RXMF CO_2 temp rH combined room sensor switch

The RXMF multifunctional room sensor switch measures temperature, relative humidity and CO_2 with four predefined ranges and one user-definable range, using self-calibrating and maintenance-free sensors.

Three relay outputs with adjustable setpoints as well as analog outputs 0-10 VDC/0- 20 mA are provided and also Modbus RTU communication for easy network access.

KEY FEATURES

- Microcontroller based design increases accuracy and reduces installation time
- Modbus RTU (RS485)
- Blue LED operation indication
- Excellent long term stability with NDIR sensors for CO_2, humidity and temperature
- Innovative self-calibrating algorithm
- Different ranges and setpoint selectable by jumper
- Sensor and switch combined

TECHNICAL SPECIFICATIONS

Article code

RXMFG

Supply

- 24 VAC/VDC ±10 %

In & outputs

- 3 C/O relay outputs, contact rating 230 VAC/2 A
- 3 analog outputs: 0-10 VDC/0-20 mA
  load resistance in 0-10 VDC mode should be more than 500 Ω
  load resistance in 0-20 mA mode should be less than 500 Ω

Range

- Temperature: 0-30 °C/10-40 °C/20-50 °C/0-50 °C/user-definable*
- Relative humidity: 2-90 % Rh/0-60 % Rh/0-80 % Rh/-100 % Rh/user-definable*
- CO_2: 450-1850 ppm/0-1000 ppm/0-1500 ppm/0-2000 ppm/user-definable*

* user-definable ranges only possible with Modbus RTU communication

Hysteresis

- Fixed: 2 °C, 5 % Rh, 100 ppm (other ranges upon request)

Power consumption

- no load: max. 80 mA
- full load: max. 140 mA

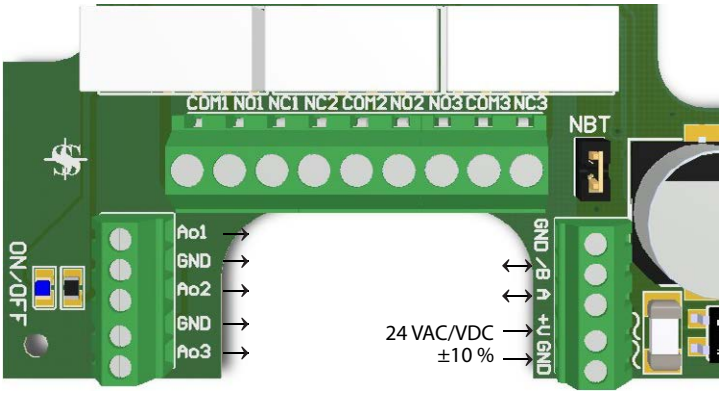
Other specifications

- Operating temperature: -10 to 50 °C

AREA OF USE

- Maintaining temperature, relative humidity and CO_2 levels in buildings and private houses

WIRING DIAGRAM



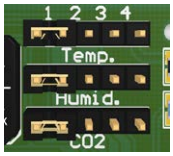
AO	analog output 1 (0-10 VDC/0-20 mA)
GND	ground
AO2	analog output 2 (0-10 VDC/0-20 mA)
GND	ground
AO3	analog output 3 (0-10 VDC/0-20 mA)
GND	ground
/B	RS485 signal /B
A	RS485 signal A
+V	supply: 24 VAC/VDC ±10 %
GND	ground
COM	relay output - common (230 VAC/2 A)
NO	relay output - normally open (230 VAC/2 A)
NC	relay output - normally closed (230 VAC/2 A)

17/03/2014

OPERATION

Settings

Jumpers sensor ranges



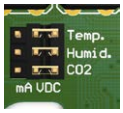
Position	Temperature	Jumper on pins
1	0-30 °C (default)	1 & 2
2	10-40 °C	2 & 3
3	20-50 °C	3 & 4
4	0-50 °C	4 & 5

Position	Humidity	Jumper on pins
1	20-90 % Rh (default)	1 & 2
2	0-60 % Rh	2 & 3
3	0-80 % Rh	3 & 4
4	0-100 % Rh	4 & 5

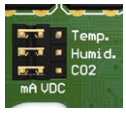
Position	CO_2	Jumper on pins
1	450–1850 ppm (default)	1 & 2
2	0–1000 ppm	2 & 3
3	0–1500 ppm	3 & 4
4	0–2000 ppm	4 & 5

Jumpers analog outputs

Position VDC



Position mA



(default: VDC)

Jumper reset Modbus settings

Put and hold jumper on position 1-2 for 20 sec.

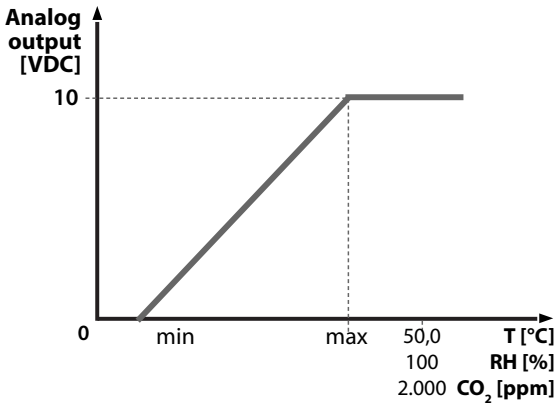
Jumper network bus termination resistor

NBT	Resistor
	connected
	disconnected

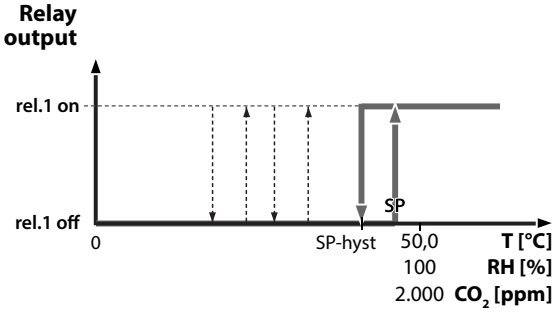
Trimmers setpoint

MIN	minimum of the sensor range
MAX	maximum of the sensor range

Operation graph



The output voltage starts to rise from 0 VDC at minimum sensor range and reaches 10 VDC at maximum sensor range.



The relays switch on at setpoints selected via the trimmers and switch off with fixed hysteresis 2 °C, 5 % RH, 100 ppm.

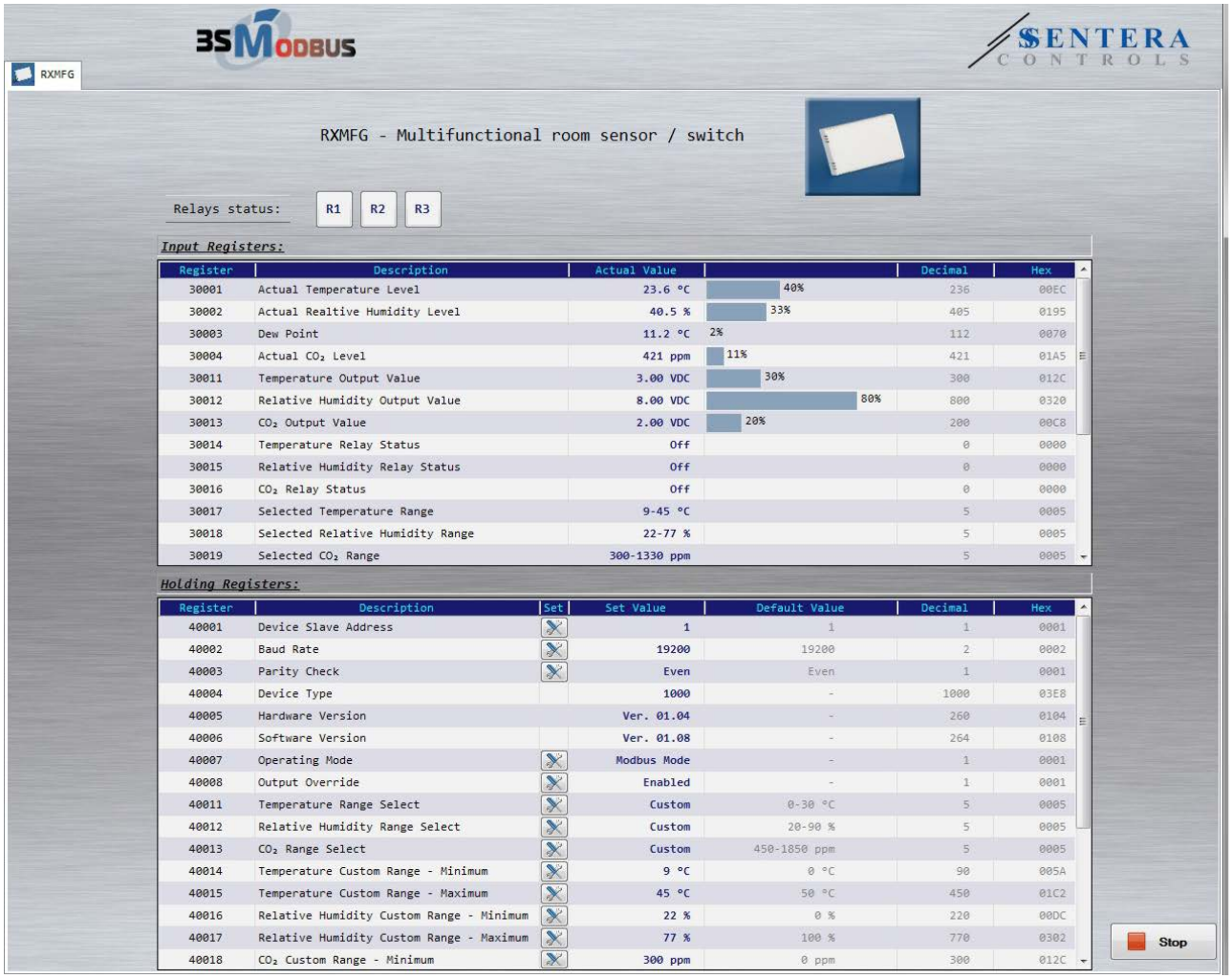
3SMODBUS

Discover the new generation of Sentera controllers, which will bring the terms 'easy to use' and 'flexibility' to another level. 3SModbus is a selected group of sensors and controllers equipped with Modbus RTU (RS485). This protocol opens a wide range of possibilities: BMS, networking …

3SModbus products are also designed for stand-alone use. To facilitate the whole configuration process Sentera developed the 3SM software configuration monitor.

3SM software

- Easy connection through Modbus RTU (RS485)
- Easy configuration of parameters
- Define control in and output(s)
- Advanced monitoring functions
- Possibility to change the working modes
- Operating systems: Windows XP, Vista, 7, 8, with Microsoft .Net Framework 2.0



More info: www.senteracontrols.com/3smodbus

MODBUS REGISTERS

Input registers (Read)

		Data type	Description	Data	Values
1	Temp. level	signed int.	Actual temperature level		500 = 50,0 °C
2	Rel. humidity level	unsigned int.	Actual relative humidity level		1000 = 100,0 % RH
3	Dewpoint	signed int.	Calculated dewpoint		200 = 20,0 °C
4	CO_2 level	unsigned int.	Actual CO_2 level		2000 = 2.000 ppm
5			Reserved, returns 0		
6			Reserved, returns 0		
7			Reserved, returns 0		
8			Reserved, returns 0		
9			Reserved, returns 0		
10			Reserved, returns 0		
11	Temperature output value	signed int.	Value of analog output for temperature Ao1	0 - 1.000	0 = 0 VDC 1000 = 10,00 VDC
12	Relative humidity output value	signed int.	Value of analog output for relative humidity Ao2	0 - 1.000	0 = 0 VDC 1000 = 10,00 VDC
13	CO_2 output value	signed int.	Value of analog output for CO_2 Ao3	0 - 1.000	0 = 0 VDC 000 = 10,00 VDC
14	Temperature relay status	signed int.	Status of relay for temperature, when on the contact between COM1 and NO1 is closed	0 1	0 = off 1 = on
15	Relative humidity relay status	signed int.	Status of relay for relative humidity, when on the contact between COM1 and NO1 is closed	0 1	0 = off 1 = on
16	CO_2 relay status	signed int.	Status of relay for CO_2, when on the contact between COM1 and NO1 is closed	0 1	0 = off 1 = on
17	Selected temperature range	signed int.	Temperature working range selected by jumper or holding register	1 2 3 4 5	1 = 0 - 30 °C 2 = 10 - 40 °C 3 = 20 - 50 °C 4 = 0 - 50 °C 5 = XX - XX °C

		Data type	Description	Data	Values
18	Selected relative humidity range	signed int.	Relative humidity working range selected by jumper or holding register	1 2 3 4 5	1 = 20 - 90 % RH 2 = 0 - 60 % RH 3 = 0 - 80 % RH 4 = 0 - 100 % RH 5 = XX-XX % RH
19	Selected CO_2 range	signed int.	CO_2 working range selected by jumper or holding register	1 2 3 4 5	1 = 450 - 1850 ppm 2 = 0 - 1000 ppm 3 = 0 - 1500 ppm 4 = 0 - 2000 ppm 5 = XXXX - XXXX ppm
20	Selected temperature setpoint	signed int.	Temperature setpoint selected by trimmer or holding register	0 - 500	500 = 50,0 °C
21	Selected relative humidity setpoint	signed int.	Relative humidity setpoint selected by trimmer or holding register	0 - 1.000	1000 = 100,0 % RH
22	Selected CO_2 setpoint	signed int.	CO_2 setpoint selected by trimmer or holding register	0 - 2.000	2000 = 2.000 ppm
23	Temperature hysteresis	signed int.	Hysteresis for temperature relay switching		20 = 2,0 °C
24	Relative humidity hysteresis	signed int.	Hysteresis for relative humidity relay switching		50 = 5,0 % RH
25	CO_2 hysteresis	signed int.	Hysteresis for CO_2 relay switching		100 = 100 ppm
26	Temperature setpoint out of range	signed int.	Flag shows if temperature setpoint is out of working range	0 1	0 = no 1 = yes
27	Relative humidity setpoint out of range	signed int.	Flag shows if relative humidity setpoint is out of working range	0 1	0 = no 1 = yes
28	CO_2 setpoint out of range	signed int.	Flag shows if CO_2 setpoint is out of working range	0 1	0 = no 1 = yes
29	Calibration timer	unsigned int.	Returns passed time in % for 10 min calibration procedure in progress, returns 0 when inactive	0 - 100	100 = 100 %
30			Reserved, returns 0		

Holding registers (Read/Write)

		Data type	Description	Data	Values
1	Device slave address	unsigned int.	Modbus device address	1 - 247 (default: 1)	
2	RS485 baud rate	unsigned int.	Modbus communication baud rate	1 = 9.600 2 = 19.200 (default) 3 = 38.400 4 = 57.600	
3	RS485 parity mode	unsigned int.	Parity check mode	0 = 8N1 1 = 8E1 (default) 2 = 8O1	
4	Device type	unsigned int.	Device type, read-only	1000 = RXMFG	
5	HW version	unsigned int.	Hardware version of the device, read-only	XXX	0x0120 = HW version 1.20
6	SW version	unsigned int.	Software version of the device, read-only	XXX	0x0120 = SW version 1.20
7	Operating mode	unsigned int .	Enables Modbus control and disables jumpers and trimmers	0 = standalone mode (default) 1 = Modbus mode	
8	Output override	unsigned int.	Enables direct control over the outputs, always settable, active only if holding register 7 is set to 1	0 = disabled (default) 1 = enabled	
9			Reserved, returns 0		
10			Reserved, returns 0		
11	Temperature range select	signed int.	Select temperature working range, always settable, active only if holding register 7 is set to 1	1 (default) 2 3 4 5	1 = 0 - 30 °C 2 = 10 - 40 °C 3 = 20 - 50 °C 4 = 0 - 50 °C 5 = custom
12	Relative humidity range select	signed int.	Select relative humidity working range, always settable, active only if holding register 7 is set to 1	1 (default) 2 3 4 5	1 = 20 - 90 % RH 2 = 0 - 60 % RH 3 = 0 - 80 % RH 4 = 0 - 100 % RH 5 = custom
13	CO_2 range select	signed int.	Select CO_2 working range, always settable, active only if holding register 7 is set to 1	1 (default) 2 3 4 5	1 = 450 - 1850 ppm 2 = 0 - 1000 ppm 3 = 0 - 1500 ppm 4 = 0 - 2000 ppm 5 = custom
14	Min. temperature custom range	signed int.	Minimum value of temperature custom range, always settable, active only if holding register 7 is set to 1 and register 11 is set to 5	0 - Max (default: 0)	100 = 10,0 °C
15	Max. temperature custom range	signed int.	Maximum value of temperature custom range, always settable, active only if holding register 7 is set to 1 and register 11 is set to 5	Min - 500 (default: 500)	500 = 50,0 °C
16	Min. relative humidity custom range	signed int.	Minimum value of relative humidity custom range, always settable, active only if holding register 7 is set to 1 and register 12 is set to 5	0 - Max (default: 0)	200 = 20,0 % RH
17	Max. relative humidity custom range	signed int.	Maximum value of relative humidity custom range, always settable, active only if holding register 7 is set to 1 and register 12 is set to 5	Min - 1.000 (default: 1.000)	1.000 = 100,0 % RH

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		Data type	Description	Data	Values
18	Min. CO_2 custom range	signed int.	Minimum value of CO_2 custom range, always settable, active only if holding register 7 is set to 1 and register 13 is set to 5	0 - Max (default: 0)	1.000 = 1.000 ppm
19	Max. CO_2 custom range	signed int.	Maximum value of CO_2 custom range, always settable, active only if holding register 7 is set to 1 and register 13 is set to 5	Min - 2.000 (default: 2.000)	2.000 = 2.000 ppm
20	Temperature setpoint select	signed int.	Select setpoint for temperature relay switching, always settable, active only if holding register 7 is set to 1	(default: 250 = 25 °C)	400 = 40,00 °C
21	Relative humidity setpoint select	signed int.	Select setpoint for relative humidity relay switching, always settable, active only if holding register 7 is set to 1	(default: 500 = 50 % RH)	200 = 20,00 % RH
22	CO_2 setpoint select	signed int.	Select setpoint for CO_2 relay switching, always settable, active only if holding register 7 is set to 1	(default: 1.000 = 1.000 ppm)	2.000 = 2.000 ppm
23	10 minute calibration	signed int.	Setting this register to 1 will perform 10 minute calibration and it will be automatically cleared after the calibration, the sensor measures CO_2 level for 10 min. and sets the lowest value at 400 ppm (do not turn off the device for 10 min during this procedure!)	0 (default) 1	1 = 10 minute calibration is active
24	1 month calibration	signed int	Setting this register to 1 will perform 1 month calibration and is not automatically cleared after the calibration, the sensor measures CO_2 level for 1 month and sets the lowest value at 400 ppm (during this procedure the device needs to be powered continuously, do not turn off!)	0 (default) 1	1 = 1 month calibration is active
25			Reserved, returns 0		
26			Reserved, returns 0		
27			Reserved, returns 0		
28			Reserved, returns 0		
29			Reserved, returns 0		
30			Reserved, returns 0		
31	Temperature output override value	signed int	Override value for temperature analog output, always settable, active only if holding register 7 and 8 is set to 1	0 - 1000 (default: 0)	0 = 0 VDC 1000 = 10,00 VDC
32	Relative humidity output override value	signed int	Override value for relative humidity analog output, always settable, active only if holding register 7 and 8 is set to 1	0 - 1000 (default: 0)	0 = 0 VDC 1000 = 10,00 VDC
33	CO_2 output override value	signed int	Override value for CO_2 analog output, always settable, active only if holding register 7 and 8 is set to 1	0 - 1000 (default: 0)	0 = 0 VDC 1000 = 10,00 VDC
34			Reserved, returns 0		
35			Reserved, returns 0		
36			Reserved, returns 0		
37			Reserved, returns 0		
38			Reserved, returns 0		
39			Reserved, returns 0		
40			Reserved, returns 0		

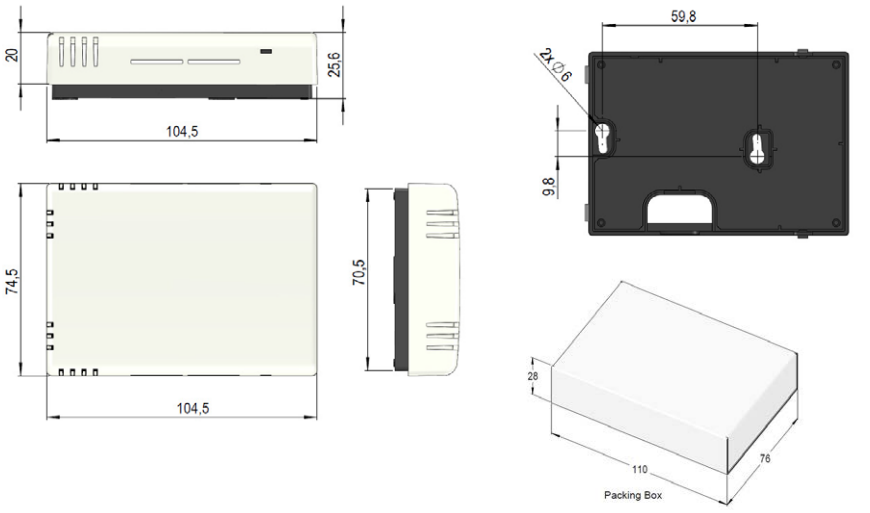
Coils (Read/Write)

		Data type	Description
1	Relay 1	bit	Relay 1 switching on and off, always available, active only if holding registers 7 and 8 are set to 1
2	Relay 2	bit	Relay 2 switching on and off, always available, active only if holding registers 7 and 8 are set to 1
3	Relay 3	bit	Relay 3 switching on and off, always available, active only if holding registers 7 and 8 are set to 1

ENCLOSURE

- Front: ASA plastic, ivory RAL9010
- Back: ABS plastic, black RAL9004
- Protection class: IP30

Dimensions & fixing



	Packing units	
	1	24 (box)
RXMFG	120 g	2,88 kg

STANDARDS

- CE conform
- EMC Directive 2004/108/EC: EN 61000-6-3:2007, EN 61000-6-2:2006 and EN 60730-1:2011

- Low Voltage Directive Directive 2006/95/EC

COMBINE WITH

Electronic fan speed control

		Input	TK	Range	1-Phase	3-Phase	RS485	IP	DIN rail
	EVS	0-10 V/4-20 mA	-	< 10 A	✓	-	-	54	-
	EVSS	0-10 V/4-20 mA	✓	< 10 A	✓	-	-	54	-
	MVS	0-10 V/4-20 mA	-	< 10 A	✓	-	-	-	✓
	MVSS	0-10 V/4-20 mA	✓	< 10 A	✓	-	-	-	✓
	TVSS	0-10 V/4-20 mA	✓	< 6 A	-	✓	✓	-	✓

Multifunctional controllers

		Input	Range	Temp.	CO2	AQ	RH	Pressure	Dewpoint	Remarks
	MFC	0-10 V/4-20 mA/PT500	< 10 A	✓	✓	✓	✓	✓	-	8 different control modes

3SMUSB controllers

		Input	Range	Temp.	CO2	RH	RS485	High/low
	TE1S	PT500	< 10 A	✓	-	-	✓	-
	TE2S	PT500	< 10 A	✓	-	-	✓	✓
	CO1S	0-10V/4-20 mA	< 10 A	-	✓	-	✓	-
	CO2S	0-10V/4-20 mA	< 10 A	-	✓	-	✓	✓
	AQ1S	0-10V/4-20 mA	< 10 A	-	-	-	✓	-
	AQ2S	0-10V/4-20 mA	< 10 A	-	-	-	✓	✓
	RH1S	0-10V/4-20 mA	< 10 A	-	-	✓	✓	-
	RH2S	0-10V/4-20 mA	< 10 A	-	-	✓	✓	✓

Frequency inverters

	FI	frequency inverters

Relay modules

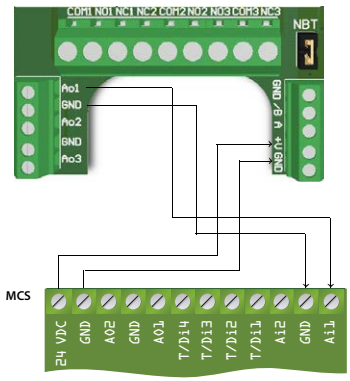
		Supply	Analog inputs	Output modes					
				C/O relays	RS485	Binary	High/Low	Raise/Lower	Modbus
	SRM2	18-32 VDC/15-24 VAC	1	2	✓	✓	✓	✓	✓
	SRM4	18-32 VDC/15-24 VAC	1	4	✓	✓	✓	✓	✓
	SRM8	18-32 VDC/15-24 VAC	1	8	✓	✓	✓	✓	✓

Transformer fan speed control

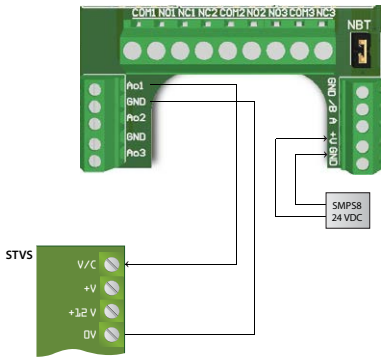
		Switch	Analog input	Thermal contacts	PTC inputs	High/low speed setting	CC/OC contacts	Flow detection	Overload protection	Real-time clock	Alarm output	Auto restart
	STRA1	5-step	-	✓	-	-	✓	-	-	-	✓	✓
	SC2-1	5-step	-	-	-	✓	-	-	-	-	-	-
	SC2A1	5-step	-	✓	-	✓	✓	-	-	-	✓	✓
	STTA1	5-step	-	✓	-	-	✓	-	✓	-	✓	✓
	ST2R1	-	-	✓	-	✓	✓	-	-	✓	✓	-
	STVS1	input	0-10 VDC/0-20 mA	✓	-	-	-	-	-	-	✓	-
	STRA4	5-step	-	✓	-	-	✓	-	-	-	✓	✓
	SC2-4	5-step	-	-	-	✓	-	-	-	-	-	-
	SC2A4	5-step	-	✓	-	✓	✓	-	-	-	✓	✓
	STTA4	5-step	-	✓	-	-	✓	-	✓	-	✓	✓
	ST2R4	-	-	✓	-	✓	✓	-	-	✓	✓	-
	STVS4	input	0-10 VDC/0-20 mA	✓	-	-	-	-	-	-	✓	-

APPLICATION EXAMPLES

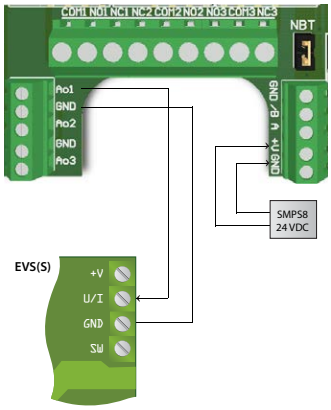
CO_2 control with MCS1



CO_2 control with output to power module STVS



CO_2 control with output to power module EVS(S)



CO_2 control with output to relays module SRM