

Air gap sensors SOPA



Key features

At a glance

Communication interface



- 2-colour LCD display

- Operating pressure 4 ... 7 bar

- Sensing range 20 ... 200 μm

- Analogue output 1 ... 5 V, 0 ... 10 V or 4 ... 20 mA

- Switching outputs 2x PNP, 2x NPN, PNP/NPN switchable



- Integrated blow-out function

- Teachable distance threshold values

- Sensing of the entire distance value via IO-Link or analogue output

Key features

General information

Lightweight, compact and highly precise, this pneumatic solution offers impressive integration features. SOPA includes a control module, compressed air regulation, measuring air shut-off and blow-out function as well as up to 4 measuring modules.

All in all, an attractively priced solution for low tolerances.

Precise

The air gap sensor SOPA senses exactly in the μm range whether the workpiece is lying flat or resting against the work surface before clamping and whether the machining tool is exactly aligned with the spindle.

The solution for two-stage workpiece machining with different surface finishes.

Alternatively, the distance value can be transmitted to the controller via IO-Link or the analogue output. Parameters can therefore be changed even when the system is running.

This means, for example, that it is easy and straightforward to adjust the switching points when workpieces change during the process.

Simple operation

Lightweight, compact and simple too: thanks to parameterisation via IO-Link, teach-in or numerical setting using three pushbuttons.

Easy to assemble and commission thanks to the inclusion of virtually unregulated compressed air and an integrated blow-out function that needs no additional peripheral devices.

All settings that have been carried out on one IO-Link measuring module (master) can be transferred (replication) to identical measuring modules (device).

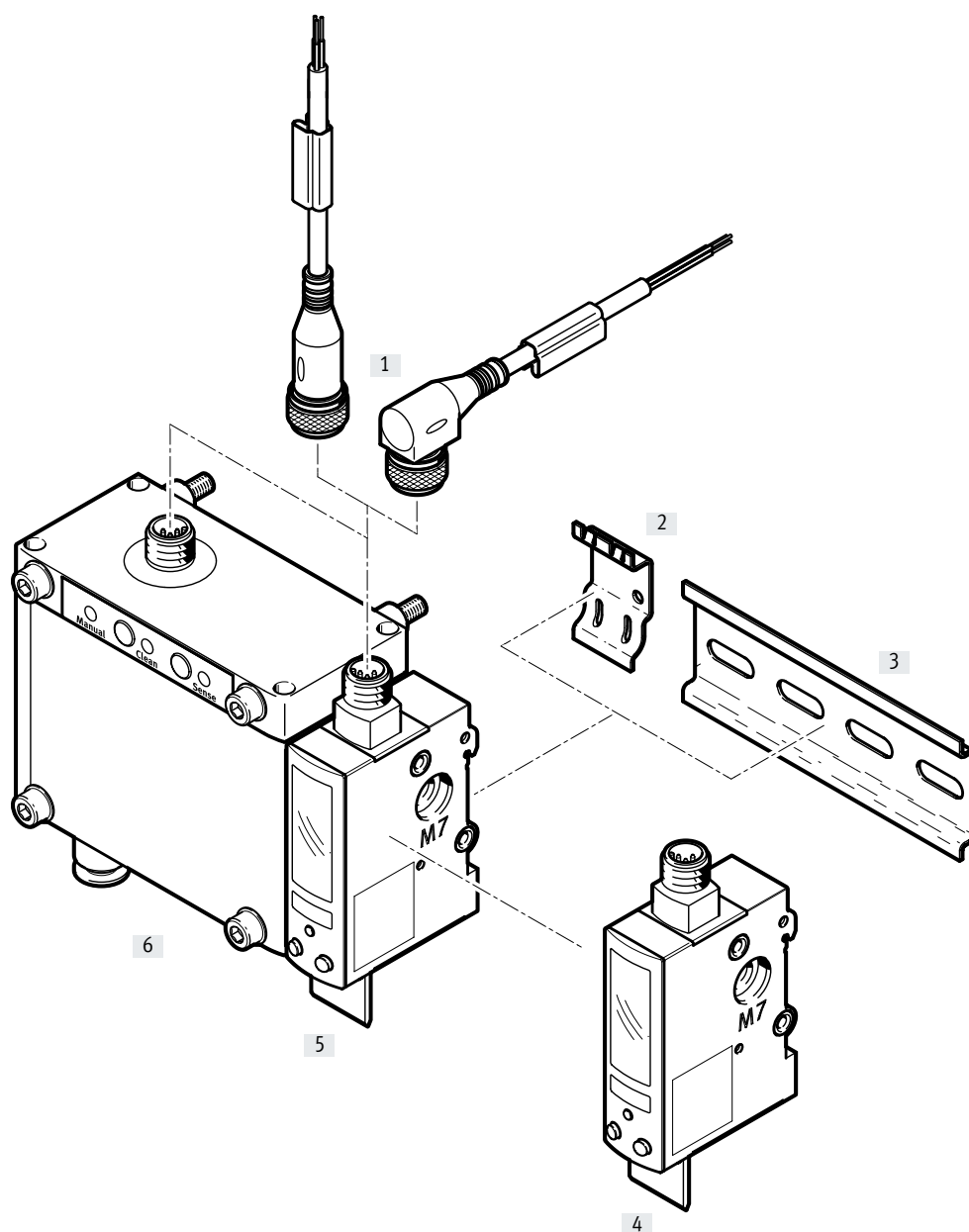
Reliable and flexible

The multi-coloured LCD display with clear operating status indication ensures maximum reliability. The selectable measuring points 1 ... 4 and additional functions provide the application with excellent flexibility.

In the menu, a four-digit security code can be chosen and freely configured. This prevents unauthorised changes to device parameters.

Peripherals overview

Peripherals overview



Accessories		→ Page/ Internet
[1]	Connecting cable, power supply, switching output, analogue output, IO-Link	10
[2]	Adapter plate SXE3-W (2 pieces included in the scope of delivery for SOPA-...-W-...)	10
[3]	Mounting rail to DIN EN 60715	-
[4]	Sensor module SOPA-M1-...	-
[5]	Inscription label holder SXE3 (included in the scope of delivery)	-
[6]	Control module with one sensor module SOPA-CM1-...	-

Type codes

001	Series
SOPA	Air gap sensor for contact and distance monitoring with LCD display

002	Modules
CM1	Control module with a sensor module
CM2	Control module with two sensor modules, pneumatically linked
CM3	Control module with three sensor modules, pneumatically linked
CM4	Control module with four sensor modules, pneumatically linked
M1	Sensor module

003	Manual override control module
	None
H	With

004	Sensing range
R1	20 ... 200 µm

005	Type of mounting
H	H-rail mounting
W	Wall mounting

006	Pneumatic connection
Q6	Push-in connector 6 mm

007	Electrical output 1
2N	2x NPN
2P	2x PNP
PNLK	PNP or NPN or IO-Link®

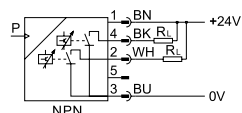
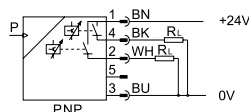
008	Electrical output 2
	None
VB	0 ... 10 V or 1 ... 5 V
A	4 ... 20 mA

009	Electrical connection
M12	Plug M12, A-coded

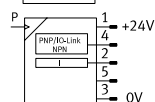
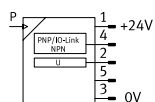
010	Electrical accessories
	None
E1	Straight socket, cable 2.5 m
E2	Straight socket, cable 5 m
E3	Angled socket, cable 2.5 m
E4	Angled socket, cable 5 m

Data sheet

Measuring unit variants 2P/2N



Measuring unit variants PNLK...



- IO-Link and analogue output in one device
- Operating pressure 4 ... 7 bar
- Sensing range 20 ... 200 µm



Technical data		SOPA-M1-...	SOPA-CM-...-H...	SOPA-CM-...-W...
Type				
Detected variable		Distance		
Sensing range	[µm]	20 ... 200		
Repetition accuracy of switching point ¹⁾	[µm]	± 2.5 sensing range 30 to 150; ± 5 sensing range 20 to 200		
Setting options		Teach-in via display and pushbuttons ⁵⁾		
Protection against tampering		Electronic locking		
Display type		Multi-coloured, illuminated LCD		
Type of mounting		Either: Via H-rail Via through-hole Via wall/surface bracket ²⁾		Either: Via H-rail Via through-hole Via wall/surface bracket ³⁾
Measuring principle		Pneumatic		
Pneumatic connection		QS-6		
Operating voltage range ⁴⁾	[V DC]	15 ... 30	22.8 ... 26.4	
Max. output current	[mA]	100		
Electrical connection		Plug M12x1, 5-pin, round design to EN 60947-5-2		
Short circuit protection		Yes		
Reverse polarity protection		For all electrical connections		
Degree of protection		IP65		

1) Under constant operating conditions (temperature and supply pressure) and measuring nozzle nominal diameter (2 mm).

2) Adapter plate SXE3 must be ordered separately as an accessory → 3

3) Two adapter plates SXE3-W included in the scope of delivery.

4) SOPA-M1-R1-...-PNLK-... 20 ... 30 V DC

5) Possible via IO-Link

Technical data							
Type	SOPA-M1-...-PNLK- VB-...	SOPA-M1-...-PN- LKA-...	SOPA-CM-...-PNLK- VB-...	SOPA-CM-...-PN- LKA-...	SOPA-CM-...-2P-...	SOPA-CM-...-2N-...	
Switching output	PNP/NPN, switchable				2xPNP	2xNPN	
Switching function	Window comparator						
Switching element function	Threshold value with variable hysteresis						
Switching element function	N/C or N/O contact, switchable						
Distance characteristic curve start value	[µm]	0				-	-
Distance characteristic curve end value	[µm]	300				-	-
Rise time	[ms]	22				-	-
Analogue output	0 ... 10 V ¹⁾	4 ... 20 mA	0 ... 10 V ¹⁾	4 ... 20 mA	-	-	
Max. load resistance of current output	[ohms]	-	500	-	500	-	
Min. load resistance of voltage output	[kOhm]	20	-	20	-	-	

1) The analogue output can be switched from 1 to 5 V.

Data sheet

Operating and environmental conditions		
Type	SOPA-M1-...	SOPA-CM-...-...
Operating pressure [bar]	–	4 ... 7
Supply pressure [bar]	0.8 ... 1.6	–
Operating medium	Compressed air to ISO 8573-1:2010 [7:4:4]	
Note on operating/pilot medium	Lubricated operation possible (in which case lubricated operation will always be required)	
Ambient temperature [°C]	0 ... 50	
CE marking (see declaration of conformity)	To EU EMC Directive	
	To EU RoHS Directive	
KC mark	KC EMC	
Certification	RCM compliance mark	
Corrosion resistance class ¹⁾ [CRC]	2	

1) Corrosion resistance class CRC 2 to Festo standard FN 940070

Moderate corrosion stress. Indoor applications in which condensation can occur. External visible parts with primarily decorative surface requirements which are in direct contact with a normal industrial environment

Communication interface	
Type	-PNLK...
Protocol	IO-Link
IO-Link, protocol version	Device V 1.1
IO-Link, profile	Smart sensor profile (0x0.0001) Identification and Diagnostics (0x4000)
IO-Link, function classes	Device Identification (0x8000)
	Switching Sensor Channel (0x8001)
	Process Data Variable (0x8002)
	Device Diagnostics (0x8003)
	Teach channel (0x8004)
	Extended Identification (0x8100)
IO-Link, communication mode	COM2 (38.4 kBaud)
IO-Link, SIO mode support	Yes
IO-Link, port class	A
IO-Link, process data width OUT	0 bytes
IO-Link, process data width IN	2 bytes
IO-Link, process data contents IN	Distance monitoring SSC1 (Switching Signal Channel 1)
	Distance monitoring SSC2 (Switching Signal Channel 2)
	Supply pressure monitoring SSC3 (Switching Signal Channel 3)
	Distance 10 bit PDV (Process Data Variable)
IO-Link, service data contents IN	Supply pressure 14 bit
IO-Link, minimum cycle time	3 ms
IO-Link, data memory required	0.5 kB

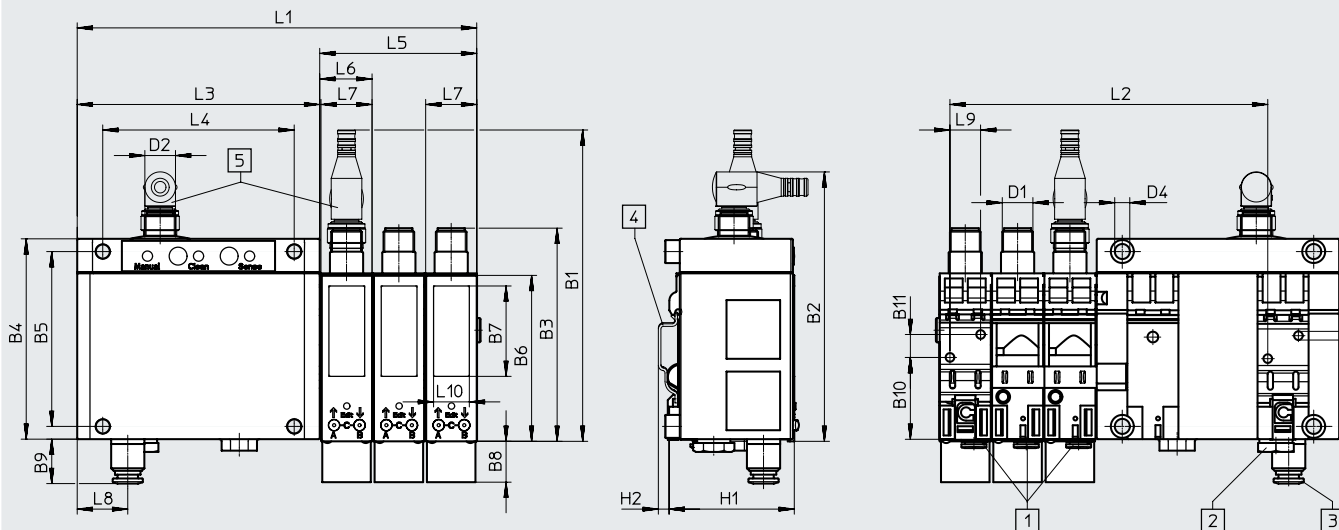
Weight					
	SOPA-M1-...	SOPA-CM1-...	SOPA-CM2...	SOPA-CM3...	SOPA-CM4...
Product weight [g]	60	510	570	630	690

Materials	
Housing	Reinforced PA
Note on materials	Free of copper and PTFE
	RoHS-compliant

Data sheet

Dimensions

Download CAD data → www.festo.com



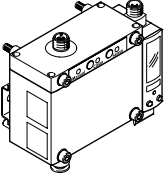

- [1] Compressed air supply port QS6 for measuring nozzle (output)
- [2] Differential pressure regulator connection possible
- [3] Pressure port QS6 for supply pressure
- [4] Surface adapter for wall mounting
- [5] Optional connection socket for plug

	B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	B11	D1	D2	D3 ∅	D4 ∅
SOPA-CM1H-...	122	106	82.9	78.5	68.5	65	35.4	16.8	17.4	32	9	M12x1	M12x1	3.4	5.5
SOPA-CM2H-...															
SOPA-CM3H-...															
SOPA-CM4H-...															
SOPA-...															

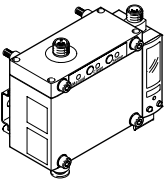

	H1	H2	L1	L2	L3	L4	L5	L6	L7	L8	L9	L10
SOPA-CM1H-...	49	4.2	115.5	83.5	95	75	20.5	20.5	20	19.8	12	14
SOPA-CM2H-...			136	104			41					
SOPA-CM3H-...			156.5	124.5			61.5					
SOPA-CM4H-...			177	145			82					
SOPA-...			95+(n x 20.5)	83.5+(n-1) x 20.5			n x 20.5					

n = number of sensor modules

Data sheet

Ordering data						
Design	Type of mounting	Number of sensor modules	Switching output PNP		Switching output NPN	
			Part no.	Type	Part no.	Type
Control module with sensor modules						
	Either via through-hole or H-rail	1	552130	SOPA-CM1H-R1-HQ6-2P-M12	552134	SOPA-CM1H-R1-HQ6-2N-M12
		2	552131	SOPA-CM2H-R1-HQ6-2P-M12	552135	SOPA-CM2H-R1-HQ6-2N-M12
		3	552132	SOPA-CM3H-R1-HQ6-2P-M12	552136	SOPA-CM3H-R1-HQ6-2N-M12
		4	552133	SOPA-CM4H-R1-HQ6-2P-M12	552137	SOPA-CM4H-R1-HQ6-2N-M12
	Via wall/surface bracket ¹⁾	1	552138	SOPA-CM1H-R1-WQ6-2P-M12	552142	SOPA-CM1H-R1-WQ6-2N-M12
		2	552139	SOPA-CM2H-R1-WQ6-2P-M12	552143	SOPA-CM2H-R1-WQ6-2N-M12
		3	552140	SOPA-CM3H-R1-WQ6-2P-M12	552144	SOPA-CM3H-R1-WQ6-2N-M12
		4	552141	SOPA-CM4H-R1-WQ6-2P-M12	552145	SOPA-CM4H-R1-WQ6-2N-M12
Individual sensor module						
	Either via through-hole or H-rail	1	552146	SOPA-M1-R1-HQ6-2P-M12	552147	SOPA-M1-R1-HQ6-2N-M12

1) Two adapter plates SXE3-W included in the scope of delivery.

Ordering data						
Design	Type of mounting	Number of sensor modules	Switching output PNP/NPN, switchable			
			Part no.	Type		
Control module with sensor modules						
	Either via through-hole or H-rail	1	8093818	SOPA-CM1H-R1-HQ6-PNLK-VB-M12		
		1	8093819	SOPA-CM1H-R1-HQ6-PNLK-A-M12		
		2	8093820	SOPA-CM2H-R1-HQ6-PNLK-VB-M12		
		2	8093821	SOPA-CM2H-R1-HQ6-PNLK-A-M12		
		3	8093822	SOPA-CM3H-R1-HQ6-PNLK-VB-M12		
		3	8093823	SOPA-CM3H-R1-HQ6-PNLK-A-M12		
		4	8093824	SOPA-CM4H-R1-HQ6-PNLK-VB-M12		
		4	8093825	SOPA-CM4H-R1-HQ6-PNLK-A-M12		
Individual sensor module						
	Either via through-hole or H-rail	1	8093816	SOPA-M1-R1-HQ6-PNLK-VB-M12		
		1	8093817	SOPA-M1-R1-HQ6-PNLK-A-M12		

Ordering data – Modular product system

Ordering table		Condi- tions	Code	Enter code
Module no.	549 902			
Function	Air gap sensor for contact and distance monitoring with LCD display		SOPA	SOPA
Modules	Control module with one sensor module		-CM1	
	Control module with two sensor modules, pneumatically linked		-CM2	
	Control module with three sensor modules, pneumatically linked		-CM3	
	Control module with four sensor modules, pneumatically linked		-CM4	
	Sensor module		-M1	
Manual override Control module	With manual override for control modules	[1]	H	
Distance measuring range	20 ... 200 µm		-R1	
Type of mounting	H-rail mounting/through-hole		-H	
	Additional wall mounting		-W	
Pneumatic connection	Push-in connector 6 mm		Q6	
Electrical output	2 switching outputs PNP		-2P	
	2 switching outputs NPN		-2N	
	PNP or NPN or IO-Link		-PNLK	
Electrical output 2	Without			
	0 ... 10 V or 1 ... 5 V	[2]	-VB	
	4 ... 20 mA	[2]	-A	
Electrical connection	M12 plug, A-coded		-M12	-M12
Electrical accessories	Straight socket, cable 2.5 m		+E1	
	Straight socket, cable 5 m		+E2	
	Angled plug socket, cable 2.5 m		+E3	
	Angled plug socket, cable 5 m		+E4	



[1] **H** Not with module M1 (sensor module)

[2] **VB, A** Only in combination with electrical output PNLK


Accessories

Ordering data – Connecting cables M12x1

Data sheets → Internet: nebu

	Number of wires	Cable length [m]	Part no.	Type
Straight socket				
	4	2.5	550326	NEBU-M12G5-K-2.5-LE4
		5	541328	NEBU-M12G5-K-5-LE4
Angled socket				
	4	2.5	550325	NEBU-M12W5-K-2.5-LE4
		5	541329	NEBU-M12W5-K-5-LE4

Ordering data – Adapter plate

	Part no.	Type
	540214	SXE3-W