TECHNICAL SPECIFICATIONS

Drilling Mud Data

TS DATA SHEETS

- MD -

Continuing development sometimes necessitates specification changes without notice

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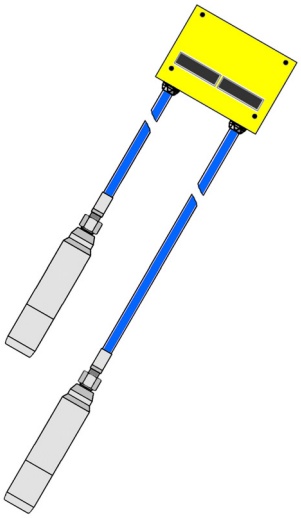
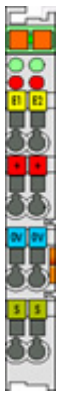
MUD WEIGHT



Frequency Converter

Barrier Amplifier

Encoder Interface



Differential Pressure Transducer for Measuring Mud Weight

- **Mud weight IN**
- **Mud weight OUT**
- **Delta mud weight**

Parameter Specifications

▪ Differential pressure measuring range	IN OUT	0 – 0.4bar 0 – 0.2bar
▪ System accuracy		< 0.1% of full scale
▪ System resolution		0.1kg/l

Principle of Operation

Two pressure transducers at different installation heights are submerged into the drilling mud. The sensor diaphragms change its capacitance proportional to the hydrostatic pressure exerted by the drilling mud. The sensor signals will be converted into an electrical current and be processed by the transmitter power supply.

Maintenance

Once the system is set up and calibrated, generally no maintenance will be required.

Visual routine checks (daily) – sensors have to be unblocked by cuttings and immersed in mud! Change the sensor installation point if the readings are unsteady.

Data Processing

Display, output, recording and storage of the measurements are determined by the Drill Monitoring System developed by GEO-data GmbH.
The DMS submits the setting of individual alarms for “High“ and “Low“ limits.

Technical Specifications

	SENSOR
▪ **Type or model**	Hydrostatic pressure transmitter
▪ **Certified for hazardous area**	Intrinsically safe to II 1G EEX ia IIC T6
▪ **Certificate of conformity**	TÜV 97 ATEX 1249 X
▪ **Operating temperature range**	-40°C … +60°C
▪ **Supply voltage**	24V DC
▪ **Installation point**	Mounted in the suction pit and/or the Sand Trap

	EVALUATION UNIT	
	Transmitter Power Supply	**Ex-Barrier Amplifier with BUS System**
▪ **Type or model**	Isolating amplifier – inputs [EEx ia] IIC	Barrier Amplifier EEx ia IIC
▪ **Certificate of conformity**	PTB No. Ex-95.D.2161 X	TÜV 99 ATEX 1499 X
▪ **Signal output**	4 – 20mA	4 – 20mA
▪ **Supply voltage**	24V DC	24 V DC
▪ **Bus System:**	Not applicable	Field bus independent connectors
▪ **Installation point**	Logging unit; plugged into 19-inch frame (DMS rack)	

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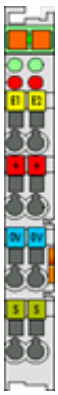
MUD TEMPERATURE

Frequency Converter

Barrier Amplifier

Encoder Interface



Temperature Sensor for Monitoring Mud Temperature

- **Mud temperature IN**
- **Mud temperature OUT**
- **Delta mud temperature**

Parameter Specifications

Measuring range	-20°C … +100°C
System accuracy	± 0.1% of full scale
System resolution	0.1°C

Principle of Operation

When the temperature of the drilling fluid is changed, the resistance the resistor integrated in the sensor changes proportionally to the change of temperature. The resulting alteration of the signal is converted into an electrical current and be processed by the transmitter power supply.

Maintenance

Once the system is set up and calibrated, generally no maintenance will be required.

Visual routine checks (daily).

Data Processing

Display, output, recording and storage of the measurements are determined by the Drill Monitoring System developed by GEO-data GmbH.
The DMS submits the setting of individual alarms for “High“ and “Low“ limits.

Technical Specifications

	SENSOR
▪ **Type or model**	Temperature transmitter
▪ **Certified for hazardous area**	Intrinsically safe to EEX ia IIC T4
▪ **Certificate of conformity**	PTB No. Ex.94.C.2008 X
▪ **Operating temperature range**	-10°C … +70°C
▪ **Supply voltage**	24V DC
▪ **Installation point**	Mounted in the suction pit and/or an outlet of the flow-line

	Evaluation Unit	
	Transmitter / Repeater Unit	**Ex-Barrier Amplifier with BUS System**
▪ **Type or model**	Isolating amplifier – inputs EEx ia IIC	Barrier Amplifier EEx ia IIC
▪ **Certificate of conformity**	BASEEFA No. Ex-90.C.2358X	TÜV 99 ATEX 1499 X
▪ **Signal output**	4 – 20mA	4 – 20mA
▪ **Supply voltage**	24V DC	24 V DC
▪ **Bus System:**	Not applicable	Field bus independent connectors
▪ **Installation point**	Logging unit; plugged into 19-inch frame (DMS rack)	

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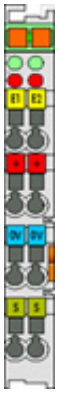
CONDUCTIVITY
(Inductive)

Frequency Converter

Barrier Amplifier

Encoder Interface



Inductive Sensor to Monitor the Conductivity, Resistivity and Temperature of the Drilling Fluid

- **Mud conductivity IN**
- **Mud conductivity OUT**
- **Delta mud conductivity**
- **Waste water conductivity**
- **Also available as stand-alone device with integrated display**

Parameter Specifications

▪ Measuring range	Conductivity	1µS/cm ... 2S/cm
	Resistivity	0.5Ω/cm ... 1MΩ/cm
	Temperature	-50°C … +250°C
▪ System accuracy		< 0.2% of full scale
▪ System resolution		0.01mS/cm -/- 0.01Ω/cm -/- 0.1°C

Principle of Operation

The sensor (temperature compensated) operates according to the induction method. When the conductivity of the process fluid increases, the inner resistance of a transformer coil alters accordingly. The induced alternating current is proportional to the conductivity of the process fluid.

Maintenance

Once the system is set up and calibrated, generally no maintenance will be required.

Visual routine checks (daily). The donut shaped sensor must be surrounded by the process fluid.

Data Processing

Display, output, recording and storage of the measurements are determined by the Drill Monitoring System developed by GEO-data GmbH.
The DMS submits the setting of individual alarms for “High” and “Low” limits.

Technical Specifications

	SENSOR		
▪	**Type or model**	Inductive conductivity sensor with integrated temperature compensation	
▪	**Certified for hazardous area**	Intrinsically safe to EEX ib [ia] IIC T6	
▪	**Certificate of conformity**	PTB No. Ex-97.D.2208	
▪	**Operating temperature range**	-20°C … +130°C	
▪	**Supply voltage**	Supplied by the Process Transmitter	
▪	**Installation point**	In open tanks, in the rig site drainage system	
	PROCESS TRANSMITTER		
▪	**Type or model**	Isolating amplifier – outputs EEx ib [ia] IIC T6	
▪	**Certificate of conformity**	PTB No. Ex-97.D.2208	
▪	**Signal output**	4 – 20mA	
▪	**Supply voltage**	24V DC	
▪	**Installation point**	Close to the conductivity sensor	
	EVALUATION UNIT		
		Transmitter / Repeater Unit	**Ex-Barrier Amplifier with BUS System**
▪	**Type or model**	Isolating amplifier – inputs EEx ia IIC	Barrier Amplifier EEx ia IIC
▪	**Certificate of conformity**	BASEEFA No. Ex-90.C.2358X	TÜV 99 ATEX 1499 X
▪	**Signal output**	4 – 20mA	4 – 20 mA
▪	**Supply voltage**	24V DC	24 V DC
▪	**Bus System:**	Not applicable	Field bus independent connectors
▪	**Installation point**	Logging unit; plugged into 19-inch frame (DMS rack)	

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ALKALINITY
(pH Measurement)

Single Core Measuring chain for Monitoring the pH Value and Temperature of a Fluid

- **pH value IN**
- **pH value OUT**
- **Delta pH value**
- **pH value waste water**
- **Also available as stand-alone device with integrated display**

Parameter Specifications

▪ Measuring range	pH value	2 … 13
	Temperature	-50°C … +250°C
▪ System accuracy		< 0.2% of full scale
▪ System resolution		pH 0.01 / 0.1°C

Principle of Operation

The pH-sensor consists of a combined glass and reference electrode, a so called single core measuring chain with integrated temperature compensation. The galvanic loads generated by the sensor are proportional to the hydrogen ion activity of the process fluid. The signal will be processed and displayed as pH value.

Maintenance

Once the system is set up and calibrated, generally no maintenance will be required.

Visual routine checks (daily). The sensor must always be immersed in the fluid.

Data Processing

Display, output, recording and storage of the measurements are determined by the Drill Monitoring System developed by GEO-data GmbH.
The DMS submits the setting of individual alarms for “High“ and “Low“ limits.

Technical Specifications

	SENSOR
▪ **Type or model**	Single core measuring chain with integrated temperature compensation
▪ **Certified for hazardous area**	Yes – passive component
▪ **Certificate of conformity**	Not required
▪ **Operating temperature range**	0°C … 85°C
▪ **Wattage**	≤ 15mW
▪ **Installation point**	In open tanks, in the rig site drainage system
	PROCESS TRANSMITTER
▪ **Type or model**	Isolating amplifier – outputs EEx ib [ia] IIC T6
▪ **Certificate of conformity**	PTB No. Ex-96.D.2118
▪ **Signal output**	4 – 20mA
▪ **Supply voltage**	24V DC
▪ **Installation point**	Close to the pH-sensor

	EVALUATION UNIT	
	Transmitter / Repeater Unit	**Ex-Barrier Amplifier with BUS System**
▪ **Type or model**	Isolating amplifier – inputs **EEx ia IIC**	Barrier Amplifier **EEx ia IIC**
▪ **Certificate of conformity**	**BASEEFA No.** Ex-90.C.2358X	**TÜV 99** ATEX 1499 X
▪ **Signal output**	4 – 20mA	4 – 20 mA
▪ **Supply voltage**	24V DC	24 V DC
▪ **Bus System:**	Not applicable	Field bus independent connectors
▪ **Installation point**	Logging unit; plugged into 19-inch frame (DMS rack)	

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