In touch with the medium

» BEDIA Intelligent TankSensor ITS60

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» No moving parts.

» Robust design for heavy applications.

» Mechanical and electrical compatible to already existing systems.

» Suitable for all fuels including bio-fuel.

» Precise indication of medium level.

» Linear output signal even with non-linear tank geometry.

» Integral MIN or MAX switching point.

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» Tough ambient conditions

Mechanics

The new tank sensor ITS60 is characterized by a particularly stable,
but light mechanical system specially designed for “Heavy Duty Applications”.

The mounting flange and measurement tube are constructed from die cast aluminium.

This construction permits the insertion of tank sensors up to 1200 mm in length,
without additional support on the tank floor.

The flange hole distribution is compatible with commercially used tank sensors.
This means that this system can be used without expensive conversions.

The capacitative measurement principle permits measurement of levels without mechanically moving parts. This considerably increases stability and operating safety.

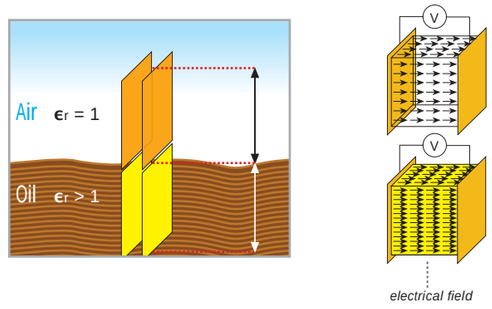
Die cast aluminium

» All fuels can be measured

Measurement principle

The ITS60 level measuring system is based on a capacitative measurement principle.
A capacitor is formed by an electrically conducting plate and an aluminium tube.
Depending on the level, the remaining air volume between the measurement electrodes varies. The resulting capacitative change is recorded and processed by the microcontroller.

Capacitance measurement



“Capacitive is not always capacitive!”

A problem in capacitative level measurements is the varying permittivity of the various fuels. In general capacitative sensors just a single fuel type can be correctly measured. This can lead to a measurement inaccuracy of up to 50% if the fuel is changed (winter or summer diesel, use of bio-diesels or mixed operation).

The ITS60 is equipped with a BEDIA patented sensor structure that makes it possible,
regardless of the fuel used, to measure the correct fuel level.

The conductivity of the medium, which dependent on the presence of water in the fuel tank, is compensated for over a wider range using various plausibility checks by the microcontroller.

» Flexibity and Compartibility

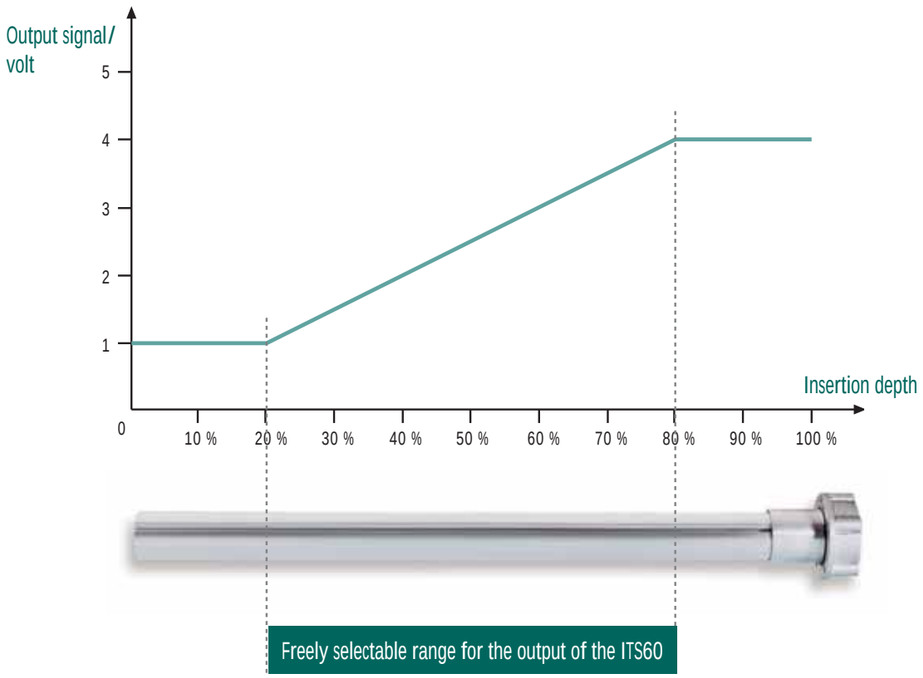
Evaluation and signal preparation

The intelligent electronics integrated in the ITS60 tank sensors offers numerous value outputs and signal preparation options such as e. g.:

- » PWM signals (digital or resistance emulation for commercial analog measurement instruments)
- » Voltage sink
- » Voltage output

The measurement range, which can be programmed according to customer requirements, lies between 20mm below the seal edge and 10mm from the sensor end.

Example of use



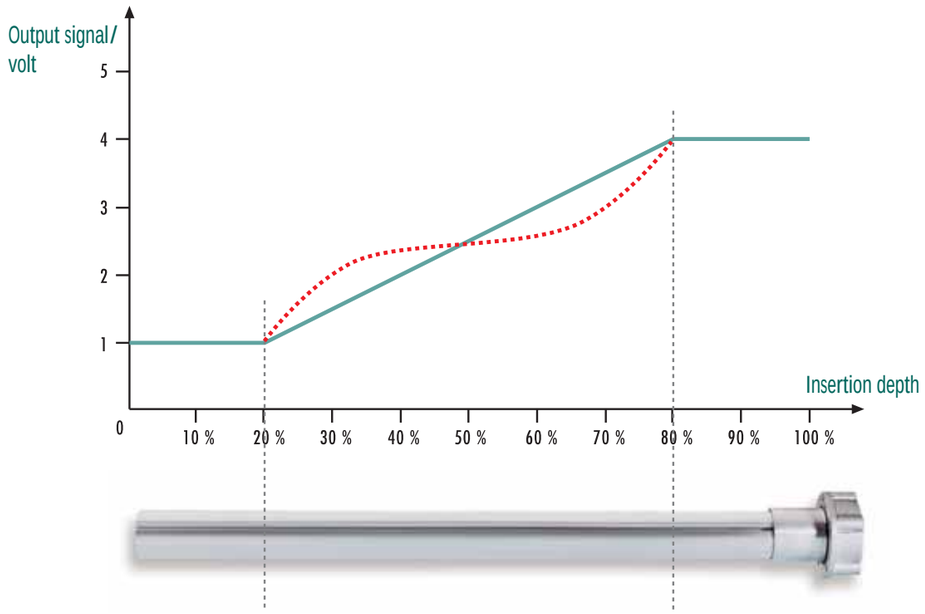
Freely selectable range for the output of the ITS60

» Tank geometry adaption

The use of a microcontroller not only permits linear tank geometries to be taken into account using the ITS60 tank sensor, but also many different tank geometries to be correctly evaluated by programming up to 15 reference points.

The output signal therefore corresponds to the actual volume and gives precise information about the tank contents.

Example of use



Tank geometry

Adaption to tank geometry using 15 reference points.

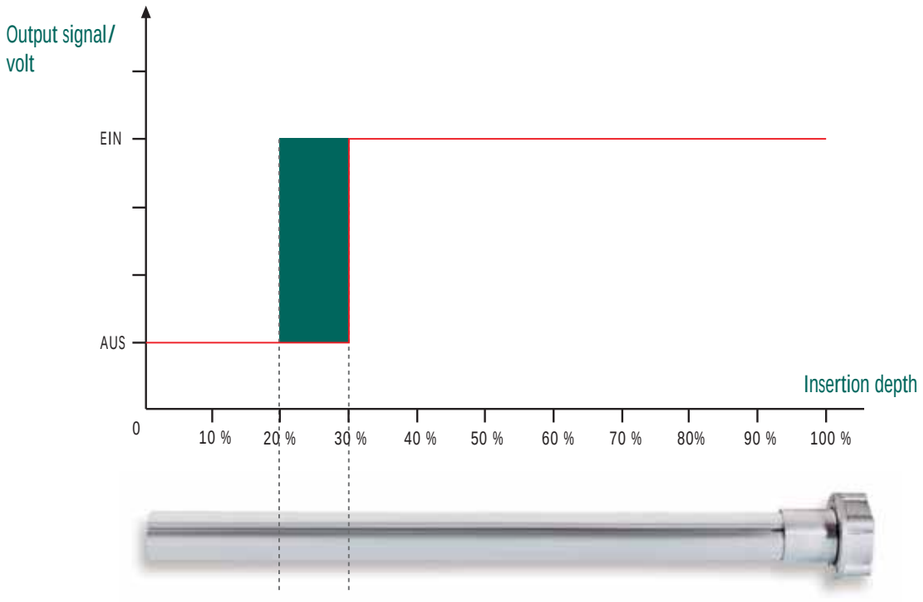
» Integrated configurable switch output

Another equipment characteristic of the ITS60 is the integrated switch output. This output can be set up individually as a minimum or maximum function. In addition, the switch point position, dalay time and switch hysteresis can be programmed.

A typical application case for the switch output is the overflow cutout on an automatic tanking unit.

With the integrated switch output, an additional sensor and therefore also the cabling expense and mechanical process connection can be omitted.

Example of use



Freely selectable switchpoint as MIN or MAX version, plus selectable switch hysteresis and switch lag

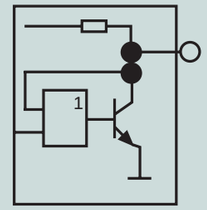
» Output

Analogue output

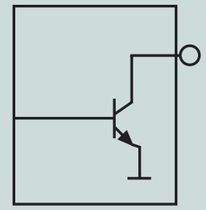
The analogue output is based on an “open-drain voltage output”, which emulates a voltage drop on a resistor.
So the sensor can be directly used instead of a normal resistance sensor.

Output types

Voltage output

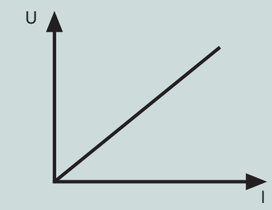


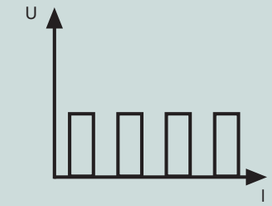
PWM signal



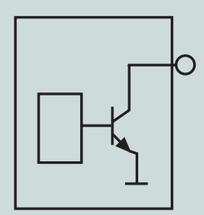
Other signal types available on request.

Signal types





Switch output



The switch output consists of a “lowside switch”. The output is high-impedance switched in active status to earth or to a passive status.

The switch output is short-circuit protected and suitable for 500 mA.

With inductive loads, a freewheeling diode must be switched in parallel to the consumer.

» Technical data

Technical data	
Measure principle:	Capacitive with integrated electronics
Supply voltage:	12 V DC / 24 V DC (–25% / +50%)
Reverse connection protection:	between supply voltage plus and minus
Measurable media:	diesel fuel, bio-diesels, eco-diesels
Sensor outputs:	PWM (digital or resistance emulation)
	Voltage sink
	Voltage output
	All outputs are short-circuit protected
Signal progress:	Range as per customer requirements
	Tank geometry:
	· linear
	· customized to the tank
	· customer requirements
Switchpoint:	Position as per customer requirement (within the measurement range)
	MIN or MAX function
	hysteresis as per customer requirement
	delay time as per customer requirement
	minus-switching to 500 mA and short-circuit proof
Measurement deviation:	+/– 3% referenced to the measurement range end value
Installation position:	Vertical without support
Pressure resistance:	5 bar
Environmental protection of flange:	IP 69K as per DIN 40050
Environmental protection of connection:	Depending on version, up to IP69k according to DIN 40050
Operating temperature:	–40 °C ... +85 °C
Storage temperature:	–40 °C ... +85°C
El. Connection:	4-wire cable plug as per customer requirements
	(standard bayonet according to DIN 72585 IP69 K)

Technical data	
Mechanical connection:	5 hole flange (standard)
	6 hole flange with adapter
Designation:	laser inscription
	(manufacturer, manufacturer number, costumer subject number, serial number,
	date:Week / Year)
Sensor length:	as per customer requirements from 200 mm to 1200 mm
EMC*:	Conducted Emissions Tests according to CISPR 25:1995
	(VDE 0879 – Teil 2: 1990-03)
	Measurement of radiated field strength according to CISPR 25:1995
	(VDE 0879 – Teil 2: 1990-03)
	Immunity test according to ISO 7637-2: 1990-06
	Immunity test according to ENV 50140: 1993
	Immunity test according to ISO 11452-2: 1995-12
	Immunity test according to ENV 50141: 1993
	ESD test according to EN 61000-4-2: 1995
	Transient immunity test with test pulse 5 (load dump)
	according ISO 7637-2:1990-06-01
Vibratory resistance*:	Sine-Vibration according to DIN 60068-2-6 / -27
Shock resistance*:	Shock test according to DIN 60068-2-6 / -27
Environmental test*:	Thermal shock test according to EN 60068-2
	Temperature cycling examination according to EN 60068-2
	Salting spray examination according to EN 60068-2
	Type of protection examinations IP 67 and IP 69K according DIN 40050 part 9
Flange material:	GD-ALSI10Mg (No. 239) DIN 1725
Profile material:	AlMgSiO,5 F22 DIN 1725

* The above-named tests are realized according to the standards of construction machinery and commercial vehicle industry.

A complete test report we send you on request.

To be able to provide you with a quote or a finished sample, we will require various details from you. Because of the numerous options that our sensor can offer, we are particularly dependent on your co-operation.

The following table provides definitions for the terms used, together with an example for the parameterisation of a sensor. A dimensioned drawing is attached with all the parameters drawn in.
All measurements are given in [mm] from the seal edge.

Please enter your data on page 25, and complete the entry with your personal information and the required number of pieces per year. To receive a quote or request a sample, please fax this page to the fax number provided.

If you require any assistance with the completion of this form, please get in touch with us.

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» Instruction for determining parameters

Structure of the parameter table

Parameter No.	Parameter designation	Possible values	Note
This number can be found in the data sheet.	Designation of the parameter.	Describes the values or value ranges available for this parameter.	Important notes and additional information for this parameter.
	Example for the parameterisation of a sensor for the tank and description depicted on page 7.		

Parameter table

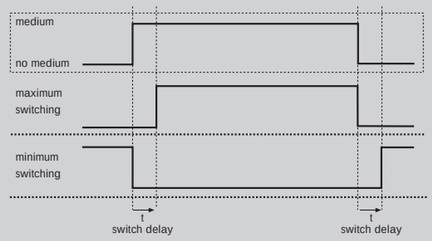
Parameter No.	Parameter designation	Possible values	Note
1.0	Mounting flange	» 5-hole flange (standard), diameter of pitch circle = 54 mm » 6-hole flange, diameter of pitch circle = 80 mm	The six-hole flange consists of a sensor with a 5-hole flange and an adapter plate. The sensor and adapter plate are supplied pre-mounted (see drawing).
	A 5-hole flange was selected for the example tank.		
1.1	Sensor pipe length	» Minimum length: 200 mm Length in [mm] » Maximum length: 1200 mm Length in [mm]	The sensor pipe, which is open to the bottom, must not be guided and must not rest on the base of the tank so that the medium to be measured can circulate within the sensor pipe. The sensor pipe should end near the intake point. This ensures that the sensor is not standing in the condensation water.
	A length of 490 mm was selected for the example tank. This length results from the position of the intake fitting. The sensor pipe ends with the intake point.		

Parame-ter No.	Parameter designation	Possible values	Note
1.2	Electrical connection	» Bayonet cap DIN 72585 (standard) » Cable with open end » Customer plug	The electrical connection of the sensor is always implemented via a 4-wire cable, preferably with a bayonet cap DIN 72585 of protection class IP 69K. Other plugs can also be used on request. In this case, please enter the reference source and reference designation.
	A bayonet cap DIN 72585 was selected for the example sensor.		
1.3	Cable length	» Minimum length: 100 mm Length in [mm] » Standard length 800 mm » Maximum length: 5000 mm Length in [mm]	The connection cable of the sensor is available as a 3-wire and 4-wire cable.
	A length of 800 mm was selected for the example sensor.		

Switch output

Parame-ter No.	Parameter designation	Possible values	Note
2.0	Switching point as low side switch or high side switch	Switching point range See dimensioned drawing Switching point in [mm]	The sensor is equipped with one **switching output**. The distance of the switching point is measured from the seal edge and is freely selectable within the switching point range (see drawing).
	A switching point of 400 mm was selected for the example sensor.		

» Instruction for determining parameters

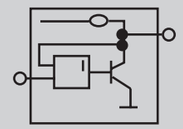
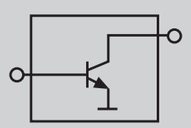
Parame-ter No.	Parameter designation	Possible values	Note
2.1	Function of switching point	» Function: Minimum » Function: Maximum	The switching output is optional and can be set as a minimum switch (e.g. as a low fuel warning) or as a maximum switch (e.g. to switch off a filling system).
			
	A minimum switch was selected for the example sensor.		
2.2	Switching delay	» Switching delay range 0 sec to 240 sec » Delay in [sec]	A switching delay can be selected for the switch output. The switching output is then switched with the specified time (t) delay. For a low fuel indicator, a delay time of 7 sec prevents the indicator from constantly triggering when the medium sloshes around. A delay time of 0 sec is recommended for overfilling (MAX- switching point) as this will ensure a prompt switch-off. Depending on the system, extremely fast level changes (fuelling up) can still occur and therefore the switching output may switch with appr. 2 sec delay.
	A switching delay of 7 s was selected for the example sensor (typical MIN).		

Parame-ter No.	Parameter designation	Possible values	Note
2.3	Reset hysteresis	» The switch-off point must lie within the switching point range. » Switch-off point in [mm]	The medium must under/overshoot a specific switch-off point before the switching output is reseted to its output condition. The position of the switch-off point is given to the switching point.
	A reset hysteresis of 0 mm was selected for the example sensor.		

Analogue output

Parame-ter No.	Parameter designation	Possible values	Note
2.4	Analogue output signal	**» Sensor not immersed:** Analogue start 0 V–5 V » 0 V–10 V (with 24 V supply only) **» Sensor immersed:** Analogue end 0 V–5 V » 0 V–10 V (with 24 V supply only)	The output signal consists of an ana-logue start and analogue end. If the given start value is smaller than the end value, the sensor is programmed normally. If the start value is large than the end value, then the signal is automatically inverted. If an analogue instru¬ment is used, the output values can be given in % of the desired display value on the scale. In this case, a suitable display instru¬ment must be provided as a sample.
	The following output signal was selected for the example sensor: Analogue start: 0.5 V Analogue end: 4.5 V This signal is not inverted.		

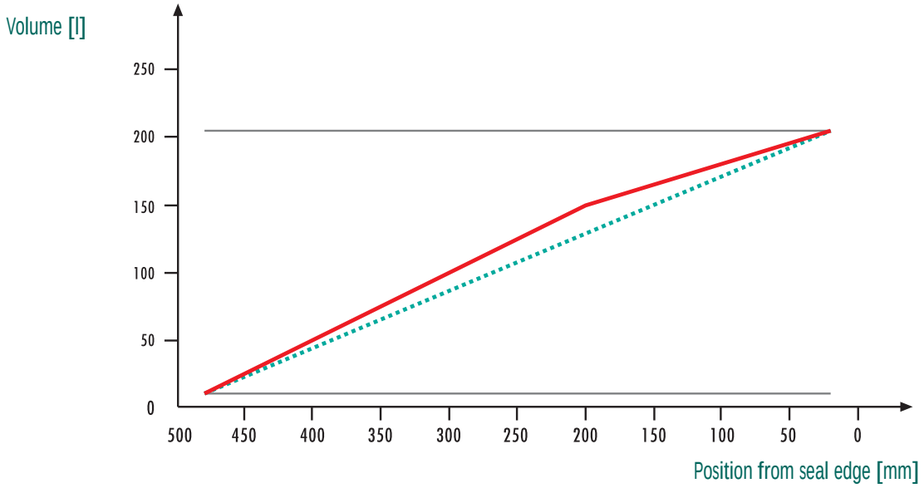
» Instruction for determining parameters

Parame-ter No.	Parameter designation	Possible values	Note
2.5	Output type	» Voltage output: 	The voltage output actively outputs the level/volume applicable voltage. A Pull Up/constant current is not required. The output can be loaded with 5 mA.
		» PWM output: 	The frequency of the PWM output is 1000 Hz. A modulation range of 0% to 100% is possible.
	Output selected for this example: voltage output.		

Geometry adaption

Parame-ter No.	Parameter designation	Possible values	Note
2.6	Measurement range / Geometry adaptation	» Position from seal edge Data in [mm] » Output value Data in [V] or [l] or [%]	This parameter is used to specify the positions of the **measurement range start and measurement range end**. Where necessary, several geometry points can also be specified (see example). In total, 15 connection points can be defined. At least two points must be defined to specify the measurement range. If the analogue output should be pro-portional to the tank volume, the connection points can be given in [l]. Optionally, the required output voltage can be given in [V] or in [%] of the analogue start and analogue end values.

Diagram for the example tank



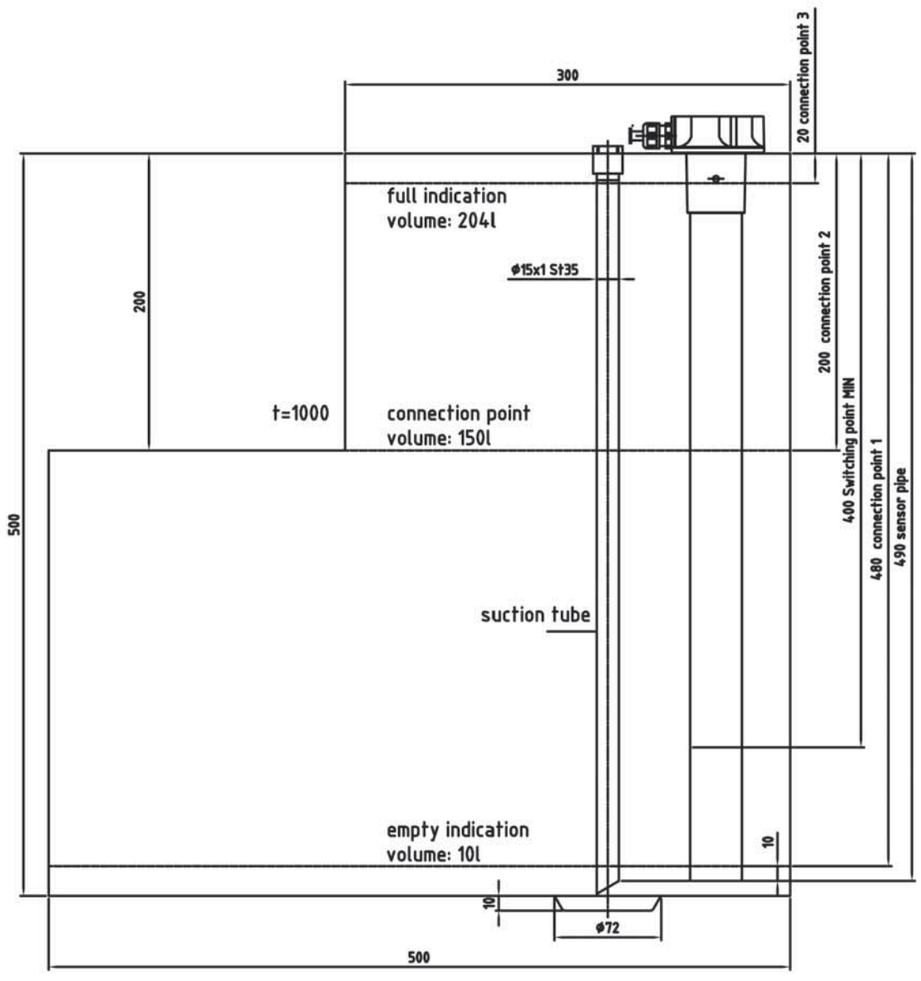
» Instruction for determining parameters

As the output signal of the example sensor is to be proportional to the contents of the tank the following connection points are defined:

Connection point	Position from seal edge	Output value
1	480 mm	10 l
2	200 mm	150 l
3	20 mm	204 l

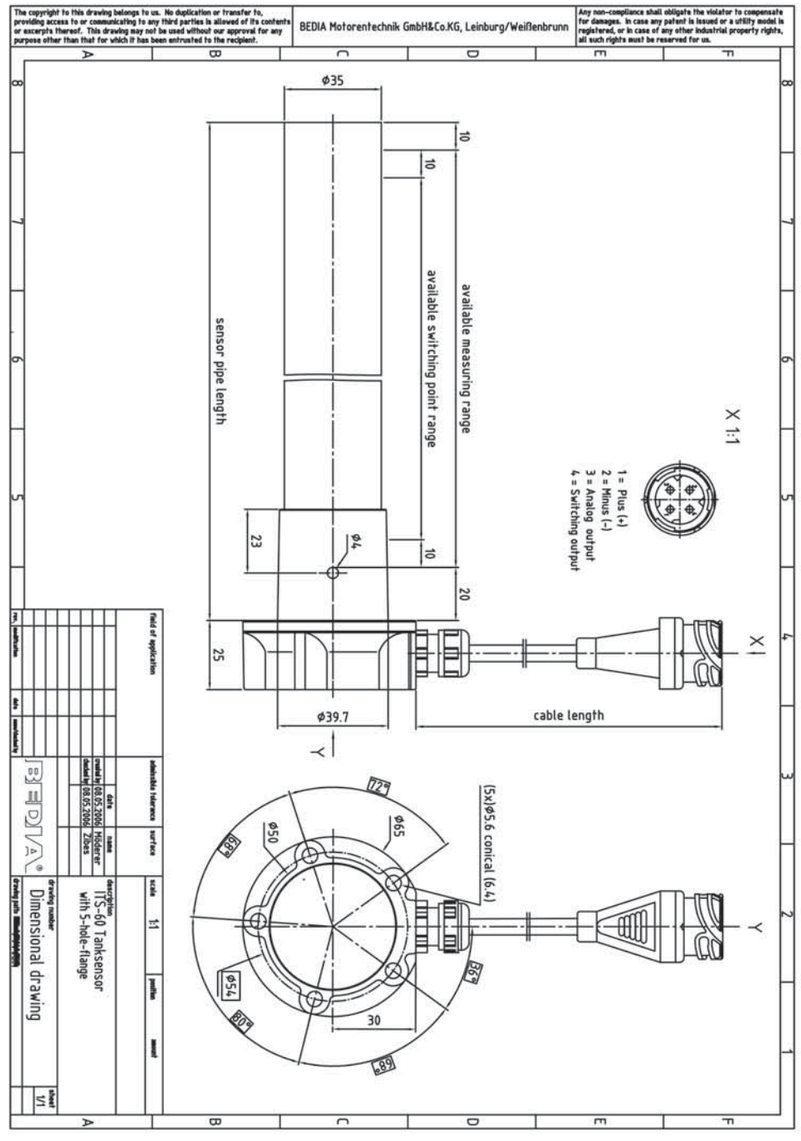
The output value “analogue start” is always given with the first connection point and the “analogue end” value is always given with the last connection point. If the signal is not to be given in proportion to the level but e.g. proportional to the actual content, additional connection points must be provided. Up to 15 connection points can be given.

Example tank



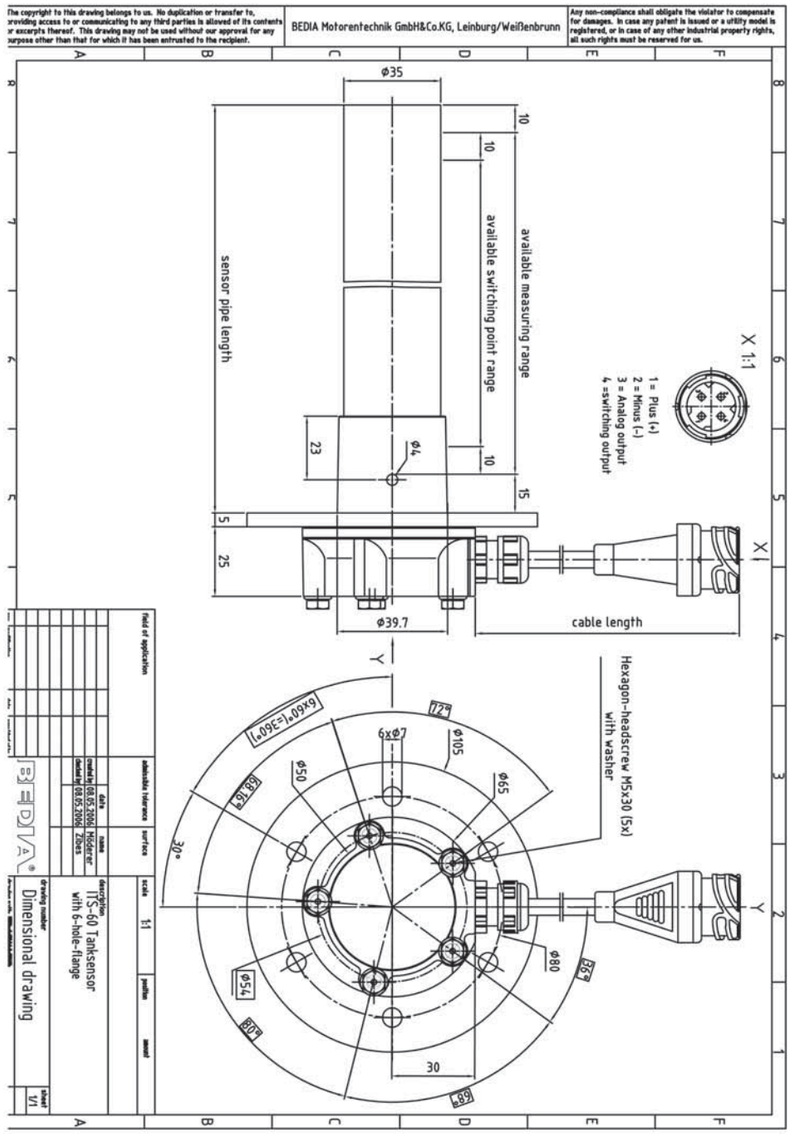
» Instruction for determining parameters

Example sensor



» Instruction for determining parameters

Example sensor



» Response

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Please send the following table completed with your data to:

BEDIA Motorentechnik GmbH & Co. KG, **Fax +49 (0) 9187 9509 1611**

No.	Designation	Customer requirements
1.0	Mounting flange	☐ 5-hole flange ø 54 mm
		☐ 6-hole flange ø 80 mm
1.1	Sensor pipe length	mm
1.2	Electrical connection	☐ Bayonet DIN 72585 (standard)
		☐ Kabel offen
		☐
1.3	Cable length	mm
2.0	Switching point from seal edge	mm ☐ Low side switch ☐ High side switch
2.1	Switching point function	☐ Min. function
		☐ Max. function
2.2	Switching delay	sec.
2.3	Reset hysteresis	mm
2.4	Analogue start value	[V] ; [%]
	Analogue endvalue	[V] ; [%]
2.5	Output type	☐ Voltage sink
		☐ Voltage output
		☐ PWM output
		☐ Resistance emulation
2.6	Geometrieanpassung	

Connection point	Position from seal edge	Output value	Connection point	Position from seal edge	Output value
1			9		
2			10		
3			11		
4			12		
5			13		
6			14		
7			15		
8					

Additional data:

» With which display instrument must the sensor work with? .....
» In what equipment is the sensor to be installed in? .....
» Which sensor must be replaced? .....
» What fuel is normally used? .....
» How many sensors are required per year? .....

Your address:

Company: ..... Name: .....

Telephon: ..... Fax: .....

E-Mail: .....

Signature / company stamp: .....

» Notices

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