

# Air gap sensors SOPA



## Key features

### At a glance

#### Communication interface



- 2-colour LCD display

- Operating pressure 4 ... 7 bar

- Sensing range 20 ... 200  $\mu\text{m}$

- Integrated blow-out function

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

- Teachable distance threshold values

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

- 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  $\mu\text{m}$  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).

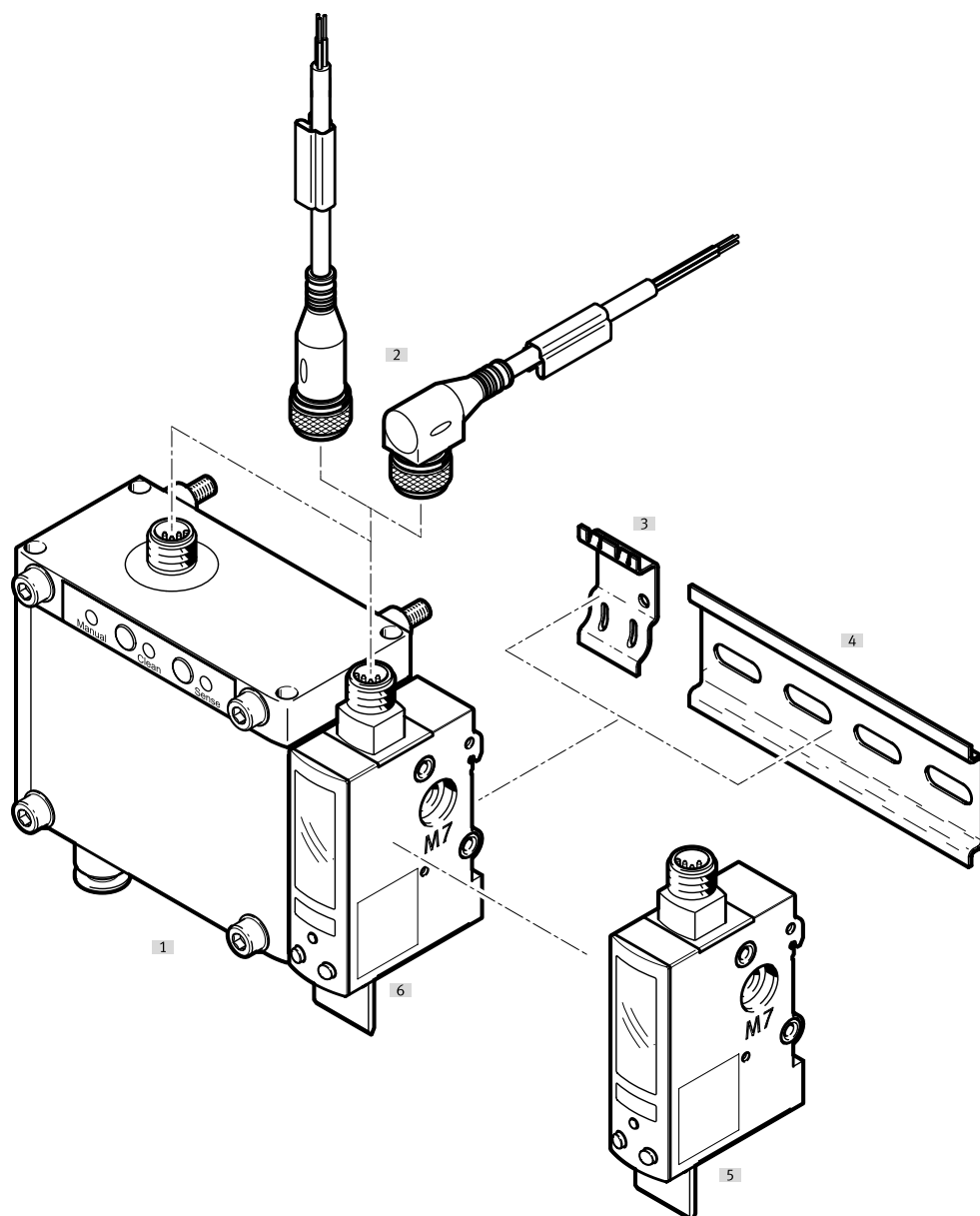
#### Reliable and flexible

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]	Control module with one sensor module SOPA-CM1-...	-
[2]	Connecting cable, power supply, switching output, analogue output, IO-Link	11
[3]	Adapter plate SXE3-W (2 pieces included in the scope of delivery for SOPA-...-W-...)	11
[4]	Mounting rail to DIN EN 60715	-
[5]	Sensor module SOPA-M1-...	-
[6]	Inscription label holder SXE3 (included in the scope of delivery)	-

## Type codes

<b>001</b>	<a href="#">Series</a>
<b>SOPA</b>	Air gap sensor for contact and distance monitoring with LCD display

<b>002</b>	<a href="#">Modules</a>
<b>CM1</b>	Control module with a sensor module
<b>CM2</b>	Control module with two sensor modules, pneumatically linked
<b>CM3</b>	Control module with three sensor modules, pneumatically linked
<b>CM4</b>	Control module with four sensor modules, pneumatically linked
<b>M1</b>	Sensor module

<b>003</b>	<a href="#">Manual override control module</a>
	None
<b>H</b>	With

<b>004</b>	<a href="#">Sensing range</a>
<b>R1</b>	20 ... 200 µm

<b>005</b>	<a href="#">Type of mounting</a>
<b>H</b>	H-rail mounting
<b>W</b>	Wall mounting

<b>006</b>	<a href="#">Pneumatic connection</a>
<b>Q6</b>	Push-in connector 6 mm

<b>007</b>	<a href="#">Electrical output 1</a>
<b>2N</b>	2x NPN
<b>2P</b>	2x PNP
<b>PNLK</b>	PNP or NPN or IO-Link®

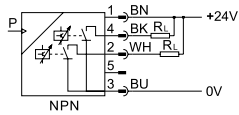
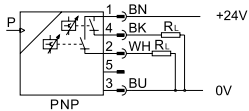
<b>008</b>	<a href="#">Electrical output 2</a>
	None
<b>VB</b>	0 ... 10 V or 1 ... 5 V
<b>A</b>	4 ... 20 mA

<b>009</b>	<a href="#">Electrical connection</a>
<b>M12</b>	Plug M12, A-coded

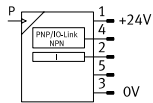
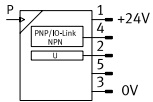
<b>010</b>	<a href="#">Electrical accessories</a>
	None
<b>E1</b>	Straight socket, cable 2.5 m
<b>E2</b>	Straight socket, cable 5 m
<b>E3</b>	Angled socket, cable 2.5 m
<b>E4</b>	Angled socket, cable 5 m

## 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  $\mu\text{m}$



Technical data		SOPA-M1-...	SOPA-CM...-...-H...	SOPA-CM...-...-W...
Type				
Detected variable		Distance		
Sensing range	[ $\mu\text{m}$ ]	20 ... 200		
Repetition accuracy of switching point <sup>1)</sup>	[ $\mu\text{m}$ ]	$\pm 2.5$ sensing range 30 to 150; $\pm 5$ sensing range 20 to 200		
Setting options		Teach-in via display and pushbuttons <sup>5)</sup>		
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 <sup>2)</sup>		Either: Via H-rail Via through-hole Via wall/surface bracket <sup>3)</sup>
Measuring principle		Pneumatic		
Pneumatic connection		QS-6		
Operating voltage range <sup>4)</sup>	[V DC]	15 ... 30	22.8 ... 26.4	
Max. output current	[mA]	100		
Electrical connection 1				
Connection type		Plug		
Connection technology		M12x1, A-coded to EN 61076-2-101		
Number of pins/wires		5		
Type of mounting		Screw-type lock		
Connection pattern				
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

## Data sheet

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					
	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 <sup>1)</sup>	4 ... 20 mA	0 ... 10 V <sup>1)</sup>	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.

Operating and environmental conditions		
Type	SOPA-M1-...	SOPA-CM-...-...
Operating pressure	[bar]	-
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	
UKCA marking (see declaration of conformity)	To UK instructions for EMC	
	To UK RoHS instructions	
KC mark	KC EMC	
Certification	c UL us - Recognized (OL)	
	RCM compliance mark	
Corrosion resistance class <sup>1)</sup>	[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

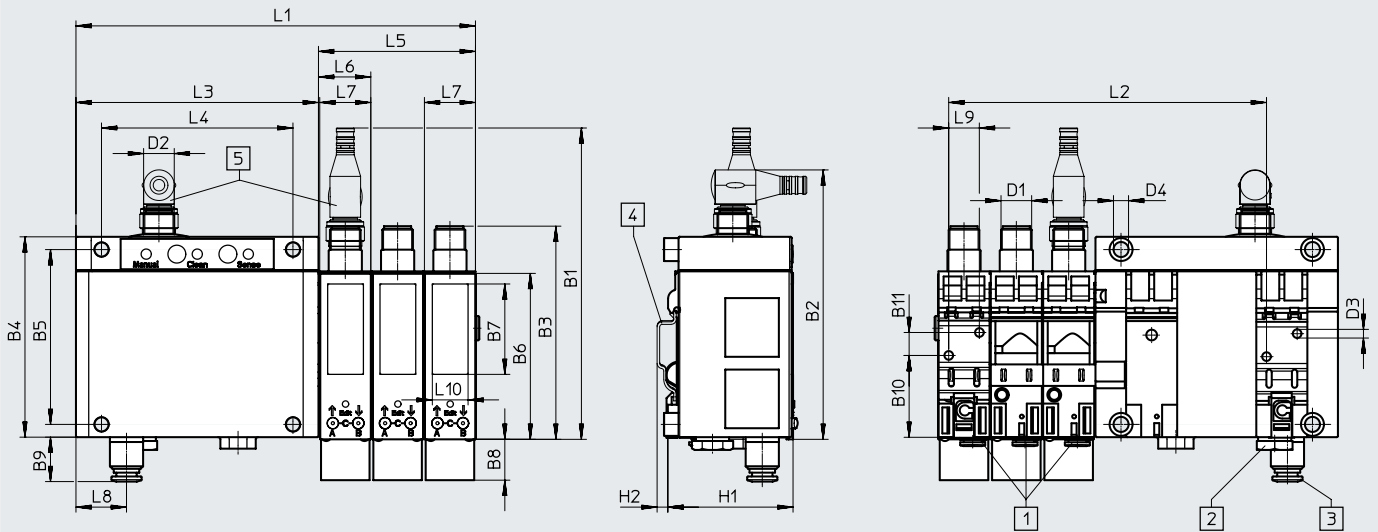
## Data sheet

Communication interface						
Type	-PNLK...					
Protocol	IO-Link					
IO-Link, protocol version	Device V 1.1					
IO-Link, profile	Smart sensor profile					
IO-Link, function classes	Identification					
	Switching signal channel (SSC)					
	Process data variable (PDV)					
	Diagnostics					
	Teach channel					
	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	2-bit SSC (distance monitoring)					
	1 bit SSC (supply pressure monitoring)					
	10 bit PDV (distance)					
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		SOPA-...-PNLK-...				
Housing	Reinforced PA					
	Anodised aluminium	-				
Note on materials	RoHS-compliant					
PWIS conformity	VDMA24364-C1-L					

Data sheet

Dimensions

Download CAD data → [www.festo.com](http://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

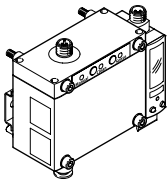
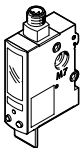
	B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	B11	D1	D2	D3 ∅	D4 ∅
SOPA-CM1H-...	122	106	82.9	78.5	68.5	65	35.4	16.8	17.4	32	9	M12x1	M12x1	3.4	5.5
SOPA-CM2H-...															
SOPA-CM3H-...															
SOPA-CM4H-...															
SOPA-...															

	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					

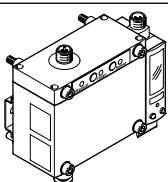

n = number of sensor modules



## Data sheet

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

[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
<b>Straight socket</b>				
	4	2.5	550326	NEBU-M12G5-K-2.5-LE4
		5	541328	NEBU-M12G5-K-5-LE4
<b>Angled socket</b>				
	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