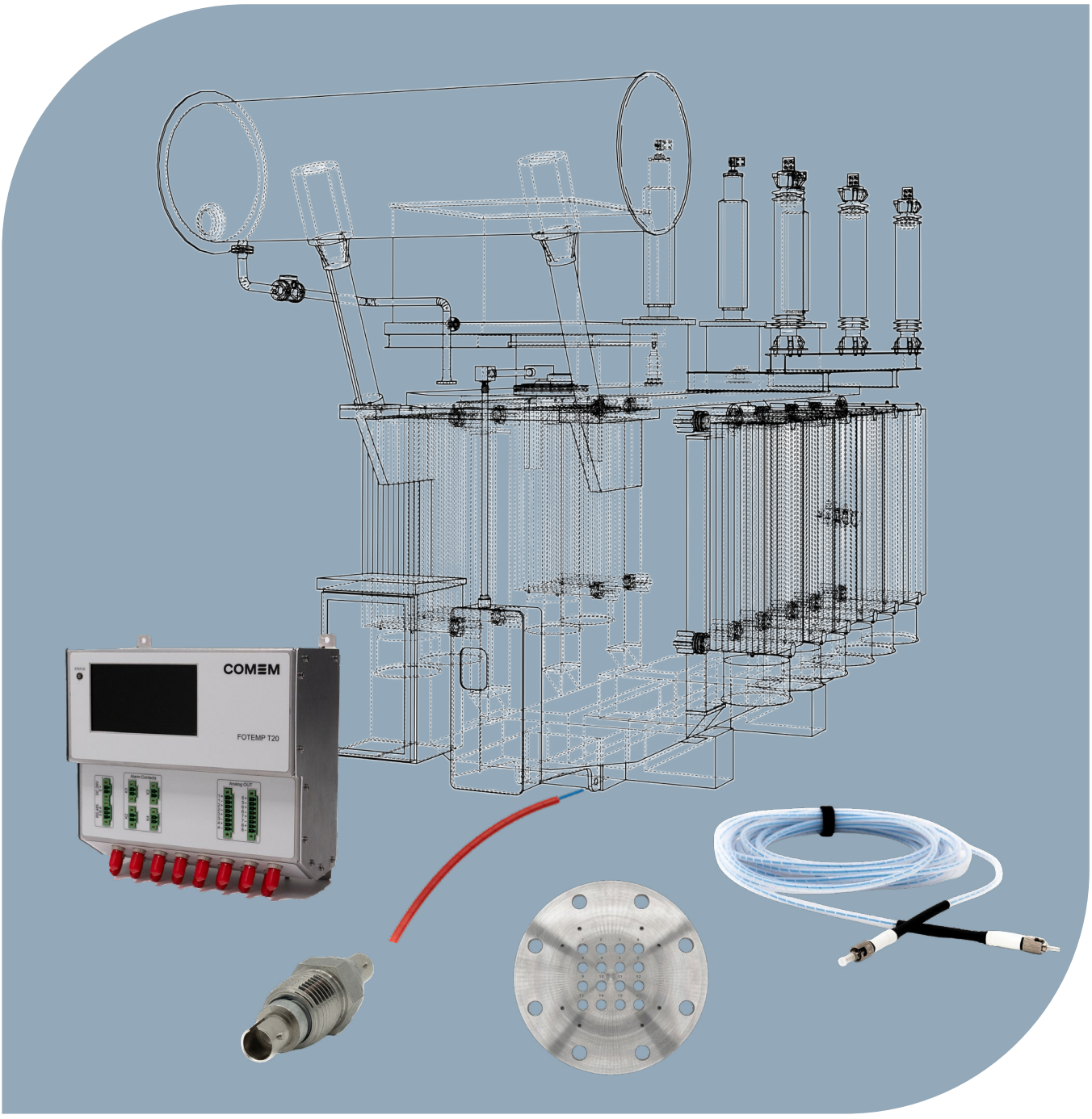
TECHNICAL GUIDE

Fiber optic hot spot monitoring for transformers



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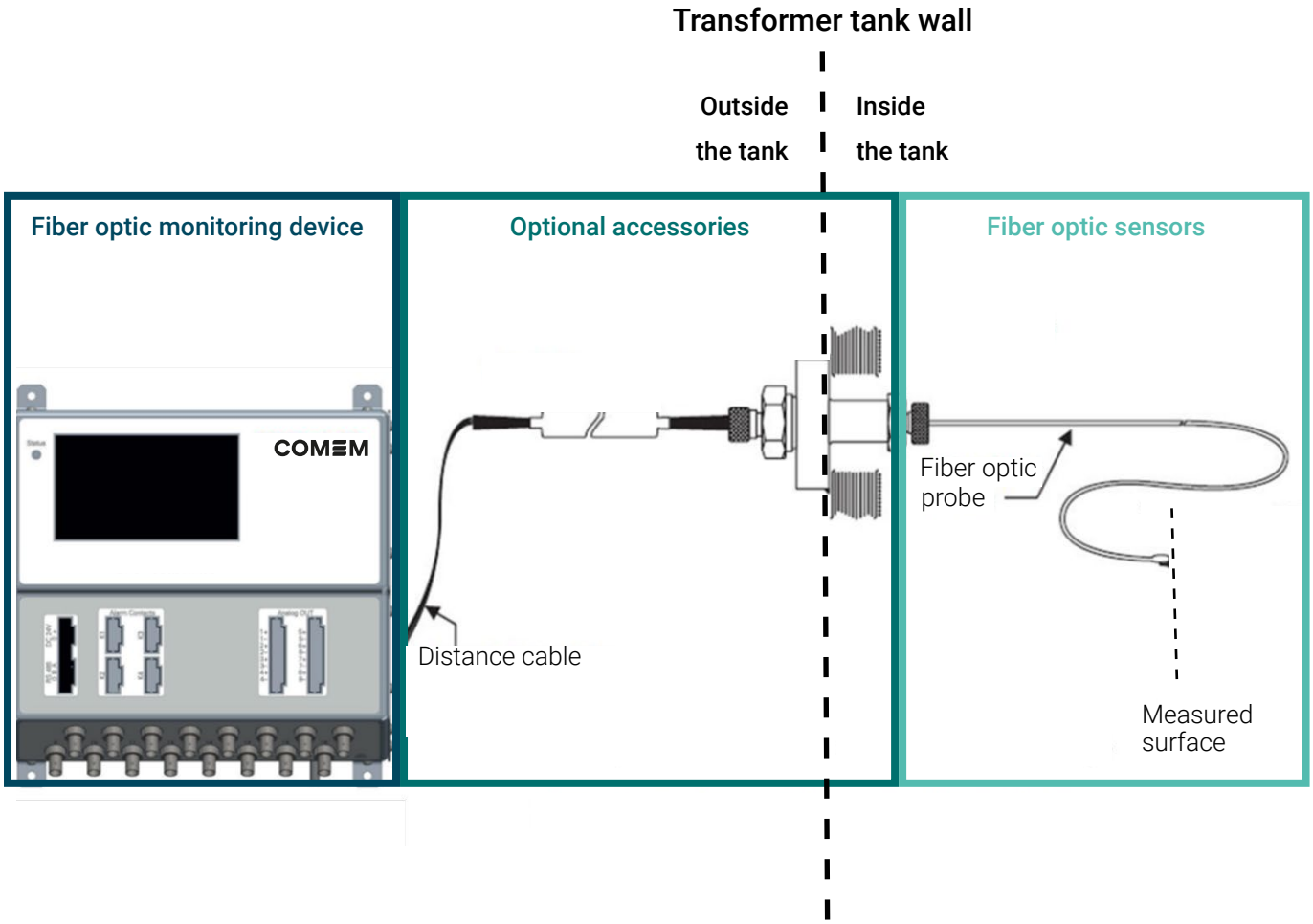
Fiber optic hot-spot monitoring system overview



What do you need to build up the right fiber optic system for precise, continuous hot-spot temperature monitoring?

1. Fiber optic monitoring device suitable for your application
2. Fiber optic sensors
3. Accessories needed for the installation

COMEM is an ISO 9001 system certified. Information subject to change without notice

Technical data

Fiber optic monitoring devices

	FOTEMP HD20	FOTEMP T20	FOTEMP T30
Number of channels	1, 2	2 to 16	2 to 16
Modules	NO	NO	4x up to 4 channel
Measuring range	-200°C to 300 °C	-200°C to 300 °C	-200°C to 300 °C
Accuracy	± 0.2 K	± 1 K	± 1 K
Sample rate channel	250 ms	250 ms	250 ms
Display	3.5" LCD	4.3” LCD	7" LCD
Analog output	NO	0 - 10 V or 4 - 20 mA	0 - 10 V or 4 - 20 mA
Relay	NO	2 programmable relays, 1 sensor fault, 1 watchdog	16 free programmable relays
Interface	USB, reference sensor	RS485, USB, Ethernet	RS485, Ethernet, RS232 (debug)
Available protocols	ASCII	ASCII, Modbus RTU	Modbus RTU, Modbus ETH DNP3.0, IEC61850, IEC 60870-104
Data logging	Continuous or timed temperature logging, spectrum snapshots	Continuous or time logging on microSD	Continuous, and time logging, 32 GB
Power supply	12 VDC	24 VDC	24 VDC
Mounting / Housing options	NO	DIN rail mounting bracket	DIN rail, and standard mounting brackets
Connector type	ST	ST	ST

Fiber optic sensor

	TST
Key features	Probe without air inclusions, designed for transformers
Long-term temperature range	-200°C to +260°C
Short-term temperature range	+260°C to +300°C
Accuracy	± 1 K
Thermal response	3 K/s
Fiber diameter	200µm
Cable coating	PTFE
Connector type	ST
Optional	J-Spacer (Nomex or Peek)

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Accessories

Feedthrough DF1 - NPT 1/4"

Temperature range	From -40°C to +120°C
Pressure	Max. 200 bar
Thread size	¼" NPT
Thread angle	60°
Connector type	ST
Probes	Compatible with all COMEM fiber optic sensors

Feedthrough DF5 - Metric M14

Temperature range	From -40°C to +120°C
Pressure	Max. 2 bar
Thread size	M14 X 1.5
Thread angle	60°
Connector type	ST
Probes	Compatible with all COMEM fiber optic sensors

These optical feedthroughs are specifically designed for installation on tank walls and oil transformers.
They have a leak-proof interface and require no maintenance.
There are no moving parts or loose optical cables.

Tank Wall Plate & J-Box

Material	Stainless steel
Number of feedthroughs	1 - 16
Mounting	Welded or screwed on tank wall
Probes	Compatible with all COMEM fiber optic sensors

Distance cable

Temperature range	From -40°C to +85°C
Fiber Ø	200 um
Sensor lengths	2 m up to 20 m (PTFE or PVC) (up to 30 m with PVC)
Connector type	ST with metallic ferrule (-40°C to 85°C)
Signal conditioner	Compatible with all COMEM fiber optic sensors

Distance cable - multiwire

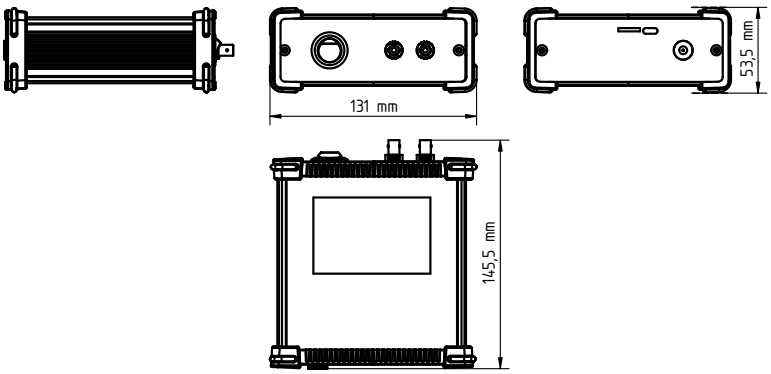
Inner material	PVC
	PE
Acount PCF-Elements (200/230)	6
Min. bending radius (short term)	100 mm
Min. bending radius (long term)	120 mm
Max. load (short term)	1200 N
Max. load (long term)	1000 N
Operating temperature	From -40°C to +70°C

J-spacer & disk-spacer

Probe dimensions	J-Spacer & Disk-spacer
Material	Nomex
Dimensions	Customized dimensions available upon request

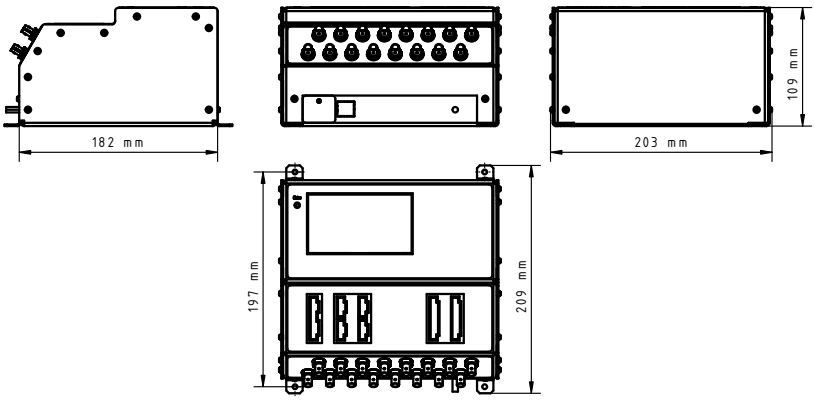
Dimensions

FOTEMP HD20



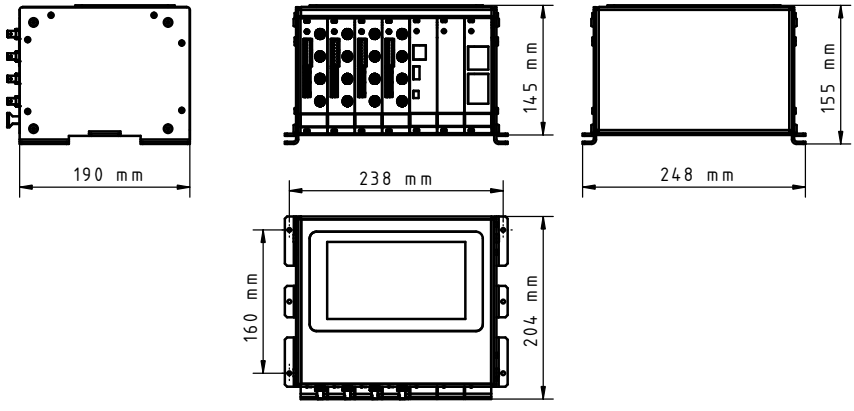
Width (mm)	Height (mm)	Depth (mm)	Weight (Kg)
131	145,5	53,5	0.6

FOTEMP T20



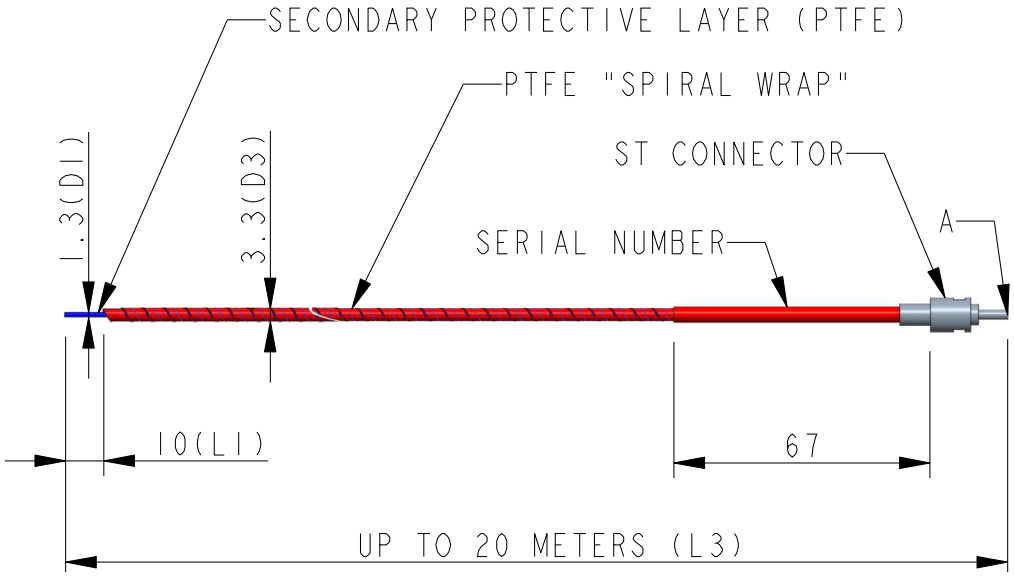
Width (mm)	Height (mm)	Depth (mm)	Weight (Kg)
203	209	109	2.0

FOTEMP T30



Width (mm)	Height (mm)	Depth (mm)	Weight (Kg)
248	204	155	2.0

TST



Probe dimensions	D1	1.3 mm
	D3	3.3 mm
Dimensions *	L1	10 mm
Other lenghts on request	L3	1 - 12 m

* 3m standard, other lengths on customer request up to 20 m

Service & Calibration

Re-calibration is typically not necessary throughout the entire lifespan of the fiber optic temperature measurement system.
However, if specific needs arise, we offer comprehensive calibration services for our products to ensure accurate temperature measurements.
Our laboratory is equipped with the latest technology and staffed by qualified professionals to guarantee that your device will be highly accurate, returned to specification and put back into service in the shortest time possible.

You will receive your calibrated or serviced devices along with a full compliance certificate and a copy of the test results.

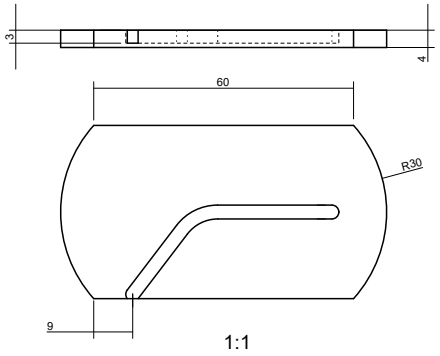
The COMEM devices are also compatible with other 200-micron fibers from different manufacturers. However, we must recalibrate our device to produce reliable and accurate measurements with a different sensor. Each channel on a device is calibrated to a specific sensor.

For assistance please contact us.

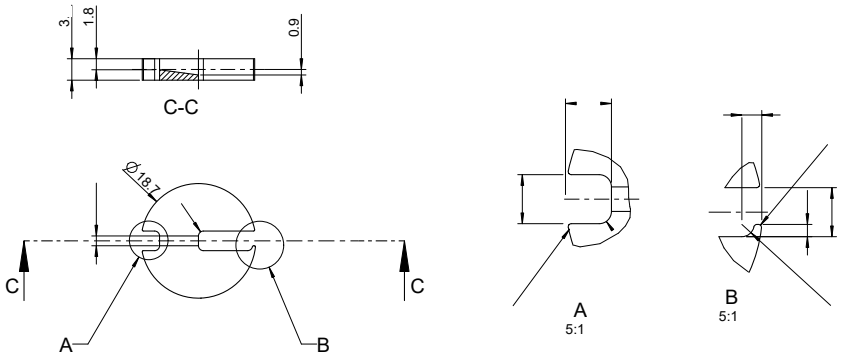
Dimensions

Accessories

J-spacer
(customized dimensions available upon request)

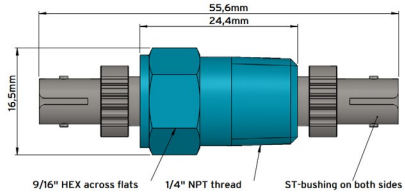


Disk-spacer
(customized dimensions available upon request)

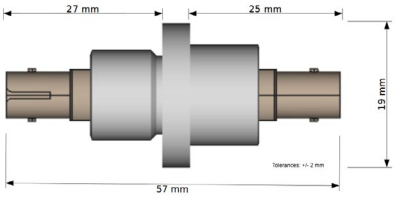


Feedthroughs

Feedthrough DF1-NPT 1/4"



Feedthrough DF5 -METRIC M14



Distance cable

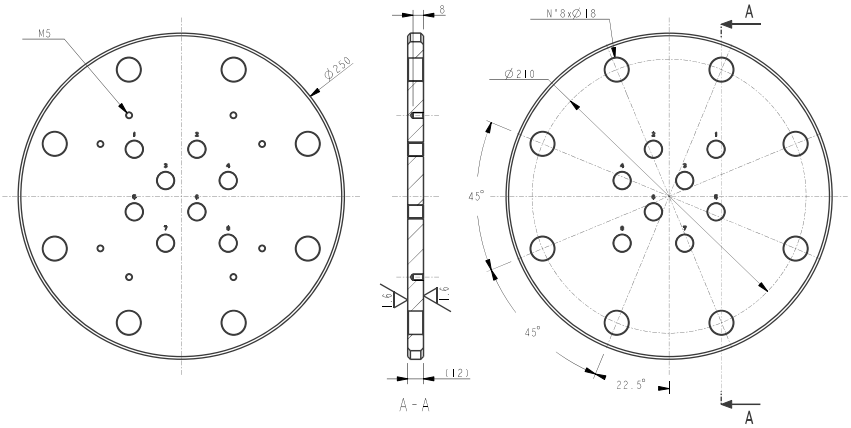
Fiber ø	200 µm
Sensor standard lenghts	2 m up to 20 m (up to 30 m with PVC)

Multiwire distance cable FO - DC6

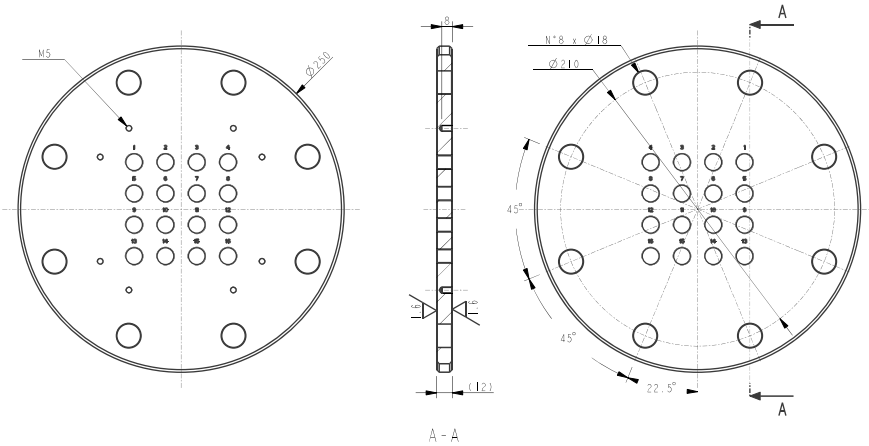
Wire-ø (mm)	3.5 mm
External-ø (mm)	7.5 mm
Min. blending radius (short term)	100 mm
Min. blending radius (long term)	120 mm
Weight	ca. 80 kg/km

Tank Wall Plate (TWP)

TWP 8 channels



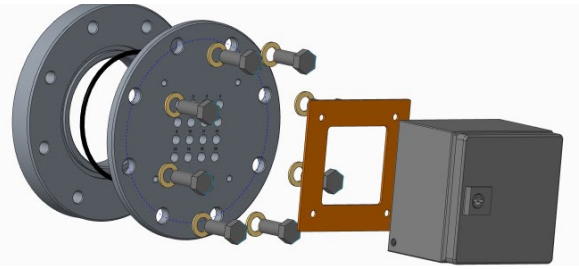
TWP 16 channels



Tank Wall Plate kit (TWP + J-Box)

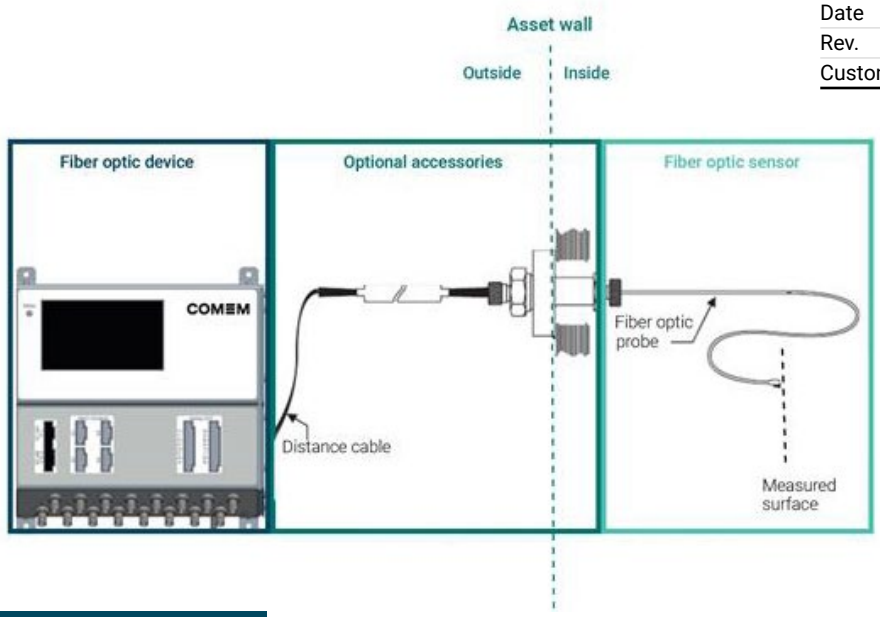
- Preassembled kit
- 24-hour leakage-tested

Tank wall plate	R: 125 mm L: 30 mm
J-Box	156x156x164,5 mm



Order sheet

Date	
Rev.	
Customer reference	



Fiber optic monitoring devices

Device type (see page 5 & 6)

FOTEMP HD20	
FOTEMP T20	
FOTEMP T30	

Channels (see page 6)

1	
2	
4	
6	
8	
10	
12	
14	
16	

Temperature calibration

From -20°C to +150°C (Standard)	
From -40°C to +200°C	
Special request (Please specify)	

Selectable communication protocols (see page 6)

Reference sensor (for FOTEMP HD20)	
Modbus RTU over IP (for FOTEMP T20/ standard for FOTEMP T30)	
DNP3 (for FOTEMP T30)	
IEC61850 (for FOTEMP T30)	
IEC60870-104 (for FOTEMP T30)	

Analog output signal (see page 6)

4 – 20 mA (Standard)	
0 - 10 V (for FOTEMP T20)	

Power supply 110 - 220 VAC

24 VDC (Standard)	
NO power supply requested	

Mounting

No (Standard)	
Inside IP65 standalone box (S-box)	

Order sheet

Fiber optic sensors

Sensor (see page 7)		Quantity
TST		

Sensor lenghts	
3 m (Standard)	
Other lenghts from 3 up to 20 m (Upon request)	

Accessories

Spacers		Quantity
Disk-Spacer (Nomex, standard)		
J-Spacer (Nomex, optional)		
Special request (Please specify)		

Feedthroughs		Quantity
Feedthrough DF-1-NPT 1/4” (COMEM standard)		
Feedthrough DF5 - metric M14		

TWP for Transformer applications		Quantity
TWP 8 (1 - 8 Feedthroughs)		
TWP 16 (1 - 16 Feedthoughs)		

J-box OR material	
NBR (from -40°C up to +120°C) (Standard)	
Viton (from -10°C up to +150°C)	
Fluorosilicon (from -60°C up to +200°C)	

Distance cables	Length	Quantity
PTFE coating*		
PVC coating (Standard)**		
Spiral wrap with PTFE coating**		
Multiwire distance cable F0-DC6**		

Note: * Length from 3 m upto 20 m is available upon request.
** Length from 5 m upto 30 m is available upon request.

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