[EN] MOUNTING INSTRUCTIONS
SPS2| High/low differential pressure controller

Article	Power supply	Connection
SPS2G-2KO	15-24 VAC ±10 %/18-34 VDC	3-wire
SPS2F-2KO	18-34 VDC	4-wire

The SPS2 is a differential pressure controller designed to directly control EC fans, frequency inverters or other controls with 2 pressure set points (High/Low or Day/Night mode). It provides an analog output (0 - 10 VDC, 0 – 20 mA) or digital output (PWM - Open Collector) with integrated PI control and K-factor setting. The two set points are switchable via external switch/contact or with digital output. All system parameters are controllable via Modbus RTU communication.

Technical data
• Power supply: 18 - 34 VDC / 15 - 24 VAC ±10 %
• 1 x analog output (0 - 10 VDC / 0 - 20 mA) or 1 x digital output (PWM - open collector - 1kHz)
• Operating temperature: 10 - 60 °C (temperature compensated)
• Selection of differential pressure or *air volume mode/readout via 3SModbus
• Modbus registers reset function - independent for each sensor (Factory preset values)
• Accuracy: ±3 % of final value (for analog voltage output)
• Long-term stability: ±1 % per year
• Response time: 0.5 s / 1 s / 2 s /5 s
• Automatic range selection: The ranges are automatically switched according to the chosen set point for better resolution of the measurement. The maximum set point for a given range is 80 % of the range span.
• Auto-Tune function: The Auto-tune function calculates the parameters Kp and Ti according to the system response in the application. Writing '1' into the holding register 22 starts the Auto-tune procedure. When this procedure is finished the SPS2X-2K0 automatically writes '0' in the holding register 22 and overrides holding registers 20 and 21 with the new values of Kp and Ti. Once started, the auto-tune procedure cannot be stopped. If during this procedure the SPS2X-2K0 is restarted, it is aborted and doesn't start automatically again after a system restart.
Remark: The Auto-tune function calculates the parameters Kp and Ti which are suitable to have good performance of the system. However, for better performance the customer is allowed to change these parameters by writing in Modbus register 20 and 21 if he has knowledge of a PI-control.

Enclosure
• RABS (UL94: V0)
• Grey RAL7035
• Protection: IP54

Standards

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• CE conform
• Low Voltage Directive 2006/95/EC
• WEEE Directive 2002/96/EC
• RoHS Directive 2002/95/EC
• EMC Directive 2004/108/EC: EN 61000-6-3:2007 and EN 61000-6-2:2005

Intended area of use
• Fan / pressure control, VAV (Variable Air Volume) and CAV (Constant Air Volume) mode when k –factor is known
• Valve and damper control (actuators)
• Pressure / airflow monitoring in clean rooms
• Usage in clean air and non-aggressive, non-combustible gases
• For indoor use only!

Connections (see p 4)

Mounting (see p 5)

Calibration
1. Make sure the nozzles are free and not connected.
2. Press button SW2 for 4 seconds until red LED3 on the printed circuit board blinks two times then release this button.
3. After 2 seconds the red LED3 will blink again for 2 times as an indication that calibration procedure is finished.

Modbus
See register table p 2-3

Reset of Modbus Registers
Press button SW2 for 4 seconds until red LED on the printed circuit board is blinking two times and keep pressing this button until the red LED is blinking three times. The Modbus registers are restored to their default values (factory preset).

LED indication
Green LED – indicates Power ON
Red LED for indication of 'Calibration Done' and 'Modbus Parameters Reset' conditions.

Transport and storage
Avoid shocks and extreme conditions, stock in original packing

Warranty
Two years from delivery date against defects in manufacturing. Any modifications or alterations to the product relieve the manufacturer of all responsibility. The manufacturer bears no responsibility for any misprints or mistakes in this data, and modifications or improvements to the product can be made at any time after date of publication.

We do not assume liability for any resulting damage in case the safety instructions are not followed. We do not assume any liability for material and personal damage caused by improper use or non-compliance with the safety instructions. In such cases the warranty will be null and void.

Maintenance
In normal conditions the device is maintenance-free. If soiled clean with dry or dampish cloth. In case of heavy pollution clean with a non-aggressive product. In these circumstances the device should be disconnected from the mains. Pay attention that no fluids enter the device. Only reconnect to the mains when it is completely dry.

Safety and precautions
• For safety and licensing (CE) reasons, unauthorized conversion and/or modifications to the product are not permitted
• Installation, electrical connection, and start-up operation may only be carried out by an electrical specialist in accordance with electro technical regulations (e.g. DIN EN 50110 od. DIN EN 60204)
• All installation shall comply with local installation requirements and the local electrical codes.
• Isolate mains before opening the controller
• Never apply line voltage to analog/digital inputs
• Do not exceed the maximum load consumption
• It is forbidden to carry out work on electrically live parts
• The product must not be exposed to extreme temperatures, direct sunlight or vibration
• Use shielded cables (to one side only) for low voltage control signals
• Inspect electrical equipment periodically: retighten loose connections – immediately replace damaged lines and cables.
• The device is designed for vertical installation (cable inlet down)
• If you have any questions that are not answered in this instruction manual, please contact our technical support or consult a professional

Vin	Positive DC voltage/AC ~
GND	Ground/AC ~
A	RS485 signal A
/B	RS485 signal /B
AO1	Analog (0-10 VDC/0-20 mA) or digital output (PWM)
GND	Ground
OC	Analog (0-10 VDC/0-20 mA) or digital output (PWM)
GND	Ground

If an external AC/DC powered device (G series) is using the same safety transformer as a DC powered device (F series), a SHORT CIRCUIT in the source may result when connecting three-wire applications (common ground)!

If an AC power supply is used with any of the devices in a network with Modbus RTU communication the GND terminal should NOT BE CONNECTED to other devices on the network or via CNVT-USB-RS485 for a computer application. This may cause permanent damage to the communication chip and/ or the computer!


PCB-SPSX-020
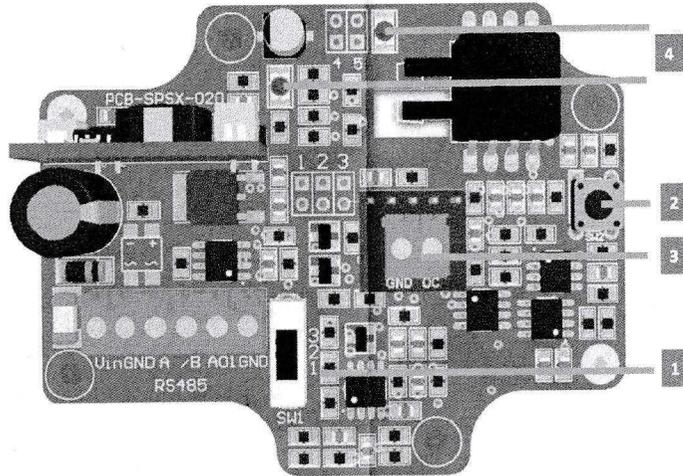
1 - Switch analog output	SW1	1: 0-10 VDC
		2: 0-20 mA
		3: PWM (open collector)
2 - Switch calibration	SW2	calibration switch zero point and factory preset of Modbus registers
3 - High/low switching contact		Contact open - Set point 1
		Contact closed - Set point 2
5 - LED indications	Green	Power on
	Red	calibration done and Modbus parameters reset

SPS2X-2K0 control functionality

Setpoint
Kp = 2.0
Kp = 1.0
Kp = 0.5
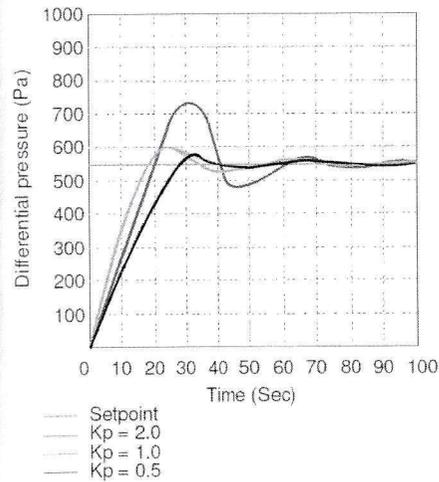
Holding registers

		Data type	Description	Data	Default	Values
1	Address	unsigned int.	Device address	1-247	1	
2	RS485 baud rate	unsigned int.	Modbus communication baud rate	1=9600	2	
				2=19200		
				3=38400		
3	RS485 parity mode	unsigned int.	Parity check mode	0=8N1	1	
				1=8E1		
				2=8O1		
4	Device type	unsigned int.	Device type: Read only.	SPSP = 1026		
5	HW version	unsigned int.	Hardware version of the device. Read only	XXX		100 = HW version 1.00
6	SW version	unsigned int.	Software version of the device. Read only	XXX		100 = SW version 1.00
7			Reserved. Returns 0			
8			Reserved. Returns 0			
9			Reserved. Returns 0			
10			Reserved. Returns 0			
11	Differential pressure setpoint 1	unsigned int.	Differential pressure setpoint 1	0 – 2000	100	1000 = 1000 Pa
12	Differential pressure setpoint 2	unsigned int.	Differential pressure setpoint 2	0 - 2000	100	1000 = 1000 Pa
13	Setpoint 1 for volume flow rate	unsigned int.	Setpoint 1 - desired volume flow rate	0 - 44000	10000	10000 = 10000 m3/h
14	Setpoint 2 for volume flow rate	unsigned int.	Setpoint 2 - desired volume flow rate	0 - 44000	10000	10000 = 10000 m3/h.
15	K factor selection register	unsigned int.	K factor according to the motor type	0 - 1000	0	
16	Active setpoint selection	unsigned int.	Register for active setpoint selection.	0 = Differential pressure	0	
				1 = Volume flow rate		
17			Reserved. Returns 0			
18			Reserved. Returns 0			
19			Reserved. Returns 0			
20	Kp	unsigned int.	Proportional gain.	1 – 100	10	
21	Ti	unsigned int.	Integration period.	1 – 1000	30	10 = 10 * 100ms = 1s
22	Auto-tune function start.	unsigned int.	Register for starting auto-tune function	0 = function is not active	0	
				1 = function is in progress		
23	Min. speed.	unsigned int.	Minimum speed of the motor (between 10 and 50 %)	100 - 500	200	100 = 10%.
24	Max. speed.	unsigned int.	Maximum speed of the motor (between 50 and 100%).	500 - 1000	1000	500 = 50%.
25			Reserved. Returns 0			
26			Reserved. Returns 0			
27			Reserved. Returns 0			
28			Reserved. Returns 0			
29			Reserved. Returns 0			
30			Reserved. Returns 0			

Input registers

		Data type	Description	Data	Values
1	Differential pressure	unsigned int.	Measured differential pressure	0 – 2000	1000 = 1000 Pa
2	Output voltage	unsigned int.	Voltage on analog output between 0-10 VDC	0 - 1000	100 = 1.00 VDC
3	Volume flow rate	unsigned int.	Calculated air volume flow rate in m3/h	0 – 44000	10000=10000 m3/h
4			Reserved. Returns 0		
5			Reserved. Returns 0		
6			Reserved. Returns 0		
7	Differential pressure range.	unsigned int.	Indicates the current range of SPS2X-2K0	0 = 0 - 100Pa 1 = 0 - 250Pa 2 = 0 - 500Pa 3 = 0 - 750Pa 4 = 0 - 1000Pa 5 = 0 - 2000 Pa	
8	Current set point	unsigned int.	Indicates the number of the active set point	0 = Setpoint 1 1 = Setpoint 2	
9			Reserved. Returns 0		
10			Reserved. Returns 0		

Mounting

2x Ø6
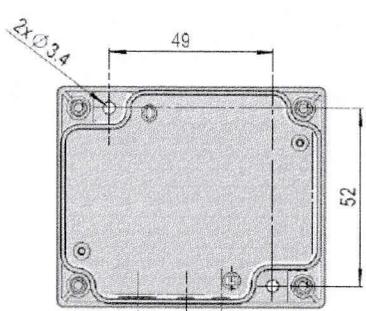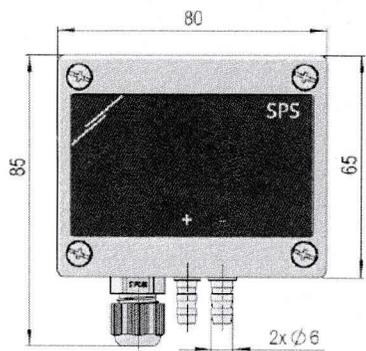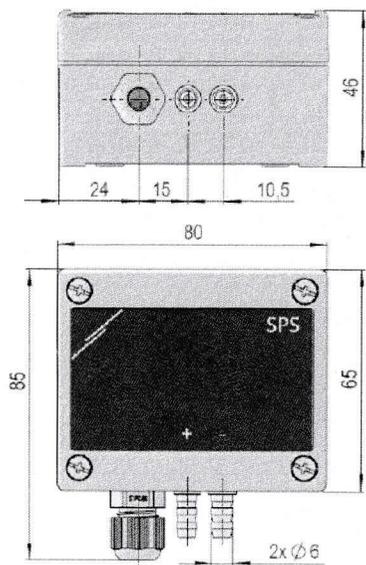
Mounting Dimensions

Packing Box