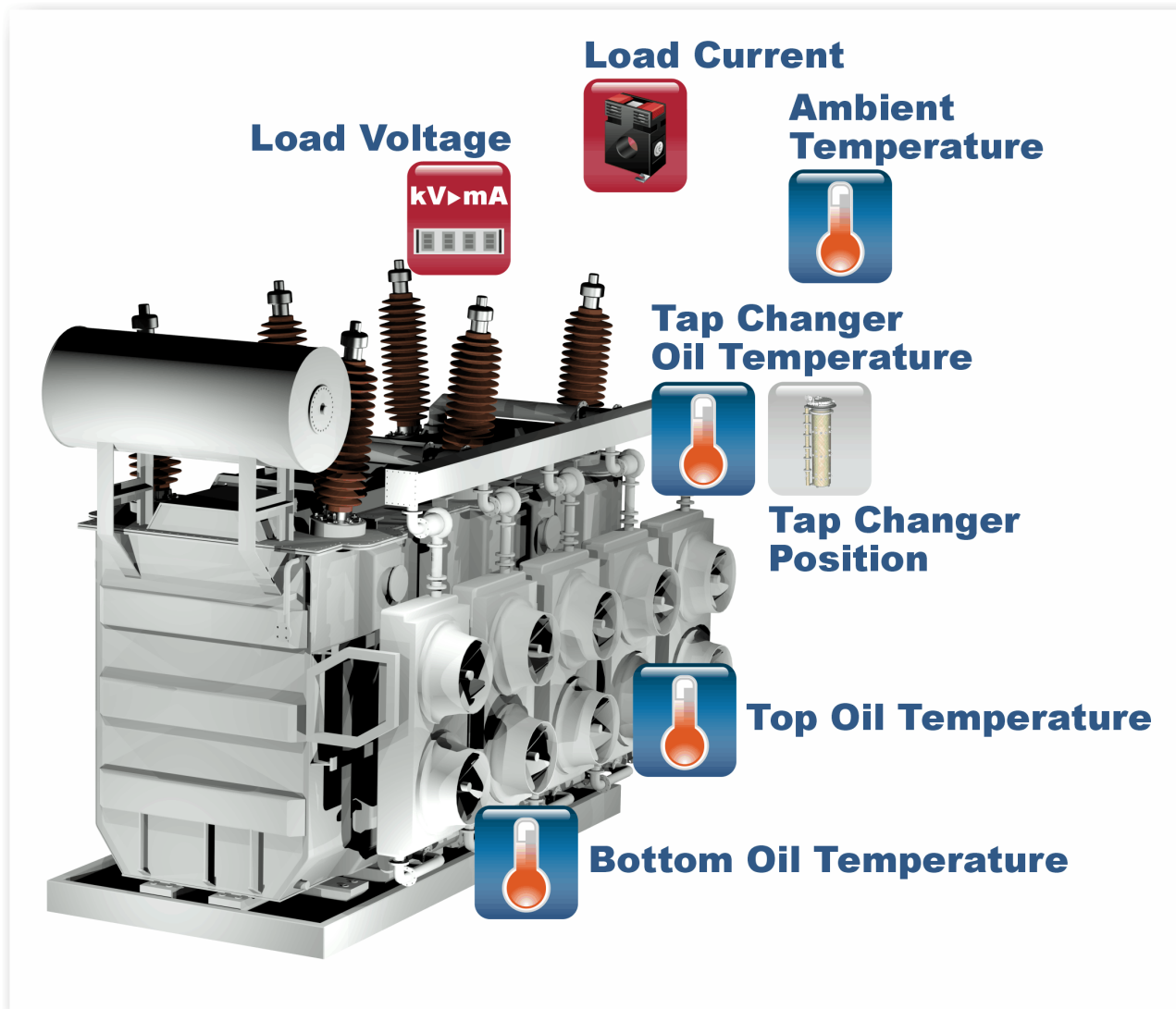


HYDROCAL MS-7

On-line Transformer Monitoring Extension Package



Thermal condition monitoring is one of the most important ways to detect transformer problems and to avoid transformer outages.

That's why MTE has addressed this issue and presents a selection of the most important indicators which are required for thermal condition monitoring.

The HYDROCAL MS-7, which is an extension package of the MTE HYDROCAL product line, is providing all these important information.

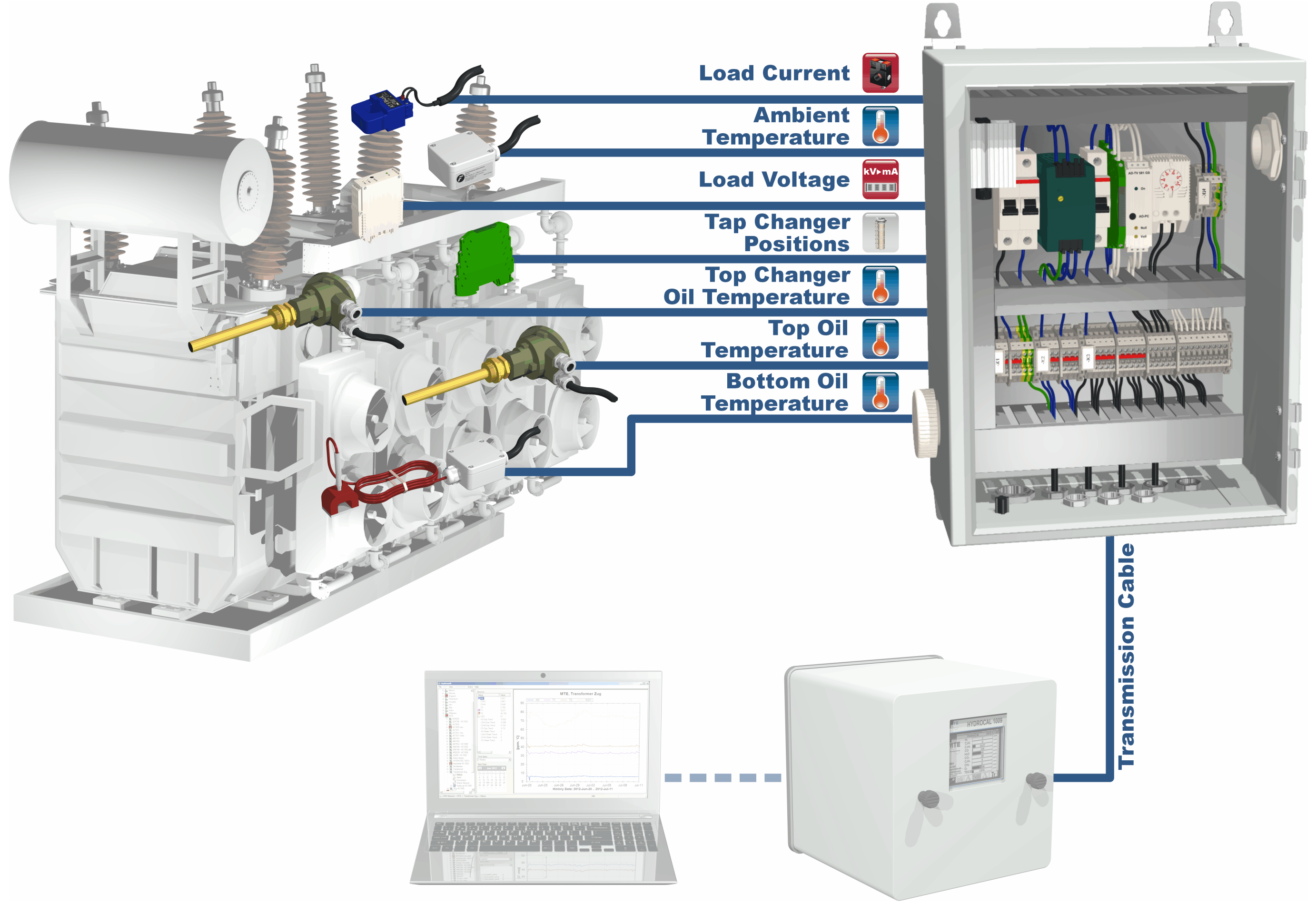
This innovative solution measures 3 oil temperatures (top oil, bottom oil & tap changer oil), ambient temperature, load current, load voltage and the tap changer position. These measurements are centralized and passed over to its analog outputs:

- 7 analog outputs 4 ... 20 mA

The analog outputs of HYDROCAL MS-7 are directly connectable to the analog inputs of HYDROCAL 1003, 1005¹, 1008¹ or 1009¹ units and in conjunction with these units it offers a complete transformer monitoring system in one package.

Key Advantages

- Complete on-line transformer monitoring extension package including cabinet, cable glands, power supply, circuit breakers, terminal connectors, anti condensation heater & thermostatic sensor, wiring, measurement sensors, measurement transducers, connection cable, transmission cable and wiring diagram
- Individual measurement of top oil temperature, bottom oil temperature, ambient temperature, tap changer oil temperature, tap changer position, load current and load voltage
- Transmission interface with 7 analog outputs 4 ... 20 mA
- Direct integration into HYDROCAL 1003, 1005¹, 1008¹ and HYDROTAP¹) hardware, firmware and software
- All information provided to use the HYDROCAL standard functions hot-spot calculation, aging rate and loss-of-life according IEC 60067-7
- Prewired transmission cable on cabinet side – 10 m
- Connection cable (one single piece) for individual wiring of sensors / transducer



Load Current



Ambient Temperature



Load Voltage



Tap Changer Positions



Top Changer Oil Temperature



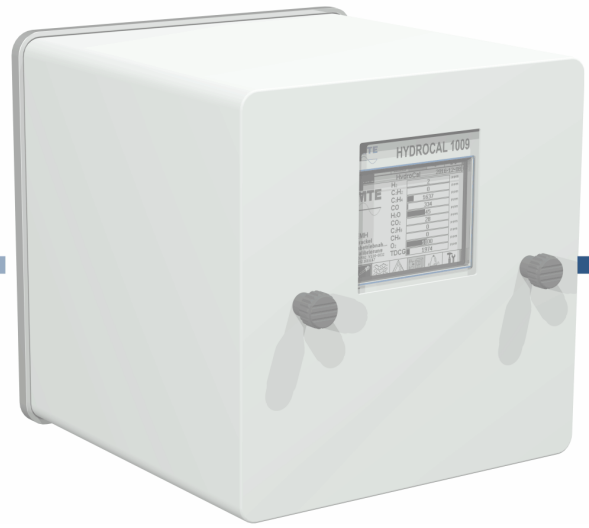
Top Oil Temperature



Bottom Oil Temperature



Transmission Cable



Technical data HYDROCAL MS-7

General

Supply voltage:	85 ... 264 V AC / 43 ... 67 Hz or 85 ... 375 V DC
Power consumption:	max. 100 VA
Cabinet:	Mild steel with RAL 7035 structure powder coating
Dimensions:	W 300 x H 400 x D 210 mm
Weight:	approx. 11.5 kg
Operation temperature: (ambient)	-40°C ... +65°C
Storage temperature: (ambient)	-40°C ... +65°C
Degree of protection:	IP-65

Measurements

Measurement		Accuracy ²⁾
Measuring quantity	Range	
Top oil temperature	-20 ... +140 °C	± 1.5 % ± 0.2 °C
Tap changer oil temperature	-20 ... +140 °C	± 1.5 % ± 0.2 °C
Bottom oil temperature	-20 ... +120 °C	± 1.5 % ± 0.2 °C
Ambient temperature	-20 ... +120 °C	± 3.0 % ± 0.2 °C
Load current	0 ... 5 A	± 1.5 % ± 0.2 mA
Tap changer position	0 ... 100 Ω / 0 ... 100 kΩ	
Load voltage	0 ... 250 V AC / 0 ... 450 V AC	± 0.5 %

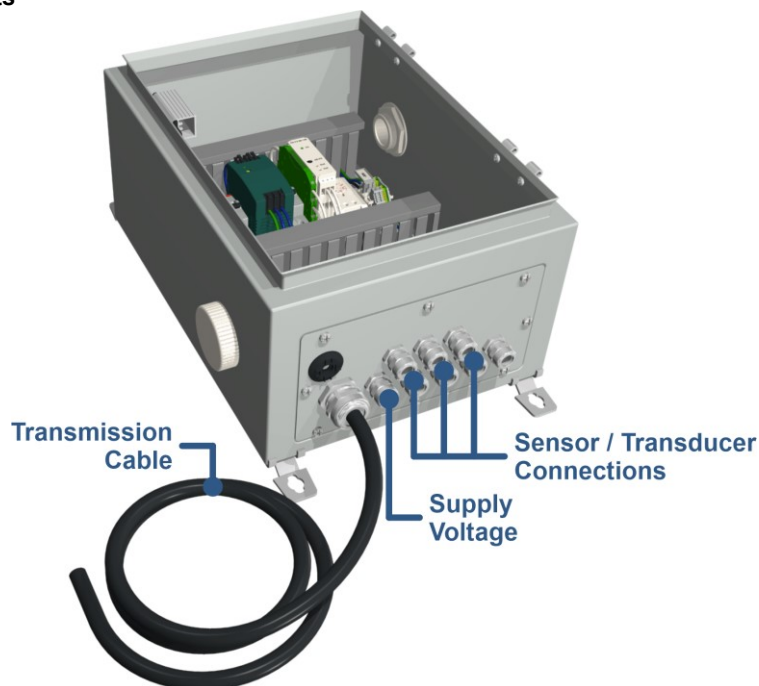
Operation principle

- PT100 temperature sensor for top oil temperature
- PT100 temperature sensor for tap changer oil temperature
- PT100 temperature sensor for bottom oil temperature
- PT100 temperature sensor for ambient temperature
- Split-core transducer for load current
- Potentiometer position transducer for tap changer position
- AC voltage transducer for load voltage

Scope of delivery

- Complete cabinet including cable glands, power supply, circuit-breakers, anti condensation heater and thermostatic sensor, terminal connectors, wiring and wiring diagram
- 2 internal transducers
- 5 external sensors / transducers
- Transmission cable - 10 m (prewired on cabinet side)
(ÖLFLEX® ROBUST 215 C 18G0,75 mm²)
- Sensor / transducer connection cable - 70 m (one single piece)
(ÖLFLEX® CLASSIC 110 CY Black 0,6/1kV 2x0,75 mm²)

Connections and outputs



Analog outputs

Output 1 - Top oil temperature		Sensor model
Type	Range	
1 x Current DC	4 ... 20 mADC	MESKO® Combi Well TT

Output 2 - Tap changer oil temperature		Sensor model
Type	Range	
1 x Current DC	4 ... 20 mADC	MESKO® Combi Well TT

Output 3 - Bottom oil temperature		Sensor model
Type	Range	
1 x Current DC	4 ... 20 mADC	FuehlerSysteme eNET Int. OM4/E-I

Output 4 - Ambient temperature		Sensor model
Type	Range	
1 x Current DC	4 ... 20 mADC	FuehlerSysteme eNET Int. AM1/E-I

Output 5 - Load current		Sensor model
Type	Range	
1 x Current DC	4 ... 20 mADC	LEM AT 5 B420L

Output 6 - Tap changer position		Sensor model
Type	Range	
1 x Current DC	4 ... 20 mADC	PHOENIX CONTACT MINI MCR-SL-R-UI

Output 7 - Load voltage		Sensor model
Type	Range	
1 x Current DC	4 ... 20 mADC	AD Messtechnik AD-TV 591 GS

Communication

- Transmission interface with 7 x analog outputs 4 ... 20 mA

Notes

¹⁾ Analog inputs on HYDROCAL 1005, 1008, 1009 and HYDROTAP units are optional (note on front page)

²⁾ Related to +20°C ambient temperature