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DEVELOPMENT OF ADVANCED MECHATRONICS

WATER IN OIL SENSOR (WIO) Product Overview

The WIO-Sensor technology is a secure on-line system monitoring the water content in oil. Water or moisture is the second largest contamination (after particles) in oil systems with damaging effects on the life time of both the machinery and the oil. Moisture is damaging to engine parts, cylinders, bearings, etc. with resulting mechanical failures and therefore repairs and expensive downtime costs (often ranging between EUR 10,000 – 200,000).



The amount of water a specific oil type can dissolve varies significantly, depending on e.g. the base oil, additives, oxidation, temperature and other factors. The sensors thus require a comprehensive calibration to measure the water content correctly. PAJ sensors have the highest quality and accuracy levels in the industry through elaborate oil calibration & testing methods.

While conventional approaches require taking a small sample of the oil and then analysing it, the sensor provides continuous monitoring of the entire lubricant oil volume, providing early warning of high levels of water content that could damage the machine. As well as providing advance warnings of problems, it can also be used to ensure that separators, filters and driers are only running when actually needed. The sensor is available with an associated terminal box. The terminal box provides power to the sensor, links the sensor to any external condition monitoring system, gives alarms and provides a local visual indication of the water level in the oil.



Oil Types	Applications	Industries	Product Features
• Lube	• Oil systems	• Marine	• 24/7 monitoring
• Gear Box	• Gear boxes	• Power	• Highest measuring accuracy
• Turbine	• Turbines	• Processing	• Robustness (for heavy use)
• Diesel	• Transformers	• Offshore	• Analogue output or MODBUS
• Hydraulic	• Compressors	• Renewables	• Configuration to exact needs
• Transformer	• Hydraulics	• Steel	• Thread or ball valve installation
	• Ventilation	• Food	• Galvanic isolated
	• Cooling systems	• Paper	• High grade cables
	• Pumps	• Mining	• Optional LED buttons & displays
	• Others	• Agriculture	• Customised alarm settings
		• Robotics	• Easy installation

CUSTOMER BENEFITS

- 24/7 monitoring and early warnings (allowing preventive actions)
- Increased lifetime of engine parts, cylinders, bearings, etc.
- Saved damages and downtime costs
- Longer oil lifetime
- Saved oil sample costs (and administration)
- Potential savings on water filters, separators, etc. (only running when needed)
- Avoided commercial costs and negative customer impact (from downtime and delays)
- Higher accuracy than most oil sample tests and real time answers

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WATER IN OIL SENSOR PRODUCT RANGE

The sensor is simple to install and easy to connect. It provides a measurement range of 0.01-1.00aw, with accuracy of ±0.03aw and a resolution of better than 0.004aw. The relay alarm contacts are rated for 250V AC by installation with the Terminal Box, with the default alarm settings being 0.50aw and 0.90aw (both adjustable). The sensor works with oils at up to 20 bar pressure with the standard installation, and up to 10 bar pressure with the ball valve installation, and from 0°C to 90°C.

With the standard fitting or ball valve version the WIO sensor can be quickly installed - either as retrofit or in new installations. The sensor functions with or without the terminal boxes. With the many different terminal box configuration possibilities it is easy to configure the systems for the exact customer requirements.

WIO Standard 200B to 400



WIO Ball Valve 200B to 400



WIO200B

- 24VDC±10% power supply
- 2 x NC relay outputs 60VAC/1A
- 1 x galvanic isolated analog output 4 - 20mA
- fixed alarm points HA-0.50 aW, HHA 0.90 aW
- manual test function

WIO300

- 24VDC±10% power supply
- 2 x NC relay outputs 60VAC/1A
- 2 x galvanic isolated analog output 4 - 20mA
- adjustable alarm points for HA and HHA (aW/PPM)
- manual test function
- RS232 modbus user interface

WIO400

- 24VDC±10% power supply
- 2 x NC relay outputs 60VAC/1A
- 2 x galvanic isolated analog output 4 - 20mA
- adjustable alarm points for HA and HHA (aW/PPM)
- manual test function
- RS485 modbus user interface

Extended with WIO300-400 TERMINAL BOX



- 24VDC±10% power supply
- 2 x NO relay outputs 250VAC/2A
- 2 x galvanic isolated analogue output 4 - 20mA
- 4 digit display for aW / ppm
- LED indication for H/HH-alarm
- Push button function for H/HH alarm
- Acoustic H/HH alarm
- RS232 / RS485 user interface
- adjustable alarm points for HA and HHA (aw/ppm) via com.-bus

Extended with WIO200B TERMINAL BOX



- 24VDC±10% power supply
- 2 x NO relay outputs 250VAC/2A
- 1 x galvanic isolated analogue output 4 - 20mA
- 4 digit display for aw / ppm
- LED indication for H/HH-alarm
- Push button function for H/HH alarm
- Acoustic H/HH alarm

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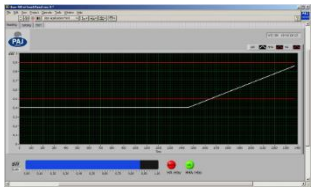
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WIO Software

- settings of High-Alarm & HighHigh-Alarm alarm limits
- monitoring of aW and PPM
- monitoring of the temperature
- status indication of the service intervals
- logfile of the measured data
- Easy to install from USB-Stick





DB9 Female RS232 /
RS485 to USB cable

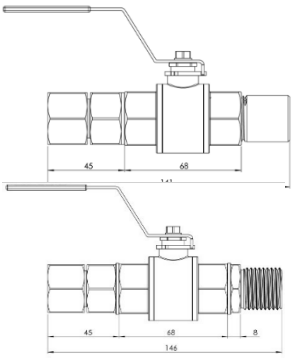


8-pole Male RS232 /
RS485 to USB cable



Ball Valve 16mm

1. Complete solution for WIO-Sensor for welding
2. Complete solution for WIO-Sensor with external thread
3. Ball Valve part adapter for sealing and retaining
    - Easy to install and to use
    - Fixed mounting of WIO-Sensor
    - Able to expand with ISO228/1 G3/4 adapter



1



2

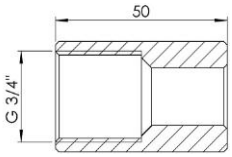


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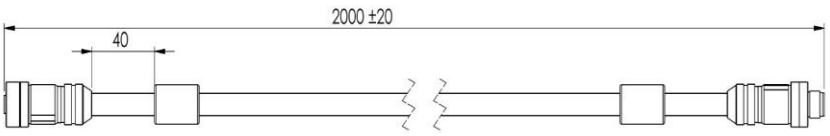
Pipe unit

- Special adapter unit for WIO-Sensors
- Fix mounting and simple solution



Cables

- Standard 2 meters
- Can also be ordered as 15m, 20m, 30m or 50m.





Product list

WI	**Water In Oil Sensor**						
	L	Lubrication / Gear Box / Hydraulic / Transformer / Turbine Oil					
		1 2 3	Standard sensor pipe 3/4” (inch) Thread with Short pipe Standard sensor pipe 1/2” (inch) Thread with Short pipe Sensor Ball valve pipe 1/2” (inch) Thread with Long pipe				
			A B C	No user interface (WIO200B) RS232 Modbus user interface (WIO300) RS485 Modbus user interface (WIO400)			
				50 xx	Standard High-Alarm 0,50 aW xx must be from 10 to 80 (0,10 – 0,80 aW)		
					90 xx	Standard HighHigh-Alarm 0,90 aW xx must be from 20 to 90 (0,20 – 0,90 aW)	
WI	L	1	A	50	90	This is an order example of standard WIO200B 3/4” sensor	
WI	L	2	B	50	90	This is an order example of standard WIO300 1/2” sensor	

Minimum quantity: 2 sensors

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TER	**Terminal box**								
	A B C	Sensor 200B Sensor 300 Sensor 400					No user interface RS232 Modbus user interface RS485 Modbus user interface		
	A	0 1 2 3 4 5	No button, no display No button, 1 x display aW No button, 1 x display ppm* 2 x button , No Display with LED indicator for HA & HHA w/ acoustic alarm 2 x button, 1 x Display aW with LED indicator for HA & HHA w/ acoustic alarm 2 x button, 1 x display ppm with LED indicator for HA & HHA w/ acoustic alarm*							
	B / C /	0 1 2 3 4 5		No button, no display No button, 1 x display to indicate aW No button, 1 x display to indicate ppm* 2 x button, no display with LED indicator for HA & HHA w/ acoustic alarm 2 x button, 1 x display aW with LED indicator for HA & HHA w/ acoustic alarm 2 x button, 1 x display ppm with LED indicator for HA & HHA w/ acoustic alarm*					
			A B				Standard 8 pin female & male connector Gland M20	Cable diameter 6 to 12mm	
				A			Output/outlet to machinery/control system, Gland M20	Cable diameter 6 to 12mm	
					02 05 15	Standard 2 m cable with female & male connector 2 pieces 5 m cable with female & male connector 2 pieces** 15 m cable with female & male connector 2 pieces**			
TER	A	0	B	A			This is an order example of a 200B terminal box with Gland M20 connector and no cables		
TER	B	1	A	A	02		This is an order example of a 300/RS232 terminal box w/ display and standard 8 pin connector and 2m cables		

* Individual pricing

** Individual pricing - MOQ 20 sets

ACC	**Accessory equipment**			
	SW1	Additional USB sticks with SW for Communication with PC and sensor (per USB stick)		
	SW2	USB to DB9 Female cable (for RS232)		
	SW3	USB to DB9 Female cable (for RS485)		
	SW4	USB to 8 pole Male cable (for RS232)		
	SW5	USB to 8 pole Male cable (for RS485)		
	PI-1	Complete Ball Valve adapter with no thread, for welding		
	PI-2	Complete Ball Valve adapter with external thread		
	PI-3	Ball Valve part adapter for sealing and retaining part		
	PI-4	Pipe unit 3/4” with internal thread, for welding		
ACC	PI-1	This is an order example of Accessory equipment		

All PAJ products are sold under PAJs General Terms and Conditions of Sale & Service.