



Thruster Oil Filter

CJC™ Filter Separator, PTU2

Filtration and Separation of Thruster Oil



July 2013

Clean Oil - Bright Ideas

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CLEAN OIL
BRIGHT IDEAS

CJC™ Filter Separator PTU2 27/27 PV-DE2H1PW

CJC™ Compendium

REMOVE WATER FROM THRUSTER SYSTEM OIL

Water in thruster gear oil systems is a serious problem costing offshore vessel owners thousands of dollars every year for thruster repairs, oil changes, down time and dockings.

According to an IMCA survey thruster malfunctions accounted for 15% of all lost positions from 1991-94 (not including computer and electrical failures). Another 1993 survey proved that azimuth thrusters failed an average of 7.65 times per year and tunnel thrusters failed an average of 2.80 times per year.

Water in the gear and hydraulic oil account for the majority of thruster breakdowns.

The water is mostly entering the systems through the thruster main seal and although there has been an impressive effort made to develop means to prevent this from occurring, it has not been enough to overcome the water ingress problem. Therefore, it is imperative to consider the means of separating and removing the water from the system oil.

C.C.JENSEN A/S has developed a special CJC™ Filter Separator for keeping thruster systems water free. The CJC™ Filter Separator is operated offline - circulating the oil continuously with its own pump. The filter is fitted with electrical pre-heaters for optimizing water separation from the oil and a fine depth filter retaining solid particles down to 0.8 micron in size.

Many offshore vessel operators world-wide vouch for the performance of the CJC™ Thruster Oil Filter... they have experienced reduced maintenance costs after only 6 months operation with the CJC™ Filter.

For additional information or quotation, please fill out the data sheet on the last page of this booklet and fax to C.C.JENSEN. We look forward to hearing from you.



*Thruster Oil Filter
CJC™ Filter Separator, PTU2*



CLEAN OIL
BRIGHT IDEAS

PTU2 27/27

CJC™ Offline Filter Separator - HYDRAULIC

CJC™ Product Sheet

APPLICATION

The CJC™ Filter Separator PTU2 27/27 Hydraulic is used for hydraulic oils, turbine lube oils and gear oils with a specific weight lower than that of water. The PTU2 27/27 is ideal for separation of water, removal of particles and degradation products.

FUNCTION

The filter pump draws oil from the bottom of the tank and presses it through the filter insert. From the centre of the insert the oil flows down into the coalescer housing where water droplets - if any - adhere to the coalescer element. Here larger drops will form and settle in the bottom of the coalescer housing.

The filter outlet port is placed in the top of the coalescer housing. The filtered oil should be returned to the tank close to the suction pipe of the main system pump.

Note that the return point preferably should be non-pressurized. Contact us in case this is not possible.

On the PTU with automatic water discharge, separated water is drained automatically. The discharge function can be monitored on the unit control box. The PTU models are also available with manual water discharge.

The pressure drop over the filter - and consequently the contaminant absorption of the filter insert - is monitored on the pressure gauge on the filter top.

THE FILTER PUMP

The filter pump is a CJC™ gear wheel pump. The electric motor can be supplied for all standard AC and DC voltages.

FILTER INSERT

The CJC™ Filter Inserts consist of several discs bonded together. The material is cotton linters (cellulose).

OPTIONS

- Preheater
- Tank
- Drip pan
- Automatic water discharger
- Control box

FILTRATION ABILITY

• Water Removal by Separation

The CJC™ Filter Separator removes water from oil to very low levels. The efficiency of water removal depends on the oil type and temperature.

• Particle Removal

All CJC™ Filter Inserts have the following filtration degree:

- 3 µm abs.: 98.7% of all solid particles > 3 µm
- 0.8 µm nom: 50% of all solid particles > 0.8 µm

are retained in each pass.

The dirt holding capacity is 4 litres of evenly distributed solids.

• Degradation Products

Oxidation products, resin / sludge, and varnish are retained by the cellulose material, which will retain appr. 4 kgs of oil degradation products.

To achieve the most efficient water separation on high viscosity oils, preheating the oil before filter pass may be necessary.

Consult C.C.JENSEN A/S for further information.



The CJC™ Filter Separator
PTU2 27/27 PV-E2W

TECHNICAL DATA

Model PTU2 - HYDRAULIC		PTU2 27/27	
		PV	PV-E2W
Pump flow, per hour (std.)	ltr/gal	45-120 / 12-32	
Pump type		PV4	
Pump inlet pressure, max.	bar/psi	0.5 / 7	
Filter Inserts 27/27, std.:	pcs.	1	
Power consumption, aver.	kW	0.18	0.4
Pressure drop, max.	bar/psi	1.8 / 26	
Oil temperature, max.*)	°C / °F	80 / 176	
Dirt holding capacity	ltr/gal	4.4 / 1.2	
Dry weight	kg/lb	60 / 132	72 / 159
Operating weight, wet	kg/lb	75 / 165	87 / 192
Design pressure, filter	bar/psi	4 / 58	
Ambient temperature, max.	°C / °F	40 / 104	
Water discharge		Manual	Automatic

*) Onboard ships: 60 °C / 140 °F

APPLICABLE FILTER INSERTS

Type	Application for
BLAT:	Hydraulic oils, turbine oils and gear oils, high water content.



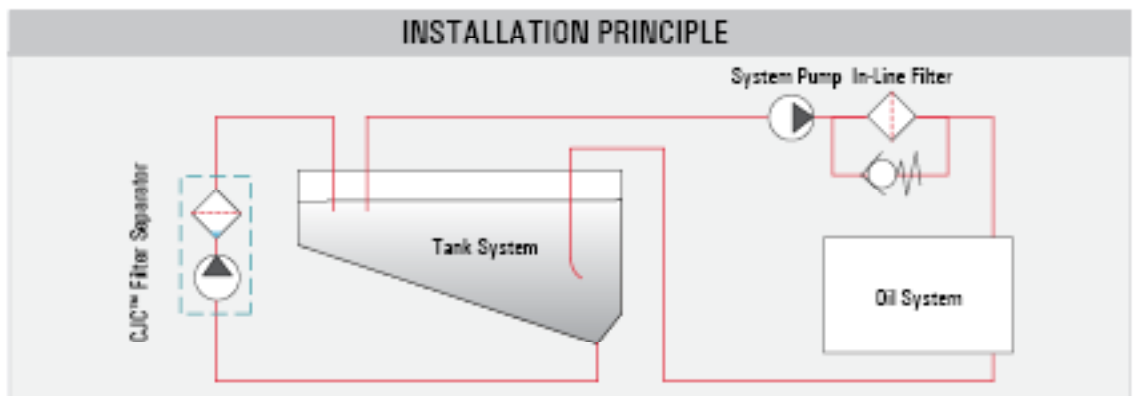
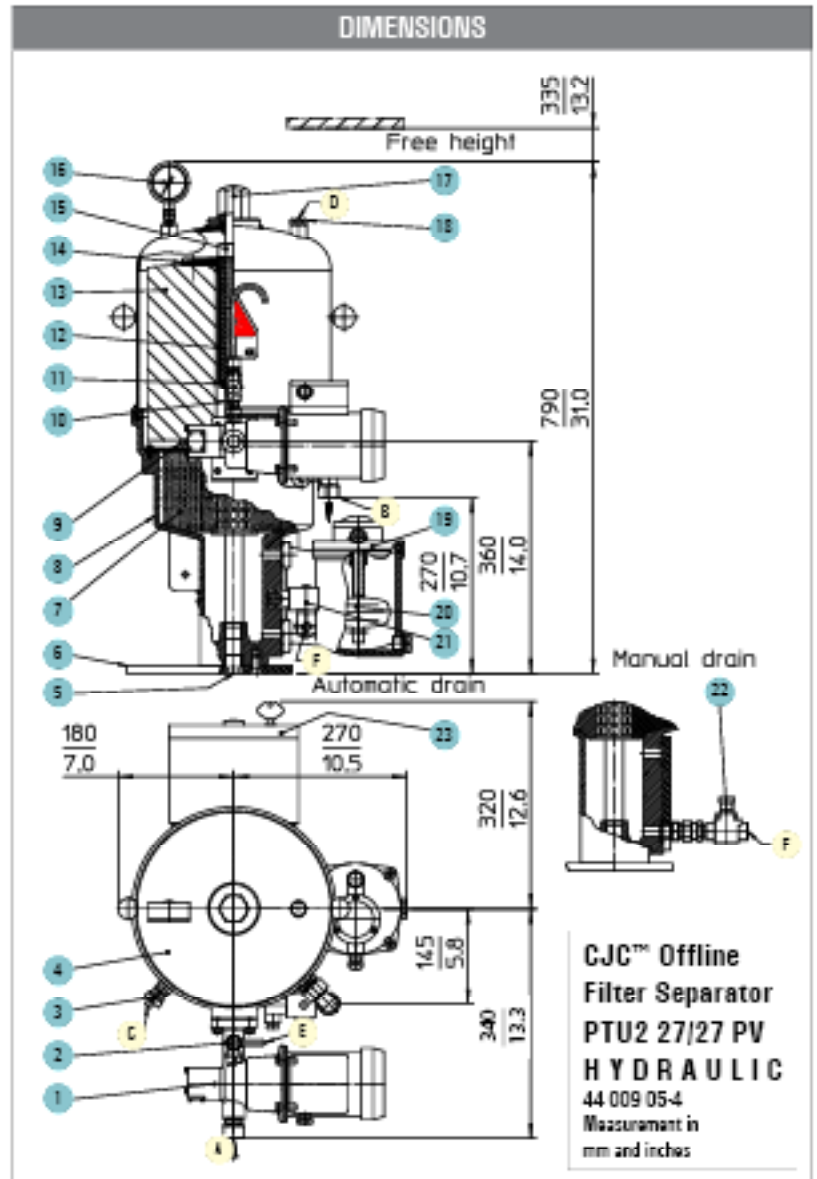
CLEAN OIL
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PTU2 27/27

CJC™ Offline Filter Separator - HYDRAULIC

CJC™ Product Sheet

COMPONENTS	
Item	Part
1	Pump
2	Sampling point
3	Drain
4	Filter housing
5	Plug
6	Foundation plan
7	Coalescer element
8	Filter base
8	Filter plate
10	Stay bolt
11	O-ring
12	Spring
13	Filter Insert
14	Spring guide
15	Nut for spring
16	Pressure gauge
17	Top nut
18	Vent screw
18	Water discharger, automatic
20	Floater
21	Solenoid valve
22	Water discharger, manual
23	Control box
A	ø18, Oil inlet
B	ø18, Oil outlet
C	3/8" BSP, Drain valve
D	1/4" BSP, Vent
E	Sampling point
F	1/2" BSP, Water outlet

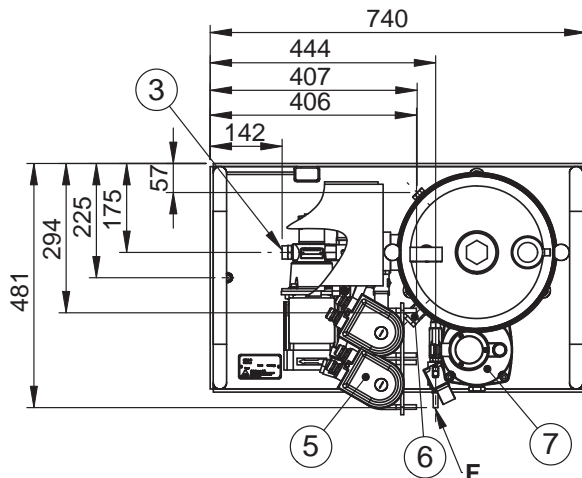
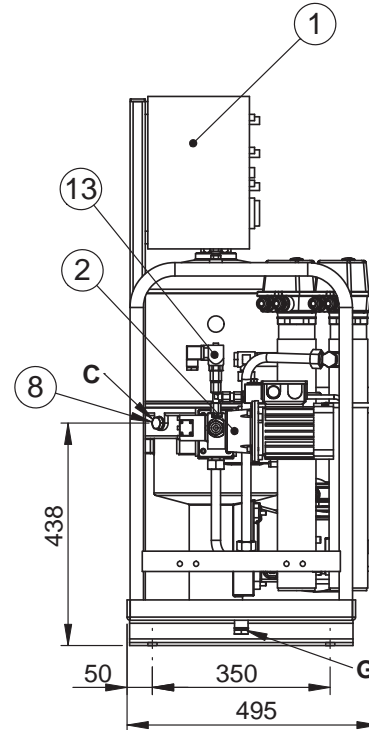
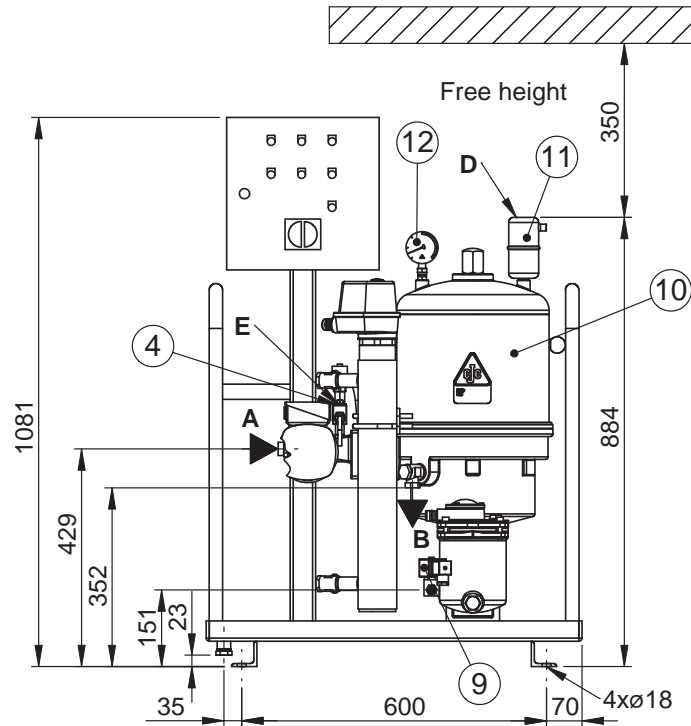


Part no. FA7600186-XY

Y	Voltage - Freq.
0	3 x 400V - 50Hz
2	3 x 440V - 60Hz
3	1 x 230V - 60Hz
4	1 x 230V - 50Hz
5	1 x 120V - 60Hz
6	1 x 120V - 50Hz

X	Execution
A	Without change over valve
B	With change over valve


Execution without change over valve



Design pressure 4 bar
 Design temp. 60°C
 Weight 130 kg


- A= ø18 Oil inlet
- B= ø18 Oil outlet
- C= 3/8" BSP Drainplug, Filter
- D= 1/4" BSP Aut.vent
- E= Sampling point
- F= 1/4" hose union Water outlet
- G= 3/4" BSP Drain plug, drip pan

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Tolerance:	N/A	 C.C.JENSEN A/S LØVHOLMEN 13, DK-5700 SVENDBORG, DENMARK Fax +45 62224615 Phone +45 63212014 www.cjc.dk	Sign	Date	
Customer:			Constr.	HJ	20-10-2009
Project:			Appr.		
Ref:	CJC Filter Separator type PTU2 27/27 PV-E2H1PW Thruster unit		Rev.	Appr.	Date
Weight:	General Arrangement		C	LU	05-02-2013
		Drawing no. 7600186			

Pos.	Description	Qty.
1	Control box	1
2	Pump type PV4	1
3	Connector	1
4	Sampling point	1
5	Preheater	2
6	Connector	1
7	Water discharger, automatic	1
8	Drain plug	1
9	Solenoid valve	1
10	CJC Filter Separator type PTU2 27/27	1
11	Aut. air vent	1
12	Pressure gauge	1
13	Pressure switch	1
Additional equipment, when change over valve execution is selected		
14	3-way valve L-port	2

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		Drawing no. 7600186			

THRUSTERS

END-USERS						
Denmark						
Customer	Vessel / Platform / Rig	Application	Thruster manufacturer	CJC™ Filter	No.	Contact Person
Andelsfærgeselskabet Læsø	M/F Læsø	Thruster	Hundsted	PTU 15/25 PM-EH1M	1	Lai Mortensen
Maersk Supply Service	Maersk Attender	Thruster	Brunvoll	PTU2 27/27 PM-DEH1PW	2	Ivan Seistrup
	Maersk Beater	Thruster		PTU2 27/27 PM-DEH1PW	1	Ivan Seistrup
	Maersk Blazer	Thruster	Brunvoll	PTU2 27/27 PM-DEH1PW	1	Ivan Seistrup
	Maersk Boulder	Thruster	Brunvoll	PTU2 27/27 PM-DEH1PW	2	Ivan Seistrup
	Maersk Champion	Thruster		PTU2 27/27 PV-DEH1PW	1	Nikolaj Kløbüll
	Maersk Chancellor	Thruster		PTU2 27/27 PV-DEH1PW	1	N. Olsen
	Maersk Exporter	Thruster	Lips	PTU2 27/27 PM-DEH1PW	8	Ivan Seistrup
	Maersk Feeder	Thruster	Ulstein	PTU2 27/27 PM-DEH1PW	4	Ivan Seistrup
	Maersk Fighter	Thruster	Ulstein	PTU2 27/27 PM-DEH1PW	2	Ivan Seistrup
	Maersk Finder	Thruster	Ulstein	PTU2 27/27 PM-DEH1PW	3	Ivan Seistrup
	Maersk Flanders	Thruster	Ulstein	PTU2 27/27 PM-DEH1PW	1	Ivan Seistrup
	Maersk Forwarder	Thruster	Ulstein	PTU2 27/27 PM-DEH1PW	4	Ivan Seistrup
	Maersk Frontier	Thruster	Ulstein	PTU2 27/27 PM-DEH1PW	4	Ivan Seistrup
	Maersk Gabarus	Thruster		PTU2 27/27 PV-DEH1PW	2	Thomas Olsen
	Maersk Geelong	Thruster		PTU2 27/27 PV-DEH1PW	2	Michael Søgaard
	Maersk Humber	Thruster	Brunvoll	PTU2 27/27 PM-DEH1PW	1	Ivan Seistrup
	Maersk Launcher	Thruster	KaMeWa	PTU2 27/27 PM-DEH1PW	2	Ivan Seistrup
	Maersk Leader	Thruster	KaMeWa	PTU2 27/27 PM-DEH1PW	2	Ivan Seistrup
	Maersk Logger	Thruster	KaMeWa	PTU2 27/27 PM-DEH1PW	2	Ivan Seistrup
	Maersk Mariner	Thruster	KaMeWa	PTU2 27/27 PM-DEH1PW	1	Ivan Seistrup
	Maersk Master	Thruster	KaMeWa	PTU2 27/27 PM-DEH1PW	3	Ivan Seistrup
	Maersk Nascopie	Thruster	Ulstein	PTU2 27/27 PM-DEH1PW	6	Ivan Seistrup
	Maersk Norseman	Thruster	Ulstein	PTU2 27/27 PM-DEH1PW	6	Ivan Seistrup
	Maersk Pacer	Thruster	Brunvoll	PTU2 27/27 PM-DEH1PW	3	Ivan Seistrup
	Maersk Provider	Thruster	Brunvoll	PTU2 27/27 PM-DEH1PW	2	Ivan Seistrup
	Maersk Puncher	Thruster	Brunvoll	PTU2 27/27 PM-DEH1PW	5	Ivan Seistrup
	Maersk Retrifer	Thruster		PTU2 27/27 PM-DEH1PW	3	Ivan Seistrup
	Maersk Rider	Thruster	Lips	PTU2 27/27 PM-DEH1PW	2	Ivan Seistrup
	Maersk Rover	Thruster	Lips	PTU2 27/27 PM-DEH1PW	4	Ivan Seistrup
	Maersk Ruler	Thruster	Lips	PTU2 27/27 PM-DEH1PW	1	Ivan Seistrup

Rederiet A.P. Møller	Maersk Shipper	Thruster	KaMeWa	PTU2 27/27 PM-DEH1PW	2	Ivan Seistrup
	Maersk Topper	Thruster	Ulstein	PTU2 27/27 PM-DEH1PW	2	Ivan Seistrup
	Maersk Trader	Thruster	Ulstein	PTU2 27/27 PM-DEH1PW	5	Ivan Seistrup
	Maersk Chieftain	Thruster		PTU2 27/27 PV-DEH1PW	2	Marie Arendtorp
	Maersk Cutter	Thruster		PTU2 27/27 PV-DEH1PW	1	Marie Arendtorp
	Maersk Helper	Thruster		PTU2 27/27 PV-DEH1PW	3	Nikolaj Klíxbüll
	Maersk Lifer	Thruster		PTU2 27/27 PV-DEH1PW	1	Nikolaj Klíxbüll
	Maersk Placentia	Thruster		PTU2 27/27 PM-DEH1PW	2	Thomas Olsen
	M/F Prins Joachim	Thruster	KaMeWa	PTU2 27/27 PV-DEH1PW	2	
	M/F Tycho Brahe	Thruster	KaMeWa	PTU3 27/54 P-EH1PW	4	Søren Leth / Valdemar Christensen
Scandlines (Gedser-Rostock)						
	Scandlines (Helsingør-Helsingborg)					
Scandlines (Rødby-Puttgarden)	M/F Prinsesse Benedikte	Thruster	KaMeWa	PTU2 27/27 PV-DEH1PW	2	
	M/F Prins Richard	Thruster	KaMeWa	PTU2 27/27 PV-DEH1PW	3	

Great Britain						
Customer	Vessel / Platform / Rig	Application	Thruster manufacturer	CJC Filter	No.	Contact Person
AOC International Ltd	Alba FSU	FPSO		PWTU 27/27 M86T 2 x 1,65 kW	1	
Andrew Weir Shipping Ltd	Pacheco	Stern Tube Application		PTU2 27/27 PV-DEH1PW	1	
Basetek Ltd	Teignbank	Stern Tube Application		PTU2 27/27 PV-DEH1PW	1	
BJ Services, Gt Yarmouth	MV Vestfonn	Thruster		PTU2 27/27 PV-DEH1PW	6	
Boston Puttord Offshore	Puttord Protector	Thruster		PTU2 27/27 PV-DEH1PW	1	
	Puttord Provider	Offshore		PTU2 27/27 PV-DEH1PW	1	
	Loch Rannoch	Offshore		PTU2 27/27 PV-DEH1PW	1	
BP Shipping	SWOPV Seilean	Oil tanker		PTU2 27/27 PM-DEH1PW	2	
		Production vessel	Schottel - Lips CS 2510-663/2500	PTU2 27/27 M86 M	3	J. A. Orr
Coflexip Stena Offshore	Stena Constructor	Pipe Layer	KaMeWa	PTU2 27/27 PM-	2	Bob Landsman
	Stena Marianos	Dive Support Vessel	Liaaen	PTU2 27/27 PM-DEH1PW	2	Ray Eastwood
	Stena Orelia	Dive Support Vessel	Stone Vickers	PTU 15/25 PM	5	Bob Landsman
	Stena Seawell	Dive Support Vessel	KaMeWa	PTU2 27/27 PM-DEH1PW	4	Bob Landsman
	Stena Wellichief		Brunvoll	PTU2 27/27 PM-DEH1PW	1	Bob Landsman
				PTU 15/25 PM	4	
	Stena Wellservicer	Dive support vessel	KaMeWa	PTU2 27/27 PM-DEH1PW	3	Ray Eastwood
Diamond Offshore	Oceanic Alliance	Semi-submersible	Lips CS 2510 663/2500	PWTU 27/27 M86T	2	Dusty Miller
Dingbro Ltd	Tidewater	Offshore		PTU2 27/27 PM-DEH1PW	3	
DOF (UK) Ltd	Skandi Chieftain	Offshore		PTU2 27/27 PV-DE2H1PW	1	
Edison Chousest Offshore LLC		Thruster		PTU2 27/27 PV-DEH1PW	119	
Frontline Hydraulics	Farstad Shipping	Offshore		PWTU 27/27 M86 T	1	
Harland & Wolff	Global Maritime Drill Ship	Mobile Thruster Unit		PTU3 27/108 P-DEH1PWY	1	
Hays Ships	Kommander Subsea	Thruster		PTU 27/27 BLAT M86	1	
K/S Rasmussen Offshore	Port Regency	Offshore	KaMeWa	PTU 27/27 M86	1	Mr. Tom Wilne
Lowline Ltd	Lowland Pioneer	Thruster		PWTU 27/27 M86T	2	
Norson Power	Reading & Bates	Offshore		PWTU 27/27 BLAT M86T	1	
	Solstad	Thruster		PTU2 27/27 PV-DE2H1PW	1	

Norson Services	Stena Drilling	Thruster Unit			PWTU 27/27 BLAT M86T	1
		Offshore			PWTU 27/27 M86T	2
		Offshore			PTU2 27/27 PM-DEH1PW	1
		Semi Sub			PTU2 27/27 PV-DEH1PW	7
		Offshore			PTU2 27/27 PM-DEH1PW	3
		Semi Sub			PTU2 27/27 PM-DEH1PW	3
		Offshore			PTU2 27/27 PM-DEH1PW	1
		Supply Vessel			PWTU 27/27 BLAT M86 T	1
		Gear Oil			PTU2 27/27 PM-DEH1PW	2
		Supply Vessel			PTU2 27/27 PM-DEH1PW	2
		Supply Vessel			PTU2 27/27 PM-DEH1PW	2
		Supply Vessel			PTU2 27/27 PM-DEH1PW	2
		Supply Vessel			PTU2 27/27 PV-DEH1PW	1
		Thruster			PTU2 27/27 PV-DEH1PW	1
		Offshore			PTU2 27/27 PV-DEH1PW	1
		Offshore			PTU2 27/27 PM-DEH1PW	1
		Thruster			PTU2 27/27 PV-DEH1PW	3
		Thruster			PTU2 27/27 PV-DEH1PW	3
		Supply Vessel			PTU2 27/27 PV-DEH1PW	1
		Thruster			PTU2 27/27 PV-DEH1PW	1
		Thruster			PTU2 27/27 PV-DEH1PW	1
		Thruster			PTU2 27/27 PV-DEH1PW	1
		FPSO			D30 PV-MY	1
		Offshore			PTU2 27/27 PV-DE2H1PW	1
		Supply Vessel			PTU2 27/27 PV-DEH1PW	1
	Offshore			PTU2 27/27 PM-DEH1PW	1	
	Thruster			PTU2 27/27 PV-DEH1PW	6	
	Offshore			PTU2 27/27 PV-DE2H1PW	1	
	Offshore			PTU2 27/27 PV-DE2H1PW	5	
North American Shipbuilding Lic		Thruster		PTU2 27/27 PV-DEH1PW	114	
Northern Marine Management	Stena Foreteller	Ferry		PTU2 27/27 PV-E2H1	1	
P&O Cruises	Arcadia	Thruster		PTU2 27/27 PV-DEH1PW	1	
	Oriana	Thruster		PTU2 27/27 PV-DEH1PW	1	
	Ocean Village	CTO Stern Thruster		PTU2 27/27 PV-DEH1PW	1	
Seacor Marine (International) Ltd	Putford Achilles	Thruster		PTU2 27/27 PV-DE2H1PW	1	
Stena Line - Holyhead,	Stena Adventurer	Ferry		PTU2 27/27 PV-DE2H1PW	1	
Stirling Offshore Ltd	Stirling Aquarius	Thruster		PTU2 27/27 PM-DEH1PW	1	
	M/V Stirling Forth	Thruster		PTU2 27/27 PM-DEH1PW	1	
Stirling Shipping	Stirling Sirius	Thruster		PWTU 27/27 BLAT M86T	1	
	Stirling Vega	Thruster		PTU2 27/27 PM-DEH1PW	1	
Sun Cruises	M/V Carousel	Thruster		PTU2 27/27 PM-	1	
Technip Offshore	CSO Venturer	Offshore		PTU2 27/27 PV-	1	
Technip Stena Offshore	CSO Deep Blue	Offshore		PTU2 27/27 PV-DEH1PW	1	
Texaco	Texaco Captain	Offshore	KaMeWa	PWTU 27/27 M86	2	
Tidewater Marine North Sea	Fortier Tide	Thruster		PTU2 27/27 PV-DEH1PW	2	
	Wiggins Tide	Thruster		PTU2 27/27 PV-DEH1PW	2	

	Russell Tide	Thruster				PTU2 27/27 PV-DEH1PW	1	
	Gulf Wigeon	Thruster				PTU2 27/27 PV-DEH1PW	1	
V ships	Cartola	Thruster				PTU2 27/27 PM-DEH1PW	1	
Wood-Way Hydraulics	Subsea Workshop	Offshore				PWTU 27/27 BLAT M86T	1	
	Sedco Forex	Offshore				PWTU 27/27 BLAT M86T	1	
	Reading & Bates	Offshore				PWTU 27/27 BLAT M86T	4	
	Subsea ROV Department	Offshore				PWTU 27/27 M86T	2	

Netherlands

Customer	Vessel / Platform / Rig	Application	Thruster manufacturer	CJC™ Filter	No.	Contact Person
Kotug Slepddienst Adrigens Koores	Montal	Thruster		PTU2 27/27 PM-DEH1PW	1	Mr. L. Wamaar
LIPS BV	Global Sentinel	Transoceanic Cable Ship	Lips	PTU2 27/27 PM-DEH1PW	2	Lips Mr. Ir Klaas Faber/TCS Mr. F.McCabe II
	Global Link	Transoceanic Cable Ship	Lips	PTU2 27/27 PM-DEH1PW	2	Lips Mr. Ir Klaas Faber/TCS Mr. F.McCabe II
		Thruster	Lips	PTU2 27/27 PM-DEH1PW	23	Lips Mr. Ir Klaas Faber/TCS Mr. F.McCabe II
SMIT FLEET SERVICE	M/V Regelia	Thruster	Brunvoll	PTU2 27/27 PM-DEH1PW	6	Mr. Ad Tange
	SEMI 1	Thruster	Lips CS 1000-250	PTU2 27/27 PM-DEH1PW	4	Mr. Ad Tange
	SEMI 2	Thruster	Lips CS 1000 - 250	PTU2 27/27 PM-DEH1PW	4	Mr. Ad Tange
	M/V Maasbank	Thruster	Lips CS 1510-350	PTU2 27/27 PM-DEH1PW	2	Mr. A. Oprel
	M/V Vikingbank Thruster	Thruster	Lips CS 1510-350	PTU2 27/27 PM-DEH1PW	2	Mr. A. Oprel
Vroon BV	M/V Sheif Express	Platform supply vessel	Lips	PWTU 27/27 M86	1	
Workshop Contractors BV	Amethyst	Thruster	Liaaen	PTU2 27/27 PM-DEH1PW	2	Mr. J. Klein

Norway

Customer	Vessel / Platform / Rig	Application	Thruster manufacturer	CJC™ Filter	No.	Contact Person
Aceryg Chartering Ltd	ACERGY EAGLE	Thruster		PTU2 27/27 PV-DE2H1PW	4	
	DISCOVERY	Azimuth thruster		PTU2 27/27 PV-DE2H1PW	2	
	DISCOVERY	Bow thruster		PTU2 27/27 PV-DE2H1PW	2	
Aker Yards AS	Highland Prestige	Azimuth thruster		PTU3 27/54 P-EPW	2	
	Highland Prestige	Thruster		PTU2 27/27 PV-DE2H1PW	1	
	North Promise	Azimuth thruster		PTU3 27/54 P-EPW	2	
	North Promise	Thruster		PTU2 27/27 PV-DE2H1PW	1	
	Bourbon Surf M/V	Thruster		PTU2 27/27 PV-DE2H1PW	1	
	Astro Maritima	Thruster		PTU2 27/27 PV-DE2H1PW	2	
	Borubon Suft M/V	Fuel Oil		PTU3 2x27/108 GP-EPTW	1	
	Bourbon Topaz	Thruster		PTU2 27/27 PV-DE2H1PW	2	
	Bourbon Borgstein	Thruster		PTU2 27/27 PV-DE2H1PW	2	
		Thruster	Brunvoll	PTU2 27/27 PV-DEH1PWY	1	

Brunvoll / Statoil		Thruster	Brunvoll	PTU2 27/27 PV-DEH1PW	2	Ottar Lillebostad, Brunvoll
		Thruster	Brunvoll	HDU 27/27 P	19	
Brunvoll A/S		Thruster	Brunvoll	PTU2 27/27 PV-DEH1PW	6	
				PTU2 27/27 PV-DEH1PW	7	
				HDU 27/27 PH	1	
Color Line Marine AS	Color Festival M/S	Thruster		PTU2 27/27 PV-DEH1PW	1	
DOF Management	Skandi Stolmen M/V	Thruster		D10	1	
	Skandi Inspector M/V	Thruster		PTU2 27/27 PV-DEH1PW	1	
	Skandi Stolmen M/V	Thruster		PTU2 27/27 PV-DEH1PW	1	
	Skandi Hav M/V	Mobil thruster		PTU2 27/27 PV-EH1MPW	1	
	Skandi Admiral	Thruster		PTU2 27/27 PV-DE2H1PW	2	
	Skandi M/V	Mobil thruster		PTU2 27/27 PV-EH1MPW	1	
	Skandi PMS 1M/V	Mobil thruster		PTU2 27/27 PV-EH1MPW	1	
	Skandi Patagonia	Thruster		PTU2 27/27 PV-DE2H1PW	1	
	Skandi Patagonia	Thruster		PTU3 27/108 P-E2H1PTW	1	
DP Filterteknikk	Normand Master	Thruster		PTU2 27/27 PV-DE2H1PW	1	
Eidesvik Shipping AS	Eidesvik	L.O. thruster		PTU2 27/27 PM-E	1	
	Subsea Viking	Thruster		PTU2 27/27 PV-DEH1PW	1	
	Veritas Viking II	Thruster		PTU2 27/27 PV-DEH1PW	1	
	Viking Queen	Thruster	Ulstein	PTU2 27/27 PM-DEH1PW	1	Roald Staudland
	Westcon BN29	Thruster Portable separator		PTU2 27/27 PV-DE2H1PW	1	
Esso Norge as	Balder	Thruster		PTU2 27/27 PV-DEH1PW	5	
Estaleiro Promar I	Promar Supply boat	Thruster		PTU2 27/27 PV-DEH1PW		
Fagervoll Havfiske A/S	Fagervoll M/S	Thruster fishing vessel		PTU 27/27	1	
Farstad Shipping AS	Far Superior M/S	L.O. thruster		HDU 27/27 P	1	
	Far Grimshader M/V	L.O. thruster		HDU 27/27 P	1	
	Far Supporter M/V	Thruster		PTU2 27/27 PV-DEH1PW	1	
	Far Superior M/S	Thruster		PWTU 27/27	1	
	Far Spirit M/S	Thruster		PWTU 27/27	1	
	Far Server M/S	Thruster	Ulstein	PTU2 27/27 PM-DEH1PW	1	
	Far Sailor	Thruster w. change over valve		PTU2 27/27 PV-DE2H1PW	1	
Fiskerstrand Verft	M/S Troms Skarven	Thruster	Brunvoll	PTU2 27/27 PM-DEH1PW	2	
Geoshipping AS	Geosea M/S	Thruster		D10	1	
	Geoholm (Bygg 145)	Thruster		PTU2 27/27 PV-DEH1PW	1	
	Geosund	Thruster		PTU2 27/27 PV-DEH1PW	3	
	Geobay MUV	Thruster		PTU2 27/27 PV-DEH1PW	1	
	Geosea M/S	Thruster		PTU2 27/27 PV-DEH1PW	2	
	Geofford M/S	Thruster		PTU2 27/27 PV-DEH1PW	2	
	Geowave Master	Thruster		PTU3 27/81 P-E2H1PW	3	
Golar-Nor Offshore	Petrojarl Foinaven	Thruster	KaMeWa	PWTU 27/27 BLAT M86, 1.65 kW PH	1	
Gulf Offshore N.S. LTD	Highland Drummer	Thruster		PTU2 27/27 PV-DEH1PW	1	
	Highland Champion	Thruster		PTU2 27/27 PV-DEH1PW	1	
	North Mariner M/V	Thruster		PTU2 27/27 PV-DEH1PW	1	
	North Traveller M/V	Thruster		PTU2 27/27 PV-DEH1PW	1	

	Sound Truck M/V	Thruster			PTU2 27/27 PV-DEH1PW	2
	Highland Fortress	Thruster			PTU2 27/27 PV-DEH1PW	2
	Aquarius	Thruster			PTU2 27/27 PV-DEH1PW	1
	North Challenger	Thruster			PTU2 27/27 PV-DEH1PW	2
	North Traveller M/V	Thruster			PTU2 27/27 PV-DEH1PW	1
	North Crusader M/V	Thruster			PTU2 27/27 PV-DEH1PW	2
	Dina Aquarius M/S	Thruster			PTU2 27/27 PV-DE2H1PW	1
	North Fortune M/V	Thruster			PTU2 27/27 PV-DEH1PW	2
	North Vanguard M/V	Thruster			PTU2 27/27 PV-DEH1PW	2
	North Mariner M/V	Thruster			PTU2 27/27 PV-DEH1PW	1
	Hual Trooper M/V	Thruster			PTU2 27/27 PV-DEH1PW	1
	Hual Trident M/V	Thruster			PTU2 27/27 PV-DEH1PW	1
	Thorsaga	L.O. thruster			PTU 27/27	1
	Nordic Apollo T/T	Thruster			PTU2 27/27	1
	Jorunn Knutsen M/T	Thruster			PTU2 27/27 PV-DEH1PW	2
	Turid Knutsen M/T	Thruster			PTU2 27/27 PM	1
	Catherine Knutsen M/T	L.O. thruster			PTU 15/25	1
	Navion Europa M/T	Thruster			PTU 27/81	1
	Valentin Shashin	Thruster			PTU2 27/27 PV-DEH1PW	5
	Boa Vista M/V	Thruster			PTU2 27/27 PV-DEH1PW	1
	Passelli M/TR	Thruster			PTU2 27/27 PM	1
	Midøy Viking M/S	Thruster			PTU2 27/27 PM-DEH1	1
	Pater Noster M/S	Bow thruster			PTU 15/25	1
	M/T Lista	Thruster		Ulstein	PWTU 27/27 BLAT M86, 1.65 kW PH	1
	M/T Borga	Thruster		Ulstein	PWTU 27/27 BLAT M86, 1.65 kW PH	1
	Storfjord B/F	L.O. thruster			PTU2 27/27	1
	M/F Glutra	Thruster		Schottel	HDU 27/54 P	2
	Romsdal B/F	L.O. thruster			PTU 15/25 PM-M	1
	Navis Explorer	Thruster			PTU2 27/27 PV-DEH1PW	6
	Deep Sea Bergen	Thruster			PTU2 27/27 PV-DEH1PW	1
	Port Reval	Thruster			PTU2 27/27 PV	1
	Navion Saga M/V	Thruster			PTU3 27/81 MZ	1
	Kyst M/S	Thruster			PTU 27/54	1
	Rem Stadt	L.O. thruster			PTU2 27/27	1
	Geco Scorpio M/V	Thruster			PTU2 27/27 PV-DE2H1PW	1
	Polar Queen M/V	Thruster			PTU2 27/27 PV-DEH1PW	4
	Geo Atlantic	Thruster			PTU2 27/27 PV-DEH1PW	1
	Ramform Victory M/V	Thruster			PTU 27/108	1
	CGG Laurentian,Brasil	Thruster			PTU2 27/27 PV-DEH1PW	1
	M/S Polar Prince	Thruster			PTU2 27/27 PM-DEH1PW	1
	M/V Ramform Challenger	Thruster		Ulstein	PTU2 27/27 PM-DEH1PW	1
	Ramform Explorer	Thruster		Ulstein	PTU2 27/27 PM-DEH1PW	1
	Ramform Valiant	Thruster		Ulstein	PTU2 27/27 PM-DEH1PW	2
	Havila Tampen	Thruster			PTU 27/27	1

Salpern Norway	Scarabeo 5	Thruster	Lips FS 1500-350 CO	PTU2 27/27 PM-DEH1PW	1	Mr. K. Mikalsen
Seadrill Offshore AS	West Navion	Thruster		PTU2 27/27 PV-DEH1PW	6	
	West Alpha	Thruster		PTU2 27/27 PV-DEH1PW	4	
	West Venture	L.O. thruster		PTU2 27/27	8	
	West Navigator	Thruster		PTU2 27/27 PV-DEH1PW	1	
Sedco Forex	Sedco 707	Thruster	Ulstein	PTU2 27/27 PM-DEH1PW	8	Per Botnen, Ulstein Propeller
Simek	Gulf Offshore	Thruster		PTU2 27/27 PV-DEH1PW	1	
	Alma Sea (supply)	Thruster		PTU2 27/27 PV-DEH1PW	4	
	Gullfonn Management	Thruster		PTU2 27/27 PV-DEH1PW	1	
Smedvig Prod. Contracting c/o Esso N.	Stena Don	Thruster		PTU2 27/27 PV-DEH1PW	1	
Solstad Shipping AS	Normand Pioneer	Thruster		PTU2 27/27 PV-DEH1PW	1	
	Normand Atlantic M/V	Thruster		PTU2 27/27 PV-DEH1PW	2	
	Normand Borg	Thruster		PTU2 27/27 PV-DEH1PW	1	
	Normand Progress	Thruster		PTU2 27/27 PV-DEH1PW	1	
	Normand Flipper	Thruster		PTU2 27/27 PV-DEH1PW	1	
	Normand Prosper	Thruster		PTU2 27/27 PV-DEH1PW	1	
	Normand Jarl M/V	Thruster		PTU2 27/27 PV-DEH1PW	1	
	Normand Draupne M/V	Thruster	Ulstein	PTU2 27/27 PV-DEH1PW	2	
	Normand Mjolne M/V	Thruster	Ulstein	PTU2 27/27 PV-DEH1PW	2	
	Normand Tonjer M/V	Thruster		PTU2 27/27 PV-DEH1PW	2	
	Normand Drott M/V	Thruster		PTU2 27/27 PV-DEH1PW	1	
	Normand Neptun M/V	Thruster		PTU2 27/27 PV-DEH1PW	2	
	Normand Carrier M/V	Thruster		PTU2 27/27 PV-DEH1PW	2	
	Normand Vester M/V	Thruster		PTU2 27/27 PV-DEH1PW	1	
	Normand Seven	Thruster		PTU2 27/27 PV-DE2H1PW	1	
	Normand Master	Thruster		PTU2 27/27 PV-DE2H1PW	1	
Solvang ASA	Clipper Lady	Thruster		PTU2 27/27 PV-DEH1PW	1	
Sonsub AS	Scarabeo 5, Saipern	Thruster		PTU2 27/27 PV-DEH1PW	1	
Statoli AS	Asgard A	Thruster		PTU2 27/27 PV-DEH1PW	6	
	Veslefrikk	L.O. thruster		HP 27/54 R-DZ	1	
	Jotun	Thruster		PTU2 27/27 PV-DEH1PW	4	
	Veslefrikk	L.O. thruster		HP 27/108 R-DEH1	8	
Stena Drilling AS	Stena Dee	Thruster		PTU2 27/27 PV-DEH1PW	2	
Stolt Comex		Thruster		PTU2 27/27 PM-DEH1PW	1	Mr. Magnus Gruntle
		Thruster	Pleuger	PTU2 27/27 PM-DEH1PW	1	
Stolt Offshore	Seaway Osprey M/V	Thruster		PTU2 27/27 PV-DEH1PW	1	
	Seaway Explorer M/V	Thruster		PTU2 27/27 PV-DEH1PW	1	
	Discovery	Thruster		PTU2 27/27 PV-DEH1PW	1	
	Seaway Falcon M/V	L.O. thruster		PTU 27/27	2	
	Seaway Kestrel M/V	L.O. thruster		PTU2 27/27 PV-EH1M	1	
	Seaway Kingfisher M/V	Thruster		PWTU 27/27	1	
Subsea 7 AS	Lochnagar	Thruster		PTU2 27/27 PV-DEH1PW	1	Rune Johansen
	Pellikan	Thruster		PTU2 27/27 PV-DEH1PW	2	
	Lochnagar	Middle Bow Thruster TV150		PTU2 27/27 PV-DE2H1PW	2	
	Lochnagar	Azimuth Thruster FWD TCNS		PTU2 27/27 PV-DE2H1PW	2	

	Lochnagar	Azimuth Thruster AFT 820VR		PTU3 27/81 P-E2H1PW	2
Søviknes Verft A/S Aker Yard	Highland Cougar, Gulf Offshore	Thruster		PTU2 27/27 PV-DEH1PW	1
Taubåtkompaniet AS	Boa Deep C	Thruster		PTU2 27/27 PV-DEH1PW	3
Team Ship Management	M/V Daviken	Thruster		PTU2 27/27 PM-DEH1PW	1
	M/V Federal Fuji	Thruster		PTU 15/25 PM-EH1	1
	M/V Federal Polaris	Thruster		PTU 15/25 PM-EH1	1
	M/V Goviken	Thruster		PTU2 27/27 PM-DEH1PW	1
Teekay Petrojarl ASA	Ramform Banff	Thruster		PTU2 27/27 PV-DEH1PW	1
	Petrojarl Varg	L.O. thruster		PTU2 27/27	2
	Petroatlantic M/T	Thruster		PTU2 27/27 PV-DEH1PW	3
	Petronordic M/T	Thruster		PTU2 27/27 PV-DEH1PW	2
TFDS Off-shore	Aldoma M/V	Thruster	Ulstain	PTU2 27/27 PM-DEH1PW	1
	M/V Sprut	Thruster	Liaaen	PTU2 27/27 PM-DEH1PW	1
	M/V Troms Falken	Thruster	Liaaen	PTU2 27/27 PV-DEH1	2
	M/V Troms Tjeld	Thruster	Liaaen	PTU2 27/27 PM-DEH1PW	1
	M/S Kovambo	Thruster	Liaaen	PTU2 27/27 PM-DEH1PW	1
Transocean AS, Stavanger	Transocean Prospect	L.O. thruster		PTU2 27/27 PM-DEH1PW	1
	Transocean Leader	L.O. thruster		PWTU 27/27	1
	Transocean Arctic	Thruster		PTU2 27/27 PM-DEH1PW	1
	Transocean Searcher	Thruster	Ulstain	PTU 27/27	3
Trico Shipping AS	Northern Clipper M/V	L.O. thruster		PWTU 27/27	1
Troms Fylkes Dampskipsselskap	Troms Steggen M/S	Thruster		PTU2 27/27 PV-DEH1PW	2
	Troms Falken M/V	Thruster		PTU2 27/27 PV-DEH1PW	2
Uksnøy Petrel AS	Aceergy Petrel (bygg4)	Thruster		PTU2 27/27 PV-DE2H1PW	1
Ulstain Propeller / Farstad UK		Thruster	Ulstain	PTU2 27/27 PM-DEH1PW	2
V Ships Norway A/S	Aragas LPG/C	Thruster		PTU2 27/27 PV-DEH1PW	1
Vestnorsk Hydraulikkservice AS	Master M/V	Thruster		PTU2 27/27 PM-DEH1PW	6
Viken Ship Management	Sandviken M/V	Thruster		PTU2 27/27 PV-DEH1PW	2
Wärtsila NSD Norway AS	Hylse	L.O. thruster		PTU 27/27	1
		Thruster		PTU2 27/27 PV-DEH1PW	6

Singapore		Vessel / Platform / Rig	Application	Thruster manufacturer	CJC™ Filter	No.	Contact Person
Customer	Platform Safe Concordia	Thruster	Thruster		PTU2 27/27 PV-DEH1PW	4	Mr. Leif Hege Larsen
Consafe	Platform Peregrin IV	Thruster	Thruster		PTU2 27/27 PM-DEH1PW	1	Flemming Justinussen
Falcon Drilling Co. Inc.	Stena Forth (Stena Drilling)	Thrusters for Roll Royce Aquamasters	Thrusters for Roll Royce Aquamasters		PTU3 HP 27/54 R-E2H1PTW	6	Dennis Thornton
Francois Marine Services	Stena Carron (Stena Drilling)	Thrusters for Roll Royce Aquamasters	Thrusters for Roll Royce Aquamasters		PTU3 HP 27/54 R-E2H1PTW	6	Dennis Thornton
	Stena DrillMax (Stena Drilling)	Thrusters for Roll Royce Aquamasters	Thrusters for Roll Royce Aquamasters		PTU3 HP 27/54 R-E2H1PTW	6	Dennis Thornton
Keppel Singmarine	Multipurpose Ice-breaking Supply Vessel (LUKOIL)	Brunvoll Bow Thruster	Brunvoll Bow Thruster		PTU2 27/27 PV-DE2H1PW	2	
	Multipurpose Ice-breaker (LUKOIL)	Brunvoll Bow Thruster	Brunvoll Bow Thruster		PTU2 27/27 PV-DE2H1PW	2	

Tidewater Marine		Thruster		PTU2 27/27 PV-DE2H1PW	1	John Gordon
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USA

Customer	Vessel / Platform / Rig	Application	Thruster manufacturer	CJC™ Filter	No.	Contact Person
Louisiana Overseas	SSV Louisiana	Thruster	Ulstein	PTU2 27/27 PM-DEH1PW	2	Paul Dennis
Noble Drilling	Muravlenko	Thruster		PWTU 27/27 BLAT M86, 2 x1.65 kW PH	1	
Sedco Forex	Sedco 707	Thruster	Ulstein	PWTU 27/27 BLAT M86, 1.65 kW PH	8	Per Botnen
	Sedco 709	Thruster	Pleuger	PWTU 27/27 BLAT, 1.65 kW PH	1	Paul Wilberger
	Sedco 710	Thruster	Pleuger	PWTU 27/27 BLAT, 1.65 kW PH	8	Paul Wilberger
Transoceanic Cable Ship	Global Link	Thruster	Lips CP 16-1 DP	PTU2 27/27 PM-DEH1PW	2	Mr. F. McCabe II
	Global Sentinel	Thruster	Lips CP 16-1 DP	PTU2 27/27 PM-DEH1PW	2	Mr. F. McCabe II

Modtaget
2 MRS. 1998



STIRLING

Shipmanagement Limited

16 Woodside Crescent Glasgow G3 7UT Telephone 0141 332 9766 Telex 77203 Fax 0141 332 0267

Our ref: WBL/KLW

25 February 1998

C C Jensen A/S
Lovholmen 13
DK-5700 Svendborg
Denmark

For the attention of Mr Lars Andersen

Dear Sir

We purchased three CJC thruster filter separator type PWTU27/27 BILAT M86T units in 1996/97 for use on our oilfield service vessels.

During this period we have used them extensively to reduce the water content normally experienced in operating Ulstein and Stone Vickers tunnel and azimuthing thrusters in the adverse sea conditions experienced in the North Sea oilfield areas. The thrusters operate with Shell Omala 150 and 100 respectively. This we believe has led to reduced water damage to the roller and thrust bearings in the thrusters extending the renewal periods and reducing the need to strip the thrusters at every drydocking.

We have also successfully used the units when we have experienced an extensive water ingress due to damaged seals to allow the vessel to continue to operate until drydocking can be arranged at a convenient time rather than as an emergency.

The units are convenient to use and we move them around our fleet as required. The consumption of consumables has been low and acceptable.

Yours faithfully
STIRLING SHIPMANAGEMENT LIMITED

W B Lauchlan
Technical Director



QUESTIONNAIRE - Tab 1

Customer & Application / System Description

How to use this Form:

This form must be completed by the Sales Person - in co-operation with the customer!
Some selections are preset, as they are CJC™ Standard, but can be changed by your selection.
***) Required fields.**

Note that this document consists of 5 pages in total:

- Page 1: Application/System Description (required entries)
 - Page 2-4: Specific product information (Fine Filters & Filter Separators, Desorbers, OilAbsorb) - Fill in only acc. to specific needs.
 - Page 5: ATEX Equipment. NOTE, if the unit is an ATEX unit, the whole document must be completed **and signed by the customer.**
- (Option Buttons and Check Boxes: If not selectable, please click some where else first and then click.)

1) Customer Information

*) Company	
*) Address	
*) Zip, City, Country	
*) Contact person	
*) Phone number	
*) E-mail	
*) Inquiry / tender / order number	

*) 2. Application/System Description:

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3. Electrical Supplies and Related Conditions

*) Nominal voltage (V)	AC	<input type="checkbox"/>	DC	<input type="checkbox"/>
*) If AC	Number of phases		Frequency, Hz	
Anticipated voltage fluctuations	Less than ± 10%	<input checked="" type="radio"/>	Other	<input type="radio"/> Specify:
Anticipated frequency fluctuations	Less than ± 2%	<input checked="" type="radio"/>	Other	<input type="radio"/> Specify:

4. Physical Environment and Operating Conditions

Is the unit to be used indoor or outdoor	Indoor	<input checked="" type="radio"/>	Outdoor	<input type="radio"/>
Ambient temperature range (24 hour period)	Max. °C (norm 40°C)		Min. °C (norm 5°C)	
Humidity range	Max. % RH		Min. % RH	
Altitude, above sea level	Below 1000 m	<input checked="" type="radio"/>	Above 1000 m	<input type="radio"/>
Special environmental conditions (Degree of protection IP Class, CJC™ Standard = IP54) (for example corrosive atmosphere, dust and wet environments)	Yes	<input type="radio"/>	No demands	<input checked="" type="radio"/>
	If yes please specify what IP Class is needed			
Specific installation and operating requirements (for example flame retardant cables and make of components)	Yes	<input type="radio"/>	No demands	<input checked="" type="radio"/>
	If yes please specify			
Indicate if limitations on the size or weight of the unit affect the installation				

5. Acceptance of Standards

Surface paint treatment, CJC™ standard = RAL5021 on the unit and = RAL7032 on control boxes	Accept, yes	<input checked="" type="radio"/>	No	<input type="radio"/>
	If no please specify:	Color code:		
		Type of paint:		
Certificates, CJC™ Standard = CE Marking	Accept, yes	<input checked="" type="radio"/>	No	<input type="radio"/>
	If no please specify:			
Approvals / classification: If required please state	Required, yes	<input type="radio"/>	No	<input checked="" type="radio"/>
	If yes please specify:			

6. Type of CJC™ Product

	CJC™ Fine Filters and Filter Separators (go to tab no 2)	<input type="checkbox"/>	CJC™ OilAbsorb Filter (go to tab no 4)	<input type="checkbox"/>
	CJC™ Desorber (go to tab no 3)	<input type="checkbox"/>		



QUESTIONNAIRE - Tab 2

CJC™ Fine Filters and Filter Separators

1. Special Condition

Will the unit use, process or produce explosive or flammable atmosphere	Yes <input type="radio"/>	No <input type="radio"/>	If YES is answered in any of the questions, please fill in the ATEX Form (go to tab no 5)
Is the unit for use in potentially explosive or flammable atmospheres	Yes <input type="radio"/>	No <input type="radio"/>	
Is the unit for use in closed mines with ATEX requirements	Yes <input type="radio"/>	No <input type="radio"/>	
If yes, please comment:			

2. Suggested type of CJC™ Product

Type and model	
----------------	--

3. Oil Information

*) Make	
*) Type	
Viscosity, cSt., 40°C	
Re. Filter Separators: Specific requirements for demulsibility test?	Yes <input type="checkbox"/> No <input type="checkbox"/>

For Multi Stay, please take an oil sample

Comments	
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4. System Capacity

Main pump capacity (in litres per hour)	
Manometric suction pressure / Manometric suction height	Bar: <input type="text"/> or in mH ₂ O: <input type="text"/>
Manometric discharge pressure / Manometric height	Bar: <input type="text"/> or in mH ₂ O: <input type="text"/>

4.1 Tank Volume / System Volume (total oil volume)

*) Litres	Tank: <input type="text"/>	System: <input type="text"/>
Comments		

4.2 Main System Temperature

*) Temperature of the oil	Minimum <input type="text"/> °C	Normal <input type="text"/> °C	Maximum <input type="text"/> °C
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5. Preheating of Fluid

Electrical preheaters	Yes <input type="checkbox"/>	No <input type="checkbox"/>
Steam (If yes)	Pressure in Bar <input type="text"/>	Temperature in °C <input type="text"/>
Hot water (If yes)	Pressure in Bar <input type="text"/>	Temperature in °C <input type="text"/>
Thermal oil (If yes)	Pressure in Bar <input type="text"/>	Temperature in °C <input type="text"/>

6. Cooling of Oil

Cooling media	
Temperature of the media	Max. °C <input type="text"/> Min. °C <input type="text"/>

7. Present Conditions

*) Solid contamination	ISO or NAS code	<input type="text"/>
	Other	<input type="text"/>
*) Water contamination	Ingress per hour	<input type="text"/>
	Drained from tank	<input type="text"/>
	Other	<input type="text"/>
Oil degradation products	<input type="text"/>	

8. Customer Demands

*) Level of solid contamination	ISO or NAS code	<input type="text"/>
*) Level of water contamination	Water content ppm	<input type="text"/>

9. Comments

<input type="text"/>	
<input type="text"/>	

Date: <input type="text"/>	Salesman Signature: <input type="text"/>
<input type="text"/>	<input type="text"/>