

control

KSUF

CONTROL AND MONITORING UNIT

Valid from week of manufacture 06/2014

Description

The KSUF is a control and monitoring unit designed to control various types of fire/smoke dampers that are fitted with actuators from Rf-technologies. The KSUF can be connected to the KSUA, or used as a completely stand-alone unit. There are eight damper inputs and four smoke detector groups. These units can be grouped in 1 or 4 fire zones. Each damper input and detector group can be monitored individually. An Air Handling System can be connected to the KSUF for blocking. The KSUF has an input for an external fire alarm and for night mode. In night mode, the dampers are closed without an alarm. A special version is available for actuators without indicating switches. Documentation of KSUFx is at the end of the manual.

General

- Slave unit for KSUA.
- Can be used as a stand-alone unit.
- 8 damper inputs.
- 4 detector groups.
- Built-in controlling of fans.
- Built-in clock for damper exercises.
- External input for central fire alarm system.
- Night mode input.
- Input for real-time clock.
- Damper position indication.
- Integrated transformer.
- MANO, MANF VD24 type actuator.
- Jackable terminals.

Maximum configuration

The KSUF can handle eight dampers and four detector groups. In principle, an unlimited number of smoke detectors can be connected. These smoke detector groups and fire dampers

can then be grouped into a maximum of four fire zones. One output for fan control.



Installation

Designed for wall installation.

Supply voltage

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

Protection class

IP66.

Ambient temperature

Max +30°C, min 0°C.

Weight

2.5 kg

Outputs

- Summary alarm. Voltage-free changeover contact 12 A max 250 V. Terminal numbers 16,17,18.
- Triggered smoke detector, shared by all fire zones. Voltage-free changeover contact 12 A max 250 V. Terminal numbers 13,14,15.
- Fan stop. Voltage-free changeover contact max 12 A / 250 V. Terminal 19,20,21.
- Damper 1 to 8.

Inputs

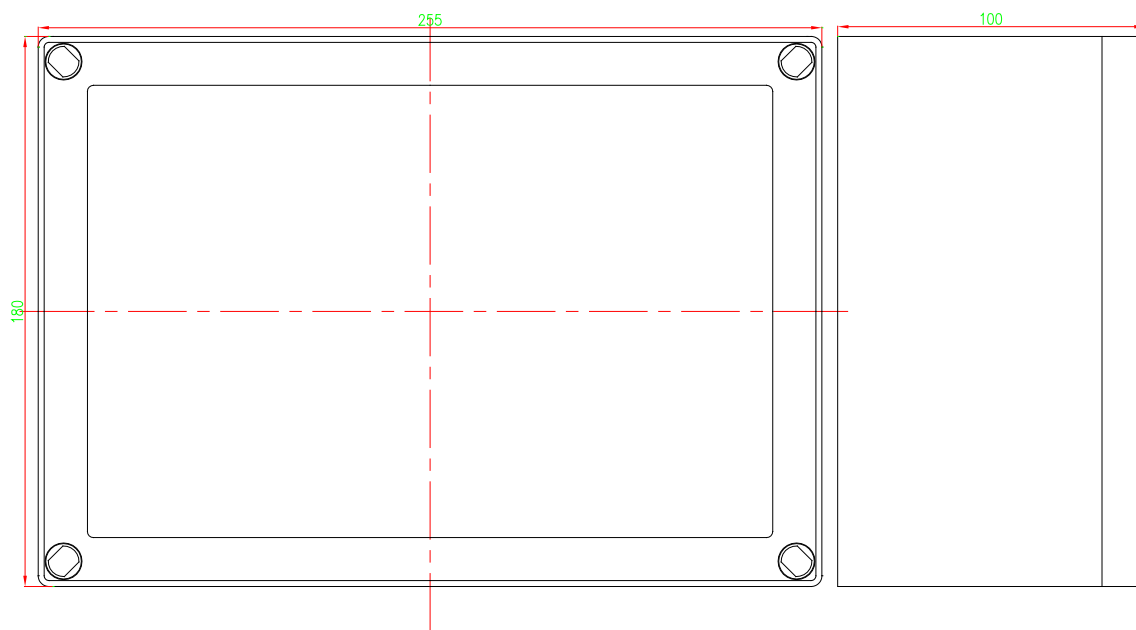
- Bus for KSUA master unit (RS485).
- Terminals 1,2. External control unit. Opening the circuit has the same effect as a triggered smoke detector (all groups affected).
- Detector 1: Terminals 3,4. Det 2: Term. 5,6. Det 3: Term. 7,8. Det 4: Term. 9-10
- Terminals 11-12. Night mode input or input for real-time clock.
- Input for 230 V 50 Hz

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Dimensions



Definitions

- **Ventilation dampers**
Dampers that are closed by a spring.
- **Evacuation dampers**
Dampers that are opened by a spring.
- **Day mode**
Ventilation dampers open and evacuation dampers closed.
- **Night mode**
All damper types are closed.
- **Forced opening**
All dampers are open.

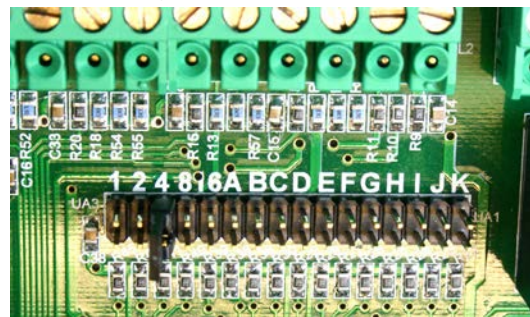
Description of the KSUF in a network

(Jumper A must not be ON)

The KSUF will only work in a network if the KSUA has been correctly installed. To communicate, the KSUA and KSUF use a communication protocol which, at level 1, is based on RS485. The physical connections are two-wire links which must also have a ground. In other words, the units must be linked with three wires. An example of a widely used shielded cable type is FKAR-PG 2*0.5. The shielding must NOT be connected anywhere other than to a KSUA, KSUB, KSUC, KSUR, KSUE or KSUF. It is important to make sure the network is connected correctly. If a number of KSUXs are connected to the KSUA, the first and last units must be terminated by setting the jumper marked TERM in the KSUF or jumper PL2 in the

KSUA. In other KSUX units, the jumper is marked I. Sometimes, the KSUA is between other units, and in this case both the terminations are in KSUXs. Note that there cannot be more than two terminations in the whole network. The maximum line length is 1200 m without repeater.

Addressing



Jumper settings for address 4.

A KSUF will only work in the network if an address is defined. The jumpers numbered 1, 2, 4, 8 and 16 are used to configure the address. For example to use address 12, set jumpers 4 and 8 ($4+8=12$). You cannot use the same address for two units within the same network. The addresses go from 0 to 31. To set address 0, leave all jumper 1, 2, 4, 8 and 16 empty. The KSUF requires four addresses. If the KSUF is only used in the network, addresses 0, 4, 8, 12, 16, 20, 24 and 28 can be used. All addresses in between are reserved for internal use. Dampers and detectors are counted from address 0 upwards. For example address 0 DMP1+2. Address 1 DMP3+4.

Address 3 DMP5+6 etc. (two damper groups per address). In the KSUF all four addresses are internal and only the first one needs to be set in the KSUF.

Table showing the relationship between addresses and dampers/detectors in the KSUA.

Address in KSUF	Dampers in KSUA	Detectors in KSUA
0	1-8	1-8
4	9-16	9-16
8	17-24	17-24
12	25-32	25-32
16	etc.	etc.

The KSUF has four detector inputs but according to the table above there is space for eight detectors. Detector input 1 acts upon detectors 1 and 2 for the selected address. Detector input 2 acts upon detectors 3 and 4. Detector input 3 acts upon detectors 5 and 6. And detector input 4 acts upon detectors 7 and 8

Description of jumpers in a network.

Jumper	ON	OFF
1,2,4,8,16	Address configuration	
A	Stand-alone	Network mode

Smoke detectors

The smoke detectors are connected to the KSUF and are then operated by the KSUA as detector groups, which in turn control the dampers. The EXT input is logically connected to detector input 1. This means the EXT input can be used for a heat detector, for example, or an external central fire alarm system that can be configured to be part of a detector group.

When you perform a reset on the KSUA all detectors are opened for 5 seconds to reset them.

Malfunctions

If a communication error occurs, the KSUF will take over and close the dampers after 15 seconds.

Other errors are forwarded to the KSUA for central processing.

LEDs

Every time a correct message is received, the Operation LED switches on or off in order to indicate that communication with the master is

working correctly. Other LEDs work in the same way as in stand-alone mode.

Buttons

No function in network mode.

Stand-alone mode

(Jumper A must be ON)



Jumpers A, 1 and 4 are ON (stand-alone mode, with damper group 1 to 5 in use)

Priority handling

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.

Function test

The function test is carried out 10 hours after power is connected to the KSUF, and then after the settings. This means you can run the function test at night without having to switch on the unit overnight. In night mode, the function test can be run without special programming. The KSUF detects the damper positions and carries out the function test to the other position. An external control clock can be connected to terminals 11-12 to start the function test. A connection is required – e.g. 1 minute – via a voltage-free contact.

Manual function test

To carry out a manual function test, hold down the reset button for longer than five seconds. After five seconds, the Operation and Error LEDs stop alternating. The test starts when you release the button.

Fan control

Intelligent and integrated fan control is provided. There are various options for the fan control output. If the Air Handling 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.

Table showing fan control possibilities

Jumper	ON	OFF
D	Do not stop in night mode	Stop in night mode
E	No fan delay	30 sec. fan delay
F	5 min. fan delay	30 sec. fan delay
G	Do not stop for test	Stop for test

Description of jumpers*Table showing how to select the number of dampers*

Number of connected dampers	Jumper 1	Jumper 2	Jumper 4	Jumper 8
1	ON	OFF	OFF	OFF
2	OFF	ON	OFF	OFF
3	ON	ON	OFF	OFF
4	OFF	OFF	ON	OFF
5	ON	OFF	ON	OFF
6	OFF	ON	ON	OFF
7	ON	ON	ON	OFF
8	OFF	OFF	OFF	ON

To specify 8 dampers, leave all jumpers OFF or use jumper 8

Table showing all selectable functions

Jumper	ON	OFF
1	Set the number of dampers. See table above	
2		
4		
8		
16		
A	Stand-alone mode	Network mode
B	4 fire zones	1 fire zone
C	Not used	
D	Do not stop fan in night mode	Stop fan in night mode
E	No fan delay	30 sec. fan delay
F	5 min. fan delay	
G	Do not stop fan for test	Fan stopped when dampers are tested
H	Damper test interval 48 hours	If all the jumpers H and I are OFF, no function test is carried out on the dampers from the built-in clock.
I	Damper test interval 1 week	
H+I	Damper test interval 30 days	
J	Automatic reset of external fire alarm input.	Manual reset of external fire alarm.
K	NIGHT/CLK input = night mode	NIGHT/CLK input = real-time clock

Notes

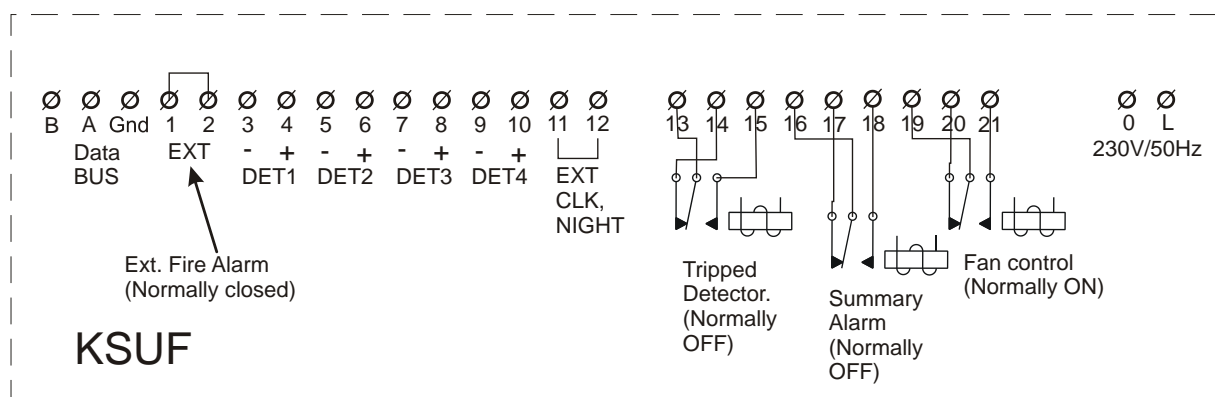
K=ON

Determines whether NIGHT/CLK is used for starting the damper test externally or for closing the dampers (night mode). OFF means that if the NIGHT/CLK input is closed, the function test starts. ON means that if the NIGHT/CLK input is closed, the system switches to night mode.

B=ON

Connects detector input 1 to damper groups 1 and 2. Detector 2 to damper groups 3 and 4. Detector 3 to damper groups 5 and 6. Detector 4 to damper groups 7 and 8. The KSUF now acts as four separate units – for example only damper groups 1 and 2 are operated if smoke detector 2 is triggered. Damper groups 3 to 8 remain active as long as detector inputs 2 to 4 are not triggered. However, fans are stopped as soon as one of the detector inputs is triggered. The EXT input always closes all dampers.

Connections



Connecting external units. Shown without power.

230 V 50 Hz.

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

EXT CLK/NIGHT input

The EXT input has two alternative uses, as determined by jumper K. If the jumper is OFF, the input is used for the clock that starts the damper function test. If the jumper is ON, the dampers are closed when the circuit is broken (night mode). When the damper test function is activated (jumper K is OFF) the test starts when the input is closed.

Relay outputs

All relays are shown in the OFF position. Fan control is normally ON (20-21 closed). In an

alarm, the summary alarm is activated and 17-18 closes for example.

Damper connection

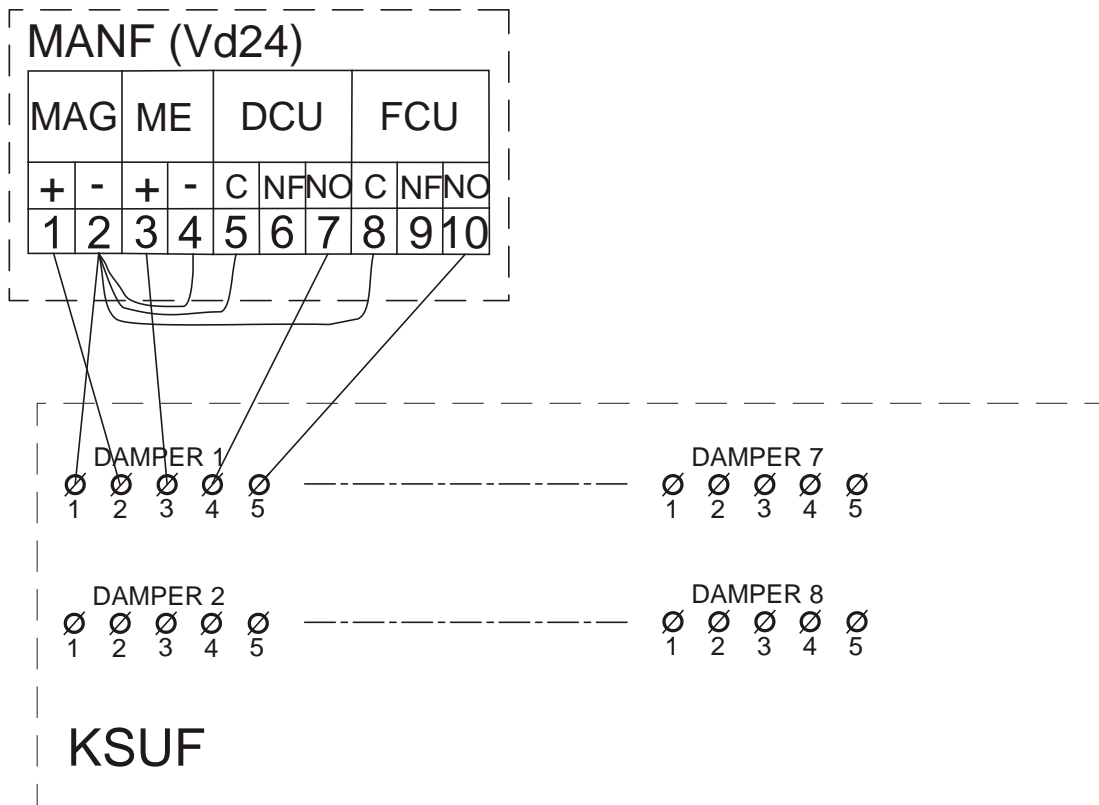
Fire/smoke dampers are connected as shown in the diagram below.

Evacuation dampers

(Only relevant in network mode)

If evacuation dampers are used, they should be connected as usual. Evacuation dampers are then defined in the KSUA, which monitors their position. 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 is only relevant in network mode. In stand-alone mode, evacuation dampers cannot be fully operated.**

Connecting dampers



Connecting a damper

Smoke detector inputs

The four smoke detector inputs are designed for a loop resistance of 2200 ohm (terminating resistor). Conventional analog types of detectors which alarm is given by an increased current in the circuit can be connected.

Examples of detectors are Calectro UG-3-O, General Electric DP700 or Apollo series 65. The detectors are supplied with 24V from KSUF. Depending on the setting of jumper B, one or all detector circuits are connected to one or more dampers. Unused detector inputs are terminated with a resistor connected directly to the terminal. 2200 ohm, power at least 0.6 W. See also the description of jumper settings.

Cable type for connections

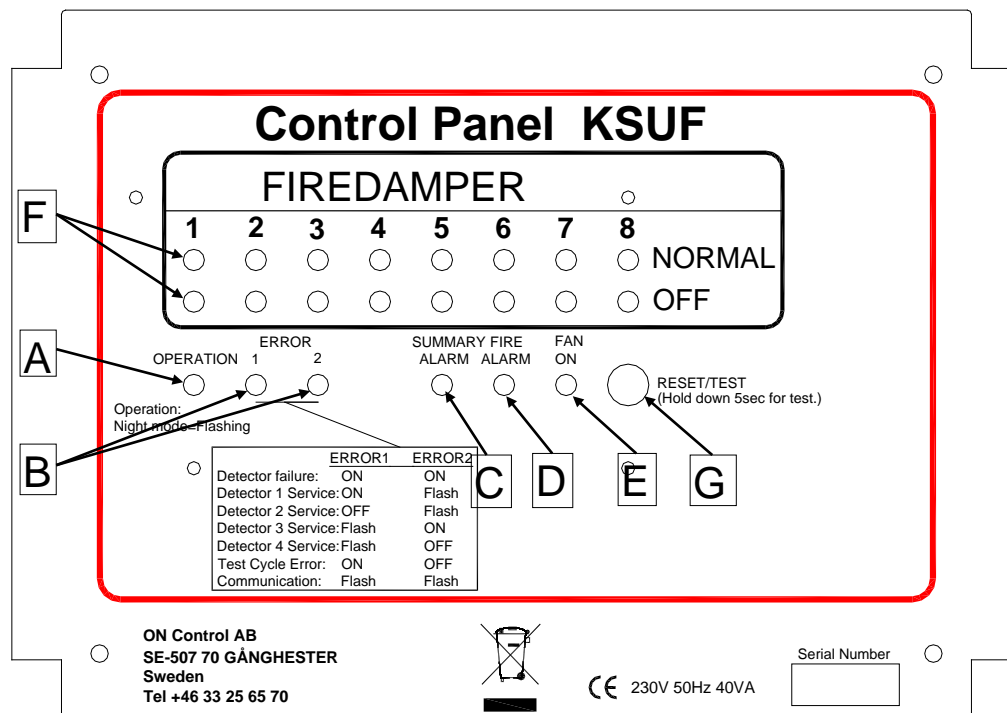
The smoke detectors are connected with twisted-pair cable separated from other parts. Telephone type cable is used, with no particular requirements in terms of area.

For example, the actuator can be connected with EKKX 1*5*1 (0,75mm²) if the distance between the actuator and the KSUF 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 2 ohm.

Fuses

There is a 160 mA fuse on the motherboard. The fuse is to the right of the mains transformer. The holder is the bayonet type. To remove the fuse, press down and turn a quarter turn anticlockwise.

Operating instructions



Indicators and buttons

A. Operation

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

B. ERROR 1 and 2

These LEDs use different flashing sequences to indicate various alarms. There is an explanatory table on the front panel.

- Both LEDs are constantly lit if any of the detector loops are broken.
- Error 1 and 2 light up/start flashing to indicate a service alarm (dirty smoke detector). 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 1 is constantly lit to show a function test fault, if the damper test fails. The following situations are tested.
 - The dampers in all damper groups close within 3 seconds.
 - The actuator contacts are correctly closed with the dampers in the closed position.

- The dampers open within 30 seconds.
- The actuator contacts are closed with the damper in the open position.

C. Summary Alarm

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

- Triggered smoke detector.
- EXT input activated.
- Break in any of the detector loops.
- Error during function test.
- Service alarm in any of the detector loops.
- Damper in incorrect position during normal operation.
- Connection error.

D. Fire Alarm

The same LED covers all smoke detector loops. If the LED is red, a detector has been triggered or a fire alarm has been received at the EXT input. The associated relay is closed.

E. Fan On

Fan control is indicated with an LED that lights up when the relay is ON.

F. Reset / Test

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.

If you keep the button pressed for at least 5 seconds, the function test starts when you release the button. After five seconds, the Error 1 and Error 2 LEDs stop alternating and the Operation LED lights up instead (the function test is usually initiated by the built-in timer).

F. Dampers

The green and red LEDs indicate the normal position/alarm position respectively for the relevant damper. The normal position is open for a ventilation damper and closed for an evacuation damper.

The damper groups are numbered 1 to 8.

Troubleshooting

"ERROR 1 and ERROR2" LEDs light up or start flashing.

- Look at the pattern of flashing to identify the error.

If the LEDs are constantly lit, there is a break in any or all of the detector loops.

Check:

- The terminating resistor in the last detector of the loop with the problem. It should be 2200 ohm, 0.6 W.
- 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!

One of the LEDs is flashing and the other is constantly lit for a service alarm (dirty smoke detector).

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.

Error 1 is constantly lit for a function test fault

Check:

- That the right number of dampers are connected for the selected mode. If only one damper is used, it must be connected to DMP1 and jumper 1=On.
- That the dampers open and that the green LED is normal.
- Carry out a manual function test and check that the dampers operate within 3 seconds. The red LED lights up. The dampers must then return to the normal position within 30 seconds and the green LED lights up.
- That the dampers are correctly connected. Make sure that terminal 1 is correctly connected to damper terminals 2, 5 and 8.

The "Fire Alarm" LED lights up.

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.

The "Summary Alarm" LED lights up.

Check:

- For other alarms indicated by the LEDs.
- That no damper has operated incorrectly.
- That the dampers are correctly connected. Make sure that terminal 1 on the KSUF is correctly connected to damper terminals 2, 5 and 8.

The dampers do not open.

Check:

- That there are no other alarms on the front panel.
- That the damper motor is connected correctly.

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 ventilation system to the KSUF.

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

Description of the KSUFx.

The x-version has different software and must be ordered with this option. The x-version is intended for use with actuators without the normal switches for indication of open-close position. Instead it is timers that control the actuators. Typical is actuators for controlling windows. All outputs for dampers can be individually configured for either switch or timing actuators. This is done with jumper D-K.

Actuators.

Every damper output has 2 connections for relay and also connection for end switches. The connection for relay is between terminal 1-2 and 1-3. When ON it is 24V DC feeding an external relay. Picture below! Terminal 1-2 have a strong internal EMC protection and is more adapted for bigger relays. Both outputs can never be on at the same time. There is a timer function so the switchover time is 250ms. When in normal mode (no alarms) terminal 1-2 have 0V and terminal 1-3 have 24V DC. In alarm situation it is opposite. The connection of switches in the actuator should be connected between 1-4 for normal position and 1-5 for alarm position.

Network.

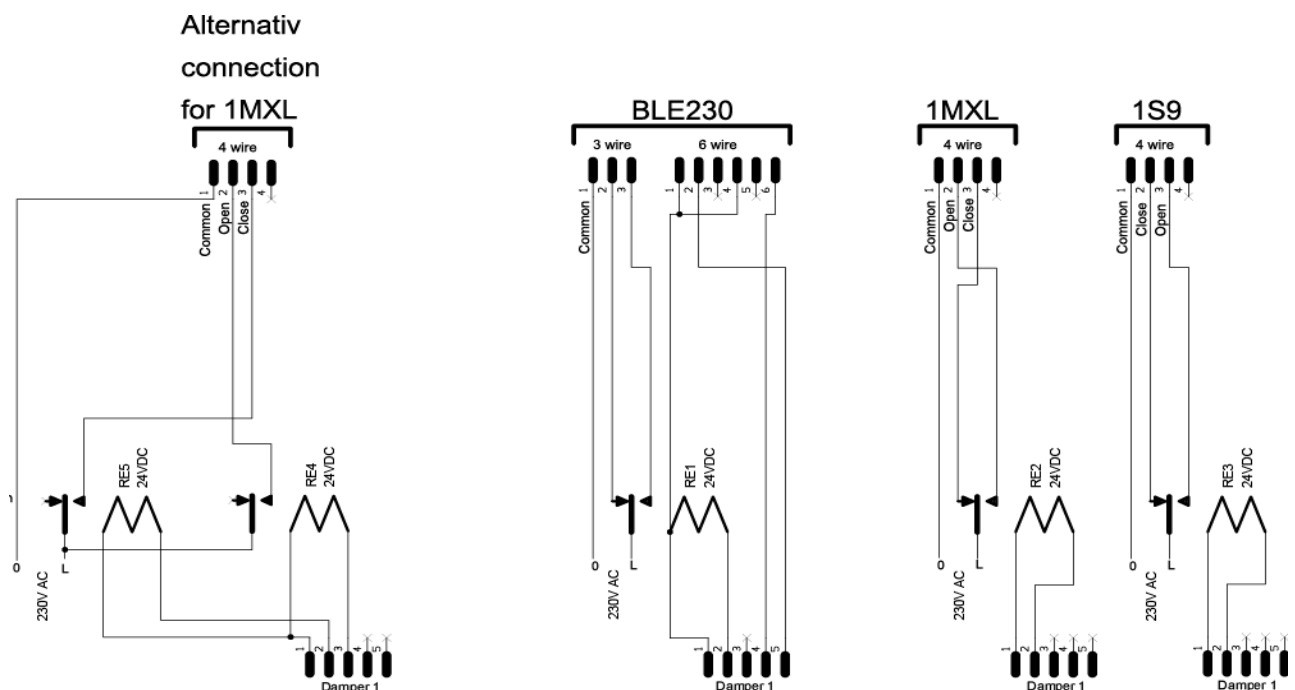
Everything regarding network is the same as the normal KSUF. See description above for address setting and termination.

Relay outputs.

The internal relays terminal 13-18 has the same function as above. The Fan relay has the same function if the unit is in network mode but in case of stand-alone this relay is intended for a smoke evacuation fan. The function is like this: Alarm gets from connected smoke detectors or from a signal connected to terminal EXT (1-2). The dampers open if it is evacuation dampers and when the dampers signalling alarm position (OFF at the front LED: s) with the switch or a timer runs out the fan relay will switch over and start the smoke evacuation fan. There is also a small extra timer that could be configured with jumper B.

Maximum load.

All dampers outputs together can be loaded by 1A. It is possible to connect an actuator for 24V directly to the KSUFx but be aware the maximum available current!



Connection examples of actuators. All relays must have isolation of 4000V between coil and contacts. Open and close can be shifted! It depends of the mechanical construction. Relays will switch on in alarm situation.

Timers in KSUFx.

There are timers in KSUA that is involved in the function of KSUFx. Please refer to the manual of KSUA. Here are only timers in KSUFx described.

The BLE actuators from Belimo have switches for indication of the position. If these switches are not working the maximum time limit is 35seconds! In KSUA it is possible to secure that evacuation damper must be open before starting the smoke evacuation fan.

The window actuators are only controlled by a timer. The time is 25 or 75 seconds (jumper C) and after that time the system sense the window or damper is fully open. When all dampers and or windows are in “alarm” position the smoke evacuation will start because the FAN-relay goes on.

Indication LED in front panel.

The LED indicator for position of damper is only working if the damper has switches.

Table showing how to select the number of dampers in stand-alone mode

Number of connected dampers	Jumper 1	Jumper 2	Jumper 4	Jumper 8
1	ON	OFF	OFF	OFF
2	OFF	ON	OFF	OFF
3	ON	ON	OFF	OFF
4	OFF	OFF	ON	OFF
5	ON	OFF	ON	OFF
6	OFF	ON	ON	OFF
7	ON	ON	ON	OFF
8	OFF	OFF	OFF	ON

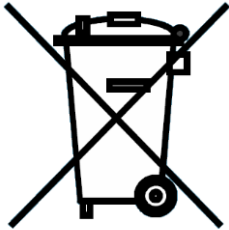
To specify 8 dampers, leave all jumpers OFF or use jumper 8

Table showing all selectable functions

Jumper	ON	OFF
1	Set the number of dampers. See table above	
2	Set the number of dampers. See table above	
4	Set the number of dampers. See table above	
8	Set the number of dampers. See table above	
16	Automatic reset of external fire alarm input.	Manual reset.
A	Stand-alone mode	Network mode
B	15 sec extra delay before fan start	Fan start after actuators are in alarm pos.
C	25sec delay for timer ctrl actuator	75sec delay for timer ctrl actuator
D	Timer controlled actuator on 1	Actuator with position switches on output1
E	Timer controlled actuator on 2	Actuator with position switches on output2
F	Timer controlled actuator on 3	Actuator with position switches on output3
G	Timer controlled actuator on 4	Actuator with position switches on output4
H	Timer controlled actuator on 5	Actuator with position switches on output5
I	Timer controlled actuator on 6	Actuator with position switches on output6
J	Timer controlled actuator on 7	Actuator with position switches on output7
K	Timer controlled actuator on 8	Actuator with position switches on output8

Jumper B is only active in stand-alone mode.

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.