



**GLOBAL FLUID
POWER SYSTEMS**
YOUR SOLUTIONS PARTNER



IOT

SOLUTIONS COMPANY
SYSTEM INTEGRATION FOR A CONNECTED WORLD



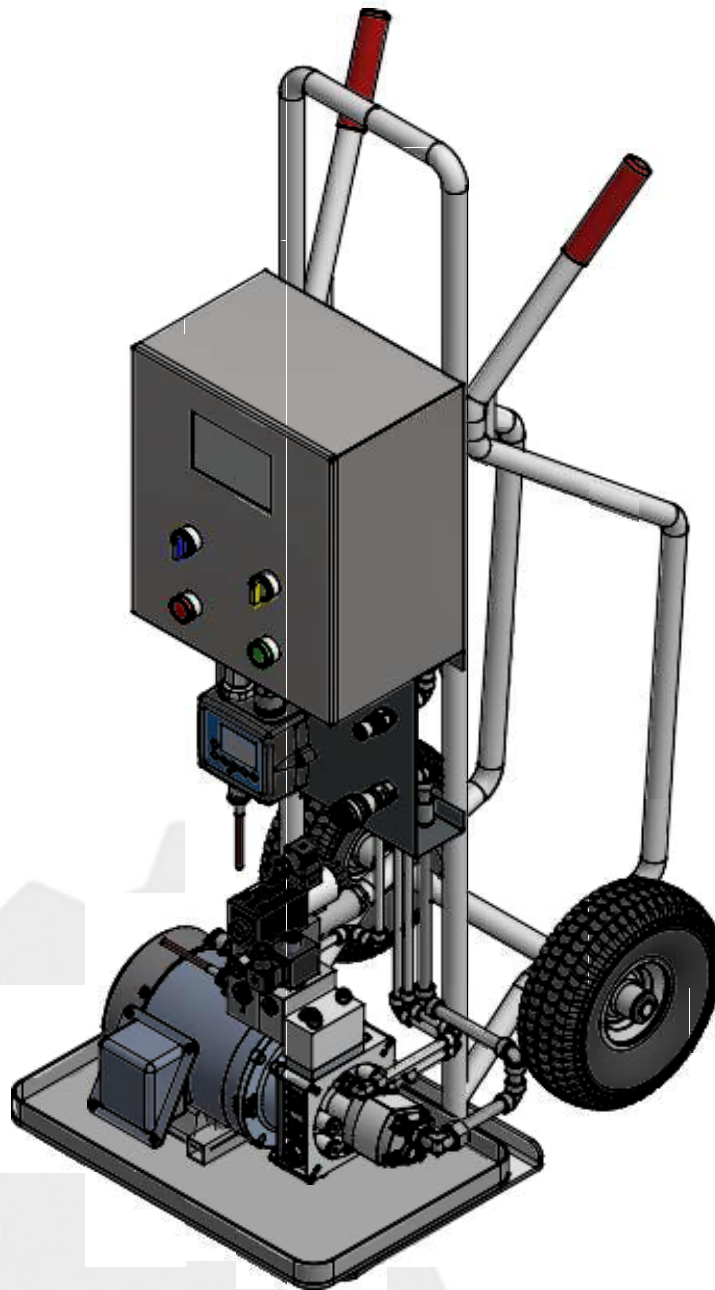
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www.gfpsco.com
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PROACTIVE OIL MONITORING STATION - POMS INTELLIGENT PREDICTIVE SYSTEM



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INTRODUCTION AND APPLICATIONS

The **POMS** combines technology to enable the continuous monitoring of the oil quality, relative humidity and particles, using a high quality oil sensor, particle counter with humidity sensors, and intelligent electronic microprocessors to process and display the acquired data to the cloud with predictive analytics.

WHERE CAN IT BE USED?

- Renewable Energy
- Gearbox Applications
- Automotive
- Pulp and Paper
- Offshore and Land Rigs
- Lubrication Systems
- Hydraulic Power Unit
- Refineries
- Steel Mills
- Turbines

The **POMS** can be installed in most hydraulic and lubrication systems, including HPU's, gearboxes, turbines, lubrication systems and more.

The **POMS** is specifically configured to provide customers the versatility they require for existing systems or those in development.

It contains a built-in motor/pump assembly, high quality oil degradation sensor, high quality oil moisture sensor and automatic oil particle counter that are directly connected to a specially designed cloud- based platform, allowing control through a wide range of communication protocols and logic controllers with machine learning and data analytics to predict future failures prior to their occurrence.

A small footprint as well as high portability and mobility make the **POMS** the ideal solution for installation on new or retrofit applications. A wide range of operating voltages support electrical variations around the globe.

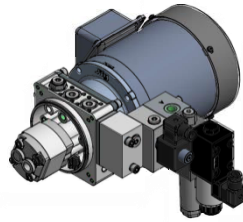
WHY POMS?

- Reliable and Accurate performance
- Compact Design
- Portability, Mobility, Versatility
- High Quality and Accuracy Oil Sensors
- Dedicated Software Platform
- Microprocessors for high volume data acquisition and interpretation
- Data and Graphics on Local Customer Server or Cloud Platforms
- Machine Learning Algorithms for Proactive and Predictive Maintenance
- Alarms for Oil Contamination Levels
- Alarms for ISO Particle Levels
- Alarms for Oil Temperature
- Alarms for Relative Humidity

The **POMS** can give you reliable feedback about solid particle contamination levels, water level (%RH), oil degradation and temperature. ***The IOT SOLUTIONS Platform Manager and microcontrollers utilize machine learning mathematical algorithms that can make predictions of oil quality possible. This provides future behavior predictions and it creates automated tasks related to proactive and predictive maintenance of the equipment/application.*** The **POMS** is the most advanced diagnostic station for hydraulic and lubrication fluids and it is the technical solution of the future for all maintenance teams and programs.

POMS TECHNICAL SPECIFICATIONS

PUMP/MOTOR HPU - OPERATIONAL PARAMETERS



Fluid compatibility	Mineral oil based and synthetic hydraulic fluids, ISO 6743-4
Environment temperature	-15 °C...+50 °C
Fluid allowed viscosity	6...500 cSt, ISO 3448
Fluid recommended viscosity	10...100 cSt, ISO 3448
Fluid viscosity at start-up	<2,000 cSt, ISO 3448
Hydraulic pump	Gear pump, model K1.2, 1.27 cm ³ /rev
Pump operating temperature	-15 °C...+80 °C
Pump minimum inlet pressure	0.7 bar
Pump maximum inlet pressure	3.0 bar
Pump continuous pressure	210.0 bar
System pressure relief valve	60.0 bar
Electric motor	High efficiency TEFC rolled steel, NEMA 56C
Electric motor power	0.5 HP
Electric motor RPM	1,740 RPM, 60 Hz
Electric motor voltage	3 phase, 208-230/460 V
Pump delivery manifold	GFPS design with integrated relief valve and solenoid valves
Maximum pressure relief valve	System pressure setting 5...60 bar
Solenoid valve SV1	2/2 Solenoid directional valve normally open – “System Ready”
Solenoid valve SV2	Solenoid directional control valve – “Oil Quality Sensor”
Pressure reducing valve	Setting at 15 bar for TAN Delta Sensor
Oil sensors manifold	GFPS design with integrated oil quality sensors

IN-LINE CONTAMINATION MONITOR – ICM 4.0



In-line contamination monitor	ICM 4.0 automatic measures particulate contamination, moisture and temperature levels of hydraulic fluids
Technology	LED based light extinction automatic optical contamination monitor
Particle sizing	>4, 6, 14, 21, 25, 38, 50, 70 µm (c) to ISO 4406:2017 Standard
Analysis range	ISO 4406:2017, code 0 to 25 NAS 1638, class 00 to 12
Accuracy	±1/2 code for particle 4, 6, 14 µm ±1 code for larger particles
Calibration	ICM 4.0 calibrated with ISO Medium Test Dust (MTD) based on ISO 11171
Operating flow rate	20...400 ml/minute
Viscosity range	<1,000 cSt
Fluid temperature	-25 °C...+80 °C
Environment temperature	-25 °C...+55 °C
Temperature measurement	±3°C, temperature sensor included
Maximum pressure	420 bar
Test time	Adjustable 10...3,600 seconds
Communication protocol	4...20 mA analog output, PLC compatible, GFPS proprietary software platform
Environmental protection	IP 65/67
Moisture sensing	% RH (Relative Humidity), ±3%, moisture sensor included

Electric power supply	9...36 VDC
Power consumption	<2.2 W
Outer casing finish	Die-cast aluminum body
Wetted parts	C46400 Cu alloy, 316 stainless steel, FPM, FR 4, sapphire 316 stainless steel, FPM, sapphire 316 stainless steel, elastomer, sapphire, EPDM
Software	IOT Solutions Company proprietary software platform, dashboard, local server or cloud storage

Featuring innovative LED optical and photodiode technology providing complete 8 channel measurement, the **ICM 4.0** delivers a comprehensive and continuous hydraulic health check - while its predictive maintenance technology safeguards machinery, enhances productivity, and reduces both costs and unplanned downtime.

Other key features and benefits of the **ICM 4.0** include:

- Connected to **IOT4Z**
- Detailed, accurate results - Exceptional repeatability and full 8-channel measurement
- Live real-time monitoring - Instant and continuous hydraulic health checks 24/7
- Predictive maintenance technology - Identifying changes before they impact performance through **IOT4Z** and **IOT SOLUTIONS Platform Manager**
- Fast, customizable test results - Adjust test times and intervals to your personal specification
- Space efficient - Perfect for installation in confined environments
- Easy to master - Simple, straightforward interface, multicolor indicators alert indicators for fast issue recognition with output alarm signals
- Live trend analysis options
- Ideal for hydraulic, lubrication fluids

OIL QUALITY SENSOR - OQS



Material	Stainless steel AISI 304
Dimensions	90 mm x 37 mm (LxW)
Weight	160 g
Mechanical connection	1/2" BSPP, 1/2" NPT
Electrical connection	6 pin Lumberg male, IEC 61076-2-106
Electric power supply	9...30 VDC
Power consumption	0.4 W
Communication protocol	4...20 mA analog output, PLC compatible, GFPS proprietary software platform
Oil quality detection parameters	Frequency 15 per second, sensitivity better than 15 ppm, accuracy $\pm 1\%$
Oil type	Mineral oil based and synthetic hydraulic fluids
Sensor temperature	-20 °C...+120 °C
Fluid temperature	-20 °C...+120 °C
Maximum fluid pressure	20 bar
Test time	Adjustable 10...3,600 seconds
Communication protocol	4...20 mA analog output, PLC compatible, GFPS proprietary software platform
Environmental protection	IP 67
Shock and vibration	BS EN 60068-2-30 (Test Db - Cyclic Humidity) BS EN 60068-2-6 (Test Fc - Sine Vibration) BS EN 60068-2-27 (Test Ea - Mechanical Shock)
Software	IOT Solutions proprietary software platform, dashboard, local server or cloud storage

The **OQS** oil condition monitoring sensor delivers the pinnacle in accuracy, performance and reliability for equipment operators who demand optimal reliability and productivity from their equipment. Proven around the world with leading equipment the **OQS** sensor is configurable to any oil type in any application hydraulics, engine, gear box, transformers, in real time – the **OQS** will continuously monitor, detect and report any quality change.

The **OQS** oil condition monitoring sensor feature:

- Connected to **IOT4Z**
- Detects and measures all oil condition changes, no matter the cause, wear or contamination
- Even the smallest change is detected enabling early detection of issues before equipment damage
- Absolute quality change detection and measurement accuracy and consistency
- Quality engineered from stainless steel. Suitable for deployment on any equipment in any environment
- Continuous inline monitoring in real time with instant detection and reporting
- Simple to configure and install. Long term maintenance free continuous operation

The **OQS** oil condition monitoring sensor benefits:

- Less downtime and less maintenance significantly reduce ongoing operating costs
- Optimize service intervals without risking equipment performance and reliability
- Ensures your equipment is in optimal condition making a safer working environment
- Increase equipment efficiency
- Reduce oil consumption, maintenance activity and costs and conserve the environment



INTELLIGENT ELECTRONIC BOARD – IOT4Z



IOT4Z is a modular hardware electronic unit that simplifies the development of industrial applications allowing rapid integration with sensors, actuators, and Cloud services.

IOT4Z mounts a powerful microcontroller and provides many onboard features like:

- DIN-rail mountable case with industrial grade sensor channels
- Support for Wi-fi,
- Bluetooth, Ethernet, LoRa, CAN, RS485, RS232, SD Card, etc.

IOT4Z is the hardware side of the **IOT SOLUTIONS Platform Manager**, a plug-and-play data gathering, processing, reporting solutions for small and large enterprises who need to achieve full visibility and optimization of industrial processes. The **IOT SOLUTIONS Platform Manager** can be installed on a Cloud-based device management service or on local server at the customer premises.

The **IOT SOLUTIONS Platform Manager** is a software management service for organizing, monitoring, and remotely updating connected devices at scale, as well as recording data and history for machine learning mathematical algorithms to make predictions of oil quality future behavior and create automated tasks related to proactive and predictive maintenance of the equipment/application.

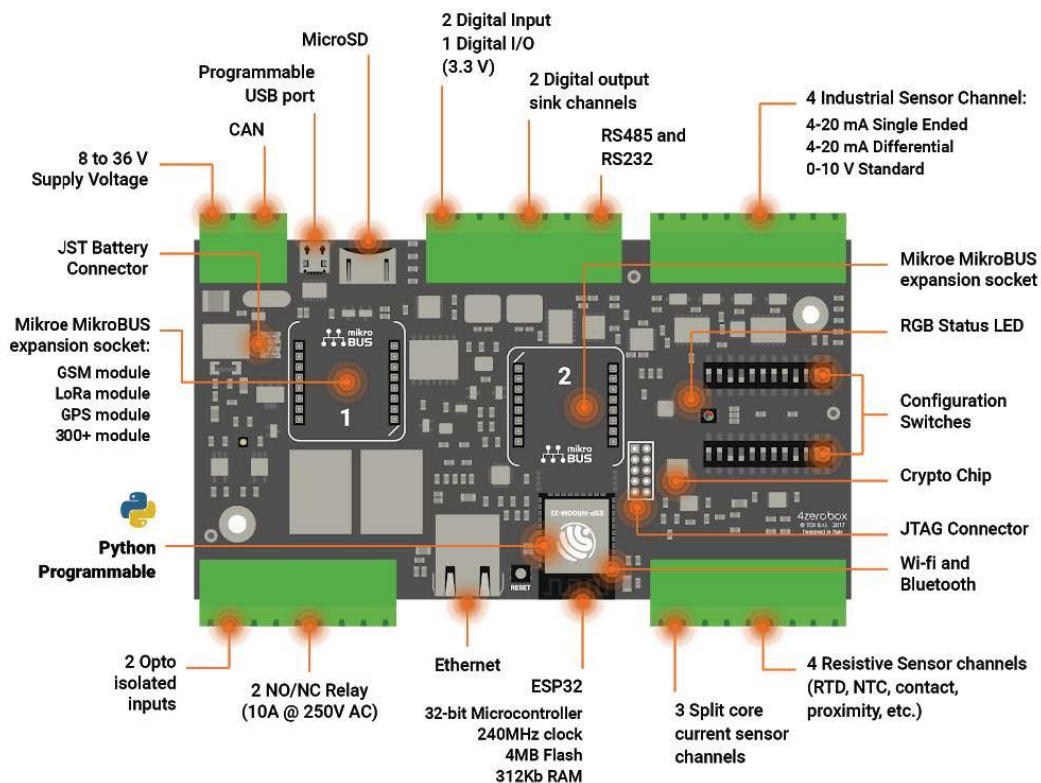


Fig. 1 – IOT4Z Electronic Board

Various sensors can be connected, programmed, monitored and analyzed through the intelligent electronic board **IOT4Z**.

POMS includes the oil quality sensor **OQS** and the contamination monitor **ICM 4.0**. The contamination monitor includes moisture and temperature sensor as well. All sensors are connected to the **IOT4Z** with dedicated communication cables.

IOT4Z is DIN-rail installed in the provided electric enclosure of the **POMS** system.

OQS Oil Quality Sensor technology features:

- Exceptional sensitivity to any change in oil condition –all wear and contamination: for example, water, acid, soot, carbon etc.
- Real time, in line, monitoring second by second of any oil type, in any application, across all temperature and pressure ranges



- Independently certified sensitivity and accuracy

ICM 4.0 Contamination Monitor measures the oil (fluid) level of contamination by counting the number of particles of certain dimensions per unit of volume of fluid. Following the count, the contamination classes are determined, corresponding to the number of particles detected in the unit of fluid.

The ICM 4.0 also indicates water content as a percentage of saturation as well as the fluid temperature.



Fig.2 – OQS Oil Quality Sensor – TAN number graphics



Fig.3 – ICM 4.0 Contamination Monitor – Humidity prediction



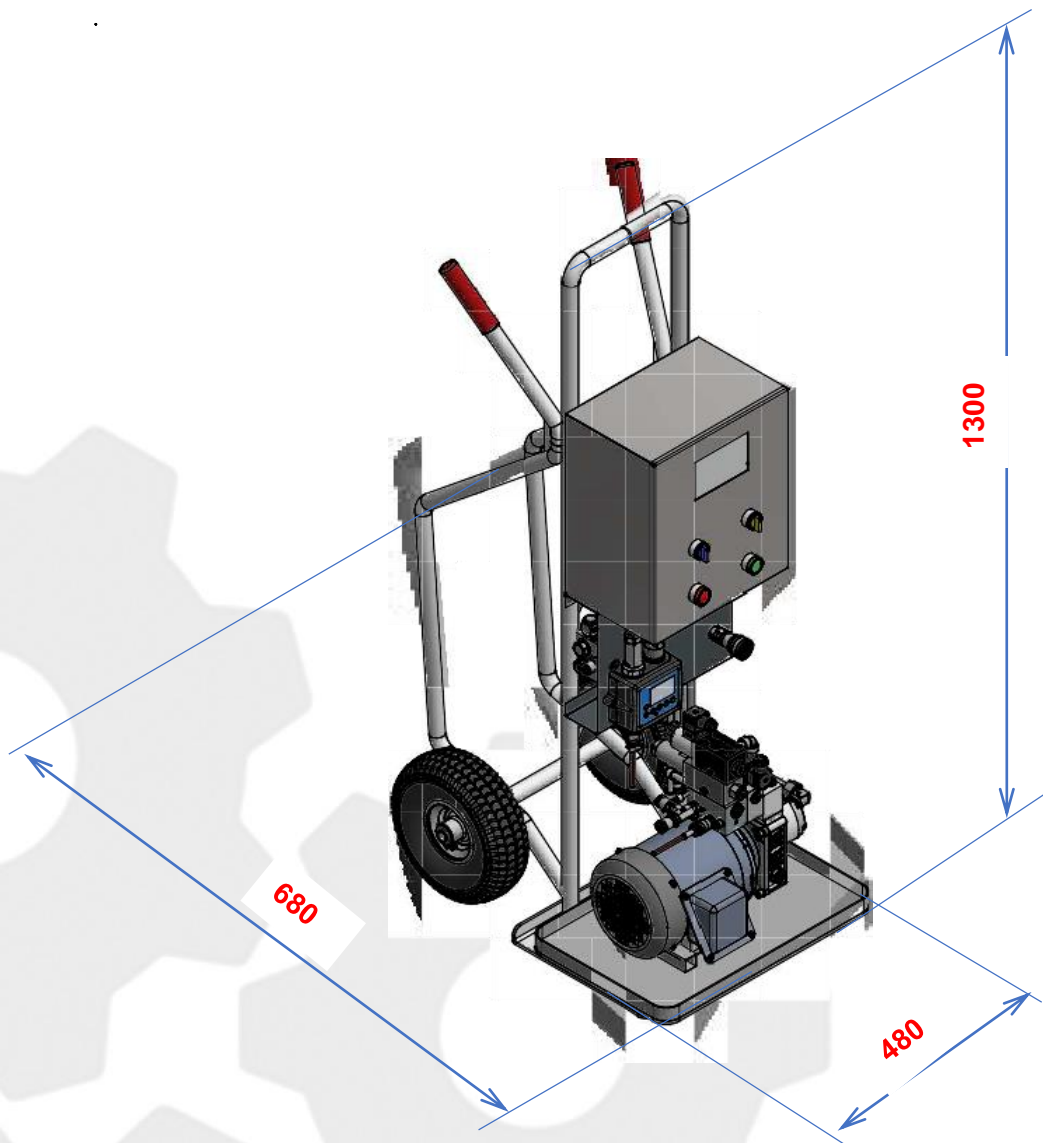
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POMS MAIN DIMENSIONS (MM)



POMS ORDERING INFORMATION

POMS ORDERING CODE

TABLE 1	TABLE 2	TABLE 3	TABLE 4	TABLE 5	TABLE 6	TABLE 7	TABLE 8	TABLE 9	TABLE 10
POMS									

TABLE 1 – BASIC CONFIGURATION

CODE

Proactive Oil Monitoring System, with intelligent electronic board 4ZeroBox

POMS

TABLE 2 – MOUNTING OPTIONS

CODE

Cart mounted – Flexibility, Mobility, Portability

1

Fixed installation – Customized equipment/application

2

Cabinet mounted

3

TABLE 3 – WORKING PRESSURE

CODE

Safety relief pressure – 60 bar; Working pressure – 20 bar

20

TABLE 4 – PUMP/MOTOR CONFIGURATION

CODE

Gear pump K1.2 – 2.29 lit/min

Electric motor 1-phase, 0.50 HP; 1,765 RPM; 115/208-230 V; 60 Hz; TEFC-56C

K12/050-1

Gear pump K1.6 – 2.99 lit/min

Electric motor 1-phase, 0.75 HP; 1,765 RPM; 115/208-230 V; 60 Hz; TEFC-56C

K16/075-1

Gear pump K2.1 – 3.90 lit/min

Electric motor 1-phase, 0.75 HP; 1,765 RPM; 115/208-230 V; 60 Hz; TEFC-56C

K21/075-1



Gear pump K2.7 – 5.04 lit/min Electric motor 1-phase, 1.00 HP; 1,765 RPM; 115/208-230 V; 60 Hz; TEFC-56C	K27/100-1
Gear pump K3.2 – 5.94 lit/min Electric motor 1-phase, 1.50 HP; 1,765 RPM; 115/208-230 V; 60 Hz; TEFC-56C	K32/150-1
Gear pump K3.7 – 6.84 lit/min Electric motor 1-phase, 1.50 HP; 1,765 RPM; 115/208-230 V; 60 Hz; TEFC-56C	K37/150-1
Gear pump K4.2 – 7.74 lit/min Electric motor 1-phase, 1.50 HP; 1,765 RPM; 115/208-230 V; 60 Hz; TEFC-56C	K42/150-1
Gear pump K1.2 – 2.29 lit/min Electric motor 3-phase, 0.50 HP; 1,765 RPM; 208-230/460 V; 60 Hz; TEFC-56C	K12/050-3
Gear pump K1.6 – 2.99 lit/min Electric motor 3-phase, 0.75 HP; 1,765 RPM; 208-230/460 V; 60 Hz; TEFC-56C	K16/075-3
Gear pump K2.1 – 3.90 lit/min Electric motor 3-phase, 0.75 HP; 1,765 RPM; 208-230/460 V; 60 Hz; TEFC-56C	K21/075-3
Gear pump K2.7 – 5.04 lit/min Electric motor 3-phase, 1.00 HP; 1,765 RPM; 208-230/460 V; 60 Hz; TEFC-56C	K27/100-3
Gear pump K3.2 – 5.94 lit/min Electric motor 3-phase, 1.50 HP; 1,765 RPM; 208-230/460 V; 60 Hz; TEFC-56C	K32/150-3
Gear pump K3.7 – 6.84 lit/min Electric motor 3-phase, 1.50 HP; 1,765 RPM; 208-230/460 V; 60 Hz; TEFC-56C	K37/150-3
Gear pump K4.2 – 7.74 lit/min Electric motor 3-phase, 1.50 HP; 1,765 RPM; 208-230/460 V; 60 Hz; TEFC-56C	K42/150-3
Gear pump K1.2 – 2.29 lit/min Electric motor 1-phase, 0.50 HP; 1,750 RPM; 115/208-230 V; 60 Hz; TEXP Class I, Division 1, Groups C and D Class II, Division 1, Groups F and G Frame 143T, Temperature Code T3C, -20 °C...+55 °C	K12/050-1EX
Gear pump K1.6 – 2.99 lit/min Electric motor 1-phase, 0.75 HP; 1,750 RPM; 115/208-230 V; 60 Hz; TEXP Class I, Division 1, Groups C and D Class II, Division 1, Groups F and G	K16/075-1EX



Frame 143T, Temperature Code T3C, -20 °C...+55 °C	
Gear pump K2.1 – 3.90 lit/min Electric motor 1-phase, 0.75 HP; 1,750 RPM; 115/208-230 V; 60 Hz; TEXP Class I, Division 1, Groups C and D Class II, Division 1, Groups F and G Frame 143T, Temperature Code T3C, -20 °C...+55 °C	K21/075-1EX
Gear pump K2.7 – 5.04 lit/min Electric motor 1-phase, 1.00 HP; 1,750 RPM; 115/208-230 V; 60 Hz; TEXP Class I, Division 1, Groups C and D Class II, Division 1, Groups F and G Frame 143T, Temperature Code T3C, -20 °C...+55 °C	K27/100-1EX
Gear pump K1.2 – 2.29 lit/min Electric motor 3-phase, 0.50 HP; 1,750 RPM; 208-230/460 V; 60 Hz; TEXP Class I, Division 1, Groups C and D Class II, Division 1, Groups F and G Frame 143T, Temperature Code T3C, -20 °C...+55 °C	K12/050-3EX
Gear pump K1.6 – 2.99 lit/min Electric motor 3-phase, 0.75 HP; 1,750 RPM; 208-230/460 V; 60 Hz; TEXP Class I, Division 1, Groups C and D Class II, Division 1, Groups F and G Frame 143T, Temperature Code T3C, -20 °C...+55 °C	K16/075-3EX
Gear pump K2.1 – 3.90 lit/min Electric motor 3-phase, 0.75 HP; 1,750 RPM; 208-230/460 V; 60 Hz; TEXP Class I, Division 1, Groups C and D Class II, Division 1, Groups F and G Frame 143T, Temperature Code T3C, -20 °C...+55 °C	K21/075-3EX
Gear pump K2.7 – 5.04 lit/min	K27/100-3EX



<p>Electric motor 3-phase, 1.00 HP; 1,750 RPM; 208-230/460 V; 60 Hz; TEXP</p> <p>Class I, Division 1, Groups C and D</p> <p>Class II, Division 1, Groups F and G</p> <p>Frame 143T, Temperature Code T3C, -20 °C...+55 °C</p>	
<p>Gear pump K3.2 – 5.94 lit/min</p> <p>Electric motor 3-phase, 1.50 HP; 1,750 RPM; 208-230/460 V; 60 Hz; TEXP</p> <p>Class I, Division 1, Groups C and D</p> <p>Class II, Division 1, Groups F and G</p> <p>Frame 143T, Temperature Code T3C, -20 °C...+55 °C</p>	K32/150-3EX
<p>Gear pump K3.7 – 6.84 lit/min</p> <p>Electric motor 3-phase, 1.50 HP; 1,750 RPM; 208-230/460 V; 60 Hz; TEXP</p> <p>Class I, Division 1, Groups C and D</p> <p>Class II, Division 1, Groups F and G</p> <p>Frame 143T, Temperature Code T3C, -20 °C...+55 °C</p>	K37/150-3EX
<p>Gear pump K4.2 – 7.74 lit/min</p> <p>Electric motor 3-phase, 1.50 HP; 1,750 RPM; 208-230/460 V; 60 Hz; TEXP</p> <p>Class I, Division 1, Groups C and D</p> <p>Class II, Division 1, Groups F and G</p> <p>Frame 143T, Temperature Code T3C, -20 °C...+55 °C</p>	K42/150-3EX

TABLE 5 – SOLENOID VALVE SV1 “SYSTEM READY”	CODE
2/2 Solenoid directional valve, direct acting, normally open, 24 VDC	R0
2/2 Solenoid directional valve, direct acting, normally open, 120 VAC	R1
2/2 Solenoid directional valve, direct acting, normally open, 240 VAC	R2
<p>ATEX 2/2 Solenoid directional valve, direct acting, normally open, 24 VDC</p> <p>EPS14ATEX1744 X</p> <p>Ex I M2 Ex e mb I Mb</p> <p>Ex II 2G Ex e mb IIC T4, T5, T6, Gb</p>	R0EX



Ex II 2D Ex tb IIIC T135 °C, T100 °C, T85 °C Db	
ATEX 2/2 Solenoid directional valve, direct acting, normally open, 120 VAC EPS14ATEX1744 X Ex I M2 Ex mb I Mb Ex II 2G Ex mb IIC T4, T5, T6, Gb Ex II 2D Ex mb IIIC T135 °C, T100 °C, T85 °C Db	R1EX
ATEX 2/2 Solenoid directional valve, direct acting, normally open, 240 VAC EPS14ATEX1744 X Ex I M2 Ex mb I Mb Ex II 2G Ex mb IIC T4, T5, T6, Gb Ex II 2D Ex mb IIIC T135 °C, T100 °C, T85 °C Db	R2EX

TABLE 6 – SOLENOID VALVE SV2 “OIL QUALITY SENSOR”	CODE
Solenoid directional spool valve, 24 VDC	Q0
Solenoid directional spool valve, 120 VAC	Q1
Solenoid directional spool valve, 240 VAC	Q2
ATEX Solenoid directional spool valve, 24 VDC ATEX 2014/34/UE Ex I M2 Ex db I Mb Ex II 2G Ex d IIC T4, T6, Gb Ex II 2D Ex tb IIIC T135 °C, T85 °C Db	Q0EX
ATEX Solenoid directional spool valve, 120 VAC ATEX 2014/34/UE Ex I M2 Ex db I Mb Ex II 2G Ex d IIC T4, T6, Gb Ex II 2D Ex tb IIIC T135 °C, T85 °C Db	Q1EX
ATEX Solenoid directional spool valve, 240 VAC ATEX 2014/34/UE	Q2EX



Ex I M2 Ex db I Mb
 Ex II 2G Ex d IIC T4, T6, Gb
 Ex II 2D Ex tb IIIC T135 °C, T85 °C Db

TABLE 7 – OIL QUALITY SENSOR	CODE
None	0
OQS Oil quality sensor – ½" BSPP connection	OQS-1
OQS Oil quality sensor – ½" NPT connection	OQS-2
ATEX OQS Oil quality sensor – ½" BSPP connection Ex ic IIA T3 Gc	OQS-1EX
ATEX OQS Oil quality sensor – ½" NPT connection Ex ic IIA T3 Gc	OQS-2EX

TABLE 8 – IN-LINE CONTAMINATION MONITOR	CODE
None	0
ICM 4.0 without moisture and temperature sensor for mineral/synthetic oils	10M
ICM 4.0 without moisture and temperature sensor for water-based fluids	10W
ICM 4.0 with moisture and temperature sensor for mineral/synthetic oils	11M
OPCom without moisture and temperature sensor for mineral/synthetic oils	20M
OPCom without moisture and temperature sensor for water-based fluids	20W
OPCom with moisture and temperature sensor for mineral/synthetic oils	21M
OPCom with moisture and temperature sensor for water-based fluids	21W
ATEX ICM 4.0 without moisture and temperature sensor for mineral/synthetic oils ATEX Zone 2, Cat 3G, EX, nR, IIB, T5, GC, IP66	10M-EX
ATEX ICM 4.0 without moisture and temperature sensor for water-based fluids ATEX Zone 2, Cat 3G, EX, nR, IIB, T5, GC, IP66	10W-EX
ATEX ICM 4.0 with moisture and temperature sensor for mineral/synthetic oils	11M-EX



ATEX Zone 2, Cat 3G, EX, nR, IIB, T5, GC, IP66

TABLE 9 – IN-LINE CONTAMINATION MONITOR DISPLAY AND KEYPAD

CODE

None

0

ICM 4.0 with keypad and display

1K

OPCom with keypad and display

2K

TABLE 10 – ELECTRIC ENCLOSURE

CODE

NEMA 4/4X/12 Electric control enclosure 12"x12"x8", carbon steel

EE-CS

NEMA 4/4X/12 Electric control enclosure 12"x12"x8", stainless steel

EE-SS

Explosion-proof, Flame-proof Electric control enclosure 12"x12"x8", aluminum

Class I, Division 1, Gas Groups BCD

Class II, Division 1, Gas Groups EFG

Class III

NEMA Type 4, 7, 9

NEMA Type 4X (w/ SS cover bolts)

Class I, Zone 1, AExd IIB

EE-EX