

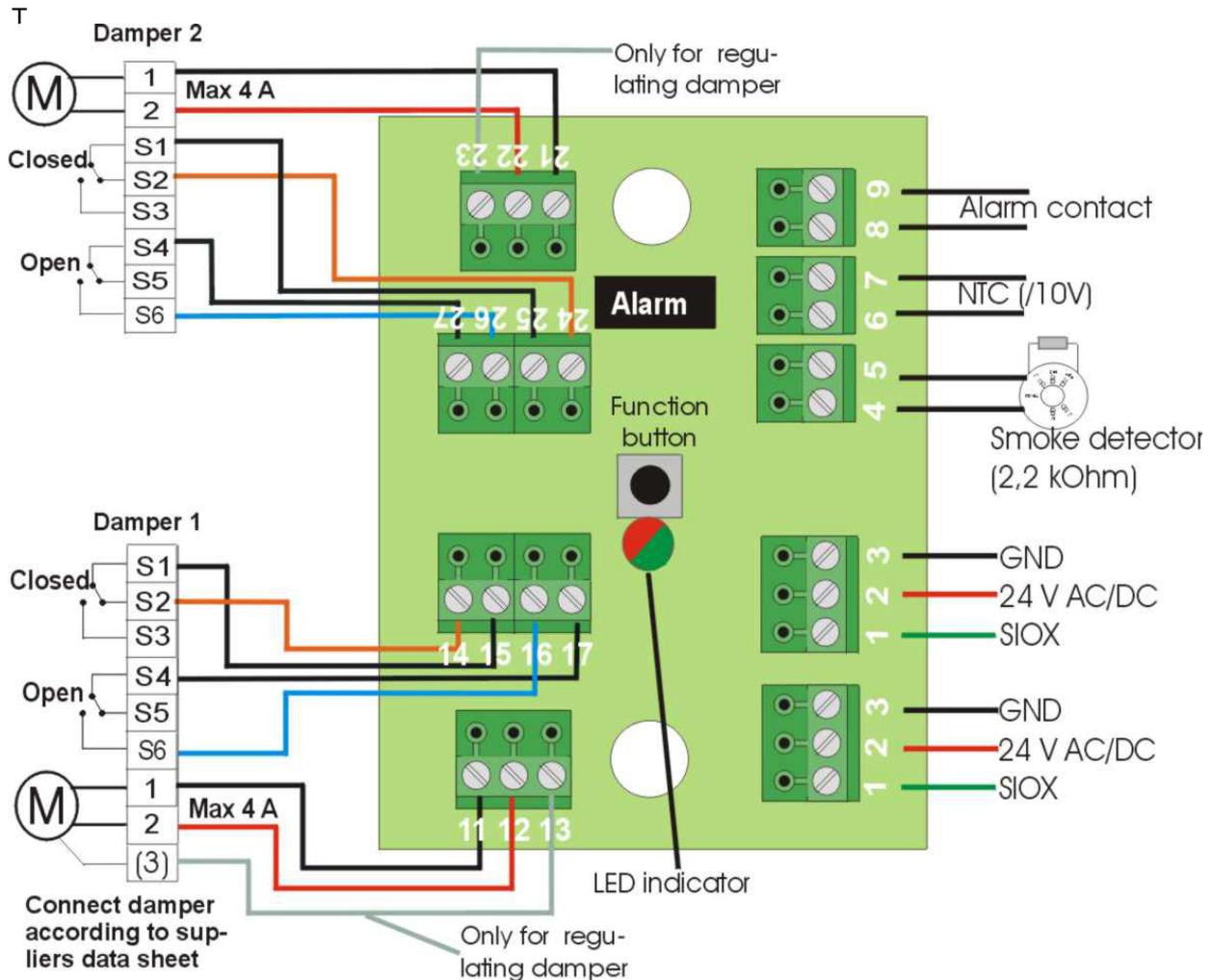
Product description: Smoke Damper Controller

Function: Dual Smoke Damper and Detector Supervision
 SIOX module: 8SC2:004, 8SC2-1:004 (single Damper)
 Process screen: SC2_004.DFF

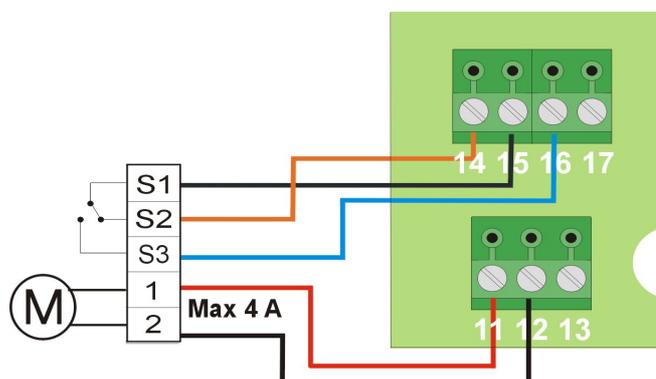


Connection

24 V AC/DC Damper motor using S1-S6 as position indication. The connections shown are typical and may vary from one motor type to another.

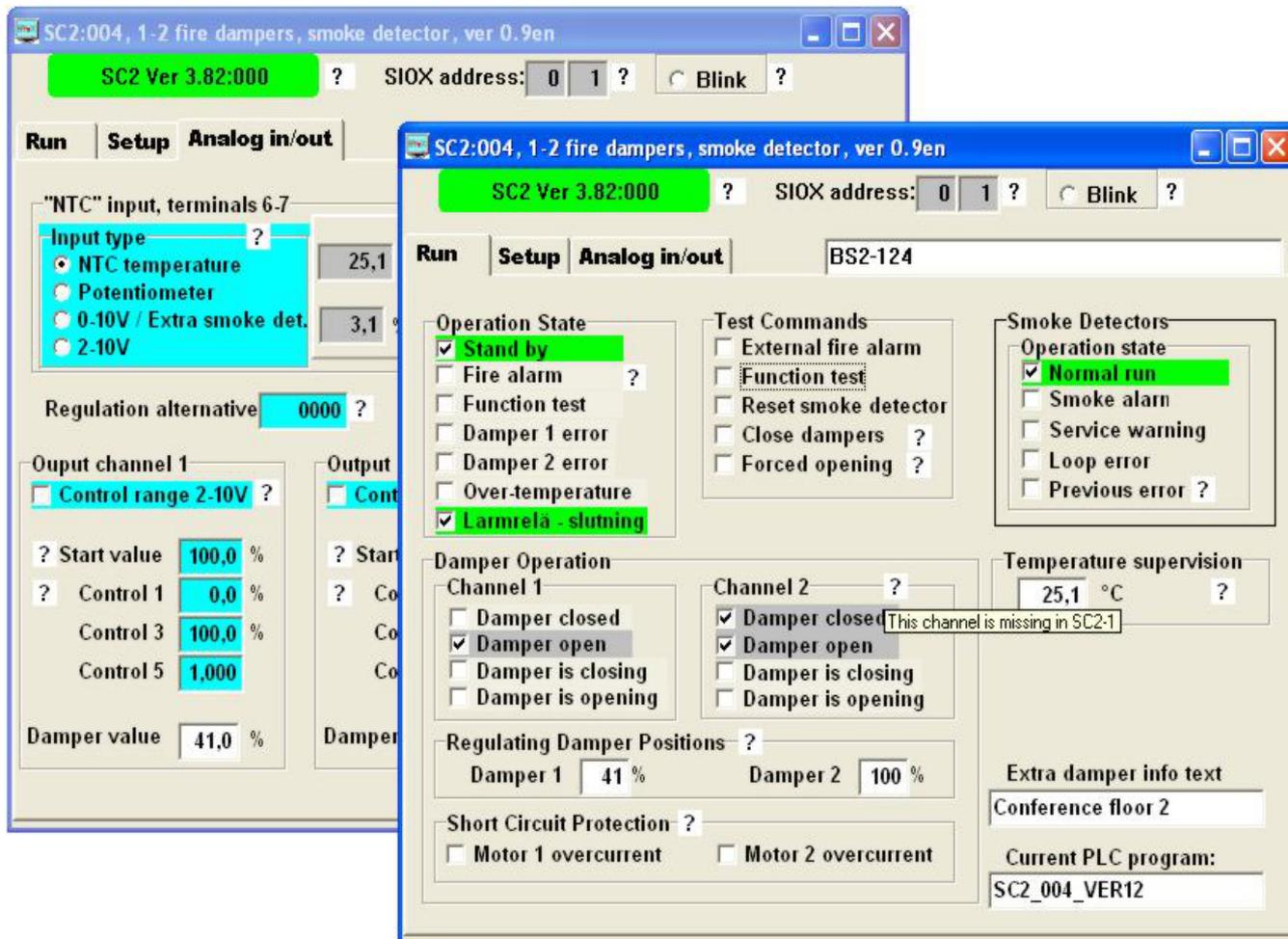


24 V AC/DC ON-OFF Damper motor using S1-S3 as position indication.



Process screen

The process screen on a PC (a Visual SIOX form) is a convenient help for commissioning and fault finding. It provides an overview of the status of each individual damper module. Light blue boxes indicate cells that are stored in EEPROM. The necessary programs are available on www.smokecontrol.net ..



Functions

8SC2:004 handles two independent smoke dampers and one smoke detector(-chain). When a detector indicates fire, the dampers connected to the module will close. A central (e.g. ES2 with ModBus TCP or MIDI SMOKE) can also collect fire alarms and set the module to a fire alarm condition. There is also an input for a 10 kohm NTC thermistor for high temp alarm or regulating dampers.

Damper Outputs

The damper outputs each allow a peak current of 4 A. In case of a shorted or over-current output, this is indicated by the red LED being continuously lit and inhibiting any test. The short is indicated in the process screen, which also allows the operator to disable the over-current protection. Some motors may exhibit extreme starting currents, but generally the protection should be left active.

Function test

When the module is powered up, a test run is initiated.

The dampers are typically tested every 48 hours. This is controlled by the internal PLC program (0 hours = disable) or by communications from a central. During the test the module checks that the dampers will close and open within the predefined time. If not, a damper error is signalled and the module tries to open the damper fully. A damper error is reset after next successful test cycle. Standard values for closing / opening are 40/180 seconds.

Damper Error / Damper in incorrect position

A damper error is indicated after a failed test run or if an ON/OFF damper moves from its open indication. A valid Function test is required to clear the error. Regulating dampers are identified by the analog control value being less than 10 V and their open switches are therefore not tested during standby.

Alarm

When the module through communication receives an indication that a fire alarm has been set in the fire cell to which the module has been assigned, or that a local detector indicates fire or over-temperature, power is cut to the motors closing the dampers via their spring returns. When all alarms are reset, a function test is automatically carried out.

Alarm Relay

The contact of the alarm relay is closed except when the module is in fire alarm mode. It can be changed in the process screen to close only when dampers are open, e.g. for fan control.

Smoke Detector

A smoke detector loop is connected between the terminals 4 (SD) and 5 (GND). The module reacts to service alarm, fire alarm and open loop connection. At a fire alarm or broken detector loop, the dampers will close. Smoke detectors using 24 VDC supply and a 2,2 kohm termination resistor operate with preset alarm levels. These levels from 0 to 50 mA can be changed in the process screen. The detector alarm is reset by the button on the module or through communication. This also triggers a test cycle. At delivery, typical alarm levels are preset and a termination resistor is installed directly to the terminals 4 and 5.

Temperature sensor

An NTC type temperature sensor (10 kOhm) can be connected between the "NTC" terminal (6) and GND (7) to show temperature. If the Temperature Alarm level is set to anything but 0°C, a local over-temperature alarm is set at high temperatures or if the sensor is short-circuited or broken.

As an alternative, a potentiometer (typ. 20 kOhm) can be connected, or, on a modified module, a 0-10 V or extra smoke loop. This permits the use for various control and regulator functions.

Regulating Dampers

The module can control regulating dampers with spring return by supplying 0-10V on terminals 13 and 23. When no regulation is needed, 10V is automatically supplied for fully open dampers, while ON-OFF dampers can leave these outputs unconnected. Control or regulation is achieved either through communication with two parameters with the range 0-4096 (\$1000), or via an analog input 0-10V scaled internally in the module using Min/Max parameters in EEPROM. Additional programs in the module allow e.g. PI regulators.

Operation Indication

A two-coloured LED (red/green) shows current operation mode.

Mode	Blink sequence
Standby	
Standby and communication with this module	
Fire alarm	
Damper error / Shorted motor / Smoke detector service alarm / Button pressed	
Function test – dampers close	
Addressing	
Identifications flash	

Communication

The module communicates with the central primarily through one 16 bit status register and one command register. Commands are Fire, Function Test, Forced Opening and Forced Closing. Please refer to last page.

Addressing

The module is delivered with the address set to 1. Addressing can be done using the SIOX Sequential Addressing Tool or SC2Setup.DFF. It is also possible to send an identification flash to the module. All necessary programs are available at www.smokecontrol.net

Watchdog

The watchdog in the module supervises communication interruptions. It can be changed by means of the process screen. The longest allowed delay after a communication to the module is 240 seconds before the module closes the dampers and indicates fire alarm. At delivery, the watchdog is disabled (set to 0 seconds) to avoid closing the dampers during the commissioning phase.

Unused Damper Channel

In case of using only one damper channel or only the smoke detector or alarm, it is possible to disable an unused channel by connecting 14-15 and 16-17 or 24-25 and 26-27. The module identifies this connection at next exercise. Alternatively, either smoke damper function may be disabled in the process screen, freeing two digital inputs, one output and an analog output for other alarm or regulation tasks. The SC2-1 can only control one damper and its channel 2 is disabled.

Parameter overview Smoke Control Options

The module contains one 16 bit status register and one 16 bit command register (and a number of other registers that normally not are changed). Each register can be read or written using a communication in the SIOX protocol. Set-ups and PLC programs may also be changed more permanently in EEPROM via similar messages. Using an ES2/EX2 module allows control via Modbus TCP/IP. See also www.siox.com.

Status flags	SIOX		MODBUS			
	Param.	Bit	Obase	1base	Bit	
Standby state	\$20	\$0001	32.0	33.1	513	
Fire state	\$20	\$0002	32.1	33.2	514	Dampers closed (external/internal cause)
Smoke detector Loop error	\$20	\$0004	32.2	33.3	515	Previous loop / temperature error
Damper 1 error	\$20	\$0008	32.3	33.4	516	
Function test state	\$20	\$0010	32.4	33.5	517	
Damper 2 error	\$20	\$0020	32.5	33.6	518	Modules with two dampers, not SC2-1
Dampers sum error	\$20	\$0040	32.6	33.7	519	
Over temperature (NTC)	\$20	\$0080	32.7	33.8	520	Local alarm due to high temperature
Damper 1 closed	\$20	\$0100	32.8	33.9	521	
Damper 1 open	\$20	\$0200	32.9	33.10	522	
Damper 2 closed	\$20	\$0400	32.10	33.11	523	Modules with two dampers, not SC2-1
Damper 2 open	\$20	\$0800	32.11	33.12	524	Modules with two dampers, not SC2-1
Smoke detector normal run	\$20	\$1000	32.12	33.13	525	
Local alarm point state	\$20	\$2000	32.13	33.14	526	Local fire / temperature alarm
Smoke detector service req	\$20	\$4000	32.14	33.15	527	
Smoke loop broken	\$20	\$8000	32.15	33.16	528	Local alarm

Status flags are read as single bits via Modbus function code 1 or 2. Status flags may also be read as register 33 via function code 3 or 4. Do not write to status flags.

Commands	SIOX		MODBUS			
	Param.	Bit	Obase	1base	Bit	
Forced damper opening	\$2C	\$0001	44.0	45.1	705	Selective smoke exhaust, blocks alarms !
External fire alarm	\$2C	\$0002	44.1	45.2	706	External fire closing command
Reset local alarms	\$2C	\$0004	44.2	45.3	707	Automatically cleared
Close dampers	\$2C	\$0008	44.3	45.4	708	E.g. for night operation
Function test / Exercise	\$2C	\$0010	44.4	45.5	709	Automatically cleared

Note: Write only once when a command is issued and not continually. (Reset Alarms / Function Test).

Setup	SIOX		MODBUS		
	Param.	Default Settings	Obase	1base	
Watchdog time no, comm.	\$03	7680	32771	32772	= 30s. 0 = No watchdog at delivery !
Smoke detector loop level	\$0C	200	32780	32781	Below = loop error = fire
Smoke detector service lev.	\$0D	1600	32781	32782	Service request above this level
Smoke detector smoke lev.	\$0E	3000	32782	32783	Above this level = fire indication
Over-temperature level	\$0F	0	32783	32784	(0,1°C) 0 = off, 720 = 72°C
Temperature current value	\$38		56	57	(0,1°C). Read only RAM
Smoke detector current val	\$39		57	58	(µA * 10). Read only RAM
Time left to exercise	\$29		41	42	(h) RAM
Exercise interval	\$23	48	32803	32804	(h) 0 = No automatic function test
Damper closing time	\$24	40	32804	32805	(s) Max damper closing time
Damper opening time	\$2A	180	32810	32811	(s) Max damper opening time

Note: Modbus registers 32xxx are stored in EEPROM (non-volatile memory). Do not write incessantly to these, since each register is limited to max 1 million writes.

Analogutgång	SIOX		MODBUS		
	Param.	Default Setting	Obase	1base	
Analog out, damper 1	\$06	\$1000	6	7	\$1000 = 4096 = 10V = 100% open
Analog out, damper 2	\$07	\$1000	7	8	\$1000 = 4096 = 10V = 100% open