



# OPERATIONS & MAINTENANCE MANUAL

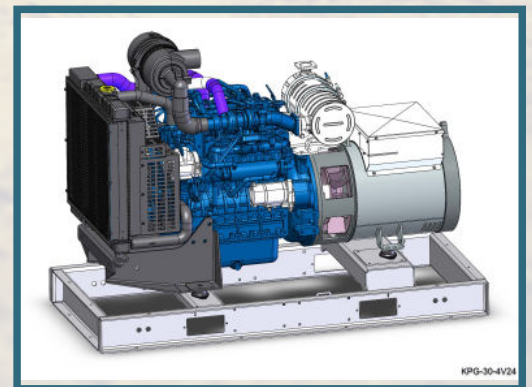
## ESI DESIGNED AND BUILT

Kubota 03 Series Tier 4 Final Diesel Engine  
Mecc Alte ECP or ECO Gen End

## APPLICABLE MODELS

KPG-20-4D18-MR21S

KPG-30-4V24-MR21S



[WWW.ESIALASKA.COM](http://WWW.ESIALASKA.COM)



ESlAlaska.com

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**Seattle:**

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**Williston:**

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Williston, ND 58801  
(701) 774-5312

**Equipment Source, Inc.**



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# General Information & Warranty

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# OPERATORS MANUAL

## ESI Generator

Kubota, JCB & Isuzu Powered  
Generators by ESI

### SPECIFICATIONS

See product specification sheet for product specifications



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# 1 Introduction

**⚠ WARNING** Read and understand this manual before operating the machine to avoid serious injury or death.

## 1.1 General Description

ESI built generators come in a variety of configurations and sizes. Refer to unit specifications and manual components for specific details. General operation and maintenance remains the same for all of these units.

## 1.2 Manual Applicability

This manual is applicable to the following Equipment Source Incorporated (ESI) machine models:

Model	Description
KPG, JCB & IPG Series	Skid mounted ESI Generators
KPG, JCB & IPG Series Enclosure Series	ESI Generators with Enclosures

This manual should be kept with the machine at all times. Immediately contact Equipment Source Incorporated (manufacturer) or an authorized dealer to obtain a copy of this manual if missing or damaged. Refer to [www.equipmentsourceinc.com](http://www.equipmentsourceinc.com) for current contact information.

## 1.3 Manual Scope

This manual contains basic operating and maintenance instructions for the above listed product. For detailed service instructions concerning specific electrical or mechanical components, refer to the operation and maintenance manual provided by the manufacture of the specific component or contact an authorized service provider. Operation and Maintenance instructions for the generator controller can be found in the separate controller manual included with the generator.

## 1.4 Warranty

Review the warranty before operating or working on the unit. The warranty contains important safety and operational requirements. Contact ESI for the latest warranty information.

## 1.5 Installation

Review the installation requirements before installing, operating or working on the unit. The installation requirements contain important information and must be adhered to in order to maintain warranty. Contact ESI for the latest installation requirements.

## 2 IMPORTANT SAFETY INSTRUCTIONS

### WARNING

- SAVE THESE INSTRUCTIONS. This manual contains important instructions that should be followed during the operation and maintenance of the generator, battery and heater.

### 2.1 Training

- Never allow untrained personnel to operate or service the machine. Take time to read the manual and discuss safe practices with jobsite personnel.
- Read and understand the operating section of this manual.
- Take time to familiarize yourself with the controls and instructional placards before operating or servicing.
- Contact your dealer or service provider if additional training is necessary.

### 2.2 Operating

- Some components are hot while in operation. Keep clothing and combustibles away.
- Wear protective clothing, such as gloves, appropriate to the jobsite.
- Observe changes in the operating environment and respond accordingly.
- Generators vibrate in normal use. During and after the use of the generator, inspect the generator as well as extension cords and power supply cords connected to it for damage resulting from vibration. Have damaged items repaired or replaced as necessary. Do not use plugs or cords that show signs of damage such as broken or cracked insulation or damaged blades.

### 2.3 Service

- Only trained service technicians should attempt to service the machine.
- Properly shutdown the machine and let cool completely before attempting to service any component.
- Never defeat the safety devices
- Never modify the machine

## 3 Transporting

### 3.1 Lifting

#### CAUTION

- Ensure that any equipment used to lift the unit is rated for the weight of the unit.

### 3.2 Transporting

1. Lift the machine following the guidelines presented below.
2. If applicable: ensure all doors are closed and latched.
3. Remove any hoods in the way before lifting.
4. Lift the unit using ONLY designated lifting points or fork pockets.

### 3.3 Storage

Units placed in storage must be stored out of the elements and protected from rain, snow and sunlight. The warranty will be voided for units left exposed to the elements during storage. ESI built unit enclosures provide sufficient protection when properly closed.

#### 3.3.1 Short-Term Storage (less than 90 days)

1. Shutdown the machine
2. Close all doors (if applicable)

#### 3.3.2 Long-Term Storage (greater than 90 days)

1. Shutdown the machine
2. Verify that the main breaker and control switches are in the off position
3. Disconnect the battery
4. Drain water from fuel filters.
5. Secure/Close vents and openings (if applicable).

## 4 Operation

### 4.1 System Operation

Refer to individual component manuals for operation of those components. This unit should only be operated by trained personnel familiar with the operation of the entire system. Refer to the PRE-OPERATION CHECK portion of the Engine Manual

### 4.2 Recommended Fuels and Fueling Instructions

**⚠ CAUTION** Do not overfill tank. Tank should be filled to only 90% of the full volume to allow thermal expansion.

Use ULSD No.1 or ULSD No.2. For continuous duty operation, a refilling schedule should be established.

### 4.3 Engine Heat - 120V Power Input

If a cold start is required, use the 120V engine pre-heat circuit to warm the engine block and engine oil prior to starting. The engine should be pre-heated for approximately 4-hours if the ambient temperature is below -7°C (20°F). Longer preheat cycles may become necessary in extremely cold conditions.

Use a grounded flexible extension cord rated at 15A minimum to connect the machine to a 120V power supply. There is an orange, three-prong “Y” located on each of the generators.

### 4.4 Cold Weather Operation

ESI generators are warranted for operation down to 5 degrees Fahrenheit. Operation at colder temperatures requires an Arctic Re-Air Enclosure from ESI. Generators installed in Arctic Re-Air enclosures are warranted for operation in extreme cold. Ask the ESI sales team about Arctic Re-Air options. Operating a generator below 5 degrees Fahrenheit will void all manufacturers warranties.

## 4.5 Monitoring and Operation

### 4.5.1 Minimum Loading of Diesel Engines

Diesel generator engines require that a minimum average load be maintained. An average load of 75% of the rated output of the generator must be maintained to avoid damaging the unit (often referred to as “Wet-Stacking”). Prolonged use of the generator at loads less than 75% of rated output will void the warranty, reduce the life span of the engine and cause damage to the unit. Refer to the ESI Warranty Summary for further details. Consider using a load bank to maintain minimum loading on the engine.

### 4.5.2 Daily Inspection & Startup Inspection (required)

- Conduct general inspection of the unit
- Listen for abnormal sounds
- Check fluid levels
- Check all hoses for damage (including but not limited to fuel lines and coolant lines)
- Check engine temperature
- Check containment for accumulation of liquids.
- Check vents for icing or other obstructions (if applicable)
- Observe recommended maintenance schedule
- Check for error codes on control units for KPG and any other equipment associated with the unit.

## 4.6 Long Run Oil Tank (LRT)

- An LRT equipped ESI generator has increased service intervals up to 3000 hours
  - Oil change intervals should be determined using an oil sample analysis at regular intervals to determine maximum service interval.
  - Operating conditions may affect the service interval of the LRT.
- The service interval of the LRT may change if operating conditions change
- Prefill oil filters with oil when completing an oil change on a LRT equipped unit. This reduces the likelihood of damaging air bubbles in the oil system.
- Users can expect some oil seeping between engine base and long run oil pan on LRT installations. This is a normal condition for operating the LRT and is not warrantable.
- Great care should be taken to limit vibration of the generator. Excessive vibration will cause premature failure of LRT seals and is not warrantable. See warranty and installation instructions for further details.

#### 4.7 EPA Tier 4 Final Rural Alaska Exemption

The EPA allows for the sale of Tier 3 generators for certain applications for use in Rural Alaska. If you have purchased a Tier 3 generator under the EPA exemption, the following requirements must be met at all times. Failure to adhere to these requirements will void all warranties and will result in legal and financial liability for the customer.

The EPA Tier 4 Final Rural Alaska Exemption allows for engines certified under EPA Tier 3 standards to be used for non-emergency applications in “Remote Areas of Alaska”.

Definition of “Remote Areas of Alaska” (according to §60.4219, “Remote Areas of Alaska” means areas of Alaska that meet paragraph (1) or (2) below):

1. Areas of Alaska that are not accessible by the Federal Aid Highway System (FAHS)
2. Areas of Alaska that meet ALL of the following criteria:
  - a. The only connection to the FAHS is through the Alaska Marine Highway System, or the stationary CI ICE (Compression Ignition Internal Combustion Engine) operation is within an isolated grid in Alaska that is not connected to the statewide electrical grid referred to as the Alaska Rail belt Grid.
  - b. At least 10 percent of the power generated by the stationary CI ICE on an annual basis is used for residential purposes.
  - c. The generating capacity of the source is less than 12 megawatts, or the stationary CI ICE is used exclusively for backup power for renewable energy

Customer is required to maintain and protect EPA or Emission Control Information labels on the engine for the life of the engine. Failure to do so will constitute failure to adhere to the requirements of the EPA Tier 4 Final Rural Alaska Exemption.

Customer agrees to indemnify ESI against, and hold ESI harmless from, any claims which may be made against ESI as a result of the EPA Tier 4 Final Rural Alaska Exemption. Customer consents to these conditions and agrees to pay in full for all legal fees, fines or other costs associated with improper application of the EPA Tier 4 Final Rural Alaska Exemption.

## 5 Maintenance

**⚠ CAUTION**

Some of the following maintenance operations should only be completed by a trained technician. Do not attempt to open electrical panels unless you are a trained technician. Maintenance schedule must be adhered to and documented in order to maintain warranty. Maintenance programs should be tailored to the specific generator, environment and operating conditions.



**5.1 Maintenance Schedule**

**Table 1. Maintenance Schedule**

Interval	Maintenance Instruction	Notes
Daily	<ul style="list-style-type: none"> <li>▪ See section 4.4.2 of this manual for additional requirements</li> </ul>	Complete at every inspection
Every 50 hours	<ul style="list-style-type: none"> <li>▪ Check of fuel pipes and clamp bands</li> <li>▪ Check radiator hoses and clamp bands</li> <li>▪ Drain water separator</li> </ul>	
Varies by model	<p>Engine Oil Change and Oil Replacement Intervals</p> <ul style="list-style-type: none"> <li>▪ Standard Oil Pan (Kubota Recommendation)                             <ul style="list-style-type: none"> <li>○ Initial Oil Change: 50 hours</li> <li>○ Interval:                                     <ul style="list-style-type: none"> <li>▪ KPG-05: 100 hours</li> <li>▪ KPG-20-T4F, KPG-30-T4F, &amp;</li> <li>▪ KPG-06 to KPG-24 &amp;</li> <li>▪ Spark Ignition: 200 hours</li> <li>▪ KPG-28 &amp; KPG-36: 250 hours</li> <li>▪ KPG-45, IPG-08, IPG-13, &amp;</li> <li>▪ IPG-55: 500 hours</li> </ul> </li> </ul> </li> <li>▪ Long Run Oil Pan (LRT) Option                             <ul style="list-style-type: none"> <li>○ Interval: 3,000 hours</li> </ul> </li> </ul>	<p>Engine oil must meet API Spec: CF, CF-4, CG-4, CH-4 or CI-4</p> <p>See section 4.5 for additional notes on LRT oil changes.</p>
Every 200 hours (KPG-05 to KPG-24) <b>OR</b> Every 250 hours (IPG-08, IPG-13, IPG-44, KPG-20-T4F, KPG-30-T4F, & KPG-28 to KPG-45)	<ul style="list-style-type: none"> <li>▪ Clean air cleaner element</li> <li>▪ Change Engine Oil and Oil Filter (KPG-06 to KPG-36)</li> <li>▪ Check and clean fuel filter</li> <li>▪ Check battery electrolyte level</li> <li>▪ Check fan belt tightness</li> <li>▪ Check intake air line</li> <li>▪ Inspect generator (see generator section of this manual)</li> </ul>	
Every 500 hours	<ul style="list-style-type: none"> <li>▪ Change Engine Oil and Oil Filter Cartridge (IPG-Series, KPG-45, standard oil pan)</li> <li>▪ Replace fuel filter cartridge</li> <li>▪ Remove sediment in fuel tank</li> <li>▪ Clean water jacket (radiator interior)</li> <li>▪ Replace fan belt</li> <li>▪ Clean water separator</li> </ul>	
Every one or two months	<ul style="list-style-type: none"> <li>▪ Charge battery as needed</li> </ul>	
Every Year	<ul style="list-style-type: none"> <li>▪ Replace air cleaner element</li> <li>▪ Clean Generator (blow out with air) and inspect</li> <li>▪ Change Engine Oil and Oil Filter</li> </ul>	Air filter element may need cleaning more frequently depending on environmental conditions



Every 800 hours	<ul style="list-style-type: none"> <li>▪ Check valve clearance</li> </ul>	
Every 1500 hours	<ul style="list-style-type: none"> <li>▪ Check fuel injectors</li> </ul>	
Every 3000 hours	<ul style="list-style-type: none"> <li>▪ Change Engine Oil and Oil Filter Cartridge (diesel units equipped with LRT)</li> <li>▪ Check turbo charge (if unit is equipped with a turbo)</li> <li>▪ Check supply pump</li> </ul>	
Every 5000 hours	<ul style="list-style-type: none"> <li>▪ Change Engine Oil and Oil Filter Cartridge (spark ignition units equipped with LRT)</li> </ul>	
Every Two Years	<ul style="list-style-type: none"> <li>▪ Change radiator coolant</li> <li>▪ Replace battery</li> <li>▪ Replace radiator hoses and clamp bands</li> <li>▪ Replace fuel pipes and clamp bands</li> <li>▪ Replace intake air line</li> <li>▪ Replace fan belt (or every 500 hours, whichever occurs first)</li> </ul>	
Every 10,000 hours / 2 years	<ul style="list-style-type: none"> <li>▪ Inspect Generator sealed bearings</li> </ul>	
At 30,000 hours	<ul style="list-style-type: none"> <li>▪ Replace Generator sealed bearings</li> </ul>	

**5.2 Engine Service**

Use engine operator’s or service manual provided for further instruction on how to complete routine service or trouble shooting.

**5.3 Battery Service**

The engine starting circuit is supplied by a single 12V battery. No maintenance is required other than normal charging and occasional replacement.

To replace the battery, sequentially remove the negative ground lead, positive power lead and the bracket holding the battery in the tray. Replace the battery by securing in the tray, connecting the positive lead and then connecting the ground lead.



## 6 Maintenance Records

**Table 2. Machine Data**

<b>Machine Serial Number</b>	
<b>Engine Serial Number</b>	
<b>Generator Serial Number</b>	

**Table 3. Maintenance Records**

<ul style="list-style-type: none"> <li>▪ Date</li> <li>▪ Engine Hours</li> <li>▪ Service Personnel</li> <li>▪ Service Location</li> </ul>	Description of work completed














## Commonly Replaced ESI Generator Parts

See next page for LRT options and remote fuel filters when applicable

Engine Series	Model	Kubota Engine	Oil Filter	Air Filter	Fuel Filter	Oil Capacity
Engine Series	KPG-05-Z48	Z482	15426-32430	K1211-82320	12581-43012	2.6 Liters / 0.69 Gal
	KPG-06-NG	DG972	HH150-32430	1G659-11222	N/A	3.4 Liters / 0.90 Gal
	KPG-06-LP	WG972				3.4 Liters / 0.90 Gal
05 Series	KPG-06-MQ	D1005	HH160-32093	15741-11083	15221-43170	5.1 Liter / 1.35 Gal
	KPG-06-D10	D1005				5.1 Liter / 1.35 Gal
	KPG-08-D11	D1105				5.1 Liters / 1.35 Gal
	KPG-10-D13	D1305				5.7 Liters / 1.50 Gal
	KPG-12-V15	V1505				5.7 Liters / 1.50 Gal
03 Series	KPG-14-D15	D1503	HH164-32430	70000-11081	HH166-43560	7.0 Liters / 1.85 Gal
	KPG-15-V17	D1703				7.0 Liters / 1.85 Gal
	KPG-18-V20	V2003				9.5 Liters / 2.50 Gal
	KPG-20-V22	V2203				9.5 Liters / 2.50 Gal
	KPG-23-V20T	V2003-T				9.5 Liters / 2.50 Gal
	KPG-24-V24	V2403				9.5 Liters / 2.50 Gal
V3 Series	KPG-28-V33	V3300	HH1C0-32430	3A111-19130 (inner) 59800-26110 (outer)	HH166-43560 & R60S	13.2 Liters / 3.50 Gal
	KPG-36-V36	V3600		R2401-42280 (inner) 59700-26112 (outer)		
	KPG-36-V38D	V3800-derated				
	KPG-45-V38	V3800				
T4F	KPG-20-D18-T4F	D1803-T4F				
	KPG-30-V24-T4F	V2403-T4F				
	Model	Engine	Oil Filter	Air Filter	Fuel Filter	Oil Capacity
Isuzu	IPG-08-3CH	3CH1NGZG1	5-8640-0632-0	K1211-82320	5-8640-0778-0 & R12s	3.4 Liters / 3.6 Qt
	IPG-13-3CE	3CE1UGZG1	5-8640-1515-0	K1211-82320	5-8640-1510-0 & R12s	6.7 Liters / 7.1 Qt
JCB	JPG-50-444	444 T4A-55				

**Service Intervals:** Air Filters: Yearly or 500 hours (more frequently may be needed) | Fuel Filters: 500 hours

**Clean Water Separator:** ALL: 500 hours

**Oil & Oil Filter Service Intervals:** ALL: Initial @ 50hrs

KPG-05: 100 hrs | 05 & 03 Series: 200 hrs | IPG-08, IPG-13, KPG-28 & KPG-36: 250 hrs

KPG-45: 500 hrs | All LRT Models: 3,000 hrs | KPG-20-T4F, KPG-30-T4F: XXX hrs

JPG-50: 500 hrs

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## Long Run Oil Option (LRT)

Replaces standard oil filter and oil capacity from chart above for units with LRT installed

Model	LRT Model	LRT Size	Oil Filter (2ea.)	Oil Capacity
KPG-06 to KPG-12	05SMLRT	9 Gallon	16121-32430	32 Quarts / 8 Gal
KPG-06 to KPG-12	05LRT	19 Gallon		48 Quarts / 12 Gal
KPG-15 to KPG-24	03LRT	19 Gallon		48 Quarts / 12 Gal
KPG-28 to KPG-45	V3LRT	26 Gallon		64 Quarts / 16 Gal
KPG-20-T4F & KPG-30-T4F	03-4-LRT	19 Gallon		48 Quarts / 12 Gal
IPG-08	3CH1LRT	19 Gallon		48 Quarts / 12 Gal
IPG-13	3CE1LRT	19 Gallon		48 Quarts / 12 Gal
JPG-50	444LRT	26 Gallon		64 Quarts / 16 Gal

## Remote Racor Fuel Filter

In addition to fuel filters from above chart for units with auxiliary Racor Fuel filter installed.

Model	Filter Part Number
120AS Racor Fuel Filter	R12S
660R2 Racor Fuel Filter	R60T (10 micron)

Part numbers may vary for non-standard products. Always have unit Stock # available when calling for parts. Consult the O&M Manual for additional details.

## Engine Coolant Capacities

Always check fluid levels after filling. Coolant capacities are approximate

Gen Model	Engine Model	Radiator Model	Volume
KPG-06	Kubota D1005	A65	4 quarts
KPG-08	Kubota D1105	RAD2	4 quarts
KPG-10	Kubota D1305	RAD2	4.5 quarts
KPG-12	Kubota V1505	RAD4	6 quarts
KPG-14 / 15	Kubota D1503 / D1703	RAD3	8 quarts
KPG-18 / 20 / 24	Kubota 03 Series	RAD3	9 quarts
KPG-28 / 36 / 45	Kubota V3 Series	RADH	14.5 quarts
KPG-20-T4F	Kubota D1803 T4F		
KPG-30-T4F	Kubota V2403 T4F		
IPG-08	Isuzu 3CH1NGZG1		
IPG-13	Isuzu 3CE1UGZG1		
JPG-50	JCB 444 T4A-55		



# KPG Model Breakdown

## ESI Generators

KPG - 18 - V20 - MR8S - AR2

Type	
KPG =	Kubota Power Generator
FPG =	Fiat Powered Generator
CPG =	Cat Powered Generator
JPG =	JCB Powered Generator
JDPG =	John Deere Powered Generator
IPG =	Isuzu Powered Generator
Output	
Nominal Output (KW)	
Engine	
Z48 =	Kubota Z482 - 1J952-55000 or 1J689-55000 5kw
DG97N =	Kubota DG972 NG - EG582-00000 6kw
WG97P =	Kubota WG972 LP - EG802-00000 6kw
WG97G =	Kubota WG972 Gas - EG802-00000 6kw
WG16P =	Kubota WG1605 LP - EG525-32000 14kw
WG16G =	Kubota WG1605 Gas - EG522-32000 14kw
WG25G =	Kubota WG2503 Gas - EG541-32000 24kw
WG38L =	Kubota WG3800 LP - EG505-07000 45kw
D10 =	Kubota D1005 - 1J935-00000 6kw
D11 =	Kubota D1105 - 1J936-00000 8kw
D13 =	Kubota D1305 - 1J937-00000 10kw
V15 =	Kubota V1505 - 1J938-00000 12kw
D15 =	Kubota D1503 - 1J939-11000 14kw
4D18 =	Kubota D1803 T4F - 1J478-10000 20kw
4V24 =	Kubota V2403 T4F - 1J488-10000 30kw
074 =	JCB AIE-444-74-CPU 50kw
125 =	JCB AIE-444-125-CPU 100kw
145 =	JCB AIE-448-145-CPU 125kw
3CE =	Isuzu 3CE1UGZG1 8kw
3CH =	Isuzu 3CH1NGZG1 13kw
4JJ =	Isuzu 4JJ1XAGV01-420 55kw
Flex - Replcement Engines	
D17 =	Kubota D1703 - 1J982-00001 15kw
V20 =	Kubota V2003 - 1J984-00001 18kw
V20T =	Kubota V2003T - 1J990-00001 23kw
V22 =	Kubota V2203 - 1J985-00001 20kw
V24 =	Kubota V2403 - 1J981-00001 24kw
V33 =	Kubota V3300 - 2J404-00001 28kw
V36 =	Kubota V3600 - 1J409-00001 36kw
V38D =	Kubota V3800 -Derated - 1J411-00001 36kw
V38 =	Kubota V3800 - 1J419-00001 45kw
N45 =	Fiat N45 SM2X.A008
N6 =	Fiat N67 TM1X.A008

Spec Built Generators (Examples)	
ATT =	Misc AT&T Spec Generators
TERRA=	GCI Terra Project
GCI =	Misc GCI Spec Generators
TCC =	TCC Clinic Back Up
ES700 =	8kw Replacement for ES700

Gen End Make	
M =	Mecc Alte
S =	Stamford
A =	Marathon

Enclosures & Accessories	
ME1 =	Modular Enclosure Size 1 6kw to 12kw
ME2 =	Modular Enclosure Size 2 14kw to 24kw
ME3 =	Modular Enclosure Size 3 28kw to 45kw
AR2 =	Arctic Re-Air Size 2 14kw to 24kw
AR3 =	Arctic Re-Air Size 3 28kw to 45kw
ENC =	Misc. Enclosure
BR =	Bull Rail Trailer
F120 =	Skid Mounted Fuel Tank Size in Gallons
LRT =	Long Run Oil Tank

Generator End Model	
MeccAlte	
MR8S =	ECP28-3S4C or ECO28-SN KPG-6KW to 12KW
MR2S =	ECP32-3S or ECO32-3S (old) KPG-14KW to 24KW & T4F
MR21S =	ECP32-1S4C KPG-14kw to KPG-36kw
MR2L =	ECP32-3L or ECO32-3L (old) KPG-28KW to 45KW
MR22S =	ECP32-2S4C KPG-45kw and JPG-50
M1EC =	NPE32-C/4 (Pancake) KPG-6KW
MREF =	NPE32-F/4 (Pancake) 26.5kw
MREC =	NPE32-C (Pancake) 12kw (Thaw Boss / ES3000)
M1ED =	NPE32=D/4 (Pancake)
M16F =	S16F-150 (3600 RPM) KPG-4KW to 6KW & APU
M1MQ =	ECP3-2SN KPG-06 single phase (MQ gen end)

Marathon	
AS36 =	361PSL1652 50KW 3P Dual Voltage
Stamford	
S11L	SOL1-S41 or BCI164A1L (old) 6kw - single phase only
SRL2	SOL2-F1 IPG-8kw to 13kw
SRE1	UCI224E1 IPG-55kw Isuzu

Phase Configuration	
R =	Reconnectable 12-Lead
1 =	Dedicated Single Phase 4-Lead
3 =	Dedicated Three Phase
S =	Dedicated Three Phase Switchable: 208/240 to 240/480

### Generator End

M R 8S

**WARRANTY****EQUIPMENT SOURCE INC.  
LIMITED WARRANTY****INFORMATION**

Equipment Source Inc. (ESI) warrant to you, the original purchaser, that all parts (except those 3<sup>rd</sup> party components listed below) of your new ESI product purchased from an Authorized ESI Distributer or from ESI directly will be free from defects in materials or workmanship for 1 (one) year/2,000 hours (whichever occurs first) from invoice date. Additional component warranties are listed below.

Summary of major component warranties (see component sections of this manual for further details and additional warranties). Warranty periods are from invoice date. Not all of the following components are applicable to every product. All warranty time periods begin at invoice date:

1. Engine – 2 (two) years / 2,000 hours, whichever occurs first (please refer to the Isuzu or Kubota Engine Warranty sheet enclosed in this manual for details).
2. Generator and Controls – Free from defects in materials or workmanship for 1 (one) year / 2,000 hours.
3. Flagro Heater / Fire Box - 1 (one) year / 2,000 hours
4. ESI Manufactured Firebox– free from defects in materials or workmanship for 3 (three).
5. Pump – 1 (one) year (please refer to the pump warranty sheet enclosed in this manual), wear parts are not covered under warranty.
6. Buderus Boiler – 2 (two) years limited warranty, please refer to Buderus warranty sheet enclosed in this manual.

In order to obtain warranty repairs, you must deliver the product, at your expense, together with proof of purchase to 1919 Van Horn Road, Fairbanks, AK 99701 (907.458.9049) or 7780 Old Seward Highway, Anchorage, AK 99518 (907.341.2250). Call 907.458.9049 from outside Alaska. Offsite warranty may be performed if customer pays all travel and shipping expenses.

No person, agent or dealer is authorized to give any warranties on the behalf of ESI, nor is to assume for this company any other liability in connection with any of ESI's products unless made in writing and signed by an officer of ESI. This warranty supersedes and is in leu of all other warranties, expressed or implied including terms and

conditions of Purchase Orders. The company must be notified within 5 (five) business days, in writing of any product failure and warranty claim.

**WHAT THE WARRANTY DOES NOT COVER**

This warranty **does not** cover:

1. Damage, malfunction or failures resulting from accidents, abuse, misuse, modifications, alteration, improper servicing or lack of performance of required maintenance service voids the warranty including but not limited to regularly scheduled oil changes and filter changes.
2. Damage, malfunction or failures resulting from underloading of the engine (also known as wet stacking) voids the warranty. Refer to the Operations and Maintenance manual for proper engine loading requirements.
3. Normal maintenance services or replacement of maintenance items such as light bulbs, preheater plugs, heater nozzles, filter elements, lubricants, oils, coolant, belts, tires, or other wear items.
4. This warranty does not cover cosmetic damage.
5. 3<sup>rd</sup> party parts installed on ESI products. Unauthorized modifications to the unit will void the warranty and may impair function.
6. Failure of or damage caused by ancillary systems. These include but are not limited to failures of the fuel or oil system (not provided by ESI), HVAC system, building / structure or other systems.
7. Units placed in storage must be stored out of the elements and protected from rain, snow and sunlight. The warranty will be voided for units left exposed to the elements during storage. ESI built unit enclosures provide sufficient protection when properly closed.
8. Improperly installed products. Operating the unit on or in the packing pallet or crate or improperly mounted skid generator (including installation of isolators between the skid and mounting surface) voids the warranty. Consult the product operator's manual for required installation procedures.
9. Installation of electrical components by anyone other than a licensed electrician voids the warranty.

10. Use of the unit for application other than what the product was meant for voids the warranty.
11. Warranty coverage expires whenever the client, for whatever reason, is late in payment.
12. The warranty does not cover repairs or modifications for small oil weeps on Long Run Oil Tanks (if installed). A small amounting of weeping during break in and use is expected and does not warrant repairs.

#### **LIMITATION ON ESI's RESPONSIBILITY**

Our responsibility for any and all losses and damages resulting from any cause whatsoever, including our negligence, alleged damage or defective goods, whether such defects are discoverable or latent, shall be limited to the repair or replacement of defective parts. IN NO EVENT WILL ESI BE LIABLE FOR LOSS OF USE, LOSS OF PROFITS, LOSS OF OR DAMAGE TO OTHER PROPERTY, INCONVENIENCE, COMMERCIAL LOSS, ENVIRONMENTAL CLEANUP OR OTHER SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES WHATSOEVER. ESI will in no event be liable for fuel, oil, coolant or other spills or cleanup regardless of cause or fault. Proper containment and monitoring is the sole responsibility of the end user. In no event shall ESI's liability ever exceed the purchase price of the specific unit in questions.

#### **MONITORING REQUIREMENTS**

Frequent monitoring of equipment is vital for proper operation and maintenance of the equipment. All equipment must be monitored daily by trained technicians (or more frequently if indicated in the Operation Manual). Monitoring can be achieved via electronic monitoring systems for remote installations (unless otherwise noted in the Operation Manual). The following unit conditions must be monitored on a daily basis, failure to do so will void all warranties. Additional monitoring may be required depending on site specific requirements.

- General inspection of unit to include: inspection for leaks, damage to unit, improper operation, malfunctioning equipment, error codes or other issues.
- Inspect coolant level and condition. Add coolant as needed to maintain proper coolant levels. Replace coolant if coolant condition has degraded.
- Inspect oil level and condition. Add oil as needed to maintain proper oil levels. Replace oil at recommended service intervals or if oil is found to have degraded.

- Inspect Engine temperature and engine speed.
- Inspect containment, check for leaks and presence of fluids in containment

Maintenance logs must be maintained for the unit and provided to ESI for warranty claims. ESI offers monitoring equipment for electronic monitoring.

#### **OPERATION & SAFETY REQUIREMENTS**

Failure to adhere to these requirements will void all warranties.

- Read and understand carefully all components of the Operator's Manual prior to starting or operating the unit.
- Learn how to operate and work safely. Know your equipment and its limitations. Always keep the engine in good condition.
- Do not carry out maintenance on a running or hot unit. Keep hands away from moving parts.
- Do not climb on top of the unit to perform work of any kind.
- When lifting the unit, ensure that the lifting device is rated for the unit weight. Only lift the unit with provided lifting rings or fork pockets.
- In case of emergency, shut off the engine and notify the person in responsible charge.
- Follow all applicable laws and regulations regarding operation and maintenance of the unit.
- For Trailer Mounted Units:
  - Ensure that the trailer is registered with an applicable transport authority before towing.
  - Complete a thorough walk around inspection of the unit before towing. Inspect for damage or abnormalities and repair as needed before travel.
  - Disconnect the trailer from the tow vehicle, place wheel chocks behind the wheels and level prior to running or operating the unit.
- Refer to the various component sections of the Operator's Manual for proper maintenance and service intervals.

Failure to adhere to any of the above requirements or the requirements of Installation Instructions or Operations and Maintenance Manual will void all warranties. ESI reserves the right to update or modify this warranty at time. Contact ESI for a current warranty.



**KUBOTA ENGINE AMERICA CORPORATION  
LIMITED WARRANTY ON INDUSTRIAL ENGINES  
AND REPLACEMENT PARTS EFFECTIVE JANUARY 1, 2009**

**OUR WARRANTY TO YOU**

We warrant to you, the original purchaser, that all parts (except those referred to below) of your new Kubota industrial engine and replacement parts purchased from an Authorized Kubota Industrial Engine Distributor or OEM Distributor in the United States will be free from defects in materials or workmanship during the following periods.

1. Industrial Engines for 2 years or 2,000 hours, whichever occurs first.
2. Industrial Engines Major Component Warranty (MCW), 3 years or 3000 hours, whichever occurs first, parts only.

**MCW covers** cylinder block, cylinder head, crankshaft, camshaft, gears, pistons, rods, flywheel, flywheel housing, oil pump, pulleys, governor, intake manifold, oil pan, ignition distributor.

**MCW does not cover** rings, bearings, water pump, any electrical component, valve train components, accessory parts, seals, gaskets, carburetors, exhaust manifold, hoses, all fuel system components, muffler, any filters, radiator, fan, belts, thermostat, spark plugs, fuel transfer pumps.

3. Replacement parts for 1 year.

**WHAT WE WILL DO**

We will, at our option, repair or replace any part covered by this warranty which becomes defective, malfunctions or otherwise fails to conform with this warranty under normal use and service during the term of the warranty at no charge for parts or labor. (Parts only for MCW)

**WHAT YOU MUST DO TO OBTAIN WARRANTY SERVICE**

In order to obtain warranty repairs, you must deliver the product, together with proof of purchase, to an Authorized Kubota Industrial Engine Distributor or Dealer at your expense. The names and addresses of such Authorized Kubota Industrial Engine Distributors can be found on the internet at [www.kubotaengine.com](http://www.kubotaengine.com), by calling 1-800-532-9808 or by contacting:

Kubota Engine America Corporation  
505 Schelter Road  
Lincolnshire, IL 60069

**WHAT THE WARRANTY DOES NOT COVER**

This warranty **does not** cover:

1. Damage, malfunctions or failures resulting from accidents, abuse, misuse, modifications, alteration, improper servicing, or lack of performance of required maintenance service.
2. Normal maintenance services or replacement of maintenance items such as light bulbs, preheater plugs, indicator and resistant coils, filter elements, lubricants, oils, spark plugs, coolant, or belts.
3. Installation of replacement parts, unless originally installed by an Authorized Kubota Industrial Engine Distributor or Dealer.
4. Non-genuine Kubota parts.
5. Any engines damaged by use of ether or any starting aid, or greater than a 50/50% solution of antifreeze and water.
6. Injection nozzle wear or any engine damage caused by injection nozzle wear or sticking.
7. Damage caused by water entering the engine due to any cause.
8. Used Products.
9. Any damage caused by overheating that is not a direct result of a defect in materials or workmanship.
10. Any Engine not application reviewed.

engine installation to optimize functionality/performance within the OEM's equipment in order to maintain durability, customer satisfaction, and reduce warranty failures and expenses. Kubota cannot anticipate all potential failures and issues that may occur with the engine or product in the field during an application review. Therefore, machine durability testing by the OEM either in a test facility and/or in the field is critical to further reduce the potential for field failures.

The amount of time spent by KEA on an application review is significantly less than the amount of time spent by the OEM's design engineers on the application. Because of this, the KEA application review is intended to identify issues that are within the scope of the application review testing performed and in some cases recommend possible solutions. The KEA application review should never take the place of proper design and testing of the finished product by the OEM.

The KEA application review does not in any way express or imply any additional warranty coverage other than what is stated in Kubota's Limited Warranty Agreement. Kubota and its subsidiary companies are not responsible for (including, but not limited to): failures resulting from any components that are not manufactured by Kubota, misrepresented or incorrect information provided from an OEM, any changes made without KEA's knowledge, any decision by the OEM not to follow KEA's recommendations, or any application related problems or deficiencies that may arise that were not found by KEA's limited application review or the OEM's durability testing.

**THIS IS THE ONLY EXPRESS WARRANTY ON OUR PRODUCTS**

We neither assume nor authorize anyone to assume for us any other express warranty. The Kubota Distributor/ Dealer has no authority to make any representation or promise on behalf of Kubota Engine America Corporation or to modify the terms or limitations of this warranty in any way.

**LIMITATIONS ON OUR RESPONSIBILITY WITH RESPECT TO PRODUCTS PURCHASED AND USED FOR PERSONAL, FAMILY OR HOUSEHOLD USE.**

Our responsibility is to repair or replace defective parts as stated above. We will not be responsible for any other expenses, losses or inconvenience which you may sustain as a result of the purchase, use, malfunction or defective condition of our products. ANY IMPLIED WARRANTIES INCLUDING WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE SHALL BE LIMITED IN DURATION TO THE PERIOD SET FORTH ABOVE AND IN NO EVENT WILL WE BE LIABLE FOR ANY SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES WHATSOEVER. Some states do not allow limitations on how long an implied warranty lasts or the exclusion or limitation of incidental or consequential damages, so the above limitations or exclusions may not apply to you. This warranty gives you specific legal rights, and you may have other rights which vary from state to state.

**LIMITATIONS ON OUR RESPONSIBILITY WITH RESPECT TO PRODUCTS USED FOR RENTAL OR FOR COMMERCIAL, INDUSTRIAL OR AGRICULTURAL PURPOSES.**

This warranty is in lieu of all other warranties, express or implied, and of any other obligations or liability on our part. IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE EXCLUDED. Our responsibility for any and all losses and damages resulting from any cause whatsoever, including our negligence, alleged damage or defective goods, whether such defects are discoverable or latent, shall be limited to the repair or replacement of defective parts as stated above. IN NO EVENT WILL WE BE LIABLE FOR LOSS OF USE, LOSS OF PROFITS, LOSS OF OR DAMAGE TO OTHER PROPERTY, INCONVENIENCE, COMMERCIAL LOSS, OR OTHER SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES WHATSOEVER.

**APPLICATION REVIEW PROCESS:** The Kubota Engine America (KEA) application review process is intended to assist the OEM with



## INSTALLATION REQUIREMENTS FOR ESI OPEN SKID GENERATORS KPG, IPG, FPG AND ALL OTHER SERIES GENERATORS

The installation and commissioning of a generator is never a Plug n Play event. Proper professional review is always needed for proper operation, personal safety and to maintain warranty. All applicable codes and laws must be adhered to for proper installation.

All electrical connections must be reviewed and confirmed at the time of installation by a licensed electrician. Compatibility and configurations of system components such as but not limited to: generator, fuel systems, enclosures, switchbox, controllers and service panels must be reviewed by a qualified professional at the point of installation. All wires and hoses must have protection from chaffing as needed. An adequate and safe 12v power, fuel supply and exhaust must be provided.

Proper installation of the skid mounted generator must include a solid platform for support. The skid must be secured to prevent the unit from walking and to prevent excess vibration. The generator must be removed from the shipping pallet, crate or other shipping materials for proper installation. The open skid generator is provided with isolator mounts between the engine/genset and skid. The mass of the skid is not adequate to provide vibration isolation for the supported components without proper installation. The installation of additional isolators between the skid and mounting surface will create excess vibration and voids all warranties.

The skid must be securely attached to a concrete floor, metal structure or reinforced wooden floor designed for the application and load. All installations must be reviewed by a professional shortly after commissioning to ensure compliance with these installation requirements.

ESI highly recommends that skid mounted generators be installed with adequate fluid containment and other safeties including but not limited to remote monitoring. The installer and operator of the generator must adhere to all laws and regulations governing the installation and operation of the generator. The installer and operator must follow industry best practices where they meet or exceed the requirements laid in these instructions, the Warranty Summary or the Operations and Maintenance Manual.

Improper installation or failure to adhere to these instructions will void the warranty, may promote the risk of injury and reduce the useful life of the unit. See Warranty Summary and Operations and Maintenance Manual for further details and requirements.

Contact ESI for the latest Installation Requirements, Warranty Summary or Operations and Maintenance Manual.

### Anchorage:

7780 Old Seward Hwy  
Anchorage, AK 99518  
(907) 341-2250 | (877) 341-2250

### Fairbanks:

1919 Van Horn Road  
Fairbanks, AK 99701  
(907) 458-9049 | (888) 868-9049

### Seattle:

17660 W. Valley Hwy  
Tukwilla, WA 98188  
(425) 251-6119

### Williston:

5064 Bennett Loop  
Williston, ND 58801  
(701) 774-5312



ESlAlaska.com

# Alternator Manual

**Anchorage:**

7780 Old Seward Hwy  
Anchorage, AK 99518  
(907) 341-2250 | (877) 341-2250

**Fairbanks:**

1919 Van Horn Road  
Fairbanks, AK 99701  
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17660 W. Valley Hwy  
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(425) 251-6119

**Williston:**

5064 Bennett Loop  
Williston, ND 58801  
(701) 774-5312



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I

## ALTERNATORI AUTOREGOLATI SERIE ECO-ECP

ISTRUZIONI PER L'USO E LA MANUTENZIONE

GB

## SELF-REGULATING ALTERNATORS SERIES ECO-ECP

OPERATING AND MAINTENANCE INSTRUCTIONS

F

## ALTERNATEURS AUTO - REGULES SERIE ECO-ECP

MANUEL D'INSTRUCTION ET DE MAINTENANCE

D

## SELBSTREGELNDER GENERATOR SERIE ECO-ECP

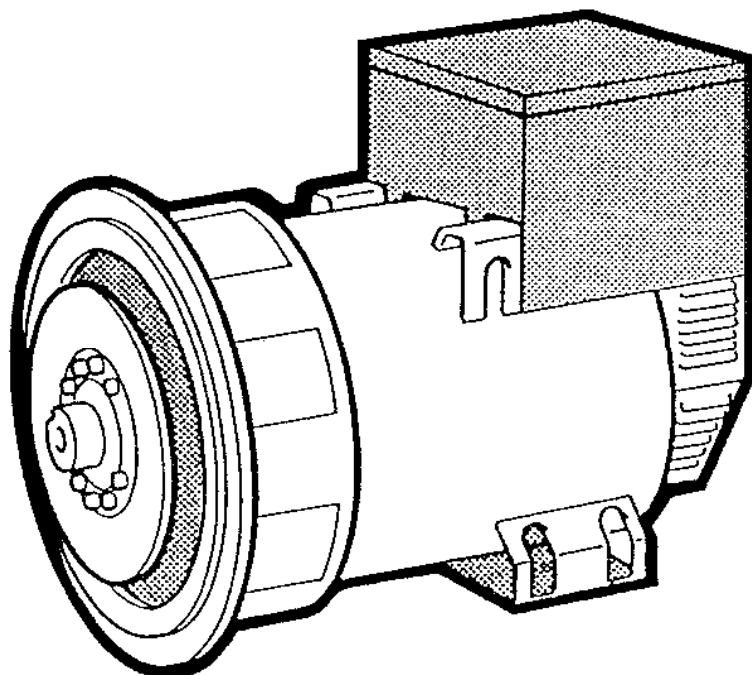
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## ALTERNADORES AUTOREGULADOS SERIE ECO-ECP

INSTRUCCIONES PARA USO Y MANTENIMIENTO

CE



ECO  
ECP



CALUS<sup>®</sup>  
INSULATION SYSTEM



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DESCRIZIONE MACCHINA	MACHINE DESCRIPTION
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I generatori della serie ECO-ECP sono autoregolati, brushless a 2 e 4 poli. Hanno induttore rotante provvisto di gabbia di smorzamento e indotto fisso a cave inclinate. Gli avvolgimenti sono a passo raccorciato per ridurre il contenuto armonico.

I generatori sono costruiti in conformità alle direttive CEE 2006/42, 2006/95, 2004/108 e relative modifiche, alle norme CEI 2-3, EN 60034-1, IEC 34-1, VDE 0530, BS4999-5000, CAN/CSA-C22.2 N°14 - N°100.

Le prove per la verifica della compatibilità elettromagnetica sono state eseguite nelle condizioni prescritte dalle norme, con il neutro collegato a terra.

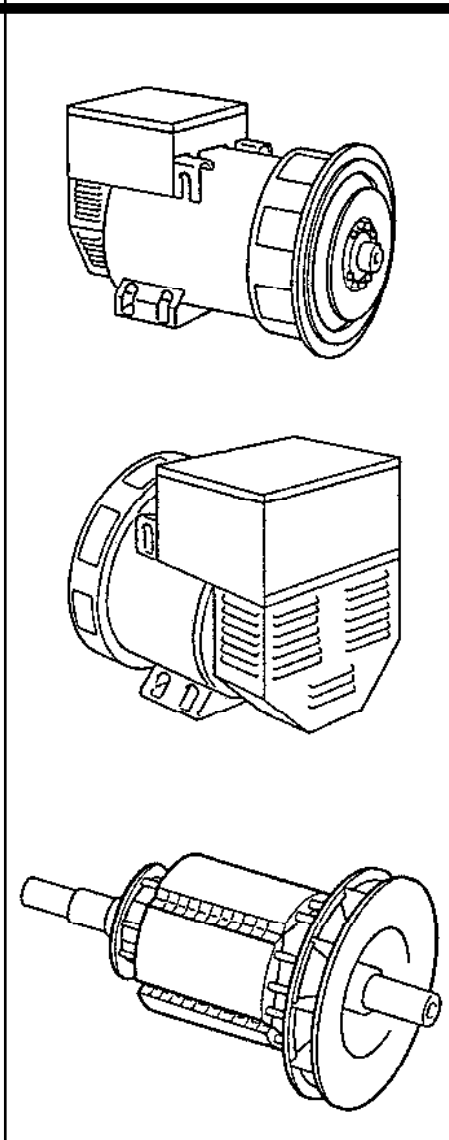
Esecuzioni in accordo ad altre specifiche possono essere eseguite su richiesta del cliente.

La struttura meccanica, sempre molto robusta, consente un facile accesso ai collegamenti e permette di eseguire le verifiche nelle diverse parti altrettanto facilmente.

La carcassa e' realizzata in acciaio, gli scudi in ghisa, l'albero in acciaio C45 con ventola calettata.

Il grado di protezione e' IP21 (a richiesta e' possibile realizzare un grado di protezione superiore).

Gli isolamenti sono eseguiti in classe H, le impregnazioni con resine epossidiche per le parti rotanti e trattamenti sottovuoto per le parti di piu' elevata tensione, quali gli statori (a richiesta trattamenti speciali).



ECO-ECP 2 and 4 pole alternators are brushless, self-regulating and incorporate a rotating inductor with damper cage winding and a fixed stator with skewed slots. The stator windings have a shortened pitch to reduce the harmonic content of the output waveform.

The alternators are made in compliance with the 2006/42, 2006/95, 2004/108 CEE directives and their amendments, and the CEI 2-3, EN 60034-1, IEC 34-1, VDE 0530, BS4999-5000, CAN/CSA-C22.2 N°14 -N°100 regulations.

Tests to verify the electromagnetic compability have been carried out in the foreseen conditions by the standards with the neutral connected to the earth.

On customer's request alternators can be manufactured according to different specifications.

The robust mechanical construction gives good access to the generator output connections, and allows the user to inspect the various components with ease.

The casing is made of steel, the shields of cast iron, and the shaft of C45 steel and it has a keyed fan.

The mechanical protection level meets standard IP21 (upon request higher levels of protection can be supplied).

Insulation materials meet Class H requirements, and all rotating components are epoxy resins impregnated; higher voltage parts, such as the stators, are vacuum-treated (special treatments are available on request).



## PRESCRIZIONI DI SICUREZZA

Durante la consultazione del presente manuale d'uso e manutenzione troverete alcuni simboli; questi hanno un preciso significato qui di seguito illustrato.

### SIMBOLOGIA CONVENZIONALE E SUA DEFINIZIONE

#### IMPORTANTE

Segnala al personale interessato che l'operazione descritta presenta un rischio che può avere come conseguenza un danno alla macchina, se non effettuata nel rispetto delle normative di sicurezza.

#### ACCORTEZZA

Segnala al personale interessato che l'operazione descritta presenta un rischio che può avere come conseguenza un danno alla macchina e/o lesioni al personale stesso, se non effettuata nel rispetto delle normative di sicurezza.

#### AVVERTIMENTO

Segnala al personale interessato che l'operazione descritta presenta un rischio che può avere come conseguenza lesioni gravi o morte, se non effettuata nel rispetto delle normative di sicurezza.

#### PERICOLO

Segnala al personale interessato che l'operazione descritta presenta un rischio immediato che ha come conseguenza lesioni gravi o morte, se non effettuata nel rispetto delle normative di sicurezza.

IMPORTANTE  
IMPORTANT  
WICHTIG



## SAFETY REQUIREMENTS

In consulting this use and maintenance manual, you will find several symbols, which have a specific meaning, as illustrated below.

### CONVENTIONAL SYMBOLS AND SYMBOL DESCRIPTION

#### IMPORTANT

This symbol warns the personnel concerned that the described operation may cause damages to the machine if it is not carried out according to the safety standards.

#### CAUTION

This symbol warns the personnel concerned that the described operation may cause damages to the machine and/or injures to the personnel if it is not carried out according to the safety standards.

#### WARNING

This symbol warns the personnel concerned that the described operation may cause serious injuries or death to the personnel if it is not carried out according to the safety standards.

#### DANGER

This symbol warns the personnel concerned that the described operation may immediately cause serious injuries or death to the personnel if it is not carried out according to the safety standards.

## PRESCRIZIONI DI SICUREZZA

### ADDETTO ALLA MOVIMENTAZIONE

Identifica il tipo di operatore a cui è riservato l'intervento trattato.

Questa qualifica presuppone una piena conoscenza e comprensione delle informazioni contenute nel manuale d'uso del costruttore oltre che competenze specifiche dei mezzi di sollevamento, dei metodi e delle caratteristiche d'imbragatura e della movimentazione in sicurezza.



### MANUTENTORE MECCANICO

Identifica il tipo di operatore a cui è riservato l'intervento trattato.

Questa qualifica presuppone una piena conoscenza e comprensione delle informazioni contenute nel manuale d'uso del costruttore oltre che competenza specifica per effettuare gli interventi di installazione, regolazione, manutenzione, pulizia e/o riparazione.



### MANUTENTORE ELETTRICO

Identifica il tipo di operatore a cui è riservato l'intervento trattato.

Questa qualifica presuppone una piena conoscenza e comprensione delle informazioni contenute nel manuale d'uso del costruttore oltre che competenza specifica per gli interventi di natura elettrica di collegamento, regolazione, manutenzione e/o riparazione.

**E' in grado di operare in presenza di tensione all'interno di armadi e quadri elettrici.**



Nel caso di interventi straordinari e su autorizzazione scritta del servizio assistenza rivolgersi ai centri autorizzati Mecc Alte.

## SAFETY REQUIREMENTS

### HANDLER

This symbol identifies the type of operator in charge of the operation described.

This qualification requires a complete knowledge and understanding of the information contained in the manufacturer's instruction manual as well as specific skills about the hoisting means, slinging methods and features and safe handling procedures.

### MECHANICAL SERVICE MAN

This symbol identifies the type of operator in charge of the operation described.

This qualification requires a complete knowledge and understanding of the information contained in the manufacturer's instruction manual as well as specific skills necessary to perform installation, adjustment, maintenance, cleaning and/or repair operations.

### ELECTRICAL SERVICE MAN

This symbol identifies the type of operator in charge of the operation described.

This qualification requires a complete knowledge and understanding of the information contained in the manufacturer's instruction manual as well as specific skills necessary to perform electrical operations such as connections, adjustment, maintenance and/or repair.

**The electrical service man must be able to work even in case electrical cabinets and panels are live.**

In case of exceptional operations and upon written request of servicing operations please apply to Mecc Alte authorized centers.

## PRESCRIZIONI DI SICUREZZA

Al momento dell'installazione le norme prevedono che il generatore sia collegato a terra.

Per questa ragione assicurarsi che l'impianto di messa a terra sia efficiente ed in conformità con le direttive del paese dove il generatore sarà installato.

### ATTENZIONE

**L'INSTALLATORE FINALE È RESPONSABILE DELLA PREDISPOSIZIONE DI TUTTE LE PROTEZIONI (DISPOSITIVI DI SEZIONAMENTO, PROTEZIONI CONTRO I CONTATTI DIRETTI E INDIRETTI, PROTEZIONI CONTRO SOVRACORRENTI E SOVRATENSIONI, ARRESTO DI EMERGENZA ECC.) NECESSARIE PER RENDERE CONFORME IL MACCHINARIO E L'IMPIANTO UTILIZZATORE, ALLE VIGENTI NORME DI SICUREZZA INTERNAZIONALI/EUROPEE.**

Per la movimentazione dei generatori disimballati usare sempre ed esclusivamente gli appositi golfari.

Utilizzare funi di portata adeguata senza sollevare il generatore troppo dal pavimento (max 30 cm.).

Alla fine del periodo di vita della macchina, rivolgersi alle agenzie di smaltimento materiali ferrosi e non disperdere parti nell'ambiente.

Gli addetti all'installazione, conduzione e manutenzione del generatore devono essere tecnici adeguatamente qualificati e che conoscano le caratteristiche dei generatori.

Le persone addette alla movimentazione devono sempre indossare guanti da lavoro e scarpe antinfortunistiche.

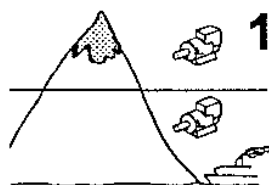
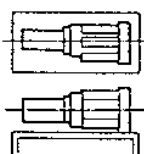
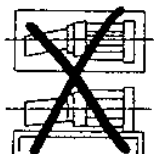
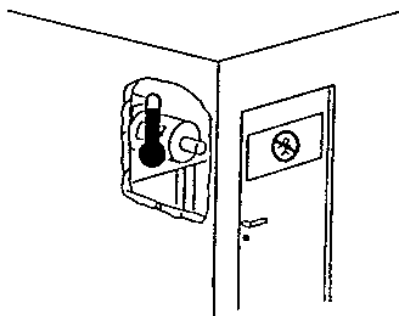
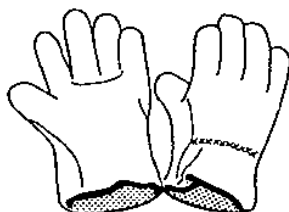
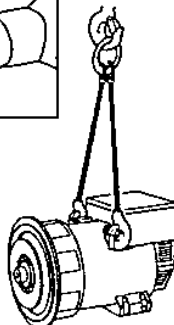
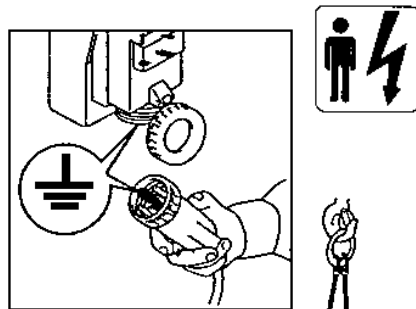
Qualora il generatore o l'intero impianto debba essere sollevato da terra, gli operatori devono usare un casco protettivo.

Il generatore va installato in un ambiente aerato. Se non c'è sufficiente aria oltre al mal funzionamento esiste pericolo di surriscaldamento (tab. 25 pag. 73). Sulla porta di ingresso del locale ci deve essere un cartello indicante il divieto di accesso alle persone non autorizzate.

Assicurarsi che il basamento del generatore e del motore primario sia calcolato per sopportare il peso e tutti gli eventuali sforzi dovuti al funzionamento.

È responsabilità dell'installatore il corretto accoppiamento del generatore al motore, mettendo in atto tutti quegli accorgimenti necessari per garantire il corretto funzionamento del generatore ed evitare anomale sollecitazioni che possono danneggiare il generatore (come vibrazioni, disallineamenti, strane sollecitazioni etc.).

La macchina è stata progettata per garantire la potenza nominale in ambienti con temperatura massima di 40 °C e altitudine inferiore ai 1000 metri (EN60034-1), se non diversamente indicato. Per condizioni diverse vedere il catalogo commerciale (depliant).



1000m

40° C

## SAFETY REQUIREMENTS

Before installing the generator, arrangements must be made to earth the machine. This is the reason why you must make sure that the grounding system is in good conditions and in compliance with the regulations of the country where the generator will be installed.

### CAUTION

**THE FINAL INSTALLER IS RESPONSIBLE FOR THE INSTALLATION OF ALL THE PROTECTIONS (SECTIONING DEVICES, PROTECTIONS AGAINST DIRECT AND INDIRECT CONTACTS, OVERCURRENT AND OVERVOLTAGE PROTECTIONS, EMERGENCY STOP, ETC.) NECESSARY FOR THE MACHINE TO COMPLY WITH THE EXISTING INTERNATIONAL/EUROPEAN SAFETY REGULATIONS.**

For handling the unpacked generators, always use the special eyebolts only; use ropes having a suitable carrying capacity and do not lift the generator too much from the floor (max 30 cm.).

When the machine is worn out, contact the companies in charge of the disposal of ferrous material and do not throw away its parts into the environment.

The operators in charge of the installation, operation and maintenance of the generators must be skilled technicians who know the characteristics of the generators.

The people in charge of the handling must always wear work gloves and safety shoes. In case the generator or the whole plant must be lifted from the floor, the operators must wear a safety helmet.

The generator must be installed in an airy room. If there is not enough air, a malfunction or an overheating may occur (table 25 pag. 73). All entry doors into generator room should be clearly marked "Authorized persons only".

Make sure that gen-set foundations and baseframe are suitable to bear the combined weight of the alternators and prime mover.

The installer is responsible for the correct coupling of the generator to the engine and for the performance of all precautions necessary to guarantee the correct operation of the generator and avoid abnormal stress, which could damage the generator (such as vibrations, misalignment, strange noises or vibrations, etc.).

The machine was designed to guarantee the nominal power in environments with a maximum temperature of 40° C, at altitudes lower than 1000 m asl (EN60034-1), unless otherwise specified; for different operating conditions, see the commercial catalogue (brochure).

## PRESCRIZIONI DI SICUREZZA

Nelle vicinanze della macchina non ci devono essere persone con indumenti svolazzanti tipo: sciarpe, fular, bracciali, etc e qualsiasi indumento deve essere chiuso con elastici alle estremità'.

I generatori non devono mai e per nessuna ragione funzionare con le seguenti protezioni aperte:

- ) copertura morsetti.
- ) coperchi frontali.
- ) protezioni delle ventole.

Nelle fasi di montaggio e smontaggio della rete, assicurarsi di tenere in posizione con le mani la stessa per evitare che l'elasticità della rete possa colpire l'operatore o chi è nelle vicinanze.

In alcuni tipi di generatore i regolatori sono corredati di 3 led visibili dall'esterno (standard per macchine grandi e opzionale per macchine piccole):

- Verde** - funzionamento regolare
- Giallo** - intervento protezione sovraccarico
- Rosso** - intervento protezione bassa velocità'.

I generatori sono rumorosi (tav. 25 pag. 73); anche se il livello acustico è sicuramente inferiore a quello del motore primario, devono essere installati in ambienti isolati (stanza, sala macchine, etc.) e chi vi accede deve munirsi di cuffie antirumore.

I generatori sviluppano calore anche elevato in funzione della potenza generata. Pertanto non toccare il generatore se non con guanti antiscottatura e attendere, una volta spento, che esso raggiunga la temperatura ambiente.

Anche se la macchina è protetta in tutte le sue parti evitare di sostare nelle sue vicinanze.

Per nessuna ragione appoggiarsi o sedersi sul generatore.

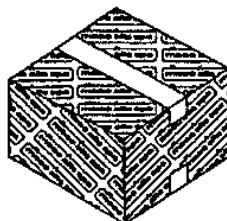
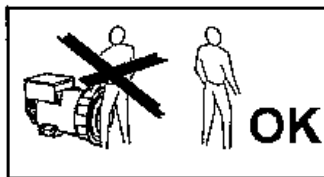
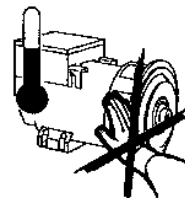
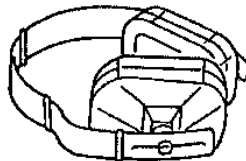
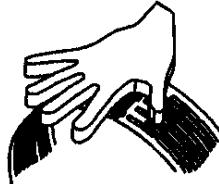
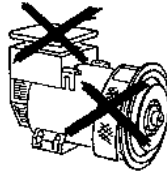
Non togliere per nessuna ragione le etichette, anzi richiedete la sostituzione in caso di necessità'.

### PERICOLO DI CORTO CIRCUITO

Il generatore è costruito con grado di protezione IP21; pertanto è fatto divieto di utilizzare qualsiasi tipo di idropulitrice e di spruzzare liquidi sopra le parti elettriche.

In caso di sostituzione di pezzi di ricambio richiedere esclusivamente ricambi originali.

Per la sostituzione di parti usurate comportarsi rigorosamente come descritto al capitolo manutenzione; queste manutenzioni devono essere eseguite da tecnici adeguatamente qualificati.



## SAFETY REQUIREMENTS

No person must wear fluttering clothes (such as scarves, etc.) near the machine and any garment must be fastened with elastic bands at its ends.

The generators must never and for no reason run with following guards removed:

- ) terminals cover
- ) front covers
- ) fan guards.

During assembling and disassembling operations, hold carefully both ends of the protection grid as the related material elasticity can be harmful.

In some machines the regulators are equipped with 3 leds which can be seen from the outside (as standard equipment on large machines, as optional equipment on small machines):

- Green led** - correct operation
- Yellow led** - overload protection on
- Red led** - low speed protection on.

The generators are noisy (table 25 pag. 73); even if the sound level is certainly lower than that of the prime motor, they must be installed in soundproof rooms (room, engine room, etc.) where it is necessary to wear antinoise protectors.

The generators produce heat proportional to the output.

Therefore, do not touch the generator if you do not wear antiscorch gloves and, after switching it off, do not touch it until it has cooled down.

Even if all the machine components are protected, keep away from the machine.

Do not lean or sit on the generator for whatever reason.

Do not remove the labels for whatever reason; on the contrary, if necessary, replace them.

### DANGER OF SHORT CIRCUIT

the degree of protection of the generator is IP21; therefore it is made prohibition to use whichever type of hydrocleaner and to spray liquids over the parts containing electrical components.

In case of replacement of spare parts, use original spare parts only.

For the replacement of worn parts, carefully follow the maintenance instructions; these operations must be carried out by skilled technicians.

**PERICOLO  
DANGER**



**GEFAHR  
PELIGRO**

In funzione della destinazione, gli alternatori possono essere imballati per la spedizione in vari modi.

In ogni caso per movimentarli, osservare nella bolla di accompagnamento, il peso, e con mezzi adeguati, sollevarli da terra il meno possibile.

Nel caso che l'imballo debba essere movimentato con carrelli, occorre che le forche siano tenute piu' larghe possibile, in modo da evitare cadute o scivolamenti.

In caso di immagazzinamento, gli alternatori imballati e non, devono essere depositati in un locale fresco e asciutto e comunque mai esposto alle intemperie.

Una volta disimballato il generatore, (mono-supporto) non scollegare il sistema di fissaggio rotore, in quanto quest'ultimo potrebbe scivolare.

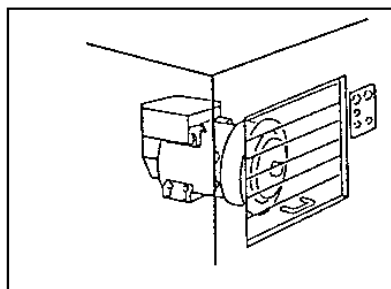
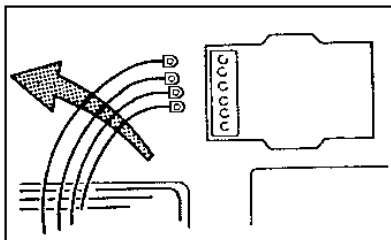
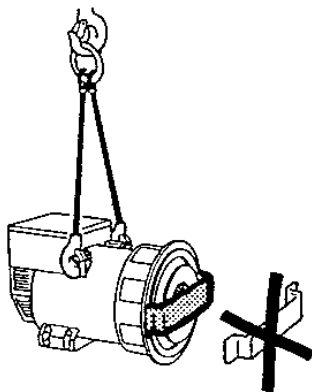
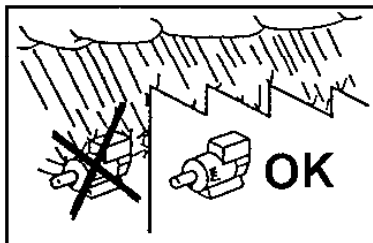
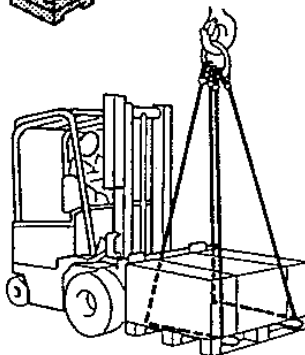
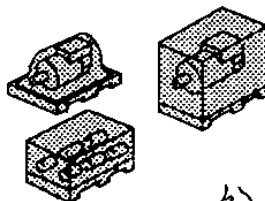
Per la movimentazione al fine dell'installazione, sollevare i generatori, sempre, attraverso i propri golfari (tav. 25 pag. 73).

**IMPORTANTE:**

**DOPO LUNGI PERIODI DI IMMAGAZZINAMENTO O IN PRESENZA DI SEGNI EVIDENTI DI UMIDITA' / CONDENSA, VERIFICARE LO STATO D'ISOLAMENTO.**

**LA PROVA DI ISOLAMENTO DEVE ESSERE ESEGUITA DA UN TECNICO ADEGUATAMENTE QUALIFICATO.**

**PRIMA DI ESEGUIRE TALE PROVA E' NECESSARIO SCONNETTERE IL REGOLATORE DI TENSIONE; SE LE PROVE DARANNO UN RISULTATO TROPPO BASSO (INFERIORE A 1 MΩ)(EN60204-1) SI DOVRA' ASCIUGARE L'ALTERNATORE IN UN FORNO A 50 - 60°C.**



Alternators will be packed for shipment in a manner suitable to their mode of transport and final destination.

Prior to handling goods, please ensure that lifting equipment is of sufficient capacity. Under lifting conditions machinery should be elevated to a minimal distance from the ground.

When lifting or moving goods by forklift apparatus, care should be taken to ensure that forks are correctly positioned to prevent slipping or falling of pallet or crate.

Both packed and unpacked alternators shall be stored in a cool and dry room, and shall never be exposed to the inclemency of the weather.

With regard to single bearing alternators (form MD35) please ensure that the rotor securing device is in place. Failure to do so may lead to slippage or assembly.

When installing the alternators, always lift them by using their eyebolts (table 25 pag 73).

**IMPORTANT :**

**AFTER PROLONGER STORAGE OR IF THE MACHINES SHOW SIGNS OF CONDENSATION, ALL WINDINGS SHOULD BE SUBJECTED TO INSULATION TESTS PRIOR TO OPERATING.**

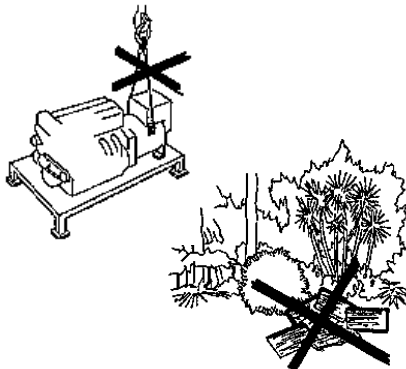
**THE INSULATION TEST SHALL BE MADE BY SKILLED PERSONNEL.**

**BEFORE CARRYING OUT THE TEST, THE VOLTAGE REGULATOR MUST BE DISCONNECTED; IF THE TEST RESULTS ARE TOO LOW (LOWER THAN 1 MΩ)(EN60204-1) THE ALTERNATOR MUST BE DRIED IN AN OVEN AT 50-60°C.**

## TRASPORTO E IMMAGAZZINAMENTO

Ricordarsi che, una volta che il generatore sarà accoppiato al motore primario, o montato su un basamento, o installato in un telaio in modo da formare un corpo unico, non dovrà più essere sollevato dai propri golfari ma si dovranno seguire le indicazioni dell'installatore.

Non disperdere l'imballo nell'ambiente, ma rivolgersi alle agenzie di smaltimento.



## TRANSPORT AND STORAGE

Once the generator is coupled with an engine, mounted on a baseframe, or installed on a complete generating set, it cannot be lifted by its lifting bolts. The relevant instructions for lifting complete generating set should be followed.

Any packing materials should be disposed of via correct waste disposal methods. Do not discard waste materials into the environment.

## ACCOPIAMENTO MECCANICO

Con il fine di proteggere, durante il trasporto e l'immagazzinamento, la flangia di accoppiamento o la estremità d'albero (a seconda della forma costruttiva del generatore) a tali parti meccaniche viene applicata una vernice antiruggine facilmente rimovibile. Tale sostanza DEVE ESSERE assolutamente RIMOSSA prima dell'assemblaggio finale.

L'accoppiamento del generatore al motore primo è a cura dell'utilizzatore finale ed è eseguito secondo la sua sola discrezione (per le coppie di serraggio vedere tabella 24 pag. 72).

Un allineamento impreciso può causare vibrazioni e danneggiamenti dei cuscinetti. È consigliabile inoltre verificare la compatibilità delle caratteristiche torsionali del motore / generatore (a cura del cliente).

I dati sul generatore necessari per tale verifica sono disponibili nella relativa documentazione tecnica.

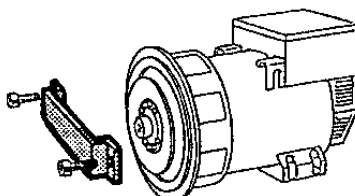
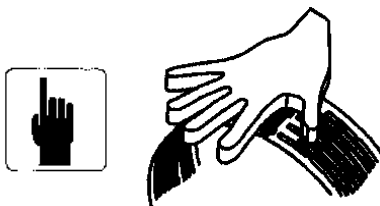
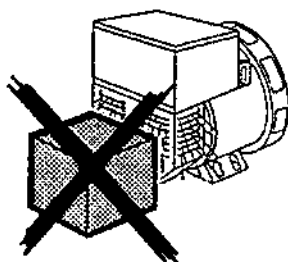
Le attenzioni richieste sono:

**NELLA MESSA IN SERVIZIO AVER CURA CHE LE APERTURE DI ASPIRAZIONE E SCARICO DELL'ARIA DI RAFFREDDAMENTO SIANO SEMPRE LIBERE.**

**IL LATO DI ASPIRAZIONE NON DEVE ESSERE VICINO A SORGENTI DI CALORE. IN OGNI CASO, SE NON SPECIFICAMENTE CONCORDATO, LA TEMPERATURA DELL'ARIA DI RAFFREDDAMENTO DEVE ESSERE QUELLA AMBIENTE E COMUNQUE NON SUPERIORE A 40°C.**

**NELLE FASI DI MONTAGGIO E SMONTAGGIO DELLA RETE, ASSICURARSI DI TENERE IN POSIZIONE CON LE MANI LA STESSA PER EVITARE CHE L'ELASTICITÀ DELLA RETE POSSA COLPIRE L'OPERATORE O CHI È NELLE VICINANZE.**

**IN CASO DI GENERATORI MONO-SUPPORTO IN FASE DI ACCOPIAMENTO CON IL MOTORE PRIMO, FARE ATTENZIONE CHE IL ROTORE NON SI SFILI; TOGLIERE IL SISTEMA DI FISSAGGIO ROTORE, SE PRESENTE.**



## MECHANICAL COUPLING

For transit and storage purposes the generator flange spigot and the generator end shaft (for the generators in B3-B14 construction form) have been coated with a rust preventer that can be removed easily.

This **MUST BE** removed before assembling to the engine.

The mechanical coupling is under the sole responsibility of the final user, and has to be done at his discretion (for tightening torque see tab. 24 pag. 72).

A bad alignment may cause vibrations and bearing damages. It is advisable to verify the compatibility of the engine / generator torsional characteristics (by the customer).

The necessary data for this verification are available on the concerning documentation.

Warnings:

**BEFORE STARTING THE ALTERNATOR, CHECK THAT THE AIR INLETS AND OUTLETS ARE FREE OF ANY OBSTRUCTIONS.**

**THE AIR INLETS SHOULD NOT BE NEAR ANY HEATING SOURCES.**

**IN ANY CASE, IF NOT SPECIFICALLY REQUESTED, THE COOLING AIR TEMPERATURE MUST BE EQUAL TO THE ENVIRONMENT TEMPERATURE AND NEVER HIGHER THAN 40°C.**

**DURING ASSEMBLING AND DISASSEMBLING OPERATIONS, HOLD CAREFULLY BOTH ENDS OF THE PROTECTION GRID AS THE RELATED MATERIAL ELASTICITY CAN BE HARMFUL.**

**BEFORE MECHANICAL COUPLING OF SINGLE BEARING ALTERNATORS REMOVE THE ROTOR SECURING DEVICE, IF FITTED, PLACED THERE TO PREVENT ROTOR FROM SLIPPING.**



## ACCOPPIAMENTO MECCANICO

### ISTRUZIONI PER MONTAGGIO IN FORMA COSTRUTTIVA MD35.

Un allineamento impreciso può causare vibrazioni e danneggiamenti dei cuscinetti. E' consigliabile inoltre verificare la compatibilità delle caratteristiche torsionali del motore / generatore (a cura del cliente).

I dati sul generatore necessari per tale verifica sono disponibili nella relativa documentazione tecnica.

Per l'accoppiamento del generatore con forma costruttiva MD35, procedere come segue:

a) verificare il corretto posizionamento dei dischi (quota "L") in funzione del tipo di accoppiamento considerato (tavola 24 pag. 72); se necessario ripristinare la quota "L" spostando leggermente e assialmente il rotore. In posizione corretta il cuscinetto posteriore deve avere un gioco assiale da 0,5 a 2 mm.

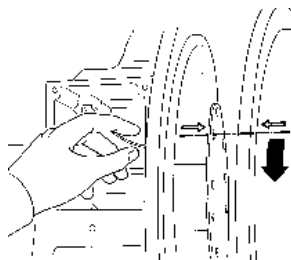
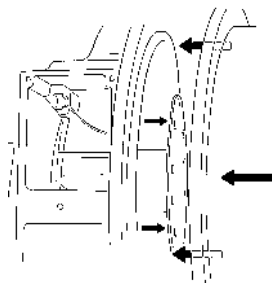
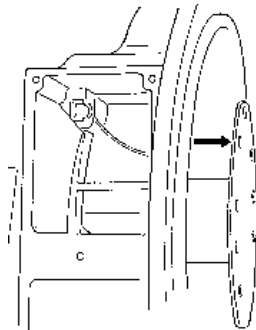
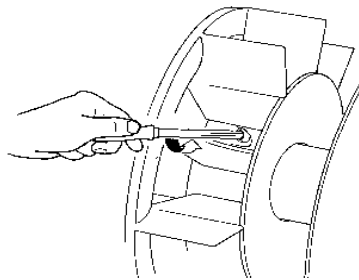
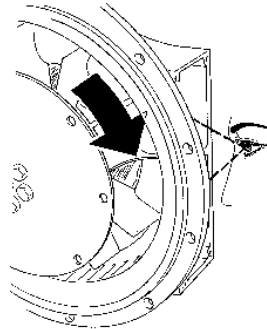
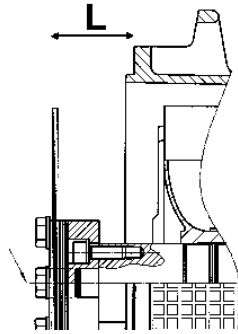
b) (Per serie 28) attraverso una delle due aperture laterali e ruotando manualmente il rotore, individuare sul mozzo della ventola, la relativa vite di bloccaggio

c) (Per serie 28) rendere la ventola libera di ruotare allentando la vite M8 di bloccaggio, utilizzando una chiave esagonale possibilmente con testa snodata

d) (Per serie 28) posizionare uno dei fori dei dischi in prossimità della parte alta di una delle aperture laterali e posizionare lo scarico realizzato su una delle pale della ventola, nella stessa posizione

e) avvicinare l'alternatore al motore di accoppiamento

f) allineare uno dei fori di fissaggio dei dischi del volano con il foro dei dischi precedentemente posizionato (punto "d")



## MECHANICAL COUPLING

### INSTRUCTIONS FOR THE ASSEMBLING OF GENERATORS WITH MD35 FORM.

A bad alignment may cause vibrations and bearing damages. It is advisable to verify the compatibility of the engine / generator torsional characteristics (by the customer).

The necessary data for this verification are available on the concerning documentation.

For the coupling of a generator with MD35 form, proceed as follows:

a) according to the type of the coupling, verify the correct placement of the discs (dimension "L") (table 24 pag. 72); if necessary restore the "L" dimension moving gently and axially the rotor. In the right position the clearance of rear bearing should be from 0.5 to 2 mm.

b) (For series 28) through one of the two lateral openings, and by manually rotating the rotor, detect the relevant clamp screw on the fan hub

c) (For series 28) let the fan be free to rotate by slackening the M8 screw by means of an hexagonal wrench, possibly having an articulated head

d) (For series 28) position one of the disk holes near the upper part of one of the side openings and place the slit that is on one of the fan blades, in the same position

e) move the generator close to the coupling engine

f) align one of the flywheel disk fastening holes with the holes of the previously positioned disks (point "d")

## ACCOPPIAMENTO MECCANICO

g) inserire ed avvitare parzialmente la relativa vite che blocca i dischi al volano. Tenendo ferma la ventola (ECP28), ruotare il volano affinché altri due fori si ripresentino nella stessa posizione ed avvitare parzialmente la relativa vite. Ripetere detta operazione per tutti gli altri fori

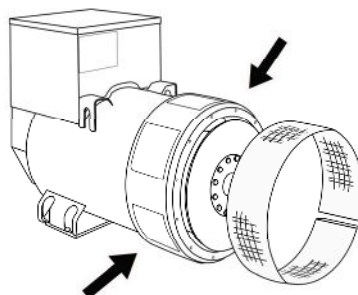
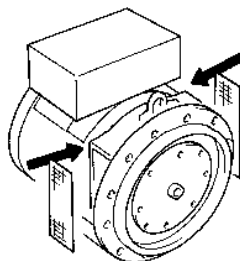
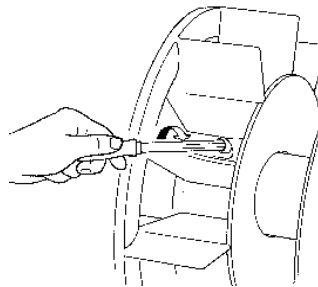
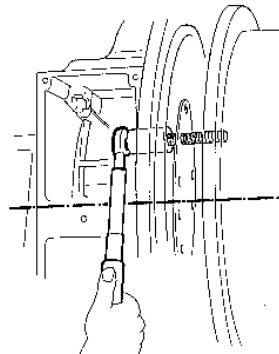
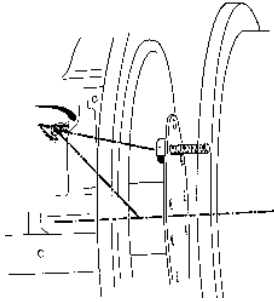
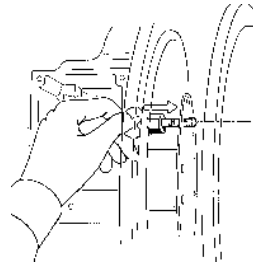
h) dopo aver verificato il corretto centraggio dei dischi nel volano motore, bloccare definitivamente dette viti

i) (Per serie 28) terminata l'operazione di bloccaggio dischi, ribloccare la ventola serrando la relativa vite con una coppia di serraggio pari a  $16 \text{ Nm} \pm 10\%$ ; la posizione radiale della ventola non è vincolante per il corretto funzionamento del sistema

l) montare le retine di protezione, fornite a corredo del generatore.

L'osservanza delle prescrizioni dei punti "i" ed "l" è di fondamentale importanza onde evitare seri danni del generatore e situazioni pericolose per cose e persone.

Solamente dopo che il generatore è stato ben fissato meccanicamente procedere all'accoppiamento elettrico.



## MECHANICAL COUPLING

g) Insert and partially tighten the screws that lock the disks to the flywheel. Keeping the fan still (ECP28), turn the flywheel until another two holes are in the same position and partially tighten the screw. Repeat this operation for all the other holes

h) after inspecting the correct centring of the disks on the engine flywheel, the screws must be completely tightened

i) (For series 28) once the clamping of the disks is over, stop the fan once again by tightening the screw with a torque wrench setting adjusted at  $16 \text{ Nm} \pm 10\%$ ; the radial position of the fan is not binding for the correct operation of the system

l) fix the protection grids supplied with the generator.

Compliance with items "i" and "l" is of the utmost consequence in order to avoid serious damages to the generator or hazardous situations for people or objects.

Only after a correct mechanical coupling, proceed with the electrical connections.

**PERICOLO  
DANGER**

**GEFAHR  
PELIGRO**



L'accoppiamento elettrico e' a cura dell'utilizzatore finale ed e' eseguito secondo la sua sola discrezione.

Per l'ingresso nella scatola morsetti si raccomanda di utilizzare passacavi e serracavi in accordo con le specifiche del paese di esportazione.

**COLLEGAMENTO AVVOLGIMENTI**

Sono previsti entrambi i collegamenti, stella con neutro (Y) e triangolo (Δ) in tutti gli alternatori (tav. 2 pag. 60).

Per passare da un collegamento Y a Δ (es. da 400V a 230V) e' sufficiente spostare i ponti sulla morsettiera principale (vedere schema tav. 2 pag. 60).

Nessun intervento e' richiesto sul regolatore di tensione.

I generatori sono costruiti di serie con 12 cavi di uscita per consentire di ottenere tensioni diverse (es.230 / 400 / 460 / 800V).

I generatori, vanno sempre collegati a terra con un conduttore di adeguata sezione utilizzando uno dei due (interno/esterno) appositi morsetti.

Per il collegamento elettrico utilizzare cavi adeguati in funzione della potenza del generatore ed effettuare le connessioni ai morsetti come indicato nelle tavole 12 o 17.

Dopo aver eseguito il collegamento (per le coppie di serraggio vedere tabella 24 pag.72) rimontare il coperchio scatola morsetti.

**IMPORTANTE:** variazioni di frequenza.

La macchina fornita per funzionare a 50Hz puo' funzionare anche a 60Hz (o viceversa); e' sufficiente tarare il potenziometro al nuovo valore nominale di tensione.

Passando da 50Hz a 60Hz, la potenza puo' aumentare del 20% (corrente invariata), se la tensione aumenta del 20%; se la tensione rimane invariata la potenza, puo' aumentare del 5% per effetto della migliore ventilazione.

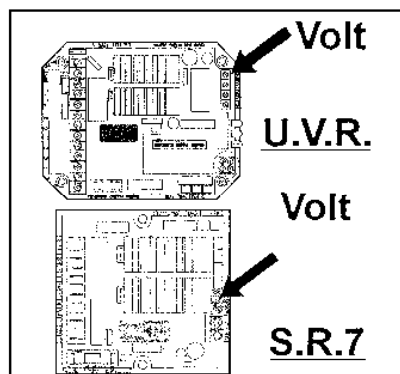
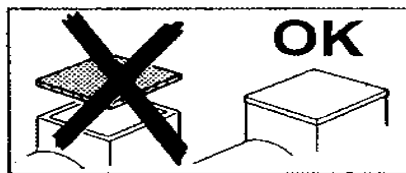
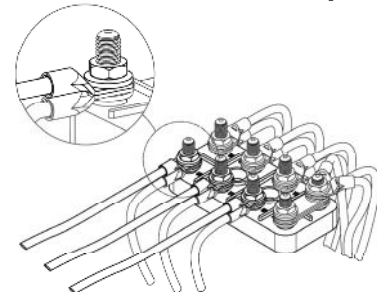
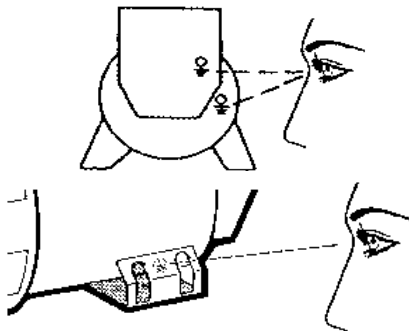
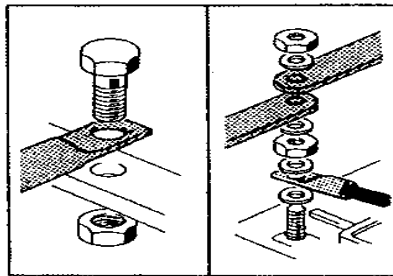
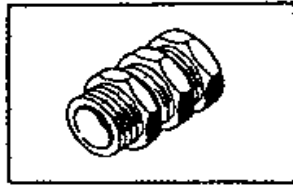
Per generatori costruiti appositamente per una frequenza di 60Hz nel passaggio a 50Hz, la tensione e la potenza devono necessariamente diminuire del 20% rispetto a quella riferita a 60Hz.

**REGOLATORI** (tav. 3 pag 60)

I regolatori tipo U.V.R.6/1-F e S.R.7/2-G possono essere indifferentemente usati nella serie ECO-ECP senza modificare le prestazioni.

L'U.V.R.6/1-F e' montato di serie nelle tipologie 38 - 40 - 43 - 46, mentre l'S.R.7/2-G nelle serie 28-31-32-34.

I due regolatori sono perfettamente uguali nelle prestazioni, ma si differenziano nelle segnalazioni e nel riferimento.



All electrical output connections are the responsibility of, and are at the discretion of, the end user.

When making terminal box connections, all cable and terminal lugs should meet the relevant standards of the country of final destination.

**WINDINGS CONNECTION**

All alternators feature both star with neutral (Y) and delta (Δ) connections (table. 2 pag.60).

To reconnect from a star to delta connection (for ex. from 400V to 230V), modify the linking arrangements on the output terminal board (see diagram on table 2 page 60).

It is not necessary to adjust the voltage regulator.

Standard alternators are equipped with 12 cables to offer different voltages (ex.230 / 400 / 460 / 800V).

The alternator must always be earthed by sufficiently rated cable, using one of the inside or outside terminals. For the electrical connections use wires suitable for the power of the generator and connect them to the terminal board as indicated on table 12 or 17.

After completing output connections (for tightening torque see tab. 24 pag. 72), ensure that the terminal box cover is securely in place.

**IMPORTANT:** frequency variations.

A standard production machine wound for 50 Hz can also function at 60 Hz (and vice versa) by resetting the A.V.R. voltage potentiometer to the new nominal voltage value.

When changing from 50 to 60 Hz the alternator power, and nominal voltage will increase by 20%, but the current does not change from 50 Hz value. Should voltage stay at 50 Hz nominal value, then the output power may be increased by 5% due to improved ventilation.

For machines wound for 60 Hz, changing to 50 Hz, the voltage and power values have to decrease by 20% of 60 Hz value.

**REGULATORS** (table. 3 pag 60)

Either U.V.R.6/1-F and S.R.7/2-G regulators can be used on the ECO-ECP series without affecting performances.

The U.V.R.6/1-F is a standard feature on the 38-40-43-46 models whereas the S.R.7/2-G is standard on the 28-31-32-34 series.

The two regulators ensure the same level of performance but have different signal systems and references.

## ACCOPIAMENTO ELETTRICO

### IMPORTANTE :

il controllo di tensione va eseguito a vuoto con l'alternatore funzionante a frequenza nominale.

Agendo sul potenziometro tensione dei regolatori elettronici si puo' ottenere la regolazione della tensione entro il  $\pm 5\%$  del valore nominale.

E' possibile ottenere la regolazione della tensione a distanza in un range di  $\pm 5\%$  inserendo negli appositi morsetti un potenziometro da 100K (per le macchine a 6 morsetti) o un potenziometro da 100K con in serie una resistenza da 100K (per le macchine a 12 morsetti).

Istruzioni per il collegamento del potenziometro esterno :

**ATTENZIONE:** quando si collega il potenziometro esterno è necessario seguire la procedura sottoriportata per ottenere un corretto funzionamento dell'alternatore.

- 1) Ruotare il trimmer VOLT nel regolatore elettronico completamente in senso antiorario
- 2) Posizionare il potenziometro esterno a meta' corsa e connetterlo agli appositi morsetti del regolatore elettronico
- 3) Tramite il trimmer VOLT del regolatore elettronico tarare la tensione al valore nominale.

### PROTEZIONI

#### U.V.R.6/1-F - S.R.7/2-G

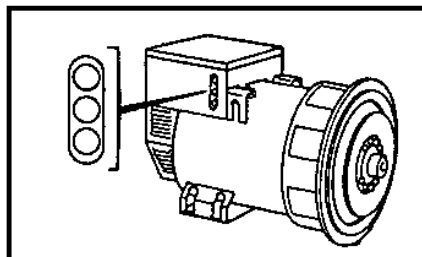
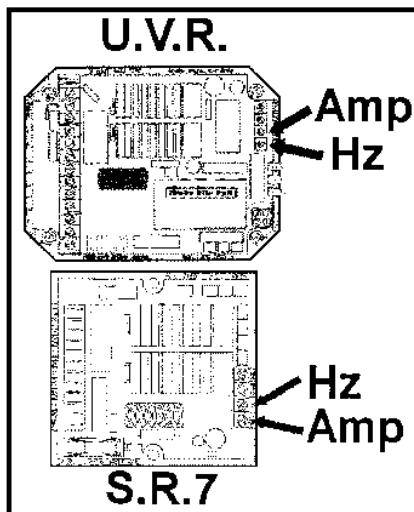
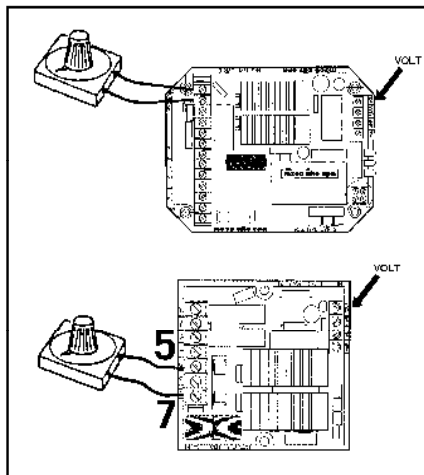
Entrambi i regolatori sono provvisti di una protezione di bassa velocita' la cui soglia di intervento e' regolabile tramite il potenziometro "Hz". L'intervento di tale protezione e' istantaneo riducendo la tensione di macchina quando la frequenza scende sotto il 10% di quella nominale. I regolatori prevedono anche una seconda protezione (protezione di sovraccarico), che sente la tensione parzializzata che va al campo di statore dell'eccitatrice e se essa supera per piu' di 20 sec il valore stabilito, abbassa la tensione di macchina limitando la corrente di eccitazione entro valori di sicurezza.

Il ritardo appositamente inserito consente lo spunto del motore che normalmente si avvia in 5 - 10 sec. Anche la soglia di intervento di questa protezione e' regolabile tramite il potenziometro "AMP".

#### U.V.R.6/1-F

Il regolatore U.V.R.6/1-F aggiunge alle prestazioni prima descritte, le seguenti caratteristiche:

- 1 - possibilita' di avere il riferimento trifase oltre che monofase.
- 2 - segnalazioni a led di autodiagnostica che indicano le condizioni di funzionamento della macchina: un led verde, che normalmente acceso indica il funzionamento normale del generatore; un led rosso che indica l'intervento della protezione di bassa velocita', un led giallo che indica l'intervento della protezione di sovraccarico.



## ELECTRICAL CONNECTIONS

### IMPORTANT :

the generator output voltage must be checked under no-load conditions, with the correct setting of frequency.

The voltage may be adjusted by  $\pm 5\%$  of the nominal, by acting upon the voltage potentiometer on the electronic regulators.

It is possible to get a remote voltage regulation of  $\pm 5\%$  inserting in the proper terminals a 100K potentiometer (for the 6 lead units) or a 100K potentiometer with a 100K resistance in series (for the 12 lead units).

Instructions to follow for the external potentiometer connection:

**CAUTION:** in order to get a correct working of the alternator, it is necessary to follow the following procedure, connecting the external potentiometer.

- 1) Turn the VOLT trimmer of the electronic regulator completely anticlockwise.
- 2) Set the external potentiometer at half turn and connect it to the proper terminals of the electronic regulator.
- 3) Adjust the voltage at the nominal value by the VOLT trimmer of the electronic regulator.

### PROTECTIONS

#### U.V.R.6/1-F - S.R.7/2-G

Both regulators are provided with an underspeed protection with an intervention threshold which can be adjusted by the potentiometer marked "Hz". This protection intervenes instantaneously by reducing the alternator voltage to a safe value when frequency falls below 10% of the nominal value. These regulators also have inherent overload protection which senses the exciter field voltage value. Should this field voltage value exceed the nominal value for a period of more than 20 seconds, then again the alternator voltage is automatically reduced to a safe operating level. This overload function has a built-in delay to allow for the overload when starting motors (normally 5-10 seconds). The operating threshold of this protection device is adjustable by the potentiometer marked "AMP".

#### U.V.R.6/1-F

Aside from the above mentioned characteristics, the U.V.R.6/1-F regulator also offers the following:

- 1 - possibility to have single-phase as well as three-phase sensing
- 2 - led indicators for self-diagnosis which indicate the unit's operational conditions: a green led which when lit confirms the alternator's normal functioning; a red led indicates the underspeed protection is on; a yellow led indicates the overload protection is on.

## ACCOPPIAMENTO ELETTRICO

### IMPORTANTE

Nel funzionamento normale del generatore deve essere acceso solamente il led verde. Tutte queste segnalazioni possono essere remote a distanza e manipolate per usi diversi tramite l'utilizzo del dispositivo chiamato SPD96/A, disponibile a richiesta.

### CAUSE CHE PROVOCANO L'INTERVENTO DELLE PROTEZIONI.

#### Intervento istantaneo protezione bassa velocità:

1 - velocità ridotta del 10% rispetto ai dati di targa.

#### Intervento ritardato protezione sovraccarico :

2 - sovraccarico del 20% rispetto ai dati di targa.

3 - fattore di potenza ( $\cos \varphi$ ) inferiore ai dati di targa.

4 - temperatura ambiente oltre i 50°C.

#### Intervento di entrambe le protezioni:

5 - combinazione del fattore 1 con i fattori 2, 3, 4.

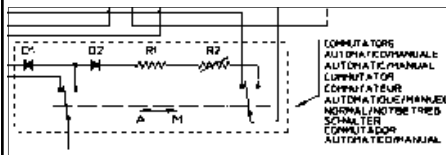
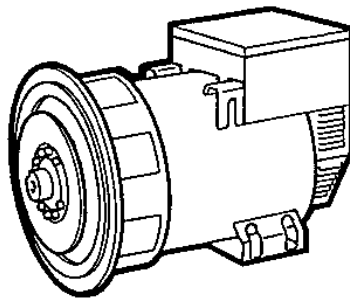
Nel caso di intervento delle protezioni, la tensione erogata dall'alternatore scenderà fino ad un valore che dipenderà dall'entità dell'anomalia.

La tensione tornerà automaticamente al suo valore nominale qualora venga a cessare l'inconveniente.

Per maggiori dettagli sui regolatori consultare il manuale specifico.

### OPTIONALS :

Tutti gli alternatori della serie ECO-ECP possono anche funzionare con regolazione manuale, senza l'ausilio di sorgenti esterne ma con il solo utilizzo di un reostato (tav. 10-11 pag. 65).



## ELECTRICAL CONNECTIONS

### IMPORTANT

In normal functioning, only the green led has to be lit.

All these indicators can be remotely controlled and adjusted, for any type of use, by utilizing the SPD96/A accessory which is available on request.

### INTERVENTION OF PROTECTION DEVICES CAUSES.

#### Underspeed protection instantaneous intervention :

1 - speed reduced by 10% of nominal RPM

#### Delayed intervention of overload protection :

2 - overload by 20% of nominal rating.

3 - power factor ( $\cos \varphi$ ) lower than the nominal one.

4 - ambient temperature above 50°C.

#### Intervention of both protections :

5 - combination of factor 1 with factors 2, 3, 4.

In case of intervention the output voltage will drop down to a value which will depend on the fault.

The voltage will return automatically to its nominal value as soon as the fault is removed.

For further details on regulators, please see the specific manual.

### OPTIONALS :

All ECO-ECP series alternators can function with manual regulation, without assistance from any external source, by using a rheostat (tab. 10-11 pag. 65).

## ACCOPIAMENTO ELETTRICO

### FUNZIONAMENTO IN PARALLELO

Nel caso si voglia far funzionare dei generatori in parallelo e' necessario montare un dispositivo che assicura un identico statismo sulla caratteristica esterna.

Questo significa che se le macchine lavorassero separatamente si avrebbe una uguale caduta di tensione (circa 4%) passando da vuoto a pieno carico.

Questo dispositivo e' montato di serie sulle grandezze 40 - 43 - 46, per cui, quando due o piu' di queste macchine devono lavorare in parallelo e' sufficiente togliere il ponticello che cortocircuita il secondario del dispositivo di parallelo.

Per le grandezze inferiori il dispositivo viene montato a richiesta o puo' essere montato (ad eccezione del tipo ECP28/4) dal cliente stesso secondo le tav.14-16-18-20. Dopo aver montato il dispositivo e' necessario verificare l'esatto collegamento; si dovra' controllare cioe' che le macchine lavorando singolarmente presentino una caduta di tensione di circa il 4% passando, a velocita' nominale e  $\cos \varphi$  0.8, da vuoto a pieno carico.

### MONTAGGIO DI UN DISPOSITIVO DI PARALLELO

Riferendosi alle tavole 14-16-19 montare il trasformatore di parallelo come illustrato.

Collegare le spire di potenza in serie alla fase.

Il numero delle spire da eseguire sul trasformatore saranno indicate sulle istruzioni allegate al trasformatore stesso.

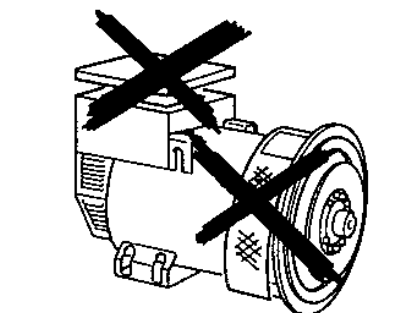
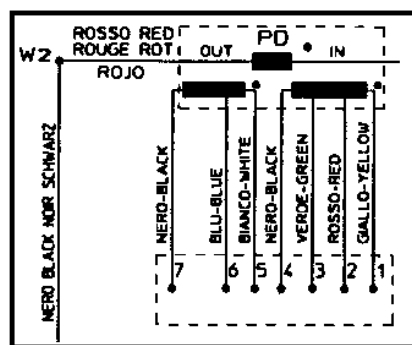
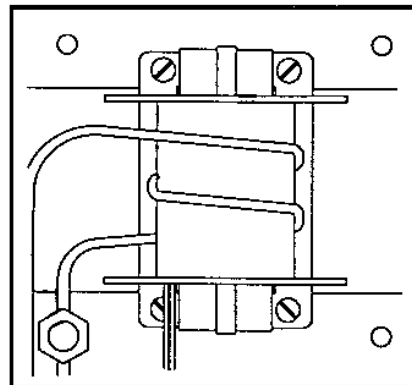
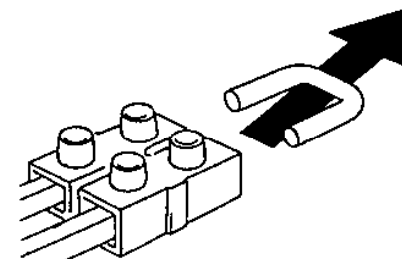
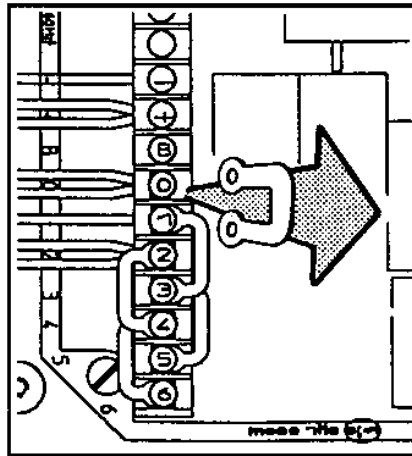
Il secondario del trasformatore di parallelo va connesso in serie al riferimento del regolatore elettronico come mostrato nelle tavole 4 e 5 pag. 61.

Per abilitare il dispositivo di parallelo rimuovere il ponticello che cortocircuita il secondario del dispositivo stesso come mostrano gli schemi sopra indicati.

### NOTA

Alla richiesta del dispositivo di parallelo e' indispensabile conoscere i dati nominali dell'alternatore su cui andra' applicato.

Dopo aver eseguito tutti i collegamenti elettrici e **solo dopo aver chiuso tutte le protezioni** e' possibile effettuare la prova di primo avviamento del sistema.



## ELECTRICAL CONNECTIONS

### PARALLEL OPERATION

Should the alternators be required to operate in parallel, it is necessary to add a paralleling device to ensure equal droop of generator output voltages.

This ensures that if the machines are operated separately, the voltage droop (4% approx.) is equal when switching from no-load to full load.

The parallel device is fitted as standard on 40-43-46 models, therefore when two or more of these units must function in parallel, it is sufficient to remove the bridge which shortcircuits the secondary winding of the parallel device.

On smaller models this device is mounted on request or it can be added (except for ECP28/4) by the client himself following the instructions of tables 14-16-18-20.

After the device has been mounted, check whether the connection has been properly made; make sure that there is a voltage drop of approximately 4% in the machines when they function individually switching at rated speed and  $\cos \varphi$  0.8 from no-load to full load operation.

### HOW TO MOUNT THE PARALLEL DEVICE

Referring to tables 14-16-19 mount parallel device as indicated.

Connect the power turns in series with phase. The numbers of turns to be wound on the transformer will be indicated in the instruction accompanying the transformer itself. The secondary winding of the parallel transformer must be connected in series to the sensing of the electronic regulator as shown on tables 4 - 5 page 61.

In order to activate the parallel device remove the bridge which shortcircuits the secondary winding of the device itself as shown in the above mentioned tables.

### NOTE

When requesting a parallel device, it is necessary to indicate the nominal data of the alternator on which the device will be applied.

After all the electric connections have been made and **only after all the protections have been put in place**, can the system be started.

## AVVIAMENTO E ARRESTO

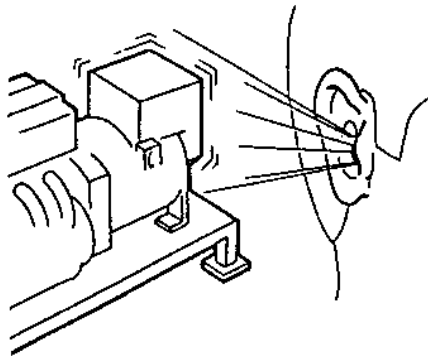
La strumentazione per l'avviamento, la conduzione e l'arresto del sistema e' a carico dell'installatore.

**LE OPERAZIONI DI AVVIAMENTO, CONDUZIONE E ARRESTO DEVONO ESSERE ESEGUITE DA PERSONALE ADEGUATAMENTE QUALIFICATO E CHE ABBA LETTO E COMPRESO LE PRESCRIZIONI DI SICUREZZA ALL'INIZIO DEL MANUALE.**

### IMPORTANTE :

Durante il primo avviamento, che deve essere eseguito a velocita' ridotta, l'installatore dovra' verificare che non si presentino rumori anomali.

In caso di rumori anomali provvedere a fermare immediatamente il sistema e intervenire per migliorare l'accoppiamento meccanico.



## STARTING AND STOPPING OPERATIONS

All the instrumentation for starting, running and stopping the system shall be provided by the installer.

**THE STARTING, RUNNING AND STOPPING OPERATIONS MUST BE CARRIED OUT BY SKILLED PERSONNEL WHO HAVE READ AND UNDERSTOOD THE SAFETY INSTRUCTIONS AT THE BEGINNING OF THIS MANUAL.**

### IMPORTANT :

When the system is set to work for the first time, which has to be done at a reduced speed, the operator shall check that no anomalous noises can be detected.

If an anomalous noise is detected, stop the system immediately and improve the mechanical coupling.

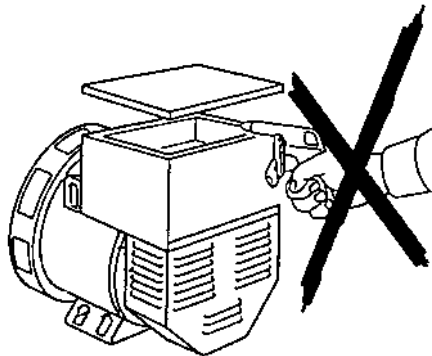
## PULIZIA E LUBRIFICAZIONE

Prima di avvicinarsi al generatore assicurarsi che sia a stato energetico zero e a temperatura ambiente; a questo punto e' possibile pulirlo esternamente con aria compressa.

**NON UTILIZZARE MAI LIQUIDI O ACQUA.**

**NON PULIRE CON ARIA COMPRESSA LE PARTI ELETTRICHE INTERNE, POICHE' POSSONO VERIFICARSI CORTOCIRCUITI O ALTRE ANOMALIE.**

Per la lubrificazione dei cuscinetti consultare la tabella 23 pag. 71.



## CLEANING AND LUBRICATION

Prior to approaching or touching the alternator, ensure that it is not live and it is at room temperature; at this stage it is possible to clean it on the outside using compressed air.

**NEVER USE LIQUIDS OR WATER.**

**DO NOT CLEAN THE INSIDE ELECTRIC COMPONENTS WITH COMPRESSED AIR, BECAUSE THIS MAY CAUSE SHORT-CIRCUITS OR OTHER ANOMALIES.**

For the lubrication of bearings, see table 23 on page 71.

## MANUTENZIONE

## MAINTENANCE

**PERICOLO  
DANGER**



**GEFAHR  
PELIGRO**

I generatori della serie ECO-ECP sono costruiti per lavorare a lungo senza manutenzione.

**PRIMA DI ESEGUIRE QUESTA OPERAZIONE LEGGERE MOLTO ATTENTAMENTE LE PRESCRIZIONI DI SICUREZZA ALL'INIZIO DI QUESTO MANUALE.**

The alternators series ECO-ECP are designed to give a long maintenance free working life.

**BEFORE PERFORMING THIS OPERATION, READ THE SAFETY REQUIREMENTS AT THE BEGINNING OF THIS MANUAL CAREFULLY.**

## MANUTENZIONE

Gli interventi di manutenzione sul generatore Mecc Alte si possono dividere in ordinari e straordinari; in ogni caso qualsiasi intervento deve essere autorizzato dal responsabile della sicurezza, a macchina ferma e isolata elettricamente dall'impianto o dalla rete. La manutenzione e la ricerca guasti deve essere eseguita da personale elettricamente/meccanicamente qualificato in quanto ogni operazione a seguito descritta presenta pericoli per il personale.

Si raccomanda inoltre che siano prese tutte le precauzioni per impedire che la macchina venga riavviata inavvertitamente durante le fasi di manutenzione e ricerca guasti.

Gli interventi di manutenzione ordinaria possono essere riassunti in :

- verifiche condizioni avvolgimenti dopo lunghi periodi di immagazzinamento o di sosta
- verifiche, ad intervalli regolari, del corretto funzionamento (assenza di rumori o vibrazioni anomale)
- verifiche meccaniche su tutti i bulloni di fissaggio ed in particolare delle connessioni elettriche
- pulizia esterna del generatore

### a) Verifiche condizioni avvolgimenti dopo lunghi periodi di immagazzinamento o di sosta.

La condizione degli avvolgimenti può essere verificata mediante la misura della resistenza di isolamento verso terra. Tale misura si esegue con uno strumento "Megger" o similari a 500V di tensione continua; è importante che prima di eseguire la prova, il regolatore di tensione (fig. a), il ponte diodi rotante (fig. b), i filtri anti disturbi radio (fig. c) e tutti gli eventuali dispositivi connessi elettricamente agli avvolgimenti da verificare, vengano scollegati.

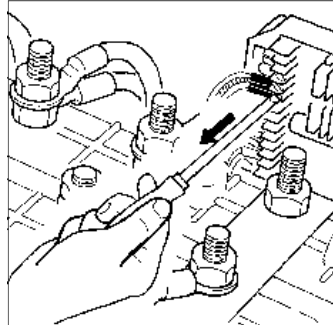
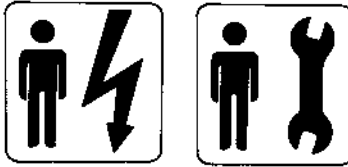


fig. a

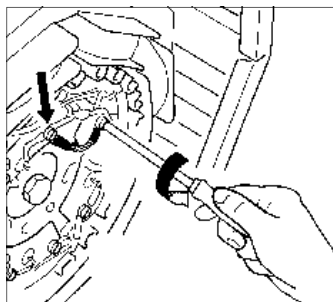


fig. b

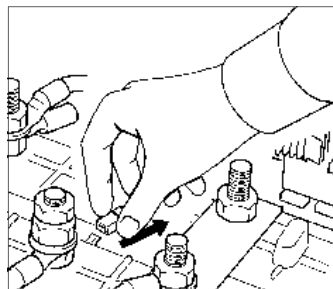


fig. c

## MAINTENANCE

Maintenance operations on Mecc Alte generators can be divided into routine and extraordinary maintenance operations; in both cases, all operations must be authorised by the safety representative and they must be carried out when the machine is turned off and insulated from the electric installation or from the power mains.

High-qualified mechanical or electrical technicians must carry out maintenance operations and any fault search since all operations described hereunder could put personnel in serious danger.

It is also highly recommended to take all the necessary precautions so as to prevent an inadvertent starting of the machine during maintenance and fault search operations.

Routine maintenance operations can be summed up as follows:

- Assessment of windings conditions after long periods of storage or inactivity
- Assessment, on a regular basis, of correct functioning (absence of anomalous noises or vibrations)
- Mechanical inspections on all fastening bolts and, in particular, on electric connections
- external cleaning of generator

### a) Assessment of windings conditions after long periods of storage or inactivity.

Measuring the insulating earth resistance can assess the condition of the windings. This measurement can be carried out with a "Megger" device, or similar, with a 500V direct-current voltage. It is very important to disconnect the voltage regulator (fig. a), the rotating diode bridge (fig. b) and the radio-interference filter (fig. c), as well as any other device connected to the windings to be checked, before carrying out the measurement.



## MANUTENZIONE

Il valore misurato di resistenza verso terra di tutti gli avvolgimenti deve essere superiore a  $1M\Omega$ .

Nell'ipotesi in cui il valore misurato sia inferiore a quanto sopra riportato, gli avvolgimenti devono essere opportunamente asciugati. Tale operazione può essere eseguita indirizzando un getto di aria calda a circa  $50-60^{\circ}\text{C}$ , negli ingressi o nelle uscite dell'aria del generatore.

In alternativa a quanto sopra, gli avvolgimenti di statore possono essere collegati elettricamente e fatti attraversare da una corrente mediante un alimentatore in continua; il valore di corrente da fare circolare negli avvolgimenti dipenderà dalle dimensioni dell'alternatore e comunque dovrà essere stabilito in accordo ai valori nominali riportati nella targhetta.

### b) Verifiche del corretto funzionamento (assenza di rumori o vibrazioni anomale).

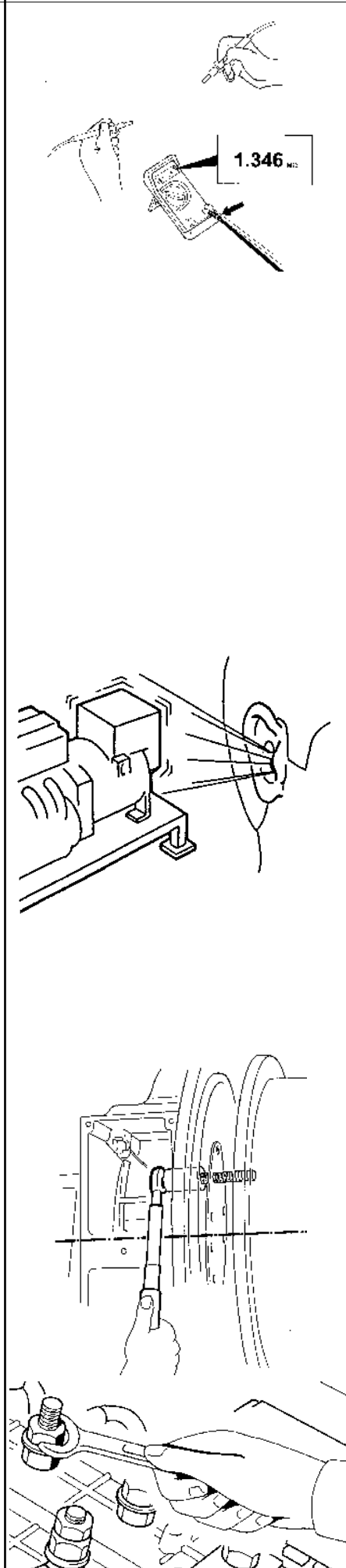
Ad intervalli regolari raccomandiamo di verificare che il generatore funzioni regolarmente senza rumori o vibrazioni anomale; tali presenze potrebbero denotare il danneggiamento dei cuscinetti.

Ricordiamo che l'alternatore a sé stante non presenta vibrazioni particolari in quanto le parti rotanti sono perfettamente bilanciate. Premesso che la bilanciatura del rotore non sia stata alterata e che i cuscinetti dell'alternatore non siano danneggiati, le cause delle vibrazioni presenti sul gruppo elettrogeno saranno da ricercare negli allineamenti degli accoppiamenti, nelle sollecitazioni del motore termico o nei supporti antivibranti.

Si raccomanda inoltre di verificare i dati funzionali che devono risultare in linea con quanto riportato nella targhetta del generatore.

### c) Verifiche meccaniche su tutti i bulloni di fissaggio ed in particolare delle connessioni elettriche.

Ad intervalli regolari raccomandiamo di verificare che tutti i bulloni di fissaggio siano adeguatamente stretti; una particolare attenzione deve essere rivolta alle connessioni elettriche, operazione che deve essere eseguita con la assoluta certezza di assenza di tensione. Nel manuale del generatore sono indicate le corrette coppie di serraggio delle varie dimensioni di bullone.



## MAINTENANCE

The figure resulting from the measurement of the windings' earth resistance must be over  $1M\Omega$ .

Should the figure be smaller than the above-mentioned one, the windings must be adequately dried up. This can be done by directing a jet of hot air of about  $50-60^{\circ}\text{C}$  into the generator's air inlets or outlets; alternatively, the stator's windings can be electrically connected and a voltage can be passed through them by means of a direct-current power supply. The amount of current in the windings depends on the generator size, even though it must be fixed according to the nominal values stated on the plate.

### b) Assessment of current functioning (absence of anomalous noises or vibrations).

We recommend users to check regularly the correct functioning of the generator, and to verify that there are no anomalous noises or vibrations; their presence might indicate damage of bearings.

May we remind you that the alternator itself has no particular vibration since the rotating parts are perfectly balanced. Provided that the rotor balancing has not been altered and that the rotor's bearings have not been damaged, vibrations in the generator set may occur due to alignments of couplings, due to stress upon the combustion engine, or to vibration mounts.

We also recommend checking of performance data which must comply with the data on the generator's plate.

### c) Mechanical checks of fastening bolts and, in particular, of electric connections.

We recommend a regular check of all fastening bolts, which must be perfectly tightened up. Special attention should be paid to all electric connections; this inspection must be carried out in the complete absence of voltage. To choose the correct tightening wrenches suitable for the different sizes of the bolts, see generator manual.

## MANUTENZIONE

### d) Pulizia esterna ed interna del generatore.

Per la pulizia esterna del generatore è possibile utilizzare dell'aria compressa; vietiamo assolutamente l'uso di qualsiasi tipo di idropulitrice e di liquidi detergenti; il grado di protezione standard del generatore è IP21 e pertanto utilizzando liquidi potrebbero verificarsi delle anomalie o anche cortocircuiti.

Gli interventi di manutenzione straordinaria possono essere riassunti in:

- manutenzione dei cuscinetti ed eventuale sostituzione
- pulizia dei filtri aria (se presenti)
- pulizia degli avvolgimenti
- sostituzione del ponte a diodi
- sostituzione dell'eccitatrice
- sostituzione del regolatore di tensione
- controllo della tensione residua

### a) Manutenzione dei cuscinetti ed eventuale sostituzione.

Tutti i cuscinetti sono ingrassati in fase di montaggio; il grasso impiegato normalmente è del tipo SKF28 o equivalenti.

Tutti i generatori ad eccezione dei tipi ECO40, ECO43N ed ECO46, montano cuscinetti di tipo stagno; per tali tipi di cuscinetti non sono necessarie manutenzioni per tutto il periodo di funzionamento (stimabile in circa 30.000 ore).

Per i generatori tipo 40, 43 e 46, ad intervalli regolari (vedere tabella cuscinetti) occorre procedere all'ingrassaggio dei cuscinetti mediante un apposito ingrassatore a pressione.

Controlli periodici durante il periodo di funzionamento, devono essere eseguiti per verificare eventuali surriscaldamenti o rumori; eccessive vibrazioni possono essere causate da una usura anomala del cuscinetto.

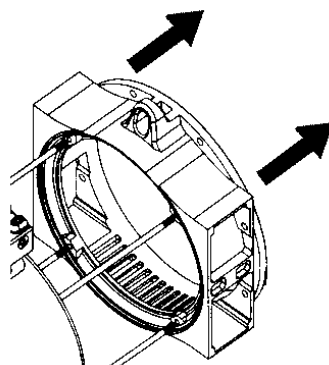
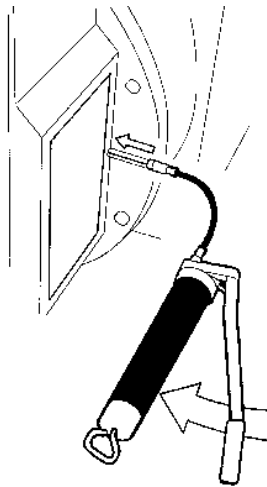
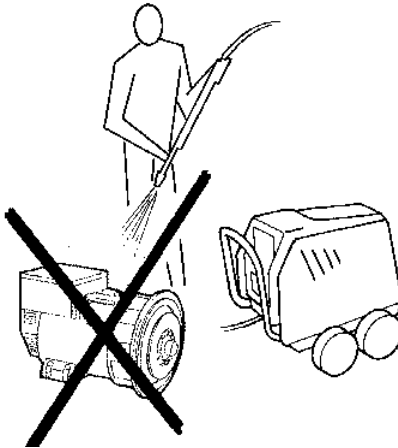
In tal caso, il cuscinetto deve essere smontato per essere esaminato ed eventualmente sostituito.

Qui di seguito viene descritta la procedura per sostituire il cuscinetto.

### Generatore tipo 28-31-32-34.

Per smontare l'alternatore della serie 28-31-32-34, attenersi alle seguenti istruzioni:

-) togliere il coperchio anteriore



## MAINTENANCE

### d) Internal and external cleaning of the generator.

For the external cleaning of the generator, you can use compressed air. The use of hydro-cleaners and detergent fluids is strictly forbidden. The standard protection degree of the generator is IP21; therefore, use of fluids could cause anomalies or even short-circuits.

Extraordinary maintenance operations can be summed up as follows:

- Maintenance and replacement (if necessary) of bearings
- Cleaning of air filters (if available)
- Cleaning of windings
- Replacement of diode bridge
- Replacement of exciter
- Replacement of voltage regulator
- Check of residual voltage

### a) Maintenance and replacement (if necessary) of bearings.

During the assembling phase, all bearings are greased with SKF28 grease, or similar.

All generators, except the ECO40, the ECO43N and ECO46 versions, are equipped with sealed bearings; for this kind of bearing, no maintenance is required for the total operating time (estimated: 30.000 hours).

Bearings of alternator versions 40, 43 and 46 must be greased on a regular basis by means of a pressure grease cup (see bearings chart).

During the operating time, checks to detect presence of either overheating, or noises, must be carried out on a regular basis. If the bearing is worn off, it can cause excessive vibrations. In such a case, the bearing must be removed, examined, and if necessary, replaced.

A description of the procedure for a bearing replacement.

### Generator versions: 28-31-32-34.

To disassemble alternator versions 28-31-32-34, follow these instructions:

-) Remove front cover

## MANUTENZIONE

-) sfilare il rotore utilizzando un mezzo di sollevamento con funi morbide ma di portata adeguata; verificare che i mezzi di sollevamento predisposti siano comunque adeguati per i pesi dei componenti da movimentare

-) per estrarre il cuscinetto deve essere utilizzato un apposito estrattore

-) per il montaggio del nuovo cuscinetto, riscaldare lo stesso con un apposito dispositivo magnetico

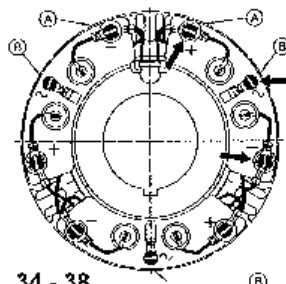
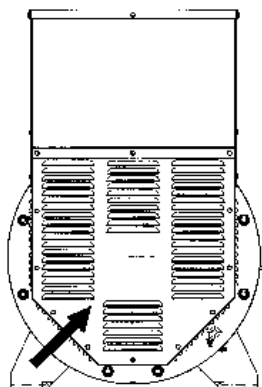
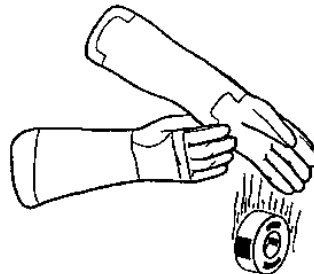
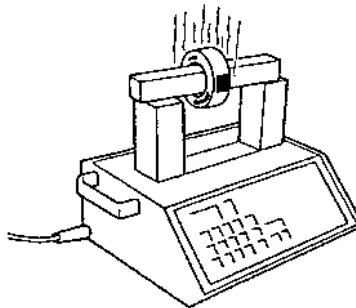
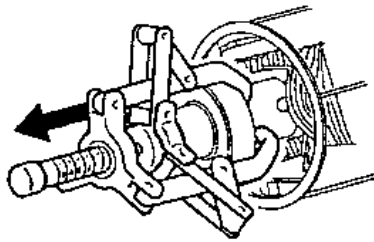
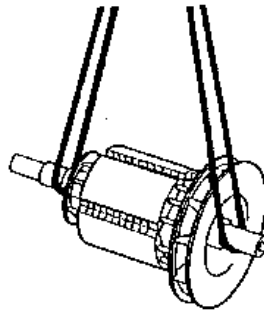
-) indossando gli appositi guanti anti-scottatura, montare il cuscinetto nella sua sede

### Generatore tipo 38-40-43-46.

Per smontare l'alternatore della serie 38-40-43-46, è necessario rimuovere l'eccitatrice, pertanto attenersi alle seguenti istruzioni :

-) togliere la chiusura posteriore

-) sconnettere i cinque fili del ponte diodi rotante "A" e "B".



34 - 38

®

## MAINTENANCE

-) Use a lifting device equipped with soft ropes of an adequate lifting capacity to extract rotor. Make sure that the lifting devices are suitable for the weight of the parts to be shifted;

-) To pull the bearing out, use a puller

-) To insert new bearing, heat it with a suitable magnetic device

-) Put on safety gloves and insert bearing into its place

### Generator versions: 38-40-43-46.

To disassemble alternator versions 38-40-43-46, remove exciter as follows:

-) Remove rear seal

-) Disconnect the five wires of the rotating diode bridge "A" and "B".

## MANUTENZIONE

-) nel caso di alternatori della serie 38, togliere le viti di bloccaggio dei settori porta diodi del ponte rotante, mentre nel caso di alternatori della serie 40-43-46 togliere il bullone di bloccaggio e tirando leggermente togliere il ponte diodi

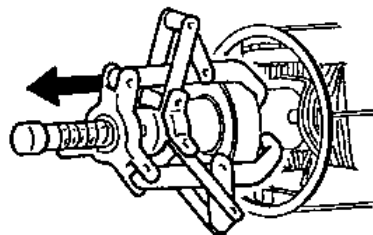
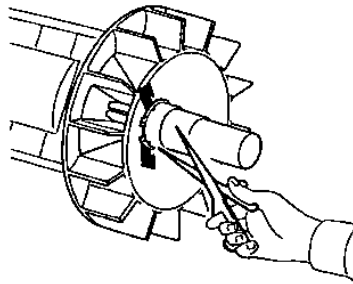
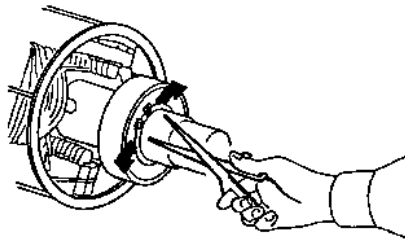
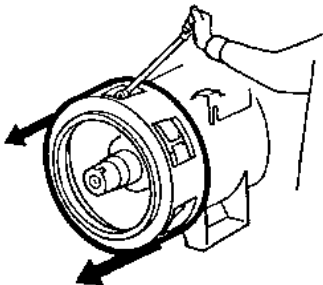
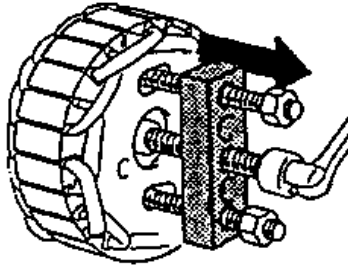
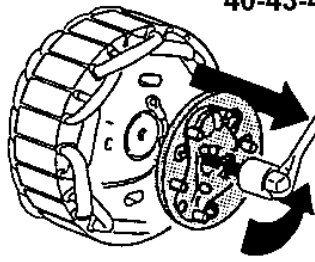
-) inserire un adeguato estrattore per sfilare il rotore eccitatrice

-) dal lato accoppiamento sfilare il rotore principale; nel caso in cui il diametro del coperchio anteriore fosse minore del diametro esterno della ventola, togliere il coperchio stesso per sfilare il rotore

-) togliere gli anelli seeger servendosi di una pinza adeguata

-) per estrarre il cuscinetto deve essere utilizzato un apposito estrattore

40-43-46



## MAINTENANCE

-) When dealing with versions 38, remove clamp screws from the diodes area of the rotating bridge, whilst when dealing with versions 40, 43 and 46, remove clamp bolt and, by pulling it gently, remove Diode Bridge

-) Insert an adequate puller to pull out exciter rotor

-) Pull out rotor from the drive-end side; should the front lead diameter be smaller than the impeller's external diameter, remove lid to pull out rotor

-) Use a pair of suitable pliers to remove seeger rings

-) Use a suitable puller to remove bearing

## MANUTENZIONE

-) per il montaggio del nuovo cuscinetto, riscaldare lo stesso con un apposito dispositivo magnetico

-) indossando gli appositi guanti anti-scottatura, montare il cuscinetto nella sua sede

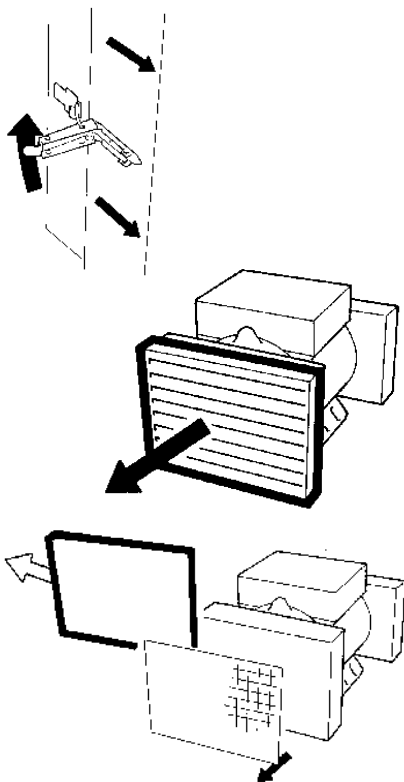
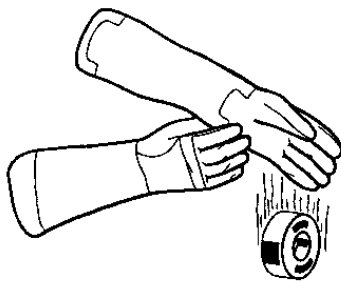
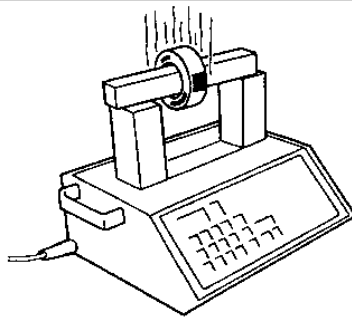
### b) Pulizia dei filtri aria (se presenti)

I filtri aria sono degli accessori che vengono montati su richiesta dei clienti; tali dispositivi devono essere periodicamente puliti in quanto al loro interno è situata una retina a maglie che deve essere mantenuta pulita per garantire l'efficienza del filtro. La periodicità di intervento sui filtri aria dipenderà dalla severità delle condizioni del luogo di installazione; in ogni caso una regolare ispezione di questi componenti permetterà di stabilire se sarà il caso di intervenire. E' importante ricordare che la pulizia di questi elementi deve essere eseguita con il generatore non in servizio, in quanto la rimozione consente l'accesso a parti che potrebbero trovarsi in tensione.

### c) Pulizia degli avvolgimenti

La durata degli avvolgimenti e quindi del generatore stesso, può essere migliorata da una corretta manutenzione e pulizia; un programma di ispezione e manutenzione dovrebbe essere stabilito tenendo presente che la frequenza di tali verifiche dipenderà dalle condizioni effettive dell'ambiente di utilizzo.

Se il generatore lavora in ambienti asciutti e puliti, un'ispezione all'anno può essere sufficiente; al contrario, se le condizioni sono più severe, è opportuno aumentare la frequenza delle ispezioni.



## MAINTENANCE

-) To insert new bearing, heat it with a suitable magnetic device

-) Put on safety gloves and insert bearing into its place

### b) Cleaning of air filters (if available)

Air filters are optional parts that are supplied upon request; these devices must be cleaned on a regular basis; inside these filters there is a mesh net that has to be kept clean in order to ensure a good performance of the filter. The time interval between each cleaning operation depends on the conditions of the installation site. A frequent inspection of these parts will establish if any cleaning is required. Make sure you turn off the generator set when performing cleaning operations of such parts as their removal entails contact with live parts.

### c) Cleaning of windings

Both windings and generator will last longer with a correct maintenance and cleaning; an inspection and a maintenance schedule should be established by keeping in mind that the frequency of these inspections depends on the conditions of the site where the generator is being used.

If the generator is used in a dry and clean environment, an inspection a year is enough; in case of severe conditions, inspections must be carried out more frequently.

## MANUTENZIONE

In ogni caso, indipendentemente dal programma stabilito, raccomandiamo di procedere a tale manutenzione nelle seguenti ipotesi :

- ) presenza di ruggine
- ) segni evidenti di corrosione
- ) deterioramento dell'isolamento
- ) presenza di polvere sulla superficie degli avvolgimenti

Gli avvolgimenti possono essere puliti utilizzando degli appositi solventi come ad esempio "l'acqua ragia" o il "solvesso"; tali sostanze, avendo un alto grado di evaporazione, permettono una pulizia adeguata senza intaccare il grado di isolamento degli avvolgimenti.

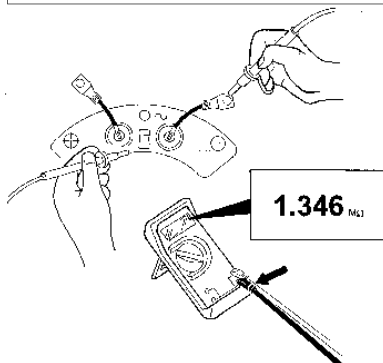
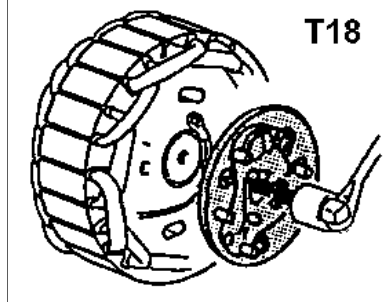
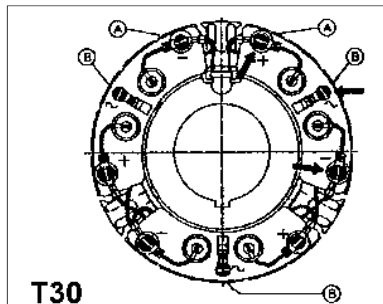
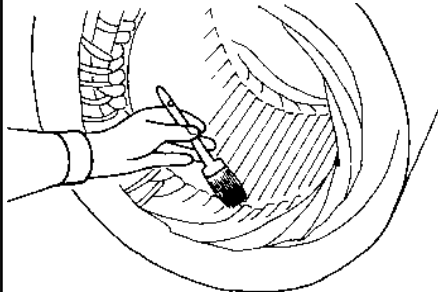
A pulizia ultimata, raccomandiamo di controllare che non vi siano segni di sovrariscaldamenti ed eventuali tracce di carbonizzazioni.

Inoltre si consiglia di asciugare gli avvolgimenti a circa 60-80°C e se si notano degradamenti della vernice degli avvolgimenti, procedere ad una ulteriore verniciatura degli stessi.

### d) Sostituzione del ponte a diodi

A seconda del tipo di alternatore, il ponte a diodi può essere composto o da tre settori separati su ognuno dei quali sono fissati due diodi (T30) oppure da un blocco unico circolare (T18) con sei diodi. La prima configurazione (T30) viene installata nei generatori tipo 34-38 mentre la seconda (T18) viene installata nei generatori tipo 40-43-46.

Ciascun singolo diodo può essere verificato molto facilmente con un multimetro; è sufficiente scollegare il cavetto del diodo in esame e controllarne la resistenza nei due sensi. Un diodo che funziona correttamente indicherà una resistenza molto alta in un senso e molto bassa nel senso opposto. Un diodo guasto avrà o una resistenza molto bassa o una resistenza infinita in entrambi i sensi. Una volta sostituito il settore o l'intero ponte vi raccomandiamo di serrare le relative viti con le corrette coppie di fissaggio e di rispettare le polarità secondo gli schemi e le tabelle forniti da Mecc Alte.



## MAINTENANCE

However, we recommend that a check should be done, regardless of the schedules, in the following cases:

- ) in case of rust
- ) in case of corrosion
- ) when the insulation is damaged
- ) when there is dust on the surface of the windings

To clean windings, use solvents like oil of turpentine or "Solvesso" solvent. Cleaning with such substances, which contain a high evaporation level, will not damage the isolation level of the windings. When cleaning is over, please look out for any overheating or carbonisation signs.

We also recommend drying up of windings at 60-80°C and if you notice that the varnish of windings is not in good shape, then have them varnished again.

### d) Replacement of diode bridge

The diode bridge varies according to the model of the generator. It can have three separate sectors with two diodes fixed on each sector (T30), or one circular body (T18) with 6 diodes. The first type (T30) is used in the alternator models 34-38, whereas the second one (T18) is used in the 40,43 and 46 versions.

Diodes can be easily inspected with a multimeter: simply disconnect the wire of the particular diode and check its resistance on both directions. A perfectly functioning diode will show a very high resistance in one direction and a very low resistance in the opposite direction. A faulty diode will show either a very low resistance, or an infinite resistance in both directions. Once the whole sector, or the whole bridge, is replaced, remember to tighten the screws with a suitable tightening wrench and to strictly comply with the polarities and the diagrams indicated by Mecc Alte.

## MANUTENZIONE

### Generatore tipo 28-31-32.

#### Procedura di verifica per diodi rotore eccitatrice.

Strumentazione necessaria :

- batteria 12V
- lampada 12V-21W (o in alternativa resistenza 6.8Ω-30W)
- voltmetro (Ex. Multimetro su scala VOLT d.c.)

**Importante: Prima di eseguire le operazioni seguenti sconnettere i due cavi di collegamento del rotore principale al ponte diodi (+ e -).**

#### TEST DEI DIODI SUL “NEGATIVO”

- Connettere gli strumenti come indicato in figura A (tabella 26 pag. 74)
- Fissare il cavo connesso alla lampada al morsetto negativo del ponte come indicato in figura A (tabella 26 pag. 74)
- Connettere il terminale “Probe” ai punti A1, A2 ed A3 in sequenza per verificare rispettivamente i diodi 1, 2 e 3. Verificare la lettura sul voltmetro in relazione a quanto indicato in tabella (tabella 26 pag. 74).

#### TEST DEI DIODI SUL “POSITIVO”

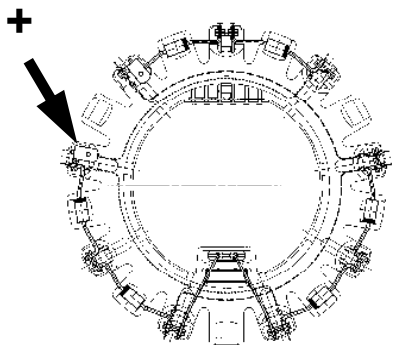
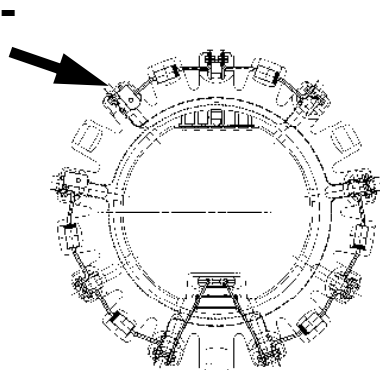
- Connettere gli strumenti come indicato in figura B (tabella 26 pag. 74)
- Fissare il cavo connesso al negativo della batteria al morsetto positivo del ponte come indicato in figura B (tabella 26 pag. 74)
- Connettere il terminale “Probe” ai punti A4, A5 e A6 in sequenza per verificare rispettivamente i diodi 4, 5 e 6; verificare la lettura sul voltmetro in relazione a quanto indicato in tabella (tabella 26 pag. 74).

#### ISTRUZIONI PER LA SOSTITUZIONE DEL DIODO.

Qualora i valori riscontrati indichino un diodo danneggiato, occorrerà procedere alla sostituzione del componente.

A tale scopo si raccomanda di non estrarre i reofori dalle rispettive sedi ma di tagliarli in prossimità del corpo del componente; inserire il nuovo componente rispettando le polarità e saldare a stagno accuratamente i reofori con gli spezzoni rimasti nelle sedi.

**IMPORTANTE  
IMPORTANT  
WICHTIG**



## MAINTENANCE

### Generator versions: 28-31-32.

#### Procedure to check the diodes of the exciter rotor.

Necessary equipment :

- 12V battery
- 12V-21W lamp (or alternatively 6.8Ω-30W Resistance)
- Voltmeter (for instance, multimeter on scale VOLT d.c.)

**Warning: before performing the following actions, it is necessary to disconnect the 2 cables connecting the main rotor to the diode bridge (+and-)**

#### TEST OF THE DIODES ON THE “NEGATIVE”

- Connect the equipment, as it is pointed out in the picture A (table 26 page 74)
- Fix the cable connected to the lamp to the negative terminal of the bridge, as it is pointed out in the picture A (table 26 page 74)
- Connect the terminal “Probe” to the point A1 (it is checked the diode 1), then to the point A2 (it is checked the diode 2) and finally to the point A3 (it is checked the diode 3); check the readings on the voltmeter in relation with what is reported on the table (table 26 page 74).

#### TEST OF THE DIODES ON THE “POSITIVE”

- Connect the equipment, as it is pointed out in the picture B (table 26 page 74)
- Fix the cable connected to the negative terminal of the battery to the positive terminal of the bridge, as it is pointed out in the picture B (table 26 page 74)
- Connect the terminal “Probe” to the point A4 (it is checked the diode 4), then to the point A5 (it is checked the diode 5) and finally to the point A6 (it is checked the diode 6); check the readings on the voltmeter in relation with what is reported on the table (table 26 page 74).

#### INSTRUCTIONS TO REPLACE THE DIODE

When the values measured point out a diode damaged, it is necessary to replace the component.

For this purpose it is recommended to not pull the rheophores out from their locations, but to cut them near to the body of the component; then fit in the new component respecting the polarity and soft-solder accurately the rheophores with the pieces remained in their locations.

## MANUTENZIONE

### e) Sostituzione dell'eccitatrice Generatore tipo 28-31-32-34.

Per smontare l'eccitatrice dell'alternatore della serie 28-31-32-34, attenersi alle seguenti istruzioni :

-) togliere il coperchio anteriore

-) sfilare il rotore utilizzando un mezzo di sollevamento con funi morbide ma di portata adeguata; verificare che i mezzi di sollevamento predisposti siano comunque adeguati per i pesi dei componenti da movimentare

-) per estrarre il cuscinetto deve essere utilizzato un apposito estrattore

-) per smontare il rotore eccitatrice, inserire un adeguato estrattore facilmente costruibile o reperibile presso la nostra sede.

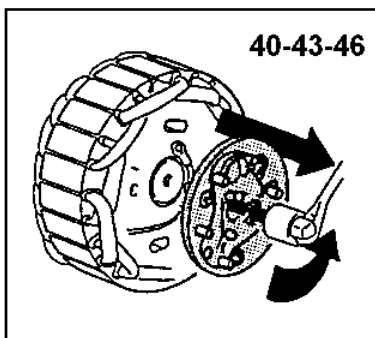
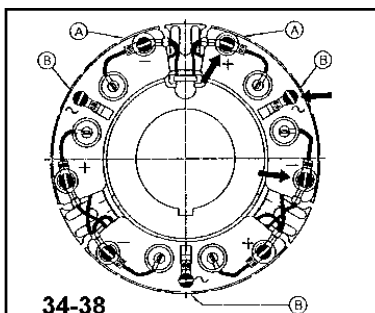
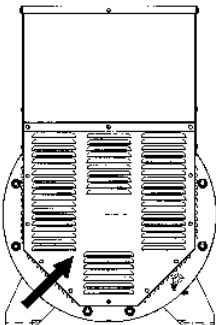
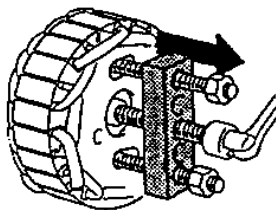
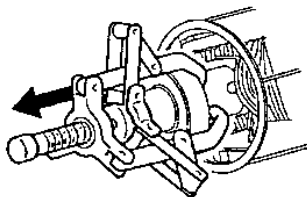
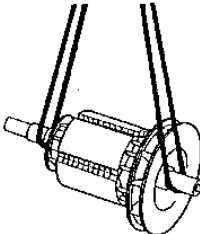
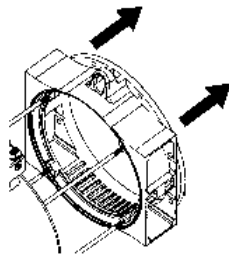
### Generatore tipo 38-40-43-46.

Per smontare l'eccitatrice dell'alternatore della serie 38-40-43-46, non è necessario smontare l'intero alternatore, pertanto attenersi alle seguenti istruzioni:

-) togliere la chiusura posteriore

-) sconnettere i cinque fili del ponte diodi rotante

-) nel caso di alternatori della serie 38, togliere le viti di bloccaggio dei settori mentre nel caso di alternatori della serie 40-43-46 togliere il bullone di bloccaggio e tirando leggermente togliere il ponte diodi



## MAINTENANCE

### e) Replacement of exciter Generator versions: 28-31-32-34

Follow these instructions to remove exciter of the 28-31-32-34 versions:

-) remove front lead

-) Use a lifting device equipped with soft ropes of an adequate lifting capacity to extract rotor. Make sure that the lifting devices are suitable for the weight of the parts to be shifted

-) Use a puller to pull out bearing

-) To remove the exciter rotor, use a suitable puller, which can be easily constructed or forwarded by the manufacturer upon request.

### Generator versions: 38-40-43-46.

To remove exciter of the 38-40-43-46 versions, there is no need to disassemble the entire generator, however, you must follow the instructions below:

-) Remove rear seal

-) Disconnect the five wires of the rotating diode bridge

-) When dealing with the 38 versions, remove clamp screws from sectors; whilst when dealing with the 40-43-46 versions, remove clamp bolt and, by pulling it gently, pull out diode bridge



## MANUTENZIONE

-) per smontare il rotore eccitatrice, inserire un adeguato estrattore facilmente costruibile o reperibile presso la nostra sede

### f) Sostituzione del regolatore di tensione

I generatori sono provvisti di regolatore automatico di tensione; a seconda del tipo di alternatore, i regolatori elettronici possono essere di due tipi : SR7/2-G, UVR6/1-F.

L'SR7/2-G è montato di serie nelle tipologie 28-31-32-34, l'UVR6/1-F è montato nelle tipologie 38-40-43-46.

Nel caso in cui si riscontrassero dei comportamenti anomali vi preghiamo di consultare il manuale specifico o di contattare il nostro servizio di assistenza tecnica.

Una volta stabilito che il regolatore deve essere sostituito, procedere come segue :

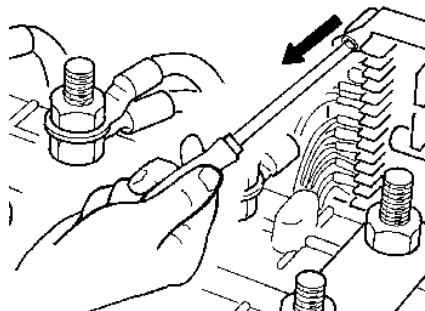
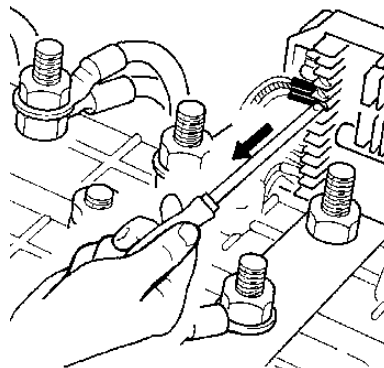
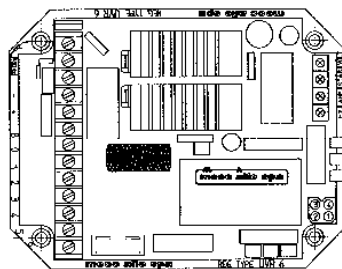
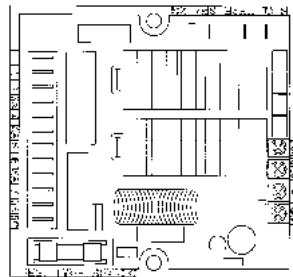
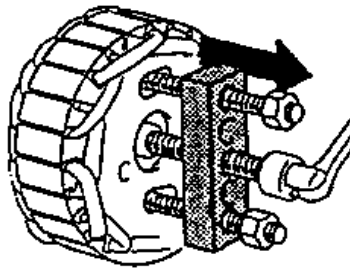
-) scollegare tutti i cavetti di collegamento in morsettieria

-) svitare le 2/4 viti di bloccaggio del regolatore

-) collocare il nuovo regolatore nella posizione prevista

-) fissare il nuovo regolatore con le viti precedentemente raccolte

-) ricollegare tutti i cavi alla morsettieria del regolatore, servendosi in caso di bisogno, degli schemi forniti da Mecc Alte.



## MAINTENANCE

-) To insert exciter rotor, use a suitable puller, which can be easily constructed or forwarded by the manufacturer upon request.

### f) Replacement of voltage regulator

All generators are equipped with an automatic voltage regulator; depending on the alternator model, electronic regulators can be of two different types: SR7/2-G, UVR6/1-F.

The SR7/2-G is an integral part of the 28-31-32-34 generators; the UVR6/1-F is supplied with the 38-40-43 and 46 versions. Should some anomalous functioning be detected, please consult our technical manual or contact our technical assistance service.

Once it has been ascertained that the regulator needs to be replaced, proceed as follows:

-) Disconnect all terminal board wires

-) Unscrew the 2/4 clamp screws of the regulator

-) Set new regulator in the usual position

-) Tighten the new regulator with the previously unscrewed screws

-) Connect again all wires to the terminal board of the regulator. Follow diagrams supplied by Mecc Alte, if necessary.

## MANUTENZIONE

### g) Controllo della tensione residua

La seguente procedura è applicabile ai generatori muniti di regolatore elettronico e deve essere applicata nell'eventualità che il generatore non si autoecciti (in tale condizione, pur ruotando alla velocità nominale, non è presente tensione nella morsettiera principale del generatore):

-) con il generatore fermo, rimuovere il coperchio di chiusura della scatola morsetti

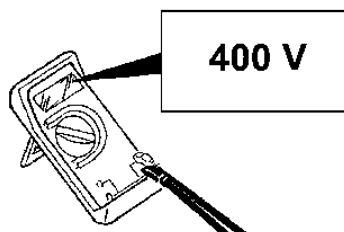
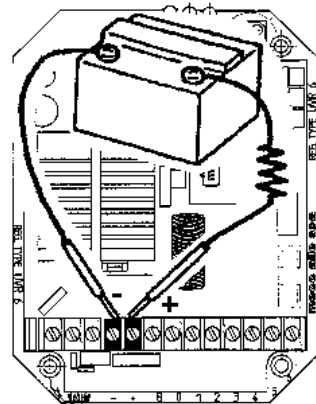
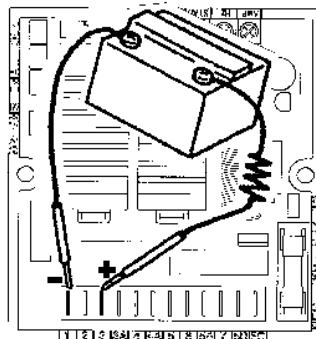
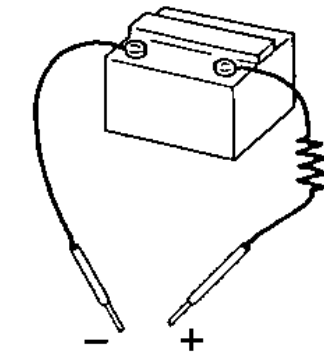
-) predisporre due terminali collegati ad una batteria da 12 Vdc con in serie una resistenza da 30  $\Omega$

-) individuare con l'ausilio degli schemi elettrici forniti da Mecc Alte, i morsetti "+" e "-" del regolatore elettronico

-) avviare il generatore

-) applicare per un istante i due terminali ai morsetti precedentemente individuati facendo molta attenzione nel rispettare le polarità (morsetto "+" del regolatore con morsetto "+" della batteria, morsetto "-" del regolatore con morsetto "-" della batteria)

-) verificare con un voltmetro o con la relativa strumentazione da quadro, che il generatore generi la tensione nominale prevista nella targhetta.



## MAINTENANCE

### g) Check of residual voltage

For generators equipped with an electronic regulator, you must perform the following procedure. This must be applied to ensure that the generator is not over-excited (in such a condition, though it still rotates at nominal velocity, no voltage is present in the generator's main terminal board):

-) When the generator is switched off, remove lid from the terminals case

-) Connect two connecting wires to a 12 Vdc battery with a 30 $\Omega$  in-series resistance

-) Follow the electrical diagrams supplied by Mecc Alte, to locate positive and negative terminals of electronic regulator

-) Start generator

-) Connect, only for a moment, the two connecting wires to the previously located terminals. Make sure to match polarities (positive terminal of regulator with positive terminal of battery, negative terminal of regulator with negative terminal of battery)

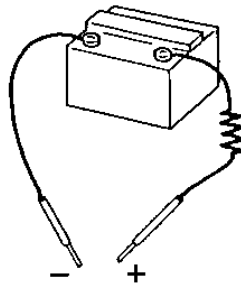
-) Use a voltmeter or the right instrument panel, to check whether the generator is producing the nominal voltage indicated on the plate.

## ANOMALIE E RIMEDI

## DEFECTS AND REMEDIES

### IL GENERATORE NON SI ECCITA

- Controllare il fusibile.
- Aumentare la velocità del 15%.
- Applicare per un istante al "+" e al "-" del regolatore elettronico, una tensione di 12 V di una batteria con in serie una resistenza di 30 Ω rispettando le polarità.



### ALTERNATOR DOES NOT EXCITE

- Substitute fuse.
- Increase speed by 15%.
- For an instant apply on "+" and "-" of the electronic regulator a 12 V battery voltage with a 30 Ω resistor in series, respecting the polarities.

### DOPO ECCITATO SI DISECCITA

- Controllare i cavi di collegamento servendosi dei disegni allegati.

### AFTER BEING EXCITED ALTERNATOR DOES NOT EXCITE

- Check connection cables as per attached drawings.

### A VUOTO TENSIONE BASSA

- Ritarare la tensione.
- Controllare il numero di giri.
- Controllare gli avvolgimenti.

### LOW VOLTAGE AT NO LOAD

- Reset voltage potentiometer.
- Check speed.
- Check windings.

### A VUOTO TENSIONE TROPPO ALTA

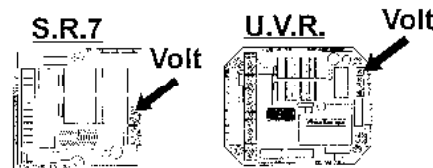
- Ritarare la tensione.
- Sostituire il regolatore.

### HIGH VOLTAGE AT NO LOAD

- Reset voltage potentiometer.
- Substitute regulator.

### A CARICO TENSIONE INFERIORE ALLA NOMINALE

- Ritarare la tensione.
- Corrente troppo alta,  $\cos \varphi$  inferiore a 0.8, velocità inferiore del 4% della nominale.
- Sostituire il regolatore.
- Controllare i diodi scollegando i cavi.



### AT LOAD CONDITIONS, VOLTAGE LOWER THAN RATED VALUE

- Reset voltage potentiometer.
- Current too high, power factor lower than 0.8, speed lower than 4% of rated speed.
- Substitute regulator.
- Check diodes, disconnect cables.

### A CARICO TENSIONE SUPERIORE ALLA NOMINALE

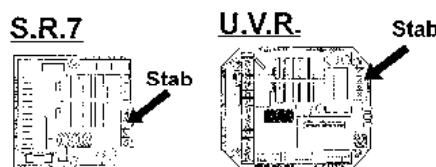
- Ritarare la tensione.
- Sostituire il regolatore.

### AT LOAD CONDITIONS, VOLTAGE HIGHER THAN RATED VOLTAGE

- Reset voltage potentiometer.
- Substitute regulator.

### TENSIONE INSTABILE

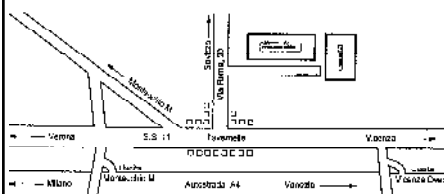
- Controllare uniformità di rotazione.
- Regolare la stabilità del regolatore agendo sul potenziometro "STAB".



### UNSTABLE VOLTAGE

- Check uniformity of rotation.
- Regulate stability of regulator by acting on "STAB." potentiometer.

Per qualsiasi altra anomalia rivolgersi al rivenditore, ai centri di assistenza autorizzati o direttamente alla Mecc Alte.



For any other defect, please contact the seller, the after-sales service or Mecc Alte directly.

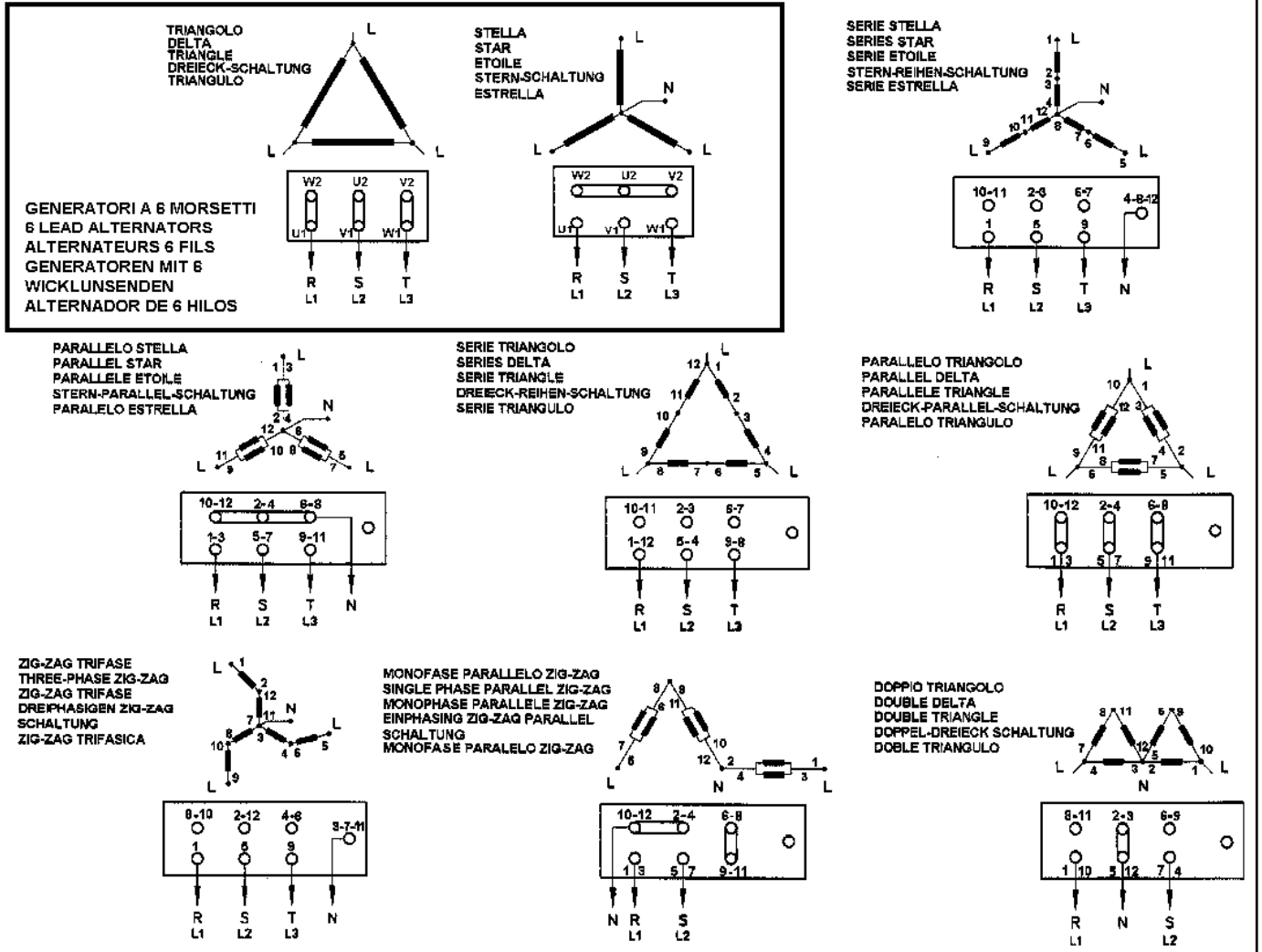


**GENERATORI 4 POLI - 4 POLE GENERATORS - ALTERNATEURS 4 POLES**  
**GENERATOREN 4 POLIG - GENERADORES 4 POLOS**

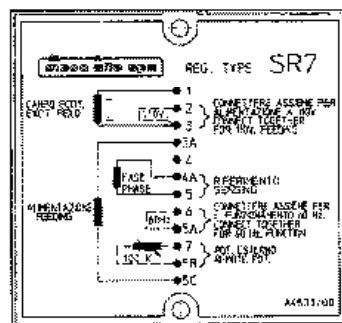
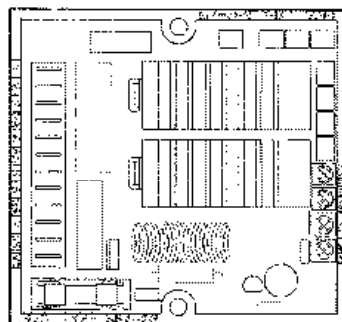
TIPO TYPE TYP	V / Hz	GENERATORE GENERATOR			ECCITATRICE EXCITER	
		PARTIE PUISSANCE GENERADORES			EXCITATRICE ERREGER	
		STATORE STATOR 1-2	ROTORE ROTOR	AVVOLGIMENTO AUSILIARIO AUXILIARY WINDING HILFS WICKLUNG BOBINADO AUXILIAR	STATORE STATOR	ROTORE FASE-FASE ROTOR PHASE-PHASE
		$\Omega$	$\Omega$	$\Omega$	$\Omega$	$\Omega$
ECP 28 1VS	115/200/230/400-50	0,951	0,911	3,753	10,60	0,417
ECP 28 2VS	115/200/230/400-50	0,582	1,032	3,225	10,60	0,417
ECP 28 0S	115/200/230/400-50	0,430	1,13	2,957	10,60	0,417
ECP 28 S	115/200/230/400-50	0,283	1,260	4,060	10,60	0,417
ECP 28 1L	115/200/230/400-50	0,198	1,396	2,250	10,60	0,417
ECP 28 2L	115/200/230/400-50	0,128	1,670	2,150	10,60	0,417
ECP 28 VL	115/200/230/400-50	0,106	1,860	2,170	10,60	0,417
ECO 32 2S	115/200/230/400-50	0,097	2,010	1,098	10,60	0,417
ECO 32 3S	115/200/230/400-50	0,078	2,163	0,929	10,60	0,417
ECO 32 1L	115/200/230/400-50	0,061	2,473	0,993	11,35	0,442
ECO 32 2L	115/200/230/400-50	0,041	2,861	0,909	11,35	0,442
ECO 32 3L	115/200/230/400-50	0,035	3,171	0,790	11,35	0,442
ECP 34 1.5VS	115/200/230/400-50	0,045	2,248	1,04	15,28	0,410
ECP 34 1S	115/200/230/400-50	0,030	2,477	1,43	15,28	0,410
ECP 34 2S	115/200/230/400-50	0,020	2,951	1,35	15,28	0,410
ECP 34 1L	115/200/230/400-50	0,018	3,165	1,18	15,28	0,410
ECP 34 2L	115/200/230/400-50	0,015	3,577	1,05	15,28	0,410
ECP 34 3L	115/200/230/400-50	0,015	4,35	0,855	15,28	0,410
ECO 38 1SN	115/200/230/400-50	0,0130	3,905	0,854	15,28	0,685
ECO 38 2SN	115/200/230/400-50	0,0105	4,133	0,845	15,28	0,685
ECO 38 3SN	115/200/230/400-50	0,0085	4,449	0,778	15,28	0,685
ECO 38 1LN	115/200/230/400-50	0,0065	4,887	0,796	15,28	0,685
ECO 38 2LN	115/200/230/400-50	0,0055	5,604	0,751	15,28	0,685
ECO 38 3LN	115/200/230/400-50	0,0042	6,780	0,700	15,28	0,685
ECO 40 1S	115/200/230/400-50	0,0048	4,488	0,558	8,85	0,317
ECO 40 2S	115/200/230/400-50	0,0074	4,881	0,521	8,85	0,317
ECO 40 3S	230/400/460/800-50	0,0106	5,176	0,540	8,85	0,317
ECO 40 1L	115/200/230/400-50	0,0055	6,025	0,476	8,85	0,317
ECO 40 1.5L	230/400/460/800-50	0,0087	1,376	0,550	8,85	0,050
ECO 40 2L	115/200/230/400-50	0,0042	1,500	0,481	8,85	0,050
ECO 40 VL	230/400/460/800-50	0,0104	1,592	0,300	8,85	0,050
ECO 43 1SN	230/400/460/800-50	0,0109	2,100	0,440	10,63	0,130
ECO 43 2SN	230/400/460/800-50	0,0086	2,300	0,413	10,63	0,130
ECO 43 1LN	230/400/460/800-50	0,0078	2,500	0,713	10,63	0,130
ECO 43 2LN	230/400/460/800-50	0,0058	2,800	0,677	10,63	0,130
ECO 43 VL	230/400/460/800-50	0,0046	2,886	0,40	10,63	0,130
ECO 46 1S	230/400/460/800-50	0,0057	3,050	0,414	12,90	0,120
ECO 46 1.5S	230/400/460/800-50	0,0034	3,319	0,35	12,90	0,120
ECO 46 2S	230/400/460/800-50	0,0039	3,500	0,330	12,90	0,120
ECO 46 1L	230/400/460/800-50	0,0032	3,977	0,360	12,90	0,120
ECO 46 1.5L	230/400/460/800-50	0,0027	4,27	0,40	12,90	0,120
ECO 46 2L	230/400/460/800-50	0,0024	4,500	0,390	12,90	0,120

**GENERATORI 2 POLI - 2 POLE GENERATORS - ALTERNATEURS 2 POLES**  
**GENERATOREN 2 POLIG - GENERADORES 2 POLOS**

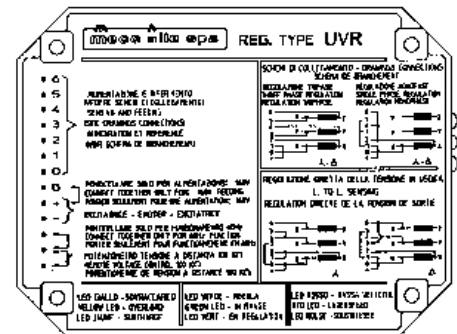
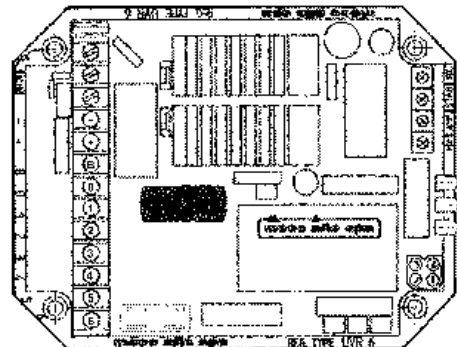
ECP 28 1L	115/200/230/400-50	0,1480	4,877	2,706	10,60	0,417
ECP 28 2L	115/200/230/400-50	0,0863	5,523	1,173	10,60	0,417
ECP 28 3L	115/200/230/400-50	0,0860	5,848	1,087	10,60	0,417
ECP 28 VL	115/200/230/400-50	0,056	6,500	0,690	10,60	0,417
ECO 31 2SN	115/200/230/400-50	0,110	3,650	1,553	10,60	0,417
ECO 31 3SN	115/200/230/400-50	0,046	4,071	1,403	10,60	0,417
ECO 31 1LN	115/200/230/400-50	0,043	4,301	1,358	11,35	0,475
ECO 31 2LN	115/200/230/400-50	0,034	4,680	1,141	11,35	0,475

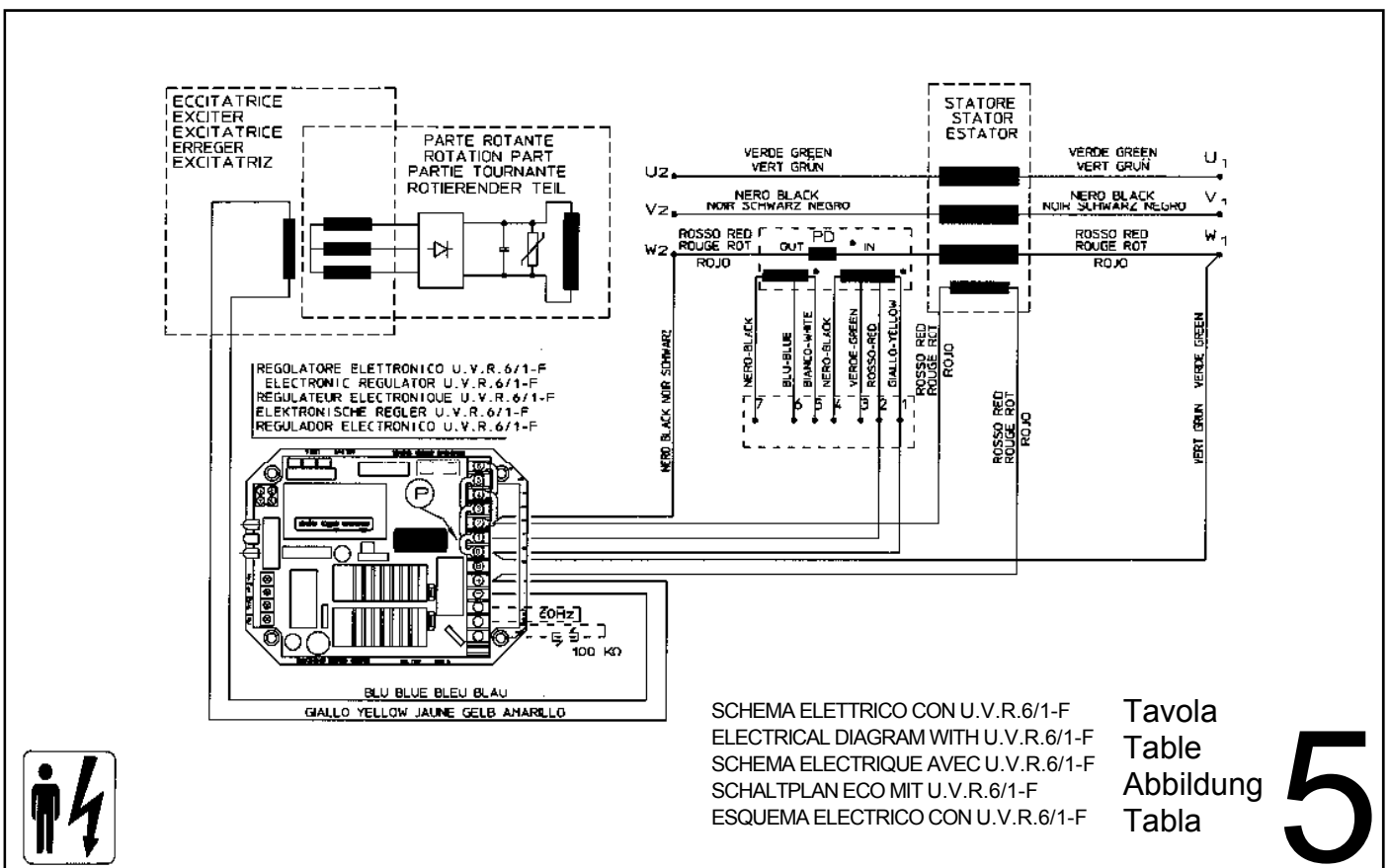
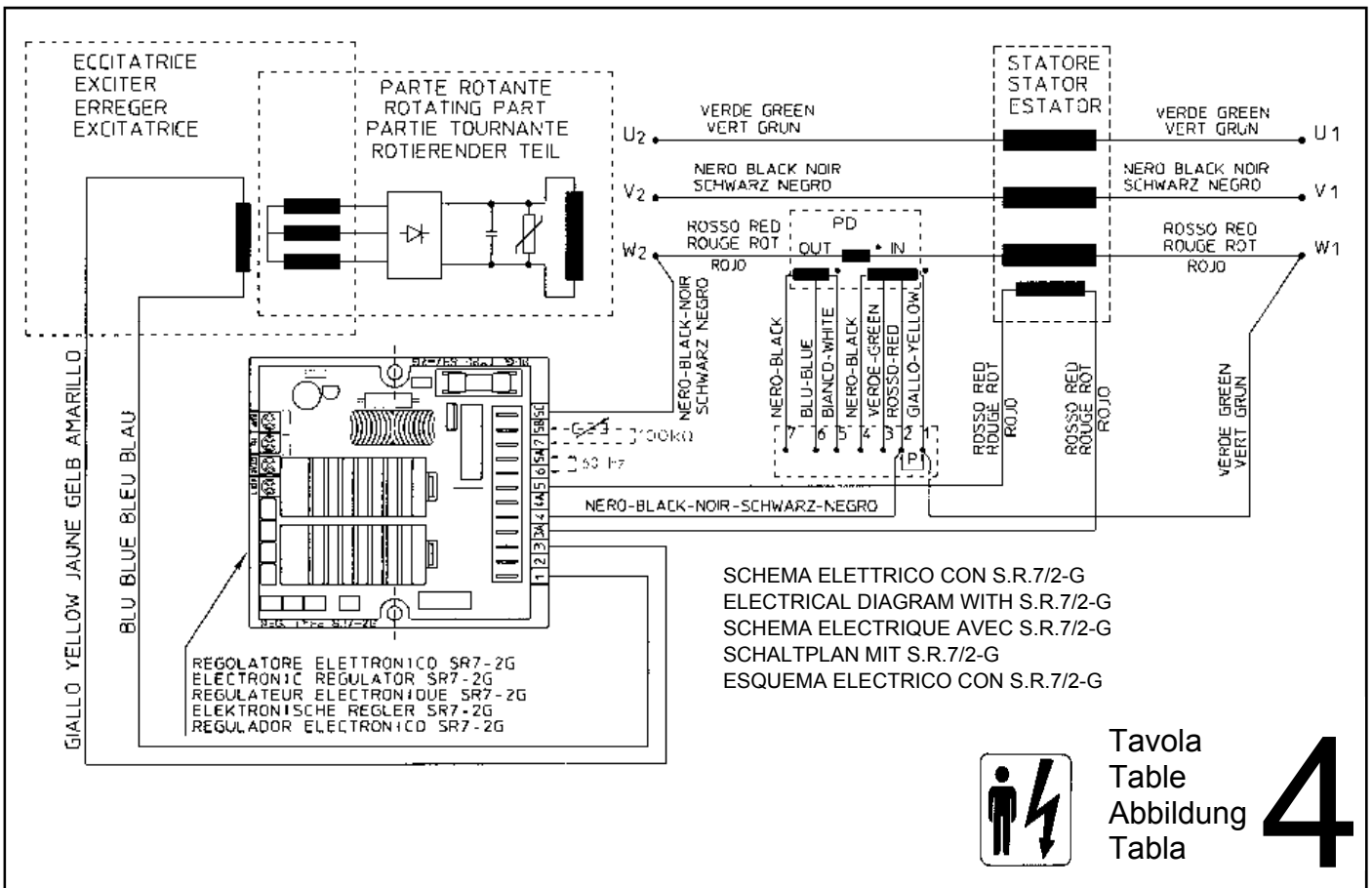


### S.R.7/2-G



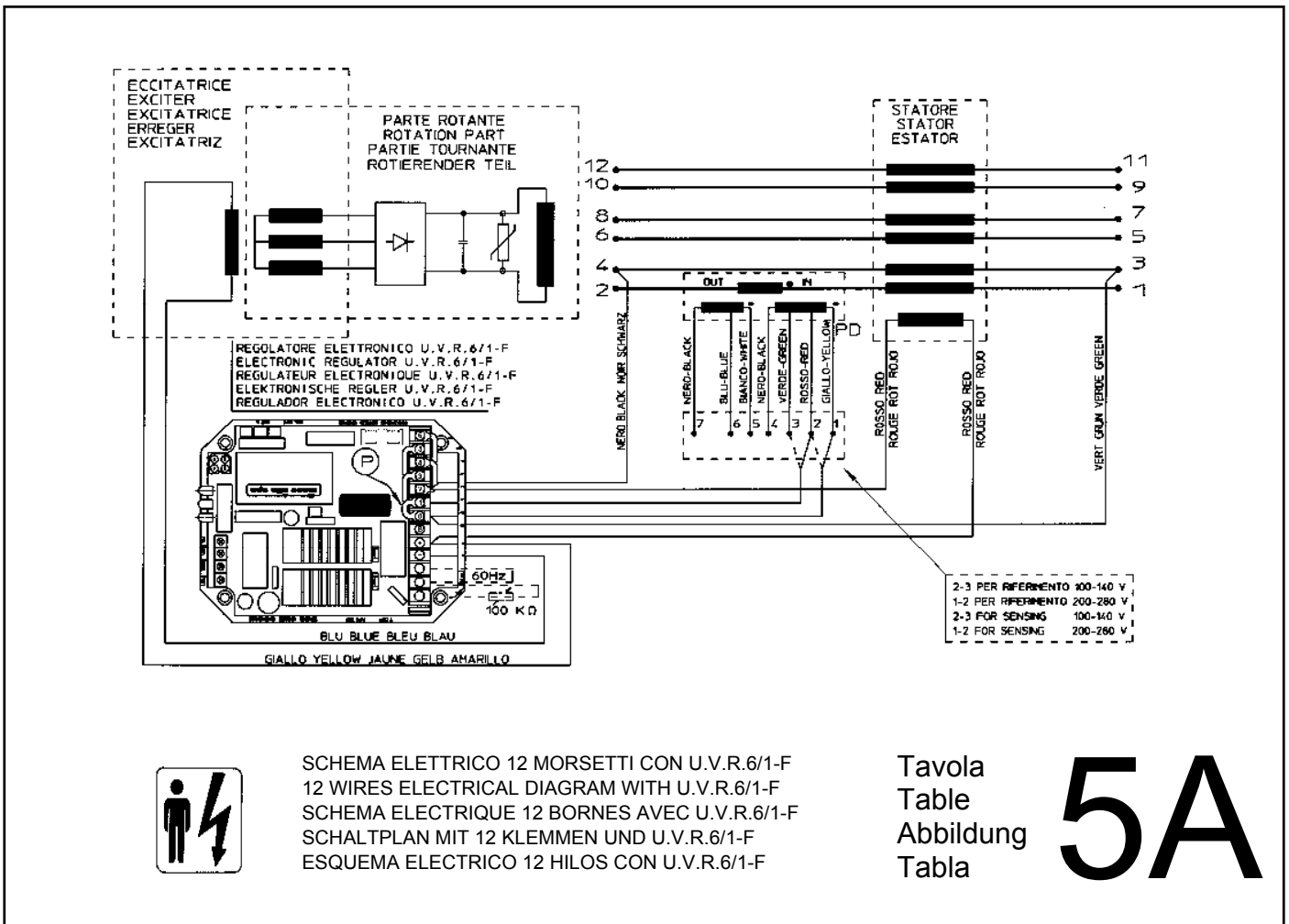
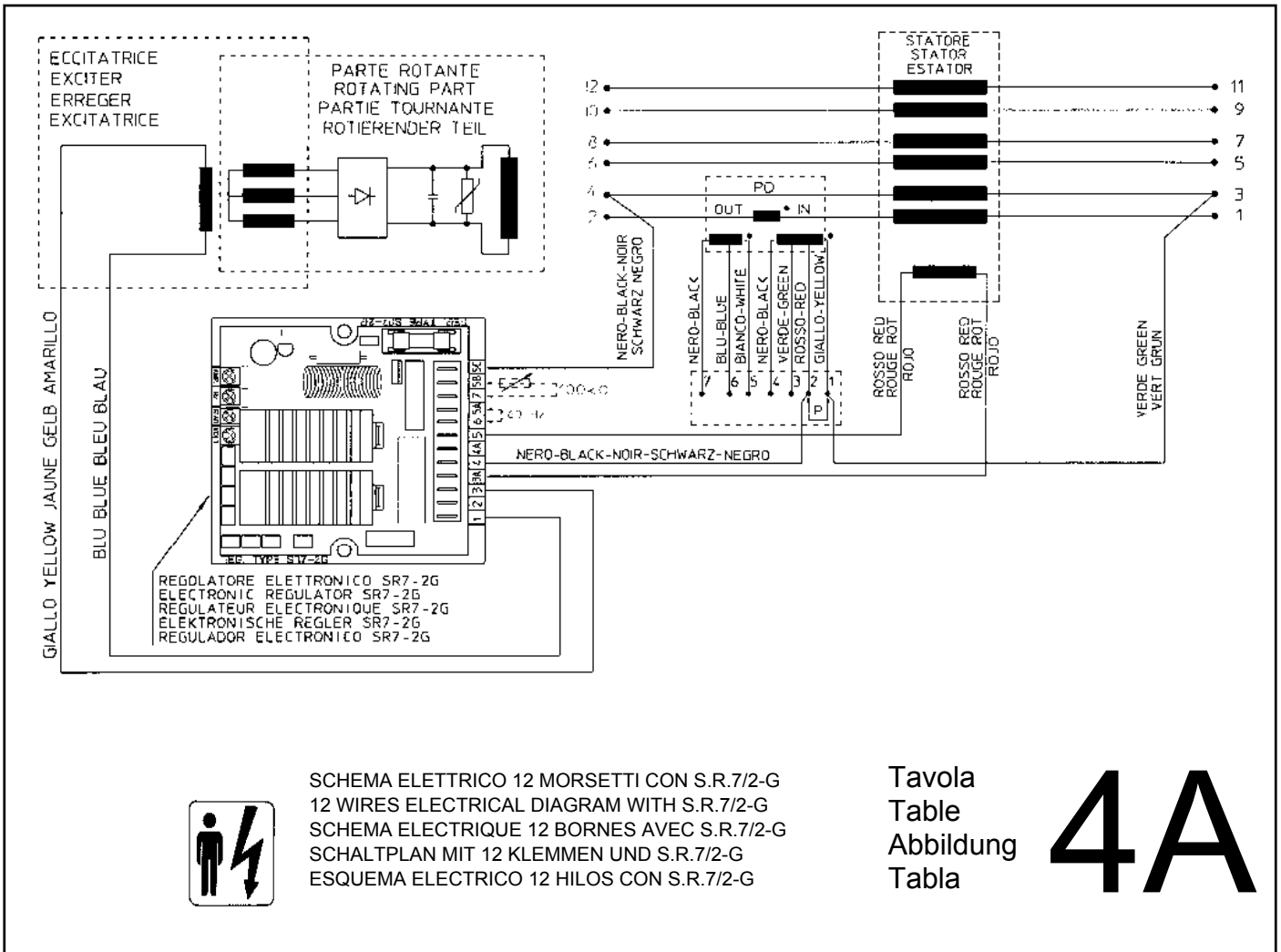
### U.V.R.6/1-F



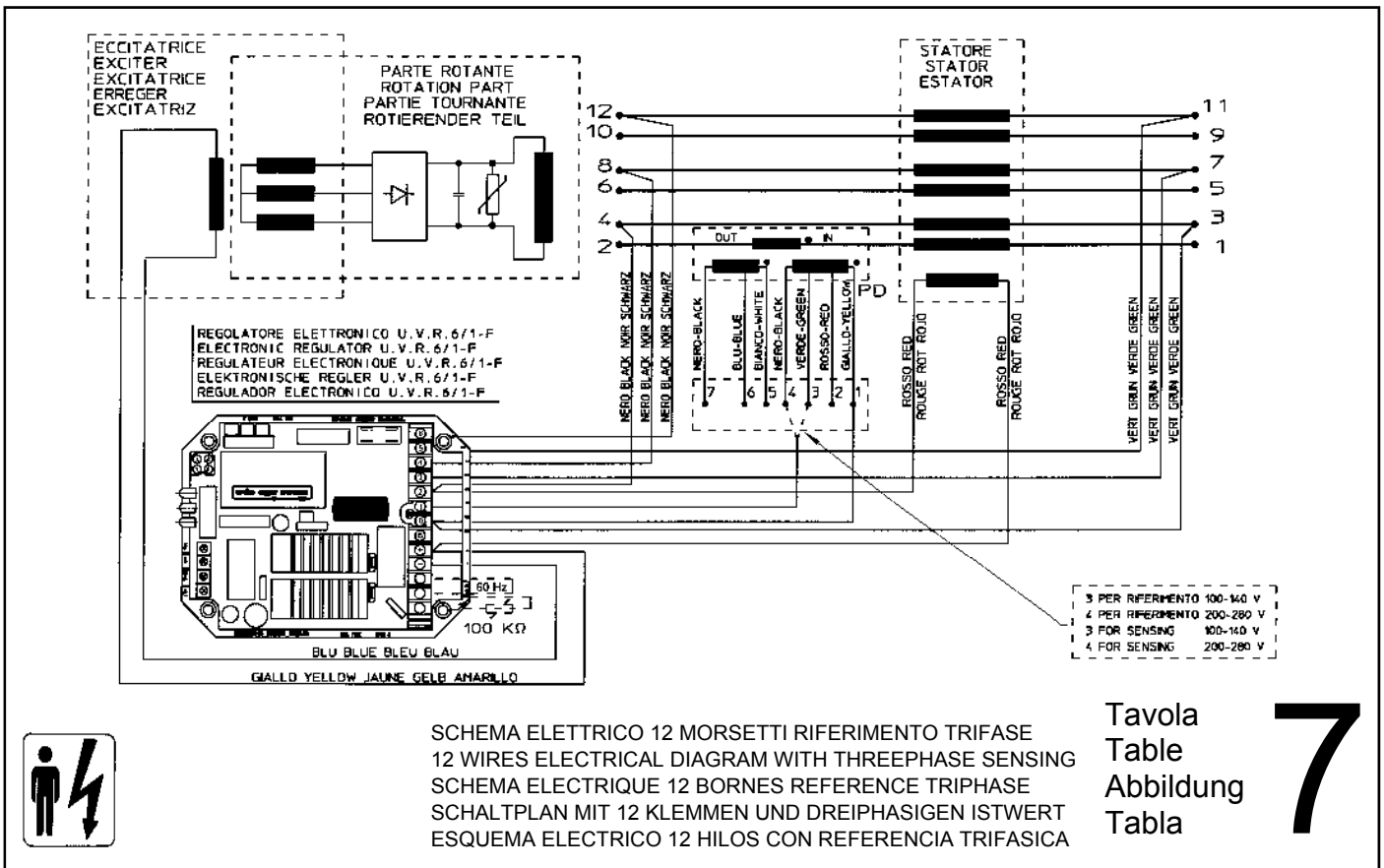
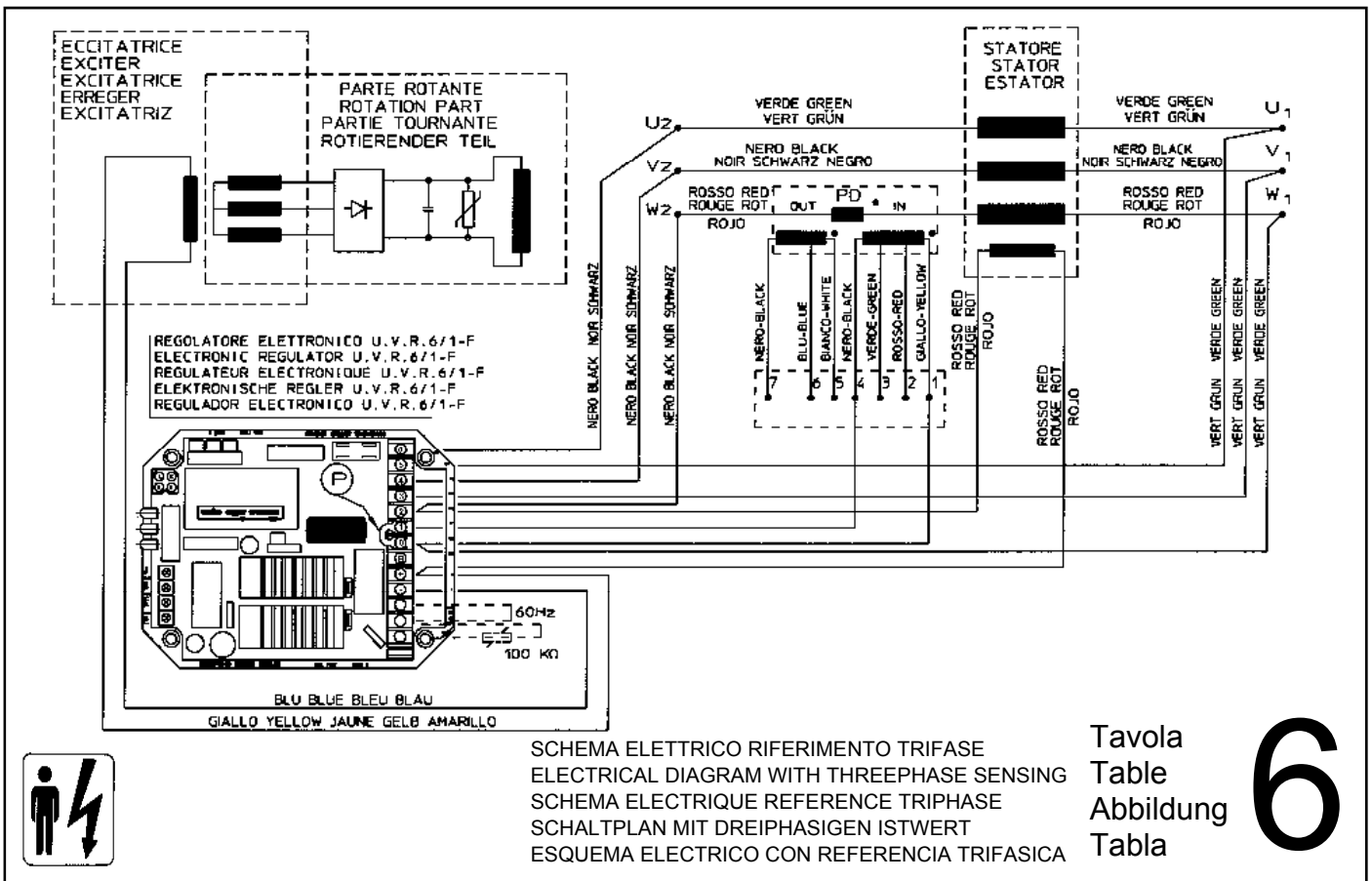


Note : Il dispositivo di parallelo PD è opzionale fino a 350 kVA.  
 Il ponticello P abilita o disabilita il dispositivo di parallelo se presente.  
 The parallel device PD is optional up to 350 kVA.  
 The link P activates or de-activates the parallel device, if it is present.  
 Le dispositif de parallele PD est en option jusqu'à 350 kVA.  
 Le pont P met ou supprime le circuit du dispositif de parallele.  
 Die Parallelvorrichtung PD ist bis zu 350 kVA optional.  
 Die Brücke P deaktiviert die Parallelvorrichtung, sofern vorhanden.  
 El dispositivo de paralelo PD es opcional hasta 350 kVA.  
 El puentecillo P, si esta presente, activa o desactiva el dispositivo de paralelo.



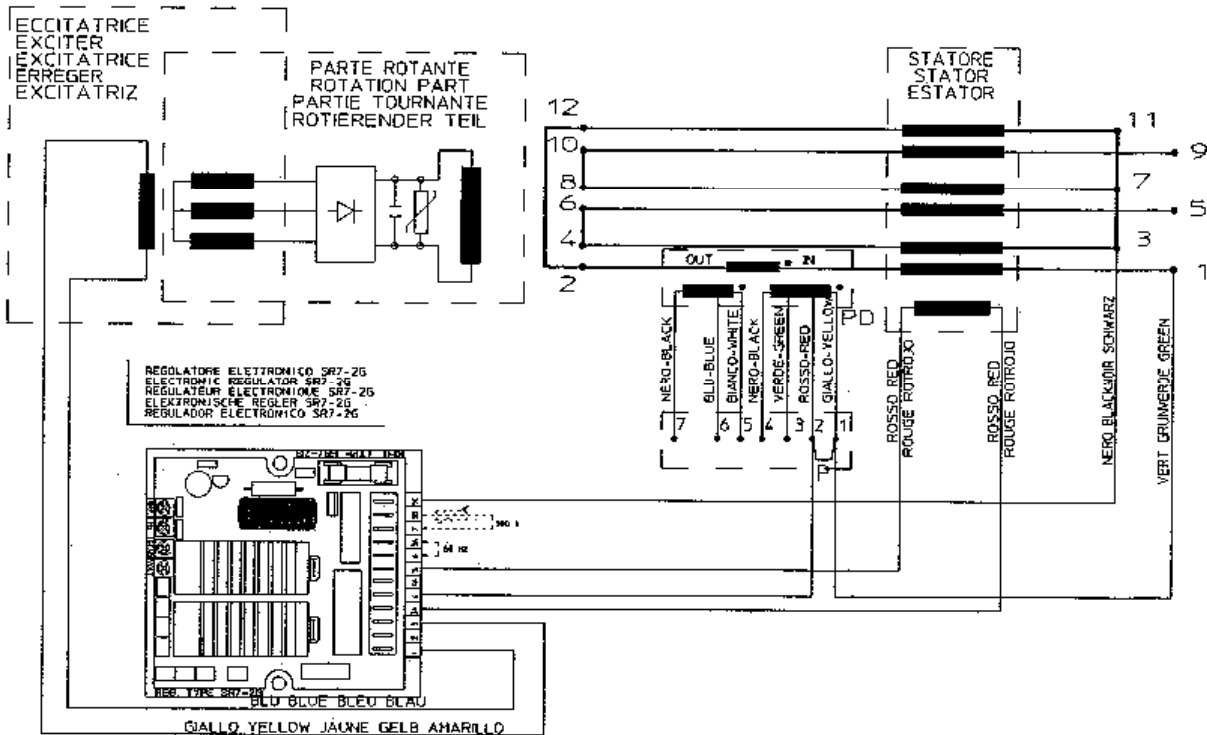






Note : Il dispositivo di parallelo PD è opzionale fino a 350 kVA.  
 Il ponticello P abilita o disabilita il dispositivo di parallelo se presente.  
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 Le pont P met ou supprime le circuit du dispositif de parallele.  
 Die Parallelvorrichtung PD ist bis zu 350 kVA optional.  
 Die Brücke P deaktiviert die Parallelvorrichtung, sofern vorhanden.  
 El dispositivo de paralelo PD es opcional hasta 350 kVA.  
 El puentecillo P, si esta presente, activa o desactiva el dispositivo de paralelo.

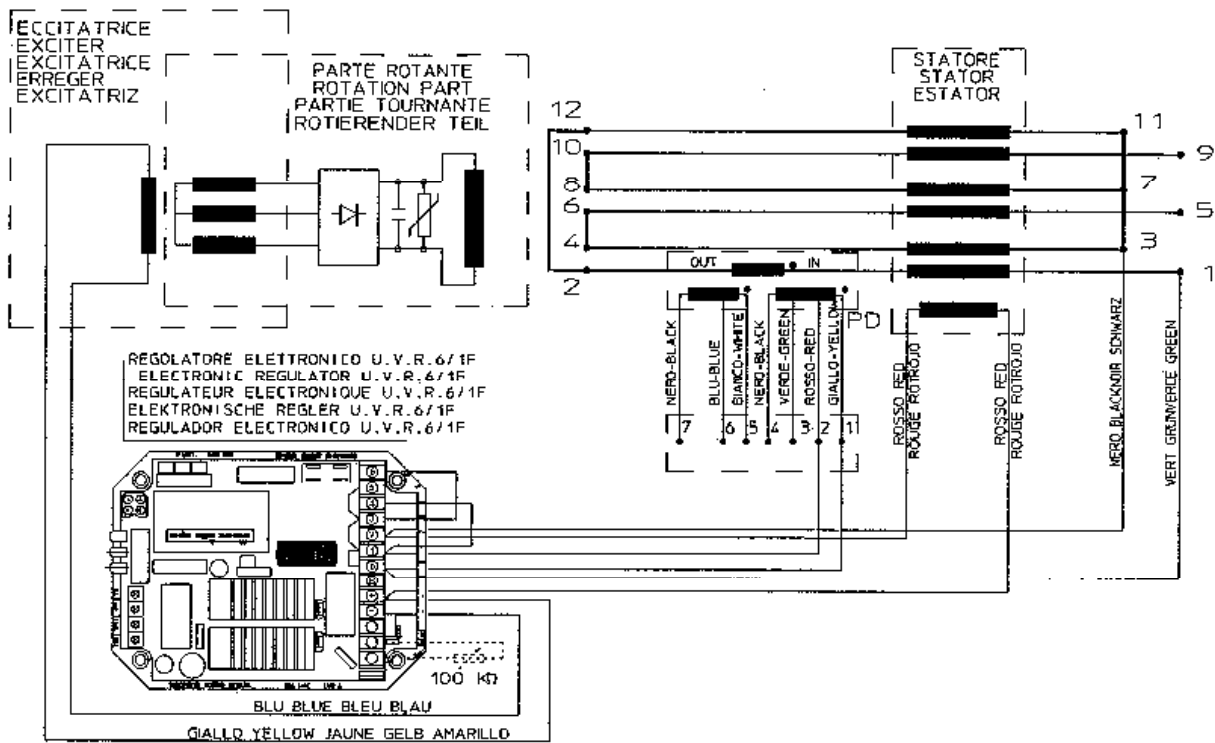




SCHEMA ELETTRICO 12 MORSETTI CON S.R.7/2-G (ZIG-ZAG)  
 12 WIRES ELECTRICAL DIAGRAM WITH S.R.7/2-G (ZIG-ZAG)  
 SCHEMA ELECTRIQUE 12 BORNES AVEC S.R.7/2-G (ZIG-ZAG)  
 SCHALTPLAN MIT 12 KLEMMEN UND S.R.7/2-G (ZIG-ZAG)  
 ESQUEMA ELECTRICO 12 HILOS CON S.R.7/2-G (ZIG-ZAG)

Tavola  
 Table  
 Abbildung  
 Tabla

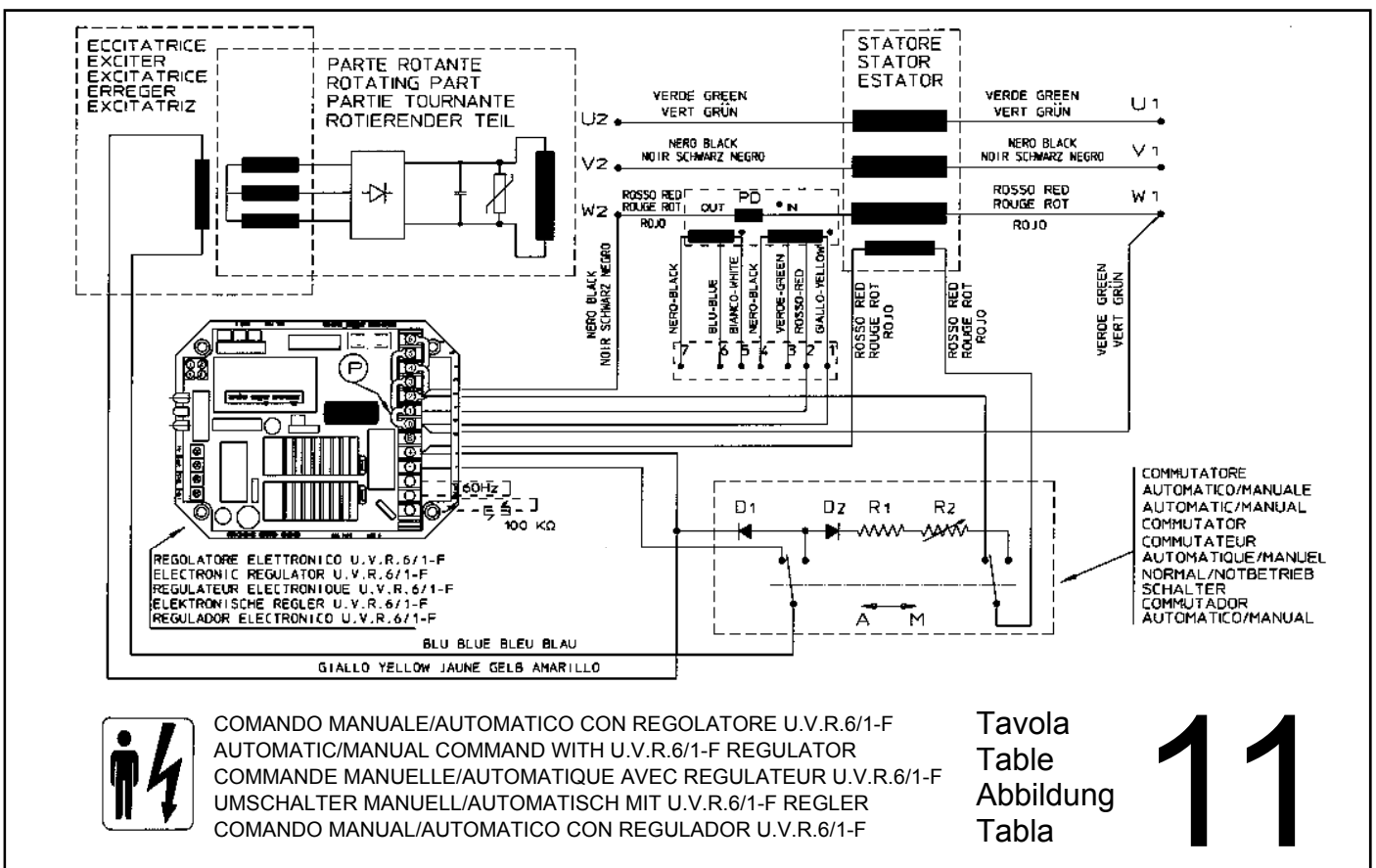
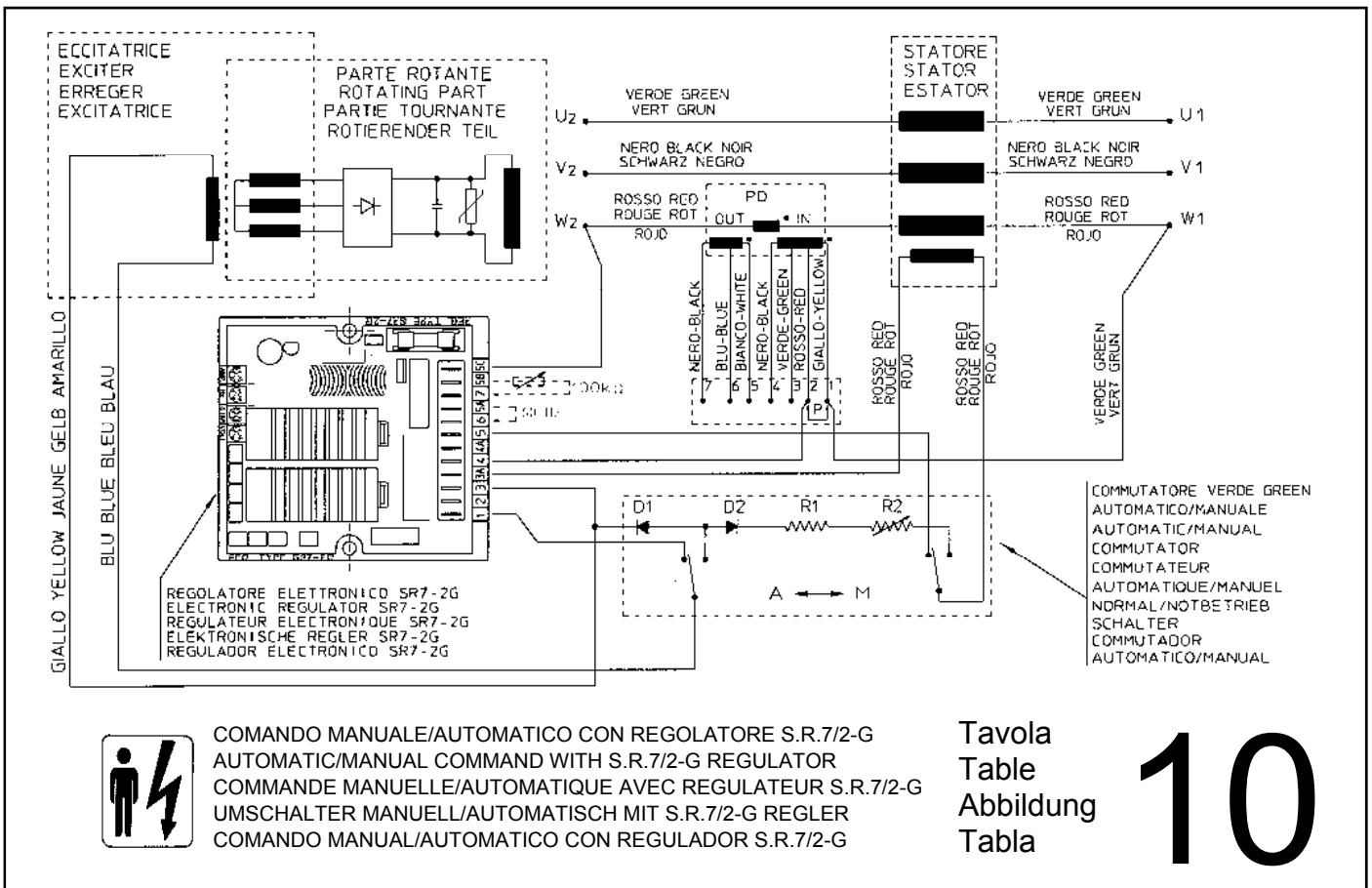
8



SCHEMA ELETTRICO 12 MORSETTI CON U.V.R.6/1-F (ZIG-ZAG)  
 12 WIRES ELECTRICAL DIAGRAM WITH U.V.R.6/1-F (ZIG-ZAG)  
 SCHEMA ELECTRIQUE 12 BORNES AVEC U.V.R.6/1-F (ZIG-ZAG)  
 SCHALTPLAN MIT 12 KLEMMEN UND U.V.R.6/1-F (ZIG-ZAG)  
 ESQUEMA ELECTRICO 12 HILOS CON U.V.R.6/1-F (ZIG-ZAG)

Tavola  
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 Abbildung  
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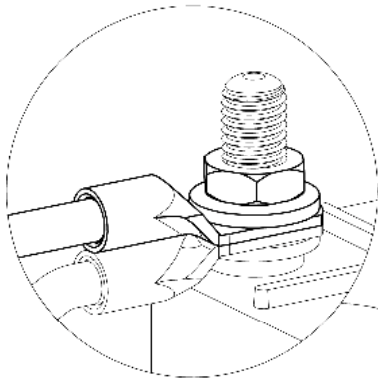
Note : Il dispositivo di parallelo PD è opzionale fino a 350 kVA.  
 Il ponticello P abilita o disabilita il dispositivo di parallelo se presente.  
 The parallel device PD is optional up to 350 kVA.  
 The link P activates or de-activates the parallel device, if it is present.  
 Le dispositif de parallele PD est en option jusqu'à 350 kVA.  
 Le pont P met ou supprime le circuit du dispositif de parallele.  
 Die Parallelvorrichtung PD ist bis zu 350 kVA optional.  
 Die Brücke P deaktiviert die Parallelvorrichtung, sofern vorhanden.  
 El dispositivo de paralelo PD es opcional hasta 350 kVA.  
 El puentecillo P, si esta presente, activa o desactiva el dispositivo de paralelo.



Tavola  
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Abbildung  
Tabla

# 12

COLLEGAMENTO CAVI UTILIZZATORE 28-31-32-34  
USER CABLES CONNECTION 28-31-32-34  
CONNEXION DES CÂBLES PAR L'UTILISATEUR 28-31-32-34  
VERBRAUCHERKABELANSCHLUSS 28-31-32-34  
CONEXIÓN CABLES USUARIO 28-31-32-34



CAVI UTILIZZATORE  
USER CABLES  
UTILISATEUR CABLE  
KABEL BENUTZER  
CABLE DE USUARIO

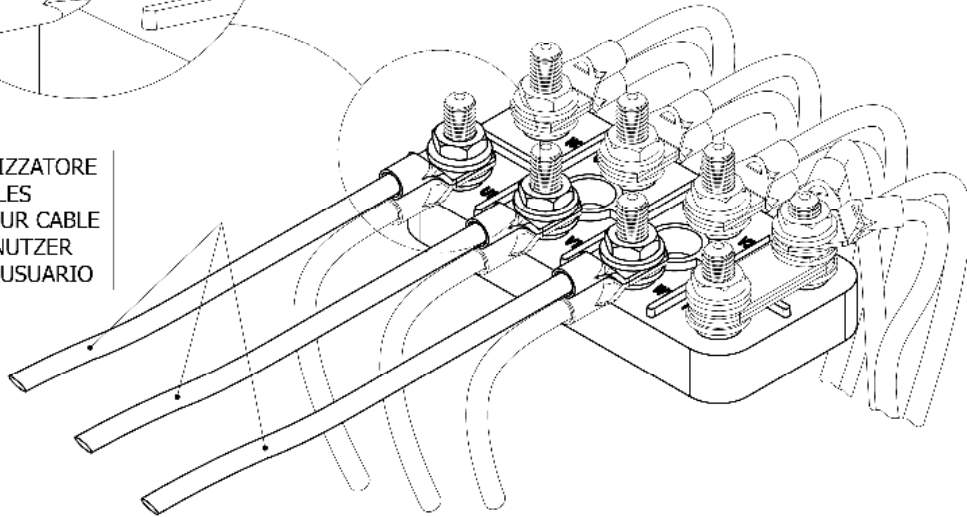
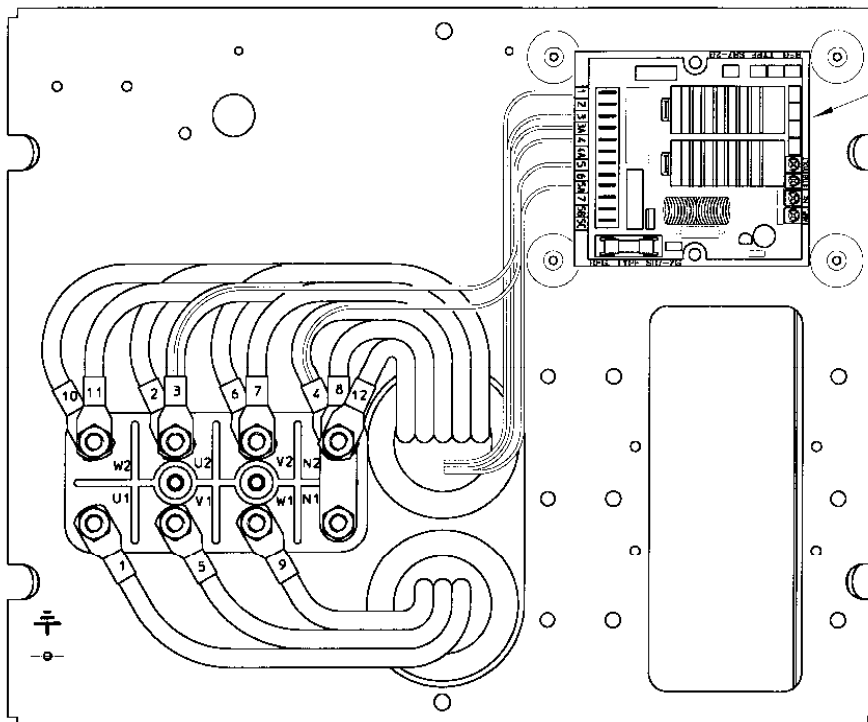


Tavola  
Table  
Abbildung  
Tabla

# 13

SCATOLA REGOLAZIONE 28-31-32  
TERMINAL BOX 28-31-32  
BOITIER DE REGULATION 28-31-32  
REGLERKASTEN 28-31-32  
CAJA DE REGULACION 28-31-32



REGOLATORE ELETTRONICO SR7 2G  
ELECTRONIC REGULATOR SR7-2G  
RÉGULATEUR ÉLECTRONIQUE SR7-2G  
ELEKTRONISCHER REGLER SR7-2G  
REGULADOR ELETRÓNICO SR7-2G

Collegamento serie stella / Series star connection / Connection serie étoile / Stern-Reihen-Schaltung / Connexion en serie estrella

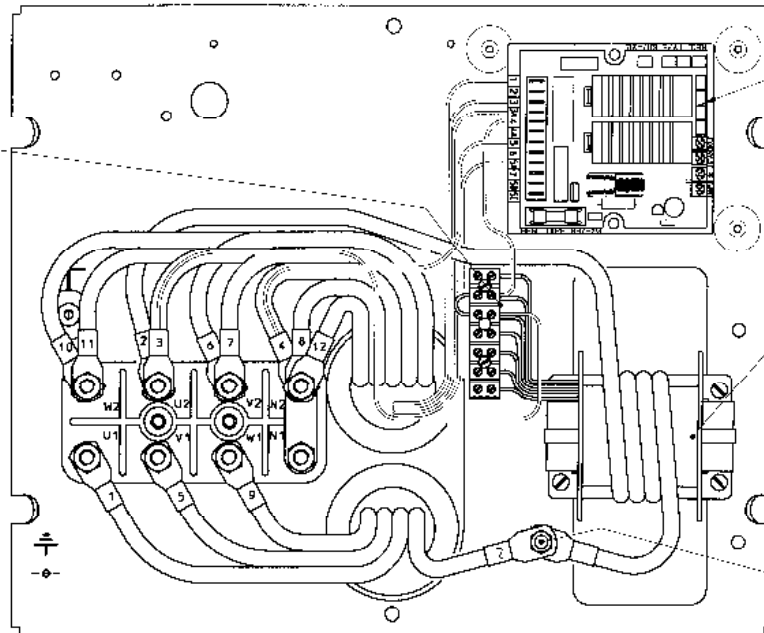
Tavola  
Table  
Abbildung  
Tabla

# 14

SCATOLA REGOLAZIONE 28-31-32 CON DISPOSITIVO DI PARALLELO  
 TERMINAL BOX 28-31-32 WITH PARALLEL DEVICE  
 BOITIER DE REGULATION 28-31-32 AVEC DISPOSITIF DE PARALLELE  
 REGLERKASTEN 28-31-32 MIT EINRICHTUNG FUR PARALLEL BETRIEB  
 CAJA DE REGULACION 28-31-32 CON DISPOSITIVO DE PARALELO



REMOVETE EL FONDELLO  
 PER ABILITARE IL  
 DISPOSITIVO DI PARALLELO  
 REMOVE THE LENS BRIDGE TO  
 OPERATE THE PARALLEL DEVICE  
 ENLEVEZ LE COUVERCLE POUR  
 LE FONCTIONNEMENT DU  
 DISPOSITIF DE PARALLELE  
 DEMONTAR EL FUNDILLO  
 PARA ABILITAR EL DISPOSITIVO  
 DE PARALELO



REGOLATORE ELETTRONICO SR7-26  
 ELECTRONIC REGULATOR SR7-26  
 REGULATEUR ELECTRONIQUE SR7-26  
 ELEKTRONISCHE REGLER SR7-26  
 REGULADOR ELECTRONICO SR7-26

DISPOSITIVO DI PARALLELO  
 PARALLEL DEVICE  
 DISPOSITIF DE PARALLELE  
 STABIKWÄHLE  
 DISPOSITIVO DE PARALELO

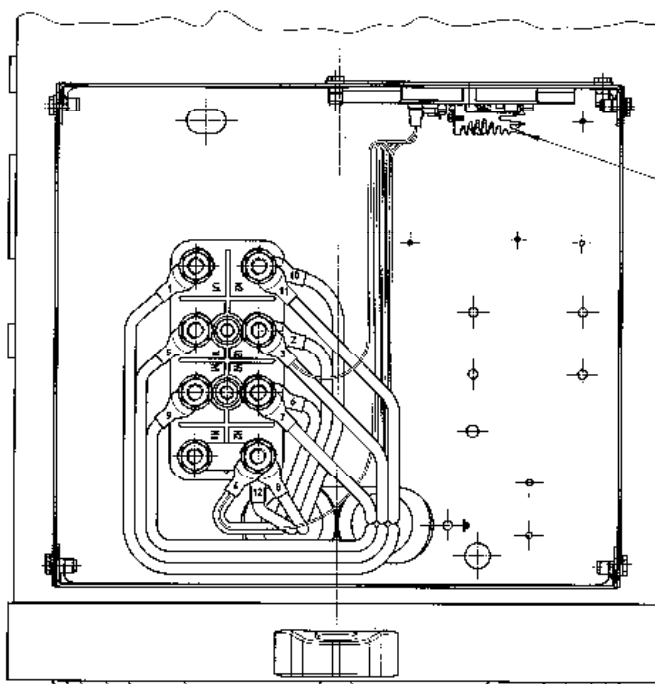
SCALA CHE  
 ISOLA IL  
 SOLLAIEUR  
 ISOLATOR  
 ASSLADOR

Collegamento serie stella / Series star connection / Connection serie etoile / Stern-Reihen-Schaltung / Connexion en serie estrella

Tavola  
Table  
Abbildung  
Tabla

# 15

SCATOLA REGOLAZIONE 34  
 TERMINAL BOX 34  
 BOITIER DE REGULATION 34  
 REGLERKASTEN 34  
 CAJA DE REGULACION 34



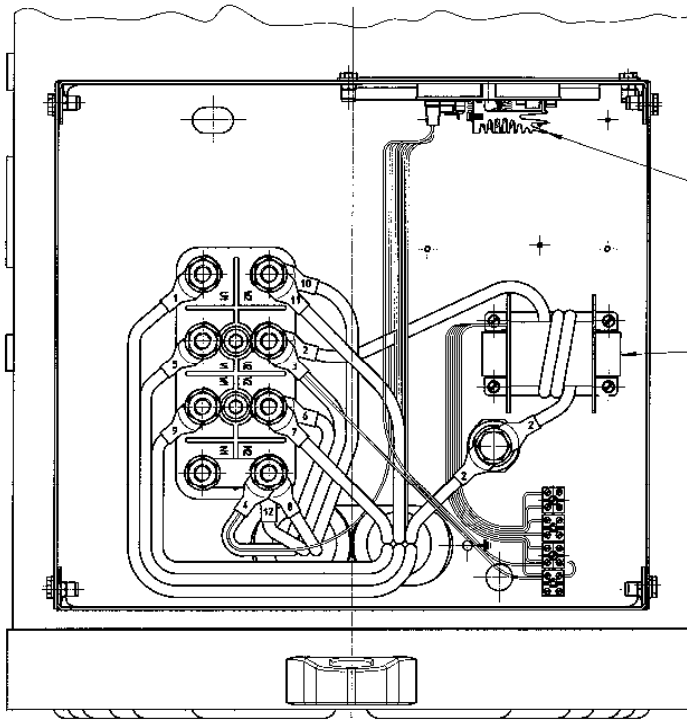
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 ELECTRONIC REGULATOR SR7-26  
 REGULATEUR ELECTRONIQUE SR7-26  
 ELEKTRONISCHE REGLER SR7-26  
 REGULADOR ELECTRONICO SR7-26

Collegamento serie stella / Series star connection / Connection serie etoile / Stern-Reihen-Schaltung / Connexion en serie estrella

Tavola  
Table  
Abbildung  
Tabla

# 16

SCATOLA REGOLAZIONE 34 CON DISPOSITIVO DI PARALLELO  
 TERMINAL BOX 34 WITH PARALLEL DEVICE  
 BOITIER DE REGULATION 34 AVEC DISPOSITIF DE PARALLELE  
 REGLERKASTEN 34 MIT EINRICHTUNG FUR PARALLELBETRIEB  
 CAJA DE REGULACION 34 CON DISPOSITIVO DE PARALELO



REGOLATORE ELETTRONICO SR7-2G  
 ELECTRONIC REGULATOR SR7-2G  
 REGULATEUR ELECTRONIQUE SR7-2G  
 ELEKTRONISCHE REGLER SR7-2G  
 REGULADOR ELECTRONICO SR7-2G

DISPOSITIVO DI PARALLELO  
 PARALLEL DEVICE  
 DISPOSITIF DE PARALLELE  
 STATIKWANDLER  
 DISPOSITIVO DE PARALELO

Collegamento serie stella / Series star connection / Connexion serie etoile / Stern-Reihen-Schaltung / Connexion en serie estrella

Tavola  
Table  
Abbildung  
Tabla

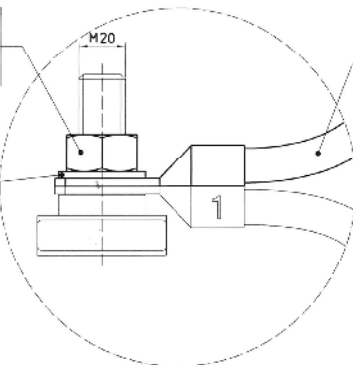
# 17

COLLEGAMENTO CAVI UTILIZZATORE 38-40  
 USER CABLES CONNECTION 38-40  
 CONNEXION DES CÂBLES PAR L'UTILISATEUR 38-40  
 VERBRAUCHERKABELANSCHLUSS 38-40  
 CONEXIÓN CABLES USUARIO 38-40



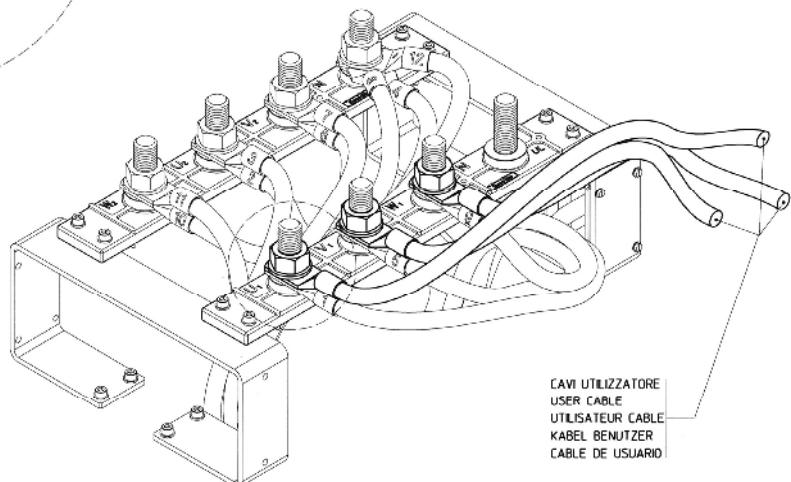
DADO ESAGONALE  
 HEXAGON NUT  
 ECROU HEXAGONAL  
 NUSS HEXAGONAL  
 TUERCA HEXAGONAL

RONDELLA PIANA  
 PLAIN WASHER  
 RONDELLE  
 UNTERLEGSCHIBE  
 ARANDELA SENCILLA



CAVO UTILIZZATORE  
 USER CABLE  
 UTILISATEUR CABLE  
 KABEL BENUTZER  
 CABLE DE USUARIO

COLLEGAMENTO SERIE STELLA  
 SERIES STAR CONNECTION  
 CONNEXION SERIE ETOILE  
 STERN-REIHEN-SCHALTUNG  
 CONNEXION EN SERIE ESTRELLA

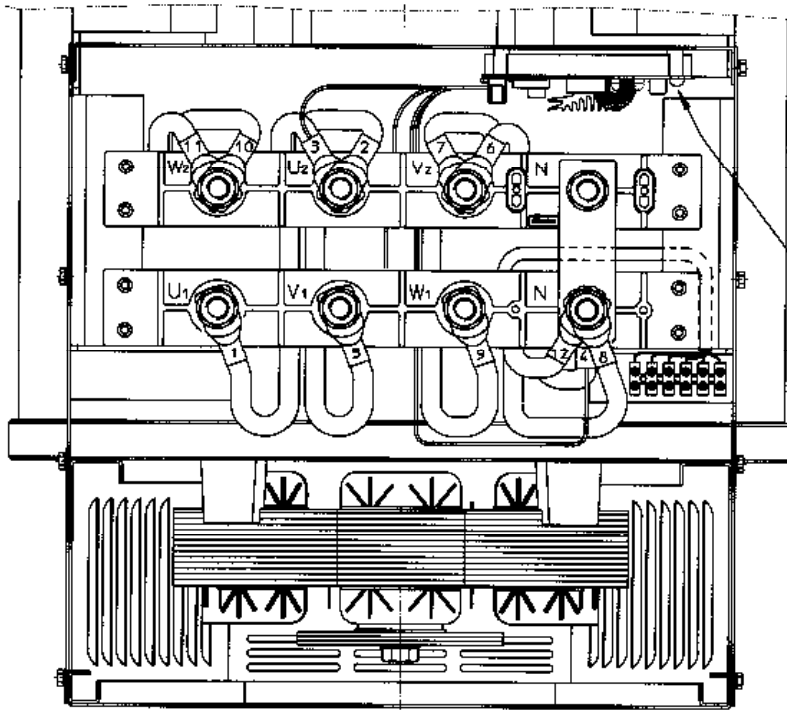


CAVI UTILIZZATORE  
 USER CABLE  
 UTILISATEUR CABLE  
 KABEL BENUTZER  
 CABLE DE USUARIO

Tavola  
Table  
Abbildung  
Tabla

# 18

SCATOLA REGOLAZIONE 38  
TERMINAL BOX 38  
BOITIER DE REGULATION 38  
REGLERKASTEN 38  
CAJA DE REGULACION 38



REGOLATORE ELETTRONICO U.V.R.6/1-F  
ELECTRONIC REGULATOR U.V.R.6/1-F  
REGULATEUR ELECTRONIQUE U.V.R.6/1-F  
ELEKTRONISCHER REGLER U.V.R.6/1-F  
REGULADOR ELECTRONICO U.V.R.6/1-F

Collegamento serie stella / Series star connection / Connection serie etoile / Stern-Reihen-Schaltung / Connexion en serie estrella

Tavola  
Table  
Abbildung  
Tabla

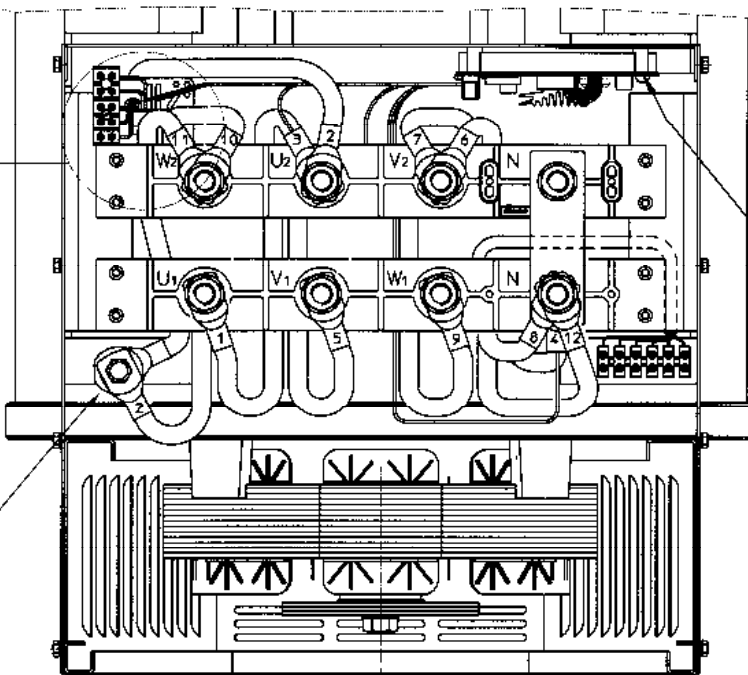
# 19

SCATOLA REGOLAZIONE 38 CON DISPOSITIVO DI PARALLELO  
TERMINAL BOX 38 WITH PARALLEL DEVICE  
BOITIER DE REGULATION 38 AVEC DISPOSITIF DE PARALLELE  
REGLERKASTEN 38 MIT EINRICHTUNG FUR PARALLEL BETRIEB  
CAJA DE REGULACION 38 CON DISPOSITIVO DE PARALELO



DISPOSITIVO DI  
PARALLELO  
PARALLEL DEVICE  
DISPOSITIF DE  
PARALLELE  
STATIKWANDLER  
DISPOSITIVO DE  
PARALELO

ISOLATORE  
INSULATOR  
ISOLATEUR  
ISOLATOR  
AISLADOR



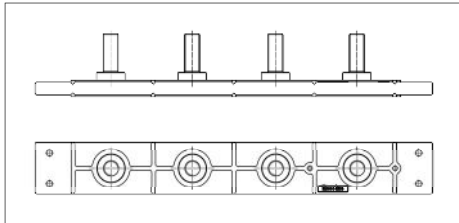
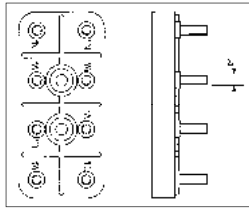
REGOLATORE ELETTRONICO U.V.R.6/1-F  
ELECTRONIC REGULATOR U.V.R.6/1-F  
REGULATEUR ELECTRONIQUE U.V.R.6/1-F  
ELEKTRONISCHER REGLER U.V.R.6/1-F  
REGULADOR ELECTRONICO U.V.R.6/1-F

Collegamento serie stella / Series star connection / Connection serie etoile / Stern-Reihen-Schaltung / Connexion en serie estrella

Tavola  
Table  
Abbildung  
Tabla

# 24

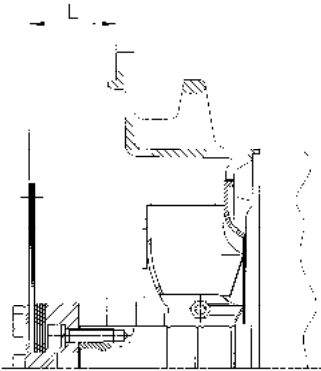
TABELLA COPPIE DI SERRAGGIO PER MORSETTIERE  
 TERMINAL BOARD TIGHTENING TORQUE TABLE  
 TABLEAU DE COUPLE DE SERRAGE POUR PLANCHETTE A BORNES  
 KLEMMENBRETT AUZUGSMOMENT TABELLE  
 TABLA PAR DE TORQUE POR PLACA DE BORNES



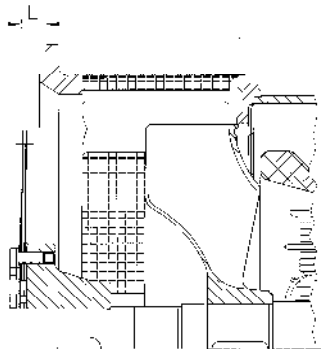
DIAMETRO DI FILETTATURA Df THREAD DIAMETER Df DIAMETRE DE FILETAGE Df GEWINDE DURCHMESSER Df DIAMETRO DE FILETEADO Df	TIPO TYPE TYP	COPPIA DI SERRAGGIO (Nm) TIGHTENING TORQUE (Nm) COUPLE DE SERRAGE (Nm) ANZUGSMOMENT (Nm) PAR DE TORQUE (Nm)
M6	ECP 28	8 ± 7%
M8	ECO 32	18 ± 7%
M10 (Steel)	ECO43-ECO46	30 ± 7%
M12	ECP34	42 ± 7%
M14	ECO32-34 special	54 ± 7%
M16	ECO38	80 ± 7%
M20	ECO40	100 ± 7%

TABELLA COPPIE DI SERRAGGIO PER DISCHI  
 COUPLING DISCS TIGHTENING TORQUE TABLE  
 TABLEAU DE COUPLE DE SERRAGE POUR DISQUES  
 KUPPLUNG AUZUGSMOMENT TABELLE  
 TABLA PAR DE TORQUE POR DISCOS

TIPO / TYPE / TYP 28 - 31 - 32

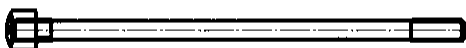


TIPO / TYPE / TYP 34 - 38 - 40  
- 43 - 46



TIPO TYPE TYP	SAE	L	DIMENSIONE VITI SCREWS DIMENSIONS DIMENSIOIS VIS SCHRAUBENBMESSUNGEN DIMENSIONES TORNILLOS		COPPIA DI SERRAGGIO (Nm) TIGHTENING TORQUE (Nm) COUPLE DE SERRAGE (Nm) ANZUGSMOMENT (Nm) PAR DE TORQUE (Nm)	
			TE	TCCEI	CL. 8.8	CL. 12.9
ECP28	6 ½	30,2	M10x30-8.8	/	48	/
	7 ½	30,2	M10x30-8.8	/	48	/
	8	62	M12x30-8.8	M10x30-8.8	80-48	/
	10	53,8	M12x30-8.8	M10x30-8.8	80-48	/
	11 ½	39,6	M10x40-8.8	/	48	/
ECO31-32	6 ½	30,2	/	M12x40-12.9	/	140
	7 ½	30,2	/	M12x40-12.9	/	140
	8	62	M12x30-8.8	M12x40-12.9	80	140
	10	53,8	M12x30-8.8	M12x40-12.9	80	140
	11 ½	39,6	/	M12x40-12.9	/	140
ECP34	10	53,8	M10x30-8.8	M10x40-8.8	48	/
	11 ½	39,6	M10x45-8.8	/	48	/
	14	25,4	M10x30-8.8	/	48	/
ECO38-N	11 ½	39,6	M12x45-8.8	/	80	/
	14	25,4	M12x30-8.8	/	80	/
ECO40	14	25,4	M16x45-8.8	/	200	/
	18	15,7	M16x40-8.8	/	200	/
ECO43-N	14	25,4	M16x55-8.8	/	200	/
	18	15,7	M16x40-8.8	/	200	/
	21	0	M16x40-8.8	/	200	/
ECO46	18	15,7	M16x40-8.8	/	200	/
	21	0	M16x40-8.8	/	200	/

TABELLA COPPIE DI SERRAGGIO PER TIRANTI  
 STAY BOLT TIGHTENING TORQUE TABLE  
 TABLEAU DE COUPLE DE SERRAGE POUR TIGE  
 TABELLE FUR DAS ANZUGSMOMENT VON ZUGSTANGEN  
 TABLA PAR DE TORQUE POR TIRANTE



DIAMETRO DI FILETTATURA Df THREAD DIAMETER Df DIAMETRE DE FILETAGE Df GEWINDE DURCHMESSER Df DIAMETRO DE FILETEADO Df	TIPO TYPE TYP	COPPIA DI SERRAGGIO (Nm) TIGHTENING TORQUE (Nm) COUPLE DE SERRAGE (Nm) ANZUGSMOMENT (Nm) PAR DE TORQUE (Nm)
M8	ECP 28	17 ± 7%
M10	ECO 32	48 ± 7%
M14	ECP34	120 ± 7%
M12	ECO38	80 ± 7%
M16	ECO40	180 ± 7%
M14	ECO43-46	120 ± 7%



**GENERATORI A 4 POLI - 4 POLE GENERATORS  
ALTERNATEURS 4 POLES  
GENERATOREN 4 POLIG - GENERADORES 4 POLOS**

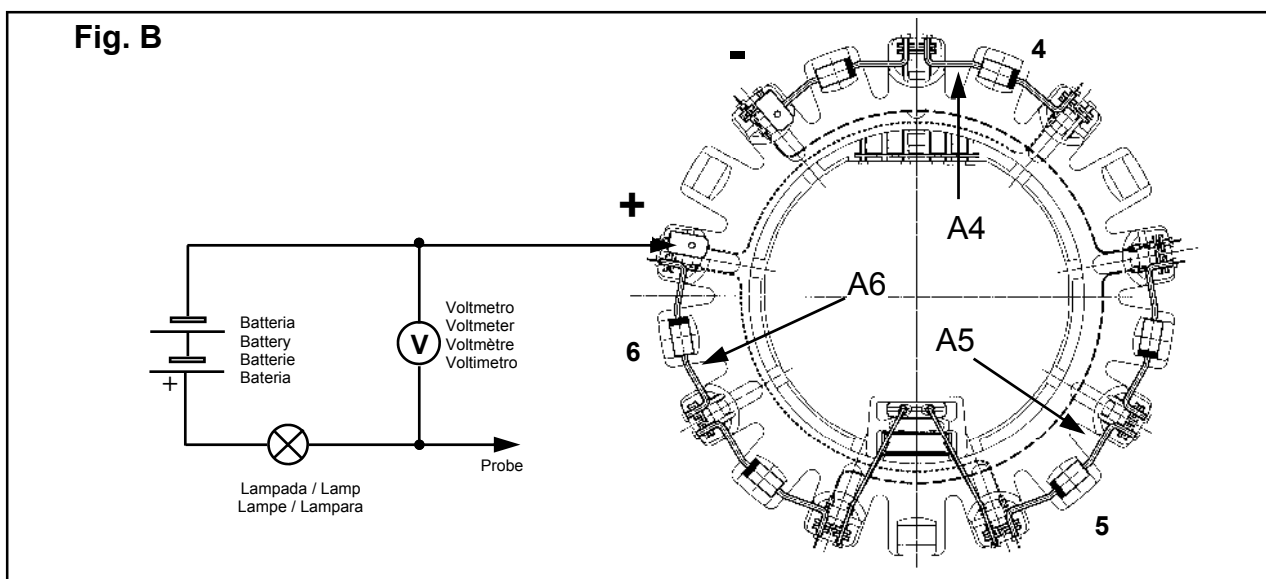
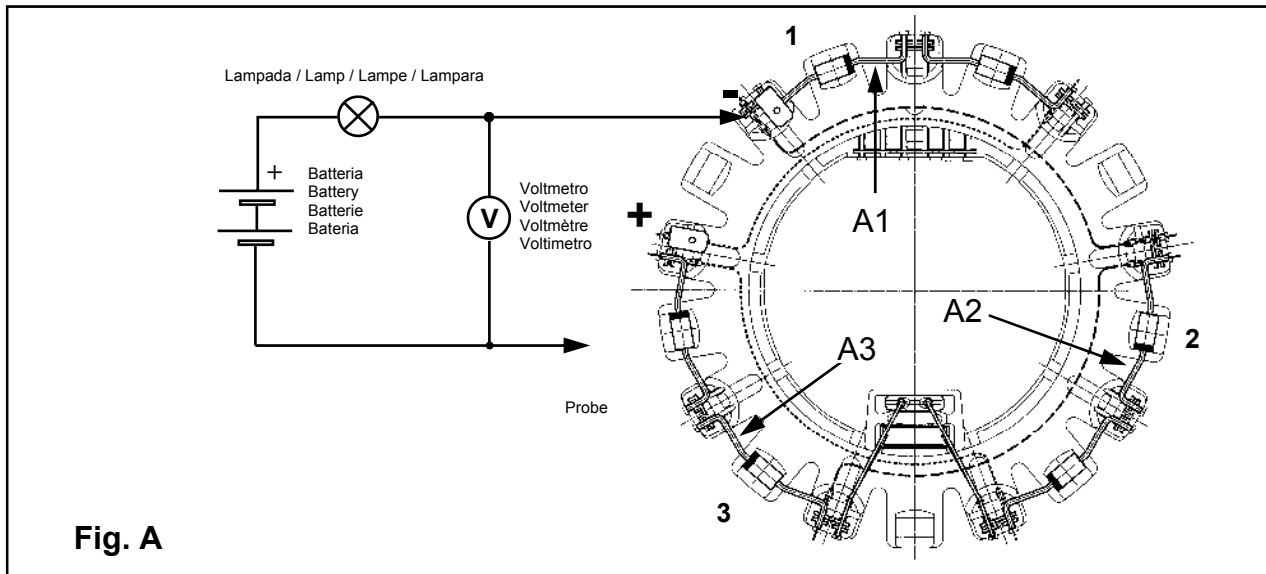
TIPO TYPE TYP	Volume d'aria Air flow Volume d'air Luftmenge Volumen de aire		Rumore Noise Bruit Gerausoh Ruido dB(A)				Peso Weight Poids Gewicht Peso
	m <sup>3</sup> /min		50 Hz		60 Hz		
	50 Hz	60 Hz	1m	7m	1m	7m	
ECP 28 1VS	5,3	5,8	68	57	71	61	82
ECP 28 2VS							89
ECP 28 OS							99
ECP 28 S							107
ECP 28 1L							122
ECP 28 2L							139
ECP 28VL	165						
ECO 32 2S	11,8	14,5	75	60	79	64	199
ECO 32 3S							214
ECO 32 1L							248
ECO 32 2L							282
ECO 32 3L							298
ECP 34 1.5VS	19,3	23	79	65	83	69	310
ECP 34 1S							341
ECP 34 2S							419
ECP 34 1L							445
ECP 34 2L							491
ECP 34 3L							495
ECO 38 1SN	32	39	82	69	86	73	510
ECO 38 2SN							560
ECO 38 3SN							590
ECO 38 1LN							680
ECO 38 2LN							765
ECO 38 3LN							905
ECO 40 1S	54	64,8	94	82	98	88	1040
ECO 40 2S							1118
ECO 40 3S							1171
ECO 40 1L							1324
ECO 40 1.5L							1380
ECO 40 2L							1586
ECO 40 VL	1693						
ECO 43 1SN	90	108	95	84	99	89	1870
ECO 43 2SN							2090
ECO 43 1LN							2395
ECO 43 2LN							2660
ECO 43 VL							2950
ECO 46 1S	135	162	97	86	100	91	2770
ECO 46 1.5S							3380
ECO 46 2S							3440
ECO 46 1L							3720
ECO 46 1.5L							4260
ECO 46 2L							4250

**GENERATORI A 2 POLI - 2 POLE GENERATORS  
ALTERNATEURS 2 POLES  
GENERATOREN 2 POLIG - GENERADORES 2 POLOS**

TIPO TYPE TYP	Volume d'aria Air flow Volume d'air Luftmenge Volumen de aire		Rumore Noise Bruit Gerausoh Ruido dB(A)				Peso Weight Poids Gewicht Peso
	m <sup>3</sup> /min		50 Hz		60 Hz		
	50 Hz	60 Hz	1m	7m	1m	7m	
ECP 28 1L	9,7	11	86	74	90,5	78	129
ECP 28 2L							136
ECP 28 3L							141
ECP 28 VL							156
ECO 31 2SN	22,4	27	88	77	93	80	178
ECO 31 3SN							204
ECO 31 1LN							217
ECO 31 2LN							236



ALTERNATORE TIPO / ALTERNATOR TYPE / ALTERNATEUR TYPE / GENERATOR TYP / ALTERNADOR TIPO : 28-31-32

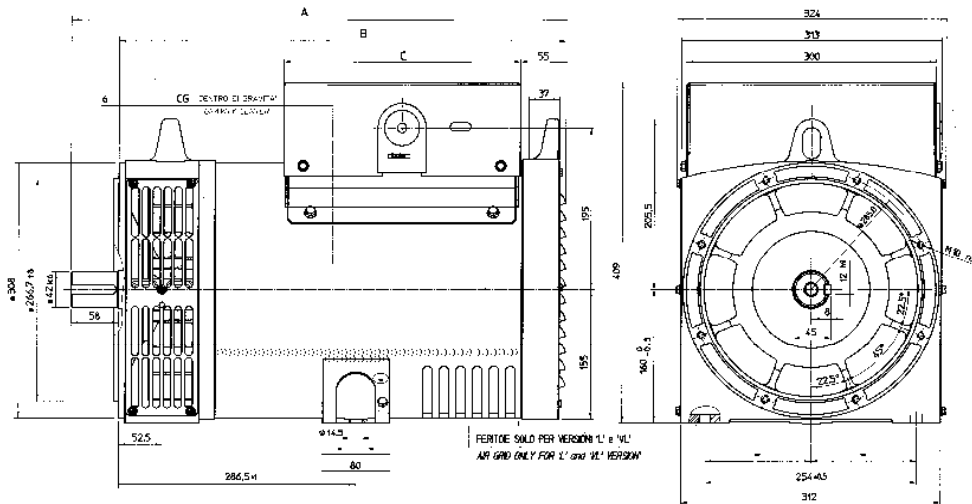


2 and 4 pole  ALTERNATORE TIPO ALTERNATOR TYPE ALTERNATEUR TYPE GENERATOR TYP ALTERNADOR TIPO	TENSIONE MISURATA / VOLTAGE MEASURED TENSION MESUREE / GEMESSENE SPANNUNG TENSION MEDIDA (fig. A-B)		
	Diodo buono Good diode Diode bonne Diode gut Diodo bueno	Diodo in corto Diode in short diode en court-circuit Diode in Kurzschlss Diodo en corto	Diodo aperto Diode open diode ouverte Diode offen Diodo abierto
ECP28, ECO31-2SN, ECO31-3SN, ECO32-2S, ECO32-3S	da 0,8V from 0,8V de von de	a 1,2V to à bis a	inferiore a lower than Inférieure à 0,6V Kleiner als Inferior a
ECO31-1LN, ECO31-2LN, ECO32-1L, ECO32-2L, ECO32-3L	da 0,8V from 0,8V de von de	a 1,2V to à bis a	superiore a more than supérieure à 1,3V grösser als Superior a

# ECP 28

FORMA FORM FORME B3/B14

dimensions in mm



TIPO / TYPE	A	B	C
28 1VS/4-2VS/4	476	418	225
28 0S/4-S/4	516	458	285
28 1L/4-2L/4 28 1L/2-2L/2 28 3L/2	596	538	285
28 VL	626	568	285

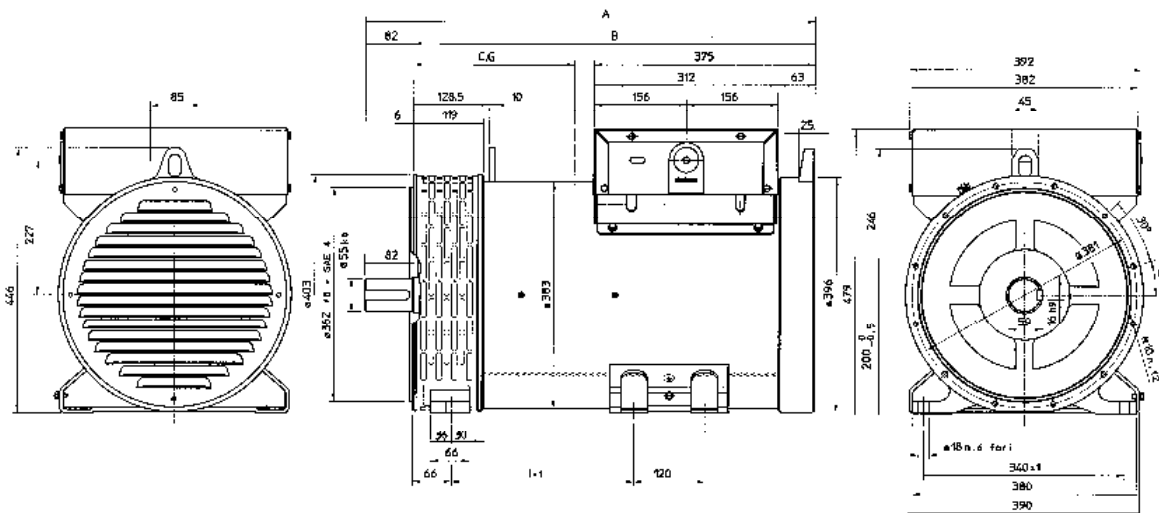
TIPO / TYPE	CG*	TIPO / TYPE	CG*
28-1VS/4	230	28-1L/2	267
28-2VS/4	230	28-2L/2	271
28-0S/4	235	28-3L/2	275
28-S/4	237	28-VL/2	291
28-1L/4	268		
28-2L/4	275		
28-VL/4	286		

\* Center of Gravity

# ECO 31N

FORMA FORM FORME B3/B14

dimensions in mm



TIPO / TYPE	CG*
31-2S/2	272
31-3S/2	285
31-1L/2	311
31-2L/2	336

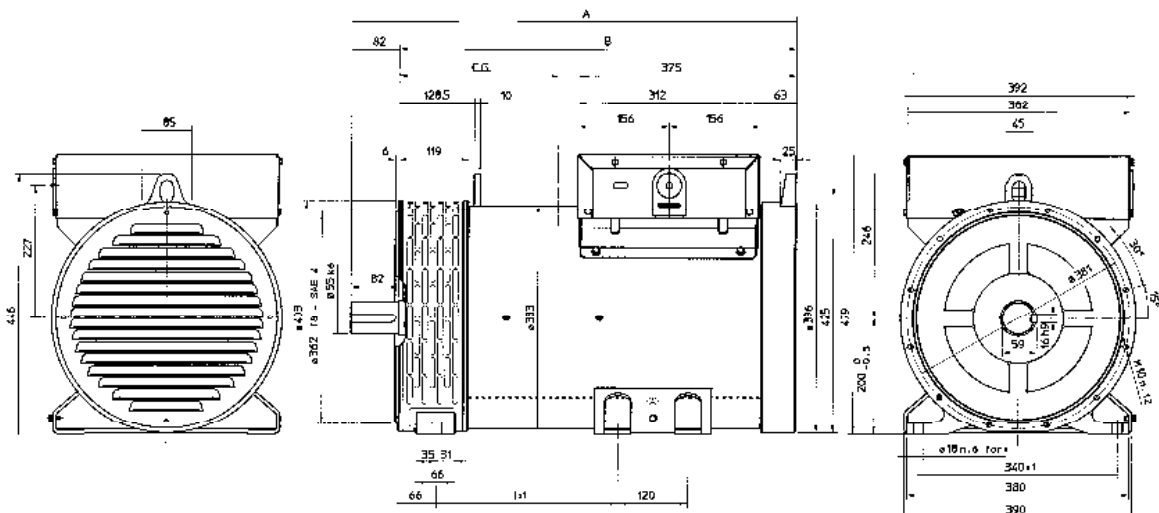
\* Center of Gravity

TIPO / TYPE	A	B	I
ECO 31 S	658	576	205
ECO31 L	763	681	310

# ECO 32

FORMA FORM FORME B3/B14

dimensions in mm



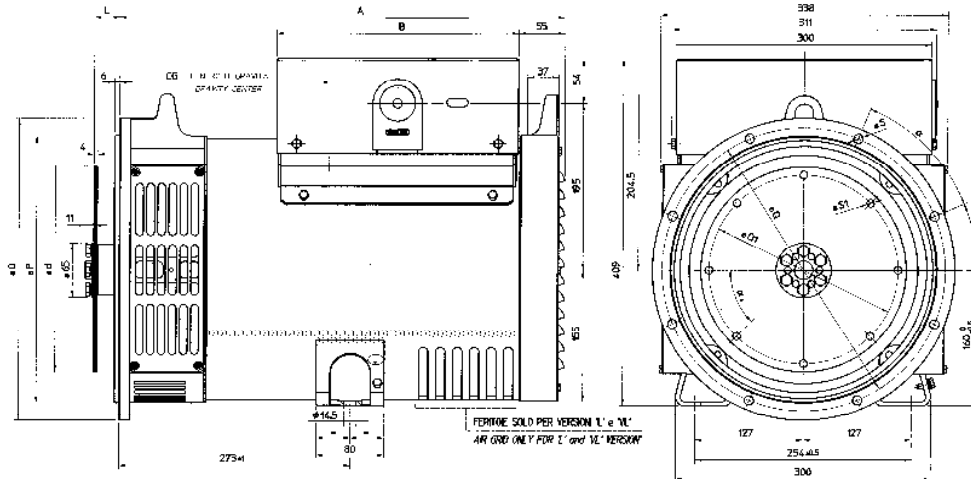
TIPO / TYPE	CG*
32-2S/4	269
32-3S/4	274
32-1L/4	316
32-2L/4	330
32-3L/4	351

\* Center of Gravity

TIPO / TYPE	A	B	I
ECO 32 S	638	556	185
ECO32 L	763	681	310

# ECP 28

FORMA FORM FORME MD35



dimensions in mm

SAE N°	Giunti a dischi Disc coupling Disque de monopulier Scheibenkupplung					
	L	d	Q1	N° fori	S1	$\alpha$
6 1/2	30,2	215,9	200	6	9	60°
7 1/2	30,2	241,3	222,25	8	9	45°
8	62	263,52	244,47	6	11	60°
10	53,8	314,32	295,27	8	11	45°
11 1/2	39,6	352,42	333,37	8	11	45°

SAE N°	Flangia / Flange					
	O	P	Q	N° fori	S	$\alpha$
5	356	314,3	333,4	8	11	45°
4	403	362	381	12	11	30°
3	451	409,6	428,6	12	11	30°
2	490	447,7	466,7	12	11	30°

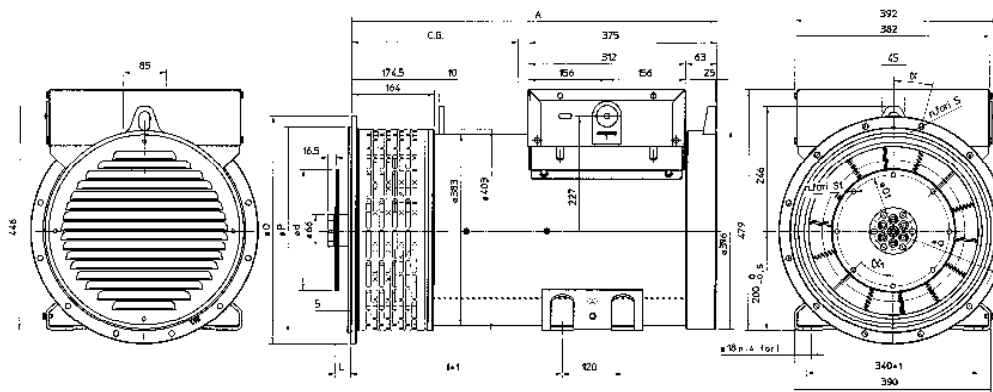
TIPO TYPE	CG*	TIPO TYPE	CG*
28-1L/2	242	28-1VS	200
28-2L/2	248	28-2VS	200
28-3L/2	254	28-0S	214
28-VL/2	273	28-S/4	217

TIPO TYPE	A	B
28 1VS-2VS	405	225
28 0S-S	445	285
28 1L/2-2L/2-3L/2	525	285
28 1L/4-2L/4	525	285
28 VL	555	285

\* Center of Gravity

# ECO 31N

FORMA FORM FORME MD35



dimensions in mm

SAE N°	Giunti a dischi Disc coupling Disque de monopulier Scheibenkupplung					
	L	d	Q1	N° fori	S1	$\alpha$
6 1/2	30,2	215,9	200	6	9	60°
7 1/2	30,2	241,3	222,25	8	9	45°
8	62	263,52	244,47	6	11	60°
10	53,8	314,32	295,27	8	11	45°
11 1/2	39,6	352,42	333,37	8	11	45°

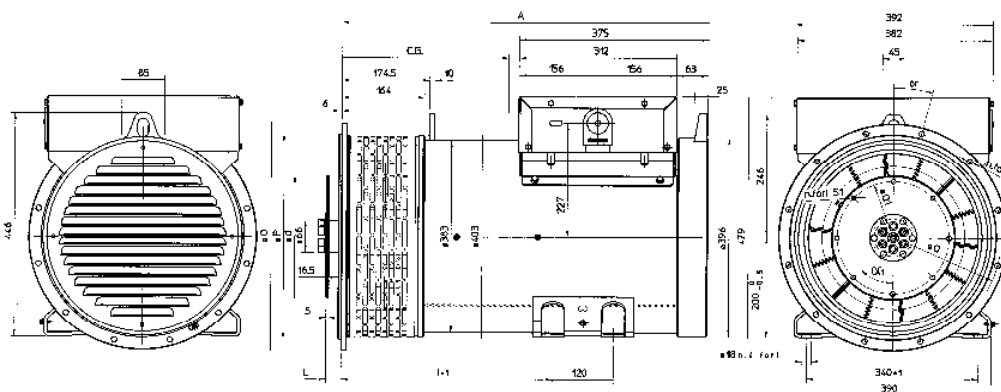
SAE N°	Flangia / Flange Bride / Flansch					
	O	P	Q	N° fori	S	$\alpha$
5	356	314,3	333,4	8	11	45°
4	403	362	381	12	11	30°
3	451	409,6	428,6	12	11	30°
2	490	447,7	466,7	12	11	30°
1	552	511,2	530,2	12	11	30°

TIPO TYPE	A	B	TIPO TYPE	CG*
ECO 31 S	621	315	31-2SN/2	296
ECO 31 L	726	420	31-3SN/2	310
			31-1LN/2	335
			31-2LN/2	360

\* Center of Gravity

# ECO 32

FORMA FORM FORME MD35



dimensions in mm

SAE N°	Giunti a dischi Disc coupling Disque de monopulier Scheibenkupplung						
	L	d	Q1	N° fori	S1	$\alpha$	F
6 1/2	30,2	215,9	200	6	9	60°	7
7 1/2	30,2	241,3	222,25	8	9	45°	7
8	62	263,52	244,47	6	11	60°	2
10	53,8	314,32	295,27	8	11	45°	10
11 1/2	39,6	352,42	333,37	8	11	45°	24

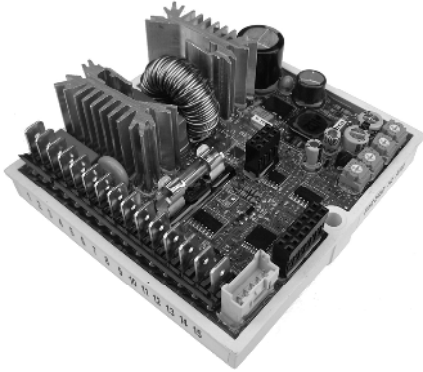
SAE N°	Flangia / Flange Bride / Flansch					
	O	P	Q	N° fori	S	$\alpha$
5	356	314,3	333,4	8	11	45°
4	403	362	381	12	11	30°
3	451	409,6	428,6	12	11	30°
2	490	447,7	466,7	12	11	30°
1	552	511,2	530,2	12	11	30°

TIPO TYPE	A	I	TIPO TYPE	CG*
ECO 32 S	601	295	32-2S/4	312
ECO 32 L	726	420	32-3S/4	316
			32-1L/4	366
			32-2L/4	377
			32-3L/4	388

\* Center of Gravity

# REGOLATORE DIGITALE DSR

## DSR DIGITAL REGULATOR



Ulteriori informazioni sul regolatore DSR sono scaricabili nell'area download del sito web al seguente indirizzo :

[www.meccalte.com](http://www.meccalte.com)

Further information about DSR regulator are available in the web site download area at following address :

[www.meccalte.com](http://www.meccalte.com)

### INSTALLAZIONE

Al ricevimento del regolatore digitale controllare visivamente che non ci siano danni dovuti al trasporto e alla movimentazione dell'apparato. Nel caso informare immediatamente lo spedizionere, l'assicurazione, il rivenditore o Mecc Alte. Se il regolatore non viene installato immediatamente, immagazzinatelo nel suo imballo originale in un luogo privo di polveri e di umidità.

Il regolatore viene normalmente installato nella scatola morsetti del generatore. Viene fissato con due viti M4x20 o M4x25 e deve essere montato dove la temperatura ambiente non ecceda le condizioni ambientali previste.

### COLLEGAMENTI

I collegamenti al regolatore digitale dipendono dall'applicazione e dal sistema di eccitazione. **Un errore nei collegamenti può avere conseguenze serie per l'unità.** Controllate attentamente e assicuratevi che tutti i collegamenti siano esatti ed in accordo agli schemi allegati, prima di applicare potenza.

### TERMINALI

I collegamenti devono essere eseguiti utilizzando cavi di sezione minima pari a :

- 1,5 mm<sup>2</sup> per i cavi di potenza sui morsetti 1, 2, 3 e 9 (Exc-, Aux/exc+, Aux)
- 1 mm<sup>2</sup> per i cavi di segnale

### INGRESSI E USCITE : SPECIFICHE TECNICHE

### INSTALLATION

Upon receipt of the digital regulator, perform a visual inspection to ensure that no damage has been sustained during transportation and movement of the equipment. In the event of damage, advise the shipper, the insurance company, the seller or Mecc Alte immediately. If the regulator is not installed immediately, store it in its original packaging in a dust and humidity-free environment.

The regulator is normally installed in the generator terminal box. It is fixed with two M4x20 or M4x25 screws and must be installed in a location where the temperature does not exceed the environmental conditions foreseen.

### CONNECTIONS

The digital regulator connections depend on the application and excitation system. **An error in connection may have serious consequences for the unit.** Carefully check to make sure that all connections are precise and in accordance with the attached drawings, before turning on the power.

### TERMINALS

The connections must be made using cables having a minimum diameter:

- 1.5 mm<sup>2</sup> for power cables on terminals 1, 2, 3 and 9 (Exc-, Aux/exc+, Aux)
- 1 mm<sup>2</sup> for signal cables

### INPUTS AND OUTPUTS: TECHNICAL SPECIFICATIONS

TABELLA 1 : CONNETTORE CN1

Morsetto <sup>(1)</sup> Terminal	Denominazione Name	Funzione Function	Specifiche Specifications
1	Exc-	Eccitazione / Excitation	Reg. continuo/Continuous Rating : 4Adc max Reg. transitorio/Transitory Rating : 12Adc di picco/peak
2	Aux/Exc+		
3	Aux/Exc+	Alimentazione / Power	Frequenza/Frequency : da/from 12Hz a/to 72Hz Range: 40Vac - 270Vac
9	Aux/Neutral		
4	F_phase	Sensing	Range: 140Vac - 280Vac Assorbimento/Burden : <1VA
5	F_Phase		
6	H_phase	Sensing	Range: 70Vac - 140Vac Assorbimento/Burden : <1VA
7	H_phase		
8	Aux/Neutral		
10	Vext/Pext	Ingresso per controllo remoto della tensione	Tipo/Type: Non isolato/Not isolated Range: 0 - 2,5 Vdc o Potenziometro/Potentiometer 10K Regolazione/Adjustment: da/from -10% a/to +10% Assorbimento/Burden: 0 - 2 mA (sink) Lunghezza massima/Max length: 30m <sup>(2)</sup>
11	Common	Input for remote voltage control	
12	50/60Hz	Ingresso per jumper 50/60Hz	Tipo/Type: non isolato/not isolated Lunghezza massima/Max length: 3m
13	Common	Jumper Input 50/60Hz	
14	A.P.O.	Uscita protezioni attive	Tipo/Type: Open collector non isolato/not isolated Corrente/Current : 100mA Tensione/Voltage: 30V Lunghezza massima/Max length: 30m <sup>(2)</sup>
15	Common	Active protections output	

**Nota 1)** Sono connessi assieme sulla scheda i morsetti: 2 con 3, 4 con 5, 6 con 7, 8 con 9, 11 con 13 e 15.

**Nota 2)** con filtro EMI esterno (3m senza filtro EMI)

A bordo di alternatori nuovi di fabbrica il DSR è già tarato, in caso di regolatori sciolti (ad es. ricambi) o qualora siano richieste variazioni di cablaggio o di taratura, per garantirne il corretto funzionamento esso dovrà essere accuratamente impostato.

Le impostazioni basilari possono essere effettuate direttamente sul regolatore tramite i 4 trimmers (VOLT - STAB - Hz - AMP), il jumper 50/60 e l'ingresso Vext. Impostazioni o misure più dettagliate possono essere effettuate esclusivamente via software utilizzando ad esempio l'interfaccia di comunicazione MeccAlte DI1 e il programma DSR\_Terminal o DSR\_Reader.

#### Ingresso Vext

L'ingresso Vext (connettore CN1 morsetti 10 e 11) permette il controllo remoto analogico della tensione di uscita tramite un potenziometro da 10Kohm con range di variazione programmabile via software (di default l'impostazione è  $\pm 5\%$ ) rispetto al valore impostato; qualora si volesse impiegare una tensione continua, essa avrà effetto se compresa nel range da 0V a +2,5V. L'ingresso tollera tensioni da -5V a +5V ma per valori che eccedono i limiti 0V / +2,5V (o in caso di sconnessione) esso non viene considerato e la regolazione della tensione ritorna sul valore impostato tramite trimmer.

**NOTA** : La sorgente di tensione continua deve essere in grado di assorbire almeno 2 mA.

#### Segnale 50/60

Un jumper posto sull'ingresso 50/60 (connettore CN1 morsetti 12 e 13) comporta la commutazione della soglia di protezione di bassa velocità da  $50 \cdot (100\% - \alpha \text{Hz}\%)$  a  $60 \cdot (100\% - \alpha \text{Hz}\%)$  dove  $\alpha \text{Hz}\%$  rappresenta la posizione relativa del trimmer Hz.

#### Contatto APO

Acronimo di **Active Protection Output** : (connettore CN1 morsetti 14 e 15) transistor open collector non isolato 30V-100mA, normalmente aperto, si chiude (con un ritardo programmabile via software da 1 a 15 secondi) quando, tra tutti gli allarmi, ne risultano attivi uno o più selezionabili via software separatamente.

Il trimmer **VOLT** permette una regolazione da circa 70V a circa 140V qualora per il sensing si utilizzino i morsetti 4 e 5, oppure da circa 140V a circa 280V qualora si utilizzino i morsetti 6 e 7.

Il trimmer **STAB** regola la risposta dinamica (statismo) dell'alternatore in condizioni transitorie.

Il trimmer **AMP** regola la soglia di intervento della protezione di sovraccorrente di eccitazione.

Per tarare la protezione di sovraccarico seguire la seguente procedura:

- 1) ruotare il trimmer Hz tutto in senso antiorario
- 2) applicare all'alternatore il carico nominale
- 3) diminuire la velocità del 10%
- 4) ruotare il trimmer AMP completamente in senso antiorario
- 5) dopo alcuni secondi, si dovrà notare una diminuzione nel valore della tensione del generatore, e l'attivazione dell'allarme 5 (visibile tramite un cambio del lampeggio del LED)
- 6) In queste condizioni, ruotare lentamente il trimmer "AMP" in senso orario fino a portare il valore della tensione di uscita al 97% del valore nominale: l'allarme 5 è ancora attivo.
- 7) Riportandosi alla velocità nominale, dopo alcuni secondi l'allarme 5 scompare e la tensione del generatore sale al valore nominale.
- 8) ritarare il trimmer Hz come indicato al seguente paragrafo.

Il trimmer **Hz** permette la taratura della soglia d'intervento della protezione di bassa velocità fino al -20% rispetto al valore di velocità nominale impostato dal jumper 50/60 (a 50 Hz la soglia può essere tarata da 40Hz a 50Hz, a 60 Hz la soglia può essere tarata da 48Hz a 60Hz).

L'intervento della protezione fa diminuire la tensione del generatore e la taratura si effettua come segue :

- 1) ruotare il trimmer Hz tutto in senso antiorario
- 2) se la macchina deve funzionare a 60 Hz, assicurarsi che sia inserito il ponticello tra i morsetti 12 e 13 del connettore CN1
- 3) portare il generatore ad una velocità pari al 90% di quella nominale
- 4) agire lentamente sul trimmer "Hz" ruotandolo in senso orario affinché la tensione del generatore inizi a diminuire e simultaneamente accertarsi che il LED inizi a lampeggiare velocemente
- 5) aumentando la velocità, la tensione del generatore si dovrà normalizzare e l'allarme dovrà scomparire
- 6) riportare la velocità al valore nominale.

Durante funzionamento normale un LED montato sulla scheda lampeggia con periodo pari a 2sec e duty cycle del 50%; in caso di intervento o segnalazione di allarme si hanno diverse modalità di lampeggio come indicato in figura 1.

**NOTA:** Pur continuando a regolare la tensione, il DSR si pone in modalità di spegnimento qualora la frequenza scenda sotto i 20Hz. Per il ripristino è necessario fermare completamente l'alternatore.

DSR regulator, on board of new generators, is already calibrated; in case of loose regulators (ie spare parts) or in case of wiring modifications or adjusting, to guarantee its correct working, it must be accurately set .

Basic settings can be done directly on the regulator by its four trimmers (VOLT - STAB - Hz - AMP), the jumper 50/60 and the Vext input. More detailed settings or measures can be done exclusively by software using for example the MeccAlte communication interface DI1 and the program DSR\_Terminal or DSR\_Reader.

#### Vext Input

The Vext input (connector CN1 – terminals 10 and 11) permits analogical remote control of output voltage through a 10Kohm potentiometer with a programmable by software variation range (by default the setting is  $\pm 5\%$ ) with respect to the value set; if you want to use continuous voltage, it will be effective if it is in the range between 0V and +2,5V. The input tolerates voltages from -5V to +5V, but for values exceeding the limits of 0V / +2,5V (or in the event of disconnection) it is automatically disabled and the voltage adjustment goes back to the value set through the trimmer (if enabled).

**NOTE** : The DC voltage generator must be able to sink at least 2mA.

#### 50/60 Signal

A jumper is located on the 50/60 input (connector CN1, terminals 12 and 13); it provokes the commutation of the underspeed protection threshold from  $50 \cdot (100\% - \alpha \text{Hz}\%)$  to  $60 \cdot (100\% - \alpha \text{Hz}\%)$ , where  $\alpha \text{Hz}\%$  represents the position relative to the Hz trimmer.

#### APO Contact

The acronym **APO** stands for Active Protection Output: (connector CN1 – terminals 14 and 15) 30V-100mA non-insulated open collector transistor, normally opened, is closed (with a delay that can be programmed by software from 1 to 15 seconds) when, among all the alarms, one or more of the active ones can be selected separately by software.

The **VOLT** trimmer allows adjustment from about 70V to about 140V when using for sensing terminals 4 and 5, or from about 140V to about 280V when using terminals 6 and 7.

The **STAB** trimmer adjusts the dynamic response (statism) of the alternator under transient conditions.

The **AMP** trimmer adjusts the excitation overcurrent protection intervention threshold.

Use the following procedure in order to calibrate the overload protection:

- 1) Rotate the Hz trimmer entirely in the counter clockwise direction
- 2) Apply the nominal load to the alternator.
- 3) Decrease the speed by 10%
- 4) Rotate the AMP trimmer completely in the counter clockwise direction.
- 5) After a few seconds, there should be a decrease in the voltage value of the generator and alarm 5 should come on (visible due to a change in the flashing indicator light) .
- 6) Under these conditions, rotate the AMP trimmer slowly in the clockwise direction, until the output voltage value is 97% of the nominal value: alarm 5 is still activated.
- 7) Return to the nominal speed; alarm 5 should disappear in a few seconds and the generator voltage should increase to the nominal value.
- 8) Re-adjust the trimmer as indicated in the following paragraph.

The **Hz trimmer** allows to calibrate the threshold of the intervention of the under frequency protection up to -20% with respect to the nominal speed value set by jumper 50/60 (at 50 Hz the threshold can be calibrated from 40 Hz to 50 Hz, at 60 Hz the threshold can be calibrated from 48 Hz to 60 Hz).

The intervention of this protection reduce the output generator voltage and, to calibrate it, use the following procedure :

- 1) Rotate the Hz trimmer entirely in the counter clockwise direction.
- 2) If the machine has to operate at 60 Hz, ensure that the bridge is inserted between terminals 12 and 13 of the CN1 connector.
- 3) Bring the generator to 90% of the nominal speed.
- 4) Slowly turn the "Hz" trimmer, rotating it clockwise until the generator voltage begins to drop and ascertain that the indicator light simultaneously begins flashing rapidly.
- 5) By increasing speed, the generator voltage will normalise and the alarm will disappear.
- 6) Set the speed to the nominal value

During normal operation and a duty cycle of 50% an indicator light mounted on the board flashes every 2 seconds; it flashes differently in the event of intervention or alarm, as indicated in figure 1.

**NOTE:** Notwithstanding DSR maintains the voltage regulation, it goes in shutdown mode if the frequency decreases under 20Hz. The reset needs the Gen-Set switching off.

N.	Descrizione evento <i>Description of event</i>	Azione <i>Action</i>
1	Checksum EEprom	Ripristino dati default, Blocco Reset default, Blockage
2	Sovratensione / <i>Overvoltage</i>	APO
3	Sottotensione / <i>Under voltage</i>	APO
4	Corto circuito / <i>Short circuit</i>	APO, Massima corrente, Blocco APO, Maximum current, Blockage
5	Sovracorrente di eccitazione <i>Excitation Overcurrent</i>	APO, Riduzione corrente di eccitazione APO, Reduction of excitation current
6	Bassa velocità / <i>Underspeed</i>	APO, Rampa/Ramp V/F
7	Sovravelocità / <i>Overspeed</i>	APO

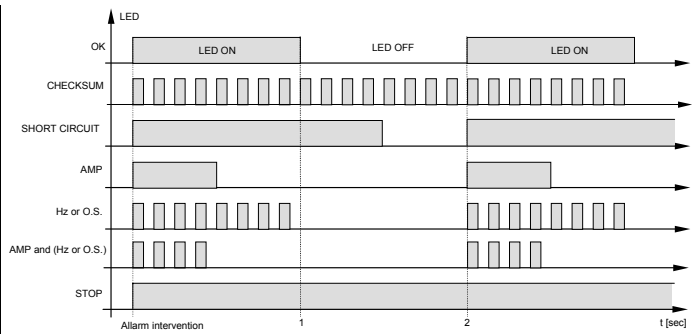
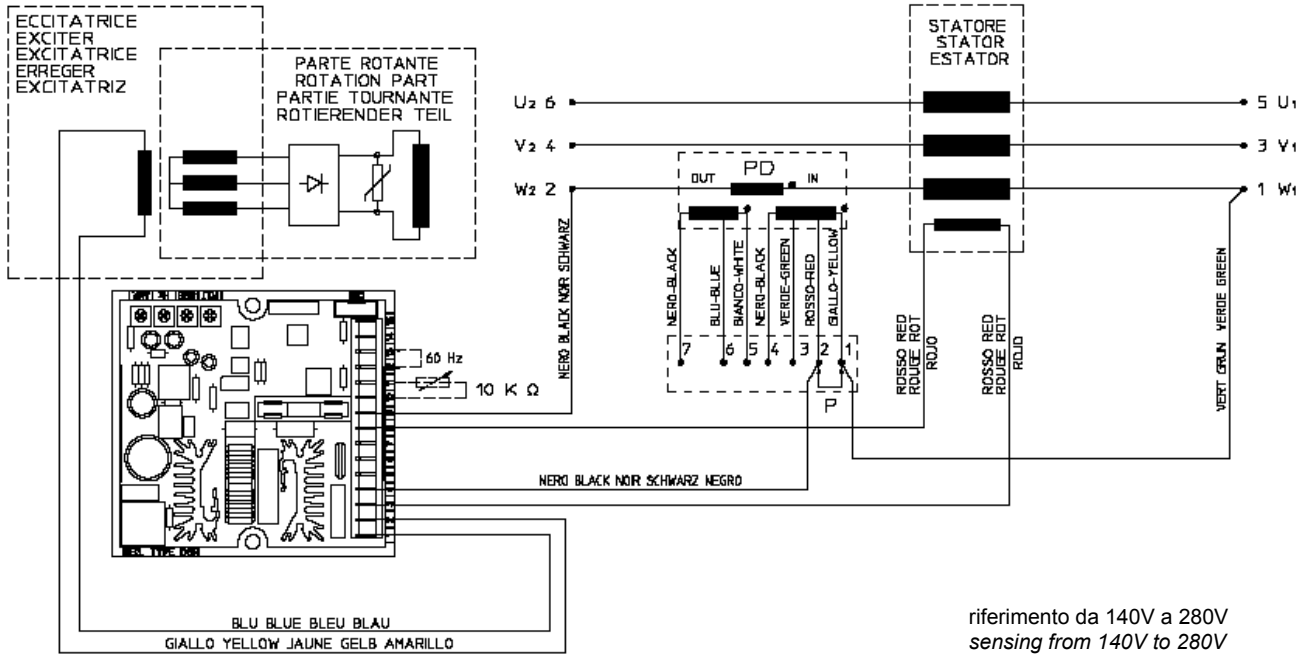


Fig. 1

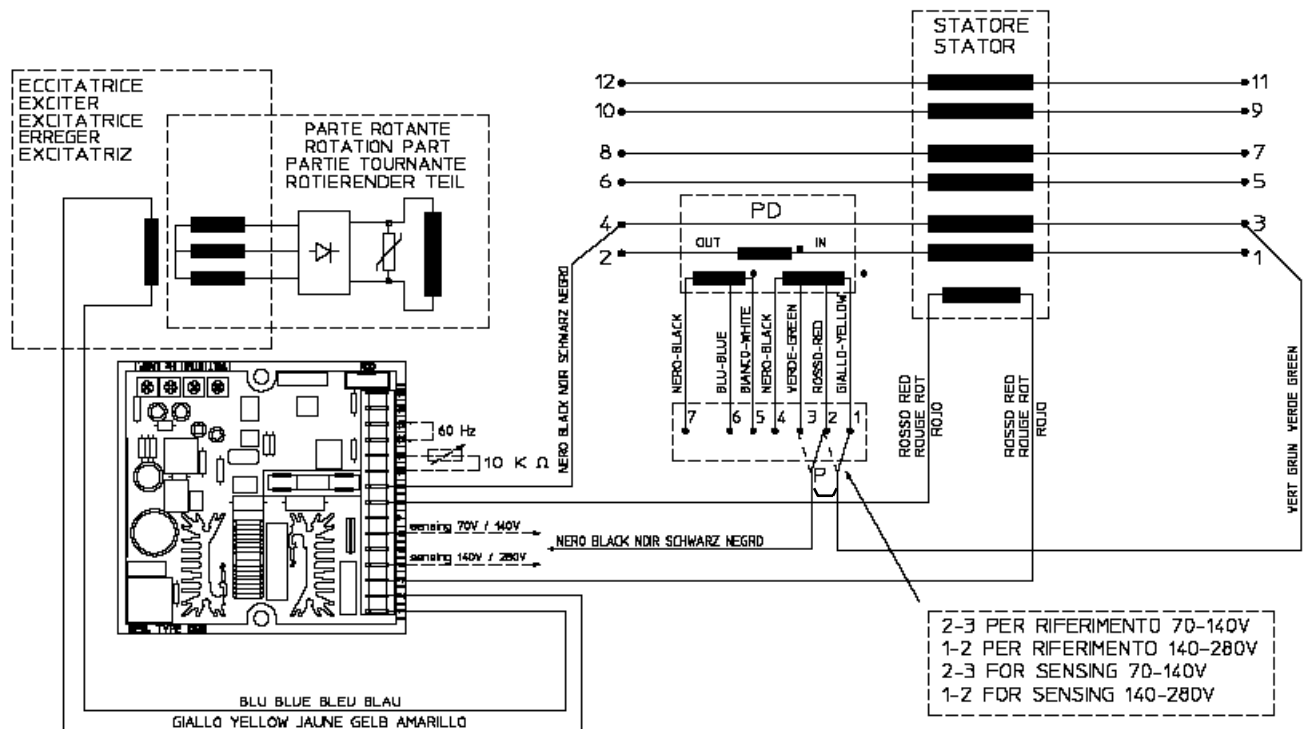
**Alternatori a 6 morsetti / 6 terminal alternators**

SCC0061/02



**Alternatori a 12 morsetti/12 terminal alternators**

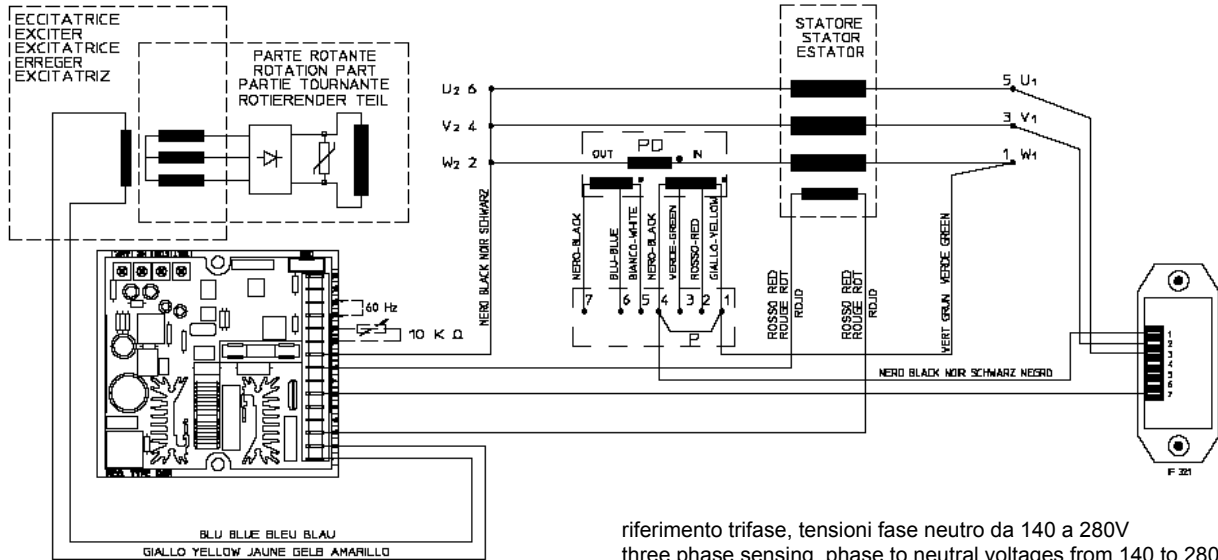
SCC0100/00



morsetto/terminal 4 : sensing 140V / 280V  
morsetto/terminal 6 : sensing 70V / 140V

**Alternatori a 6 morsetti, riferimento trifase/6 terminal alternators, three-phase sensing**

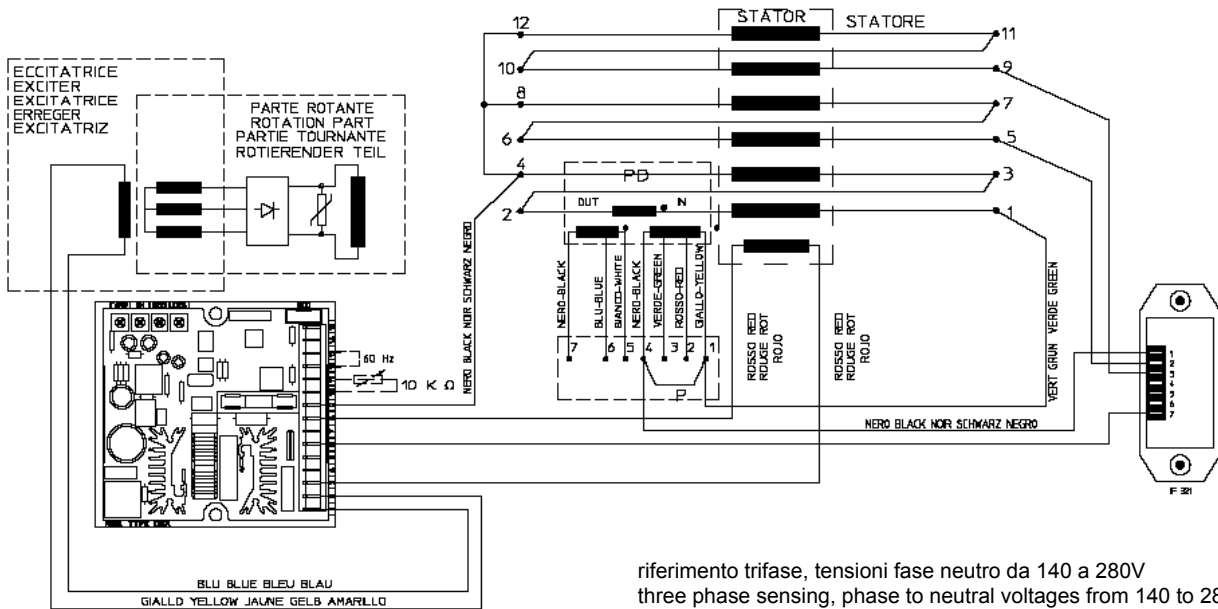
SCC0104/00



riferimento trifase, tensioni fase neutro da 140 a 280V  
three phase sensing, phase to neutral voltages from 140 to 280V

**Alternatori a 12 morsetti, riferimento trifase/12 terminal alternators, three-phase sensing**

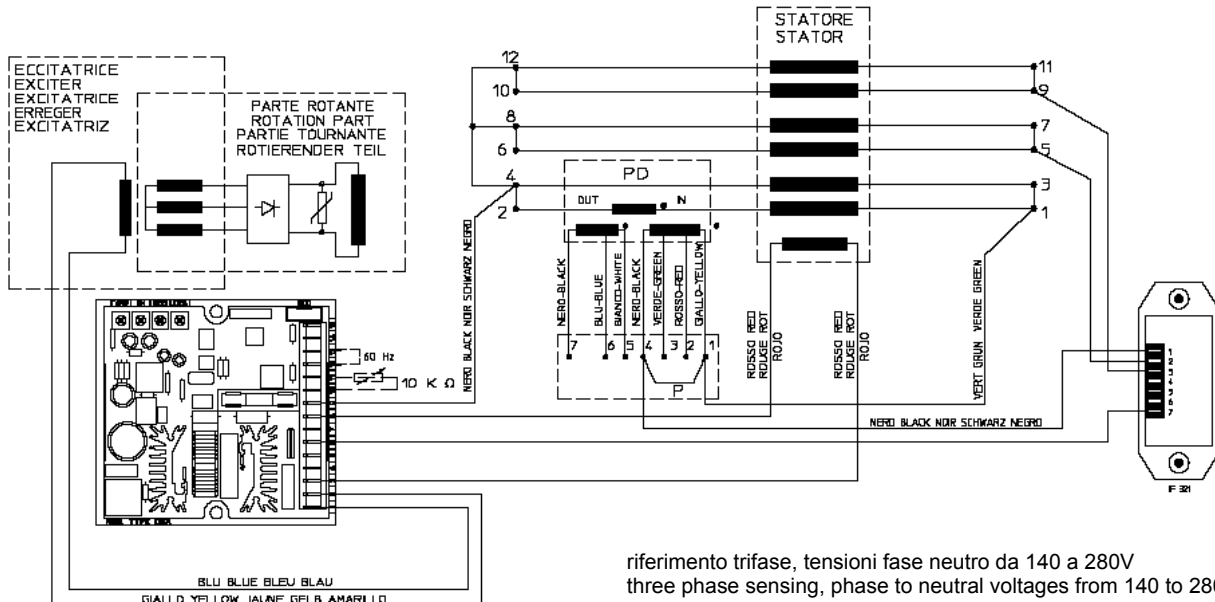
SCC0106/00



riferimento trifase, tensioni fase neutro da 140 a 280V  
three phase sensing, phase to neutral voltages from 140 to 280V

**Alternatori a 12 morsetti, riferimento trifase/12 terminal alternators, three-phase sensing**

SCC0105/00



riferimento trifase, tensioni fase neutro da 140 a 280V  
three phase sensing, phase to neutral voltages from 140 to 280V



## GARANZIA

### A

La Mecc Alte garantisce la buona costruzione e qualita' dei propri alternatori per 24 mesi dalla data di spedizione dai propri stabilimenti o filiali.

### B

Durante il suddetto periodo la Mecc Alte si impegna a riparare o sostituire (a proprie spese) nella propria sede, quelle parti che si fossero avariate, senza pero' essere tenuta a risarcimenti di danni diretti o indiretti.

### C

La decisione sul riconoscimento o meno della garanzia e' riservata esclusivamente alla Mecc Alte previo esame delle parti avariate che dovranno per-venire in porto franco, alla sua sede di Vicenza.

### D

Tutte le eventuali spese di viaggio, trasferta, trasporto, mano d'opera per lo smontaggio e rimontaggio dell'alternatore dall'apparecchiatura azionante sono sempre a carico dell'utente.

### E

La garanzia decade se durante il periodo predetto, i prodotti fossero:

1 immagazzinati in luogo non adatto;

2 riparati o modificati da personale non autorizzato dalla Mecc Alte;

3 usati o sottoposti a manutenzione non in base alle norme stabilite dalla Mecc Alte;

4 sovraccaricati o impiegati in prestazioni diverse da quelle per le quali sono stati forniti.

La garanzia cessa comunque qualora il cliente fosse inadempiente nei pagamenti per qualunque ragione.

## WARRANTY

### A

Mecc Alte warrants the good manufacture and quality of all its products for 24 months, starting from the time of shipment from our factories or our branches.

### B

During said period Mecc Alte obliges to repair or replace at its cost, at its works, all those parts which failed without any other liability of any type, direct or indirect.

### C

The decision for warranty approval is Mecc Alte's exclusive right and subject to a previous examination of the failed parts which are to be forwarded fob Mecc Alte Italy for analysis.

### D

All the eventual expenses concerning travel, board, transport, and labour for assembly/disassembly of alternator from the drive unit are always at the user's charge.

### E

The warranty shall be void if during the above described period the following anomalies should occur:

1 inadequate storage;

2 repair or modification by unauthorized personnel;

3 use or maintenance conditions which do not conform with norms established by Mecc Alte;

4 overload or application other than what the product was meant for.

Warranty coverage also expires whenever the client, for whatever reason, is late in payment.

## GARANTIE

### A

La société Mecc Alte garantit la bonne construction et qualité de ses produits pour une durée de 24 mois à compter de la date d'expédition de ses usines de fabrication ou filiales.

### B

Durant la période indiquée, Mecc Alte s'engage à réparer ou à remplacer (à prix équivalent) dans la société, la partie qui serait endommagée sans toutefois être tenue de prendre en considération les frais directs ou indirects.

### C

La décision sur la prise en charge ou non de la garantie est réservée exclusivement à Mecc Alte sur examen préalable des pièces endommagées qui devront parvenir en port Franco à l'usine de Vicenza.

### D

Tout les éventuels frais de voyage, transfert, transport, main d'oeuvre pour le démontage de l'alternateur sont toujours à la charge de l'utilisateur.

### E

La garantie ne s'applique pas si durant la période indiquée il y a:

1 emmagasinement dans un local non adapté;

2 réparations ou modifications personnelles non autorisées par Mecc Alte;

3 usage et manutentions non conformes aux normes établies par Mecc Alte;

4 surcharges et emplois des fonctions différentes de celles pour lequel ils sont fournis.

Il est bien évident que la garantie ne s'applique que sur le matériel payé en totalité.

## GARANTIE

### A

Die Firma Mecc Alte gibt 24 Monate Garantie ab dem Zeitpunkt der Auslieferung vom Stammhaus oder einer ihrer Filialen auf die einwandfreie Konstruktion und Qualität ihrer Generatoren.

### B

Während der genannten Periode repariert oder ersetzt Mecc Alte zu seinen Kosten alle fehlerhaften Teile, ohne Rücksicht ob direkt oder indirekt.

### C

Mecc Alte behält sich das Recht vor, die fehlerhaften Teile frei Mecc Alte Vicenza zurückzufordern, z u r Schadensuntersuchung

### D

Alle eventuellen Kosten wie Transport, Fahrtkosten, Arbeitslohn für De-und Montage gehen zu Lasten des Kunden.

### E

Die Garantie in O.A. Zeit wird für nachstehende Faktoren ausgeschlossen:

1 nicht korrekte Lagerung;

2 Reparatur oder Modifizierung durch nicht von Mecc Alte autorisiertem Personal;

3 Gebrauch oder Einsatz bei Konditionen die nicht der Norm von Mecc Alte entsprechen;

4 Überlast Gebrauch oder Montage anders als wofür das Produkt bestimmt ist.

Die Garantie erlischt auch, wenn aus welchen Gründen auch immer, der Kunde in Zahlung überfällig ist.

## GARANTIA

### A

Mecc alte garantiza la buena construccion y calidad de los propios productos por 24 meses desde la fecha de salida de sus fabricas o de sus filiales.

### B

Durante dicho periodo la Mecc Alte se obliga a reparar o sustituir a su cargo, en su establecimiento todas aquellas piezas que hubieran sido averiadas, sin hacerse cargo de otro tipo de danos, directos o indirectos.

### C

La decision acerca del reconocimiento de garantia esta reservada exclusivamente a la Mecc Alte, previo examen de las partes averiadas que deberan permanecer en puerto franco o en su propia sede de Vicenza.

### D

Todos los eventuales gastos de transporte, viaje, transferencia o mano de obra, para el desmontaje y nuevo montaje, del alternador o elemento accionante seran siempre a cargo del usuario.

### E

La garantia caduca si durante el periodo descrito se produjeran las siguientes anomalias:

1 almacenaje en lugar inadecuado;

2 reparacion o modificacion por personal no autorizado por Mecc Alte;

3 utilizacion o condiciones de manutencion que contravengan las normas establecidas por Mecc Alte;

4 sobrecarga o empleo en prestaciones distintas de aquellas para las que ha estado suministrado.

La garantia cesa igualmente en el momento que el cliente sea moroso de pago, cualquiera que sea la razon.



ESlAlaska.com

# Engine Manual

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- Japan : **KUBOTA Corporation**  
Engine Export Dept.  
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Code No. 1J778-8915-9

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## OPERATOR'S MANUAL KUBOTA DIESEL ENGINE

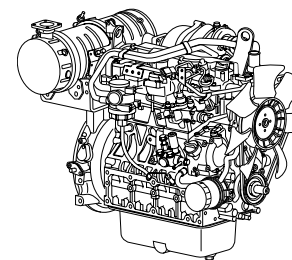
## MANUEL DE L'OPERATEUR MOTEUR DIESEL DE KUBOTA

## BEDIENUNGSANLEITUNG KUBOTA DIESEL MOTOR

## MANUALE DELL'OPERATORE KUBOTA MOTORE DIESEL

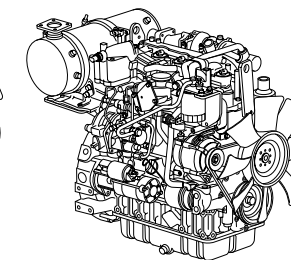
## MANUAL DE INSTRUCCIONES KUBOTA MOTOR DIESEL

**D1803-CR-TIE4  
V2403-CR-TIE4**



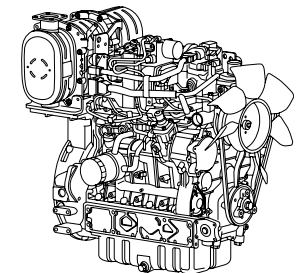
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**V2607-CR-TIE4  
V3307-CR-TIE4  
V3307-TIE4A**



1ABAHABAP0070

**V3800-TIE4**



1ABADBMAP0230

READ AND SAVE THIS BOOK  
MANUEL A LIRE ET A CONSERVER  
DIESE ANLEITUNG BITTE SORGFÄLTIG DURCHLESEN  
UND GRIFFBEREIT AUFBEWAHREN  
LEGGETE E CONSERVATE QUESTO MANUALE  
LEAN Y CONSERVEN ESTE MANUAL

California Proposition 65

**▲ WARNING ▲**

Engine exhaust, some of its constituents, certain vehicle components and fluids, contain or emit chemicals known to the State of California to cause cancer and birth defects or other reproductive harm.

D1803-CR-TIE4/V2403-CR-TIE4  
V2607-CR-TIE4/V3307-CR-TIE4  
V3307-TIE4A/V3800-TIE4  
BA. A. 10-27. 15. K

# OPERATOR'S MANUAL

ENGLISH

# KUBOTA DIESEL ENGINE

## MODELS

**D1803-CR-TIE4**

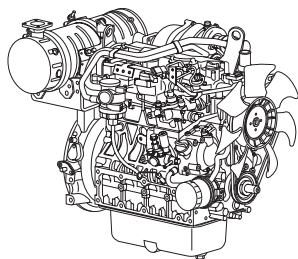
**V2403-CR-TIE4**

**V2607-CR-TIE4**

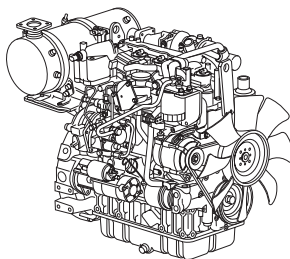
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**V3307-TIE4A**

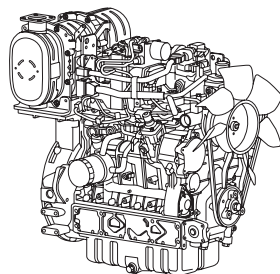
**V3800-TIE4**



1ABACCJAP0070



1ABAHABAP0070



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*READ AND SAVE THIS BOOK*

**Kubota**

# FOREWORD

You are now the proud owner of a KUBOTA Engine. This engine is a product of KUBOTA quality engineering and manufacturing. It is made of fine materials and under a rigid quality control system. It will give you long, satisfactory service. To obtain the best use of your engine, please read this manual carefully. It will help you become familiar with the operation of the engine and contains many helpful hints about engine maintenance. It is KUBOTA's policy to utilize as quickly as possible every advance in our research. The immediate use of new techniques in the manufacture of products may cause some small parts of this manual to be outdated. KUBOTA distributors and dealers will have the most up-to-date information. Please do not hesitate to consult with them.

This Operator's Manual should be considered a permanent part of the engine and should remain with the engine when it is resold.



## SAFETY FIRST

This symbol, the industry's "Safety Alert Symbol", is used throughout this manual and on labels on the machine itself to warn of the possibility of personal injury. Read these instructions carefully. It is essential that you read the instructions and safety regulations before you attempt to assemble or use this unit.



**DANGER :** Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.



**WARNING :** Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.



**CAUTION :** Indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury.

**IMPORTANT :** Indicates that equipment or property damage could result if instructions are not followed.

**NOTE :** Gives helpful information.

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# SAFE OPERATION

Careful operation is your best assurance against an accident. Read and understand this section carefully before operating the engine. All operators, no matter how much experience they may have, should read this and other related manuals before operating the engine or any equipment attached to it. It is the owner's obligation to provide all operators with this information and instruct them on safe operation.

Be sure to observe the following for safe operation.

## 1. OBSERVE SAFETY INSTRUCTIONS

- Read and understand carefully this "OPERATOR'S MANUAL" and "LABELS ON THE ENGINE" before attempting to start and operate the engine.
- Learn how to operate and work safely. Know your equipment and its limitations. Always keep the engine in good condition.
- Before allowing other people to use your engine, explain how to operate and have them read this manual before operation.
- DO NOT modify the engine. UNAUTHORIZED MODIFICATIONS to the engine may impair the function and/or safety and affect engine life. If the engine does not perform properly, consult your local Kubota Engine Distributor first.



1AAACAAAAP008B

## 2. WEAR SAFE CLOTHING AND PERSONAL PROTECTIVE EQUIPMENT (PPE)

- DO NOT wear loose, torn or bulky clothing around the machine that may catch on working controls and projections or into fans, pulleys and other moving parts causing personal injury.
- Use additional safety items-PPE, e.g. hard hat, safety protection, safety goggles, gloves, etc., as appropriate or required.
- DO NOT operate the machine or any equipment attached to it while under the influence of alcohol, medication, or other drugs, or while fatigued.
- DO NOT wear radio or music headphones while operating the engine.



1AEAAAAAP0133

### 3. CHECK BEFORE STARTING AND OPERATING THE ENGINE

- Be sure to inspect the engine before operation. Do not operate the engine if there is something wrong with it. Repair it immediately.
- Ensure all guards and shields are in place before operating the engine. Replace any that are damaged or missing.
- Check to see that you and others are a safe distance from the engine before starting.
- Always keep the engine at least 3 feet (1 meter) away from buildings and other facilities.
- DO NOT allow children or livestock to approach the machine while the engine is running.
- DO NOT start the engine by shorting across starter terminals. The machine may start in gear and move. Do not bypass or defeat any safety devices.



1BAABADAP0010

### 4. KEEP THE ENGINE AND SURROUNDINGS CLEAN

- Be sure to stop the engine before cleaning.
- Keep the engine clean and free of accumulated dirt, grease and trash to avoid a fire. Store flammable fluids in proper containers and cabinets away from sparks and heat.
- Check for and repair leaks immediately.
- DO NOT stop the engine without idling; Allow the engine to cool down, first. Keep the engine idling for about 5 minutes before stopping unless there is a safety problem that requires immediate shut down.



1AEFAAAAAP0120

### 5. SAFE HANDLING OF FUEL AND LUBRICANTS -KEEP AWAY FROM FIRE

- Always stop the engine before refueling and/or lubricating.
- DO NOT smoke or allow flames or sparks in your work area. Fuel is extremely flammable and explosive under certain conditions.
- Refuel at a well ventilated and open place. When fuel and/or lubricants are spilled, refuel after letting the engine cool down.
- DO NOT mix gasoline or alcohol with diesel fuel. The mixture can cause a fire or severe engine damage.
- Do not use unapproved containers e.g. buckets, bottles, jars. Use approved fuel storage containers and dispensers.



1AAACAAAP001A

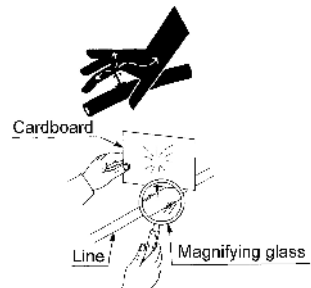
## 6. EXHAUST GASES AND FIRE PREVENTION

- Engine exhaust fumes can be very harmful if allowed to accumulate. Be sure to run the engine in a well ventilated location and where there are no people or livestock near the engine.
- The exhaust gas from the muffler is very hot. To prevent a fire, do not expose dry grass, mowed grass, oil or any other combustible materials to exhaust gas. Keep the engine and muffler clean at all times.
- To avoid a fire, be alert for leaks of flammable substances from hoses and lines. Be sure to check for leaks from hoses or pipes, such as fuel and hydraulic fluid by following the maintenance check list.
- To avoid a fire, do not short across power cables and wires. Check to see that all power cables and wirings are in good condition. Keep all electrical connections clean. Bare wire or frayed insulation can cause a dangerous electrical shock and personal injury.
- Make sure there is nothing flammable around muffler.
- Do not touch the muffler nor get yourself directly exposed to exhaust gases. You may get burnt.
- Inspect the exhaust system daily for any signs of leakage. Check for broken pipes and muffler and also for loose or missing bolts, nuts and clamps. If any exhaust leaks or fractured parts are found, repairs must be completed prior to operation.



## 7. ESCAPING FLUID

- Relieve all pressure in the air, the oil and the cooling systems before disconnecting any lines, fittings or related items.
- Relieve all pressure in any system before disconnecting any lines, fittings, or related items.  
DO NOT check for pressure leaks with your hand. High pressure oil or fuel can cause personal injury.
- Escaping fluid under pressure has sufficient force to penetrate skin causing serious personal injury.
- Fluid escaping from pinholes may be invisible. Use a piece of cardboard or wood to search for suspected leaks: do not use hands and body. Use safety goggles or other eye protection when checking for leaks.
- If injured by escaping fluid, see a medical doctor immediately. This fluid can produce gangrene or severe allergic reaction.



\*ABAAAAAP120F

## 8. CAUTIONS AGAINST BURNS AND BATTERY EXPLOSION

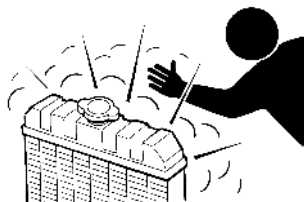
- To avoid burns, be cautious of hot components, e.g. muffler, exhaust piping, turbo charger, EGR system, radiator, hoses, engine body, coolants, engine oil, etc. during operation and after the engine has been shut off.
- DO NOT remove the radiator cap while the engine is running or immediately after stopping. Otherwise hot coolant will spout out from the radiator. Wait until the radiator is completely cool to the touch before removing the cap. Wear safety goggles.
- Be sure to close the coolant drain plugs, secure the pressure cap, and fasten the pipe bands before operating. If these parts are taken off, or loosened, it will result in serious personal injury.
- The battery presents an explosive hazard. When the battery is being charged, hydrogen and oxygen gases are extremely explosive.
- DO NOT use or charge the battery if its fluid level is below the LOWER mark.

Otherwise, the component parts may deteriorate earlier than expected, which may shorten the service life or cause an explosion. Immediately, add distilled water until the fluid level is between the UPPER and LOWER marks.

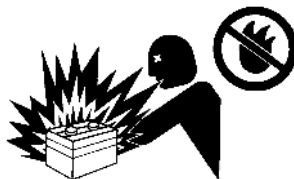
- Keep sparks and open flames away from the battery, especially during charging. DO NOT strike a match near the battery.
- DO NOT check the battery charge by placing a metal object across the terminals. Use a voltmeter or hydrometer.
- DO NOT charge a frozen battery. There is a risk of explosion. When frozen, warm the battery up to at least 16°C (61°F).



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1ARAEAAAAP0520

## 9. KEEP HANDS AND BODY AWAY FROM ROTATING PARTS

- Be sure to stop the engine before checking or adjusting the belt tension and cooling fan.
- Keep your hands and body away from rotating parts, such as the cooling fan, V-belt, fan drive pulley or flywheel. Contact with rotating parts can cause severe personal injury.
- DO NOT run the engine without safety guards. Install safety guards securely before operation.



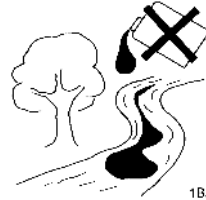
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## 10. ANTIFREEZE AND DISPOSAL OF FLUIDS

- Antifreeze is poisonous. If it is swallowed, seek immediate medical help. Do NOT make a person throw up unless told to do so by poison control or a health care professional. Use standard first aid and CPR for signs of shock or cardiac arrest. Call your local Poison Control Center or your local emergency number for further assistance.
- Wear rubber gloves to avoid personal injury, when you treat antifreeze. In case of contact with skin, wash it off immediately.
- DO NOT mix different types of antifreeze. The mixture can produce a chemical reaction causing harmful substances. Use approved or genuine KUBOTA antifreeze.
- Be mindful of the environment and the ecology. Before draining any fluids, determine the correct way to dispose of them. Observe the relevant environmental protection regulations when disposing of oil, fuel, coolant, brake fluid, filters and batteries.
- When draining fluids from the engine, place a suitable container underneath the engine body.
- DO NOT pour waste onto the ground, down a drain, or into any water source. Dispose of waste fluids according to environmental regulations.



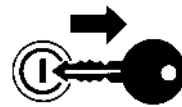
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## 11. CONDUCTING SAFETY CHECKS AND MAINTENANCE

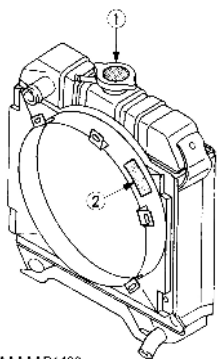
- When inspecting the engine or servicing, place the engine on a large flat surface. DO NOT work on anything that is supported ONLY by lift jacks or a hoist. Always use blocks or the correct stands to support the engine before servicing.
- Disconnect the battery from the engine before conducting service. Put a "DO NOT OPERATE!" tag on the starter switch to avoid accidental starting.
- To avoid sparks from an accidental short circuit always disconnect the battery's ground cable (-) first and reconnect it last.
- Be sure to stop the engine and remove the key when conducting daily and periodic maintenance, service and cleaning.
- Check or conduct maintenance after the engine, coolant, muffler, or muffler cover have cooled off completely.
- Always use the appropriate tools and fixtures. Verify that they are in good condition before performing any service work. Make sure you understand how to use them before service.
- Use ONLY correct engine barring techniques for manually rotating the engine. DO NOT attempt to rotate the engine by pulling or prying on the cooling fan and V-belt. This practice can cause serious personal injury or premature damage to the cooling fan and belt.



1BJABAAAAP0200

- Replace fuel pipes and lubricant pipes with their hose clamps every 2 years or earlier whether they are damaged or not. They are made of rubber and age gradually.
- Keep a first aid kit and appropriate type fire extinguisher handy at all times.

## 12. SAFETY LABELS



1ABAAAAAP1480

- ① The following label is just an example. A different label might be applied on the actual machine.



1ABACAAAP038K

- ② Part No.TA040-4957-1  
Do not get your hands close to engine fan and fan belt.



1AGAWAAP2620

## 13. CARE OF SAFETY LABELS

1. Keep safety labels clean and free from obstructing material.
2. Clean safety labels with soap and water, dry with a soft cloth.
3. Replace damaged or missing safety labels with new labels from your local KUBOTA Dealer.
4. If a component with safety label(s) affixed is replaced with a new part, make sure the new label(s) is (are) attached in the same location(s) as the replaced component.
5. Mount new safety labels by applying to a clean dry surface and pressing any bubbles to the outside edge.

# SERVICING THE ENGINE

Your dealer has knowledge of your new engine and has the desire to help you get the most value from it. After reading this manual thoroughly, you will find that you can do some of the regular maintenance yourself.

However, when in need of parts or major service, be sure to see your KUBOTA Dealer.

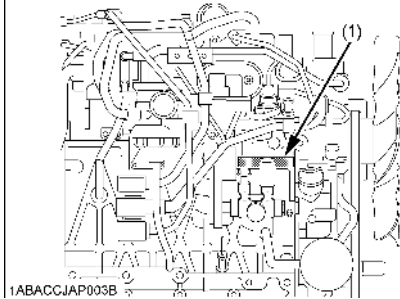
For service, contact the KUBOTA Dealership from which you purchased your engine or your local KUBOTA Dealer.

When in need of parts, be prepared to give your dealer the engine serial number.

Locate the serial number now and record them in the space provided.

	Type	Serial No.
Engine		
Date of Purchase		
Name of Dealer		
(To be filled in by purchaser)		

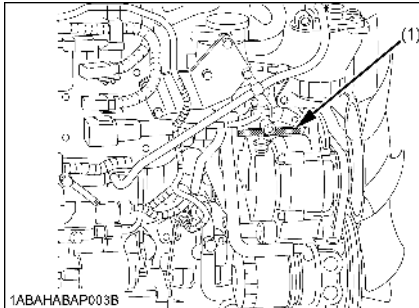
## [D1803-CR-TIE4, V2403-CR-TIE4]



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(1) Engine serial number

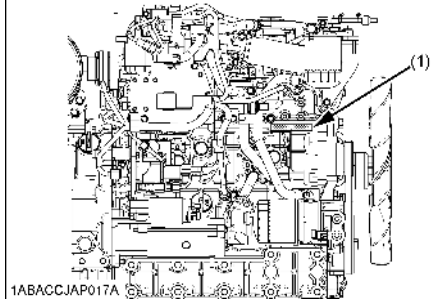
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(1) Engine serial number

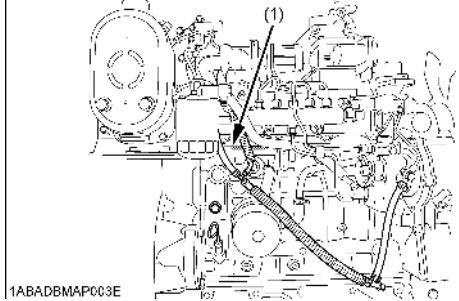
## [V3307-TIE4A]



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(1) Engine serial number

## [V3800-TIE4]



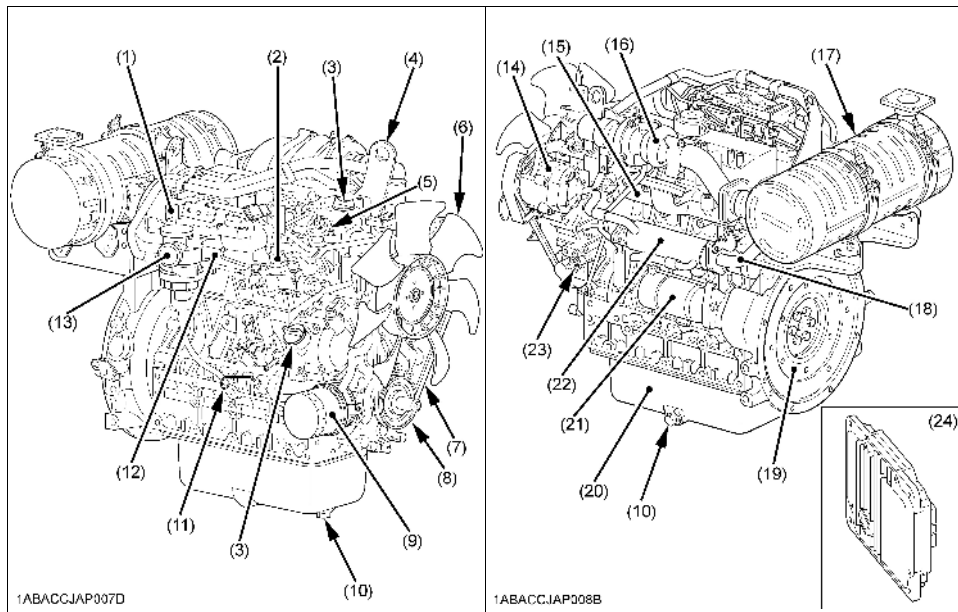
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(1) Engine serial number



# NAMES OF PARTS

[D1803-CR-TIE4, V2403-CR-TIE4]



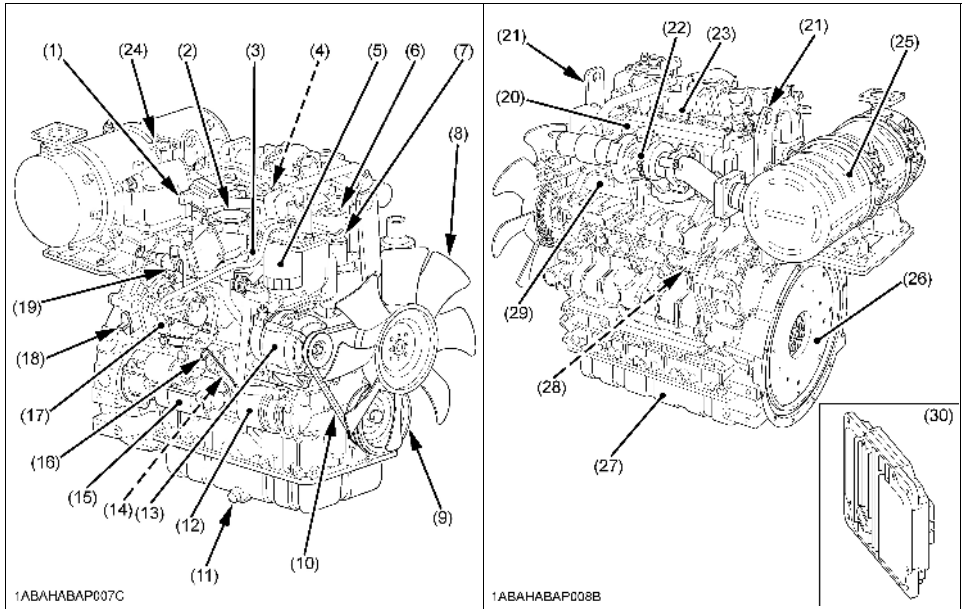
- (1) EGR valve
- (2) Supply pump
- (3) Oil filler plug
- (4) Engine hook
- (5) Rail
- (6) Cooling fan
- (7) Fan belt
- (8) Fan drive pulley
- (9) Oil filter cartridge
- (10) Oil drain plug
- (11) Oil level gauge
- (12) Intake manifold

- (13) Oil separator
- (14) Alternator
- (15) Exhaust manifold
- (16) Turbo charger
- (17) DOC (Diesel Oxidation Catalyst)
- (18) EGR pipe
- (19) Flywheel
- (20) Oil pan
- (21) Starter
- (22) EGR cooler
- (23) Oil pressure switch
- (24) ECU (Engine Control Unit)

**NOTE :**

- (24) ECU (Engine Control Unit) is not connected to the engine in the figure above.

[V2607-CR-TIE4, V3307-CR-TIE4]



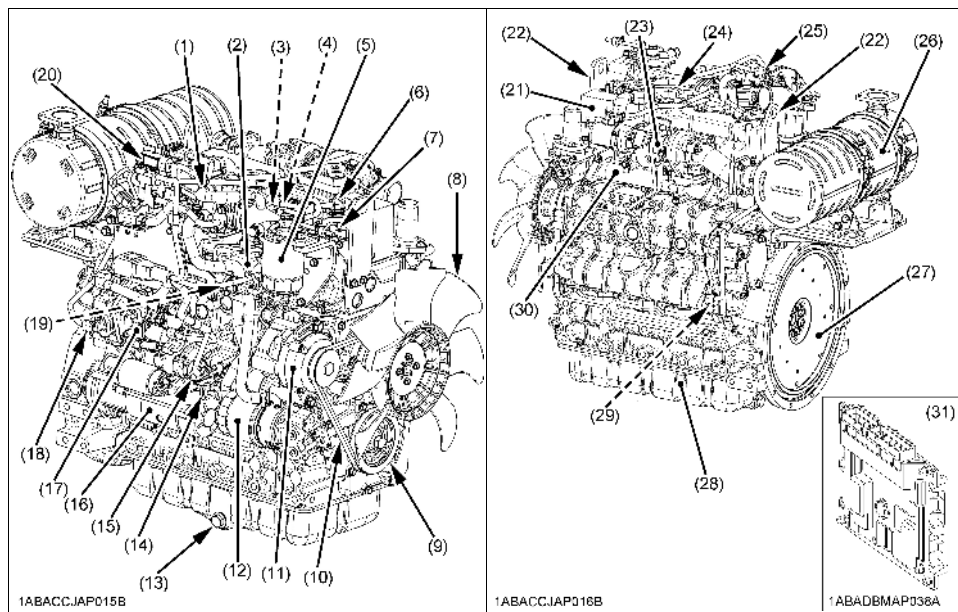
- (1) EGR valve
- (2) Oil separator
- (3) Intake manifold
- (4) Glow plug
- (5) Fuel filter cartridge
- (6) Injector
- (7) Oil filler plug
- (8) Cooling fan
- (9) Fan drive pulley
- (10) Fan belt
- (11) Oil drain plug
- (12) Oil filter cartridge
- (13) Alternator
- (14) Oil pressure switch
- (15) Starter

- (16) Oil level gauge
- (17) Supply pump
- (18) NE sensor
- (19) Rail
- (20) Head cover
- (21) Engine hook
- (22) Turbo charger
- (23) EGR cooler
- (24) Boost sensor
- (25) DOC (Diesel Oxidation Catalyst)
- (26) Flywheel
- (27) Oil pan
- (28) G sensor
- (29) Exhaust manifold
- (30) ECU (Engine Control Unit)

**NOTE :**

- (30) ECU (Engine Control Unit) is not connected to the engine in the figure above.

## [V3307-TIE4A]



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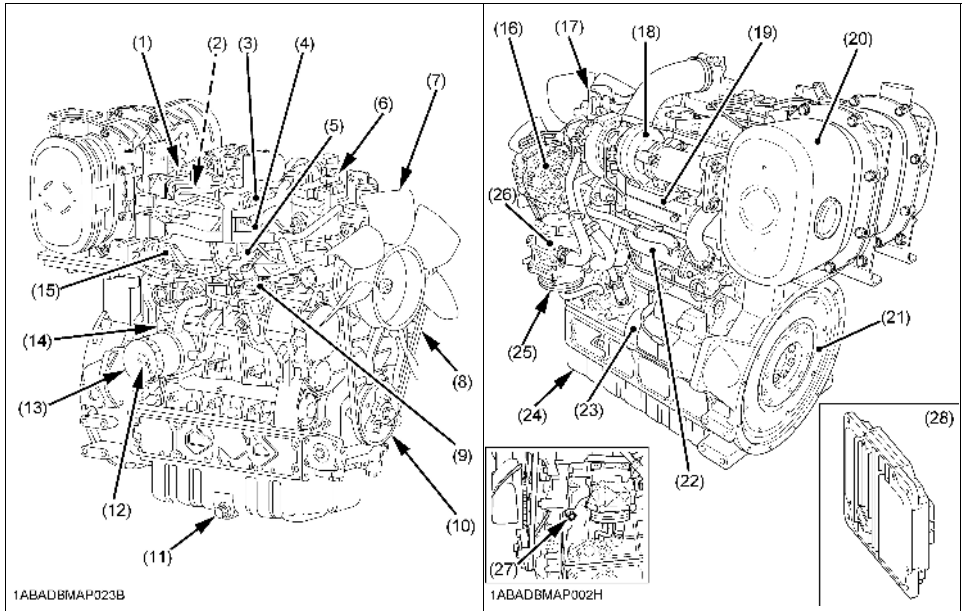
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- |                           |   |
|---------------------------|---|
| (1) EGR valve             | (17) Supply pump                        |
| (2) Intake manifold       | (18) NE sensor                          |
| (3) Glow plug             | (19) Rail                               |
| (4) Temperature sensor    | (20) Differential pressure sensor (AFM) |
| (5) Fuel filter cartridge | (21) Head cover                         |
| (6) Injector              | (22) Engine hook                        |
| (7) Oil filler plug       | (23) Turbo charger                      |
| (8) Cooling fan           | (24) EGR cooler                         |
| (9) Fan drive pulley      | (25) Boost sensor                       |
| (10) Fan belt             | (26) DOC (Diesel oxidation catalyst)    |
| (11) Alternator           | (27) Flywheel                           |
| (12) Oil filter cartridge | (28) Oil pan                            |
| (13) Oil drain plug       | (29) G sensor                           |
| (14) Oil level gauge      | (30) Exhaust manifold                   |
| (15) Oil pressure switch  | (31) ECU (Engine Control Unit)          |
| (16) Starter              |   |

**NOTE :**

- (31) ECU (Engine Control Unit) is not connected to the engine in the figure above.

[V3800-TIE4]



- (1) EGR pipe
- (2) EGR valve
- (3) Intake air throttle
- (4) Intake air heater
- (5) Intake manifold
- (6) Oil filler plug
- (7) Cooling fan
- (8) Fan belt
- (9) Supply pump
- (10) Fan drive pulley
- (11) Oil drain plug
- (12) Oil level gauge
- (13) Oil filter cartridge
- (14) Coolant drain plug
- (15) Rail

- (16) Alternator
- (17) Engine hook
- (18) Turbo charger
- (19) Exhaust manifold
- (20) DOC (Diesel Oxidation Catalyst)
- (21) Flywheel
- (22) EGR cooler
- (23) Starter
- (24) Oil pan
- (25) PCV valve (Positive Crankcase Ventilation valve)
- (26) Oil separator
- (27) Oil pressure switch
- (28) ECU (Engine Control Unit)

**NOTE :**

- (28) ECU (Engine Control Unit) is not connected to the engine in the figure above.

# PRE-OPERATION CHECK

## BREAK-IN

During the engine break-in period, observe the following by all means:

1. Change engine oil and oil filter cartridge after the first 50 hours of operation. (See "Changing engine oil" and "Replacing oil filter cartridge" in "EVERY 400 SERVICE HOURS" (D1803-CR-TIE4, V2403-CR-TIE4) or "EVERY 500 SERVICE HOURS" and "EVERY 500 SERVICE HOURS OR 1 YEAR" (V2607-CR-TIE4, V3307-CR-TIE4, V3307-TIE4A, V3800-TIE4) in "REGULAR CHECKS AND MAINTENANCE WORK" section.)
2. When ambient temperature is low, operate the machine after the engine has been completely warmed up.

## DAILY CHECK

To prevent trouble from occurring, it is important to know the conditions of the engine well. Check it before starting.



### WARNING

To avoid personal injury or death:

- Be sure to install shields and safeguards attached to the engine when operating.
- Stop the engine at a flat and wide space when checking.
- Keep dust or fuel away from the battery, wiring, muffler and engine to prevent a fire. Check and clear them before operating every day. Pay attention to the heat of the exhaust pipes or exhaust gas so that it can-not ignite trash.

Item		Ref. page
1. Parts which had trouble in previous operation		-
2. By walking around the machine	(1) Oil or cooling water (coolant) leaks	24
	(2) Engine oil level and contamination	15
	(3) Amount of fuel	17
	(4) Amount of coolant	17 to 19
	(5) Dust in air cleaner dust cup	22
	(6) Damaged parts and loosened bolts and nuts	-
3. By inserting the key into the starter switch	(1) Proper functions of meters and pilot lamps; no stains on these parts	-
4. By starting the engine	(1) Color of exhaust fumes	9
	(2) Unusual engine noise	9
	(3) Engine start-up condition	8
	(4) Slow-down and acceleration behavior	9

# OPERATING THE ENGINE

## STARTING THE ENGINE (NORMAL)



### WARNING

To avoid personal injury or death:

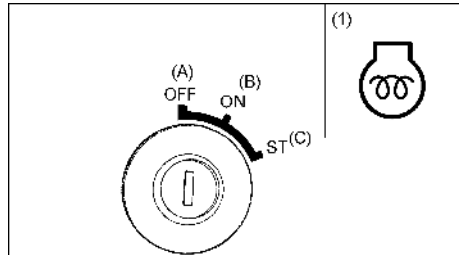
- Do not allow children to approach the machine while the engine is running.
- Be sure to install the machine on which the engine is installed, on a flat place.
- Do not run the engine on gradients.
- Do not run the engine in an enclosed area. Exhaust gas can cause air pollution and exhaust gas poisoning.
- Keep your hands away from rotating parts (such as fan, pulley, belt, flywheel etc.) during operation.
- Do not operate the machine while under the influence of alcohol or drugs.
- Do not wear loose, torn or bulky clothing around the machine. It may catch on moving parts or controls, leading to the risk of accident. Use additional safety items, e.g. hard hat, safety boots or shoes, eye and hearing protection, gloves, etc., as appropriate or required.
- Do not wear radio or music headphones while operating engine.
- Check to see if it is safe around the engine before starting.
- Reinstall safeguards and shields securely and clear all maintenance tools when starting the engine after maintenance.

### IMPORTANT :

- Do not use ether or any starting fluid for starting the engine, or a severe damage will occur.
- When starting the engine after a long storage (of more than 3 months), activate the starter for about 10 seconds to allow oil to reach every engine part.

1. Set the fuel shutoff-valve to the "ON" (OPEN) position.
2. Insert the key into the starter switch.

3. Turn the key to the "ON" position and hold it until the heater indicator turns off.



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(1) Heater indicator

(A) "OFF" SWITCHED OFF  
(B) "ON" OPERATION  
(C) "ST" STARTING

4. Turn the key to the "STARTING" position and the engine should start. Release the key immediately when the engine starts.
5. Check to see that the oil pressure lamp and charge lamp are off. If the lamps are still on, immediately stop the engine, and determine the cause. (See "CHECKS DURING OPERATION" in "OPERATING THE ENGINE" section.)

### NOTE :

- If the oil pressure lamp stays on after the engine starts and runs, shut the engine off immediately and check the following:
  - if there is enough engine oil.
  - if the engine oil has dirt in it.
  - if the wiring is faulty.
 If the oil pressure lamp continues to stay on and is not resolved by checking these items, contact your local KUBOTA Dealer for service.

6. Warm up the engine at medium speed without load.

### IMPORTANT :

- If the engine does not catch or start at 10 seconds after the starter switch is set at "STARTING" position, wait for another 30 seconds and then begin the engine starting sequence again. Do not allow the starter motor to run continuously for more than 20 seconds.

## COLD WEATHER STARTING

If the ambient temperature is below  $-5^{\circ}\text{C}$  ( $23^{\circ}\text{F}$ ) and the engine is very cold, start it in the following manner:  
Take steps (1) through (2) above.

### 3. Turn the key to the "ON" position and hold it until the heater indicator turns off.

Heater indicator comes on when the key is turned to the "ON" position and engine coolant temperature is below  $0^{\circ}\text{C}$  ( $32^{\circ}\text{F}$ ), and goes off automatically when preheat is completed.

### 4. Turn the key to the "STARTING" position and the engine should start.

(If the engine fails to start after 10 seconds, turn off the key for 30 seconds. Then repeat steps (3) and (4).)

#### IMPORTANT :

- Do not allow the starter motor to run continuously for more than 20 seconds.
- Be sure to warm up the engine, not only in winter, but also in warmer seasons. An insufficiently warmed-up engine can shorten its service life.
- When the ambient temperature is expected to be below  $-15^{\circ}\text{C}$  ( $5^{\circ}\text{F}$ ), remove the battery from the machine and move it to a warmer or heated and safe indoor location. Reinstall the battery in the machine just prior to the next machine usage. Do not store the battery in living areas. Please observe Cautions under section 8. in "SAFE OPERATION" of this manual when working on or handling the battery or personal injury and property damage may occur.
- When the engine coolant temperature is below  $0^{\circ}\text{C}$  ( $32^{\circ}\text{F}$ ), the engine speed becomes temporarily restricted. This is to protect the engine component parts, especially turbo charger.
- A specific time later, the restrictive system gets automatically released in stages.
- Basically the models are standard equipped with this function. Some engine models are not equipped with this, however.

## STOPPING THE ENGINE



### WARNING

To avoid personal injury or death:

- To stop the engine, be sure to use the starter switch.

**When shutting off the battery power directly with the battery switch or the like, first stop the engine with the starter switch and then make sure the ECU comes to a complete stop. Otherwise a trouble or malfunction may be caused**

### 1. Run the engine under idling conditions.

#### IMPORTANT :

- Allow the engine to idle for 5 minutes before shutting it off after a full load operation.  
Failure to do so may lead to turbo charger trouble.
2. The engine should stop with the starter switch placed at the "OFF" position.
  3. After stopping the engine, remove the key.

## CHECKS DURING OPERATION

While running, make the following checks to see that all parts are working correctly.

### ■ Radiator cooling water (Coolant)



### WARNING

To avoid personal injury or death:

- Do not remove the radiator cap until coolant temperature is well below its boiling point. Then loosen the cap slightly to the stop position, to relieve any pressure, before removing the cap completely.

#### ◆ Precaution at overheating

The event that the coolant temperature is nearly or more than the boiling point is called "OVERHEATING".

While running, make the following checks to see that all parts are working correctly. **If anything is unusual, inspect it, referring to the relevant description in "MAINTENANCE" and "REGULAR CHECKS AND MAINTENANCE WORK" section.**

If the coolant temperature warning lamp lights up or if steam or coolant does not stop squirting from the radiator overflow pipe, turn off the load and **keep the engine idling (COOLING-DOWN) for at least 5 minutes** to let it cool down gradually. Then stop the engine and take the following inspections and servicing.

1. Check to see if the coolant runs short or if there is any coolant leak;
2. Check to see if there is any obstacle around the cooling air inlet or outlet;
3. Check to see if there is any dirt or dust between the radiator fins and tubes;
4. Check to see if the fan belt is too loose; and check to see if any one of the radiator water pipe is clogged.

### ■ Oil pressure lamp

The lamp lights up to warn the operator that the engine oil pressure has dropped below the prescribed level. If this should happen during operation or should not go off even after the engine is accelerated more than 1000rpm, immediately stop the engine and check the following:

1. Engine oil level (See "Checking of engine oil level" in "DAILY CHECKS" in "MAINTENANCE" section.)

### ■ Charge lamp

The charge lamp lights up to warn the operator the battery charge is low during running or there is no alternator output during running. It is normal to have the charge lamp on when the key is on and engine is not running. If the charge lamp is on during running, check the following:

1. Cable broken
2. Poor connection at alternator terminal
3. Fan belt too loose or damaged

### ■ Fuel



## WARNING

To avoid personal injury or death:

- Fluid escaping from pinholes may be invisible. Do not use hands to search for suspected leaks; Use a piece of cardboard or wood, instead. If injured by escaping fluid, see a medical doctor at once. This fluid can produce gangrene or a severe allergic reaction.
- Check any leaks from the fuel pipes. Use eye, face and hand protection such as gloves and any necessary appropriate additional personal protective equipment and clothing.

Do not run the fuel tank level too low or completely out of fuel. You may experience improper engine running and/or a DTC (Diagnostic Trouble Code) error code may be recorded in the Engine Control. Additionally, fuel system bleeding may be necessary if air enters the fuel system. (See "Checking of fuel level" in "DAILY CHECKS" in "MAINTENANCE" section.)

### ■ Color of exhaust

White exhaust may come out. In most cases this is caused by water vapor and not a problem. Such exhaust disappears when the temperature rises up as specified.

### ■ Immediately stop the engine if;

- The engine suddenly slows down or accelerates.
- Unusual noises are suddenly heard.
- Exhaust fumes suddenly become very dark.
- The oil pressure lamp lights up.
- The engine warning lamp lights up.
- Continuous large or abnormal quantities of white smoke.

## AIR FLOW SENSOR

### ■ Air cleaner-mounted type

- Do not use any other air cleaner and element than specified. Unspecified ones cause the air flow sensor to malfunction and to lose its full performance.

### ■ Inlet hose pipe-mounted type

- Be careful not to install the air flow sensor on the pipe in the wrong direction.
- Do not change the direction and insertion angle of the hoses before and after the pipe. Wrong direction causes the air flow sensor to malfunction and to lose its full performance.

## PRECAUTIONS ON GENERATOR-EQUIPPED ENGINE



## WARNING

To avoid personal injury or death:

If the engine is kept running under no load or light load (load factor below 30%), unburnt fuel or carbon builds up in the exhaust system. As a result, the engine may get damaged or cause a fire.

Run the engine under enough load at regular intervals to remove unburnt fuel and carbon deposits.

- Before doing the load operation, make sure there is nothing flammable around the engine.
- Do not put a load all at once on the engine, but gradually.
- If by any chance, spark rises out of the muffler outlet, **DO NOT GET THE ENGINE UNLOADED, BUT INTERRUPT IT IMMEDIATELY.**



# MAINTENANCE

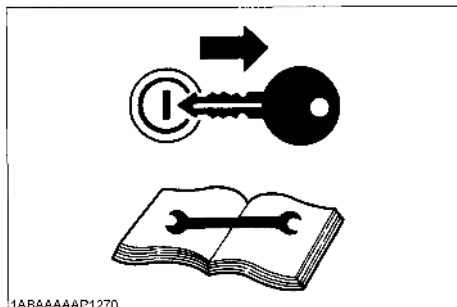
**IMPORTANT :**

- A repair shop or person of the owner's choosing may maintain, replace, or repair emission-control devices and systems. However, warranty service must be performed by an authorized KUBOTA service facility except in the case of emergency.

**WARNING**

To avoid personal injury or death:

- Be sure to conduct daily checks, periodic maintenance, refueling or cleaning on a level surface with the engine shut off and remove the key.
- Before allowing other people to use your engine, explain how to operate, and have them read this manual before operation.
- When cleaning any parts, do not use gasoline but use regular cleanser.
- Always use proper tools, that are in good condition. Make sure you understand how to use them, before performing any service work.
- When installing, be sure to tighten all bolts lest they should be loose. Tighten the bolts by the specified torque.
- Do not put any tools on the battery, or battery terminals may short out. Severe burns or fire could result. Detach the battery from the engine before maintenance.
- Do not touch muffler or exhaust pipes while they are hot; Severe burns could result.



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## SERVICE INTERVALS

### [D1803-CR-TIE4, V2403-CR-TIE4]

Observe the following for service and maintenance.

Interval	Item	Ref. page		
Daily	Checking engine oil level	15		
	Checking fuel level and refueling	17		
	Checking coolant level	17		
	Checking fan belt	19		
Initial 50 hours	Changing engine oil	25		
	Replacing oil filter cartridge	25		
Every 50 hours	Checking fuel pipes and clamp bands	21		
	Draining water separator	21		
Every 250 hours	Cleaning air cleaner element	22	*1	
	Adjusting fan belt tension	22		
	Checking intake air line	24		
Every 250 hours or 6 months	Checking radiator hoses and clamp bands	24		
Every 400 hours	Changing engine oil	25		
	Replacing oil filter cartridge	25		
Every 500 hours	Replacing fuel filter cartridge	26		
	Cleaning water separator (Type 1)	26		
	Removing sediment in fuel tank	26	*3	
	Cleaning water jacket (radiator interior)	26	*3	
	Replacing fan belt	26	*3	
Every 500 hours or 1 year	Replacing water separator filter (Type 2)	27	*3	
Every 1000 hours	Checking valve clearance	27	*3	
Every 1500 hours	Checking injector tip	28	*3	@
	Checking EGR cooler	28	*3	@
	Changing oil separator element	28		@
	Checking PCV valve	28	*3	@
Every 3000 hours	Checking turbo charger	28	*3	@
	Checking EGR system	28	*3	@

Interval	Item	Ref. page		
Every year	Replacing air cleaner element	28	*3	
	Checking EGR piping	29	*3	
	Checking intake air line	29		
	Checking exhaust manifold for cracks or gas leak and for looseness or damage	29		
Every 2 years	Replacing rubber piping related to oil separator	29	*3	
	Replacing intake air line and suction air pressure takeout rubber piping	29	*3	
	Replacing EGR cooler rubber piping	29	*3	
	Replacing water rubber piping	29	*3	
	Replacing lubricant rubber piping	29	*3	
	Changing radiator coolant (L.L.C.)	29		
	Replacing radiator hoses and clamp bands	29	*3	
	Replacing fuel pipes and clamp bands	30	*3	
Replacing intake air line	30	*3		

**IMPORTANT :**

\*1 Air cleaner should be cleaned more often in dusty conditions than in normal conditions.

\*2 After 6 times of cleaning.

\*3 Consult your local KUBOTA Dealer for this service.

- The items listed above (@ marked) are registered as emission related critical parts by KUBOTA in the U.S. EPA nonroad emissions regulations. As the engine owner, you are responsible for the performance of the required maintenance on the engine according to the above instructions.

Please see the Warranty Statement in detail.

- The items listed above other than @ marked are not necessary to keep the emission related warranty valid.
- Failure to perform the maintenance will cause problems that will significantly degrade the engine performance.

**[V2607-CR-TIE4, V3307-CR-TIE4, V3307-TIE4A, V3800-TIE4]**

Observe the following for service and maintenance.

Interval	Item	Ref. page		
Daily	Checking engine oil level	15		
	Checking fuel level and refueling	17		
	Checking coolant level	17		
	Checking fan belt	19		
Initial 50 hours	Changing engine oil	27		
	Replacing oil filter cartridge	26		
Every 50 hours	Checking fuel pipes and clamp bands	21		
	Draining water separator	21		
Every 250 hours	Cleaning air cleaner element	22	*1	
	Adjusting fan belt tension	22		
	Checking intake air line	24		
Every 250 hours or 6 months	Checking radiator hoses and clamp bands	24		
Every 500 hours	Replacing oil filter cartridge	26		
	Replacing fuel filter cartridge	26		
	Cleaning water separator (Type1)	26		
	Removing sediment in fuel tank	26		
	Cleaning fuel tank interior	26	*3	
	Cleaning water jacket (radiator interior)	26	*3	
Every 500 hours or 1 year	Changing engine oil	27	*3	
	Replacing water separator filter (Type 2)	27	*3	
Every 500 hours or 2 years	Replacing fan belt	27	*3	
Every 1000 hours	Checking valve clearance	27	*3	
Every 1500 hours	Checking injector tip	28	*3	@
	Checking EGR cooler	28	*3	@
	Changing oil separator element	28		@
	Checking PCV valve	28	*3	@
Every 3000 hours	Checking turbo charger	28	*3	@
	Checking EGR system	28	*3	@

Interval	Item	Ref. page		
Every year	Replacing air cleaner element	29	*2 *3	
	Checking EGR piping	29	*3	
	Checking intake air line	29		
	Checking exhaust manifold for cracks or gas leak and for looseness or damage	29		
Every 2 years	Replacing rubber piping related to oil separator	29	*3	
	Replacing intake air line and suction air pressure takeout rubber piping	29	*3	
	Replacing boost sensor pressure rubber piping	29	*3	
	Replacing EGR cooler rubber piping	29	*3	
	Replacing EGR differential pressure sensor rubber piping	29	*3	
	Replacing water rubber piping	29	*3	
	Replacing lubricant rubber piping	29	*3	
	Changing radiator coolant (L.L.C.)	29		
	Replacing radiator hoses and clamp bands	29	*3	
Replacing fuel pipes and clamp bands	30	*3		

**IMPORTANT :**

\*1 Air cleaner should be cleaned more often in dusty conditions than in normal conditions.

\*2 After 6 times of cleaning.

\*3 Consult your local KUBOTA Dealer for this service.

● The items listed above (@ marked) are registered as emission related critical parts by KUBOTA in the U.S. EPA nonroad emissions regulations. As the engine owner, you are responsible for the performance of the required maintenance on the engine according to the above instructions.

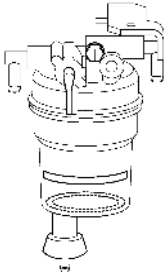
Please see the Warranty Statement in detail.

● The items listed above other than @ marked are not necessary to keep the emission related warranty valid.

● Failure to perform the maintenance will cause problems that will significantly degrade the engine performance.

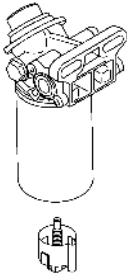
■ Water separator

[Type 1]



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[Type 2]



1ABADBMAP024C

DAILY CHECKS

For your own safety and to assure the long life of your machine, a careful check should be made before each operation.

■ Checking engine oil level

**⚠ WARNING**

To avoid personal injury or death:

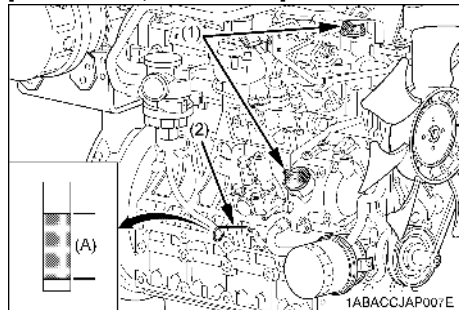
- Be sure to stop the engine before checking and changing the engine oil and the oil filter cartridge.
- Do not touch muffler or exhaust pipes while they are hot; Severe burns could result. Always stop the engine and allow it to cool before conducting inspections, maintenance, or for a cleaning procedure.
- Contact with engine oil can damage your skin. Put on gloves when using engine oil. If you come in contact with engine oil, wash it off immediately.

IMPORTANT :

- Do not operate a diesel engine when engine oil is overfilled. This oil can drain through the air intake system, which cause engine disacceleration and oil leaks from breather piping. It could result in an overrunning or oil hammering of engine in case of the engine with suction blow-by gases breathed in.

1. Check the engine oil level before starting or more than 5 minutes after stopping the engine.
2. Remove the oil level gauge, wipe it clean and reinstall it.
3. Take the oil level gauge out again, and check the oil level.

[D1803-CR-TIE4, V2403-CR-TIE4]

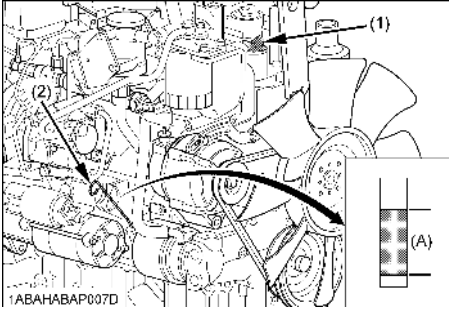


- (1) Oil filler plug
- (2) Oil level gauge

[Lower end of oil level gauge]  
 (A) Engine oil level within this range is proper.

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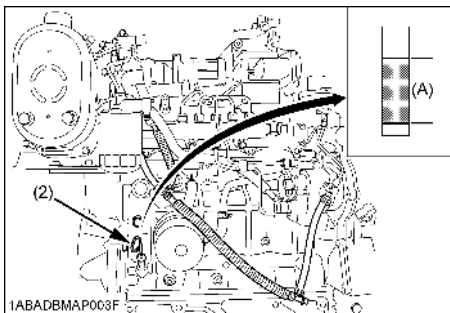
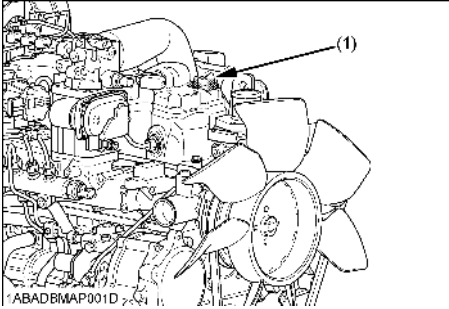
## [V2607-CR-TIE4, V3307-CR-TIE4, V3307-TIE4A]



- (1) Oil filler plug  
(2) Oil level gauge

[Lower end of oil level gauge]  
(A) Engine oil level within this range is proper.

## [V3800-TIE4]



- (1) Oil filler plug  
(2) Oil level gauge

[Lower end of oil level gauge]  
(A) Engine oil level within this range is proper.

- If the oil level is too low, remove the oil filler plug, and add new oil to the prescribed level.
- After adding oil, wait more than 5 minutes and check the oil level again. It takes some time for the oil to drain down to the oil pan.

Models	Engine oil quantity
D1803-CR-TIE4	7.0 L (1.85 U.S. gals.)
V2403-CR-TIE4	9.5 L (2.51 U.S. gals.)
V2607-CR-TIE4	10.2 L (2.69 U.S. gals.)
V3307-CR-TIE4 V3307-TIE4A	11.2 L (2.95 U.S. gals.)
V3800-TIE4	13.2 L (3.49 U.S. gals.)

**IMPORTANT :**

- Engine oil should be American Petroleum Institute (API) service classification CJ-4 or CK-4.
- Change the type of engine oil according to the ambient temperature.

Above 25°C (77°F)	10W-30 or 10W-40 or 15W-40
-10°C to 25°C (14°F to 77°F)	10W-30 or 10W-40 or 15W-40
Below -10°C (14°F)	10W-30 or 10W-40

- When using oil of different brands from the previous one, be sure to drain all the previous oil before adding the new engine oil.
- Use of the following oil not only disallows the engine from performing well in low temperatures until it warms up sufficiently but may also lead to excessive engine wear or engine seizure.
  - Oil with a viscosity higher than 10W-30
  - Oil not recommended by KUBOTA

**NOTE :**

- Be sure to inspect the engine, locating it on a level place. If placed on gradients, oil quantity may not be accurately.

**■Checking fuel level and refueling**

Fuel is flammable and can be dangerous. You should handle fuel with care.

**⚠ WARNING**

**To avoid personal injury or death:**

- **Do not mix gasoline or alcohol with diesel fuel. This mixture can cause an explosion.**
- **Be careful not to spill fuel during refueling. If fuel should spill, wipe it off at once, or it may cause a fire.**
- **Do not fail to stop the engine before refueling. Keep the engine away from the fire.**
- **Be sure to stop the engine while refueling or bleeding and when cleaning or changing fuel filter or fuel pipes. Do not smoke when working around the battery or when refueling.**
- **Check the fuel systems at a well ventilated and wide place.**

1. Check to see that the fuel level is above the lower limit of the fuel level gauge.
2. If the fuel is too low, add fuel to the upper limit. Do not overfill.

- Cetane Number : The minimum recommended Fuel Cetane Number is 45. A cetane number greater than 50 is preferred, especially for ambient temperatures below -20°C (-4°F) or elevations above 1500 m (5000 ft).
- Diesel Fuel Specification Type and Sulfur Content % (ppm) used, must be compliant with all applicable emissions regulations for the area in which the engine is operated.
- DO NOT USE Fuels that have sulfur content greater than 0.0015 % (15 ppm).
- Diesel fuels specified to EN 590 or ASTM D975 are recommended.
- No.2-D is a distillate fuel of lower volatility for engines in industrial and heavy mobile service. (SAE J313 JUN87)
- These engines utilize Tier 4 standards, the use of ultra low sulfur fuel is mandatory for these engines, when operated in US EPA regulated areas. Therefore, please use No.2-D S15 diesel fuel as an alternative to No.2-D, and use No.1-D S15 diesel fuel as an alternative to No.1-D for ambient temperatures below -10 °C (14 °F).

- 1) SAE : Society of Automotive Engineers
- 2) EN : European Norm
- 3) ASTM : American Society of Testing and Materials
- 4) US EPA : United States Environmental Protection Agency
- 5) No.1-D or No.2-D, S15 : Ultra Low Sulfur Diesel (ULSD) 15 ppm or 0.0015 wt.%

**IMPORTANT :**

- Be sure to use a strainer when filling the fuel tank, or dirt or sand in the fuel may cause trouble.
- Do not run the fuel tank level too low or completely out of fuel. You may experience improper engine running and/or a DTC (Diagnostic Trouble Code) error code may be recorded in the Engine Control. Additionally, fuel system bleeding may be necessary if air enters the fuel system.
- Fuel must be controlled carefully to prevent the additives being mixed into fuel such as fuel tank anti-oxidants, water remover, antifreeze and so on.

**■Checking coolant level**

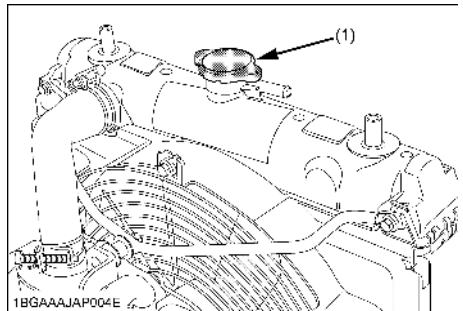
Coolant will last for one day's work if filled all the way up before operation start. Make it a rule to check the coolant level before every operation.

**⚠ WARNING**

**To avoid personal injury or death:**

- **Do not stop the engine suddenly, stop it after about 5 minutes of unloaded idling.**
- **Work only after letting the engine and the radiator cool off completely (more than 30 minutes after it has been stopped).**
- **Do not remove the radiator cap while coolant is hot. When cool to the touch, rotate cap to the first stop to allow excess pressure to escape. Then remove cap completely. If overheats should occur, steam may gush out from the radiator or the reserve tank; Severe burns could result.**

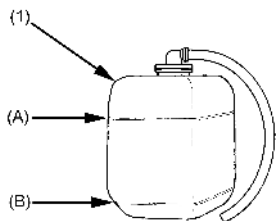
1. Remove the radiator cap, after the engine has completely cooled, and check to see that coolant reaches the supply port.



(1) Radiator pressure cap



2. If the radiator is provided with a reserve tank, check the coolant level of the reserve tank. When it is between the "FULL" and "LOW" marks, the coolant will last for one day's work.



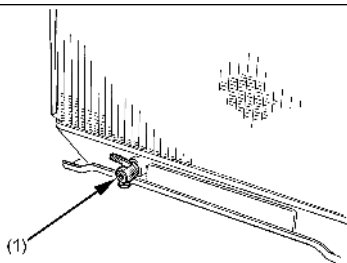
1ABACAAAP017C

- (1) Reserve tank  
(A) "FULL"  
(B) "LOW"

3. When the coolant level drops due to evaporation, add water only up to the full level.

**[D1803-CR-TIE4, V2403-CR-TIE4, V2607-CR-TIE4, V3307-CR-TIE4]**

4. Check to see the drain plug; which is at the lower part of the radiator as figures below.

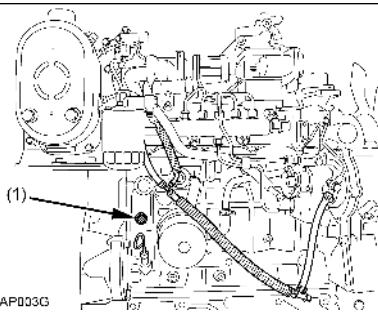


1ABACAAAP018B

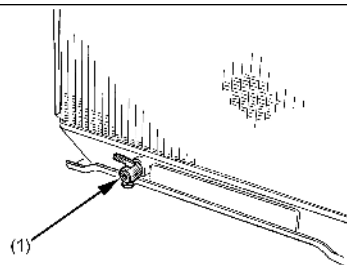
- (1) Coolant drain plug

**[V3800-TIE4]**

4. Check to see that two drain plug; one is at the crankcase side and the other is at the lower part of the radiator as figures below.



1ABADBMAP003G



1ABACAAAP018B

- (1) Coolant drain plug

**IMPORTANT :**

- If the radiator cap has to be removed, follow the caution and securely retighten the cap.
- If coolant should be leak, consult your local KUBOTA Dealer.
- Make sure that muddy or sea water does not enter the radiator.
- Use clean, fresh water and 50% antifreeze to fill the reserve tank.
- Do not refill reserve tank with coolant over the "FULL" level mark.
- Be sure to close the radiator cap securely. If the cap is loose or improperly closed, coolant may leak out and decrease quickly.

■ Antifreeze



**WARNING**

To avoid personal injury or death:

- When using antifreeze, put on some protection such as rubber gloves (Antifreeze is poisonous.).
- If it is swallowed, seek immediate medical help. Do NOT make a person throw up unless told to do so by poison control or a health care professional. Use standard first aid and CPR for signs of shock or cardiac arrest. Call your local Poison Control Center or your local emergency number for further assistance.
- When antifreeze comes in contact with the skin or clothing, wash it off immediately.
- Do not mix different types of antifreeze. The mixture can produce chemical reaction causing harmful substances.
- Antifreeze is extremely flammable and explosive under certain conditions. Keep fire and children away from antifreeze.
- When draining fluids from the engine, place some container underneath the engine body.
- Do not pour waste onto the grounds, down a drain, or into any water source.
- Also, observe the relevant environmental protection regulations when disposing of antifreeze.

Always use a 50/50 mix of long-life coolant and clean soft water in KUBOTA engines.

Contact KUBOTA concerning coolant for extreme conditions.

1. Long-life coolant (hereafter LLC) comes in several types. Use ethylene glycol (EG) type for this engine.
2. Before employing LLC-mixed cooling water, flush the radiator with fresh water. Repeat this procedure 2 or 3 times to clean up the radiator and engine block from inside.
3. Mixing the LLC  
Premix 50% LLC with 50% clean soft water. When mixing, stir it up well, and then fill into the radiator.

4. The procedure for the mixing of water and antifreeze differs according to the make of the antifreeze. Refer to SAE J1034 standard, more specifically also to SAE J814c.

Vol % Antifreeze	Freezing Point		Boiling Point *	
	°C	°F	°C	°F
50	-37	-34	108	226

\*At 1.013 x 10<sup>5</sup>Pa (760 mmHg) pressure (atmospheric). A higher boiling point is obtained by using a radiator pressure cap which permits the development of pressure within the cooling system.

5. Adding the LLC
  - (1) Add only water if the coolant level reduces in the cooling system by evaporation.
  - (2) If there is a coolant leak, add the LLC of the same manufacturer and type in the same coolant percentage.  
\*Never add any long-life coolant of different manufacturer. (Different brands may have different additive components, and the engine may fail to perform as specified.)
6. When the LLC is mixed, do not employ any radiator cleaning agent. The LLC contains anti-corrosive agent. If mixed with the cleaning agent, sludge may build up, adversely affecting the engine parts.
7. Kubota's genuine long-life coolant has a service life of 2 years. Be sure to change the coolant every 2 years.

**NOTE :**

- The above data represents industry standards that necessitate minimum glycol content in the concentrated antifreeze.

■ Checking fan belt

(See "Adjusting fan belt tension" in "EVERY 250 SERVICE HOURS" in "REGULAR CHECKS AND MAINTENANCE WORK" section.)

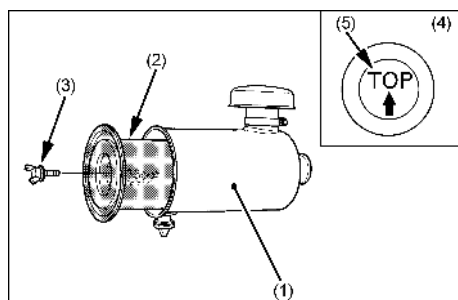
### ■ For the air cleaner with a dust cup (optional)

Remove and clean out the dust cup before it becomes half full with dust; usually once a week, or even every day if the working surroundings are dusty.

Install the air cleaner dust cup with "TOP" indicated on the rear of the cup in the up position. (However, it may be installed in either direction when the cover is placed at the lower part.)

#### IMPORTANT :

- If the dust cup is mounted incorrectly, dust or dirt does not collect in the cup, and direct attachments of the dust to the element will cause its lifetime to shorten to a great extent.



1ABACAAAP022A

- (1) Air cleaner body
- (2) Element
- (3) Wing bolt
- (4) Dust cup
- (5) "TOP" mark

### ■ Dust indicator (optional)

If the red signal on the dust indicator attached to the air cleaner is visible, the air cleaner has reached the service level.

Clean the element immediately, and reset the signal with the "RESET" button.

# REGULAR CHECKS AND MAINTENANCE WORK

## EVERY 50 SERVICE HOURS

### ■ Checking fuel pipes and clamp bands



### WARNING

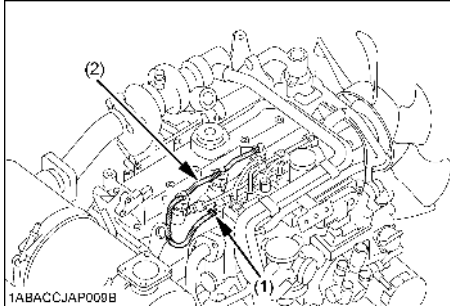
To avoid personal injury or death:

- Stop the engine before checking or replacing the fuel pipes. Broken fuel pipes can cause fires.

Check the fuel pipes every 50 hours of operation. When if;

1. If any one of the clamp bands is loose, apply oil to the screw of the band, and tighten the band securely.
2. If the fuel pipes, made of rubber, become worn out, replace them and the clamp bands every 2 years.
3. If the fuel pipes and clamp bands are found worn or damaged within 2 years' of use, replace or repair them at once.

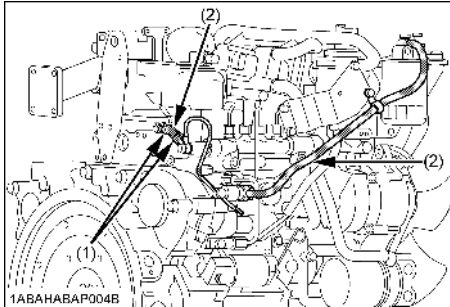
#### [D1803-CR-TIE4, V2403-CR-TIE4]



1ABACCJAP008B

- (1) Clamp bands
- (2) Fuel pipes

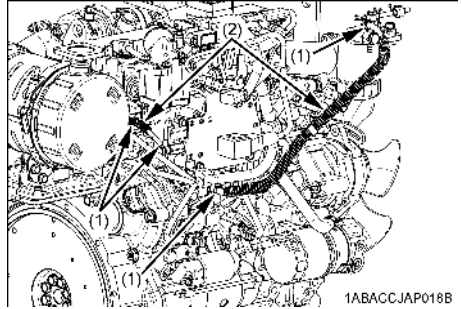
#### [V2607-CR-TIE4, V3307-CR-TIE4]



1ABAHABAP004B

- (1) Clamp bands
- (2) Fuel pipes

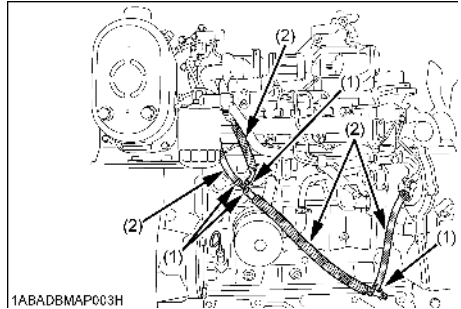
#### [V3307-TIE4A]



1ABACCJAP018B

- (1) Clamp bands
- (2) Fuel pipes

#### [V3800-TIE4]



1ABADBMAP003H

- (1) Clamp bands
- (2) Fuel pipes

### ■ Draining water separator

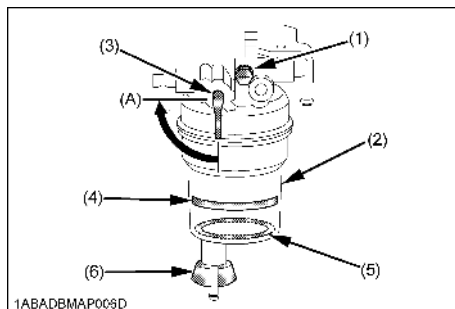
#### [Checking and Draining]

Water and dirt contained in fuel will settle down in the water separator. When such foreign substances are deposited, set the water separator handle to the "CLOSE" position. Loosen the top screw first and then the bottom drain valve to let the foreign substances out of the separator.

Finally be sure to air-bleed the fuel system.

**[Cleaning]**

1. Set the water separator handle to the "CLOSE" position.
2. Loosen and remove the cup proper, and clean its inside with light oil.
3. Tighten up the cup proper.



1ABADBMAP0069D

- (1) Screw
- (2) Cup
- (3) Water separator handle
- (4) Line
- (5) Float
- (6) Drain valve

(A) Close

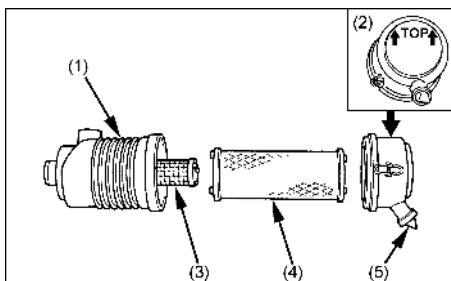
**IMPORTANT :**

- As water is collected, the red float goes up. When the float has reached the specified line, immediately drain the water separator.
- In reattaching the water separator, be careful to keep off dust and dirt.
- Be sure to air-bleed the fuel system before getting the engine restarted.

**EVERY 250 SERVICE HOURS****■Cleaning air cleaner element**

Since the air cleaner employed on this engine is a dry type, never apply oil to it.

1. Open the evacuator valve once a week under ordinary conditions - or daily when used in a dusty place. This will get rid of large particles of dust and dirt.
2. Wipe the inside air cleaner clean with cloth if it is dirty or wet.
3. Avoid touching the element except when cleaning.
4. When dry dust adheres to the element, blow compressed air from the inside turning the element. Pressure of compressed air must be under 205 kPa (2.1 kgf/cm<sup>2</sup>, 30 psi).
5. Replace the primary element every year or every 6 cleanings.  
If the primary element is stained heavily, replace it soon. At this time, replace the secondary element too.
6. The secondary element should be removed only if it is to be replaced.
7. To protect the engine, do not remove the secondary element in servicing the primary element.



1ABADBGAP012B

- (1) Air cleaner body
- (2) Dust cup
- (3) Secondary element
- (4) Primary element
- (5) Evacuator valve

**IMPORTANT :**

- Make sure the hooking clip for the element is tight enough. If it is loose, dust and dirt may be sucked in, wearing down the cylinder liner and piston ring earlier and thereby resulting in poor power output.
- Do not overservice the air cleaner element. Overservicing may cause dirt to enter the engine causing premature wear. Use the dust indicator as a guide on when to service.

**◆ Cleaning primary air cleaner element**

1. To clean the element, use clean dry compressed air on the inside of the element.  
Air pressure at the nozzle must not exceed 205 kPa (2.1 kgf/cm<sup>2</sup>, 30psi).  
Maintain reasonable distance between the nozzle and the filter.

**■Adjusting fan belt tension****WARNING**

To avoid personal injury or death:

- Be sure to stop the engine and remove the key before checking the belt tension.
- Be sure to reinstall the detached safety shield after maintenance or checking.

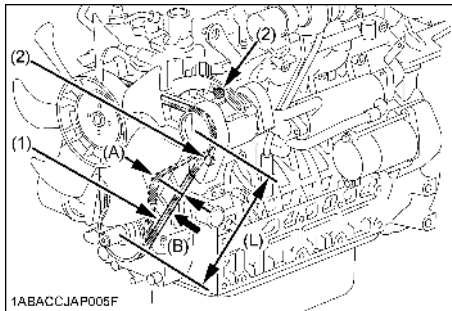
1. Stop the engine and remove the key.
2. Apply moderate thumb pressure to belt between the pulleys.
3. If tension is incorrect, loosen the alternator mounting bolts and, using a lever placed between the alternator and the engine block, pull the alternator out until the deflection of the belt falls within acceptable limits.
4. Replace fan belt if it is damaged.

**IMPORTANT :**

- If belt is loosen or damaged and the fan is damaged, it could result in overheats or insufficient charging. Correct or replace belt.
  - Use a sonic tension meter to measure tension. Make sure to measure properly according to the operation manual of the device being used.
  - Measure immediately after installing the belt without rotating the pulleys.  
Measure at location (B) in the figure with (L) as the distance between the pulleys.
  - For the belt specifications, contact your KUBOTA dealer.
  - If a tension meter cannot be used, adjust based on the deflection.
- The deflection must be as indicated by (A) in the figure, when pressing the middle of the belt between the pulleys.

**[D1803-CR-TIE4, V2403-CR-TIE4]**

Proper fan belt tension		
Adjustment	Replacement	(A)
237 to 403 N	460 to 680 N	10 to 12 mm (0.39 to 0.47 in.) (under load of 10 kgf (22.1 lbs))

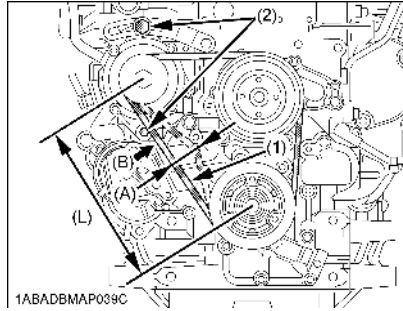


1ABACCJAP005F

- (1) Fan belt
- (2) Bolt and nut

**[V2607-CR-TIE4, V3307-CR-TIE4, V3307-TIE4A]**

Proper fan belt tension		
Adjustment	Replacement	(A)
392 to 480 N	441 to 650 N	10 to 12 mm (0.39 to 0.47 in.) (under load of 10 kgf (22.1 lbs))

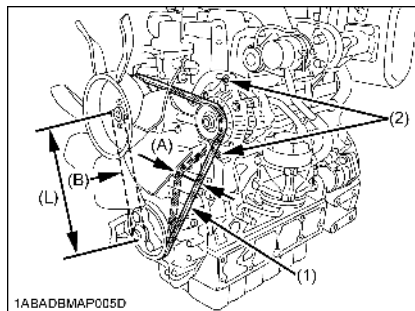


1ABADBMAP039C

- (1) Fan belt
- (2) Bolt and nut

**[V3800-TIE4]**

Proper fan belt tension		
Adjustment	Replacement	(A)
392 to 480 N	441 to 531 N	10 to 12 mm (0.39 to 0.47 in.) (under load of 6 to 7 kgf (13.2 to 15.4 lbs))



1ABADBMAP005D

- (1) Fan belt
- (2) Bolt and nut

### ■ Checking intake air line

Visually check for cracks, gas leak and anything else unusual.

Check to see if the lock bolts and nuts are tight enough. In particular, the hose between the turbo charger and the intake manifold must be checked for cracks and come-off. This is because this line will be under high pressure.

See if this hose is deep enough into the pipe. If not, reinsert the hose deeper. Put the clamp on the hose free of the bulge of the pipe, and tighten the clamp bolt to the specified torque.

## EVERY 250 HOURS OR 6 MONTHS

### ■ Checking radiator hoses and clamp bands



## WARNING

To avoid personal injury or death:

- **Be sure to check the radiator hoses and clamp bands periodically. If any one of the radiator hoses is damaged or coolant leaks, overheats or severe burns could occur.**

Check to see if radiator hoses are properly fixed every 250 hours of operation or 6 months, whichever comes first.

1. If any one of the hose clamps is loose or coolant leaks, tighten the hose clamp securely.
2. Replace hoses and tighten hose clamps securely, if radiator hoses are swollen, hardened or cracked.

Replace hoses and hose clamps every 2 years or earlier, if checked and found that the hoses are swollen, hardened or cracked.

### ■ Precaution at overheating

[V3800-TIE4]

The event that the coolant temperature is nearly or more than the boiling point is called "OVERHEATING".

While running, make the following checks to see that all parts are working correctly. **If anything is unusual, inspect it, referring to the relevant description in "MAINTENANCE" and "REGULAR CHECKS AND MAINTENANCE WORK" section.**

#### ◆ Coolant

If the coolant temperature warning lamp lights up or if steam or coolant does not stop squirting from the radiator overflow pipe, turn off the load and **keep the engine idling (COOLING-DOWN) for at least 5 minutes** to let it cool down gradually. Then stop the engine and take the following inspection and servicing.

1. Check to see if the coolant runs short or if there is any coolant leak;
2. Check to see if there is any obstacle around the cooling air inlet or outlet;
3. Check to see if there is any dirt or dust between the radiator fins and tubes;
4. Check to see if the fan belt is too loose; and check to see if the radiator water pipes are clogged.

## EVERY 400 SERVICE HOURS

### ■ Changing engine oil

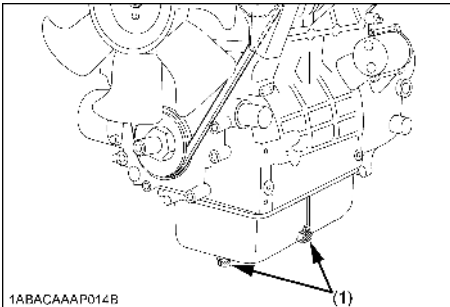
[D1803-CR-TIE4, V2403-CR-TIE4]



### WARNING

To avoid personal injury or death:

- Be sure to stop the engine before draining engine oil.
  - When draining engine oil, place some container underneath the engine and dispose it according to local regulations.
  - Do not drain oil after running the engine. Allow engine to cool down sufficiently.
1. Change oil after the initial 50 hours of operation and every 400 hours thereafter. When the annual operating hours are below 400, replace the oil every year.
  2. Remove the drain plug at the bottom of the engine, and drain all the old oil. Drain oil will drain easier when the oil is warm.



1ABACAAAP014B

(1) Oil drain plug

3. When letting out the oil, remove the filler plug too. With the filler plug still in place, it would be difficult to discharge the oil completely.
4. Add new engine oil up to the upper limit of the oil level gauge. Be careful not to add oil above the upper limit of the oil level gauge.

### ■ Replacing oil filter cartridge

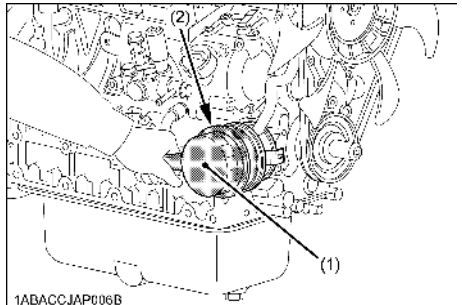
[D1803-CR-TIE4, V2403-CR-TIE4]



### WARNING

To avoid personal injury or death:

- Be sure to stop the engine before changing the oil filter cartridge.
  - Allow engine to cool down sufficiently, oil can be hot and cause burns.
1. Replace the oil filter cartridge. Oil filter cartridge should be replaced after the initial 50 hours of operation and every 400 hours thereafter.
  2. Remove the old oil filter cartridge with a filter wrench.
  3. Apply a film of oil to the gasket for the new cartridge.
  4. Screw in the cartridge by hand. When the gasket contacts the seal surface, tighten the cartridge enough by hand. Because, if you tighten the cartridge with a wrench, it will be tightened too much.



(1) Oil filter cartridge

(2) Remove with a filter wrench (Tighten with your hand)

5. After the new cartridge has been replaced, the engine oil level normally decreases a little. Thus, run the engine for a while and check for oil leaks through the seal before checking the engine oil level. Add oil if necessary.

#### NOTE :

- Wipe off any oil sticking to the machine completely.



## EVERY 500 SERVICE HOURS

### ■ Replacing fuel filter cartridge

1. Replace the fuel filter cartridge with a new one every 500 operating hours.
2. Apply fuel oil thinly over the gasket and tighten the cartridge into position by hand-tightening only.
3. Finally, vent the air.

#### IMPORTANT :

- Replace the fuel filter cartridge periodically to prevent wear of the supply pump or the injector, due to dirt in the fuel.

#### NOTE :

- The fuel filter cartridge and water separator should be replaced earlier according to the fuel classification in use.

### ■ Replacing oil filter cartridge

[V2607-CR-TIE4, V3307-CR-TIE4, V3307-TIE4A, V3800-TIE4]

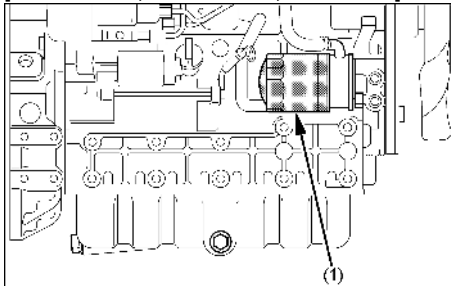


## WARNING

To avoid personal injury or death:

- Be sure to stop the engine before changing the oil filter cartridge.
  - Allow engine to cool down sufficiently, oil can be hot and cause burns.
1. Replace the oil filter cartridge. Oil filter cartridge should be replaced after the initial 50 hours of operation and every 500 hours thereafter.
  2. Remove the old oil filter cartridge with a filter wrench.
  3. Apply a film of oil to the gasket for the new cartridge.
  4. Screw in the cartridge by hand. When the gasket contacts the seal surface, tighten the cartridge enough by hand. Because, if you tighten the cartridge with a wrench, it will be tightened too much.

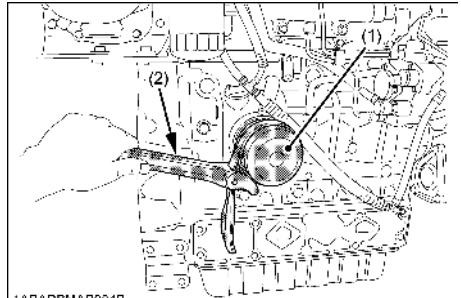
[V2607-CR-TIE4, V3307-CR-TIE4, V3307-TIE4A]



1ABAHA8AP005D

- (1) Oil filter cartridge

[V3800-TIE4]



1ABAD8MAP004B

- (1) Oil filter cartridge  
(2) Remove with a filter wrench (Tighten with your hand)

5. After the new cartridge has been replaced, the engine oil level normally decreases a little. Thus, run the engine for a while and check for oil leaks through the seal before checking the engine oil level. Add oil if necessary.

#### NOTE :

- Wipe off any oil sticking to the machine completely.

### ■ Cleaning water separator (Type 1)

(See "Draining water separator" in "EVERY 50 SERVICE HOURS" in "REGULAR CHECKS AND MAINTENANCE WORK" section.)

### ■ Removing sediment in fuel tank

Consult your local KUBOTA Dealer for this service.

### ■ Cleaning fuel tank interior

[V2607-CR-TIE4, V3307-CR-TIE4, V3307-TIE4A, V3800-TIE4]

Consult your local KUBOTA Dealer for this service.

### ■ Cleaning water jacket (radiator interior)

Consult your local KUBOTA Dealer for this service.

### ■ Replacing fan belt

[D1803-CR-TIE4, V2403-CR-TIE4]

Consult your local KUBOTA Dealer for this service.

(See "Adjusting fan belt tension" in "EVERY 250 SERVICE HOURS" in "REGULAR CHECKS AND MAINTENANCE WORK" section.)

**EVERY 500 SERVICE HOURS OR 1 YEAR****■ Changing engine oil**

[V2607-CR-TIE4, V3307-CR-TIE4, V3307-TIE4A, V3800-TIE4]

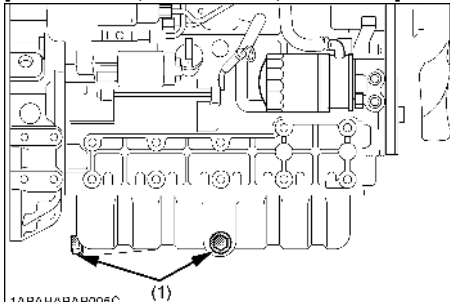
**WARNING**

To avoid personal injury or death:

- Be sure to stop the engine before draining engine oil.
- When draining engine oil, place some container underneath the engine and dispose it according to local regulations.
- Do not drain oil after running the engine. Allow engine to cool down sufficiently.

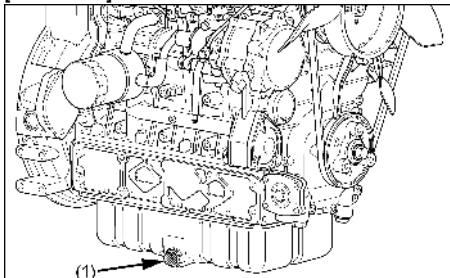
1. Change oil after the initial 50 hours of operation and every 500 hours thereafter. When the annual operating hours are below 500, replace the oil every year.
2. Remove the drain plug at the bottom of the engine, and drain all the old oil. Drain oil will drain easier when the oil is warm.

[V2607-CR-TIE4, V3307-CR-TIE4, V3307-TIE4A]



1ABAHAHABAP005C  
(1) Oil drain plug

[V3800-TIE4]

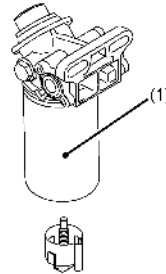


1ABADBMAP001E  
(1) Oil drain plug

3. When letting out the oil, remove the filler plug too. With the filler plug still in place, it would be difficult to discharge the oil completely.
4. Add new engine oil up to the upper limit of the oil level gauge. Be careful not to add oil above the upper limit of the oil level gauge.

**■ Replacing water separator filter (Type 2)**

1. Replace the water separator filter with a new one every 500 hours or 1 year.
2. Remove the old water separator filter with a filter wrench.
3. Apply a film of oil to the gasket for the new water separator filter.
4. Screw in the water separator filter by hand. Because, if you tighten the water separator filter with a wrench, it will be tightened too much.



1ABADBMAP024D

(1) Water separator filter

**IMPORTANT :**

- Replace the water separator filter periodically to prevent wear of the supply pump or the injector, due to dirt in the fuel.

**EVERY 500 SERVICE HOURS OR 2 YEARS****■ Replacing fan belt**

[V2607-CR-TIE4, V3307-CR-TIE4, V3307-TIE4A, V3800-TIE4]

Consult your local KUBOTA Dealer for this service.  
(See "Adjusting fan belt tension" in "EVERY 250 SERVICE HOURS" in "REGULAR CHECKS AND MAINTENANCE WORK" section.)

**EVERY 1000 SERVICE HOURS****■ Checking valve clearance**

Consult your local KUBOTA Dealer for this service.

## EVERY 1500 SERVICE HOURS

### ■ Checking injector tip

Consult your local KUBOTA Dealer for this service.

### ■ Checking EGR cooler

Consult your local KUBOTA Dealer for this service.

### ■ Changing oil separator element

[D1803-CR-TIE4, V2403-CR-TIE4, V2607-CR-TIE4, V3307-CR-TIE4, V3800-TIE4]



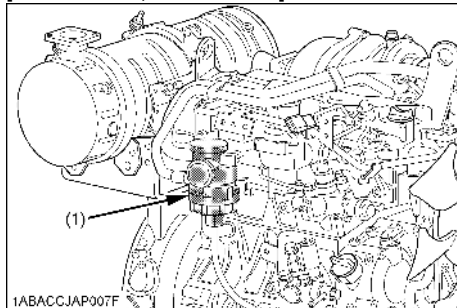
## WARNING

To avoid personal injury or death:

- Be sure to stop the engine before changing the oil separator element.

1. Remove the cover and take out the oil separator element and gasket. Then wipe oil and grease off the zone in question.
2. Fit a new oil separator element and gasket into position.

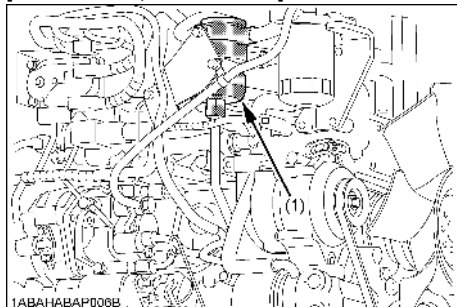
[D1803-CR-TIE4, V2403-CR-TIE4]



1ABACCJAP007F

(1) Oil separator

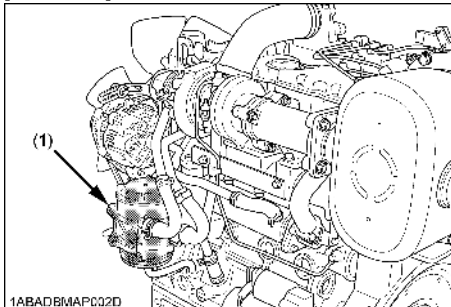
[V2607-CR-TIE4, V3307-CR-TIE4]



1ABAHAAP000B

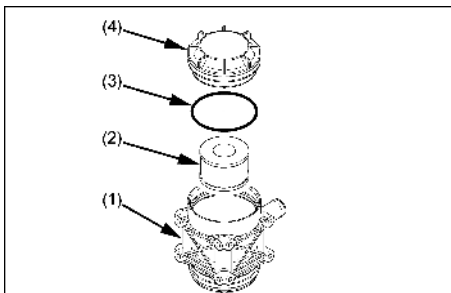
(1) Oil separator

[V3800-TIE4]



1ABADBMAP002D

(1) Oil separator



1ABADBMAP007C

- (1) Body
- (2) Oil separator element
- (3) Gasket
- (4) Cover

### ■ Checking PCV valve (Positive Crankcase Ventilation valve)

[D1803-CR-TIE4, V2403-CR-TIE4, V2607-CR-TIE4, V3307-CR-TIE4, V3800-TIE4]

Consult your local KUBOTA Dealer for this service.

## EVERY 3000 SERVICE HOURS

### ■ Checking turbo charger

Consult your local KUBOTA Dealer for this service.

### ■ Checking EGR System

Consult your local KUBOTA Dealer for this service.

## ANNUAL SERVICING

### ■ Replacing air cleaner element

Consult your local KUBOTA Dealer for this service.  
(See "Cleaning air cleaner element" in "EVERY 250 SERVICE HOURS" in "REGULAR CHECKS AND MAINTENANCE WORK" section.)

### ■ Checking EGR piping

Consult your local KUBOTA Dealer for this service.

### ■ Checking intake air line

Visually check for cracks, gas leak and anything else unusual.

Check to see if the lock bolts and nuts are tight enough. In particular, the hose between the turbo charger and the intake manifold must be checked for cracks and come-off. This is because this line will be under high pressure. See if this hose is deep enough into the pipe. If not, reinsert the hose deeper. Put the clamp on the hose free of the bulge of the pipe, and tighten the clamp bolt to the specified torque.

### ■ Checking exhaust manifold for cracks or gas leak and for looseness or damage

Visually check for cracks, damages, gas leak and anything else unusual.

Check to see if the lock bolts and nuts are tight enough.

## BIENNIAL SERVICING

### ■ Replacing rubber piping related oil separator

[D1803-CR-TIE4, V2403-CR-TIE4, V2607-CR-TIE4, V3307-CR-TIE4, V3800-TIE4]

Consult your local KUBOTA Dealer for this service.

### ■ Replacing intake air line and suction air pressure takeout rubber piping

Consult your local KUBOTA Dealer for this service.

### ■ Replacing boost sensor pressure rubber piping

[V2607-CR-TIE4, V3307-CR-TIE4, V3307-TIE4A, V3800-TIE4]

Consult your local KUBOTA Dealer for this service.

### ■ Replacing EGR cooler rubber piping

Consult your local KUBOTA Dealer for this service.

### ■ Replacing EGR differential pressure sensor rubber piping

[V3307-TIE4A]

Consult your local KUBOTA Dealer for this service.

### ■ Replacing water rubber piping

Consult your local KUBOTA Dealer for this service.

### ■ Replacing lubricant rubber piping

Consult your local KUBOTA Dealer for this service.

### ■ Changing radiator coolant (L.L.C.)

- To drain coolant, always open both drain plugs and simultaneously open the radiator cap as well. With the radiator cap kept closed, a complete drain of coolant is impossible.
- Remove the overflow pipe of the radiator pressure cap to drain the reserve tank.

#### NOTE :

- If the recovery tank is under pressure, make sure that the recovery tank is cool enough and free from pressure inside.

- Prescribed coolant volume (U.S. gallons)

Models	Quantity
D1803-CR-TIE4	5.8 L (1.53 U.S. gals.)
V2403-CR-TIE4	8.4 L (2.22 U.S. gals.)
V2607-CR-TIE4	6.0 L (1.59 U.S. gals.)
V3307-CR-TIE4 V3307-TIE4A	6.3 L (1.67 U.S. gals.)
V3800-TIE4	9.0 L (2.38 U.S. gals.)

#### NOTE :

- Coolant quantities shown are for standard radiators.
- An improperly tightened the radiator cap or a gap between the cap and the seat quickens loss of coolant.
  - Coolant (Radiator cleaner and antifreeze)

Season	Coolant
All seasons	Pure water and antifreeze (See "Antifreeze" in "DAILY CHECKS" in "MAINTENANCE" section.)

### ■ Remedies for quick decrease of coolant

- Check any dust and dirt between the radiator fins and tubes. If any, remove them from the fins and the tubes.
- Check the fan belt tension. If loose, tighten it securely.
- Check the internal blockage in the radiator hoses. If scale forms in the hoses, clean with the scale inhibitor or its equivalent.

### ■ Replacing radiator hoses and clamp bands

Consult your local KUBOTA Dealer for this service.  
(See "Checking radiator hoses and clamp bands" in "EVERY 250 SERVICE HOURS" in "REGULAR CHECKS AND MAINTENANCE WORK" section.)

**■ Replacing fuel pipes and clamp bands**

Consult your local KUBOTA Dealer for this service.  
(See "Checking fuel pipes and clamp bands" in "EVERY 50 SERVICE HOURS" in "REGULAR CHECKS AND MAINTENANCE WORK" section.)

**■ Replacing intake air line**

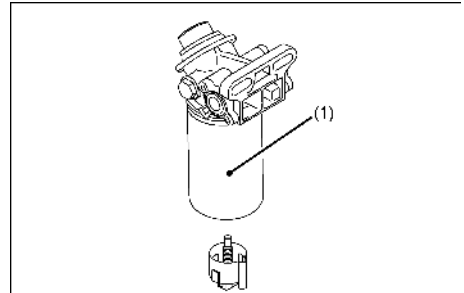
**[D1803-CR-TIE4, V2403-CR-TIE4]**

Consult your local KUBOTA Dealer for this service.

**SERVICE AS REQUIRED****■ Draining water separator (Type 2)**

If water or impurities collect in the water separator, the indicator in the monitor will light up. For more details, refer to the operator's manual for the equipment.

If this should happen during operation, drain from the switch Assy.



(1) Water separator filter

**IMPORTANT :**

- Be sure to air-bleed the fuel system before getting the engine restarted.

# CARRIAGE AND STORAGE

## CARRIAGE



### WARNING

To avoid personal injury or death:

- Fix the engine securely not to fall during operation.
  - Do not stand near or under the engine while carrying it.
  - The engine is heavy. In handling it, be very alert not to get your hands and body caught in.
1. Use carrier such as a crane when moving the engine to avoid bodily injury. Support the engine securely to avoid injury or damage.
  2. When lifting the engine, put the hook securely to metal fittings attached to the engine. Use strong hook and fittings enough to hang the engine.

#### NOTE :

- In the above step, do not hook the lifting sling to the muffler.

## STORAGE



### WARNING

To avoid personal injury or death:

- Do not clean the machine with engine running.
- To avoid the danger of exhaust fume poisoning, do not operate the engine in a closed building without proper ventilation.
- When storing the engine just after running, let the engine cool off.

Before storing the engine for more than a few months, remove any dirt on the machine, and:

1. Drain the coolant in the radiator. Open the plug at the bottom of the radiator, and remove the pressure cap to drain coolant completely. Leave the plug open. Hang a note written "No coolant" on the pressure cap. Since water may freeze when the temperature drops below 0°C (32°F), it is very important that no water is left in the machine.

#### NOTE :

- When using antifreeze, it is not necessary to take step (1) above.
2. Remove dirty engine oil, fill with new oil and run the engine for about 5 minutes to let the oil penetrate to all the parts.
  3. Check all the bolts and nuts, and tighten if necessary.

4. Remove the battery from the engine, adjust the electrolyte level, and recharge it. Store the battery in a dry and dark place.
5. When the engine is not used for a long period of time, run it for about 5 minutes under no load every 2 to 3 months to keep it free from rust. If the engine is stored without any running, moisture in the air may condense into dew over the sliding parts of the engine, resulting in rust there.
6. If you forget to run the engine for longer than 5 to 6 months, apply enough engine oil to the valve guide and valve stem seal and make sure the valve works smoothly before starting the engine.
7. Store the engine in a flat place and remove the key from engine.
8. Do not store the engine in a place where has flammable materials such as dry grass or straw.
9. When covering the engine for storage, let engine and muffler cool off completely.
10. Operate the engine after checking and repairing damaged wirings or pipes, and clearing flammable materials carried by mouse.

#### [V3307-TIE4A]

11. Idle speed restriction on cold days
  - (1) When the engine coolant temperature is below 0°C (32°F), the engine idle speed becomes temporarily restricted. This is to protect the engine component parts, especially turbo charger.
  - (2) A specific time later, the restrictive system gets automatically released in stages.

# TROUBLESHOOTING

If the engine does not function properly, use the following chart to identify and correct the cause.

## ■ When it is difficult to start the engine

Cause	Countermeasures
Fuel is thick and doesn't flow.	<ul style="list-style-type: none"> <li>* Check the fuel tank, and remove water, dirt and other impurities.</li> <li>* Check the fuel filter cartridge and replace it if necessary.</li> </ul>
Engine oil becomes thick in cold weather and engine cranks slow.	<ul style="list-style-type: none"> <li>* Use oils of different viscosities, depending on ambient temperatures. (Use 10W-30 in winter season.)</li> </ul>
Battery is discharged and the engine will not crank.	<ul style="list-style-type: none"> <li>* Charge the battery.</li> </ul>

## ■ When output is insufficient

Cause	Countermeasures
Fuel is insufficient.	<ul style="list-style-type: none"> <li>* Refuel.</li> <li>* Check the fuel system. (Bleed the fuel system if necessary.)</li> </ul>
Overheating of moving parts	<ul style="list-style-type: none"> <li>* Consult your KUBOTA Dealer.</li> </ul>
Air cleaner is dirty.	<ul style="list-style-type: none"> <li>* Clean the element.</li> </ul>
The output is limited because of a trouble.	<ul style="list-style-type: none"> <li>* Check the engine warning lamp. (If a trouble occurs, it means that the ECU might be in the output limiting mode.)</li> </ul>

## ■ When engine suddenly stops

Cause	Countermeasures
Lack of fuel	<ul style="list-style-type: none"> <li>* Refuel.</li> <li>* Check the fuel system. (Bleed the fuel system if necessary.)</li> </ul>
Overheating of moving parts	<ul style="list-style-type: none"> <li>* Consult your KUBOTA Dealer.</li> </ul>
Air cleaner is dirty.	<ul style="list-style-type: none"> <li>* Clean the element.</li> </ul>
Forced stop due to a trouble	<ul style="list-style-type: none"> <li>* Check the engine warning lamp. (If a serious trouble occurs, it means that the ECU might have forced the engine to a stop.)</li> </ul>

### NOTE :

- If the cause of trouble can not be found, contact your KUBOTA Dealer.

### IMPORTANT :

- If any of the sensors of common-rail engine malfunctions, the engine output and rotating speed drops during the run. In such case, contact your KUBOTA Dealer for repair.

### ■ When engine must be stopped immediately

Cause	Countermeasures
Engine revolution suddenly decreases or increases.	* Check the adjustments and the fuel system.
Unusual sound is heard.	* Check all moving parts carefully.
Oil lamp lights up during operation.	* Check the lubricating system. * Check to see if the engine bearing clearances are within factory specs. * Check the function of the relieve valve in the lubricating system. * Check pressure switch. * Check filter base gasket.
Engine warning lamp lights up.	* Consult your KUBOTA Dealer.

### ■ When engine overheats

Cause	Countermeasures
Engine oil insufficient	* Check oil level. Replenish oil as required.
Fan belt broken or elongated	* Change belt or adjust belt tension.
Coolant insufficient	* Replenish coolant.
Excessive concentration of antifreeze	* Add water only or change to coolant with the specified mixing ratio.
Radiator net or radiator fin clogged with dust	* Clean net or fin carefully.
Inside of radiator or coolant flow route corroded	* Clean or replace radiator and parts.
Fan or radiator or radiator cap defective	* Replace defective parts.
Thermostat defective	* Check thermostat and replace if necessary.
Temperature gauge or sensor defective	* Check temperature with thermometer and replace if necessary.
Overload running	* Reduce load.
Head gasket defective or coolant leakage	* Replace parts.



# SPECIFICATIONS

Model	D1803-CR-TIE4	
Type	Vertical, water-cooled, 4-cycle diesel engine	
Number of cylinders	3	
Bore and stroke	mm (in.)	87 x 102.4 (3.43 x 4.04)
Total displacement	L (cu.in.)	1.826 (111.43)
Combustion type	Direct injection type	
Output:	kW / min <sup>-1</sup> (rpm)	37.0 / 2700
Gross Intermittent	(PS / min <sup>-1</sup> (rpm))	(50.3 / 2700)
Max. torque / Rotating speed	N-m / min <sup>-1</sup> (rpm) (kg-m / min <sup>-1</sup> (rpm))	150.5 / 1600 (15.3 / 1600)
Maximum bare speed	min <sup>-1</sup> (rpm)	2900
Minimum bare idling speed	min <sup>-1</sup> (rpm)	800
Order of firing	1-2-3	
Direction of rotation	Counter-clockwise (viewed from flywheel side)	
Compression ratio	16.0	
Fuel	Diesel Fuel No.2-D ULS	
Lubricant (API classification)	CJ-4 or CK-4	
Dimensions (length x width x height)	mm (in.)	758 x 513 x 744 (29.8 x 20.2 x 29.3)
Dry weight	kg (lbs.)	195 (430)
Starting system	Cell starter	
Starting motor	12V, 1.4 kW	
Charging generator	12V, 480 W	
Recommended battery capacity	12V, 88 Ah	

**NOTE :**

- Specifications are subject to change without notice.

Model	V2403-CR-TIE4	V2607-CR-TIE4	
Type	Vertical, water-cooled, 4-cycle diesel engine		
Number of cylinders	4		
Bore and stroke mm (in.)	87 x 102.4 (3.43 x 4.04)	87 x 110 (3.43 x 4.33)	
Total displacement L (cu.in.)	2.434 (148.53)	2.615 (160.04)	
Combustion type	Direct injection type		
Output: Gross Intermittent	kW / min <sup>-1</sup> (rpm) (PS / min <sup>-1</sup> (rpm))	48.6 / 2700 (66.1 / 2700)	53.0 / 2700 (72.1 / 2700)
Max. torque / Rotating speed	N-m / min <sup>-1</sup> (rpm) (kg-m / min <sup>-1</sup> (rpm))	198.5 / 1600 (20.2 / 1600)	225 / 1600 (22.9 / 1600)
Maximum bare speed min <sup>-1</sup> (rpm)	2900		
Minimum bare idling speed min <sup>-1</sup> (rpm)	800		
Order of firing	1-3-4-2		
Direction of rotation	Counter-clockwise (viewed from flywheel side)		
Compression ratio	16.0		
Fuel	Diesel Fuel No.2-D ULS		
Lubricant (API classification)	CJ-4 or CK-4		
Dimensions (length x width x height)	mm (in.) 854 x 517 x 744 (33.6 x 20.4 x 29.3)	869 x 529 x 724 (34.2 x 20.8 x 28.5)	
Dry weight kg (lbs.)	232 (511)	259 (571)	
Starting system	Cell starter		
Starting motor	12V, 2.0 kW	12V, 2.5 kW	
Charging generator	12V, 480 W	12V, 720 W	
Recommended battery capacity	12V, 92 Ah		

**NOTE :**

- Specifications are subject to change without notice.

Model	V3307-CR-TIE4	V3307-TIE4A	V3800-TIE4
Type	Vertical, water-cooled, 4-cycle diesel engine		
Number of cylinders	4		
Bore and stroke mm (in.)	94 x 120 (3.70 x 4.72)		100 x 120 (3.93 x 4.72)
Total displacement L (cu.in.)	3.331 (203.27)		3.769 (229.41)
Combustion type	Direct injection type		
Output: Gross Intermittent	kW / min <sup>-1</sup> (rpm) (PS / min <sup>-1</sup> (rpm))		55.4 / 2600 (75.3 / 2600)
Max. torque / Rotating speed N-m / min <sup>-1</sup> (rpm) (kg-m / min <sup>-1</sup> (rpm))	265 / 1500 (27.0 / 1500)		310 / 1500 (31.6 / 1500)
Maximum bare speed min <sup>-1</sup> (rpm)	2800		
Minimum bare idling speed min <sup>-1</sup> (rpm)	800		
Order of firing	1-3-4-2		
Direction of rotation	Counter-clockwise (viewed from flywheel side)		
Compression ratio	15.6		17.0
Fuel	Diesel Fuel No.2-D ULS		
Lubricant (API classification)	CJ-4 or CK-4		
Dimensions (length x width x height) mm (in.)	882 x 561 x 744 (34.7 x 22.1 x 29.3)	882 x 561 x 749 (34.7 x 22.1 x 29.5)	835 x 580 x 835 (32.9 x 22.8 x 32.9)
Dry weight kg (lbs.)	295 (650)		324 (714)
Starting system	Cell starter		
Starting motor	12V, 3.0 kW		
Charging generator	12V, 720 W		12V, 540 W
Recommended battery capacity	12V, 108 Ah		12V, 136 AH

**NOTE :**

- Specifications are subject to change without notice.



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## Accessories

**Anchorage:**

7780 Old Seward Hwy  
Anchorage, AK 99518  
(907) 341-2250 | (877) 341-2250

**Fairbanks:**

1919 Van Horn Road  
Fairbanks, AK 99701  
(907) 458-9049 | (888) 868-9049

**Seattle:**

17660 W. Valley Hwy  
Tukwilla, WA 98188  
(425) 251-6119

**Williston:**

5064 Bennett Loop  
Williston, ND 58801  
(701) 774-5312



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**CAUTION**

GASOLINE IS INVOLVED AND VAPORS WILL SETTLE IN LOW AREAS. WORK IN A WELL VENTILATED SPACE AWAY FROM SPARKS OR OPEN FLAME SUCH AS A PILOT LIGHT. HAVE A CLASS 'B' FIRE EXTINGUISHER CLOSE BY.

**CAUTION****CAUTION**

TO ELIMINATE THE CHANCE OF FIRE OR PERSONAL INJURY, THE FUEL SYSTEM PRESSURE MUST BE RELIEVED BEFORE SERVICING ANY FUEL SYSTEM COMPONENT.

## **INSTALLATION INSTRUCTIONS FOR UNIVERSAL ELECTRIC FUEL PUMP**

**NOTE:**

- Before replacing any electric fuel pump diagnose the cause of failure.
- Dirt is the major cause of pump failure, so the tank must be cleaned out or dirt may cause the replacement pump to fail as well.
- Exercise care so that no dirt falls into the tank during disassembly or reassembly.

***-For safety reasons, it is recommended an Oil Pressure Safety Switch be installed. This will prevent engine damage and reduce the chance of fire in the case that the engine stops without the ignition switch in the "off" position.***

- Installation of the replacement pump may require some of the mounting or electrical components be reused. Do not discard any parts.
- To prevent fuel pump failure, installation of a high quality fuel filter on the inlet side of the pump, is required.

**A. FUEL PUMP INSTALLATION**

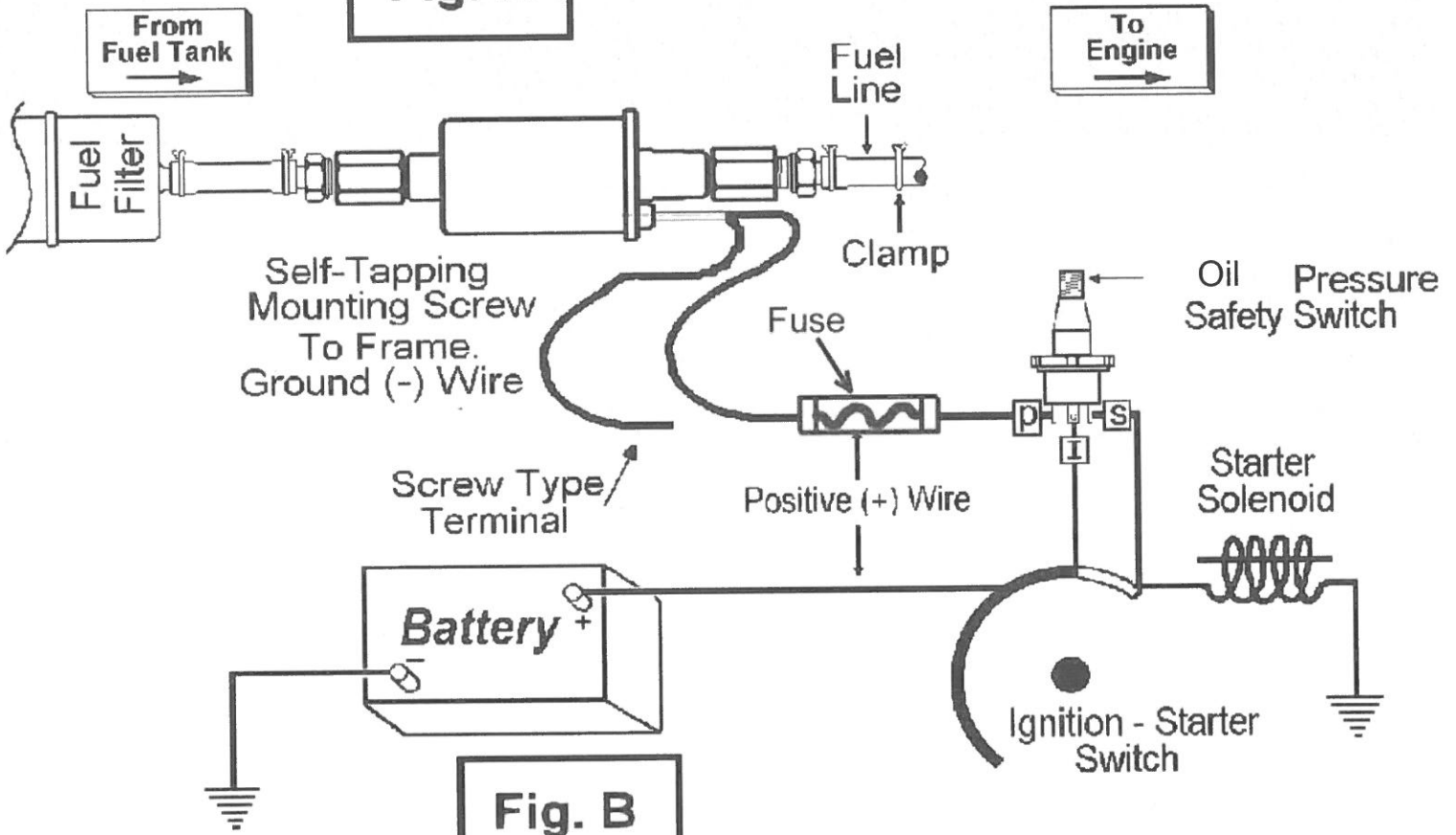
1. Disconnect the negative battery cable.
2. Mount the fuel pump close to the existing fuel lines and tank, but away from any exhaust system component. Place the pump and bracket assembly as near to the bottom of the fuel tank as possible, but never more than 24 inches above the top of the tank.
3. Remove a section of fuel line where the pump is to be mounted. (A tube cutter is recommended when cutting fuel lines. Flush the fuel line to prevent metal chips from entering the fuel system.)
4. If pump has rubber hose fittings proceed to next step. If using a pump with threaded inlet/outlet fittings, assemble the (supplied) fuel fittings to the fuel pump (See Fig. A). (This pump is equipped with dry-seal fuel fittings. Do not use Teflon tape or pipe sealant on pipe fittings, or pump breakage will occur.)
5. Install mounting bracket onto vehicle's chassis/frame with self-tapping screw(s).
6. Install the fuel pump on the mounting bracket with the outlet towards the engine. Place ground (-) wire from pump under mounting screw or bolt.
7. Connect the fuel lines to the fuel pump, using supplied rubber fuel line and clamps provided. (To prevent fuel pump failure, installation of a high quality fuel filter on the inlet side of the pump, is required.) (See Fig. A.)
8. Using #14 or larger (lower gauge #) gauge wire, follow the wiring diagram (See Fig. A & B) and connect the pump to the vehicle's electrical system. If the vehicle has a pre-existing oil pressure safety switch which operates either a warning light or gauge, it is recommended that a T-adapter be installed into the engine block and both the O.E. and the Oil Pressure Safety Switch be used (See Fig. C). A 10-amp fuse should be installed between the pressure safety switch and the electric pump. (Route wires away from heat and road hazards, and anchor securely to prevent vibration and chafing. Full battery voltage must be available to the pump when the ignition switch is "on". Pump ground must be the same as the battery ground.)
9. If this pump is being used to replace a defective in tank pump, and it is not going to be removed, make sure the defective pump does not restrict the fuel supply.
10. If this pump is being used to replace a defective mechanical pump, the fuel lines should bypass the mechanical pump. Fuel pushed through a defective mechanical pump can cause severe engine damage. If mechanical pump is not removed from the engine, the mechanical pump inlet should be plugged.

**WARNING**

**NOT FOR USE IN AIRCRAFT OR OTHER NON-AUTOMOTIVE USE. THE USE OF A PUMP FOR OTHER THAN THE APPLICATIONS LISTED WILL VOID THE WARRANTY AND COULD DO SEVERE ENGINE DAMAGE.**

**WARNING****WARNING**

**Fig. A**



**Fig. B**

