

Patrick Pal

Fuel & Oil Cleanliness Analyser

User Manual



March 2018

V1.1

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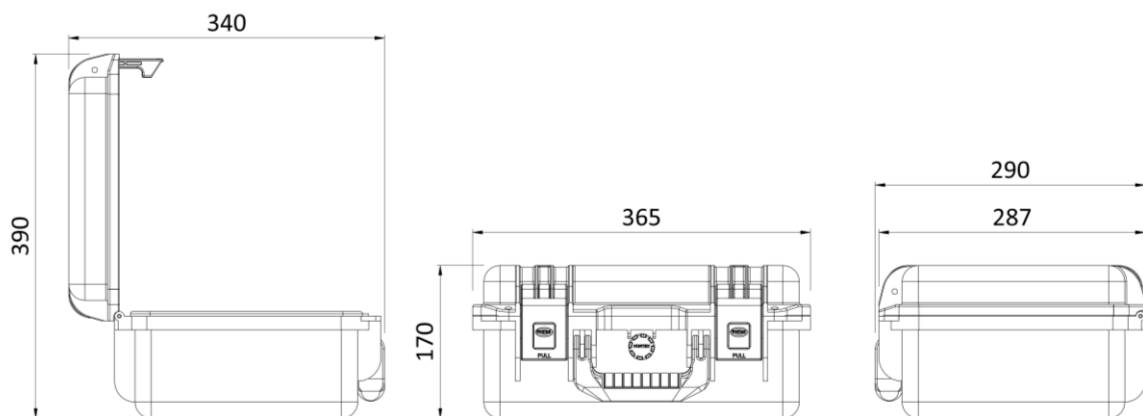
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Specifications

Specification	Detail
Dimensions	(w)365 mm x (d)290 mm x (h)170 mm
Weight	5.5 kg
Finish	Black HPX resin
Nominal Battery Voltage	15.0 VDC
Charge Voltage	16.8 VDC
Capacity	5.2 Ah
Charge time	2 hours (80%) 5 hours (100%)
Run time	3 hours
Modes of operation	Tank sampling Bottle sampling (1000ml minimum sample bottle recommended)
Cleanliness standards	ISO 4406, NAS 1638, SAE AS4059
Pump type	Gear pump
Duty cycle	Continuous
Viscosity range	1-320 cSt
Fluid compatibility	Diesel & oil (hydraulic, lubrication, mineral, synthetic)
Fluid temperature	-10 to 55°C (oils) -10 to 50°C (diesel)
Connections	1604 minimess test points, with 0.6m long 8mm tubing
Pressure	2.5 bar max (up to 350 bar with optional High Pressure device)
Operating temperature	0°C to +50°C
Environment	Lid closed – IP67 Lid open – IP54
Maximum humidity	97% relative humidity, non-condensing
Certification	Factory calibration certificate CE declaration
Verification frequency	12 months recommended



Typical Applications

Typical fuel applications include:

- Test rigs
- Emergency standby power generation
- Diesel fuel systems
- Automotive Industry
- Marine and offshore technology
- Bulk fuel storage depots
- Fuel polishing systems
- Tank cleaning equipment

Typical oil applications include:

- Mining / Heavy industry
- Wind power
- Process technology
- Railway
- Lifting and materials handling
- Hydraulic and mechanical presses
- Construction equipment

Health, Safety & Environmental Considerations

- This equipment should only be used for its intended purpose by competent and authorised persons, inappropriate use could cause serious injury or death.
- Prolonged contact with oil can cause damage to the skin. Appropriate PPE (personal protective equipment) should be worn when operating the unit e.g. protective gloves, safety glasses, safety shoes etc. Always observe local health and safety requirements.
- The unit should only be used on a flat, even surface and be attended at all times.
- Do not operate switches with wet hands.
- The unit must always be disconnected from the mains supply before carrying out any routine maintenance or repairs.
- Electrical cables and tubes should be checked for any signs of damage before starting the unit.
- Ensure a spill kit is available in case of any accidental spills.
- Used samples must be disposed of in accordance with local environmental requirements.

Basic Description

Whether on-site or in the laboratory, the range of self-contained oil and fuel cleanliness analysers will provide instant readings to allow you to fully understand the condition of your oils and fuels.

Samples from oil and fuel tanks or sample bottles can be analysed quickly and accurately, thereby minimising the frequency of laboratory analysis. This pro-active maintenance approach is ideal for sites with multiple storage tanks, thereby making the range of analysers the ultimate in survey and diagnostic equipment.

Built-in datalogging allows for data to be transferred to a portable data logger such as the MultiSystem 5060 for display in a graphical format, or real-time monitoring via the CAN/RS232 and 4- 20mA connections. By identifying the fluids cleanliness, the user can be alerted to the need for corrective action.

Best Efficiency

During the process of taking fuel or oil samples it is easy to agitate and aerate the samples which when passed through the analyser can lead to inaccurate results. It is recommended to either let the sample sit for a couple of hours or to use a sample pump to draw out the air under negative pressure. It is advisable to use a sample bottle size of at least 1000ml to mitigate aeration problems.

Precautionary Measures

- The portable analysers are designed for diesel fuel, hydraulic oils and lubrication oils only.
- It is not to be used for highly volatile fluids, such as gasoline, paint thinners etc.

CAUTION - DO NOT USE THE UNIT WITH THE FOLLOWING FLUIDS:

Fluids not to be used	Related dangers
Gasoline	Fire / Explosion
Inflammable liquids with PM <55°C	Fire / Explosion
Water	Oxidation
Corrosive chemicals	Oxidation / Injury to persons
Solvents	Fire / Explosion / Damage to gaskets

Component Identification



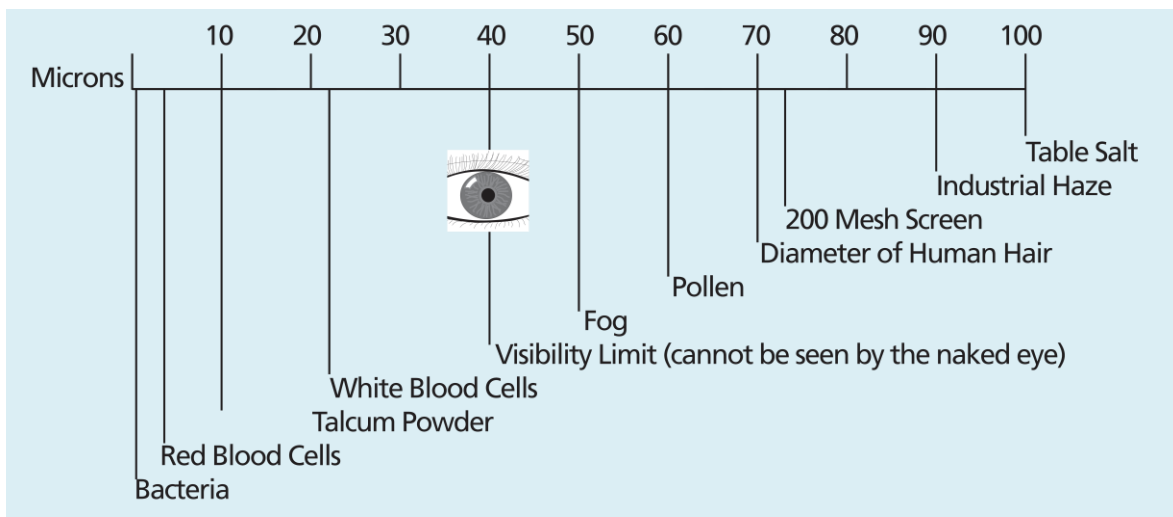
Key:

1.) On/Off Switch	5.) 4-20mA Output Connection
2.) Charging port	6.) Return / Outlet (1604 Minimesh Test Point)
3.) CAN/RS232 Output Connection	7.) Suction / Inlet (1604 Minimesh Test Point)
4.) Patrick Particle Counter	

Operational Guidelines

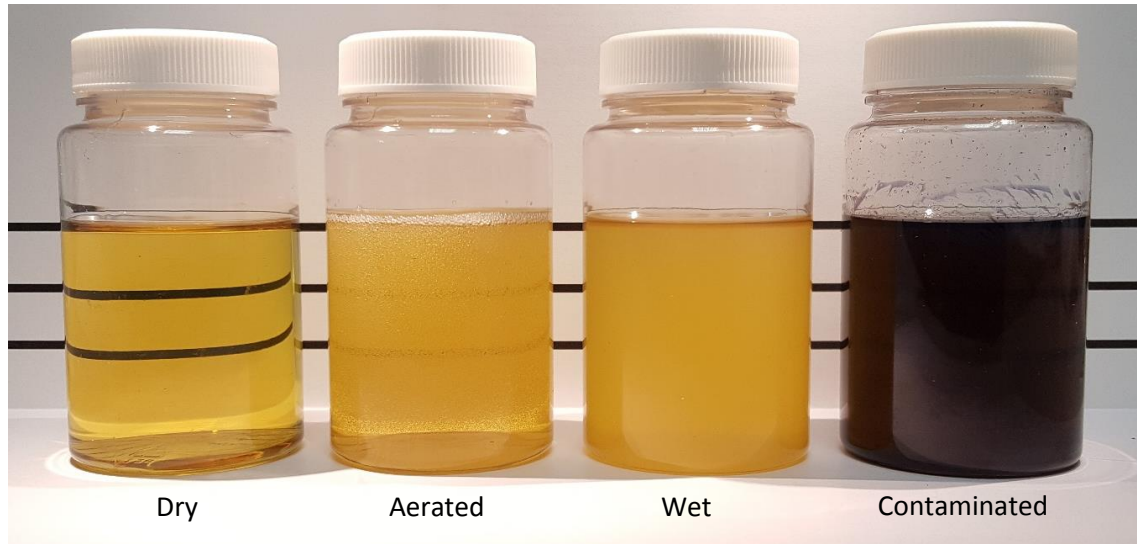
To get the most accurate results from the portable analysers follow the below as a guide:

- When pulling a fresh fluid sample, try to avoid agitation and aeration. It may be beneficial to let the sample sit, allowing air to rise out. The higher the fluids viscosity the longer it will need to sit, this process can be sped up by warming the fluid, therefore reducing the viscosity.
- Portable analysers are designed to detect particulate contamination the eye can't see. Carry out a visual inspection of the sample before passing it through the analyser. If particles of dirt are visible, or the sample is hazy indicating high water contamination it is safe to assume the sample is out of specification and requires cleaning.
- Passing highly contaminated samples through the unit can blind the particle counter, reducing the accuracy of readings.



- Wet diesel/oil samples can cause inaccurate high readings and should be avoided.
- Keep the suction and discharge hoses clean, stored in an air tight bag and regularly check the suction strainer to ensure accuracy of samples and unrestricted flow.
- Avoid running the unit dry for longer than 30 seconds to prevent damage to the pump gears.

- Erratic or high counts are often caused by a high water content, an aerated sample or blockage/reduced flow. A dark sample, such as engine oil with high carbon contamination can stop the laser light penetrating the fluid sample and prevent the particle counter from seeing anything. Always visually inspect the fluid sample before passing it through the unit.



- When sampling from a bottle it's advisable to use a 300-1000ml sample, with the suction tube at the bottom and delivery tube near the top allowing air the rise out faster. Higher viscosity fluids may benefit from a larger sample size.
- The internal gear pump can overheat when exposed to fluid viscosities above 320 cst. A 4 bar check valve is fitted internally to help protect the pump. Warming a fluid sample will reduce the viscosity and strain on the pump. This will also prolong available battery power.

Fluid Viscosity

The portable analysers are design to handle a fluid viscosity of up to 320 cSt (ISO 68 at 15°C for example or ISO 100 at 21°C). It's possible to pass higher viscosity oils through the unit if they are preheated up to 40°C.

Note that as a pre-heated oil passes though the unit it will cool, therefore increasing its viscosity and strain on the pump. Thick oils should not be left in the unit to cool, as the pump may struggle to start.

Temperature °C	Viscosity (cSt)				
	ISO 32	ISO 46	ISO 68	ISO 100	ISO 150
10.0	161	262	442	711	1185
11.0	151	244	409	656	1088
12.0	141	227	379	605	1001
13.0	132	212	352	560	922
14.0	124	198	327	518	850
15.0	116	185	304	480	785
16.0	109	173	283	446	726
17.0	103	162	264	414	671
18.0	97	152	246	385	622
19.0	91	142	230	359	577
20.0	86	134	215	334	536
21.0	81	126	201	312	498
22.0	77	118	188	291	464
23.0	73	112	177	272	432
24.0	69	105	166	255	403
25.0	65	99	156	239	376
26.0	62	94	147	224	352
27.0	59	89	138	210	329
28.0	56	84	130	198	308
29.0	53	80	123	186	289
30.0	51	75	116	175	271
31.0	48	72	109	165	254
32.0	46	68	103	155	239
33.0	44	65	98	147	225
34.0	42	61	93	139	212
35.0	40	58	88	131	199
36.0	38	56	83	124	188
37.0	36	53	79	117	178
38.0	35	50	75	111	168
39.0	33	48	71	105	159
40.0	32	46	68	100	150

Starting & Stopping the Unit

To power up the unit toggle the On/Off switch, this will switch on both the pump and Patrick particle counter. When switching on the unit make sure hoses are connected and fluid is ready for sampling.

Battery Charging

The fuel and oil cleanliness analysers are fitted with a li-Ion battery, providing approximately 3 hours of run time. A charge port on the fascia allows for charging of the battery, which from a complete discharge takes approximately 5 hours (2 hours to reach 80% charge). To maintain the overall life of the battery, avoid complete discharges.



Battery Charging Unit:

The battery charge unit is designed for indoor use only and should not come into contact with water, dust, oils or grease. To prevent overheating, the product should not be covered whilst in use.

The mains socket should be easily accessible. In the event of operational error, the plug should be immediately removed from the socket.

A fuse protects the product against short circuit and overload. If the fuse needs to be replaced, the same type and size of fuse should always be used.

Charging Instructions:

It is recommended you connect the charger to the portable analyser and mains socket before switching on the power at the socket. This will reduce the spark that may occur due to the difference in potential between the charger terminals and charge port terminals.

When charging is complete, disconnect the charger from the portable analyser before disconnecting it from the mains.

An LED in the battery charger unit indicates the following status:

Condition	Description	LED Status
Constant current phase	0-80% charged condition	Orange
Constant voltage phase	80-95% charged condition	Yellow
Charging complete	100% charged condition	Green

Suction & Return Hose Connections

The portable analysers come equipped with Minimesse Test Points. These seal automatically as the coupling is removed, so the connections won't leak during transit.

To connect the hoses, screw them onto the Minimesse Test Points, hand tight only.

Make sure the hose assembly with the strainer is always used on the suction port.



To disconnect the hoses, unscrew from the Minimesse Test Point. The hose assemblies do not contain a self-seal mechanism and may drip; keep an oil absorbent spill mat ready and store hoses in a plastic bag when not in use.

Suction Strainer

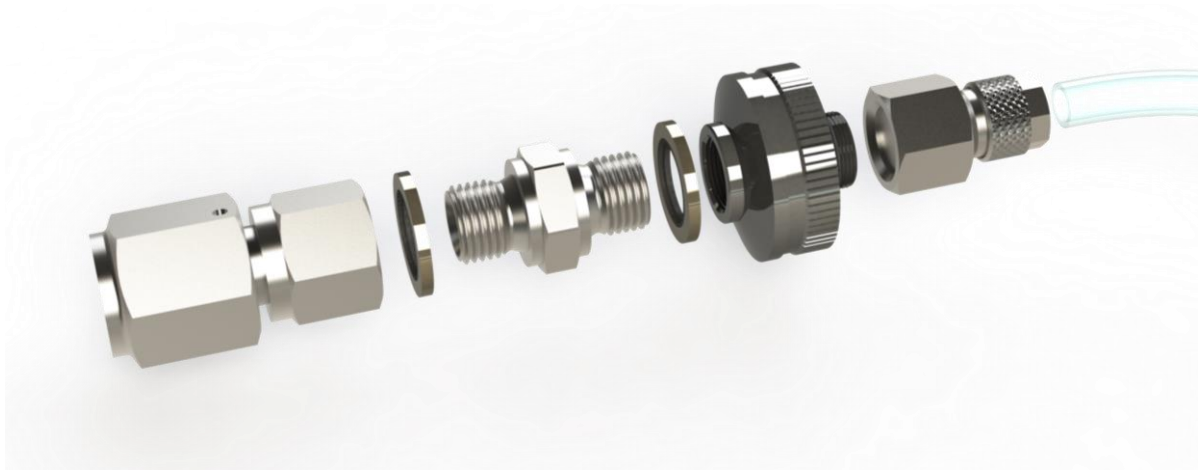
Portable analysers are supplied with a strainer fitted to the suction tube assembly. The inline strainer has a 270 micron mesh and is used for keeping accidental debris from damaging the pump gears or clogging other components.

The strainer must be used always, otherwise the units warranty will become void.

The strainer can be disassembled for cleaning as shown below and should be checked periodically to ensure the flow is unrestricted.



When taking apart the strainer, note the orientation of the mesh for correct reassembly.



High-Pressure Device (Patrick-Pal-HP)

The –HP option allows the portable analyser to sample directly from a high-pressure line with a maximum allowable inlet pressure of 350 bar, reducing this down to 2.5 bar at the outlet.



The High-Pressure Device can be purchased separately and used with existing portable analysers by connecting it to the end of the suction tubing as shown below.



While the High-Pressure Device feeds the portable analyser with fluid pressurised to 2.5 bar, the pump must be switched on to maintain a steady flowrate.

Fluid passing out of the discharge/outlet tube should be fed into a suitably sized sample container for disposal or emptying back into the fluid reservoir.

Patrick Particle Counter

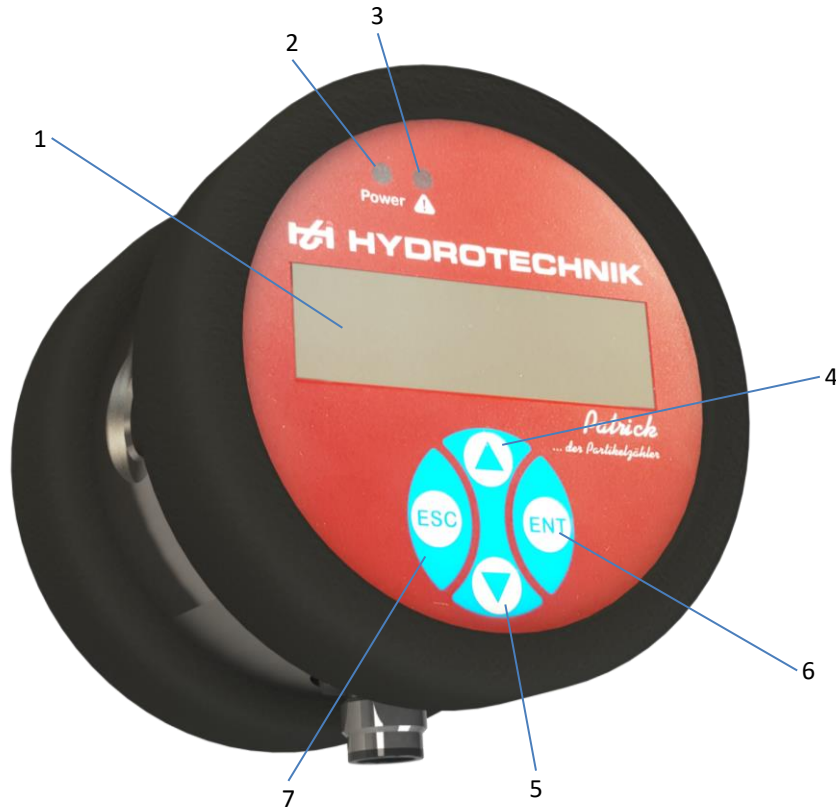
Specifications

Specification	Details
Voltage supply	9 to 36 VDC, 300 mA
Storage temperature	–20 to 85 °C (–4 to 185 °F)
Operating temperature	–10 to 60 °C (14 to 140 °F)
Light source	Laser diode, Class I
Particle size	4, 6, 14 and 21 µm
Storage/operating humidity	95% relative humidity, non-condensing
Fluid compatibility	Hydraulic and lubrication oils, mineral, synthetic
Reports	ISO 4406 cleanliness codes
Wetted materials	High-grade steel, sapphire, copper
Sealing material	NBR
Performance verification	Optional validation certificate available (± 0.5 ISO code with ISO MTD at 2.8 mg/L concentration at 100 mL/min)
Measuring range (ISO 4406)	10-24
Interfaces	CANopen, RS232
Current outputs	4-20 mA
Measuring accuracy	± 1.0

Calibration

The instrument cannot be calibrated by the user. Contact the manufacturer for instrument verification.

Device Layout



LCD Display (1)

The display shows the last calculated purity class and the time to the next measurement, or the remaining measuring duration.

Power Indicator (2)

Operating voltage is present if the indicator is lit green.

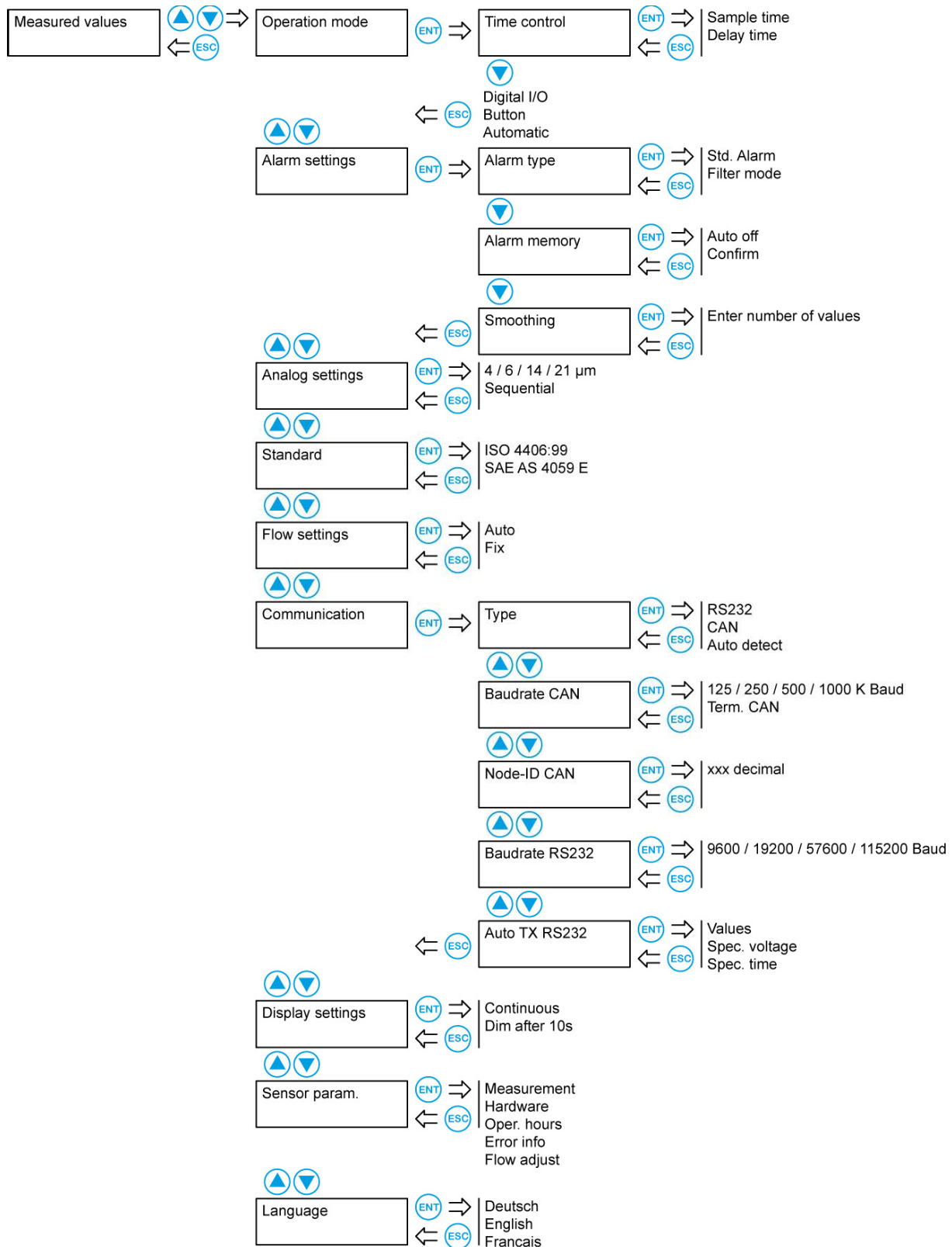
Alarm Indicator (3)

This is lit red if an alarm is present. You may program two alarms, please see the information in the respective chapter of this manual.

Keys (4, 5, 6, 7)

	Opens the main menu; moves the highlighting bar upward; increases a value
	Opens the main menu; moves the highlighting bar down; lowers a value
	Selects menu items and opens submenus; confirms entries; jumps to the next digit
	Returns to the higher menu level; leaves the main menu; cancels entries

Menu Tree



Selecting Operation Mode



Do not use a measuring duration of less than 30 seconds. The particle counter needs more time to detect all particles accurately. The cleaner the oil, the longer the measuring duration. ISO 4406:99 purity levels of 15 and better should be re-measured after 120 seconds, latest.

Patrick can be used in three operation modes that can be selected in the menu:

Time	<p>Patrick works with the set measurement duration and wait time between the measurements.</p> <p>Example: one minute measurement duration and four minutes wait time produces a result every five minutes. In fact, it takes two to three seconds longer since the laser is regulated at the beginning of each measurement.</p> <p>With activated and marked Timer option, press ENT again to set the measurement duration and wait time:</p> <ul style="list-style-type: none"> • Measurement duration: <ul style="list-style-type: none"> ○ Press ENT to start the entry. ○ Arrows appear next to the first digit. ○ Press ▲ ▼ to set the first digit. ○ Press ENT to change to the next digit. ○ Set all the digits of the measurement duration this way, confirm with ENT and press ESC. • Wait time: <ul style="list-style-type: none"> ○ Set the desired wait time as described for the measurement duration.
Digital I/O	<p>The measurement lasts as long as there is a signal on the input. The digital input is active if it is connected to a ground. Then there is a current of:</p> $I = (U - 1.1 \text{ V}) / 5600 \Omega$ <p>With U = supply voltage.</p> <p>Press the ENT key to start and end a measurement.</p>
Automatic	<p>In automatic mode, the measurement time is determined dynamically, depending on the flow and the particle concentration.</p> <p>The measurement can last between 45 and 300 seconds. A measurement value should be awaited at the earliest after 45 seconds if in this time the defined number of particles was detected. If the defined number of particles has also not been detected after 300 seconds, the measurement is cancelled, and the result displayed. The result is then not backed up statistically.</p>

Configuring Alarms

Alarm Type

Select from the following types of alarm:

Standard Alarm	As soon as a channel exceeds a set threshold, the alarm is triggered.
Filter Mode	Serves to monitor a cleaning: As soon as all activated channels have dropped below a threshold, the alarm is triggered.
Temperature	As soon as the temperature exceeds the set threshold, the alarm is triggered. To deactivate the alarm, the limit value must be 00. The measured temperature does not correspond directly to the temperature of the oil.

Activate the desired alarm type with  and then press  again to display the alarm thresholds:

Standard Alarm			
0/	0/	0/	0

Press  to start the entry. Arrows appear next to the first “zero”.

Press   to set the first alarm threshold. Press  to change to the next size class. Set the alarm thresholds this way for all size classes. If one should not be considered, set its value to 0.

The thresholds set for the standard alarm also apply for the filter mode, and vice-versa.

Alarm Memory

Here you select the behaviour of Patrick when an alarm is present. This can either be switched off automatically (Autom. off), or it can remain active up to an acknowledgement by keypress (Confirm).

Smoothing

In a hydraulic system, short-term concentration increases (peaks) can occur, which are not representative for the overall system. The particle counter detects this change and displays these correctly.

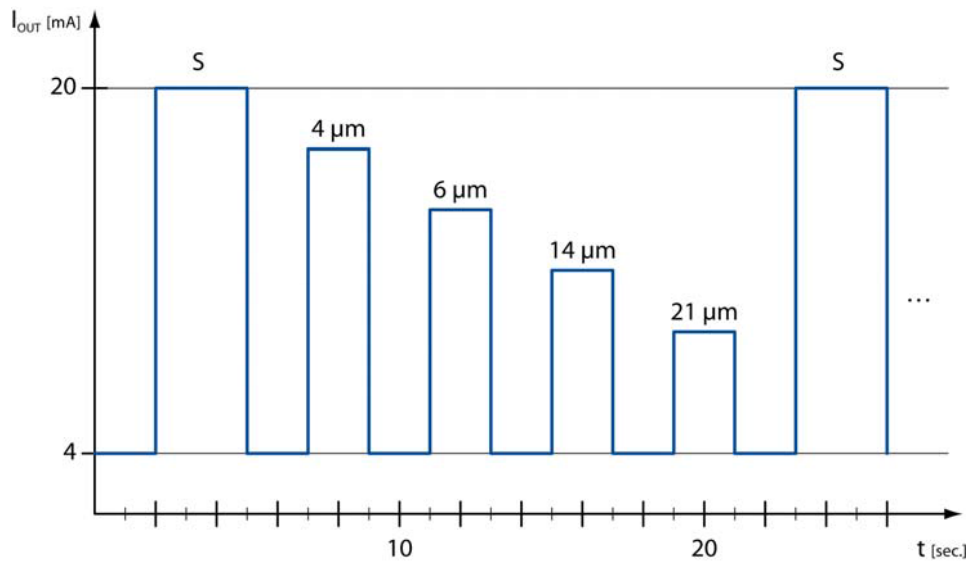
Smoothing ensures that for a set alarm threshold, an alarm is not triggered for each peak. The particle concentrations relevant for the alarm are smoothed internally and an alarm is only output in case of a long-lasting measurement change. The measurement value output and display are not affected by the filtering:

- With a volumetric flow of 0 ml/min or an ISO class of 0 to 4µm, the filter function is deactivated automatically.
- Adjustment range: 1 ... 255 (1 = deactivated)
- Factory setting: 2
- Recommended value: ≤10

Configuring Analog Output

Here you select which data should be output via the analog output:

4 / 6 / 14 / 21	Select the class which measured value shall be transferred via the analog output; it is a linear output in full ordinal numbers (4 mA equals to cleanliness code "zero", 20 mA to cleanliness code "26"); the maximum burden depends on the supply voltage ($R_{max} = ((U - 2 V) / 20 \text{ mA}) - 100 \Omega$)
Sequential	The measured values of all classes are transferred sequentially (see below)



Configuring the Display

The display can be configured to adjust the following:






- Lighting – Select whether the background lighting should be, permanently active or deactivated after 10 seconds
- Contract – Adjustment of the LCD contrast via bar display.

Setting the Language

Within the operating menu it is possible to change the displayed language.

Sensor Parameters

Various parameters of the particle counter can be displayed:

Measurement results	<p>Displays the last measurement results of the size glasses and the index of the volumetric flow.</p> <p>Press  to switch the display between the size classes.</p> <p>Press  to display the previous measurement result.</p>
Electronics	<p>Displays various measurement values of the electronics.</p> <p>Press  to display additional parameters.</p>
Operating hours	Displays the number of operating hours of sensor and laser.
Error info	<p>Displays a list of the error messages and alarms that have occurred.</p> <p>Press   to page through the available messages.</p>
Set flow	<p>Here the level of the volumetric flow is displayed.</p> <ul style="list-style-type: none"> • If the bar is between L and H, the volumetric flow is OK. • If the bar fills the entire diagram or if no bar is visible and H/L is flashing, the volumetric flow is too high or too low and it must be adjusted. <p>The limits of the display (bar diagram) are between L = 50 ml/min and H = 400 ml/min.</p> <p>The display is updated every 10 seconds.</p> <p>If the FIX flow is set to a static value, this is also displayed. However, the bar will not change.</p>

Troubleshooting

General Operational Errors

Problem	Possible Cause	Solution
Unit will not switch on.	Fully discharged battery.	Connect to the mains and fully charge the unit.
Unit will not prime.	Internal tubing/pump gears are dry. High viscosity fluids. Restriction in the suction/discharge lines.	Prime the pump using a lower viscosity fluid. Raise the height of the fluid sample to gravity assist. Check the hoses and strainer for blockages.
Identical values in all size classes.	Air in the oil.	Let the fluid sample sit, allowing air to rise out. Higher viscosity fluids may take longer and will benefit from being heated.
Laser current high / photo voltage low.	Air in the oil. Soiled counter.	Reduce aeration of the sample as above. Flush with clean oil/diesel.

Error Codes

Bit	ECR 1	ECR 2	ECR 3	ECR 4
0		First limit value calibration (S1) reached		Laser current too high
1		Last limit value calibration (S5) reached		Laser current too low
2				Photodiode voltage too low
3				Photodiode voltage too high
4				Temperature > 80°C
5				Temperature < -20°C
6				
7				Measurement mode = Automatic
8	Concentration ≥ ISO 23			Measurement running
9	Flow too high			Measurement mode = timed
10	Flow too low			Measurement mode = Digital I/O
11	ISO(i+1) ≥ ISO(i)			Measurement mode = Key
12				Alarm mode: 0 = Standard 1 = Filter
13	Autoparts not reached			Power Up = 1 before first measurement
14	Concentration ≤ ISO 9			Alarm concentration
15				Alarm temperature

Errors on the Display

After each measurement, Patrick checks various conditions. If the check produces errors during measurement or on the instrument, then these are output on the display.

The errors are output on the left of the display. The error text flashes. If more than one error is displayed, then the error texts are output so that they alternate.

Error Text	Description	Error Code
FL LO	Flow too low	ECR 1, Bit 10
FL HI	Flow too high	ECR 1, Bit 9
CELL	Error in measurement cell	ECR 4, Bit 0, 1, 2 or 3
C LO	Concentration too low	ECR 1, Bit 14
C HI	Concentration too high	ECR 1, Bit 8
2 CLN	Measurement result not plausible	ECR 1, Bit 13

Particle Count and Other Codes

ISO Codes (ISO4406)

The table below shows the ISO 4406 codes by number of particles per 1 ml of fluid sampled.

ISO 4406 Code	Counts/mL	
	Greater than	Up to/including
0	0	0.01
1	0.01	0.02
2	0.02	0.04
3	0.04	0.08
4	0.08	0.16
5	0.16	0.32
6	0.32	0.64
7	0.64	1.3
8	1.3	2.5
9	2.5	5
10	5	10
11	10	20
12	20	40
13	40	80
14	80	160
15	160	320
16	320	640
17	640	1300
18	1300	2500
19	2500	5000
20	5000	10000
21	10000	20000
22	20000	40000
23	40000	80000
24	80000	160000
25	160000	320000
26	320000	640000
27	640000	1300000
28	1300000	2500000
29	2500000	∞

NAS Codes (NAS 1638)

Class	Particle Size Range (Particles/100 mL)	
	5 to 15 μm	15 to 25 μm
00	125	22
0	250	44
1	500	89
2	1,000	178
3	2,000	356
4	4,000	712
5	8,000	1,425
6	16,000	2,850
7	32,000	5,700
8	64,000	11,400
9	128,000	22,800
10	256,000	45,600
11	512,000	91,200
12	1,024,000	182,400

SAE Codes (SAE AS4059)

Size, ISO 4402 calibration, or optical microscope count ¹	Maximum Contamination Limits (Particles/100 mL)					
	> 1 μm	> 5 μm	> 15 μm	> 25 μm	> 50 μm	> 100 μm
Size, ISO 11171 calibration, or electron microscope ²	> 4 $\mu\text{m(c)}$	> 6 $\mu\text{m(c)}$	> 14 $\mu\text{m(c)}$	> 21 $\mu\text{m(c)}$	> 38 $\mu\text{m(c)}$	> 70 $\mu\text{m(c)}$
Size Code	A	B	C	D	E	F
Class 000	195	76	14	3	1	0
Class 00	390	152	27	5	1	0
Class 0	780	304	54	10	2	0
Class 1	1560	609	109	20	4	1
Class 2	3120	1220	217	39	7	1
Class 3	6250	2430	432	76	13	2
Class 4	12,500	4860	864	152	26	4
Class 5	25,000	9730	1730	306	53	8
Class 6	50,000	19,500	3460	612	106	16
Class 7	100,000	38,900	6920	1220	212	32
Class 8	200,000	77,900	13,900	2450	424	64
Class 9	400,000	156,000	27,700	4900	848	128
Class 10	800,000	311,000	55,400	9800	1700	256
Class 11	1,600,000	623,000	111,000	19,600	3390	512
Class 12	3,200,000	1,250,000	222,000	39,200	6780	1020

¹ Particle size based on the longest dimension.

² Particle sized based on the projected area equivalent diameter.

Conversion between Standards

ISO 4406 Code 4µm / 6µm / 14µm	Mil Std. NAS 1638	Mil Std. 1246A	ACFTD Gravimetric Level mg/L	SAE Level
21/19/16	10			
20/18/15	9			6
19/17/14	8	300		5
18/16/13	7		1	4
17/15/12	6			3
16/14/12		200		
16/14/11	5			2
15/13/10	4		0.1	1
14/12/9	3			0
13/11/8	2			
12/10/8		100		
10/10/7	1			
12/10/6			0.01	
11/9/6				

Cleanliness Standards Conversion

Equivalent ISO 4406 Code (approx.)	NAS Code	Size Range in Microns (µm)				
		5-15	15-25	25-50	50-100	>100
-	00	125	22	4	1	0
-	0	250	44	8	2	0
12/10/7	1	500	89	16	3	1
13/11/8	2	1,000	178	32	6	1
14/12/9	3	2,000	356	63	11	2
15/13/10	4	4,000	712	126	22	4
16/14/11	5	8,000	1,425	253	45	8
17/15/12	6	16,000	2,850	506	90	16
18/16/13	7	32,000	5,700	1,012	190	32
19/17/14	8	64,000	11,400	2,025	360	64
20/18/15	9	128,000	22,800	4,050	720	128
21/19/16	10	256,000	45,600	8,100	1,440	256
22/20/17	11	512,000	91,200	16,200	2,880	512
23/21/18	12	1,024,000	182,400	32,400	5,760	1,020

ISO 4406 vs NAS 1638 Contamination

Required Cleanliness Codes for Fluid Power Components

Element	Type	ISO 4406 Cleanliness Code
Pump	Piston (slow speed, inline)	22/20/16
	Piston (high speed, variable)	17/15/13
	Gear	19/17/15
	Vane	18/16/14
Valve	Directional	20/18/15
	Pressure control	19/17/14
	Flow control	19/17/14
	Check valve	20/18/15
	Cartridge valve	20/18/15
	Proportional	18/16/13
	Servo valve	16/14/11
Motor	Axial piston	18/16/13
	Radial piston	19/17/13
	Gear	20/18/15
	Vane	19/17/14
Actuator	-	20/18/15
Station Nozzle	Worldwide fuel charter cleanliness standard for fuel delivered	18/16/13

Spare Parts List

For spare parts please contact the sales team at Hydrotechnik.

Warranty Statement

All products manufactured or distributed by Hydrotechnik Ltd are subject to the following, and only the following, Limited Express Warranties, and no others:

For a period of one (1) year from and after the date of delivery of a new Hydrotechnik product, Hydrotechnik warrants and guarantees only to the original purchaser/user that such a product shall be free from defects of materials and workmanship in the manufacturing process. The warranty period for pumps and motors is specifically limited to ninety (90) days from the date of delivery. A product claimed to be defective must be returned to the place of purchase. Hydrotechnik, at its sole option, shall replace the defective product with a comparable new product or repair the defective product. This express warranty shall be inapplicable to any product damaged or impaired by external forces or used for any purpose other than that for which it was originally sold.

THIS IS THE EXTENT OF WARRANTIES AVAILABLE ON THIS PRODUCT. HYDROTECHNIK SHALL HAVE NO LIABILITY WHATSOEVER FOR CONSEQUENTIAL DAMAGES FOLLOWING THE USE OF ANY DEFECTIVE PRODUCT OR BY REASON OF THE FAILURE OF ANY PRODUCT. HYDROTECHNIK SPECIFICALLY DISAVOWS ALL OTHER WARRANTIES, EXPRESS OR IMPLIED INCLUDING, WITHOUT LIMITATION, ALL WARRANTIES OF FITNESS FOR A PARTICULAR PURPOSE (EXCEPT FOR THOSE WHICH APPLY TO PRODUCT OR PART THEREOF THAT IS USED OR BOUGHT FOR USE PRIMARILY FOR PERSONAL, FAMILY OR HOUSEHOLD PURPOSES), WARRANTIES OF DESCRIPTION, WARRANTIES OF MERCHANTABILITY, TRADE USE OR WARRANTIES OF TRADE USAGE.

EC Declaration of Conformity

Manufacturer's Name: Hydrotechnik UK Ltd.

Manufacturer's Address: 1 Central Park, Lenton Lane, Nottingham, NG7 2NR

EC Representative's Name: N/A

EC Representative's Address: N/A

Equipment Description: Portable analysers for fuel and oil

Equipment Model Designation: PATRICK PAL

Application of Council Directive:

EMC Directive 2004/108/EEC
Low Voltage Directive 2006/95/EC
Batteries Directive 2006/66/EC

Referenced Standards:

EN61000-6-3: 2001
EN61000-6-1: 2001
EN61326-1: 2006
CISPR 11
EN60825-1: 2007
EN61010-1:01

I, the undersigned, hereby declare that the equipment specified above conforms to the above Directive(s) and Standard(s).

Signature: 

Printed Name: Chris Banks

Title: Commercial Director

Date: 04th March 2018