



V.T.E. S.r.l.
via Petronio, 1/C - Zona Industriale Noghere
34015 Muggia - Trieste - Italy
Tel.: +39 040 231715 - Fax: +39 040 231933

Web Site: www.volpitemco.com - E-mail: volpi@volpitemco.com

Owners manual

PAGURO 6500





We thank you for the confidence you have shown in us, by purchasing the **PAGURO** for fitting in your boat.

The target of our design, to achieve a diesel unit with the power usually supplied in a small flat, in a compact size and light weight, is completely reached. So there is not the need to waste a large room in your boat, and even if the chosen place is away from the centerline of the boat, the reduced weight of the **PAGURO** will not influence the stability.

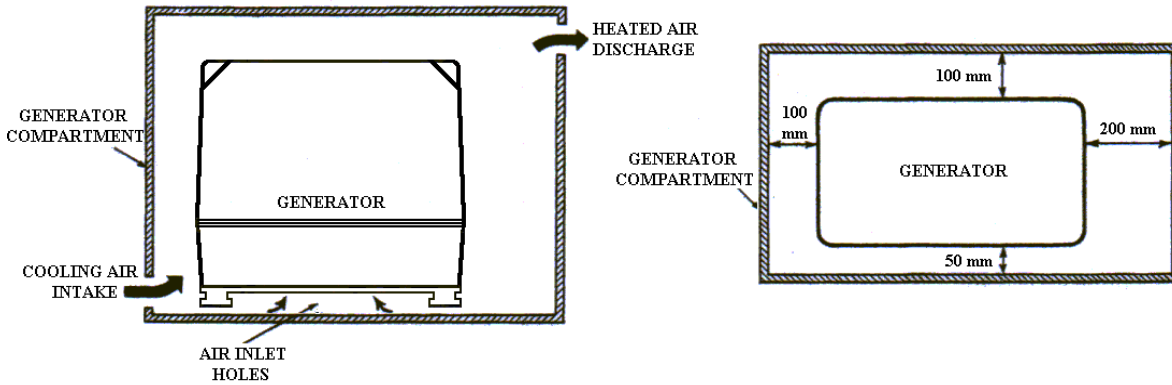
TECHNICAL SPECIFICATION AND PERFORMANCES

		PAGURO 6500
Diesel engine maker		LOMBARDINI MARINE, Italy
Engine type / cylinders n.		LDW 1003 / 3 cyl.
Mechanical continuous power	50 cyc.	8.3 KW
	60 cyc.	10 KW
Continuous speed	50 cyc.	1500 rpm
	60 cyc.	1800 rpm
Specific fuel consumption		0.35 lt./KW/h
Cooling system		Fresh water with heat exchanger
Cooling pump		Johnson system self-priming directly driven, without belt
Starting and shut-off system		12 V electrical starter remote controlled
Generator maker		V.T.E. - Italy
Generator type		Synchronous, brushless, AC watercooled generator
Water cooling system		Through stainless steel AISI 316 L heat exchanger jacket
Electrical continuous power	50 cyc.	6.5 KVA - 6 KW
	60 cyc.	8 KVA - 7.5 KW
Pick current for 2 sec. (230 V)		72 A
Voltage	50 cyc.	Single phase AC 230 V
	60 cyc.	Single phase AC 115 V
Auxiliary voltage for starting battery		12 V - 8 A
Remote control		fitted with hourmeter, load indicator, automatic shut-off device for low oil pressure and water over temperature, starting motor self disengagement, 10m cable and socket
Noise level		49 dB(A)
Weight (soundproof hood included)		170 Kos
Engine serial number		

WHERE TO FIT YOUR PAGURO

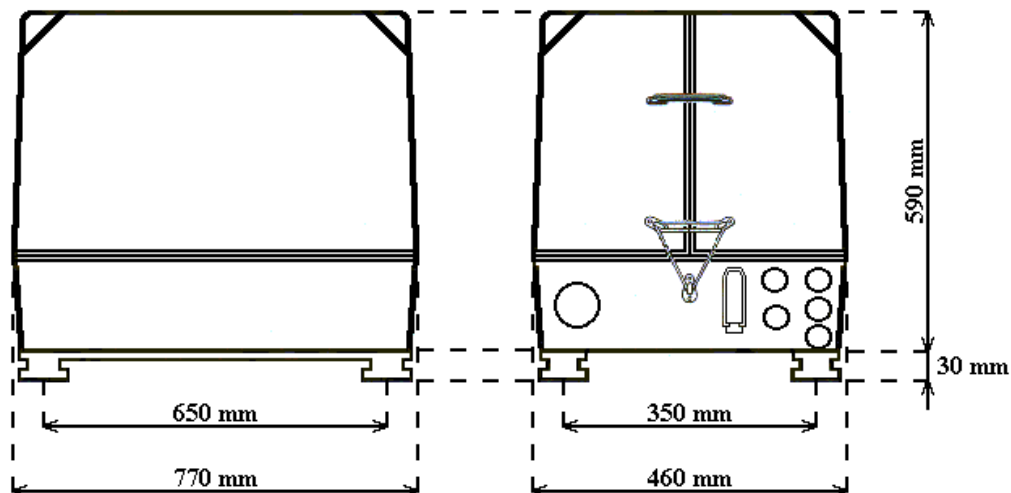
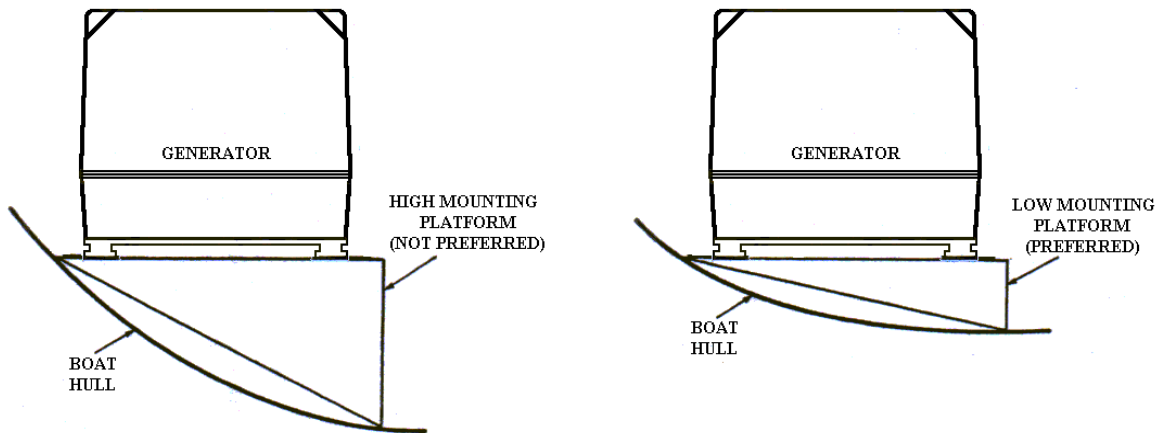
For a correct air replacement

Around the **PAGURO** have at least the shown tolerance; of course the ambient have to be naturally vented with more then one external connection.

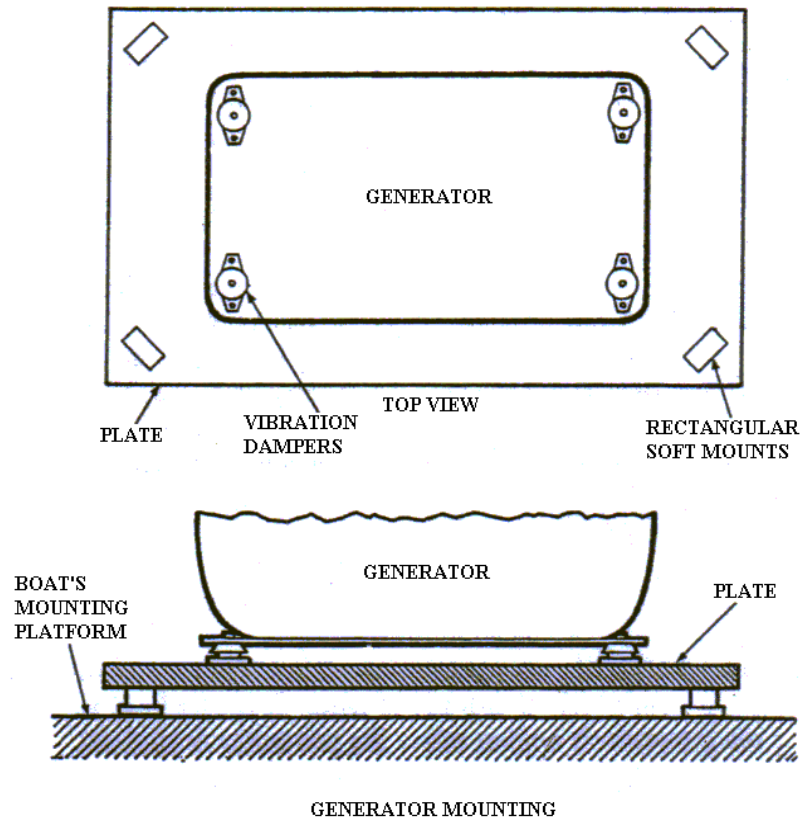


For fixing the PAGURO on board

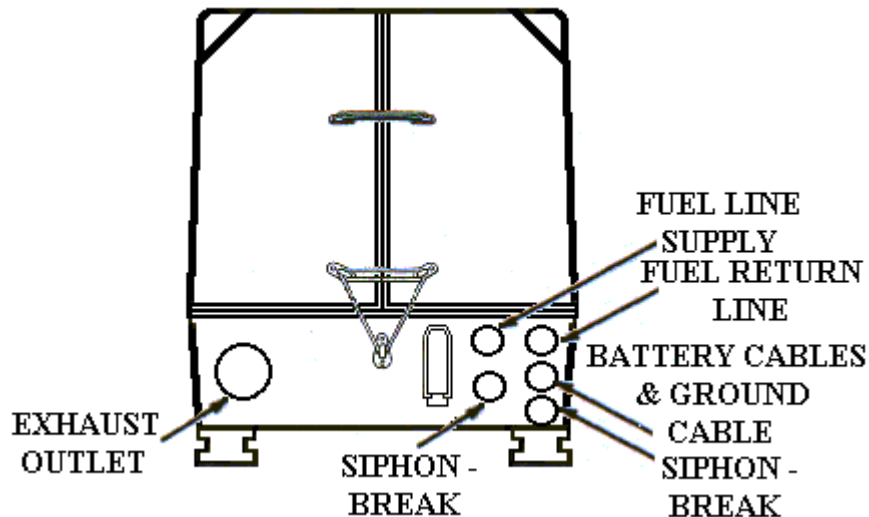
A metallic, wooden or fiberglass structure have to be achieved. It must be as small as possible to avoid the generation of vibrations and must keep the unit horizontally.

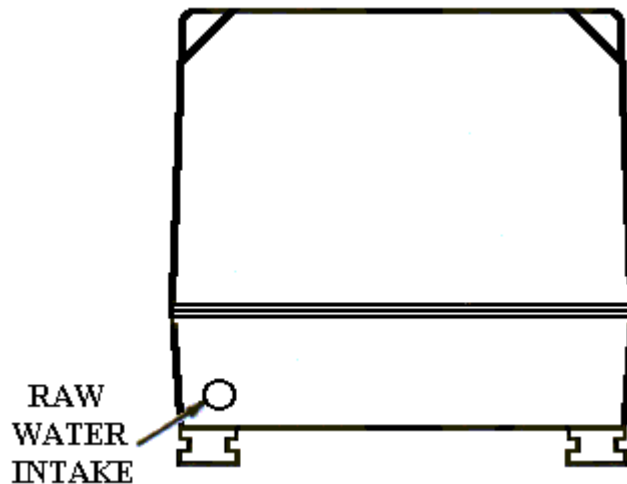


If the vibration-dampening mounts furnished with the generator are not adequate to muffle vibration or resonance in an installation where the mounting surface is not ideal, then adding a plate between the generator and the boat's mounting platform is a possible solution. This will also improve the sound insulation. For this plate, use 3 cm thick wood that weighs 10-15 Kg, and soft mounts that are rectangular. Position these mounts so they are on the diagonal and not aligned with the generator's mounts (see illustration). The generator's mounts may be turned in any direction. Mount the plate to the boat's platform, then mount the generator to the plate



EXTERNAL CONNECTIONS

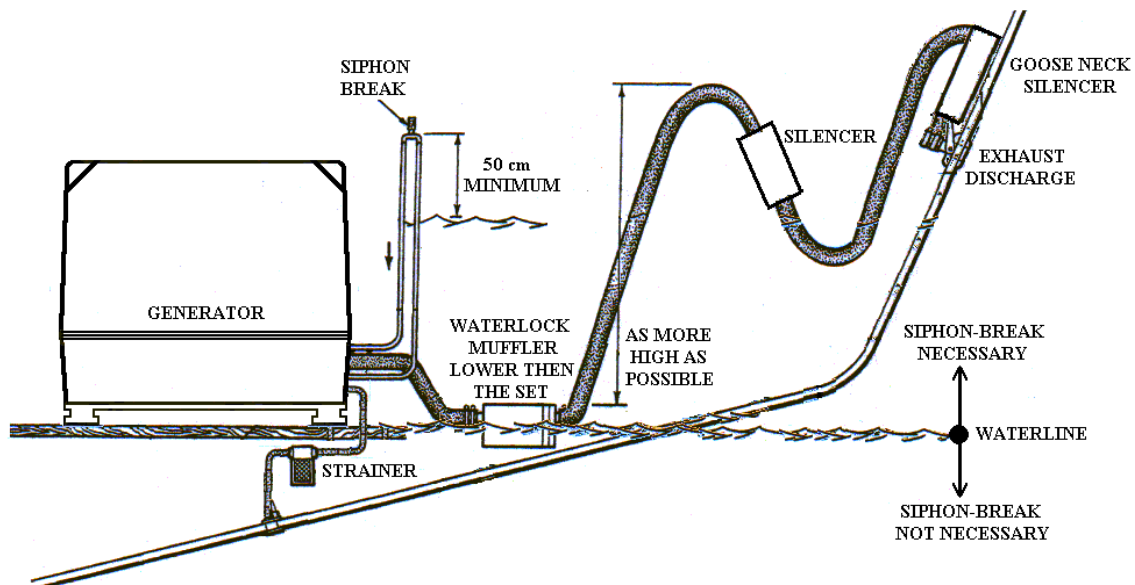




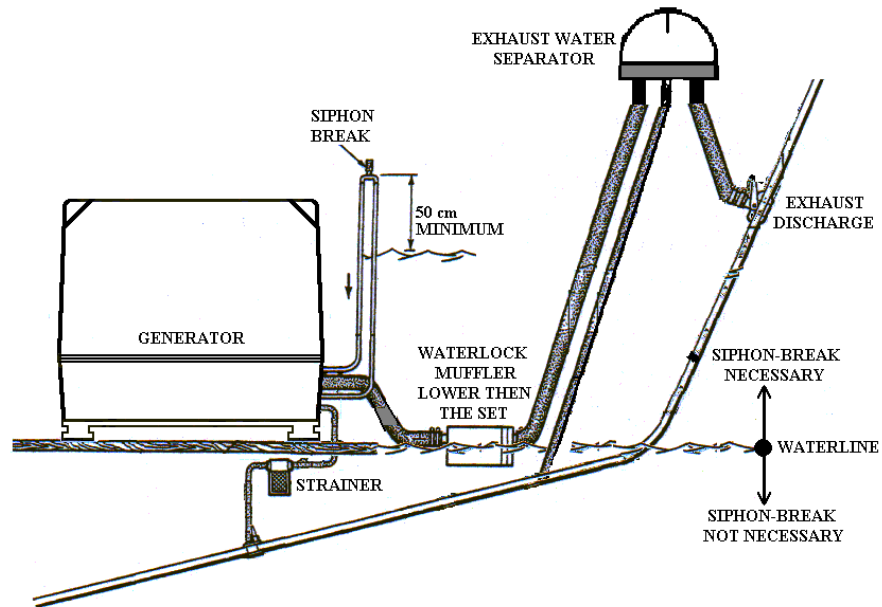
Note: The internal diameter of the pipes have to be respected to avoid untightening and leakage, but the external diameter is important too, because the correct size avoids a noise way-out from the sound-proof capsule.

Exhaust line (on request)

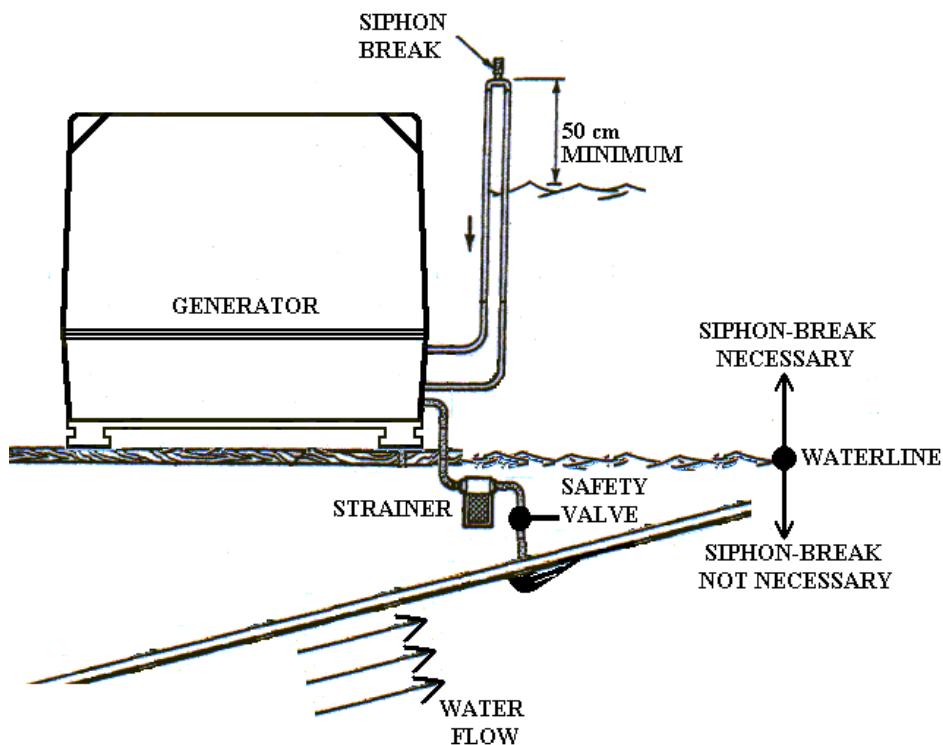
STANDARD SYSTEM: the best dumping result is obtained fitting the 3 typical "Vetus" exhaust mufflers: the first as water lock avoids the risk of water return into the engine and dumps 50% of noise so it must be installed; the second reduces a further 20% noise and must be fitted with a gradient towards the out let in order to avoid water return; the third dumps a further 10% and avoids the risk of external seawater due to waves.



IMPROVED SYSTEM: a further improvement in the noise dampening is achieved fitting instead of the third muffler the water separator. The cooling water is separately throw from a separate hole flowing smoothly, avoiding the noise produced by the water coming alternatively spread from the exhaust pipe.



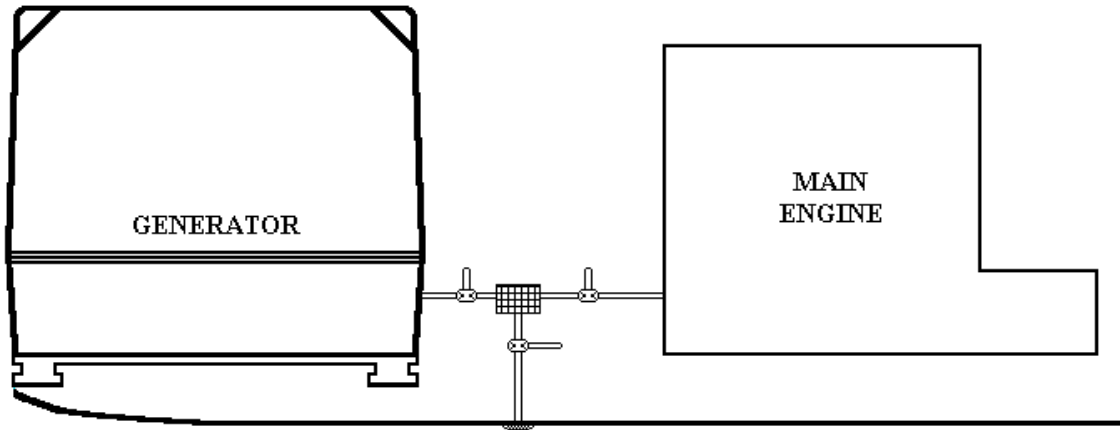
Cooling water intake (on request)



Note 1: The unit can be installed completely below the sea level; in this case the safety cooling vacuum valve has to be fitted out of the capsule and connected with separate pipes to the delivery of cooling pump.

Note 2: In case the hole in the hull for the water intake is undesired, the water line can be connected in parallel with the water intake of the main engine. In this case a couple of locking valves are necessary, because a failure of the main engine pump can influence the cooling of the set and voiceovers.

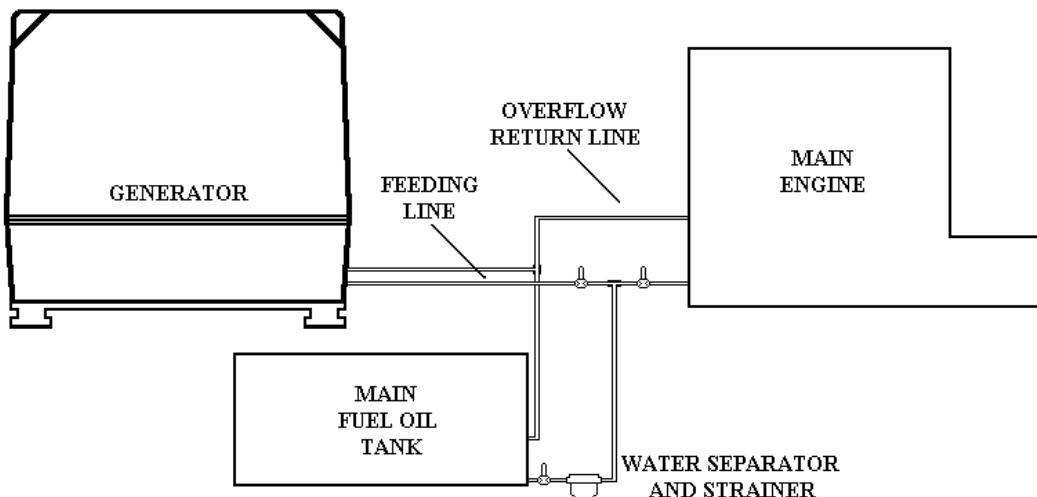
Note 3: In case the hole in the hull for the water intake is undesired, the water line can be connected in parallel with the water intake of the main engine. In this case a couple of locking valves are necessary, because a failure of the main engine pump can influence the cooling of the set and voiceovers.



Fuel oil line

It is usually employed the main fuel tank of the boat: the feeding pump driven by the engine assure a suction from a maximal height of 1 m, no length limits.

A separate line coming from the tank avoids air bubbles troubles, but in several cases the fuel can be taken from the pipe of the main engine: a couple of locking valve are necessary, because a failure in the non-return valve of the feeding pump of the main engine can influence the set and voiceovers.

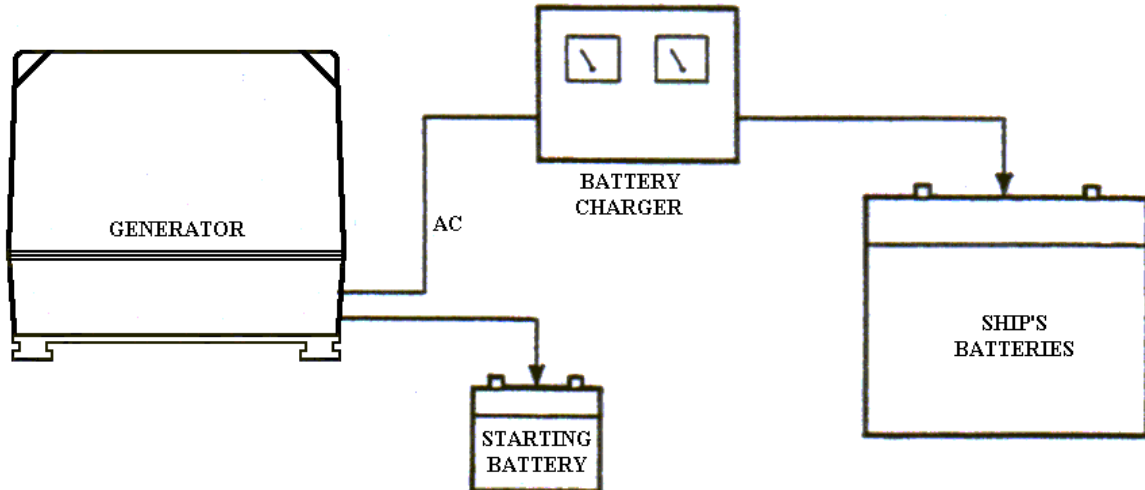


Note 1: The injection pump of the **PAGURO** is self-bleeding, it means that in case the engine shut-off for lack of fuel, after fuel tank filling up there is no need of disconnecting the pipes for bleeding, because this operation is simply obtained acting by hand on the lever of the feeding pump.

Note 2: Even if a small fuel filter is contained in the capsule, an external strainer and water separator is suggested to delay the replacement time.

Starting battery connection

The **PAGURO** is negative grounded, and can be connected to the main board batteries 12 V or to a separate small battery 12 V of about 90 Ah; in this second case its internal charging device takes care of feeding the battery with 8 A



Note : In case of connection to the main board batteries the 8 A are available as well, but are irrelevant for charging them: a static high power battery charger fed by the 230 V (115 V) of the set must be installed on board (on request).

Remote control (supplied)

It allows the user to **START** and **STOP** the unit, verify if there is a cooling water or oil pressure failure, (in that case the engine shut-off automatically and the **RED LED** is lighted) and the power supplied control.

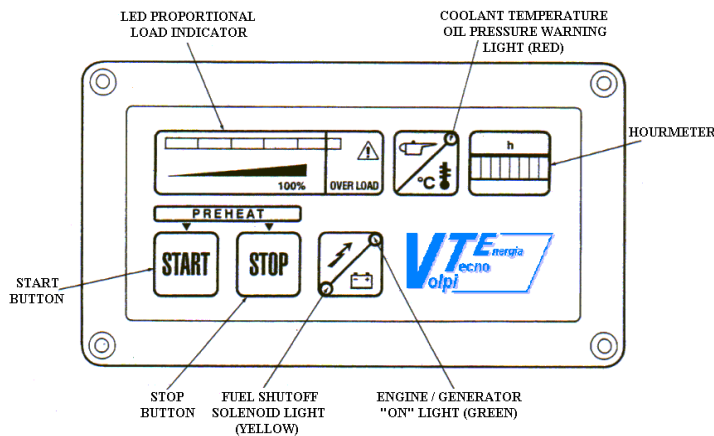
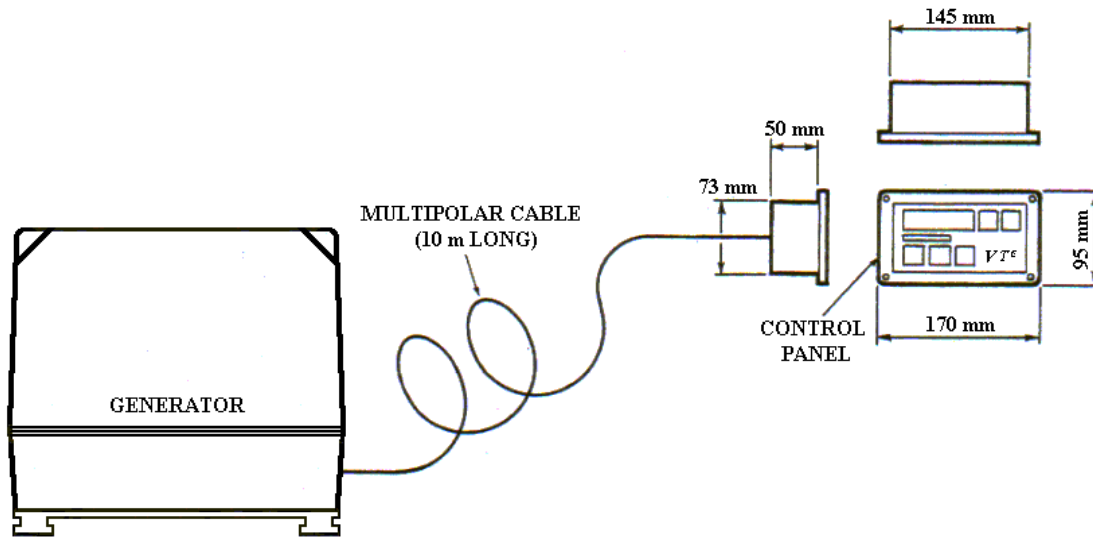
For preheating keep pushed contemporaneously the **START** and **STOP** buttons for about 10 sec.. The **GREEN LED** energized means that the preheating is in progress. For starting release the 2 pushed buttons, repushing the **START** only.

Note 1: The load indicator is designed to avoid overloading of the unit through feeding too many electrical loads; it begins to show the load after the first half power supplied and has to be considered normal when the bar is **GREEN**. The last **RED LED** lighted means an overcharge: switch-off the exceeding load to return at normal conditions.

Note 2: Do not forget the starter knob switched **ON** and the engine not running due to aborted starting attempt (**YELLOW LED** flashing), the **STOP** button should be pushed because on the contrary the engine shut-off valve remains energized and takes useless power from the starting battery.

Note 3: If the **YELLOW LED** remains flashing when the set is running normally, it means that the internal battery charger protection has tripped, so the starting battery is no longer connected to it. In that condition the automatic protection shut-off system is not operative, so **do not operate the set with the YELLOW light flashing**. Reset the device by pushing the button located on the side of the **GREY** box fitted on the set. The set can normally operate when the **YELLOW** flashing LED is **OFF** and the **GREEN** on the opposite corner is **ON**.

Note 4: If for operator's mistake the starting knob is pushed whilst the engine is already running, an electrical safety device avoids the gears re-engagement, protecting the starting motor and preventing failures.



For passing trough small holes the remote control panel cable, the disconnection must be made panel side, opening the back cover, and not plug side, that is welded.

Main power 230 V (115 V)

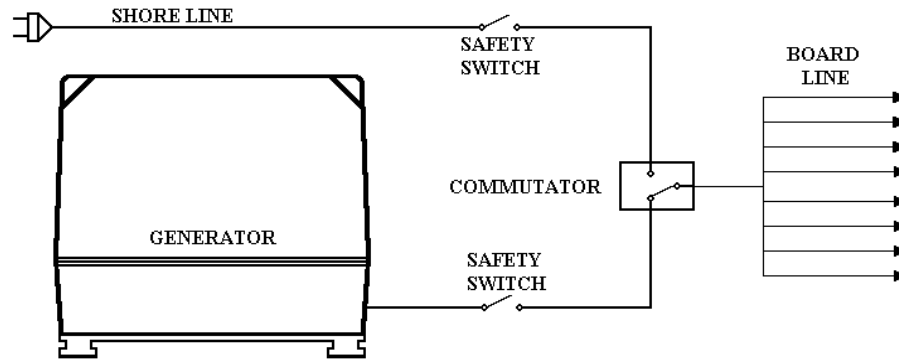
As the most of the boats have installed 230 V (115 V) feeding line from the shore, it has to be absolutely avoided that the main and the generator remain contemporaneously connected to the boat plant.

A manual safety commutator (on request), or an automatic safety commutator (on request) has to be provided.

Note: Both the lines or at least the generator line only, have to be protected with a magneto thermic safety switch, fitted on the main board panel.

For your **PAGURO** choose a:

	PAGURO 6500
If connected at:	Bipolar:
230V 50Hz	24A
115V 60Hz	60A



WHAT CHECKING BEFORE FIRST STARTING

- That the lubricating oil level in the engine reaches the upper line on the deep stick.
- That the valves of the following feeding pipes are properly open:
 - cooling sea water;
 - fuel oil suction;
 - fuel oil overflow return.
- That the main AC safety switch is SHUT-OFF.
- That the commutator GENERATOR / SHORE LINE is fitted in GENERATOR mode.

AFTER FIRST STARTING CHECK THAT

- Inside the capsule there is no leakage from the connections of the several pipes.
- The cooling water is flowing properly from the exhaust outlet, outboard.

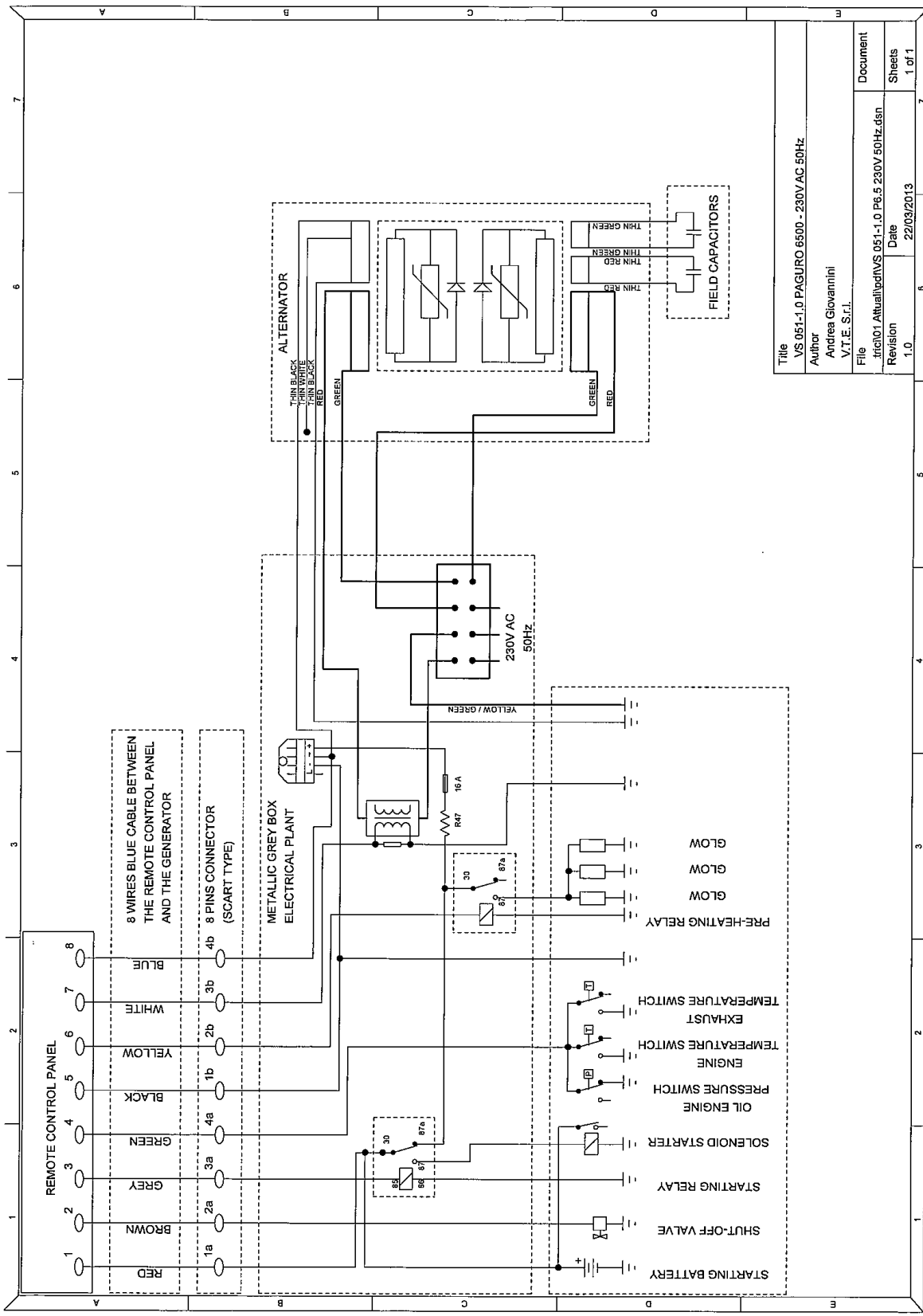
When everything is in order, close carefully the capsule and your **PAGURO** is ready for supply trouble less energy.

FAILURES

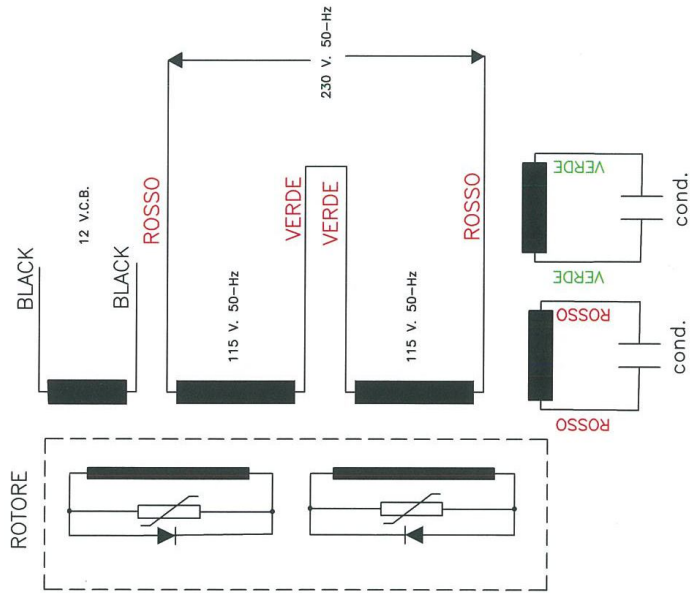
Each unit is carefully tested in our factory and the performances are verified; even so a readjustment can be sometime necessary according to the following suggestions.

PROBLEMS	CAUSES	REMEDIES
Alternator excitation failure	1. Low engine speed	1. Check rpm and set at the nominal value of 3100 rpm without load (3700 for 60 cycles)
	2. Faulty capacitor	2. Check and replace
	3. Faulty windings	3. Check that winding resistance as follows: - rotor 3.785 Ω - battery charger 0.146 Ω - stator 1.320 Ω - excitation 0.784 Ω
High no-load voltage (over 240 V)	1. Engine speed too high	1. Check and adjust rpm
	2. Capacitor with too high capacity	2. Check and replace

PROBLEMS	CAUSES	REMEDIES
Low no-load voltage (under 230 V)	1. Engine speed too low	1. Check and adjust rpm
	2. Faulty rotating diodes	2. Check and replace
	3. Break down in windings	3. Check windings resistance as above
	4. Capacitor with low capacity	4. Check and replace
Proper no-load but low under load voltage	1. Low loaded engine speed	1. Dirty fuel filter
	2. Overload	2. Check the load indicator
	3. Rotating diodes short circuited	3. Check and replace
Unstable voltage	1. Loose contacts	1. Check connections
	2. Uneven rotation	2. Check for uniform rotation speed (dirty fuel filter)
Noisy generator	1. Broken bearings	1. Replace
	2. Loose coupling	2. Check and repair



Title		VS 051-1.0 PAGURO 6500 - 230V AC 50Hz	
Author		Andrea Giovannini	
File		.itrc01 Attualpdr\VS 051-1.0 P6.5 230V 50Hz.dsn	
Revision		Date	
1.0		22/03/2013	
Document		1 of 1	
Sheets		1 of 1	

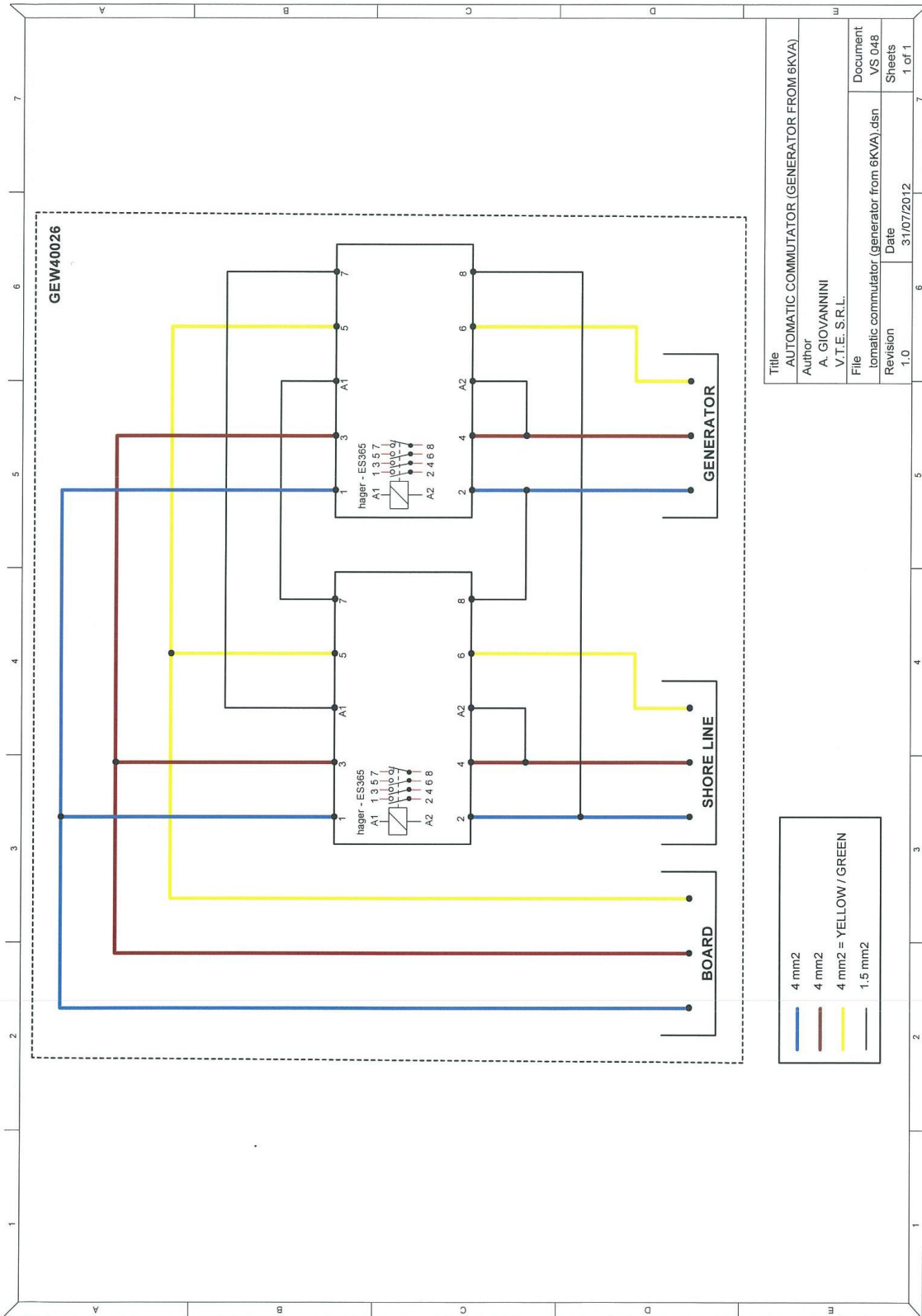


MAIN WIND RED-GREEN=0.658
 AUX. WIND. RED-RED =0.784
 C.B. WIND. RED-BLACK =0.146
 ROTOR= 3.785

note Schema elettrico per alternatori : AM W-28/4 H-70 115/230V. 50Hz+12VDC

A. termine di legge ci riserviamo la proprietà di questo disegno con il divieto di riprodurlo.

AUTOMATIC COMMUTATOR GENERATOR / SHORE LINE (ON REQUEST)

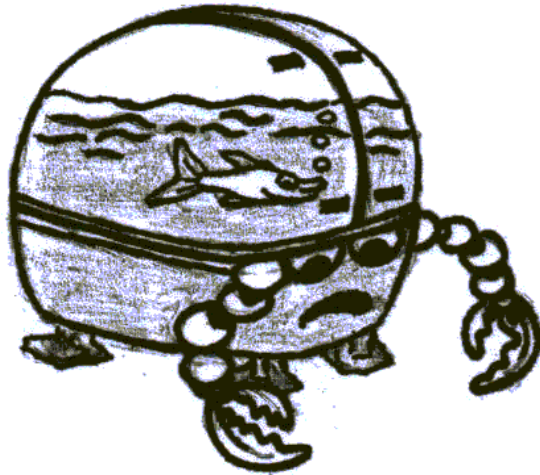


Title	AUTOMATIC COMMUTATOR (GENERATOR FROM 6KVA)	
Author	A. GIOVANNINI	
File	Automatic commutator (generator from 6KVA).dsn	
Revision	Date	31/07/2012
1.0	1 of 1	1 of 1

4 mm ²	4 mm ²	4 mm ² = YELLOW / GREEN	1.5 mm ²
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WARNING

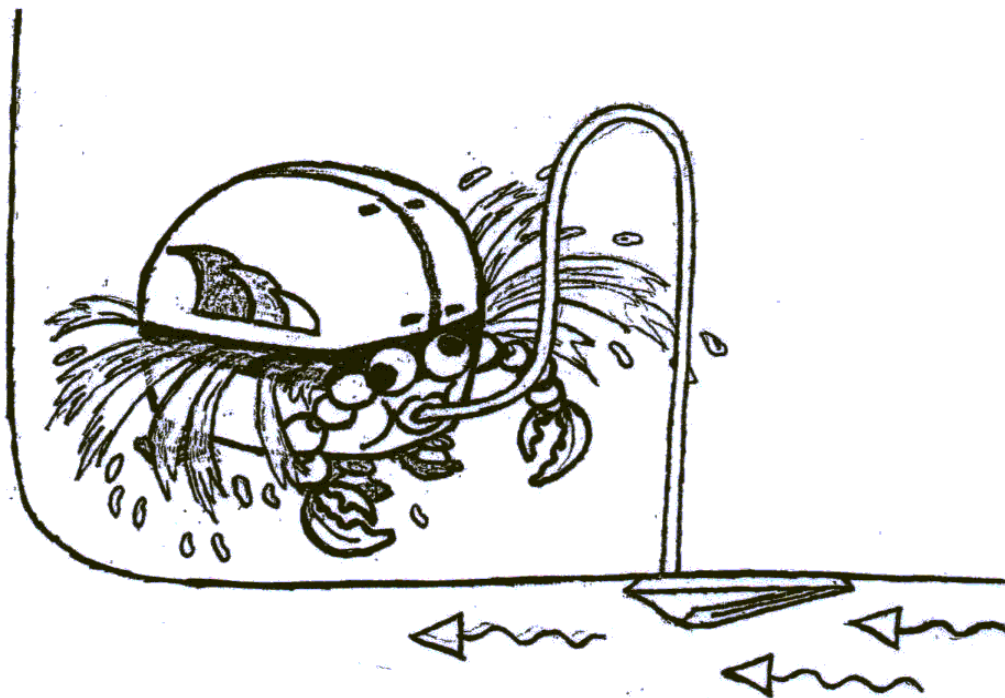
A great marine sets number of any type and manufacture, after first installation on board are flooded by sea water causing severe damages to the unit with high replacement or repairing costs, improperly claimed in warranty but gently refused, because it always depends from a critical installation, made compromising some physical rules.



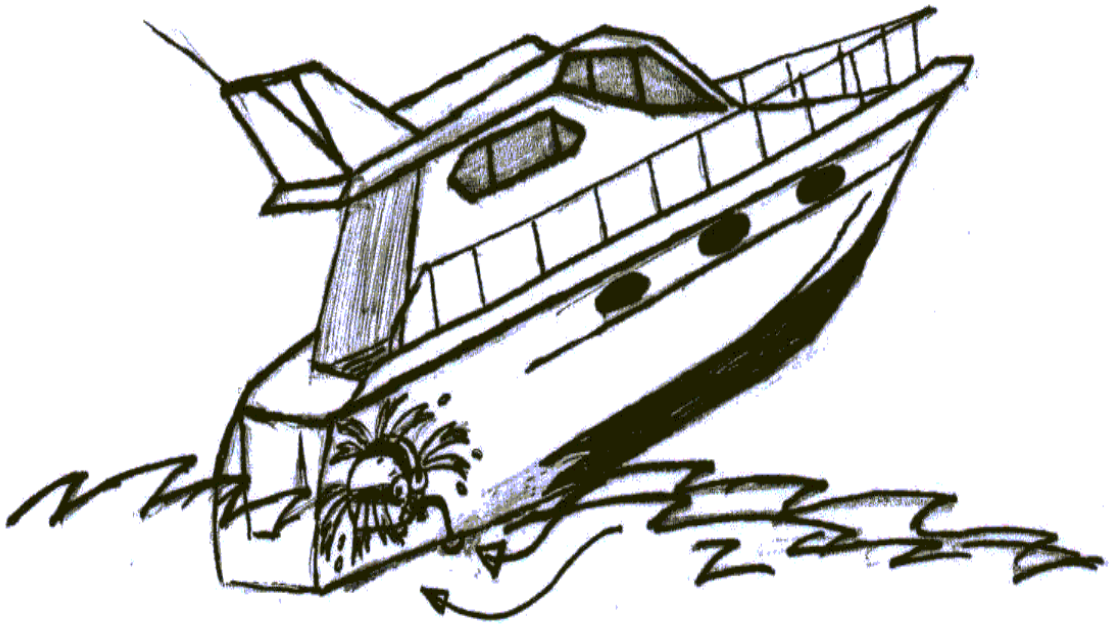
We draw your attention on the most common mistakes to be avoided.

1st MISTAKE

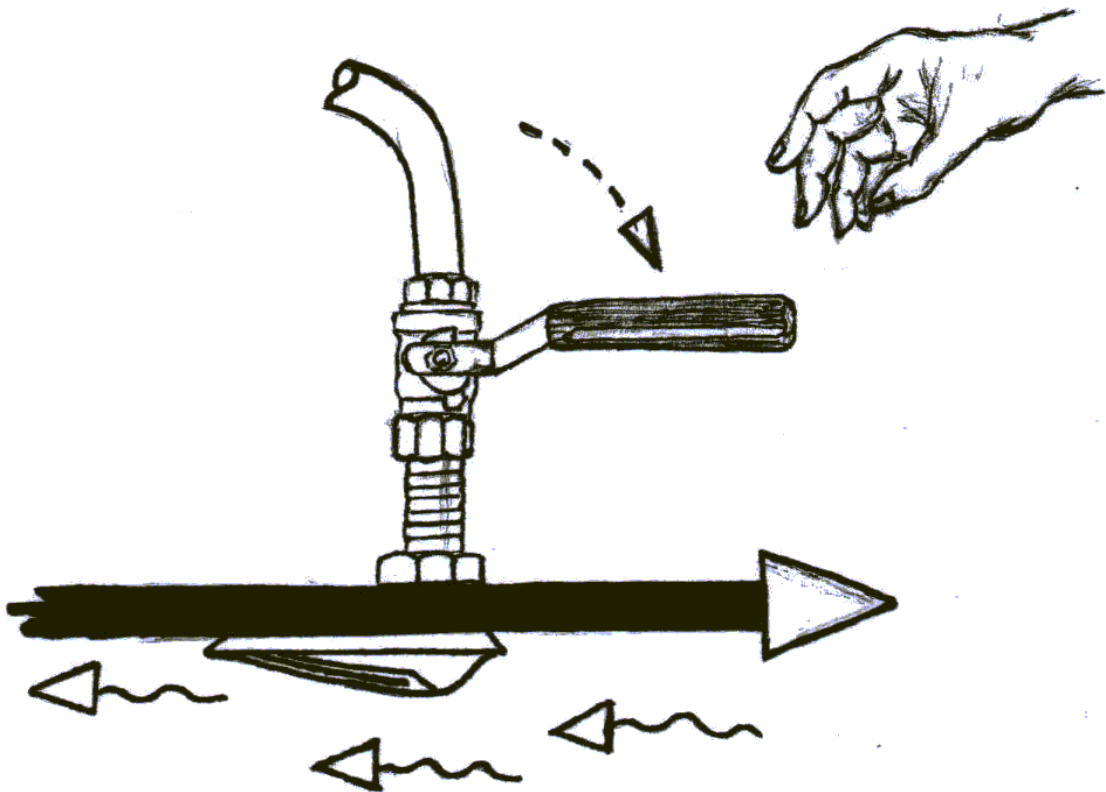
- Sea water intake oriented towards sailing direction, causing a dynamical pressure that, when the generator is not running, let flow sea water through the cooling pump, reaching the exhaust pipe and consequently the engine exhaust valve, flooding the cylinder and the oil sump.



- On a high speed motorboat, a neutral flush hull mounted water intake can cause as well dynamical pressure due to the hull gradient compared the sea surface, or the decreased water line level before reaching the proper trim.

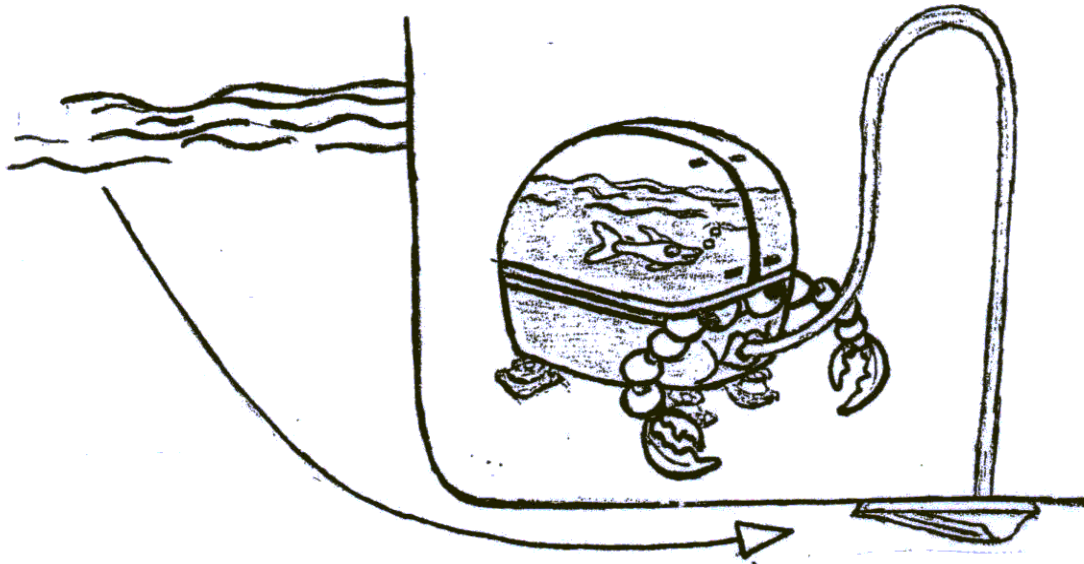


- For avoiding the risk, the water intake entrance must be fitted facing the rear position and even so, in critical sailing conditions the internal valve must be closed when the generating set is not in operation.



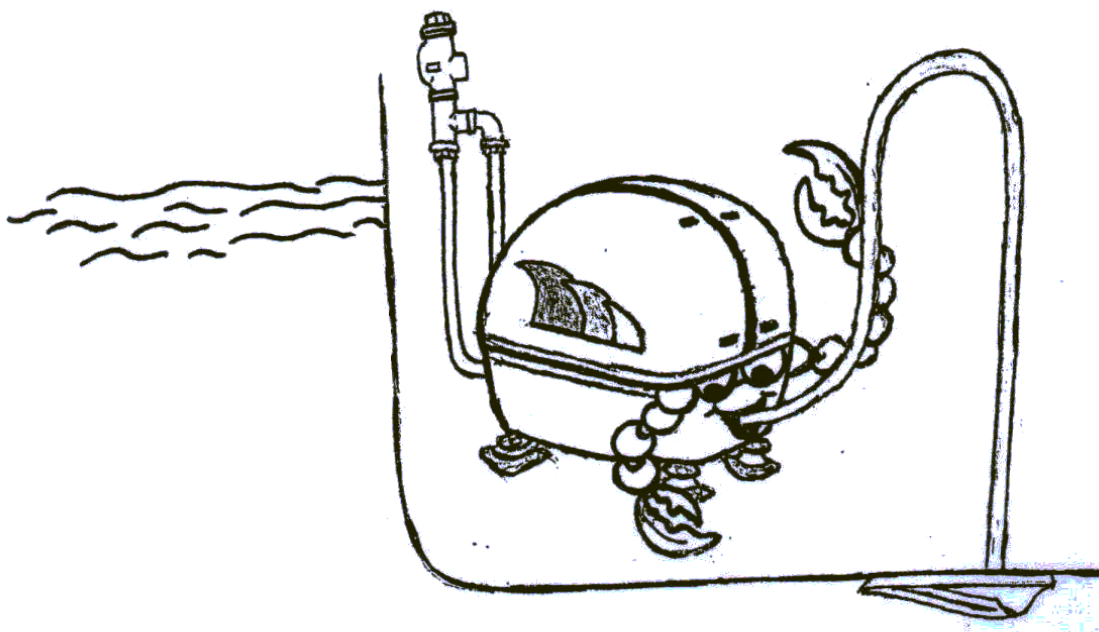
2nd MISTAKE

- Installation below the sea level without a proper cooling pipe goose neck and vacuum siphon break valve.



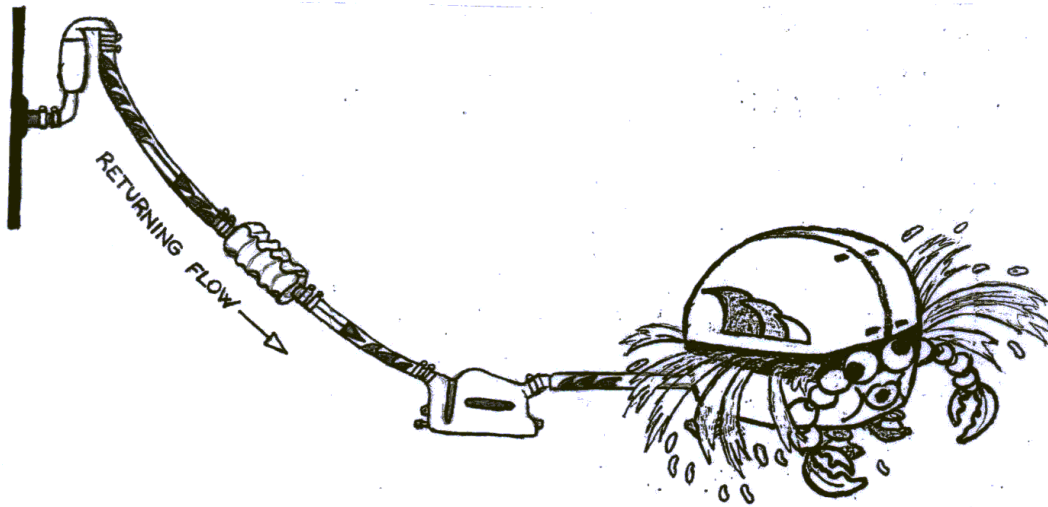
- If the set installation surface is just a little below the external sea water level but can be guessed that while sailing the difference is further increased, must be foreseen an external goose neck pipe with siphon break valve, on the contrary drop by drop an internal leakage through the pump clearance, fills the exhaust pipe with the same above explained result. For relevant level difference the leakage occurs when the boat is not sailing too.

- The vacuum siphonbreak valve must be fitted out of the hood, on a prolonged pipe, as more high as possible and in any case above the sea level, in connection to a cooling pipe at the engine pump delivery side, namely in pressure zone. On the several sets the pipe to be prolonged can be different, but each one chosen at the pump delivery side, is suitable.

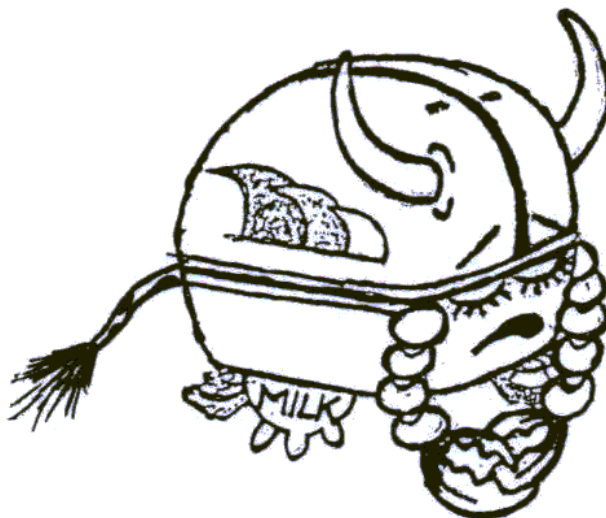


3rd MISTAKE

- An exhaust line trapping too much water for length excess or negative gradient course, that return back into the engine when the set is shut off.



- The first water lock muffler is designed for avoiding that risk, but if fitted not enough lower than the engine manifold either reversing the entrance with the outlet, or of too reduced capacity for the return water volume that has to contain, can be unable avoiding the problem.
- Particular care must be taken in designing the exhaust pipe course, preferring the alternatives that keep self draining towards outside as more pipe stroke as possible.
- In any case, to be sure of a correct and safety installation, especially during the first employment season, check often the lubrication oil integrity watching the engine steak level: a transparent yellow oil if new or a black color if old, mean no water entrance, but an emulsion similar to milk white/yellow not transparent or worst an increased level into the sump mean water flooding.



- Another water presence signal, becomes from starting difficulties as due to some roost on the exhaust valve, the compression does not reach the proper burning value.

Spraying some lubricating oil into the cylinder while insisting with the starter, very often the engine can be started. Better if the operation is made acting on the decompression device, for allowing some free engine revolution for better distributing the oil and adding the flywheel kinetic energy. When started the valve self cleans, but in some cases, of too long time water presence, also the piston rings are locked from roost, so the engine must be opened for repairing.

- In some cases the engine does not start for external reasons like lack of fuel, air bubbles, too flat battery. While insisting, the water pump deliver a certain quantity of water, that is not pushed out by the engine exhaust pressure, remaining trapped into the exhaust pipe even if correctly fitted. If that happens, drain the exhaust pipe when giving up the unsuccessful starting operation.

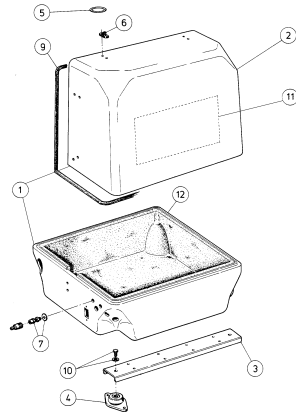
- When the installation is correctly planned and carried on, surveying the result during the first operative season, the generator on board give many troubles operative seasons, requiring lubricating oil and fuel filter replacement only, but there is another up keeping operation that prolong considerably the unit life. It consists in a "wintering" but useful in summer too if the set remains unemployed for more than two months. Due to temperature difference between night and day the water remaining into the exhaust pipe and muffler water lock causes condensation, that on the engine exhaust valve, produces roost. Spraying into the combustion chamber some lubricating oil, and disconnecting the exhaust pipe, moving the piston position by the handle or a flash starting attempt, avoids completely the roost risk for long time.

Consider that on the marine engines employed for the nautical generating sets, there are no critical connections between cooling water and fire zone, so in case of some gasket breakage there is water sprayed out of the engine, around it into the hood and never water entering into the piston or the sump zone.

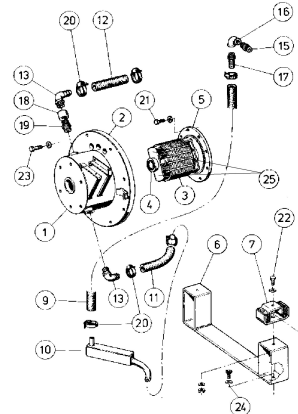
Our technical staff is in any case at customer's disposal for additional suggestions or solving out of standard cases for getting the complete satisfaction result, that can be always reached putting more attention on the plant, or adding special accessories like a dry exhaust pipe and similar.



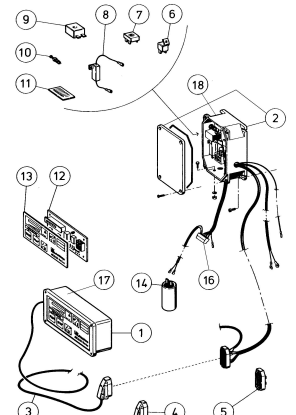
LDW 1003 M - TAB: 1



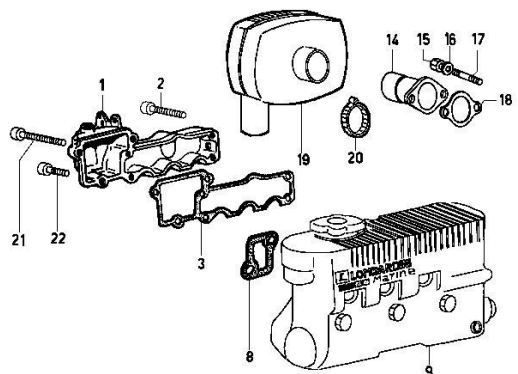
LDW 1003 M - TAB: 2



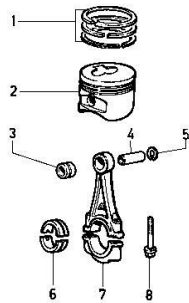
LDW 1003 M - TAB: 3



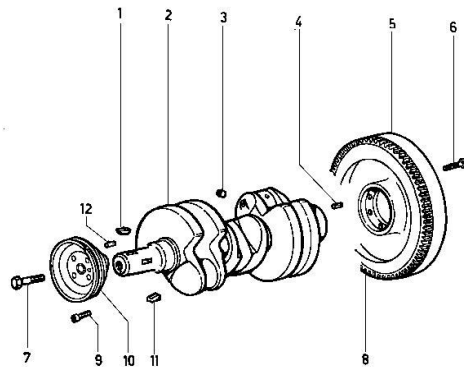
LDW 1003 M - TAB: A



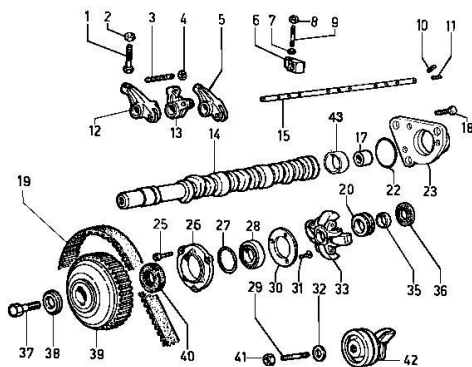
LDW 1003 M - TAB: B



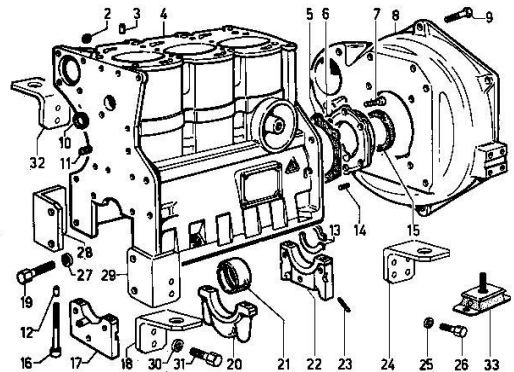
LDW 1003 M - TAB: C

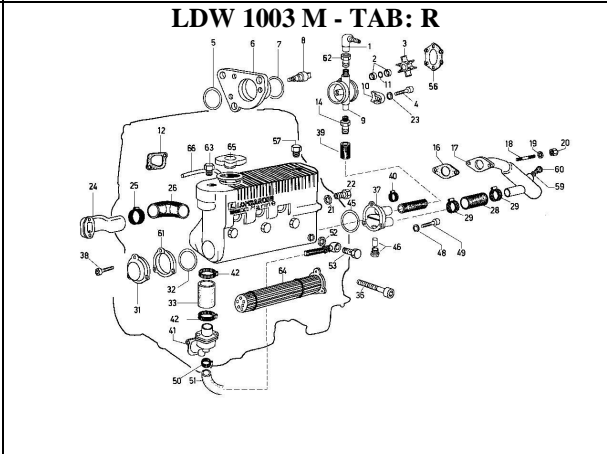
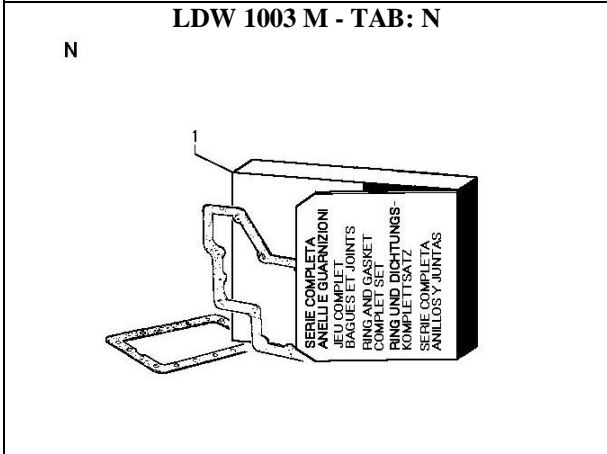
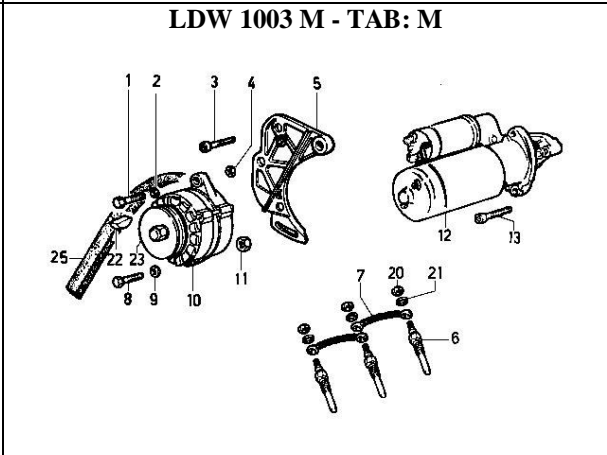
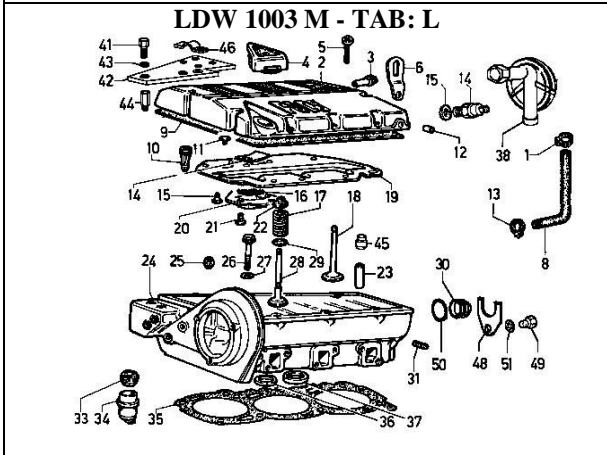
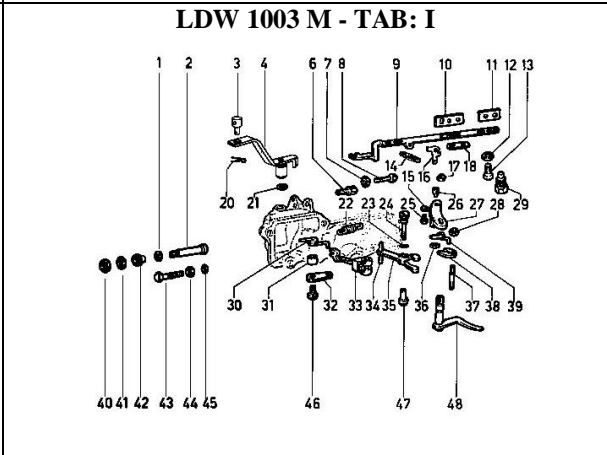
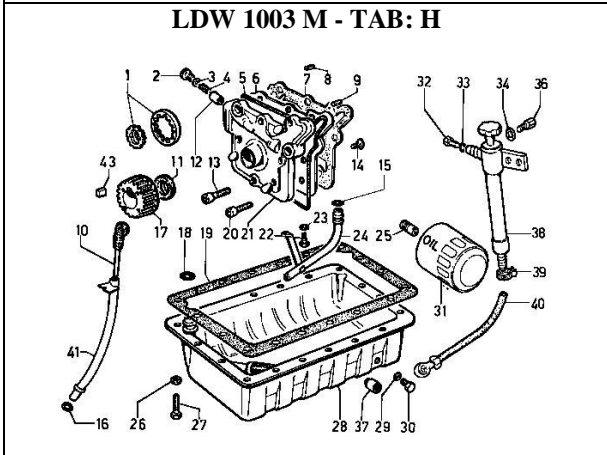
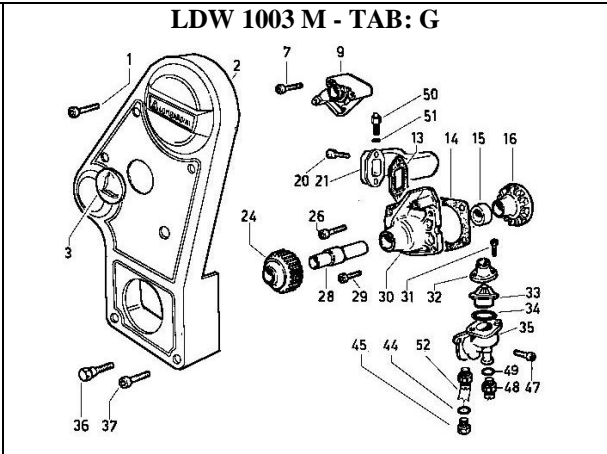
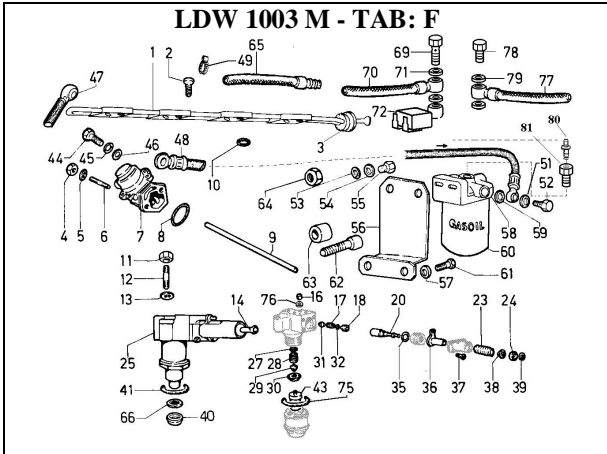


LDW 1003 M - TAB: D



LDW 1003 M - TAB: E





Tab	Pos	Number	Description
1	1	6509	Complete soundshield
1	2	6555	Soundshield lid
1	3	6510	External frame 550mm
1	4	6011	External rubber mounts
1	5	4014	Closing o-ring
1	6	4015	Shield hook
1	7	6054	Fuel connection
1	9	8016	Soundshield gasket
1	10	6012	Bolt and wash
1	11	4071	Label
1	12	6564	Soundshield bottom
2	1	6505	Stator with cooling jacket
2	2	6006	Flange
2	3	6502	Rotor
2	4	6004	Ball bearing
2	5	6003	Flexing coupling
2	6	6017	Internal frame
2	7	6020	Internal rubber mounts
2	9	6029	Water hose
2	10	6022	Oil cooler
2	11	6030	Water hose
2	12	6056	Water hose
2	13	6063	Fitting
2	14	6057	Gomito M/F
2	15	6058	Nipples 1/2" - 3/8"
2	16	6059	Gomito 1/2" F/F/fitting
2	17	6060	Fitting
2	18	6061	Fitting connection
2	19	6062	Nipples 1/2"
2	20	6031	Clamp
2	21	6090	Bolt washer
2	22	6091	Bolt washer
2	23	6092	Bolt flange 6x35 mm
2	23	6093	Bolt flange 10x20 mm
2	23	6094	Bolt flange 10x40 mm
2	24	6096	Screw
2	25	6049	Diode
2	25	6050	Zenamic
3	1	4034	Remote control panel
3	2	6038	Electrical box
3	3	4047	10 m cable with connector
3	4	4037	8 poles male connector
3	5	4036	8 poles female connector
3	6	4040	Relè
3	7	4041	Graetz bridge
3	8	4044	Resistor
3	9	6052	Transformer
3	10	4042	Fuse holder
3	11	4043	Fuse (10pz)
3	12	4035	Printed board
3	13	6051	Label
3	14	4039	Capacitor
3	16	4046	Connector
3	17	4048	Gray box
3	18	4053	Safety switch
A	1	2486.233	Inlet manifold
A	2	9730.032	Screw M 8 X 1,25 X 45
A	3	4420.051	Inlet manifold joint
A	8	.....	See drawing R
A	9	.....	See drawing R
A	14	3866.083	Air cleaner flange
A	15	3240.018	Nut M 8
A	16	7565.007	Washer
A	17	6760.007	Stud M 8x20
A	18	4501.081	Gasket
A	19	3700.333	Air cleaner
A	20	3630.152	Clamp 30-60
A	21	9731.040	Screw M 8x60
A	22	9732.064	Screw M 8x30

Tab	Pos	Number	Description
B	1	8211.248	Ring set standard
B	1	8211.249	Ring set +0,50
B	1	8211.250	Ring set +1,00
B	2	6501.512	Piston set standard
B	2	6501.513	Piston set +0,50
B	2	6501.514	Piston set +1,00
B	3	1630.038	Small end bushing
B	4	8480.081	Pin
B	5	1261.099	Snap ring
B	6	1640.118	Large end bushing -0,50
B	6	1640.117	Large end bushing -0,25
B	6	1640.116	Large end bushing std.
B	7	1526.211	Connecting rod
B	8	1770.101	Bolt
C	1	2280.119	Key
C	2	1051.105	Crankshaft
C	3	9080.132	Plug
C	4	8400.120	Pin
C	5	9880.721	Standard flywheel with crown
C	5	9880.938	7" 1/2 flywheel with crown
C	5	9881.160	6" 1/2 flywheel with crown
C	5	9880.875	6" 1/2 flywheel with crown
C	6	1780.097	Bolt M 10x30
C	7	9865.258	Screw M 16x1,5 Sin
C	8	2816.088	Crown gear
C	9	9732.016	Screw M 6x1x40
C	10	6975.295	Blower driv. pulley
C	10	2280.150	Key
C	11	2280.145	Key (mm 8)
C	12	8430.004	Lock pin
D	1	9850.088	Adj. screw
D	2	3240.008	Nut
D	3	9850.110	Adj. screw
D	4	3240.151	Nut
D	5	6045.111	Rocker arm assembly
D	5	1541.193	Rocker arm
D	6	8615.105	Rock. arm shaft supp.
D	7	7625.020	Washer
D	8	3240.033	Nut
D	9	6800.088	Stud
D	10	8430.061	Pin
D	11	9080.182	Plug diam. 10
D	12	1541.193	Rocker arm
D	13	1541.220	Inj. pump rocker arm
D	14	1011.503	Camshaft
D	15	6045.088	Rocker arm shaft
D	17	3580.027	Cam
D	18	9730.012	Screw M 6x1x20
D	19	2440.338	Cog belt
D	20	5401.205	Control sleeve
D	22	1200.233	Rubber oil seal
D	23	8836.197	Water pump support
D	25	9730.010	Screw M 6x1x16
D	26	2690.294	Governor cover
D	27	1202.037	Rubber oil seal
D	28	3001.066	Ball bearing
D	29	6800.090	Stud
D	30	6275.116	Plate
D	31	9800.061	Screw M 6x1x16
D	32	7495.010	Washer
D	33	8805.048	Weight support
D	35	1585.085	Sleeve
D	36	3110.127	Thrust bearing
D	37	9820.142	Screw
D	38	7495.010	Washer
D	39	7090.012	Contr. Gear pulley
D	40	1213.303	Seal ring
D	41	3240.033	Nut
D	42	4110.009	Jockey pulley

Tab	Pos	Number	Description
D	43	1970.399	Bushing
E	2	4670.060	Copper joint
E	3	1970.140	Dowel
E	4	1510.627	Crankcase
E	5	4501.121	Joint
E	6	3790.078	Flange
E	7	9730.010	Screw M 6x1x16
E	8	2032.315	Flanging bell per MG
E	8	2032.362	Short flanging bell MG
E	8	2032.248	Flanging bell standard
E	9	1770.056	Bolt M 8x1,25x18
E	10	8990.022	Plug
E	11	9765.113	Screw M 12
E	12	1970.140	Dowel
E	13	1257.158	Thrust washer std.
E	13	1257.160	Thrust washer +0,20
E	13	1257.159	Thrust washer +0,10
E	14	8400.108	Pin
E	15	1213.347	Seal ring
E	16	9820.120	Fixing supp. screw
E	17	.....	See pos. 4
E	18	6429.317	Front side eng. mount
E	19	1790.024	Bolt M 12x28
E	20	.....	See pos. 4
E	21	1611.193	Support bearing std.
E	21	1611.194	Support bearing -0,25
E	21	1611.195	Support bearing -0,50
E	22	.....	See pos. 4
E	23	4400.054	Joint
E	24	6429.246	Rear side eng. mount
E	25	7565.007	Washer
E	26	1770.005	Bolt M 8x1,25x22
E	27	7565.013	Washer diam. 12
E	28	6429.247	Side mount
E	29	6429.249	Side mount
E	30	7565.013	Washer diam. 12
E	31	1790.037	Bolt M 12x20
E	32	6429.318	Front side eng. mount
E	33	8636.125	Vibr. isolator Galb1
E	33	8636.136	Vibr. isol. Metalastik
E	38	1510.627	Crankcase
F	1	9375.965	Delivery pipe
F	2	9730.313	Fuel pipe fix. screw
F	3	4750.014	Del. pipe joint
F	4	3203.047	Nut
F	5	7625.010	Washer
F	6	6780.049	Stud
F	7	6585.097	Feed pump
F	8	1200.087	O ring
F	9	7200.180	Drive rod
F	10	1200.286	9,25x1,78 seal ring
F	11	3240.018	Nut
F	12	6780.135	Stud
F	13	7555.029	Washer
F	14	1410.112	Tapped
F	16	9680.041	Bleeding valve
F	17	5801.274	Spring
F	18	9672.107	Delivery valve
F	20	6578.222	Plunger
F	21	4670.061	Copper gasket
F	23	5755.113	Spring
F	24	7215.101	Push-rod
F	25	6590.290	Nozzle-injection pump
F	27	8335.144	Adj. spacer 1,80
F	27	8335.146	Adj. spacer 1,60
F	27	8335.147	Adj. spacer 1,50
F	27	8335.148	Adj. spacer 1,40
F	27	8335.149	Adj. spacer 1,30
F	27	8335.151	Adj. spacer 1,10

Tab	Pos	Number	Description
F	27	8335.145	Adj. spacer 1,70
F	27	8335.143	Adj. spacer 1,90
F	27	8335.152	Adj. spacer 1,00
F	27	8335.150	Adj. spacer 1,20
F	28	5625.011	Pressure spring
F	29	1420.048	Drive rod
F	30	3527.220	Spacer
F	31	7470.007	Filler
F	32	4760.015	Valve gasket
F	35	1200.277	20,35x1,78 seal ring
F	36	5375.017	Shim
F	37	9730.206	Screw TCEI M 4 X 12
F	38	6410.096	Lower retainer
F	39	1241.009	Diam.19 circlip
F	40	5989.007	Spark stop
F	41	1200.213	26,70x1,78 O ring
F	43	6531.436	Nozzle
F	44	1901.115	Union bolt
F	45	4670.059	Copper gasket
F	46	4670.059	Copper gasket
F	47	9375.909	Fuel pipe
F	48	9375.691	Fuel pipe
F	49	3630.148	Clamp
F	51	4670.061	Copper gasket diam. 14
F	52	1901.032	Union bolt M 14
F	52	4670.061	Copper gasket
F	53	7625.019	Washer diam.10
F	54	7565.011	Washer diam.10
F	55	1780.006	Bolt M 10x1,5x30
F	56	8760.073	Filter support LDW 903/MG
F	56	8760.079	Filter support LDW 903/M
F	57	7565.007	Washer diam.8
F	58	3730.074	Fuel filter
F	59	4670.061	Copper gasket diam. 14
F	60	2175.045	Fuel filter element
F	61	1770.002	Bolt M 8x1,25x16
F	62	9731.088	Screw M 10 X 50
F	63	3521.052	Spacer
F	64	3240.033	Nut M 10
F	65	9375.750	Bleeding pipe MG
F	65	9571.102	Bleeding pipe
F	66	4670.082	Copper joint
F	69	1901.115	Union bolt
F	70	9375.748	Fuel hose
F	71	4670.059	Copper gasket d.10
F	72	3587.159	Electro-valve
F	75	1200.287	O ring 25,12x1,78
F	76	4760.038	Gasket
F	77	9375.748	Fuel hose
F	78	1901.032	Union bolt M 14
F	79	4670.061	Copper gasket d.14
F	80	7330.314	Elettrostop con riarmo
F	81	7330.315	M14x1.5 D.10
G	1	9730.015	Screw M 6x1x30
G	2	6927.430	Pulley guard
G	3	9000.134	Plug
G	7	9730.031	Screw M 8x1,25x40
G	9	8850.053	Fan support
G	13	4501.074	Joint
G	14	4580.083	Pump body joint
G	15	.....	See pos. 30
G	16	.....	See pos. 30
G	20	9730.018	Screw M 6x1x45
G	21	7330.286	Union flange
G	24	.....	See pos. 30
G	26	9732.063	Screw M 8x1,25x35
G	28	.....	See pos. 30
G	29	9730.024	Screw M 8x1,25x16
G	30	6584.438	Water pump

Tab	Pos	Number	Description
G	31	9732.074	Screw M 8x1,25x20
G	32	2750.279	Thermostat cover
G	33	9195.057	Thermostat valve
G	34	1200.091	O ring
G	35	4896.208	Thermostat
G	36	9865.174	Screw
G	37	9732.016	Screw M 6x1x40
G	44	4670.061	Copper gasket diam.14
G	45	9040.012	Plug
G	47	9730.100	Screw M 8x1,25x25
G	48	9195.077	Sensor (alarm)
G	49	4670.019	Copper gasket diam.16
G	50	9195.078	Sensor
G	51	4670.061	Copper gasket diam.14
G	52	6902.165	Pipe
H	1	.....	See pos. 21
H	2	9015.005	Plug
H	3	4670.060	Joint
H	4	5625.008	Spring
H	5	1200.292	Rubber oil seal
H	6	.....	See pos. 21
H	7	4580.176	Joint
H	8	8400.106	Pin
H	9	8400.108	Pin
H	10	1400.219	Oil dipstick
H	11	1213.343	Seal ring 32x50x6
H	12	6495.045	Drive rod
H	13	9732.064	Screw M 8x1,25x30
H	14	9800.061	Screw M 6x1x16
H	15	1200.274	Rubber oil seal 8,00
H	16	1200.266	Rubber oil seal
H	17	6975.292	Driving pulley
H	18	1200.030	Rubber oil seal
H	19	4431.120	Joint
H	20	9732.074	Screw M 8x1,25x20
H	21	6605.096	Oil pump
H	22	1760.003	Bolt M 6x1x12
H	23	7625.008	Washer
H	24	9485.229	Scavenge oil pipe
H	25	7265.021	Oil filter connect.
H	26	7500.018	Washer
H	27	9730.009	Screw M 6x1x12
H	28	6645.551	Oil pan
H	29	4670.061	Copper gasket 14x19x1,5
H	30	1901.119	Union bolt M 14
H	31	2175.107	Oil filter element
H	32	1770.129	Bolt M 8x12
H	33	4670.058	Copper gasket
H	34	7625.211	Washer
H	36	1780.116	Bolt M 10x1,5x35
H	37	3527.441	Grilled spacer
H	38	6595.020	Lift oil pump
H	39	3630.129	Clamp
H	40	9320.141	Suction pipe
H	41	9330.049	Dipstick tube
H	43	.....	See pos. C 11
I	1	4670.059	Copper gasket
I	2	8576.077	Extra fuel device
I	2	8576.076	Extra fuel device MG
I	3	2501.104	Hollow stud
I	4	5201.153	Ext. lever
I	6	9180.042	Wire end
I	7	3240.008	Nut
I	8	1760.128	Adjusting bolt
I	9	1380.068	Connecting rod
I	10	6320.045	Plate
I	11	6320.048	Plate
I	12	7626.037	Washer
I	13	9732.096	Screw M 3x0,5x6

Tab	Pos	Number	Description
I	14	5655.257	Device spring
I	15	7626.017	Washer
I	16	6370.331	Stop plate
I	17	3203.077	Nut M 4
I	18	6275.127	Plate
I	20	2800.079	Split pin
I	21	1200.052	Rubber oil seal
I	22	5655.185	Control spring 3600 rpm
I	22	5655.241	Control spring 1500 rpm
I	22	5655.210	Control spring 3000 rpm
I	23	1200.037	Rubber oil seal
I	24	6110.101	Control lever pin
I	25	9790.023	Screw M 5x0,8x7
I	26	6000.049	Nut
I	27	5200.414	External lever
I	28	3240.008	Nut
I	29	9865.202	Screw
I	30	5660.065	Return spring
I	31	1957.009	Sleeve
I	32	5200.674	Internal lever
I	33	4896.360	Contr. spring lever
I	34	6140.420	Journal
I	35	5200.893	Control lever
I	36	1200.051	Rubber oil seal
I	37	6760.044	Stud M 6x10 (19)
I	38	6275.114	Stop plate
I	39	5660.047	Return spring
I	40	3203.074	Nut
I	41	4670.062	Copper joint
I	42	4190.109	Nut
I	43	1760.128	Adjusting bolt
I	44	3203.074	Nut
I	45	4670.062	Copper joint
I	46	1760.081	Screw
I	47	1954.014	Sleeve
I	48	5200.413	Int. lever
L	1	3630.043	Clamp
L	2	2125.277	Rocker arm cover
L	3	9580.065	Tube
L	4	9032.061	Oil filler cap
L	5	9730.012	Screw M 6x1x20
L	6	8545.322	Lifting brace
L	8	9400.098	Drain pipe
L	9	4400.056	Joint
L	10	5365.122	Connection
L	11	.....	See pos. 19
L	12	9080.132	Plug diam. 6
L	12	9080.133	Plug diam. 8
L	13	3617.168	Strip fixing
L	14	6745.050	Pressure switch oil
L	15	4670.060	Copper gasket
L	16	.....	See pos. 19
L	17	5755.137	Valve spring
L	18	9652.157	Intake valve
L	19	.....	See pos. 2
L	20	.....	See pos. 19
L	21	.....	See pos. 19
L	22	6410.017	Spring retainer
L	23	4845.220	Valve guide +0,50
L	23	4845.200	Valve guide std.
L	24	9200.703	Cylinder head
L	25	8990.047	Plug d.18
L	26	9820.119	Special screw
L	27	7625.130	Washer
L	28	9685.150	Exhaust valve
L	29	7625.185	Washer
L	30	9065.007	Plug
L	31	9080.132	Plug d.6
L	33	4130.096	Tappet

Tab	Pos	Number	Description
L	34	6725.070	Pre-combustion chamber
L	35	4730.743	Head gasket 1,55 (1)
L	35	4730.744	Head gasket 1,65 (2)
L	35	4730.742	Head gasket 1,45 (0)
L	36	8000.211	Exhausting v. seat
L	37	8000.197	Intake v. seat
L	38	9680.034	Suction valve
L	41	1760.003	Bolt M 6x12
L	42	8490.114	Bracket
L	43	7565.004	Washer
L	44	2501.102	Hollow stud
L	45	4535.015	Gasket
L	46	6370.285	Plate
L	48	5570.019	Retainer
L	49	1770.001	Bolt M 8x12
L	50	1200.081	O ring
L	51	7625.010	Washer d.8
M	1	1780.027	Bolt M 10x1,5x60
M	2	7625.020	Washer
M	3	9732.064	Screw M 8x1,25x30
M	4	3240.033	Nut
M	5	8725.065	Alt. support
M	6	2100.089	Glow plug
M	7	2185.548	Connection wire
M	8	1780.027	Bolt M 10x1,5x60
M	9	7625.020	Washer
M	10	1157.269	Volt alternator 12v-45a
M	10	1157.270	Volt alternator 12v-65a
M	11	3240.033	Nut
M	12	5840.147	Start engine Bosch
M	13	9730.044	Screw M 10x1,5x25
M	20	3240.005	Nut
M	21	7626.066	Washer
M	22	2280.045	Alternator key
M	23	6995.037	Alternator pulley
M	25	2440.360	Belt
M	26	3810.024	Flange
N	1	8205.073	Ring and gasket complete set
R	1	7330.284	Union 90ø (Johnson – Jota - Jabsco)
R	2	8150.028	Ring set (Johnson - Jota)
R	2	8150.032	Ring set (Jabsco)
R	3	4200.204	Propeller (Jabsco)
R	3	4200.193	Propeller (Johnson - Jota)
R	4	9730.220	Screw M 8x20
R	5	.....	See drawing D
R	6	.....	See drawing D
R	7	1200.233	O ring
R	8	4240.044	Water pump coupling
R	9	6584.245	Water pump Johnson
R	9	6584.309	Water pump Jota
R	9	6584.396	Water pump Jabsco
R	10	1557.098	Pump nut Johnson-Jabsco
R	10	1557.102	Pump nut Jota
R	11	.....	See pos. 2
R	12	4420.070	Exhaust gasket
R	14	7330.245	Union (Johnson – Jota - Jabsco)
R	16	4501.098	Gasket
R	17	9543.069	Riser
R	18	6780.139	Stud M 8x18
R	19	7565.048	Washer
R	20	3240.140	Nut
R	22	9040.012	Plug
R	23	7555.030	Washer
R	24	.....	See drawing G
R	25	3630.128	Clamp
R	26	9340.017	Water pipe
R	27	7350.243	Cooling radiator "MOTA"
R	28	9602.100	Union pipe
R	29	3630.111	Clamp

Tab	Pos	Number	Description
R	31	.....	See pos. 27
R	32	1200.265	Seal ring
R	33	9602.072	Union pipe
R	36	9730.221	Screw M 8x100
R	37	.....	See pos. 27
R	38	9730.211	Screw M 6x16
R	39	9602.170	Union pipe
R	40	3630.111	Clamp
R	41	.....	See drawing G
R	42	3630.128	Clamp
R	45	1200.265	Seal ring
R	46	9080.215	Zinc plug
R	49	9730.211	Screw M 6x16
R	50	3630.129	Clamp
R	51	9602.076	Union pipe
R	53	1901.119	Connection bolt
R	56	4775.498	H2O/gasket (Johnson – Jota - Jabsco)
R	57	9080.220	Plug 1/8"
R	59	4670.061	Copper gasket d.14
R	60	9040.012	Plug M 14
R	61	.....	See pos. 27
R	62	5953.072	Nipple 1/2"-3/4"
R	63	8965.004	Plug
R	64	.....	See pos. 27
R	65	9000.114	Radiator cap
R	66	9580.045	Breather pipe



Volpi Tecno Energia S.r.l.
via Petronio, 1/c - Zona Industriale Noghere
34015 Muggia - Trieste
Italia

Tel.: +39 040 231715 - Fax: +39 040 231933

Web Page: www.volpитеcno.com - E-mail: volpi@volpитеcno.com