Sensor Selection Guide

SO005e-4 (10/2026)

a DwyerOmega brand

Scope

Overview of available oxygen sensor configuration and the corresponding order code.

1 Basic Selection Steps

1.1 Choose O2 measurement range

part number	Measuring range*	output current	at O2 level	Accuracy	Reproducibility	bias voltage	marking
SO-xx-001	10 – 1000 ppm O2	150 – 250 µA	at 1000ppm O2	± 20 ppm O2	< 10 ppm O2	0.7 VDC	"A"
SO-xx-010	0.01 – 1.0 % O2	150 – 250 µA	at 1.0 % O2	± 100 ppm O2	< 100 ppm O2	0.75 VDC	"H"
SO-xx-020	0.01 – 2.0 % O2	150 – 250 µA	at 2.0 % O2	± 200 ppm O2	< 100 ppm O2	0.75 VDC	"B"
SO-xx-050	0.05 – 5.0 % O2	150 – 250 µA	at 5.0 % O2	± 500 ppm O2	< 250 ppm O2	0.8 VDC	"C"
SO-xx-250	0.10 – 25.0 % O2	150 – 250 µA	at 20.9 % O2	± 0.25 % O2	< 0.1 % O2	0.85 VDC	"D"
SO-xx-400**	0.20 – 40.0 % O2	150 – 250 µA	at 20.9 % O2	± 0.4 % O2	< 0.2 % O2	0.85 VDC	"J"
SO-xx-960	1.0 – 96.0 % O2	15 – 30 µA	at 20.9 % O2	± 1.00 % O2	< 0.2 % O2	1.0 VDC	"E"

*Operation outside the specified measuring range can cause permanent damage to the electrode
** 40% is a range customization, which is not included in all product documents

1.2 Choose fitting sensor housing / design (blue arrows indicate the gas flow/exchange)

TO-8 housings cable and board mount option

SO-B0-xxx
- TO-8 housing nickel plated cap
- gas exchange via mesh
- response t_{90}<12s
- B0 offers slightly better linearity compared to E2
- gas flow passes by

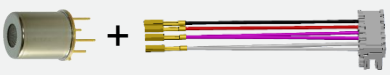


SO-E2-xxx
- TO-8 housing nickel plated cap
- gas exchange via mesh
- response t_{90}<12s
- E2 optimized for frequent heater power cycles
- gas flow passes by

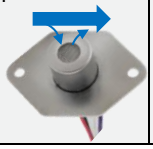


order code extensions for TO8+cable:
- e.g. -D040C see examples below
  - 040... 40cm cable length
- detachable cable with 6 poles
- Rast 2.5 connect for PCB-edge

SO-B0-xxx => SO-B0-xxx-D040C
SO-E2-xxx => SO-E2-xxx-D040C



SO-B1-xxx-A100C or SO-B1-xxx
- TO-8 + flange, with or without cable
- gas exchange via mesh
- response t_{90}<12s
- gas flow passes by



Flow through housing options cable and board mount option

SO-E3-xxx
- TO-8 for single hose connection
- Hose connection with barb
- For gas flow 0.1-0.5 l/min
- Gas exits via small hole
- gas flow through housing
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SO-E61-xxx
- TO-8 for dual hose connection
- Hose connection without barb
- For gas flow <0.1 l/min
- for micro/suction pump
- gas flow through housing



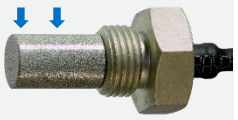
SO-E3-xxx => SO-E3-xxx-D040C
SO-E61-xxx => SO-E61-xxx-D040C

flow through housing D3
- for SO-D3-xxx-Ax00C
- M18 aluminium
- G1/8 in-/outlet
- Fittings not included
- For gas flows up to 5l/min
- gas flow through housing



Threaded O2 housing always with cable for installation in process chamber

SO-D0-xxx-A100C SO-D0-xxx-A300C
- M16-threaded nickel-plated steel housing
- Fixed cable with Rast 2.5 connector
- porous sinter cap
- fast response t_{90}<5s
- exposed to gas flow



SO-D1-xxx-A100C SO-D1-xxx-A300C
- M10-threaded nickel-plated steel housing
- Fixed cable with Rast 2.5 connector
- porous sinter cap
- fast response t_{90}<5s
- exposed to gas flow



SO-D2-xxx-A100C SO-D2-xxx-A300C
- M16-threaded aluminium housing
- Fixed cable with Rast 2.5 connector
- porous sinter disc
- slower response t_{90}<25s
- gas flow passes by



SO-D3-xxx-A100C SO-D3-xxx-A300C
- M18-threaded aluminium housing
- Fixed cable with Rast 2.5 connector
- porous sinter cap
- response t_{90}<10s
- exposed to gas flow



2 Order code structure

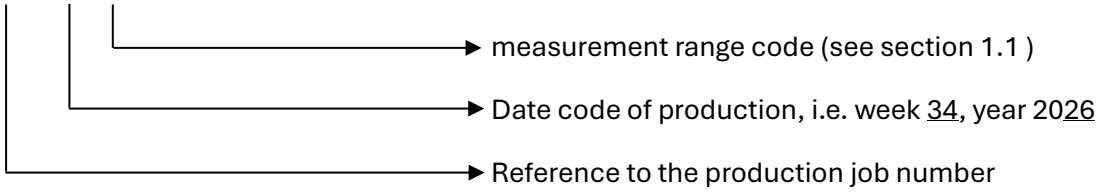
1	2	3	4	5	6	7	8	9	10	
SO	**-**	**B0(_)**	**-**	**250**	**-**	**D**	**040**	**C**		**sensor with cable**
SO	**-**	**B0(_)**	**-**	**250**						**sensor without cable**

Pos	description
1	Sensor for Oxygen (O2), 2 digits
2	dash, 1digit
3	Housing design, 2 or 3 digits, see **section 1.2** (standard housings) and **7.2** (A0 housing)
4	standard is dash, 1 digit, used for customizations inside the housing (e.g. thicker Pt-wire)
5	measuring range, 3 digits, **section 1.1**
6	standard is dash/space, 1 digit, also used for customizations (numbering)
7	wire type, connection to sensor, 1 digit
8	wire length in cm, 3 digits, (040 ... 40cm = 400mm = 15.75 inch)
9	connector, pin assignment, 1 digit
10	Usually skipped, reserved for cable customizations (e.g. label)

3 Identification marking and traceability

The identification marking is engraved on the lateral surface of the TO-8 sensors or on or near the hex flats of the threaded housings.

Example: 412 3426 D



All sensors can be traced back to a specific production job number. However, standard TO-8 sensors do not provide individual traceability, as they do not feature a unique serial number.

O_2 sensors with a threaded housing are marked with a unique serial number, enabling full individual traceability. The unique serial number is added behind the code for measuring range. The serial number is engraved after the measurement range code as part of the identification marking.

4 Cable assemblies

The cable assembly determines the sensor's maximum operating temperature and is typically supplied in the standard lengths listed below. Please contact SENSORE if you require customization.

4.1 Welded cable for operating temperatures up to 200°C

The welded cable assembly is the standard option for threaded housing (SO-Dx).

1	2	3	4	5	6	7	8	9	10	
					-	A	100	C		**welded cable 1m, Rast 2.5 / 6 pins**
					-	A	300	C		**welded cable 3m, Rast 2.5 / 6 pins**

4.2 plugged cable for operating temperatures up to 125°C

This cost-optimized cable assembly is the standard option for TO-8 sensor (SO-B0, SO-Ex).

1	2	3	4	5	6	7	8	9	10	
					-	D	012	C		**plugged cable 0.12 m, Rast 2.5 / 6 pins**
					-	D	040	C		**plugged cable 0.40 m, Rast 2.5 / 6 pins**

4.3 Standard connector Rast 2.5 and possible option for Smart Sensor with M12

1	2	3	4	5	6	7	8	9	10	
								C		**Rast 2.5 / 6 pins**
								M		**M12 plug / 8 pins**

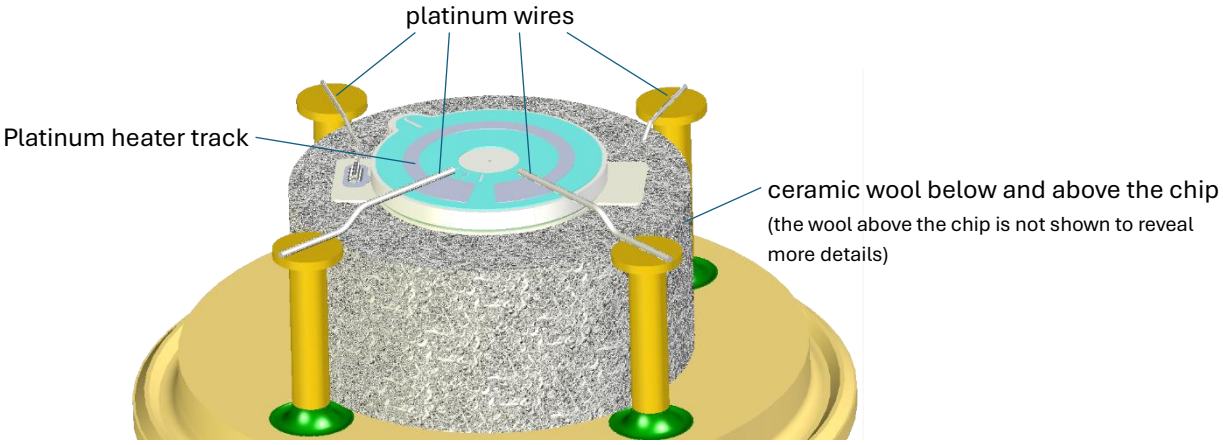
Rast 2.5 / 6 pins	M12 connector / 8 pins for Smart Sensor
Rast 2.5 connector standard for cost-efficient cable to PCB connection, e.g. for connection to Sensore's General Circuit Board (GSB), see picture below 	Pre-calibrated Smart sensor with M12 connector to be used with: • OXY-ProXT (single ch.) or OXY-ProXT2 (dual ch.) • Microx ProSafe SIL2 Dual-Ch. – Oxygen Transmitter 

See also Annex A: Oxygen Transmitters (O2-Sensor + Electronic)

5 Customisations inside the sensor housing (chip, wire, ceramic wool)

SENSORE offers customizations of the sensor's core components to optimize performance under special application conditions. The most common options are listed below. For additional guidance, please refer to the application notes on our website. Always test the sensor under the conditions of the intended application to verify its suitability. Please contact SENSORE for further information or assistance, e.g. if you need to combine customizations.

Overview of the sensor chip and surrounding components



5.1 customization "a" – thicker platinum wires for better mechanical stability

Usually combined with E2 housing / design as it also offers improved thermomechanical stability of the heater wires. Not available for A0, D0 and D1 housings. Please contact SENSORE for more information about possible combinations, e.g. with D2 or D3 housing.

1	2	3	4	5	6	7	8	9	10
SO	-	E2	a	250					

5.2 customization "b" – no ceramic wool but thicker platinum wires

The ceramic wool is based on low biopersistent fibres and therefore acceptable for most application. E2 sensors have a mesh on top which will hold back the ceramic wool inside the housing, nevertheless there is some risk that small fibre piece might exit the sensor housing into the air stream. If there are concerns about negative effect cause by such fibre pieces, it is possible to build sensors without ceramic wool. The basic function of the ceramic wool is the provision of thermal insulation but also mechanical stability. So, the removal of the ceramic wool will introduce disadvantages that requires counter measures for compensation. The reduced thermal insulation should be compensated by applying a constant heater resistance control. While the reduced mechanical stability will be compensated by using a thicker wire.

Usually combined with E2 design as this is also the recommended choice for thicker platinum wires. Not available for A0, D0 and D1 housings. Please contact SENSORE for more information about possible combinations, e.g. with D2 or D3 housing.

1	2	3	4	5	6	7	8	9	10
SO	-	E2	b	250					

5.3 customization “e” – for measurements below the lower detection limit

For O_2 monitoring in N_2 generators or inertization applications, the actual O_2 concentration may fall below the specified lower detection limit (LDL). This customization significantly improves signal stability when the sensor operates below the LDL.

Without this modification, the sensor may degrade rapidly and produce significant measurement errors under these conditions.

This option is typically combined with the B0 housing/design or threaded sensor housings. It is not recommended for use with the 96% sensor, whose measurement range provides unsuitable resolution for inertization applications.

1	2	3	4	5	6	7	8	9	10
SO	-	B0	e	001					

5.4 customization “i” – additional protection layer on top of the Pt-heater

Under certain application conditions e.g. combustible gases or metal vapours, the Pt-heater has a higher risk of degrading. To reduce such risks, it is possible to apply an additional glass passivation layer on top of the sensor heater track, which is the same glass material as used for the passivation layer below the heater track.

1	2	3	4	5	6	7	8	9	10
SO	-	E2	i	960					

5.5 customization “r” – 2 Ohm heater cold resistance

For use on electronic boards originally designed for Fujikura sensors, a heater resistance of approximately 2 Ohm simplifies integration.

1	2	3	4	5	6	7	8	9	10
SO	-	E2	r	960					

6 Further customization options

6.1 Individual sensor engraving for TO-8 sensors

The sensor is additionally engraved with a unique sequential number.

1	2	3	4	5	6	7	8	9	10
SO	-	E2	-	960	n				

6.2 customized labeling for sensors with cable

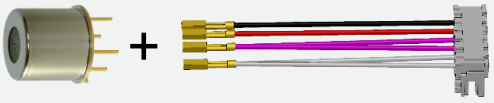
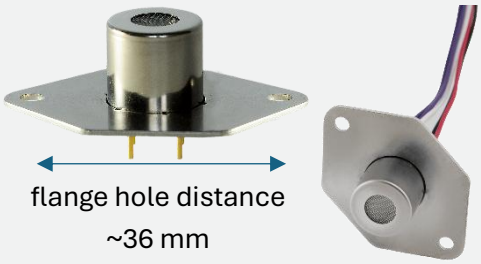
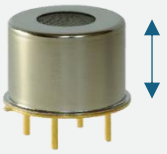
1	2	3	4	5	6	7	8	9	10
SO	-	B0	-	250	-	D	012	C	_

Position 10 would define a customized labeling for sensor with cable, e.g. by using a cable tie, see example below.

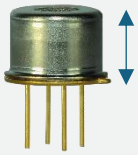


7 Housing designs additional information

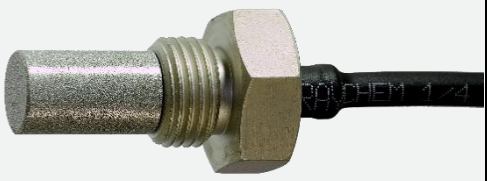
7.1 Housing designs based on TO-8 package (board mounted or with attached cable)

part number	Description	
SO-B0-xxx, SO-E2-xxx	TO-8 housing, nickel plated cap with stainless steel mesh, gold-plated pins and gold-plated baseplate SO-E2-xxx is optimized for frequent power cycles SO-B0-xxx offers a slightly better linearity Maximum operating temperature: 350°C	 cap height ~13.7mm
SO-B0-xxx-D040C, SO-B0-xxx-D012C SO-E2-xxx-D040C, SO-E2-xxx-D012C	TO-8 housing with detachable sensor cable and Rast 2.5 connector for PCB edge connection. D040C…40cm length with Rast 2.5 connector D012C…12cm length with Rast 2.5 connector Maximum operating temperature: 125°C temperature restriction due to cable configuration	
SO-B1-xxx SO-B1-xxx-A100C SO-B1-xxx-A300C	TO-8 housing + flange, with/without welded cable A100C…100cm length with Rast 2.5 connector A300C…300cm length with Rast 2.5 connector Maximum operating temperature: 350°C (without cable) or 200°C (with cable)	 flange hole distance ~36 mm
customization options	Contact SENSORE for customization options, e.g. smaller cap height (9.5mm), cable length, cable temperature rating or even customized tweaking of the electrical specification	 cap height ~9.5mm

7.2 Housing designs based on TO-39 package

part number	Description	
SO-A0-xxx	TO-39 housing, nickel cap with stainless steel mesh, gold-plated pins and gold-plated baseplate Warning: Due to its very compact design, the sensor housing can reach temperatures of ~250°C, which may complicate system integration. For most applications, a TO-8 package is the preferred choice. If height is a critical constraint, consider a TO-8 package with a reduced cap height.	 cap height ~6.4mm

7.3 Oxygen sensors with threaded housings and cable (1m or 3m)

part number	Description	
SO-D0-xxx-A100C SO-D0-xxx-A300C	M16-threaded nickel-plated steel housing, with a stainless-steel sinter cap. 1 or 3 m cable with RAST 2.5 connector Maximum operating temperature: 200°C	
SO-D1-xxx-A100C SO-D1-xxx-A300C	M10-threaded nickel-plated steel housing, with a stainless-steel sinter cap. 1 or 3 m cable with RAST 2.5 connector Maximum operating temperature: 200°C	
SO-D2-xxx-A100C SO-D2-xxx-A300C	M16-threaded aluminum housing, with a stainless-steel sinter disk 1 or 3 m cable with RAST 2.5 connector Maximum operating temperature: 200°C	
SO-D3-xxx-A100C SO-D3-xxx-A300C	M18-threaded aluminum housing, with a stainless-steel sinter cap 1 or 3 m cable with RAST 2.5 connector Maximum operating temperature: 200°C	

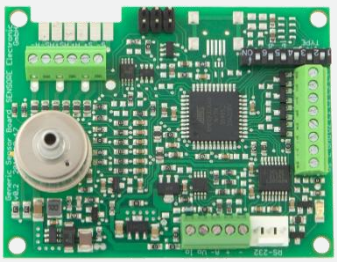
Note: A100C ...1m, A300C...3m, for other cable lengths please contact SENSORE

7.4 Oxygen sensors for flow through applications

part number	Description	
SO-E3-xxx	TO-8, single hose connection with barb, gas outlet via small hole on top of the housing for low airflows: 0.1 to 0.5 l/min	
SO-E61-xxx	TO-8, dual hose connection without barb, e.g. for operation with a suction/micro pump for very low airflows: ≤0.1 l/min	
1601001-0-L no fittings included	M18 flow-through housing for SO-D3-xxx-Ax00C two G1/8 threads for gas in- and outlet G1/8 fittings are not included For airflows up to 5 l/min	

Annex A: Oxygen Transmitters (O2-Sensor + Electronic)

System	Description	

Generic Sensor Board (GSB)	sub system for integration into larger devices
	• For board mounted and cabled sensors
	• Compact size 50mm x 65mm
	• Supply: 12Vdc / 200mA
	• Analog outputs: 4-20mA and 0-5V
	• Digital output: RS232
	• Sensor calibration is stored on the board
	  ○ Standard delivery: factory calibration
	  ○ allows also customer/field calibration
	• Further customization possible, e.g.:
	  ○ O2-treshold levels via digital I/O
	  ○ customized connectors
		

OXY-ProXT (single channel)
 	
OXY-ProXT2 (dual channel)
 	
for
 	
pre-calibrated smart sensors (M12 connector)
	Oxygen Transmitter for industrial environments
	• for use with pre-calibrated smart sensors
	  ○ calibration is stored in M12 connector
	  ○ only available for cabled sensors
	  ○ easy sensor replacement in the field (plug and play approach)
	• DIN-rail housing
	• Supply: 24Vdc / 250mA per channel
	• Analog outputs per channel:
	  ○ 4-20mA and 0-5V
	• Digital output: RS485 Modbus RTU
	  ○ 1 address per channel
	• 1 relay contact output per channel
	  ○ user programmable O2 alarm
	• fully compliant with EC-machinery directive
		

Microx ProSafe SIL2 Dual-Channel – Oxygen Transmitter	Oxygen Transmitter with SIL 2 / PL d rating
	• for safety critical inertisation monitoring
	• fully compliant with EC-machinery directive
	EC type examination by TUV AUSTRIA
	No. IN-AT-AS-MRL-20-00297A
	• Dual channel system:
	  ○ ch1 - coarse range: 0.1 - 23.5% O2
	  ○ ch2: fine range: 0.01 - 2.35% O2
	• typical SIL 2 alarm level: 2% O2
	  ○ interlock relays will open on >2% O2
	• for use with pre-calibrated smart sensors
	  ○ calibration is stored in M12 connector
	  ○ only available for SO-D3 sensors
	  ○ easy sensor replacement in the field (plug and play approach)
	• DIN-rail housing
	• Supply: 24Vdc / 250mA per channel
	• Analog outputs per channel:
	  ○ 4-20mA and 0-5V
	• Digital output: RS485 Modbus RTU
	  ○ 1 address per channel
	• 1 relay contact output per channel
	  ○ user programmable O2 alarm
		