

INSTALLATION, OPERATION, SERVICE, AND REPAIR MANUAL

DAB DIVER SERIES SUBMERSIBLE DEF PUMPS

MODEL NUMBERS: Diver 100 M, Diver 200 M HF, and Diver 200 T HF



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WARNINGS FOR THE SAFETY OF PEOPLE AND PROPERTY

The symbols used in this manual are shown below together with their meanings.

	DANGER Failure to observe this warning may cause injury and/or damage to property.
	ELECTRIC SHOCK Failure to observe this warning may result in electric shock.
	WARNING Failure to observe this warning may cause damage to property (pump, system, panel, ...) or the environment.
	READ Read this manual carefully before proceeding.

READ AND UNDERSTAND THIS MANUAL BEFORE PROCEEDING

1 General



Read this documentation carefully before installation. Installation and functioning must comply with the safety regulations in the country in which the product is installed. The entire operation must be carried out in a workmanlike manner. Failure to comply with the safety regulations not only cause risk to personal safety and damage to the equipment, but invalidates every right to assistance under guarantee.



Read this manual carefully before installing and using the product.



The manufacturer declines any responsibility in case of accidents or damages caused by improper use of the pump product or due to negligence or lack of observance of the instruction described in this booklet or use of the pump under conditions that differ from the rating on the nameplate.

2 Application

Diver: Submersible Multistage pumps with multiple impellers to give a great range of pressures to suit many different applications. Particularly suitable for 34% UREA solution (Diesel Exhaust Fluid) supply from totes or below ground storage tanks.

3 Pumped Fluids



34% UREA solution DEF (Diesel Exhaust Fluid) only. Do not use for refined fuels of any kind.

4 Technical Data & Range of Use

Supply Voltage:	Diver 100 M	115V / 1 PH / 60 Hz
	Diver 200 M HF	220V / 1 PH / 60 Hz
	Diver 200 T HF	230V / 3 PH / 60 Hz
Absorbed Power:	See electrical data plate	
Delivery:	2 GPM to 44 GPM	
Head:	Up to 160 Ft	
Pumped Liquid:	DEF clean and free from solid bodies or abrasive substances, non-aggressive.	
Degree of Motor Protection	IP68	
Thermal Class	F	

Model	Power	Voltage	Current	Capacitor	Fatt. Pot.	Capacity GPM		Head Ft		Weight	Height
	Watt	V / Hz	Max Amps	MF	Cos. Fi	Min	Max	Min	Max	Lb	In.
100 M	1100	115/60	11.8	51-80	0.89	2	22	33	160	25.4	19
200 M	2140	220/60	10.0	35	0.97	8	40	40	152	34.2	24
200 T	2140	230/60	9.2	N/A	0.82	8	40	40	152	33.8	24

Maximum Operating Pressure:	70 PSI
Liquid Temperature Range:	33 °F to 90 °F
Maximum Immersion:	230 Feet
Minimum Positive Head:	6 Inches

Storage Temperature:	33 °F to 100 °F
Relative Humidity of the Air:	MAX. 99%
Max Starts Per Hour:	40
Max Voltage Variation:	+/- 5%

5 Cable Length

DIVER MODEL	CABLE SIZE	16 AWG	14 AWG	12 AWG
		100 M 115v 1~	98	147
200 M 220v 1~	Max length Ft.	32	82	130
200 T 230v 3~		179	280	450

6 Management

6.1 Storage

Diver pumps must be stored indoors, in a dry, vibration-free and dust-free environment, possibly with constant air humidity. They are supplied in their original packaging and must remain there until the time of installation. If this is not possible, the intake and discharge ports must be plugged.

6.2 Transport

Avoid subjecting the products to needless jolts or collisions. To lift and transport the unit, use lifting equipment and the pallet supplied standard (if applicable).

The pump must never be lifted using the power cord.

7 Warnings

7.1 Skilled Technical Personnel

It is advisable that installation be carried out by skilled personnel in possession of the technical qualifications required by the specific legislation in force.

The term **skilled personnel** means persons whose training, experience and instruction, as well as their knowledge of the respective standards and requirements for accident prevention and working conditions, have been approved by the person in charge of plant safety, authorizing them to perform all the necessary activities, during which they are able to recognize and avoid all dangers.

7.2 Safety

Use is allowed only if the electric system is in possession of safety precautions in accordance with the regulations in force in the country where the product is installed. The pump should not be handled while connected to an electrical supply.

7.3 Preliminary Inspection

- Unpack the pump and check its integrity and all of its components.
- Check the data on the nameplate to make sure it corresponds with power supply, and the original requirements.
- For single phase pumps, check the control panel to make sure that the correct capacitor has been installed (see section 4). If using a single phase DAB controller (see section 15) disregard this line. DAB single phase controllers contain a capacitor.
- In the case of any discrepancies contact the supplier immediately.

7.4 Responsibility



The Manufacturer does not vouch for correct operation of the pumps if they are tampered with or modified, run outside the recommended work range or in contrast with the other instructions given in this manual.

The Manufacturer declines all responsibility for possible errors in this instructions manual, if due to misprints or errors in copying. The company reserves the right to make any modifications to products that it may consider necessary or useful, without affecting the essential characteristics.

8 Installation General



Installation and use should be compliant with ISO 22241 and PEI recommended practice 1100-10. Consult these standards for last updates. Installation should also comply with all applicable Federal, State, Local, or Provincial construction, safety and environmental codes and regulations. OEC Fluid Handling, Inc. declines any responsibility in case of accidents or damages caused by improper use of the pump product or due to negligence or lack of observance of the instruction described in this booklet or use of the pump under conditions that differ from the rating on the nameplate.

Installation is safety relevant, and therefore must be carried out by an expert and authorized installer, by regulations issued by the competent authorities and dictated by experience and common practice.

DAB Diver Series Multistage Submersible pumps are designed for pumping DEF 34% Urea solution (Diesel Exhaust Fluid) only. Never use these pumps for gasoline, kerosene, diesel fuel or any other distillates or solvents.

ISO 22241 provides the Urea Diesel Exhaust Fluid (DEF) requirements including 1) quality of Urea DEF solution, 2) applicable test methods, 3) packaging transportation and storage requirements and 4) refilling interface requirements.

Urea DEF solution must be handled and stored in compatible material, kept free of contamination, and stored at temperatures that will not cause the solution to deteriorate. The use of contaminated or out of specification Urea DEF can cause filter problems, clogged injectors, deterioration of the selective catalytic reduction process, or poison the vehicle's catalytic converter used in the exhaust system. Urea manufacturers may require a system inspection to insure that all components are Urea DEF compatible and that the tank and system have been properly cleaned, rinsed, and flushed before Urea DEF is delivered.

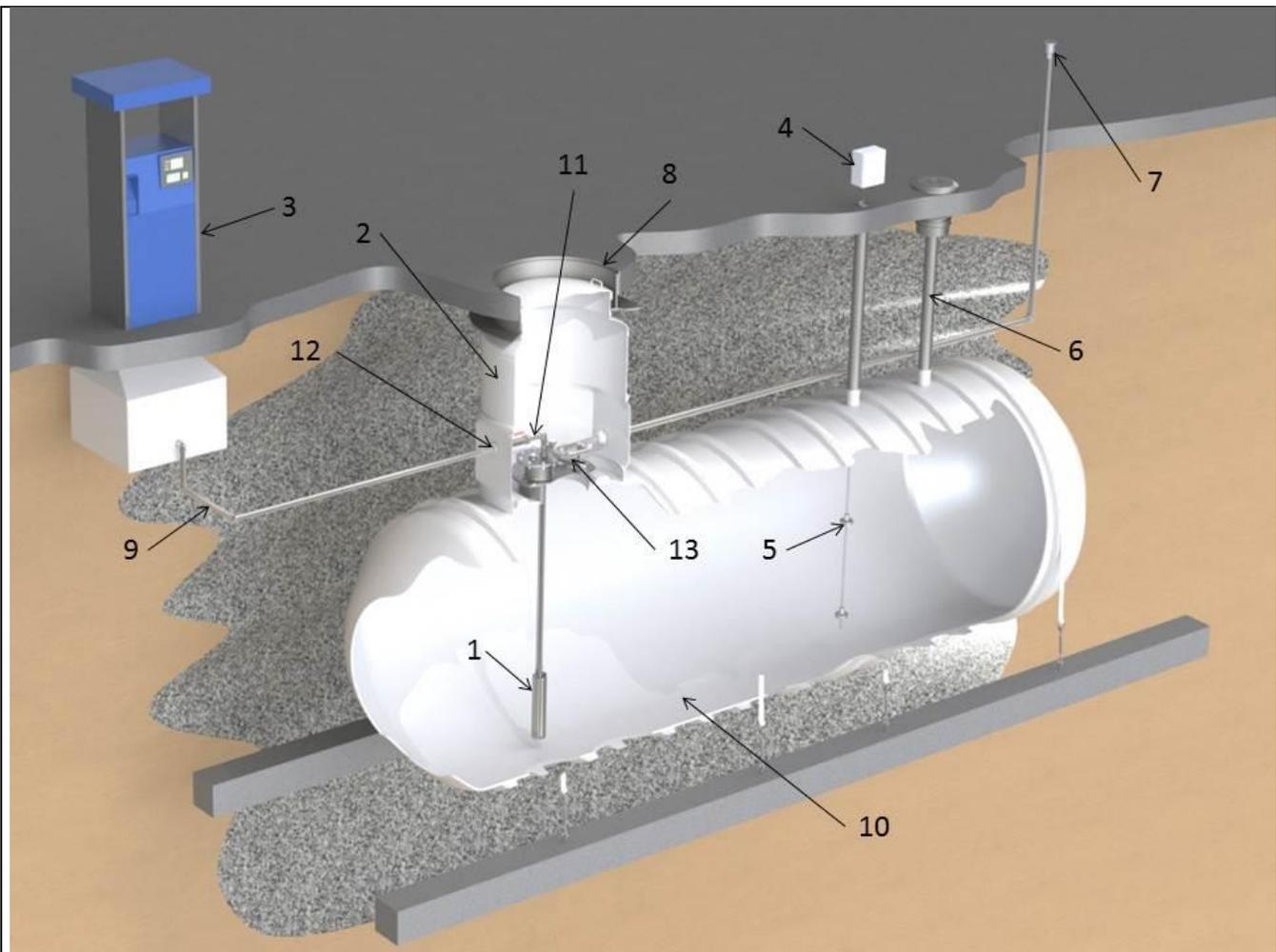
The tank in which the pump is being installed must be vented in accordance with manufacturer's installation instructions. Follow the tank manufacturer's tank installation instructions.

The use of NPT threaded piping and tank fittings for Urea DEF is not recommended. Threaded connections are likely to weep urea solution forming urea crystals at the point of the leak. However, if NPT threaded fittings are used, Urea DEF compatible thread sealant is necessary to achieve a tight connection. Use only pipe dope that is ISO 22241-2 approved for DEF and suitable for stainless steel. Do not use PTFE-based pipe tape. Cleaning of all piping systems with deionized or distilled water per ISO 22241-3 is recommended prior to placing system into service.

A product filter must be installed between the tank / piping and the dispensing point. The filter should be sized to insure that Urea DEF supplied to the dispenser nozzle meets the requirements of ISO 22241 and does not pass particulates that may clog the injector nozzles in the vehicle.

The installation contractor should install the pump so that future service can be easily performed. Tank access ways, man ways, and pump mounting flanges should be large enough for the safe and easy removal of the pump for service and replacement.

8.1 Typical below ground DIVER Installation Diagram (Fig. 8.1)



- 1. DIVER Pump
- 2. Water Tight Chamber
- 3. DEF Dispenser
- 4. Control Panel for Pump Protection
- 5. Level Control Sensor
- 6. Tank Fill
- 7. Pressure / Vacuum Vent

- 8. Man Hole Cover (Not Shown)
- 9. Discharge Pipework
- 10. DEF Storage Tank (Courtesy of Containment Solutions Inc.)
- 11. Check Valve
- 12. Liquid Tight Pipe Connection
- 13. Relief Bypass Valve

8.2 Installation

- Make sure that the tank is free from sand, dirt, and other debris, and that its dimensions are sufficient to fit the pump.
- The pump must be supported by metallic pipe only. Plastic or nonmetallic pipe should not be used without a support cable. Flexible pipe installations also require the use of stainless steel cables for pump support.

WARNING

- Do not lift or support the pump by the electric cable.
- The pump should not touch the tank bottom. It should be suspended at least 3 inches from the tank bottom. Minimum liquid level should be no less than 6 inches above the bottom of the pump.
- Fasten the electric cable to the delivery pipe to prevent it from getting damaged.
- To allow for thermal expansion of the discharge pipe, do not pull the power cable tight.
- The pump is supplied with approximately 30 ft. of FEP-6Y electrical cable. Cable extensions should be made with suitable cable. Cable length should not exceed the length listed in the table in section 5.
- Extension junctions should only be made with a safe and waterproof system.
- The ground cable connection must be physically separated from the power cable junction.
- The pump (both single phase and three phase) should be installed with an electric panel guaranteeing the following functions: overload protection, short circuit protection, dry run protection.
- The three phase pump should also be installed with phase failure protection
- We strongly recommend the installation of a ground fault interrupter / RCCD-protector, whose current differential operation must not exceed 30mA
- For the connection of single or three phase pumps, follow the wiring diagram shown in paragraph 9.3.
- For a three phase pump, check for the correct direction of rotation. It should be clockwise for DIVER and counterclockwise for DIVER HF looking the arrow on nameplate.



WARNING



- The pump cannot be run dry.
- Before connecting the power, check resistance on the ground.
- The pumps DIVER and DIVER HF single phase versions are equipped with a built in thermal overload protector, which disconnects the pump when overheated, and automatically starts it again once the temperature has returned to normal.

WARNING

- **Pumps rated for 220V or 230V cannot be run on 200V or 208V. Doing so will void the warranty.**

8.3 Discharge Piping Connection (See Fig. 8.4)

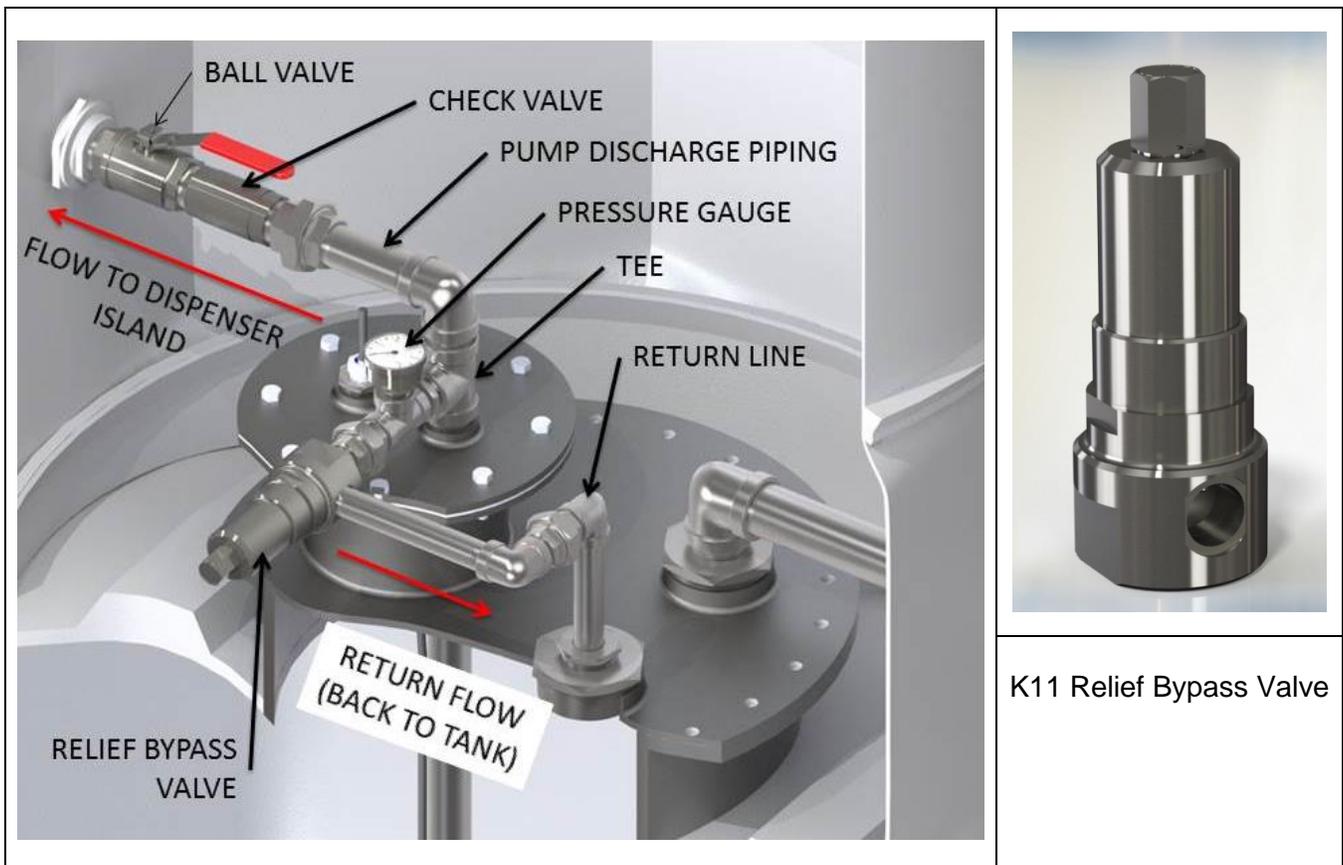
- The hydraulic connection of the pump can be made with stainless steel or rigid polypropylene parts.
- Avoid any reduction of the discharge pipe.
- It is advisable to use pipes with an internal diameter at least equal to that of the delivery pipe, so as to avoid a fall in the performance of the pump and the possibility

of clogging.

- To lower the pump, always use a stainless steel or poly chain fixed beforehand to the hook on top of the pump. Hose made of approved materials may be used if proper lift cable or chain is used.
- Verify all fittings are DEF compatible.
- **Never use the power cable to lift the pump.**
- The supplied check valve should be installed on the discharge piping. A ball valve should be installed to allow for servicing of pump, check valve, and relief bypass valve. The supplied pressure gauge, and the supplied relief bypass valve should be teed off of the discharge piping, upstream of the check valve. The outlet of the back pressure valve should be piped back to the tank. (See Fig. 8.4)
- The relief bypass valve is pre-set to 45 psi. It should begin to relieve at just over 30 psi. It can be field adjusted; however field adjustment is not recommended without first consulting OEC Fluid Handling.
- **A relief valve or other means of protecting the pump motor from overheating due to downstream line closure is required to maintain warranty**
- **Dry operation or closed valve operation of the pump causes irreparable damage to the mechanical seal and will cause premature failure.**



8.4 Typical Discharge Piping Installation Diagram (Fig. 8.4)



K11 Relief Bypass Valve

9 Electrical Connection



Caution! Always follow the safety regulations.

9.1



All electrical work should be performed by a qualified electrician in accordance with the latest edition of the National Electrical Code, local codes and regulations.



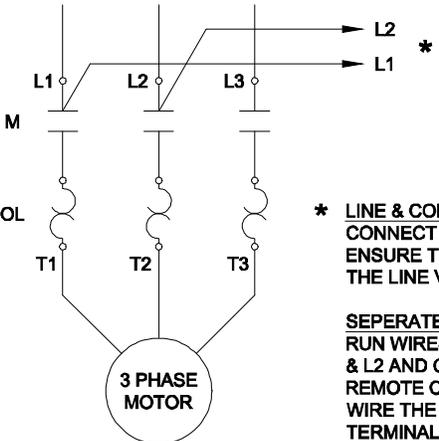
Ensure that the mains voltage is the same as the value shown on the motor plate. A faulty motor or winding can cause electrical shock that could be fatal, whether touched directly or conducted through standing water. For this reason, proper grounding of the pump to the power supply's grounding terminal is required for safe installations, the above-ground metal plumbing should be connected to the power supply as a ground as described in Article 250-80 of the National Electrical Code or Section 26-954 of the Canadian.

9.2

- The single phase pump motors require a capacitor start control.
- The pump (both single phase and three phase) should be installed with an electric panel guaranteeing the following functions: overload protection, short circuit protection, dry run protection.
- The three phase pump should also be installed with phase failure protection
- We strongly request the installation of a ground fault interrupter / RCCD-protector, whose current differential operation must not exceed 30mA

9.3 Single and Three Phase Wiring Diagrams

<p>SINGLE PHASE WIRING DIAGRAM</p> <p>Yellow 2 Black 2 Black 1 Red 3 Black 3 Green Yellow / Green</p> <p>T L1 N C</p> <p>1-Common 2-Main 3-Auxiliary C-Capacitor T-Thermic relay</p>	<p>Diver 100 M 115V/1Ph/60Hz 60148894</p>	<p>Diver 200 M HF 220V/1Ph/60Hz 60148895</p>
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<p>3 PHASE WIRING DIAGRAM</p>  <p>* LINE & CONTROL VOLTAGE CONNECT AS INDICATED ON DRAWING. ENSURE THAT THE COIL VOLTAGE MATCHES THE LINE VOLTAGE.</p> <p>SEPERATE CONTROL SOURCE RUN WIRES FROM CONTACTOR TERMINALS L1 & L2 AND CONNECT THESE WIRES TO THE REMOTE CONTROL VOLTAGE SOURCE. WIRE THE REMOTE CONTROL VOLTAGE TO THE TERMINALS AS SHOWN.</p>	<p>Diver 200 T HF 230V/3Ph/60Hz (60161782)</p> 
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10 Start Up



Do not start the pump unless it has been completely submerged in fluid.

Before starting up, check that the pump is properly primed; fill it completely with DEF by means submerging the pump completely in the liquid to be pumped and releasing all the air from the pump body. This ensures that the mechanical seal is well lubricated and that the pump immediately starts to work regularly. **(Fig. 1). Dry operation causes irreparable damage to the mechanical seal.**

- Turn the power supply switch upstream from the pump to position I (ON) and wait until the liquid comes out of the delivery pipe.
- If malfunctions are found, disconnect the pump from the power supply, turning the power supply switch to position 0 (OFF) and consult the section on "TROUBLESHOOTING".
- The pump may be started and stopped manually by means of the isolator switch upstream from the system.

11 Precautions

The pump should not be started more than 30 times in one hour so as not to subject the motor to excessive thermal shock. The suction filter in DIVER pumps must always be present during pump operation. **DANGER OF FROST:** When the pump remains inactive for a long time at temperatures of less than 32°F, the pump body must be completely emptied, to prevent possible cracking of the hydraulic components. This operation is advisable even in the event of prolonged inactivity at normal temperature. When starting after long periods of inactivity, the starting-up operations listed above must be repeated.

12 Maintenance and Hydraulic Inspection



In normal operation, the pump does not require any specific maintenance. However, it may be necessary to clean the hydraulic parts when a decrease in performance is observed. **The pump must not be dismantled unless by skilled personnel in possession of the qualifications required by the regulations in force.** In any case, all repairs and maintenance jobs must be carried out only after having disconnected the pump from the power mains.

13 Modifications & Spare Parts



Any modification not authorized beforehand relieves the manufacturer of all responsibility. All the spare parts used in repairs must be original ones and the accessories must be approved by the manufacturer so as to be able to guarantee maximum safety of the machines and systems in which they may be fitted.

13.1 Removal and replacement of parts



Before beginning any servicing, ensure that the pump is not connected to the power supply.

14 Troubleshooting



Before taking any troubleshooting action, disconnect the pump from the power supply. If there is any damage to the power cable or pump, all necessary repairs or replacements must be performed by the manufacturer or his authorized customer support service or an equally qualified party with the manufacturer's permission.

FAULT	POSSIBLE CAUSE		CORRECTIVE ACTION	
Pump starts and stops	A	Incorrect voltage, or voltage drop	A	Check the voltage during startup; if the cable cross-section is too small, the voltage drop may be such that the motor cannot function normally
	B	Open-circuit in motor power cord	B	Measure the resistance between phases. Refit the pump if necessary and check the cable.
	C	Motor protection trips out	C	Check the current setting on the thermal relay and compare to the indicated value. Important: do not continually reset relay, try to locate the cause; forced operation could overheat and damage the motor.
Pump fails to deliver, or greatly reduced flow	A	Voltage low	A	Check supply voltage at the panel.
	B	Suction strainer clogged	B	Refit the pump: unclog and clean
	C	Incorrect direction of rotation (3 Phase only)	C	Switch two phase wires in the panel.
	D	Insufficient liquid level	D	Check liquid level. Min. level is 6 inches measured from bottom of pump.
Impellers do not spin freely	A	Insufficient voltage	A	Check incoming voltage against required voltage list on pump data plate
	B	Interference between impeller(s) and pump housing	B	Contact OEC Fluid Handling.
Pump starts too often	A	Differential on pressure-sensitive switch too small.	A	Increase the Stop/Start difference.
	B	Dry run protection float incorrectly placed.	B	Adjust the distance between them so the time between stopping and starting of pump is reasonable.
	C	Bladder tank is too small or insufficiently pressurized	C	Check and adjust pressures (On/Off). Check pressure in tank. Add a tank to increase capacity or change tank.

15	Parts Listing	
	Description	Part Number
	Diver 100 M Single Phase 115V Submersible Pump	60148888
	Controller, Diver 100 M Single Phase 115V	60148894
	Diver 200 M HF Single Phase 220V Submersible Pump	60148893
	Controller, Diver 200 M HF Single Phase 220V	60148895
	Diver 200 T HF Three Phase 230V Submersible Pump	60152613
	Controller, Diver 200 T HF Three Phase 230V	60161782
	Check and Bypass Valve Kit	6011K11
	Check Valve, 1-1/2" NPT SS	CVSE150
	Relief Bypass Valve, 1" NPT (Pre-Set to 45 PSI)	K11EWA01-E
	Pressure Gauge, 0-100 PSI	98153610

Contact OEC Fluid Handling, Inc. for current pricing and availability (1-800-500-9311).

16 Declaration of Conformity

DAB Pumps S.p.A., with headquarters in Mestrino – Padova – Italy, hereby declares that the following products

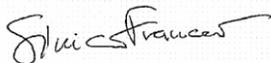
Submersible pumps DIVER & DIVER HF (DEF Application)

Comply with the provisions of the following European Directives and regulations transposing them into national law

- Low Voltage Directive 2006/95/CE and subsequent amendments
 - Electromagnetic Compatibility Directive 2004/108/CE and subsequent amendments
- And with the following technical standards
- EN 60335-1 :08
 - EN 60335-2-41 :05
 - ISO 22241-1
 - ISO 22241-2
 - ISO 22241-3
 - ISO 22241-4

Mestrino, 24.11.2011

Francesco Sinico
(R&D Director)



17 Warranty

DAB Water Technologies will provide a warranty to the original purchaser of the product. A valid warranty will fall within the warranty period shown below.

Product	Warranty Period
DEF (Diesel Exhaust Fluid) Handling Systems Products:	
DAB Jet Inox SS 50 115/230v 60Hz.	Product is warranted 18 months from date of installation, or 24 months from date of manufacture.
Leader US Bluediver 115v 60 Hz.	Product is warranted 18 months from date of installation, or 24 months from date of manufacture.

Our Warranty will not apply to any product that; in our sole judgment, has been subject to negligence, misapplication, improper installation, or improper maintenance.

Any material defects will be corrected during the warranty period established by this Limited Warranty. It is up to the manufacturer to decide whether to repair or replace the faulty pump(s).

The manufacturer's warranty covers all substantial defects attributable to manufacturing or material defects, providing the product has been used correctly and in compliance with the instructions.

The warranty becomes null and void in the event of the following:

- Unauthorized attempts to repair the pump.
- Unauthorized technical changes to the pump.
- Use of non-original spare parts.
- Mishandling

For any action or questions concerning your warranty, you can contact OEC Fluid Handling, Inc. at 1-800-500-9311.