

InPro 6000 Sensor Series

Oxygen Measurement Sensors

Technical Data



InPro 6800/
InPro 6850 i
InPro 6900/
InPro 6900 i
InPro 6950 i

InPro 6860 i
InPro 6860 i HD

InPro 6960 i
(not shown)
InPro 6970 i

Short description

The InPro® O₂ sensor family provides the means for reliable in-line measurement of dissolved and gaseous oxygen in a wide spectrum of processes amongst others under sterile/hygienic conditions. To meet the range of respective requirements, METTLER TOLEDO offers a selection of advanced O₂ sensors and measuring systems for the beverages industry, biotechnology and chemical industry.

Outstanding features of the O₂ sensors are:

- hygienic design, capable of withstanding cycles of standard CIP/SIP
- stainless steel surfaces with highly polished finish
- steam sterilizable and autoclavable up to 140 °C (284 °F)
- low detection limit at high signal stability
- O-rings with FDA and USP Class VI approval
- minimal maintenance requirement
- ISM (Intelligent Sensor Management) technology for digital sensors

Measuring systems for non-hygienic applications, such as in wastewater/effluent treatment, are also available.



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METTLER TOLEDO

Amperometric Sensors

Applications	InPro 6950 i	InPro 6900 (i)	InPro 6800 InPro 6850 i
Biotechnology/Pharma			
Fermentation	–	–	•
Brewery			
Yeast propagation	–	–	•
CO ₂ recovery	• (after recovery)	–	• (before recovery)
CO ₂ conditioning	•	•	–
Wort aeration	–	–	•
Filtration	–	•	–
Filling	–	•	–
Mineral water and soft drinks			
Spring and mineral water	–	•	•
Filling	–	•	–
Fruit juices and concentrates			
Processing	–	–	•
Storage	–	–	•

Specifications	InPro 6950 i	InPro 6900 (i)	InPro 6800 InPro 6850 i
Measurement principle			
	amperometric/polarographic (in accordance with ISO 5814 and EN 25 814)		
Working conditions			
Permissible pressure range during measuring (abs.)	0.2 ... 9 bar	0.2 ... 6 bar	0.2 ... 6 bar
	2.9 ... 130 psi	2.9 ... 87 psi using standard membrane	2.9 ... 87 psi
	–	0.2 ... 9 bar 2.9 ... 130 psi using reinforced membrane	–
Mech. pressure resistance (absolute)	max. 12 bar max. 174 psi	max. 12 bar max. 174 psi	max. 12 bar max. 174 psi
Permissible temperature range during measuring	0 ... 80 °C 32 ... 176 °F	0 ... 80 °C 32 ... 176 °F	0 ... 80 °C 32 ... 176 °F
Mechanical temperature resistance	–5 ... 121 °C 23 ... 250 °F	–5 ... 121 °C 23 ... 250 °F	–5 ... 140 °C 23 ... 284 °F
– steam-sterilizable	•	•	•
– autoclavable	–	–	•
Sensor performance			
Operating range	0.1 ppb to air saturation	1 ppb to oxygen saturation	3 ppb to oxygen saturation
Accuracy			
– in aqueous media	≤ ± [1 % + 0.1 ppb]	≤ ± [1 % + 1 ppb]	≤ ± [1 % + 3 ppb]
– in liquids containing CO ₂	≤ ± [1 % + 0.25 ppb]	≤ ± [1 % + 3 ppb]	≤ ± [1 % + 6 ppb]

Optical Sensors

Typical applications	InPro 6860 i	InPro 6860 i HD	InPro 6960 i	InPro 6970 i
Biotechnology/Pharma				
Fermentation and cell culture	•	•	–	–
Brewery				
Yeast propagation	–	–	–	–
CO ₂ recovery	–	–	–	• (before recovery)
CO ₂ conditioning	–	–	–	–
Wort aeration	–	–	•	–
Filtration	–	–	•	•
Filling	–	–	–	•
Mineral water and soft drinks				
Filling	–	–	–	•
Fruit juices and concentrates				
Processing	–	–	–	•
Storage	–	–	–	•

Specifications	InPro 6860 i	InPro 6860 i HD	InPro 6960 i	InPro 6970 i
Measurement principle	optical	optical	optical	optical
Working conditions				
Permissible pressure range during measuring (abs.)	0.2 ... 6 bar 2.9 ... 87 psi	0.2 ... 6 bar 2.9 ... 87 psi	0.2 ... 9 bar 2.9 ... 130 psi	0.2 ... 12 bar 2.9 ... 174 psi
Mech. pressure resistance (absolute)	– max. 6 bar max. 87 psi	– max. 6 bar max. 87 psi	– max. 12 bar max. 174 psi	– max. 12 bar max. 174 psi
Permissible temperature range during measuring	5 ... 60 °C 41 ... 140 °F	5 ... 60 °C 41 ... 140 °F	0 ... 40 °C 32 ... 104 °F	0 ... 40 °C 32 ... 104 °F
Mechanical temperature resistance	–20 ... 140 °C –4 ... 284 °F	–20 ... 140 °C –4 ... 284 °F	–20 ... 121 °C –4 ... 250 °F	–20 ... 121 °C –4 ... 250 °F
– steam-sterilizable	•	•	•	•
– autoclavable	•	•	–	–
Sensor performance				
Operating range	0 to 60 % O ₂ saturation	0 to 60 % O ₂ saturation	0 to 60 % O ₂ saturation	0 to 2000 ppb
Accuracy				
– in aqueous media	≤ ± [1%+8 ppb]	≤ ± [1%+8 ppb]	≤ ± [1%+8 ppb]	≤ ± [1%+2 ppb]
– in liquids containing CO ₂	≤ ± [1%+8 ppb]	≤ ± [1%+8 ppb]	≤ ± [1%+8 ppb]	≤ ± [1%+2 ppb]

Amperometric Sensors

Specifications	InPro 6950 i	InPro 6900 (i)	InPro 6800 InPro 6850 i
Response time at 25 °C (77 °F) [air → N ₂]	t _{98%} < 90 s	t _{98%} < 90 s	t _{98%} < 90 s
Sensor signal in ambient air at 25 °C (77 °F)	2500 ... 5000 nA	250 ... 500 nA	50 ... 110 nA
Residual signal in N ₂ at 25 °C (77 °F) in % of signal in ambient air	≤ 0.025 %	≤ 0.03 %	≤ 0.1 %
Design features			
Temperature compensation	automatic with built-in RTD		
Cable connection			
– analog	VarioPin (IP 68)	VarioPin or T-82	VarioPin (IP 68)
– digital	K8S (IP 68)	K8S (IP 68)	K8S (IP 68)
Wetted O-rings	Silicone FDA & USP Class VI approved (other materials on request)		
O ₂ selective membrane material	PTFE/Silicone reinforced with steel mesh	PTFE/Silicone reinforced with steel mesh	PTFE/Silicone reinforced with steel mesh
Wetted sensor parts	Silicone	PTFE S/steel 1.4404, [AISI 316L] with material certificate 3.1 (other materials on request)	PTFE
Surface roughness of wetted stainless steel parts (EN 1320: 1996)	N5 (R _a < 0.4 µm / < 16 µin)		
Inner body (exchangeable)	traces with guard ring and reference	low ppb with guard ring	InPro 6800: standard InPro 6850 i: standard with reference
Cathode	Pt	Pt	Pt
Anode	Pt	Ag/AgCl	InPro 6800: Ag/AgCl InPro 6850 i: Pt
Reference	Ag/AgCl	Ag/AgCl	Ag/AgCl
Guard	Pt	Pt	–
Ex-classification / ATEX	⊕ Ex ia IIC T6/T5/T4/T3 Ga/Gb ⊕ Ex ia IIIC T69°C/T81°C/ T109°C/T161°C Da/Db	⊕ Ex ia IIC T6/T5/T4/T3 Ga/Gb ⊕ Ex ia IIIC T69°C/T81°C/ T109°C/T161°C Da/Db	⊕ Ex ia IIC T6/T5/T4/T3 Ga/Gb ⊕ Ex ia IIIC T69°C/T81°C/ T109°C/T161°C Da/Db

FM approved



IS CL I, II, III, Div 1/ABCDEFG/T6 Ta = 60 °C
– 53 800 002; Entity

Certificates

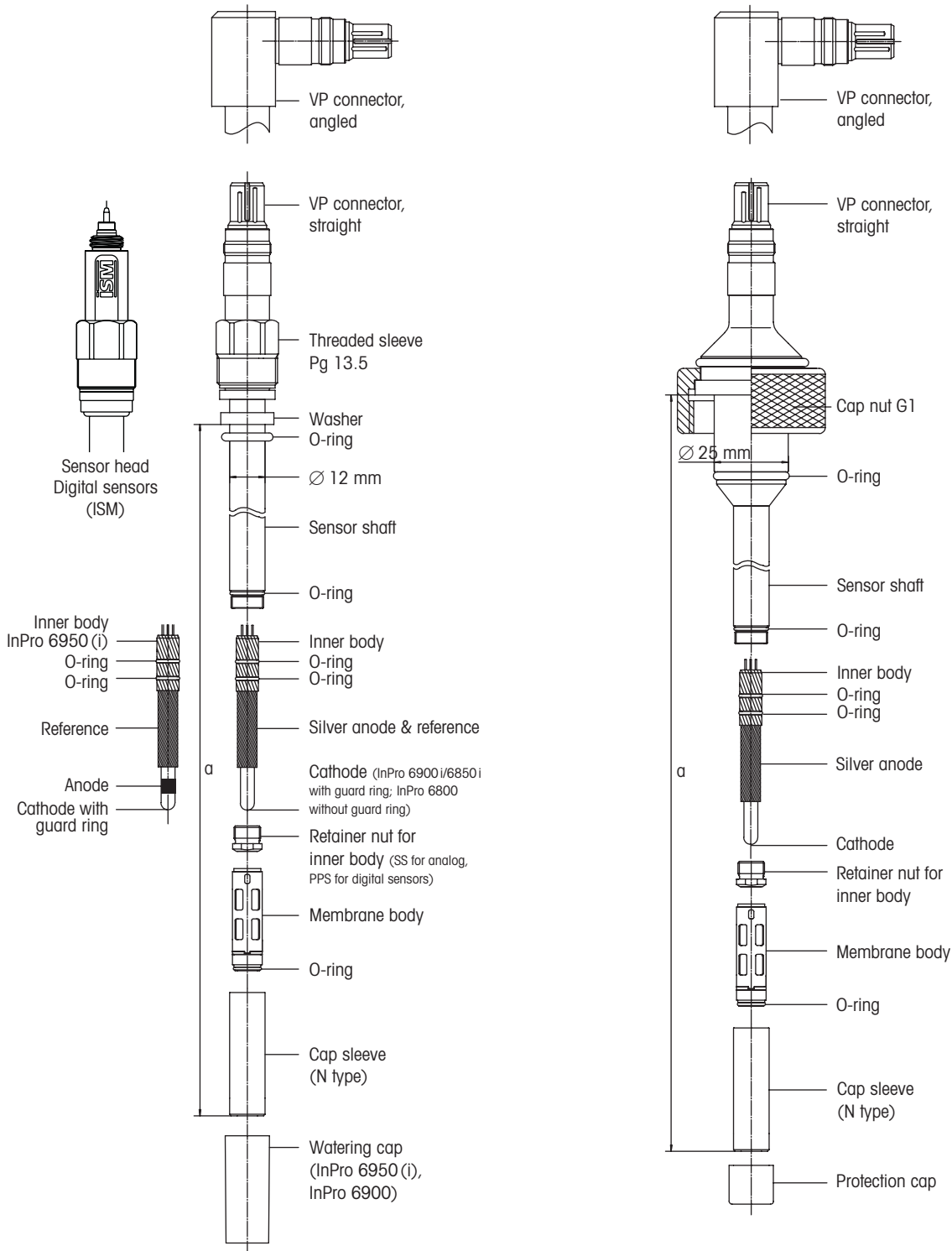
Quality Certificate (final inspection)	•	•	•
EHEDG	•	•	•
FDA	•	•	•
USP Class VI	•	•	•
Material Certificate 3.1	•	•	•
Surface Finish Certificate 2.1	•	•	•
ATEX / FM	•	•	•

Optical Sensors

Specifications	InPro 6860 i	InPro 6860 i HD	InPro 6960 i	InPro 6970 i
Response time at 25 °C (77 °F) [air → N ₂]	t _{98%} < 90 s	t _{98%} < 90 s	t _{98%} < 20 s	t _{98%} < 20 s
Sensor signal in ambient air at 25 °C (77 °F)	phi ₁₀₀ = 20°–36° ¹	phi ₁₀₀ = 20°–36° ¹	phi ₁₀₀ = 15°–35° ¹	phi ₁₀₀ = 11°–18° ¹
Residual signal in N ₂ at 25 °C (77 °F) in % of signal in in ambient air	phi ₀ = 50°–65° ¹	phi ₀ = 50°–65° ¹	phi ₁₀₀ = 55°–71° ¹	phi ₀ = 65°–85° ¹
Design features				
Temperature compensation	automatic with built-in RTD			
Cable connection				
– analog	VP6	VP6	–	–
– digital	VP8	VP8	Data cable 5 pin	Data cable 5 pin
Wetted O-rings	EPDM, FDA approved	EPDM, FDA approved	EPDM, FDA approved	EPDM, FDA approved
O ₂ selective membrane material	PTFE/Silicone	PTFE/Silicone	Silicone	Silicone
Wetted sensor parts	PTFE	PTFE S/steel 1.4404, [AISI 316L] with material certificate 3.1	Silicone	Silicone
Surface roughness of wetted stainless steel parts (EN 1320: 1996)	N5 (R _a < 0.4 µm / < 16 µin)			
Communication	RS 485 (ISM) RS 485 Modbus RTU nA or mA 22 kOhm	RS 485 (ISM) RS 485 Modbus RTU nA or mA 22 kOhm	RS 485 (ISM) – – –	RS 485 (ISM) – – –
Certificates				
Quality Certificate (final inspection)	•	•	•	•
EHEDG	–	–	–	–
FDA	•	•	•	•
USP Class VI	•	•	–	–
Material Certificate 3.1	•	•	•	•
Surface Finish Certificate 2.1	•	•	•	•
ATEX	•	•	–	–

¹ Phase of the fluorescence

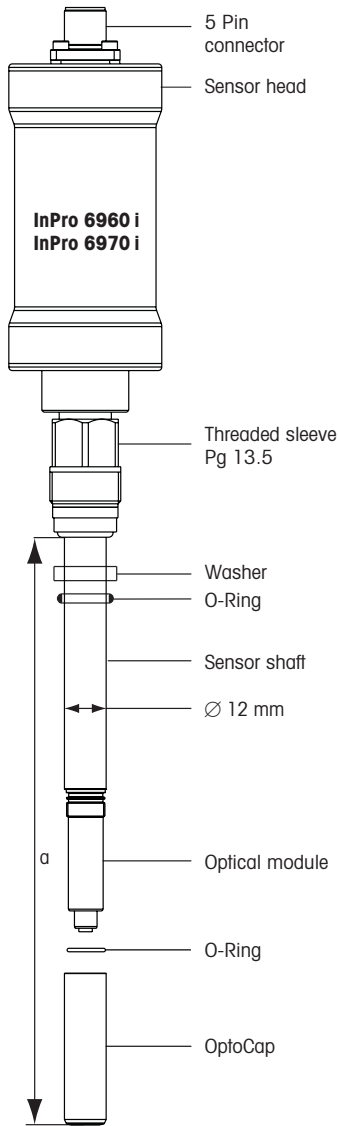
Drawings amperometric sensors



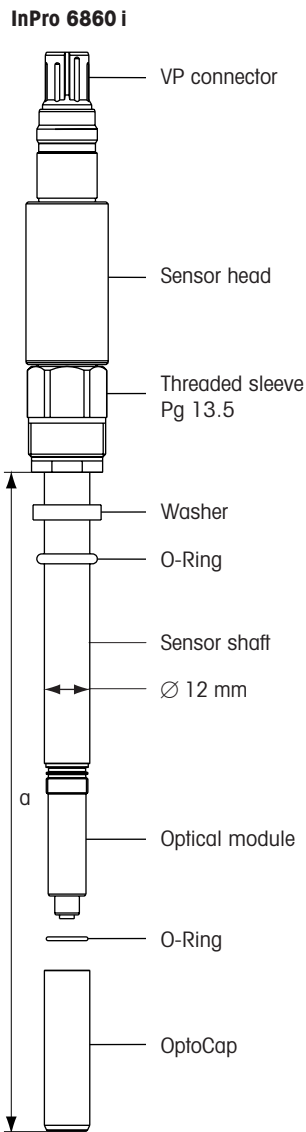
12 mm Sensor
InPro 6800
InPro 6850 i
InPro 6900 (i)
InPro 6950 i

25 mm Sensor
InPro 6800
InPro 6850 i

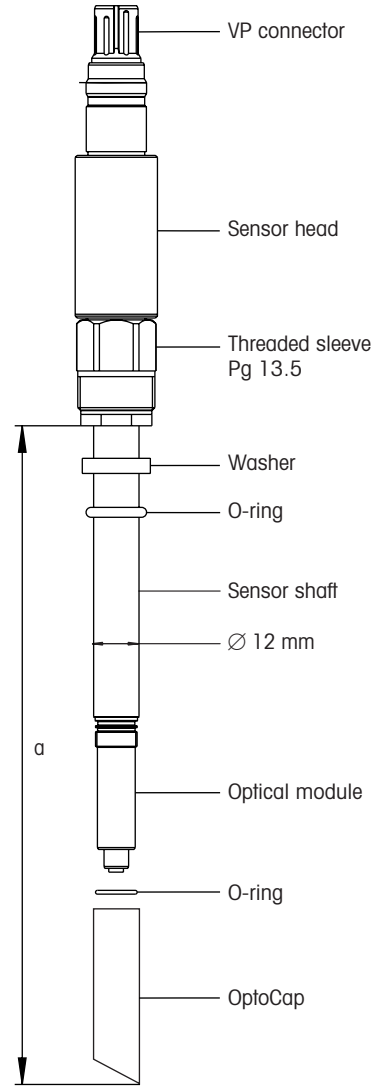
Drawings optical sensors



12 mm Sensor
InPro 6960 i
InPro 6970 i



12 mm Sensor
InPro 6860 i





12 mm Sensor
InPro 6860 i HD


Ordering information


Amperometric sensors	InPro 6800, 12 mm Ø	Order no.	Order no.	Order no.	Order no.
		VP connector		T82 connector	
Immersion length (a)		straight	angled	straight	angled
70 mm (2.8")		52 200 964	52 200 969	–	–
80 mm (3.2")		–	–	–	–
120 mm (4.7")		52 200 965	52 200 970	52 201 012	52 201 016
220 mm (8.7")		52 200 966	52 200 971	52 201 013	52 201 017
320 mm (12.6")		52 200 967	52 200 972	52 201 014	52 201 018
420 mm (16.5")		52 200 968	52 200 973	52 201 015	52 201 019
	InPro 6800, 25 mm Ø				
		VP connector		T82 connector	
Immersion length (a)		straight	angled	straight	angled
80 mm (3.2")		52 200 974	52 200 978	52 201 020	52 201 023
160 mm (6.3")		52 200 975	52 200 979	52 201 021	52 201 024
260 mm (10.2")		52 200 976	52 200 980	52 201 022	52 201 025
360 mm (14.2")		52 200 977	52 200 981	–	–
	InPro 6850 i				
Immersion length (a)	12 mm Ø		Immersion length (a)	25 mm Ø	
70 mm (2.8")		52 206 118	80 mm (3.2")		52 206 123
120 mm (4.7")		52 206 119	160 mm (6.3")		52 206 124
220 mm (8.7")		52 206 120	260 mm (10.2")		52 206 125
320 mm (12.6")		52 206 121	360 mm (14.2")		52 206 126
420 mm (16.5")		52 206 122			
	InPro 6900, 12 mm Ø			InPro 6900 i, 12 mm Ø	
		VP connector		AK9 connector	
Immersion length (a)		straight	angled		
70 mm (2.8")		52 200 944	52 200 947		52 206 316
120 mm (4.7")		52 200 945	52 200 948		52 206 317
220 mm (8.7")		52 200 946	52 200 949		52 206 318
320 mm (12.6")		–	–		52 206 319
	Version with Varivent flange				
InPro 6900/12/060 V80		52 200 951	–		
	InPro 6950 i, 12 mm Ø				
		AK9 connector			
Immersion length (a)					
70 mm (2.8")					52 206 127
120 mm (4.7")					52 206 128
220 mm (8.7")					52 206 129
320 mm (12.6")					52 206 130
	Optical sensors				
	for Biopharma				
	12 mm Ø	InPro 6860 i nA	InPro 6860 i mA Ex	InPro 6860 i HD nA	InPro 6860 i HD mA Ex
Immersion length (a)					
120 mm (4.7")		30 014 100	30 129 734	30 449 703	30 449 705
220 mm (8.7")		30 014 101	30 129 735	30 449 704	30 449 706
320 mm (12.6")		30 014 102	30 129 736	30 526 901	30 526 900
420 mm (16.5")		30 014 103	30 129 737	30 526 902	30 532 157
590 mm (23.2")		–	–	30 526 903	–
	for Food & Beverage				
	12 mm Ø	InPro 6960 i	InPro 6970 i		
Immersion length (a)					
120 mm (4.7")		52 206 500	52 206 393		
220 mm (8.7")		52 206 501	52 206 394		
320 mm (12.6")		52 206 502	52 206 395		

Spare parts amperometric sensors


		InPro 6950 (i)	Order no.
Inner body  InPro 6950 (i) InPro 6800		Membrane body InPro 6950 (single unit)	52 206 105
		Membrane kit InPro 6950 (4 membrane bodies, 1 O-ring set, 2 × 5 ml electrolyte)	52 206 106
		InPro 6950 electrolyte pack (3 × 5 ml)	30 298 426
		Inner body InPro 6950 (exchangeable)	52 206 112


		InPro 6900 (i)	
Membrane body  T-6900 R T-96		Membrane body T-6900 (single unit)	52 201 049
		Membrane kit T-6900 (4 membrane bodies, 1 O-ring set, 2 × 5 ml electrolyte)	52 201 003
		Reinforced membrane body T-6900R (single unit)	52 201 108
		Reinforced membrane kit T-6900R (4 reinforced membrane bodies, 1 O-ring set, 2 × 5 ml electrolyte)	52 201 109
		InPro 6900 electrolyte pack (3 × 5 ml)	30 298 425
		Inner body InPro 6900 (exchangeable)	52 200 943

		InPro 6950 (i)/6900 (i)/6800/6850 i	
Cap sleeve  P type N type		Cap sleeve N type, stainless steel 1.4404 (AISI 316L)	52 200 037
		Cap sleeve N type, stainless steel 1.4435 (AISI 316L)	52 201 153
		Cap sleeve P type, stainless steel 1.4404 (AISI 316L)	52 200 038
		Cap sleeve P type, stainless steel 1.4435 (AISI 316L)	52 201 154

		InPro 6800/6850 i	
Cap sleeve  P type N type		Membrane body T-96 (single unit)	52 200 071
		Membrane kit T-96 (4 membrane bodies, 1 O-ring set, 25 ml electrolyte)	52 200 024
		Membrane body S-96 (single unit)	52 200 072
		Membrane kit S-96 (4 membrane bodies, 1 O-ring set, 25 ml electrolyte)	52 200 025
		O ₂ electrolyte pack (3 × 25 ml)	30 298 424
		Inner body InPro 6800 (exchangeable)	52 200 899
		Inner body InPro 6850 i (exchangeable)	52 206 347

Spare parts optical sensors

		InPro 6860 i/6860 i HD	
OptoCap  InPro 6860 i InPro 6970 i InPro 6960 i InPro 6860 i HD		OptoCap BT 01 (InPro 6870 i)	52 206 225
		OptoCap BT 02T (InPro 6860 i) incl. O-ring	30 018 857
		Anti-bubble™ OptoCap BT 02THD	30 302 172
		O-ring set (InPro 6870 i)	52 206 252
		Cap sleeve, stainless steel 1.4404 (AISI 316L)	52 206 232

		InPro 6960 i/6970 i	
OptoCap  InPro 6860 i InPro 6970 i InPro 6960 i InPro 6860 i HD		OptoCap BW 01 (InPro 6960 i)	52 206 509
		OptoCap BR 01 (InPro 6970 i)	52 206 403
		O-ring set	52 206 252
		Cap sleeve, stainless steel 1.4404 (AISI 316L)	52 206 232

Accessories amperometric sensors

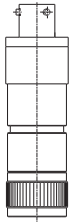


O₂ sensor master

The sensor master serves to polarize the connected sensor in air as well as to check functioning of the sensor. Perfect operation of the sensor master can also be verified through a self-check procedure.

O₂ sensor simulator

The sensor simulator is used to perform a function check of transmitter and cable. It simulates the behavior of the sensor in air and in an oxygen-free medium. This device can be used to simulate all amperometric analog O₂ sensors.



Adapter T-82 bushing/VP connector, order no. 52 200 939



Adapter VP bushing/T-82 connector, order no. 52 200 940

Sensor	Order no.
O ₂ sensor master InPro 6950	52 206 113
O ₂ sensor master InPro 6900	52 200 893
O ₂ sensor master InPro 6800	52 200 892
O ₂ sensor master ISM	52 206 329
O ₂ sensor simulator	52 200 891
Zeroing gel for zero-point control (amperometric sensors only) 3 × 30 ml	30 300 435
Adapter T-82 bushing/VP connector	52 200 939
Adapter VP bushing/T-82 connector	52 200 940
Retrofit kit optical	52 403 811
VP cable	Order no.
Temperature range -30 ... 80 °C / -22 ... 176 °F	Temperature range -30 ... 130 °C / -22 ... 266 °F
VP6-ST/1 m	52 300 107
VP6-ST/3 m	52 300 108
VP6-ST/5 m	52 300 109
VP6-ST/10 m	52 300 110
VP6-ST/15 m	52 300 144
VP6-ST/35 m	52 300 184
VP6-HT/1 m	52 300 111
VP6-HT/3 m	52 300 112
VP6-HT/5 m	52 300 113
VP6-HT/10 m	52 300 114
VP6-HT/15 m	52 300 237
AK9 coax cables with K8S connector	Order no.
1 m (3.3 ft)	59 902 167
3 m (9.8 ft)	59 902 193
5 m (16.4 ft)	59 902 213
10 m (32.8 ft)	59 902 230
20 m (65.6 ft)	52 300 204

Accessories optical sensors

M12 5-pin data cable (6960 i/6970 i)			
Temperature range -30 ... 80 °C / -22 ... 176 °F			
	Order no.		Order no.
2 m (6.6 ft)	52 300 379	15 m (49.2 ft)	52 300 422
5 m (16.4 ft)	52 300 380	25 m (82.0 ft)	52 300 529
10 m (32.8 ft)	52 300 381	50 m (164.0 ft)	52 300 530
VP cable (InPro 6860 i)	Order no.		Order no.
Temperature range -30 ... 80 °C / -22 ... 176 °F	Temperature range -30 ... 130 °C / -22 ... 266 °F		
VP8-ST/1 m	52 300 353	VP8-HT/1 m	52 300 360
VP8-ST/3 m	52 300 354	VP8-HT/3 m	52 300 361
VP8-ST/5 m	52 300 355	VP8-HT/5 m	52 300 362
VP8-ST/10 m	52 300 356	VP8-HT/10 m	52 300 363
VP8-ST/15 m	52 300 357	VP8-HT/15 m	52 300 364
VP8-ST/20 m	52 300 358		
VP8-ST/35 m	52 300 359		
Power Supply/Power Adapters	Order no.		
Power supply for InPro 6860 i	30 014 119		
Power adapter ODO T82	30 083 984		
Power adapter ODO VP6	30 083 985		
Ex i power supply 9143/10-244-060-20s	30 215 910		
Signal converter 4/20 Hart (active/passive)	30 212 436		

Accessories amperometric & optical sensors



CalBox

Designation	Order no.
iSense	30 130 614
iSense CFR	30 283 620
CalBox incl. temperature sensor	52 300 400
iLink RS485	52 300 399
iLink RS485 – VP (InPro 6860 i)	30 014 134
iLink Multi incl. humidity and pressure compensation	30 130 631
Cable set iLink Multi oDO (RS485)	30 355 582

Compatibility with METTLER TOLEDO transmitters for amperometric sensors

Please ask your local METTLER TOLEDO sales representative.

	InPro 6950 i	InPro 6900 (i)	InPro 6800 InPro 6850 i
M700	• (4700 i traces)	• (4700 i ppb)	• (4700 i)
M300 1/2-channel(s)	–	–	•
M400 PA, FF, 2-wire HART, 4-wire HART	•	•	•
M800 ¹	•	•	•

¹ ISM sensors only

Compatibility with METTLER TOLEDO housings for amperometric sensors

Please ask your local METTLER TOLEDO sales representative.

Static housings	12 mm Ø	25 mm Ø
INGOLD "safety weld-in socket"	–	•
InFit 761 series	•	–
Retractable housing		
InTrac 777 e	•	–
InTrac 797 e	•	–
Immersion housing		
InDip 550	•	–

Compatibility with METTLER TOLEDO transmitters for optical sensors

Please ask your local METTLER TOLEDO sales representative.

	InPro 6860 i InPro 6860 i HD	InPro 6960 i InPro 6970 i
M100 SM	•	–
M400	•	•
M700	(nA)	–
M800	•	•

Compatibility with METTLER TOLEDO housings for optical sensors

Please ask your local METTLER TOLEDO sales representative.

Static housings	InPro 6860 i	InPro 6860 i HD	InPro 6960 i InPro 6970 i
InFit 761 series	•	•	•
Retractable housing			
InTrac 777 e	•	–	•
InTrac 797 e	•	–	•
InTrac 781	•	–	–
Immersion housing			
InDip 550	•	–	–
Conversion kit			
Retrofit kit optical	–	–	•

For addresses of METTLER TOLEDO
Market Organizations please go to:
www.mt.com/pro-MOs



Management System
certified according to
ISO 9001/ISO 14001



Subject to technical changes.
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