches to weekly. You can then select up to 52 weeks. The control clock for the smoke extraction fan test is completely separate from the damper test. The damper test can be scheduled for once a week, once a month or any number of months. You can specify the day of the week and date of the month.

**Function test of smoke extraction fan with pressure sensor**

If the smoke extraction fan has a pressure sensor, it can be connected to terminals 28-29 in the SUSAs. After the smoke extraction fan is started via relay output fan 1 or fan 2 (depending on the selected configuration) in the SUSAs, the pressure sensor should close within the test time, otherwise a function test error and B-alarm are indicated. If there is no pressure sensor the input must be jumpered.

**Connections**

**230 V 50 Hz.**

The 230 V power supply must be connected via fixed cables to a group fuse of at least 2 A. The isolating switch must be positioned close to the unit. The SUSAs are built with reinforced insulation, so no ground is necessary.

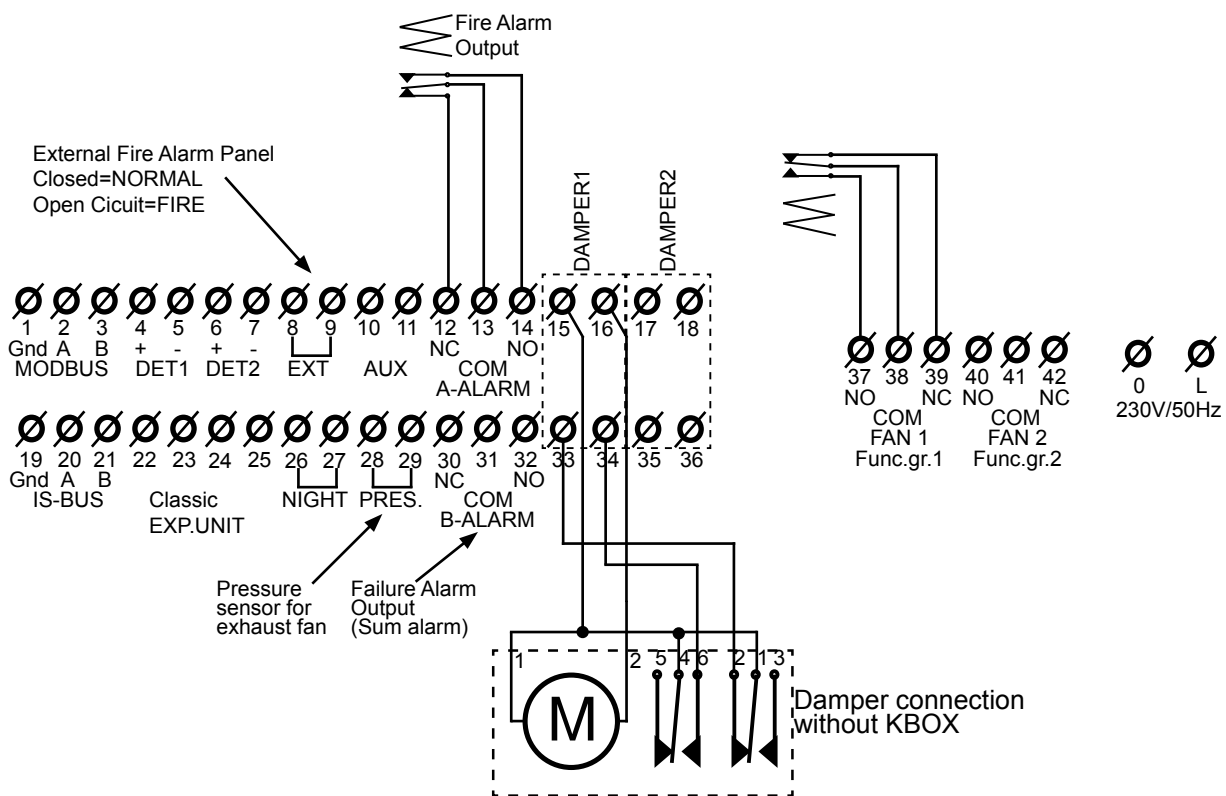
**Relay outputs**

All relays are shown in the open position. The normal factory setting is Fan 1 and 2 on. (37-38 and 40-41 closed) If there is an alarm, B-alarm (sum alarm) is activated (for example) and 31-32 are closed.

**Damper connection**

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

Evacuation dampers are normally closed (LED NORMAL) and are opened if there is an alarm (LED OFF). The damper motor closes the damper and the spring return opens it.



**Connections**

External units. Note that Belimo used to mark the connecting cables S1, S2, S3, etc. This corresponds to 1, 2, 3, etc. in the figure above.

## INSTALLATION INSTRUCTIONS

### Smoke detector inputs

The two smoke detector inputs are designed for a loop resistance of 2200 ohm (terminating resistor). A maximum of five detectors per input is recommended.

### 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 SUSAs 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. The line length can

be increased to 400 metres by connecting four 0.5 mm conductors (CAT5 cable) in parallel. To do this, at least the G and M lines must be connected in parallel.

### Legend of letter and numbers

Damper1 G=15, M=16, S=33, Ö=34.

Damper2 G=17, M=18, S=35, Ö=36.

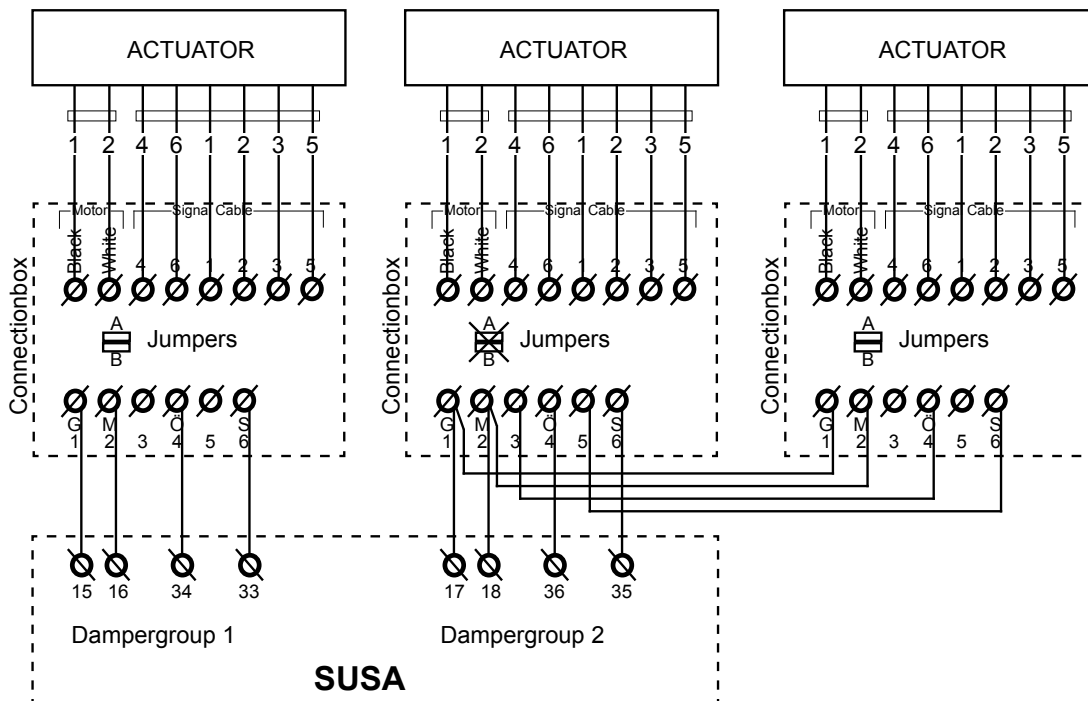
### Fuses

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. Take extra care with the thin ribbon cable connecting the front panel with the connection card. There is a fuse holder on the bottom right-hand side. This is the primary fuse.

### Connection box (KBOX or KBOX-U)

To make it easier to connect Belimo damper motors (actuators) we recommend using the connection box provided for this purpose. The connection box also simplifies parallel connection and troubleshooting. See the drawing below.

In a parallel connection, jumpers A and B should only be set in the last KBOX.



### Example of parallel connection

The figure shows each damper in damper group 1 and the parallel connection for group 2. Connection boxes are used.

## Basic principles and concepts

### Dampers

This documentation refers to ventilation dampers and evacuation dampers. Ventilation dampers are normally open and are closed by a spring. Evacuation dampers are sometimes called pressure relief dampers or bypasses. They are normally closed and they are opened by a spring.

### Fans

A ventilation fan is also called a ventilation system. In this documentation, an evacuation fan is a smoke extraction fan or other extractor which starts when there is a fire.

### Operating positions

In normal operation, all ventilation fans are open and the evacuation fans are closed. In night mode, all dampers are closed. The switch from day to night mode takes place from input terminals 26-27.

### Function groups

The SUSA consists of two halves called function groups. Each group has dampers, detectors and fan relays. All dampers and detectors must be assigned to one or both groups. The groups themselves have various group functions which can be set in the "Group config." menu. At present there are four options. One option is for just one group to be active, controlling detectors, dampers and fan functions in a shared configuration. This means that no division is possible. See also the function group menu on page 7.

### Factory settings

Damper 1 is always activated as a ventilation damper on delivery. The detector inputs are not activated. The external fire input with terminals 8-9 are activated with automatic reset. Fan outputs 1 and 2 are in parallel and function group 1 is active. The ventilation fan is not stopped in night mode. The clock is set to start the function test at 01:00 every other day. The clock function for the smoke extraction fan test is not activated. No expansion units are activated

### Installation without expansion units

Once the detectors, dampers and other components are installed, the SUSA must be configured. Assume there is one smoke detector and two dampers to be closed if there is a fire (ventilation dampers). The smoke detector is connected to terminals 4-5 and the dampers are connected to 15-16-33-34 and 17-18-35-36.

Follow these steps:

- Click with the knob to choose the Settings menu.
- Log in with AAAA.
- Choose "Damper menu" and click with the knob.
- Choose "Local damper list" and click with the knob.
- Choose "Damper 2" and click.
- Set the damper type to VENT and function group 1.
- Press BACK to return to SETTINGS.

- Turn the knob one step clockwise to the Detector menu and click.
- Choose "Local detectors" and click.
- Click once to display Detector 1 and FG1 in the menu.
- Press BACK to return to the info menu and finish.

### Installing a classic expansion unit

See page 8 for the physical connection of the expansion unit. In the Installation menu, choose "Damper menu" then "Local damper list". At the bottom, the expansion unit can be activated in the same way as a directly connected damper. The damper type and function group are selected exactly as described above for damper installation. To install more classic units, connect them in the usual way one after the other. Note that these expansion units should normally be placed within sight of the SUSA. More than one person will be needed for troubleshooting if the system contains classic units and the distances are long. Intelligent expansion units should be used instead.

### Installing intelligent expansion units

The network is almost always run from one unit to the next, and the next if there are more units. Read more on page 8. Activate the terminating resistor at each end of the network. You are recommended to test the slave units in standalone mode before connecting them to the network. They are delivered pre-configured for the test. After testing, remove ALL the jumpers in the slaves and specify an address. The first slave has the address 0. (No jumpers in the address panel.) The next slave has the address 1, etc. Each slave has a unique address. No two slaves must have the same address. The software version must be at least 3.0 for a KSUB and at least 2.0 for a KSUE in order to work with the SUSA. The last two digits of the serial number indicate the software version.

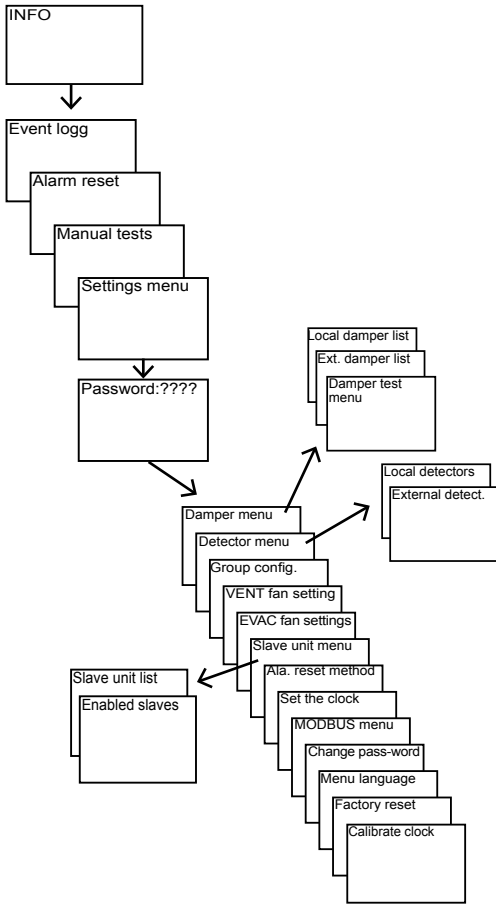
### Configuration

- In the Settings menu choose "Slave unit menu".
- Choose "Slave unit list".
- For address 0 (00) click until the correct slave unit appears under "Unit".
- Continue in the same way with address 1 (01).
- After entering the correct slave units, press BACK.
- Hold down the knob for five seconds to create the damper and detector lists.
- Continue to the Damper menu and choose "Ext. damper list".
- You can now activate the inputs used in the slave units by specifying the damper type and function group.
- Define the detector connections in the same way in "External detectors".

## Menu system

A detailed description is provided for the menus that are not self-explanatory.

The navigation structure is presented below.



## Installing local slave units

Classic type slave units are activated in the Damper menu. Choose “Local damper list” and “Expansion” then choose the damper type and function group. Usually, only classic is used for ventilation dampers.

LOCAL DAMPER LIST			
	Type	FG	
▶ Damper 1	V	1	
Damper 2	V	1	
Expansion	V	1	
ENTER=Edit		ESC=Done	

## Installing external slave units

Start by assigning an address to slave units with built-in intelligence of type KSUB and KSUE. When the list is finished, press BACK (ESC) and you are asked whether you want to create new damper and detector lists. New lists are created and the old ones are deleted.

CONNECTED SLAVE UNITS	
Address	Unit
00	KSUB
01	KSUE
02	----
03	----
04	----
ENTER=Change ESC=Done	

## Login

You must log in in order to configure the system. The default password is AAAA. You can change the password in a submenu. If you are not logged in you can only read information and perform manual testing.

## INFO MENU

Sun 15-02-10 18:37:34
Status:OK
Daytime operation
On Control SUSA v1.00

Status: OK

The status indicates whether the system is alarm free and provides brief status information.

Status: OK? means that the dampers are in an undefined position. Other operating information is also shown.

## Installing external dampers

If external slave units are configured, you can also configure the associated dampers and detectors.

The menu has a heading area. In the example below, damper 1 is connected to a KSUB with address 0 port 1 (DAMPER1). The damper is a ventilation damper in function group 1. Damper 3 is connected to a KSUE with address 1 port 1 (DAMPER1) and is an evacuation damper in function group 1.

EXTERNAL DAMPER LIST				
Dmp	Position	T	FG	
▶ 1	KSUB-00-1	V	1	
2	KSUB-00-2	-	-	
3	KSUE-01-1	E	1	
4	KSUE-01-2	-	-	
ENTER=Edit		ESC=Done		

## INSTALLATION INSTRUCTIONS

### Disable a slave unit temporarily

Slave units of type KSUB and KSUE have an address. To allow them to be easily re-installed without having to create new lists, it is possible to disable a slave while retaining all other settings. This is a useful function when servicing or replacing slave units. Select the slave and click to remove the check mark next to the address.

ACTIVE SLAVE UNITS	
Address	Unit
<input checked="" type="checkbox"/> 00	KSUB
<input checked="" type="checkbox"/> 01	KSUE
<input checked="" type="checkbox"/> 02	----
<input checked="" type="checkbox"/> 03	----
<input checked="" type="checkbox"/> 04	----

ENTER=Toggle ESC=Done

### Installing local smoke detectors

To activate smoke detectors, select them from the relevant menu. The options for the function group are 1, 2 or 1+2. Choose 1+2 if you want the smoke detector to work with both groups, otherwise choose the relevant group.

LOCAL DETECTORS		
Position	FG	
<input checked="" type="checkbox"/> Detector 1	1	1+2
<input checked="" type="checkbox"/> Detector 2	2	1

ENTER=FG ESC=Done

### Installing external detectors

The menu is similar to the external damper list. In the example below, detector 1 is connected to a KSUB with address 0 port 1 (DET1). The detector is in function groups 1 and 2. Detector 2 is connected to the same KSUB port 2 and is also in function groups 1+2.

EXTERNAL DETECTORS			
Det	Position	FG	
<input checked="" type="checkbox"/> 1	KSUB-00-1	1+2	
<input checked="" type="checkbox"/> 2	KSUB-00-2	1+2	
<input checked="" type="checkbox"/> 3	KSUE-01-1	---	
<input checked="" type="checkbox"/> 4	KSUE-01-2	---	

ENTER=FG ESC=Done

### Function group configuration

Used to select the control of ventilation systems or smoke extraction fans with all settings.

FUNCTION GROUP CONFIG	
FGroup-Type-Relay:	
<input checked="" type="checkbox"/> Fg1-V-(Re1+Re2)	
<input checked="" type="checkbox"/> Fg1-V-Re1,Fg1-E-Re2	
<input checked="" type="checkbox"/> Fg1-V-Re1,Fg2-V-Re2	
<input checked="" type="checkbox"/> Fg1-E-Re1,Fg2-E-Re2	

ENTER=Select ESC=Quit

### Ventilation fan settings

The ventilation system settings can be found in "Fan stop conditions". There are a number of stop conditions. You can select a stop time between 0 and 600 seconds. If there is a fire, the stop time is always 0 seconds.

VENT FAN SETTINGS	
<input checked="" type="checkbox"/> Fan stop conditions	
<input checked="" type="checkbox"/> Fan stop time	

ENTER=Select ESC=Quit

### Evacuation fan settings

Used to select the control of the smoke extraction fan. This menu also contains the function test settings for the smoke extraction fan.

The smoke extraction fan can be set to start with a delay of 15 seconds, or it can be locked so that all evacuation fans must be open.

The run duration is specified for the function test. (0-600 seconds)

The day of the week and the time of the test can be specified with an interval.

The test interval can be set to every week or once a month. All months can be selected.

EVAC FAN SETTINGS	
<input checked="" type="checkbox"/> Fan start condition	
<input checked="" type="checkbox"/> Test run duration	
<input checked="" type="checkbox"/> Test weekday	
<input checked="" type="checkbox"/> Test starting time	
<input checked="" type="checkbox"/> Test run schedule	

ENTER=Select ESC=Quit



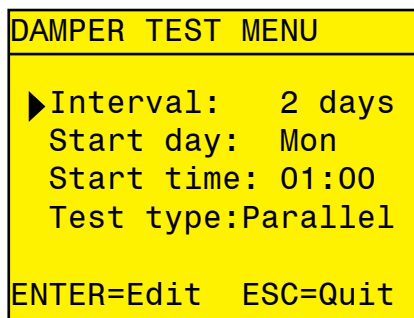
## INSTALLATION INSTRUCTIONS

### Damper test

The damper test settings are configured in a submenu of the Damper menu.

The test can be set to run every day, every other day, every third day, etc. After six days the frequency switches to weekly. The maximum interval that can be selected is 52 weeks. If you set the interval to 0 days, the automatic test is disabled.

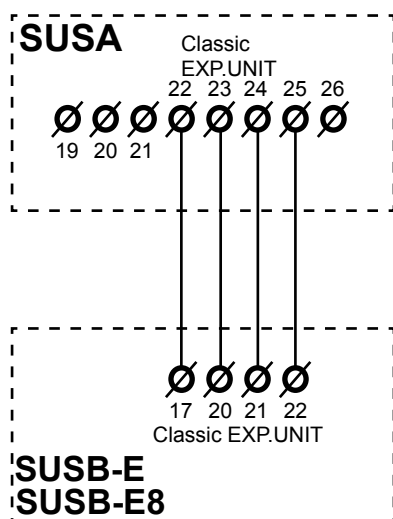
You can choose whether to test the dampers simultaneously or in sequence. In a sequential test, each damper group is tested separately. It can take a very long time to complete a sequential test if the system has a large number of dampers.



### Expansion units

#### Classic expansion unit

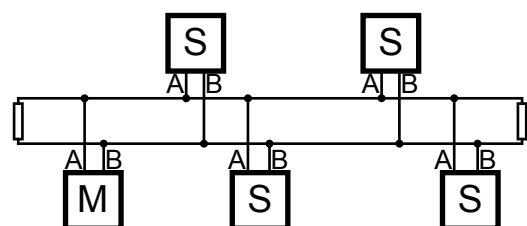
Terminals 22-23-24-25 are used to connect a classic expansion unit of type SUSB-E and SUSB-E8. The connection diagram appears below. Dampers forming part of the LOCAL DAMPER LIST Expansion (damper group 3) can be connected to the expansion unit. The expansion units form a separate group which receives its own error messages, etc.



### Network expansion unit

Terminals 19-20-21 are used to connect a network expansion unit such as a KSUB, KSUE, etc. (At present, these are the only types that can be connected.) The connection diagram appears below. Shielded two-wire cable is used to make the connections. Connect the shielding ONLY to Gnd in the SUSA and the expansion units. Connect A to A and B to B in all units. Connect resistors at the ends of the network. Each unit contains a resistor, connected using a jumper called UA2 and situated to the left of terminal 19 in the SUSA. In the KSUB the jumper is called I and in the KSUE it is called TERM. Thin cable is preferable because it takes less space and is more economical.

The maximum cable length is 1200 m. If the cable is split as shown in the figure below, the branch must not be longer than 20 m.



### AUX input

Used to stop the function test. If the input is closed, the automatic function test is stopped.

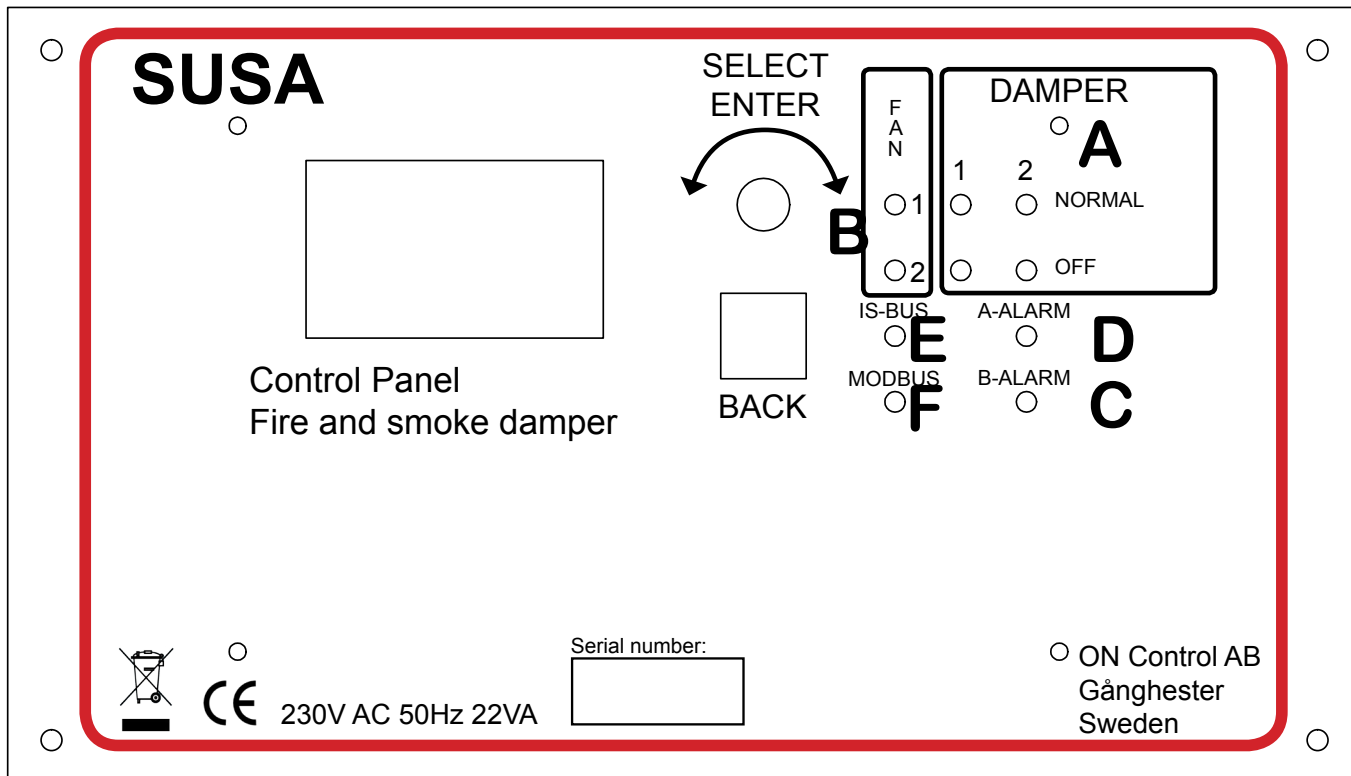
### Modbus

The Modbus connection is of type RTU and communicates via RS485. The communication parameters and the Modbus address are specified in the special menu. The default setting on delivery is address 10, 9600 bps 8n2. To terminate the line, there is a built-in resistor which is activated by jumpering the pin marked UA1. The pin is situated to the left of terminal 1 in the SUSA.

Modbus can be used to download a large amount of information from the system. If classic type expansion units are used, you can only download general information about all the dampers of all the expansion units. Networked units are far superior in this context because you can obtain detailed information about each damper. The same is true of all detector groups.

For more information about Modbus parameters, please see the separate document.





## Operating instructions

### Indicators and buttons

#### A. Dampers

Green LED indicates the normal position. Red LED indicates the off position. Ventilation dampers are open in the normal position and evacuation dampers are closed in the normal position. Evacuation dampers are also known as pressure relief or bypass dampers. The damper groups are numbered 1 and 2.

#### B. Fans

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

#### C. B-ALARM

The alarms indicated as B-alarms are:

- Incorrect damper position
- Damper function test error
- Smoke extraction fan function test error
- Break in any of the detector loops
- Smoke detector service alarm
- Slave communication error

The B-alarm relay closes when the LED lights up.

#### D. A-ALARM

Red LED indicates:

- Smoke detector triggered
- EXT input activated

The A-alarm relay closes when the LED lights up.

#### E. IS-BUS

The green LED flashes when a correct message is received from a slave unit. Not relevant for classic type slave units.

#### F. MODBUS

The green LED flashes when a correct message is received from the Modbus master (SCADA). This confirms that the communication parameters and checksum are correct when the message is received by the SUS A.

## Reset

Choose “Alarm reset” from the menu to reset all alarms.

## Function test

Choose “Manual tests” and the test type. Dampers are either tested in sequence or all at the same time depending on the configuration. The function test for the fire ventilation fan is completely separate. All dampers are tested with the smoke extraction fan, for the configured time.

## Manual check of smoke extraction fan function

Choose MANUAL TESTS->START E FAN TEST.

The test starts and the ventilation system is stopped (if there is one). The dampers move to the fire position within the configured ventilation fan stop time, factory setting 30 seconds. After the evacuation dampers have opened, the smoke extraction fan starts. If there is a pressure sensor, it must close during the test. This is checked just before the fan stops running. The function test ends after the preconfigured time. The smoke extraction fan stops and everything returns to normal operation.

The monitoring menu indicates when the function test is running.

## Troubleshooting

### *B-alarm LED lights up*

Open the log and look up the error or errors.

- If the B-alarm slowly switches on and off and the “Damper in wrong position motor on” error is logged, the damper is connected wrongly. Terminals 15-16 and 17-18 (G and M) are probably the wrong way around.

### *A-alarm LED lights up.*

Follow these steps:

- Open the log and look up the error.
- Check that the EXT input is jumpered or closed by an external control unit.
- Check for a short-circuit in one of the detector loops.

### *The dampers do not open.*

Follow these steps:

- Check that there are no other alarms on the front panel.
- Check that the dampers indicate the position OFF or CLOSED in the unit(s) where they are installed.
- Check that any slave units are correctly connected to the SUSA.
- Check that intelligent slave units have the correct address.
- Check that the dampers are configured in the SUSA.
- Check that classic expansion units are activated. See page 6.

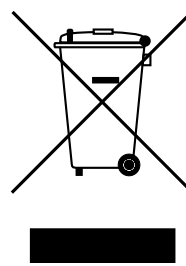
*A manual reset is required after an automatic function test.*  
The “fan lock” output has probably been connected to the wrong input in the ventilation system, which has locked itself as a result.

*A manual reset is required after night mode.*

Requires a night mode signal from the ventilation system to the SUSA.

Locking may occur if night mode is indicated by the SUSA, which then sends a stop signal to the system via the fan lock. This locking may be bypassed by deselecting the “stop at night” option in the ventilation fan properties.

## 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.