

## HYDROCAL BPD

Modular monitoring system for high voltage bushings of power transformers



HYDROCAL BPD is a modular online monitoring system for high voltage bushings. It supports the measurement of voltage and phase angle on the test tap to derive  $\tan\delta$ /PF, bushing capacitance.

HYDROCAL BPD can be combined with other HYDROCAL models, preferably HYDROCAL genX, in order to set up a comprehensive monitoring system.

As per CIGRÉ Working Group A2.37 bushings resp. the lead exit represents the 2<sup>nd</sup> largest group of transformer failure locations (approx. 25%) after the windings (43%) and before the tap changers (23%). Therefore, bushing monitoring can help to reduce those failures. HYDROCAL BPD combined with online DGA performed by the HYDROCAL product family provides the ideal overall transformer monitoring solution.

The measurement of voltage and phase angle on the test tap of high voltage bushings allows to compare  $\tan\delta$ /PF with factory test results for analysing deterioration of the bushings.

### Key Advantages

- Monitoring of capacitance,  $\tan\phi$ /PF of up to six high voltage bushings (1 up to 6 bushings)
- Advanced software (on the unit and via PC) with intuitive operation by 7" color TFT capacitive touchscreen, WLAN and Webserver operation from any smart phone, tablet or notebook PC
- Communication interfaces WiFi, USB or ETHERNET 10/100 Mbit/s
- SD memory of test results, history and diagnostic data of power transformers
- Maintenance free system
- Optional 4G modem with external adhesive antenna
- Optional DNP3 protocol for SCADA connection
- Optional IEC 61850 protocol for SCADA connection



## HYDROCAL BPD Configurations

The modular concept of HYDROCAL BPD allows to select between 1 up to 6 bushings

**HYDROCAL BPD 100**



**HYDROCAL BPD 200**



**HYDROCAL BPD 300**



**HYDROCAL BPD 400**



**HYDROCAL BPD 500**



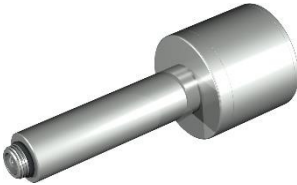
**HYDROCAL BPD 600**



## Bushing sensors

Different designs available according to bushing types and manufacturers

Sensor with thread M16x1.5 long



Sensor with thread M16x1.5 short



Sensor with thread 1/1 8"-12N-UNF



Sensor with thread M33x1.5



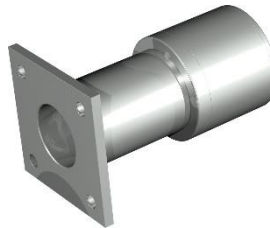
Sensor with thread M24x1.5



Sensor with thread M30x2



Sensor with Flange 70x70 mm



Sensor with thread G3 4"



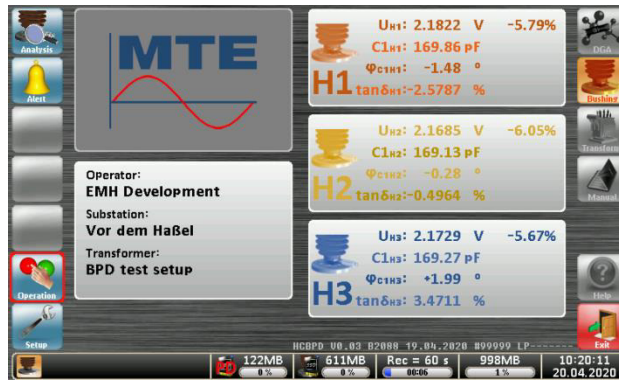
## Software Tool HydroSOFT Hybrid App

**Analysis:** Chart, graph, table, polar and PRPD presentation

**Alert:** Configuration, report, protocol and acknowledgement of alerts

**Operation:** Start, stop, configuration of measurement/recording

**Setup:** Communication, time/date, language and other configurations



**Dissolved Gas Analysis:** Setup, operation, alert functions and modes

**Bushing Monitoring:** Setup, operation, alert functions and modes

**Transformer Monitoring:** Setup, operation, alert functions and modes

**Manual:** Scrolling through/Display of all chapters of the manual

**Help:** Automatic switching to the relevant page of the manual

**Exit:** Closing/Returning to the previous function/step

## Bushing Parameter Configuration Summary

Parameter	C	H1	H2	H3	H4	H5
C	165.00 PF	165.00 PF	165.00 PF	153.00 PF	153.00 PF	153.00 PF
tanδ	0.3200 %	0.3200 %	0.3200 %	0.4100 %	0.4100 %	0.4100 %
Manuf.	TRENCH	TRENCH	TRENCH	ABB	ABB	ABB
Type	COT 1245-1000	COT 1245-1000	COT 1245-1000	Gob550	Gob550	Gob550
Ref.	Ref.U1	Ref.U2	Ref.U3	Ref.U1	Ref.U2	Ref.U3
Uprim.	110.00 k	110.00 k	110.00 k	110.00 k	110.00 k	110.00 k
Usec.	110.00	110.00	110.00	110.00	110.00	110.00
Offset	100.00m	100.00m	100.00m	100.00m	100.00m	100.00m
PD	✓	✓	✓	✓	✓	✓

## U | C | φ | tan δ Measurement

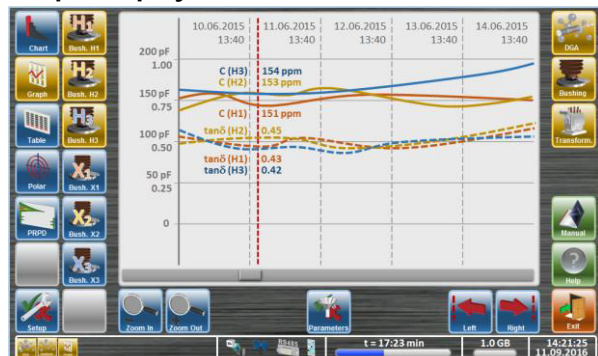
Parameter	Value	Phase Angle
U <sub>H1</sub>	2.45840 V	φ <sub>H1H2</sub> : 120.456 °
U <sub>H2</sub>	2.42981 V	φ <sub>H2H3</sub> : 121.056 °
U <sub>H3</sub>	2.44297 V	φ <sub>H3H1</sub> : 118.488 °
U <sub>X1</sub>	2.45840 V	φ <sub>X1X2</sub> : 120.456 °
U <sub>X2</sub>	2.42981 V	φ <sub>X2X3</sub> : 121.056 °
U <sub>X3</sub>	2.44297 V	φ <sub>X3X1</sub> : 118.488 °
U <sub>1</sub>	57.7493 V	φ <sub>U1H1</sub> : -0.638 °
U <sub>2</sub>	57.6209 V	φ <sub>U2H2</sub> : -0.186 °
U <sub>3</sub>	57.6976 V	φ <sub>U3H3</sub> : 0.773 °
U <sub>12</sub>	99.9142 V	φ <sub>U1X1</sub> : -0.638 °
U <sub>23</sub>	99.8965 V	φ <sub>U2X2</sub> : -0.186 °
U <sub>31</sub>	99.9469 V	φ <sub>U3X3</sub> : -0.773 °

10 s      f: 49.9965 Hz

## Chart Display



## Graph Display





## Technical data HYDROCAL BPD

### General

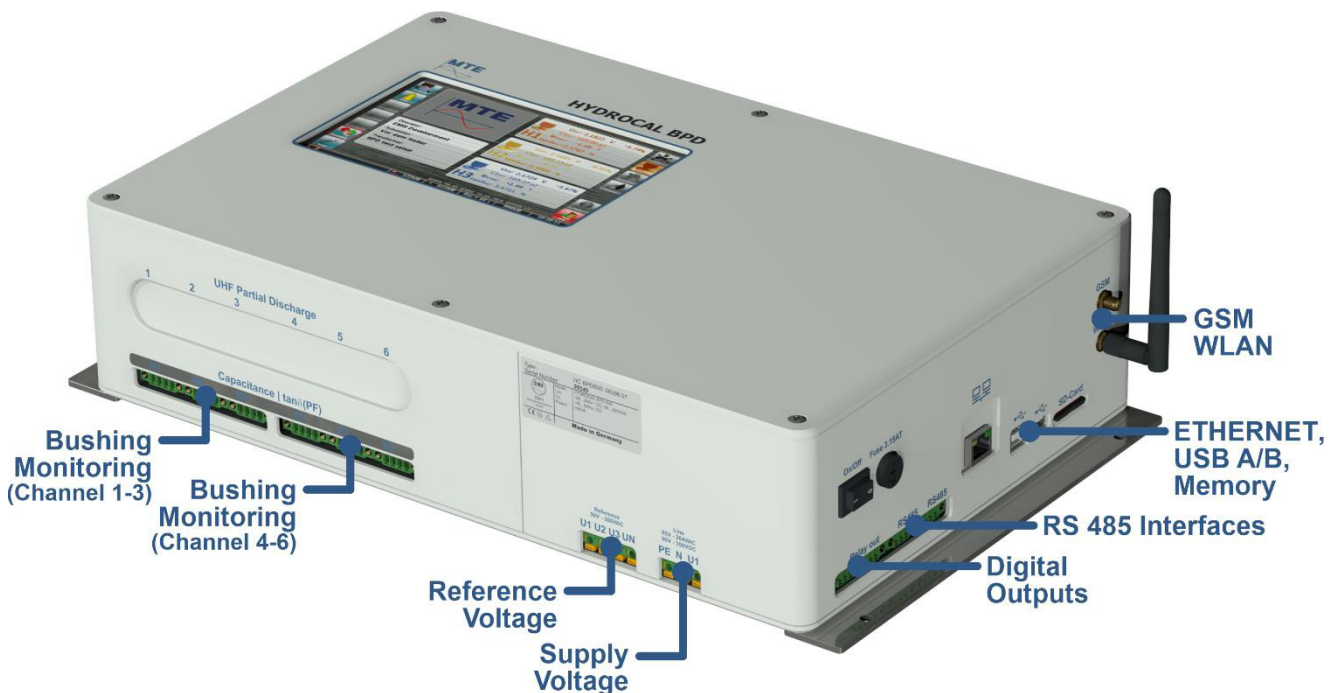
Auxiliary power supply:	85 VAC <sub>min</sub> ... 264 VAC <sub>max</sub> 90 VDC <sub>min</sub> ... 300 VDC <sub>max</sub>	
Operation frequency:	45 Hz ... 70 Hz	
Power consumption:	max. 100 VA	
Operation temperature: (ambient)	-55°C ... +50°C	
Storage temperature: (ambient)	-20°C ... +55°C	
Relative Humidity:	≤ 85% at Ta ≤ 21°C ≤ 95% at Ta ≤ 25°C, 30 days/year spread	
Operation altitude:	max. 2000 m	
	<b>HYDROCAL BPD</b>	<b>Cabinet</b>
Housing:	Hard Plastic	Stainless Steel
Dimensions (W x H x D):	400 x 260 x 97 mm (instrument only) 555 x 555 x 110 mm (on mounting plate)	600 x 600 x 210 mm
Weight:	approx. 10kg	approx. 23kg
Degree of protection:	IP-40	IP-66
Corrosion protection:	C1/2	C5M
Display:	7" Colour (800x600 pixels) TFT touch screen	
Memory:	SD Card (removable) up to 64 GB SSD (with option PD) up to 256 GB	

### Safety

CE

Insulation protection:	EN 61010-1:II
Electrical protection class:	EN 61140:I

### Connections



## Measurements

### Capacitance (C) tanδ / Power factor (PF)

Measuring quantity	Voltage	Phase Angle	Frequency	Reference voltage
Measuring range:	0 V ... 28 V	0° ... 360°	40 Hz ... 70 Hz	5 V ... 300 V
Uncertainty:	≤ ± 0.1 %	≤ ± 0.01°	≤ ± 0.01 %	≤ ± 0.1 %
Resolution:	14 bit			
Sampling rate:	50 kHz			
Sensors:	Bushing Tap Adapter		PT	
Input channels	up to 6		up to 3	

### Digital outputs

4 x Digital outputs		Max. Switching capacity (Free assignment)
Type	Control voltage	
4 x Relay	12 VDC	220 VDC / VAC / 2A / 60W

### Communication

- 2 x USB (type A and type B)
- 2 x RS 485 (proprietary or MODBUS® RTU/ASCII protocol)
- ETHERNET 10/100 Mbit/s copper-wired / RJ 45 or fiber-optical / SC Duplex (proprietary or MODBUS® TCP protocol)
- WIFI (genX Webserver)
- 4G modem with external adhesive antenna (optional)
- DNP3 protocol (option)
- IEC 61850 protocol (option)