

# control

## KSUA

### Control panel

Valid from week of manufacture 14/2011 and software version 2.6

#### Description

The KSUA is a control and monitoring unit designed to control various types of fire/smoke dampers and fans in a flexible way. This unit is a master unit. Up to 32 slave units can be connected to the KSUA. Each slave can operate two damper groups, each with a maximum of two dampers and two smoke detector groups. These units can be grouped in any way in up to 64 fire zones. Each damper group and detector group can be monitored individually. A central fire alarm system can be connected using the KSUC, which has a maximum capacity of 16+16 fire zones. The KSUA can also be used to connect ventilation systems, smoke evacuation fans and heater batteries. These units are then controlled in an intelligent way depending on their function. The KSUA has additional inputs for an external fire alarm, forced opening, night mode, etc. The KSUA also has a standardised input for connecting a Modbus network monitoring all dampers, smoke detectors and other devices.

#### General

- Master unit for KSUB
- 32 slave units
- 64 damper groups
- 64 detector groups
- Separate KSUC unit for connecting a fire alarm
- Separate alarm inputs for isolating switches in smoke extraction fans (for example)
- 2 fan groups
- 6 distributed relay outputs
- Real time clock with battery backup
- External input for central fire alarm system

- Night mode input
- Forced opening input
- Evacuation dampers (pressure relief) can be configured in any way in the system
- Damper position indication
- Error logging
- Integrated troubleshooting program
- Compact plastic case
- Integrated transformer
- Programming using modern techniques (knob with pushbutton)
- Easy to back up the configuration
- Serial or TCP/IP Modbus
- And more



#### Maximum configuration

The system can handle a total of 64 damper groups with a maximum of 128 dampers and 64 detector inputs. In principle, an unlimited number of smoke detectors can be connected. These smoke detector inputs and fire dampers can then be grouped into a maximum of 64 fire zones. 16+16 fire zones come from the KSUC. There are up to two outputs for fan control. Using the KSUC, a further 6 outputs are available. These outputs can be configured for ventilation fans, smoke extraction fans, various alarms or heater batteries. Custom delays, etc. can be selected for each of the options.

## Installation

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

## Supply voltage

230 VAC 50 Hz 5VA. Protected with 2A 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

## Accessories

- Assembly kit for rack installation

## Outputs

- Sum alarm. Voltage-free changeover contact 1A max 60VA. Terminal numbers 16,17,18.
- Triggered smoke detector, shared by all smoke detectors. Voltage-free changeover

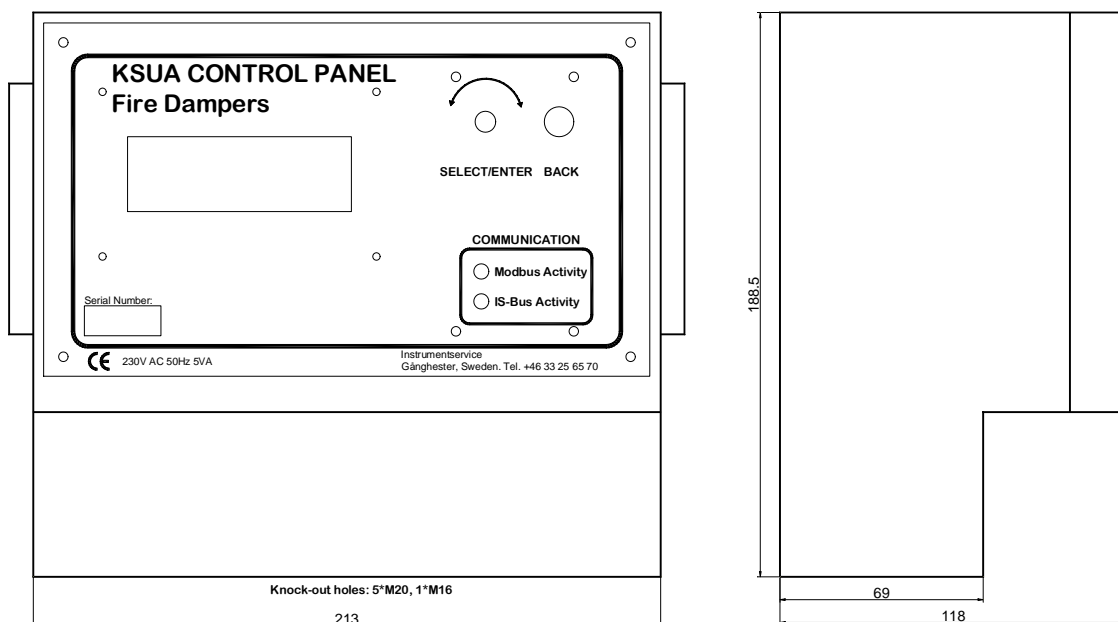
contact 1A max 60VA. Terminal numbers 13,14,15.

- FAN 1. Voltage-free changeover contact max 10A / 250V. Terminal numbers 19,20,21. Intended to lock the ventilation system.
- FAN 2. Voltage-free changeover contact max 10A / 250V. Terminal numbers 22,23,24. Various applications. Vent. systems, heater batteries or smoke extraction fans can be programmed with different time delays.

## Inputs

- Modbus slave. (RS485) Available as a screw terminal or standardised RJ45 contact
- Bus for KSUB and KSUC slave units (RS485)
- Forced opening
- Night mode
- Alarm (external control unit). Opening the circuit has the same effect as a triggered smoke detector (the system switches to critical mode)

## Dimensions



## How does the network work?

Both network connections are based on the RS485 standard, which is well-established in the market. For communication to take place, there is always one master and one or more

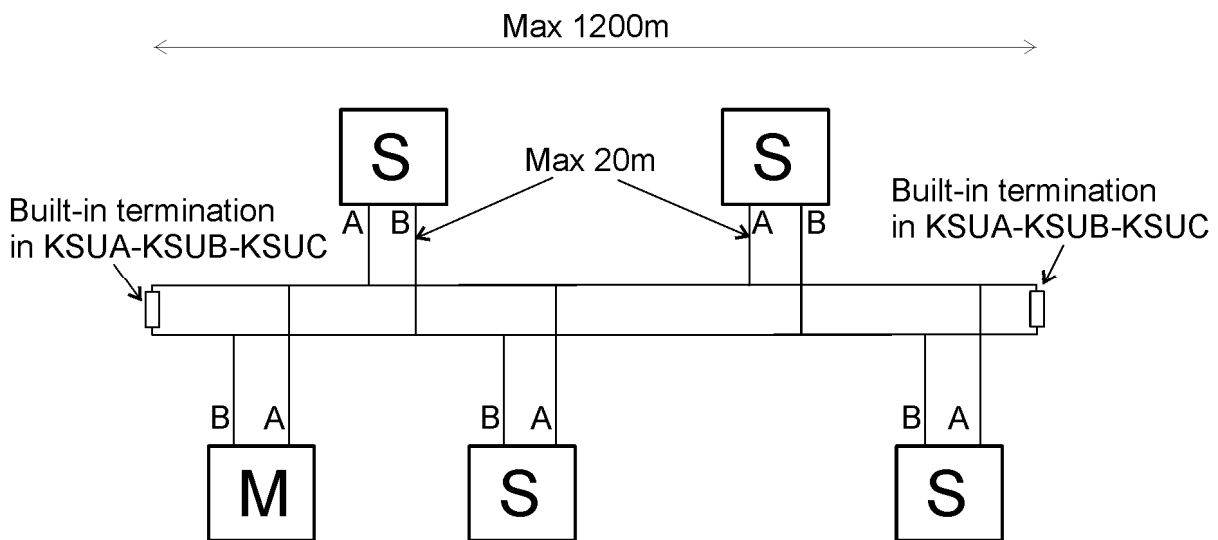
slaves. Each of the slaves must have a unique address. In the case of Modbus, a special Modbus menu is used to configure the address (the KSUA is always a slave). In the case of SBus, the KSUA is the master and the KSUB

and KSUC units are slaves. The address is configured in a jumper panel in the KSUB.

The maximum length of the cable between master and slave is 1200 metres. According to the standard, the cable has three wires, one of which is the "internal ground" of the system. It is usually OK to leave out this ground, and most installers even think that systems may work better without the ground wire. Note that the ground wire CANNOT be connected to anything other than a KSUA-KSUB. Because the system is symmetrical, twisted pair cable

should be used to minimise the risk of transients. In this type of cable, the diameter of the wires is usually 0.5 mm. If shielded cable is used, the shield can be used as the ground wire if it is not connected to any other ground. An example of a widely used cable is FKAR-PG 2\*0.5.

It is advisable to run the cable from one unit to another, but it is also possible to install a backbone cable with drop cables. Make sure that the drop cables are no longer than 20 metres.



*The common ground connection (Gnd) is not shown.*

An RS485 network must be connected correctly. There must be a termination at each end of the network. For example the master unit is usually placed at one end and one of the slaves at the other. Both units must then be terminated with the built-in resistors, i.e. jumper I in the KSUB and jumper PL2 or PL3 in the KSUA. PL3 is used for the Modbus connection and PL2 for SBus.

### Priority handling

The system can handle so-called critical and non-critical detector groups. A non-critical group will not affect the fans, etc. if a detector is triggered. All that happens is that the dampers assigned to the group are closed and an alarm is sent to the KSUA output for triggered smoke detector. For evacuation dampers, it is possible to start smoke extraction

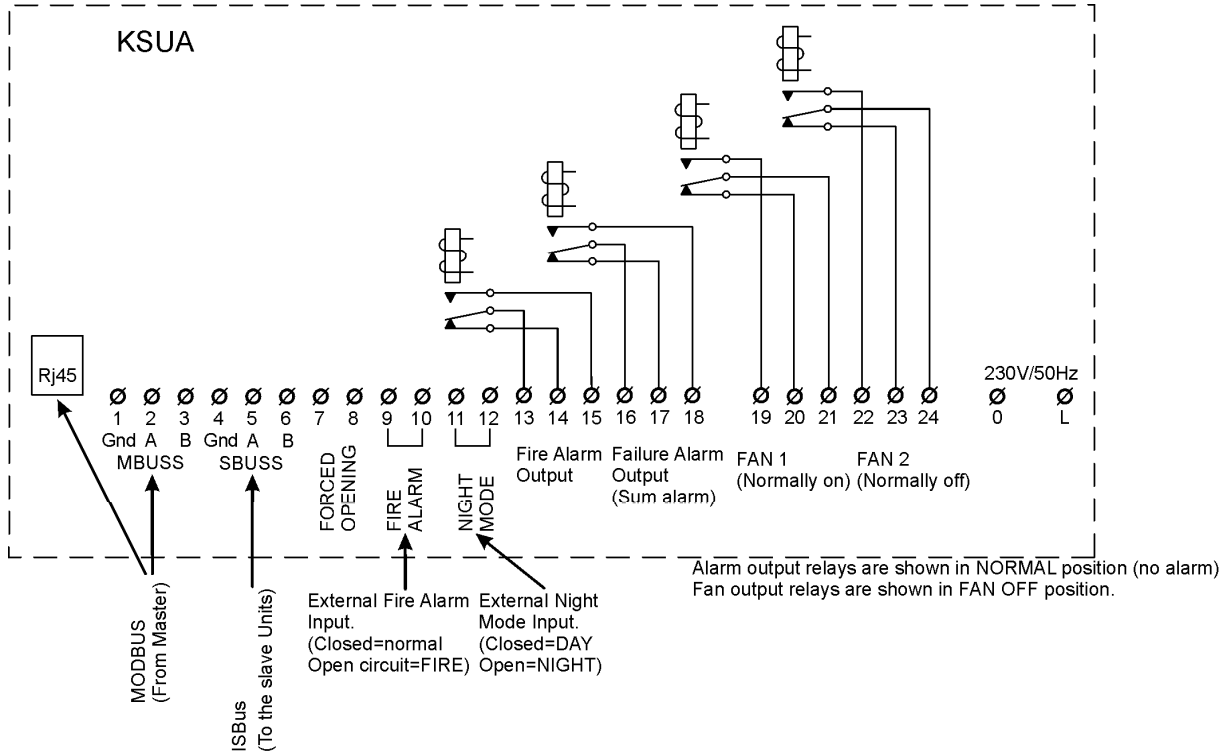
fans without switching to critical mode. If a critical group triggers an alarm, the ventilation system is stopped, all dampers are moved to alarm position and any smoke extraction fans are started. The alarm is of course sent from the KSUA output for triggered detector. Forced opening has the highest priority. Regardless of the alarm position, the dampers will be forced to the open position. If there is a communication error between KSUA-KSUB, the system goes into critical mode except that any smoke extraction fans is not started (you can use a KSUC unit if you want to start the smoke extraction fan in the presence of a communication error). The alarm output for triggered detector will of course also be unaffected. Dampers in the KSUB that lose communication with the KSUA will move to alarm position.

## Authorisation

An authorisation code is required in order to configure the system. The factory settings for the code are AAAA. You should change the code for improved security.

You do not need to enter the authorisation code to read logs and error messages.

## Connection terminals



### Connections

## Connections

### 230V 50Hz.

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 KSUA is built with reinforced insulation, so no ground is necessary.

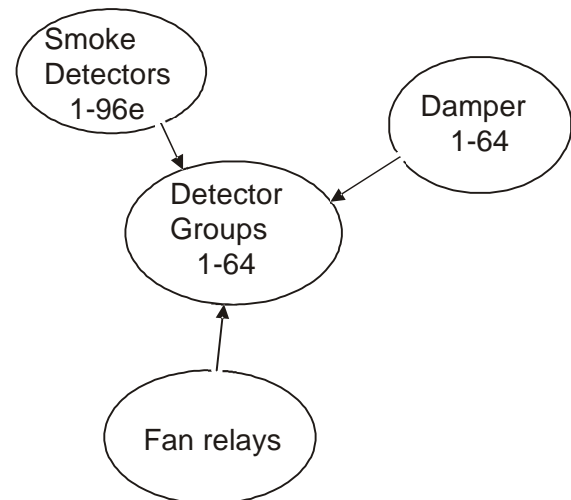
### SBus (ISbus)

Connect one slave at a time, each with a unique address, so that not too many errors occur at the same time. Make sure the network is correctly connected as described above.

## Configuration / Installation

Install and test every single KSUB in stand-alone mode. This guarantees correct connection of dampers and detectors. Start the

configuration process by defining the dampers in the respective KSUB. When all dampers are included in the table, start on the smoke detectors.



The detector groups appear first in the menu. A detector group is a collection of smoke

detectors that form a fire zone. One or more smoke detectors can be connection to a detector group. The smoke detectors in a group are indicated with a star to the right of the menu. A smoke detector can be assigned to more than one detector group if required. When you close the menu, a message tells you the number of smoke detectors in this group. The external input of the KSUB is always connected to detector 1 for each KSUB. This means that external fire alarm systems connected to a KSUB can also be included in a particular detector group. The fire alarm input of the KSUA always takes precedence and can be thought of as belonging to all detector groups.

The fan control is configured next. FAN 1 is the same as Relay 1 in the description. Relay 1 is intended for the ventilation system. Relay 2 can be used for another ventilation system, heater batteries or smoke extraction fans. An important part of the configuration process is defining what is to happen when a smoke detector group is triggered. If a detector group is considered to be critical, the entire system must switch to fire mode, which means that the ventilation system is stopped, all ventilation dampers are closed, the evacuation dampers are opened and a smoke extraction fan is started. In a non-critical group, only the dampers within the group are affected if a smoke detector is triggered. Detector groups are defined as critical in Stop/DetGrps in the menu.

The fan output of the KSUB can be used if there are a number of small ventilation systems in the installation, and you want them to be controlled by the relevant detector group. The output is hard coded so that detector group 1 is connected to KSUB address 0. Detector group 2 is connected to KSUB address 1, etc. up to detector group 12.

The KSUB fan relay output is dependent on the Relay 1 configuration in the KSUA. If you want the fans connected via the KSUB to stay on during the damper exercises until the relevant damper closes, set Stop/Test to OFF in the Relay 1 menu. Other functions are also dependent on the settings in the Relay 1 menu.

## Inputs

### Modbus / RJ45

The contact is standard for Modbus RTU and contains outputs for +5V on pin 7 and 0V on pin 8. A is on pin 5 and B is on pin 4. +5V can be loaded with up to 100 mA resistive load. The contact for Modbus over TCP/IP is on the left side of the box. (TCP/IP is an optional extra)

### MBUS, SBUS

These are connections for Modbus and SBus respectively. The SBus connection goes to the slave units.

### Forced opening

If the input is closed, the dampers will move to the open position. All other functions are disabled. It is possible to define whether the fans will be on or off.

### Alarm

This input is used to connect to a central fire alarm system. If 9-10 is open the entire system switches to critical mode. Ventilation systems, etc. are stopped immediately, the dampers are switched off and any smoke extraction fans are started. Normally manual resets are necessary. In menu 19 it could be changed to automatic reset.

### Night mode

The night mode input is activated when 11-12 is open. What happens next is that any heater battery and the ventilation system are stopped with the delays defined during configuration. The open dampers are closed. If there are evacuation dampers (pressure relief dampers), they are not affected.

## Outputs

### Relay outputs

All relays are shown in the open position. FAN 1 is normally activated. The state of FAN 2 depends on the configuration.

## Triggered detector

If a smoke detector in the system is triggered, 13-15 is closed. The output can be seen as a so-called A-alarm.

## Sum alarm

The sum alarm is activated for any kind of error (16-18 closed). The error is also logged. The output can be seen as a so-called B-alarm.

## FAN 1

Used to lock the ventilation system. 19-21 is normally closed. The delay can be adjusted between 0-300 seconds to allow large systems to shut down before the duct system is stopped.

## FAN 2

There are four different ways to use this output.

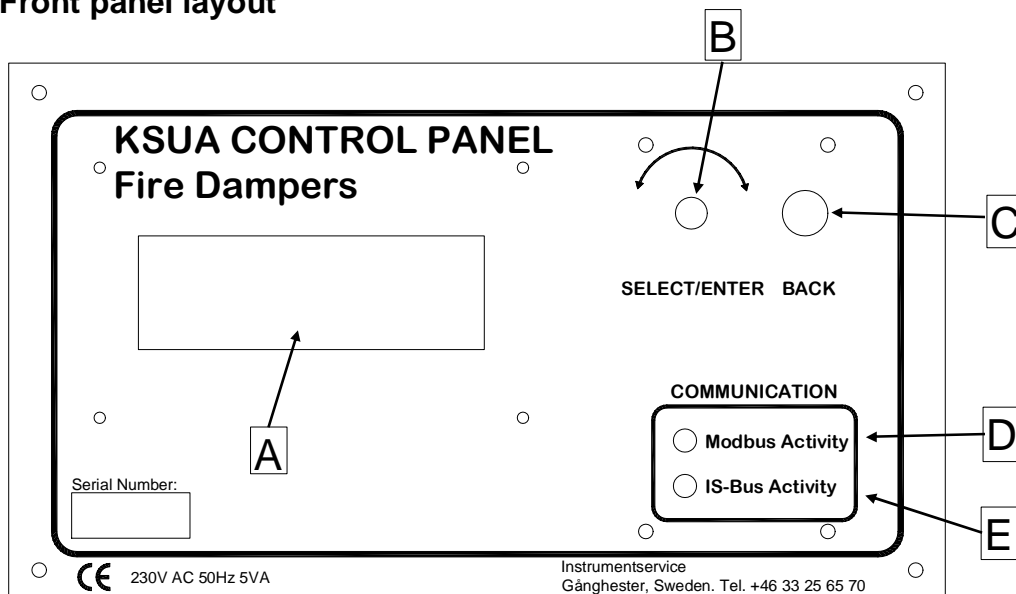
- Ext. Fire. Fan 2 output activated when input 9-10 is off.

- To control heater batteries with an adjustable cooling period between 0 and 990 seconds.
- To control a second ventilation system. In this case, the output follows FAN 1.
- To control a smoke extraction fan. The fan can be set to start either after all the evacuation dampers have opened or after 20 seconds. For the function test, the running time can be set between 10 and 900 seconds

## Fuses

There is a 100mAT fuse on the motherboard. To access the fuse, remove the four screws in the corners of the front panel. There is a fuse holder on the bottom right-hand side. The holder is the bayonet type. To remove the fuse, press the holder down and twist anticlockwise.

## Front panel layout



## Indicators and buttons

### A

The display is dimly lit during normal operation. When you start using the menu the light level increases to make the display easier to read.

*Special symbols used in the display:*

	Description
◊	Select by turning the knob.
→	Move to next menu by pushing the knob
⌂	Direct selection by pushing the knob.

Some of the menus are described below. Many items are self-explanatory so no special description is needed.

Other

**Starting from menu 10, you need to log in. This covers all the settings that must not be changed by unauthorised personnel.**

**B**

Encoder for selecting options. Push the knob to select or activate an option.

**C**

Back button. Usually moves one step back in the menus.

**D**

Flashes when a Modbus message is received

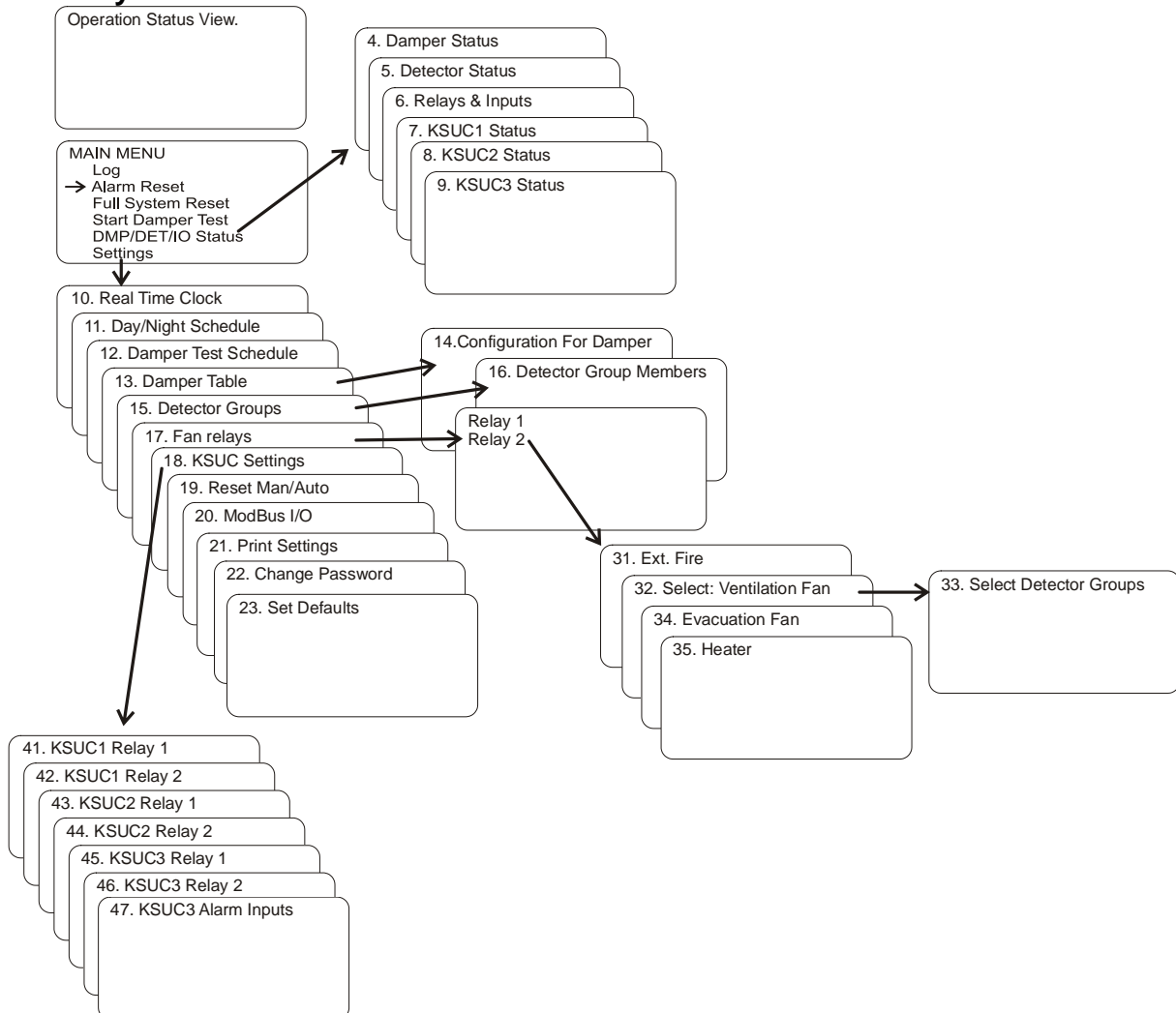
**E**

Flashes when an SBus message is received

Friday	KSUA V2.0
08-11-09	Status:OK
08:42:29	Day mode
winter	

*Operation Status View.*

### Menu system



*Menu system. (Number ref to description below.)*

Press any of the buttons to show the main menu from standby mode. A short summary of the system status appears in standby mode. Errors or anything else of interest appear in summary.

```

MAIN MENU
  ▶Log
1 Alarm Reset
  Full System Reset
▼ Start Damper test

```

Select this item to open the log. The log contains the last 99 events. It contains information with timestamps for all errors.

Two different resets are possible. The alarm reset is a softer reset, and only applies to the affected dampers in the system. All critical alarms must be acknowledged by clicking on Full System Reset.

```

DAMPER ↕ 1 (SLV 0)
Motor:    ON
Position: Fully ON

```

4. You can read the position of the dampers in real time. There are three different positions. On, off and intermediate. You can also see whether the damper motor is powered from the KSUB.

```

DETECT. ↕ 5 (SLV 2)
Fail:    NO| Loop
Serv.:   NO| curr:
Smoke:   NO| I=10mA

```

5. The status of the detectors is shown in real time. Loop current is passing through the detector. The standby current is approx. 10 mA. The current increases when the detectors are dirty, and at 20 mA a service alarm is triggered. This indicates that the detector needs cleaning. A fire alarm is triggered if the current increases to 40 mA. An alarm can be traced more accurately by reading the current.

```

Relay1=1 ForceOp=NO
Relay2=1 ExtFire=NO
Fail =0  ExtNite=NO
Fire =0  SlvDay =NO

```

6. All outputs and inputs in the KSUA can be viewed in real time. SlvDay is a day mode request from a slave.

```

KSUC1 STATUS 65e-80e
6666677777777778
5678901234567890
Not Installed!

```

7 and 8. The active inputs in the KSUC are displayed here. Inactive inputs appear as 0, and if there is no unit, "Not Installed" appears. Menu 8 contains the corresponding function for alarm inputs 81e-96e.

```

KSUC3 STATUS 1-16
          1111111
1234567890123456
-----

```

9. The active inputs in a KSUC3 (a KSUC with jumper 8 on) appear as described for menus 7 and 8.

```

NIGHT INTERVAL ▶1(7):
Begins: Fri    20.00
Ends   : Mon    06.00
In use: YES

```

11. There are up to seven different schemes that can be used for the night interval. Night mode can also be controlled from external units via input 11-12 or via Modbus. In this case, close this menu with all intervals deactivated.

```

DMP TEST SCHEDULE:
Start: ▶Mon 01:00
Interval: ▶2 days
Simultaneous test

```

12. Damper exercises are defined in a separate menu, where the start time is specified. You then specify how often the exercise will be carried out. If more than 6 days are selected the menu change to weeks. The National Housing Board in Sweden recommends every two days. Finally, you can specify whether the exercise covers all dampers simultaneously or in sequence. If they are exercised in sequence, each damper is closed and opened fully before the next damper is exercised. If Modbus is used for the exercise, the interval should be set to OFF.

```

DAMPER| DMP ITF Dgr
TABLE |▲ 4 YVN 1
Select||▶5 YVN 1
damper|▼ 6 YVN 2

```

13.



All dampers appear in a table with their configuration. Damper numbers 1 and 2 are in slave unit 0. Damper numbers 3 and 4 are in slave unit 1. Damper numbers 5 and 6 are in slave unit 2, etc.

- DMP stands for damper number.
- I indicate whether the damper is installed.
- T is the type of either ventilation damper or evacuation damper. Ventilation dampers are normally open while evacuation dampers are closed.
- F stands for function. For ventilation dampers, the options are either Always open or Night. Select Always open if you only want the damper to be affected by an alarm state. Select Night if you want the damper to be affected by night mode. For evacuation dampers, the options are Critical or Detector group no. Critical means that the damper is operated when a fire occurs in a critical detector group. See menu 31.
- Dgr shows the detector group of the damper. This can be between 1 and 64.

CONFIG.	Instal	┌	Yes
FÖR	Type:		VENT
DAMPER	Func:		NITE
No 5:	DetGrp:		3

14.

This menu is used to actually program the dampers. See the description for menu 13.

DETECTOR	▶	1 (6)
GROUPS		2 (3)
(Det count)	↓	3 (6)
Select GRP:	▼	4 (-)

15.

There are 64 detector groups. Each detector group is a fire zone. There are one or more detectors in a detector group. The number of detectors in the group is shown in brackets.

DETECTOR	▶	1*
GROUPS		2*
(Det count)	↓	3*
Select GRP:	▼	4*

16.

This menu selects the detectors that are included in a detector group. A detector can be

included in more than one group. The stars on the right indicate that the detector is included in the group.

SETTINGS	
▲	Damper Table
6	Detector groups
▼	▶Fan Relays

17.

Select Fan Relays to configure the way the ventilation system, smoke extraction fans, heater batteries, etc. are controlled.

CONFIGURE RELAY 1:	
Func:	▶VENT-FAN
Stop/night:	
YES	
▼ Stop/DMP test:	
YES	

32.

Select Stop/night if you want the ventilation system to stop in night mode. Similarly, you can specify whether you want the ventilation system to stop during the function test.

CONFIGURE RELAY 1:	
▲ Stop/DMP fail:	YES
Start/ForceOp:	NO
▼ Stop/DetGrps:	▶List

32. (Continued from the Relay 1 menu.)

- Select Stop/DMP fail if you want the ventilation system to stop if a damper closes incorrectly.
- Select Start/ForceOp if you want the ventilation system to start during forced opening.
- **Stop/DetGrps has a submenu, see below, which works by causing the selected detector group or groups to stop the ventilation system, meanwhile placing the entire system into a critical state. This means that all V dampers are closed, evacuation dampers are opened and smoke extraction fans are started.**

Select D-Grps	┌	1*
To stop v-fan		2
when smoke or		3
det. Failure:	▼	4

33.

Select the detector groups to be defined as critical.

Relay 2		EXT. FIRE
		VENT FAN
Select	▶	EVAC FAN
Function:		HEATER

Relay output 2 can be configured for a specific purpose. Ext. Fire is to be used if input 9-10 should control relay 2. If you select VENT FAN, relay 2 completely follows relay 1.

```
CONFIGURE RELAY 2:
| Func:►EVAC FAN
| Await ED open: YES
▼ Start/ForceOp: YES
```

34.

EVAC FAN is displayed to explain the special parameters used with this type of fan.

- Await ED open means that the evacuation fan is not started until all evacuation dampers are open. If you specify NO, the fan starts after 20 seconds or when the evacuation dampers are open.
- Start/ForceOp means that the fan is started when the forced opening input is closed.

```
CONFIGURE RELAY 2:
▲ Start/ForceOp: YES
| Test run for: ►600s
| Test weekday: ►Mon
```

34. (Continuation of evacuation fan menu.)

- Test weekday and following parameters define start of evacuation fan. The test is run the first week in the selected month. If no month is selected the test is never carried out. Manual test of the evacuation fan is possible by the menu that occurs when configuration of an evacuation fan at relay 2. Before the fan is started, the ventilation dampers are closed and the evacuation dampers are opened. This test is never carried out in sequence, regardless of the setting.

```
Automatic reset when
External fire alarm
Input goes back to
normal:      ⌋ NO
```

19.

Select if input 9-10 force manual or automatic reset.

```
KSUC/XDG1 Relay 1
is controlled by:
►Fan Relay 1
```

41-47.

All the relays in the various models of KSUC can be connected to the four different relays in the KSUA. Menus 18 to 23 are used to change the settings.

```
SETTINGS
▲ ModBus I/O
| ►Print Settings
▼ Change Password
```

21.

This function is used to document the entire installation. The Modbus port is used as the output, and is connected to the serial port of a PC via a small adapter, KS232. A communication program is used in the PC, for example Windows HyperTerminal. This program is installed as standard on most PCs. Set the program parameters to 9600 bps, 8 bits, no parity. Set the emulation to TTY and the font to Courier New. You will then be able to save the entire output to file or print it on paper.

To output the data, you will need to physically disconnect any Modbus connection.

### Description of Modbus.

The KSUA acts as a slave and must be connected to a Modbus server. According to the standard, the server must clearly define a 1 on the line before transmission takes place. This can be done with resistance on the line to +5V or 0V, or using software by sending a logical 1 before transmission takes place. See the description for the relevant server. Modbus can be used for effective monitoring of the entire system. It can obtain information about the status of each damper, how each detector is working and provides an overview of all possible alarms. Modbus can also be used to control day/night mode, the damper exercise, resets and much more. Certain Modbus parameters can be set in the communication menu. The factory setting is 19200bps, 8 bits, even parity and address 10. RTU mode is always used. Modbus over TCP/IP is an optional extra. See the separate description

## Troubleshooting.

The special status menus in the KSUA can be used as a very good diagnostics tool covering every part of the system. One serious pitfall that cannot be diagnosed is giving the same address to more than one slave unit. It is therefore extremely important to assign addresses correctly during installation.

### Procedure

If an error occurs, always start by looking at the log. The log contains information about what happened. To find out more detail about the error, you can then use everything in the six status menus to physically inspect individual dampers. One good tip is to look at the status screen for I/O Relays and Inputs. Menu 6. You can see from this menu whether the KSUA went into a specific state because of an external system. It can take a lot of work to find out what exactly caused the problem. The KSUA includes tools to help with diagnostics.

#### *Finding the slaves*

The easiest way to find out which slaves are installed is to look at menu 4. You can scroll through all the dampers for the relevant slave unit by simply turning the encoder knob. The bottom part of the menu indicates if contact with a slave has been lost.

#### *Smoke detector error*

It is not unusual for something to go wrong with a smoke detector. Go to menu 5 and check the current for the detector with the problem. The standby current should be 10mA. If the current increases to around 20mA, the service alarm is triggered and the detector needs to be cleaned. If the dirt continues to build up, the current gradually increases until the alarm limit of 40mA is reached. This will trigger a real smoke alarm, more or less affecting the entire system.

#### *A manual reset is required after an automatic function test*

The öFAN 1ö 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*

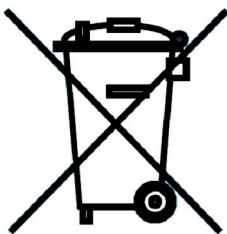
Requires night mode signal from ventilation system to the KSUA.

Locking may occur if night mode is indicated by the KSUA, which then sends a stop signal to the system via fan lock on the FAN 1 output. This locking may be bypassed by specifying that there is no fan stop in night mode. The fans are still locked if a smoke detector is triggered and during the function test.

#### *Other*

See the troubleshooting section in the KSUB description, which contains lots of tips about connecting dampers, for example.

## 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.