

GEARLEC - TRACTELEC

27 - 38 - 70 kVA

Installation and maintenance

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Thank you for choosing a **LEROY-SOMER** generator.

This manual applies to the **GEARLEC / TRACTELEC** which you have just purchased.

The latest in a new generation of alternators, this range benefits from the experience of one of the world's largest manufacturers, using advanced technology and implementing rigorous quality control.

We would like to draw your attention to the contents of this maintenance manual. Please note that respecting a few important points during installation, operation and servicing of your alternator will ensure problem-free operation for many years.

Standards

Our generators conform to the majority of international standards and are compatible with :

- the recommendations of the International Electrotechnical Commission IEC 34-1, (EN 60034).
- the recommendations of the International Standards Organisation ISO 8528.
- European Community directive 89/336/EEC on Electromagnetic Compatibility (EMC) (Tractelec only).
- European Community directives 73/23/EEC and 93/68/EEC (Low Voltage Directive) (Tractelec and Gearlec).

GEARLEC has CE marking in the context of the LVD (Low Voltage Directive) as a machine component. A declaration of incorporation can be supplied on request.

TRACTELEC has CE marking in the context of the EMC, LVD (Low Voltage Directive) and MACHINERY directives as a machine. A certificate of conformity can be supplied on request.

Safety measures

Before using your generator for the first time, you should read this installation and maintenance manual carefully, which is supplied with the machine. All operations carried out on the generator should be done so by qualified personnel, trained in the commissioning, servicing and maintenance of electrical and mechanical components.

The various operations described in this manual are accompanied by recommendations or symbols to alert the user to risks of accidents. It is vital to understand and respect the various warning symbols set out below :

WARNING

Warning symbol for intervention which could damage or destroy the machine or surrounding equipment.



Warning symbol for general danger to personnel.



Warning symbol for electrical danger to personnel.

Note : LEROY-SOMER reserves the right to modify the characteristics of its products at any time in order to incorporate the latest technological developments. The information contained in this document may therefore be changed without notice.

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1 - RECEIPT

1.1 - Inspection

On receiving your generator, check that it has not been damaged in any way during transportation.

If there is any obvious damage, contact the carrier (a claim can be made on their insurance) and after a visual check, turn the generator by hand to detect any possible fault.

1.2 - Identification

GEARLEC / TRACTELEC are identified by a self-adhesive black/orange nameplate on the machine cover.

Check that the nameplate on the machine corresponds to your order.

GEARLEC / TRACTELEC incorporate alternators from the **PARTNER** range, especially designed for agricultural use. The generator is identified by another metal nameplate riveted on the casing.

The **GEARLEC / TRACTELEC** range comprises 2 products :

- the **GEARLEC : GT 41.1, GT 42.1, GT 44.1** is intended for the builder of the generator set or installer,

- the **TRACTELEC** is a finished product, ready to use, and available :

- as a fixed version : **TF.1- 27 , TF.1-38 and TF.1-70** (without 3-point chassis),

- as a mobile version : **TM.1- 27 , TM.1-38 and TM.1-70** (with chassis enabling the TRACTELEC to be fixed to a tractor's 3-point linkage).

1.2.1 - Dimensions

The dimensions of the **GEARLEC** range are set out in catalogue ref : 626 and those of the **TRACTELEC** range in catalogue ref : 634.

1.3 - Electrical diagram/coupling/regulator

Both the electrical diagram for the alternator and the terminal connections are defined in the maintenance manual ref : 1383. For **TRACTELEC**, electrical connection should be performed in accordance with the diagram (Fig. 1). Electrical installations must conform to the legislation in force in the country of use.



- A current reversing switch must be placed between the mains and the **GEARLEC** equipped with a panel, or **TRACTELEC**.

1.4 - Storage

Before commissioning, machines must be :

- sheltered from humidity : for relative humidities greater than 90%, the machine insulation can drop very quickly and become virtually non-existent at around 100%; check the anti-rust protection on unpainted parts.

For a very long storage period, it is advisable to place the motor in a sealed package (eg. heat-sealed plastic) containing dehydrating sachets, protected from frequent significant temperature variations to prevent formation of condensation during storage.

- In the event of surrounding vibrations, try to reduce the effect of these vibrations by placing the generator on a damping support (eg. rubber plate) and turn the rotor slightly once a fortnight to prevent the bearing rings from being marked.

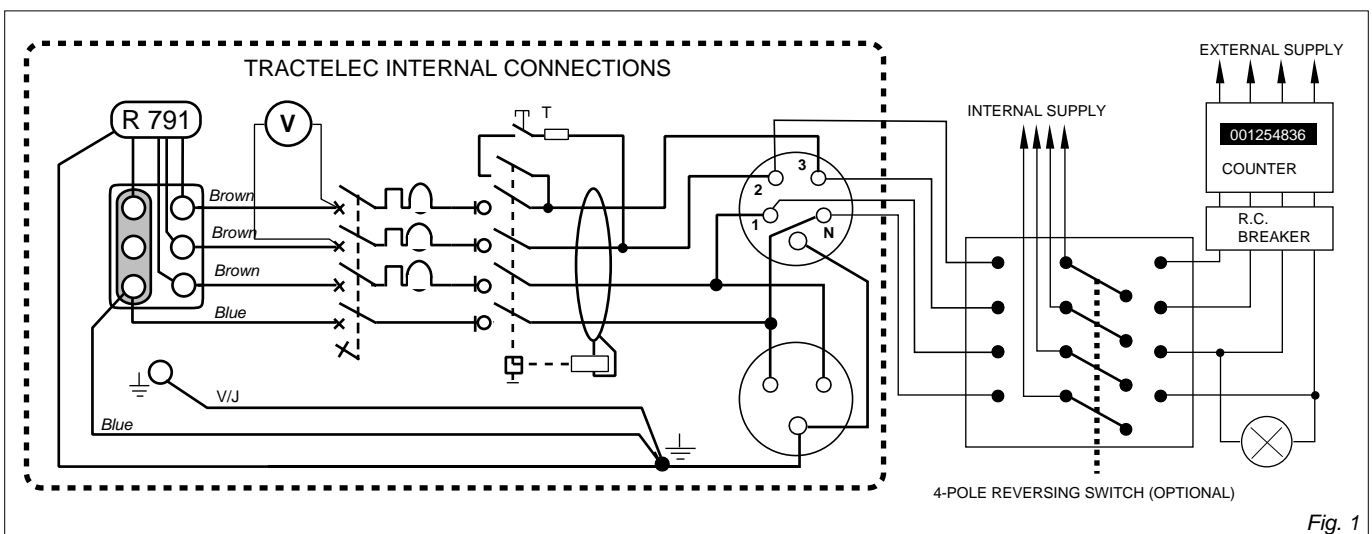


Fig. 1

2 - TECHNICAL CHARACTERISTICS

2.1 - Operating principle

The GEARLEC or TRACTELEC is a generator, driven by an agricultural tractor. A gearbox compensates for the difference in speed between the tractor power take-off shaft and the alternator. This oil gearbox is included in the generator and coupled to the alternator.

2.2 - Mechanical characteristics

- Steel casing
- Cast iron or aluminium flanges
- Sealed ball bearings (greased for life)
- Mounting arrangement :
 - B 3 (two-bearing with feet)
 - Standard splined shaft extension
- Drip-proof machine, self-ventilated
- Degree of protection : IP 21 (IP 23 on request)
- Rotation speeds (see table)

GT/GM RANGE				
MODEL	KVA	Voltage VOLTS	Tractor (min-1)	Alternator (min-1)
GT 41.1 M3/50 L	27	400 V	540	1500
GT 42.1 M6/50 L	38	400 V	540	1500
GT 44.1 S1/50 H	70	400 V	1000	1500
GT 41.1 M3/60 L	36	480 V	540	1800
GT 42.1 M6/60 L	48	480 V	540	1800
GT 44.1 S1/60 H	75	480 V	1000	1800
GT 41.1 M3/60 L	20	240 V	540	1800
GT 42.1 M6/60 L	26	240 V	540	1800
GT 44.1 S1/60 L	46	240 V	540	1800
GT 44.1 S1/60 H	46	240 V	1000	1800
GT 44.1 M4/60 H	61	240 V	1000	1800

TF.1/TM.1 RANGE				
MODEL	KVA	Voltage VOLTS	Tractor (min-1)	Alternator (min-1)
TF.1/TM.1 - 27	27	400 V	540	1500
TF.1/TM.1 - 38	38	400 V	540	1500
TF.1/TM.1 - 70	70	400 V	1000	1500

2.3 - Electrical characteristics

- Class H insulation
- Overload capacity : the alternators are capable of starting electrical motors with a starting current 2 to 3 times the rated alternator current.
- Voltage regulation : around $\pm 1\%$ in steady state at the rated speed on a 3-phase non-distorting balanced load; on a single-phase or unbalanced load voltage regulation may reach $\pm 5\%$.
- Automatic priming on remanent voltage.

2.4 - Electronic characteristics of voltage regulation

See alternator maintenance manual.

2.5 - Options

See alternator maintenance manual.

3 - INSTALLATION - COMMISSIONING

3.1 - Mounting



All lifting and materials handling operations must be carried out using tried and tested equipment.

3.1.1 - Materials handling

The generously sized lifting ring is only for handling the alternator. It cannot be used to lift the whole set. During any operations the machine should ideally be horizontal. Use a lifting system which respects the machine environment (terminal box).

3.1.2 - Coupling

The **GEARLEC** or **TRACTELEC** is coupled to an agricultural tractor by means of a universal joint (not supplied). A housing protects the splined shaft end on the alternator side. The universal joint must incorporate a protective device.



Unsuitable or incorrectly fitted universal joint protection can cause serious accidents.

3.1.3 - Version TF.1 : TRACTELEC without 3-point chassis

- Fix the TRACTELEC securely on a raised baseplate for optimum alignment of the universal joint link with the tractor power take-off shaft. A shim 10 mm thick should be placed under the back foot of TF.1 6.5 and 10 kVA units.

3.1.4 - Version TM.1 : TRACTELEC with 3-point chassis

The chassis enables the TRACTELEC to be fixed to the tractor 3-point linkage. Ideally, the TRACTELEC should be placed on the ground, raising it sufficiently to align the universal joint link with the tractor power take-off shaft.



The TRACTELEC must be fixed to the tractor 3-point linkage during operation.

3.2 - Checks before first use

3.2.1 - Mechanical tests

Before starting for the first time, check that :

- the fixing bolts on the feet are locked securely,
- the coupling is correct, and the universal joint link is aligned as closely as possible with the tractor power take-off shaft,
- cooling air must enter and exit freely through the machine vents,
- the grilles and protective housing are properly in place,
- the breather plug pin on the gearbox has been removed,
- the bearings have been inspected and the oil level of the gearbox is correct (see section 4.2).

3.2.2 - Electrical tests

3.2.2.1 - Insulation measurement and dielectric tests

See the maintenance manual for the machine concerned ref : 1383.

WARNING DO NOT under any circumstances start using an alternator, whether it is new or not, if the insulation is lower than 1 megohm for the stator and 100,000 ohms for the other windings.

3.2.2.2 - Checking connections

Check that :

- the TRACTELEC / GEARLEC is earthed (earthing rod),
- the residual circuit breaker conforms to the legislation covering protection of personnel in force in the country of use, and has been properly installed on the alternator power output as near to the alternator as possible. (In this case, disconnect the blue wire connecting the neutral on the R 791 interference suppression module).
- the machine has been connected to the mains supply according to the connection diagram (see section 1.3).
- the connection of cables and any links conforms to the diagram included with the machine,
- no protection devices have tripped,
- the equipment to be supplied has its own switchgear or starter system for motors.

3.3 - Setting

Your machine is preset and tested in the factory.

3.4 - Commissioning (environment /safety)



Before starting up, check that all preparations and safety procedures already mentioned in this manual have been observed.

Select a site which is sheltered from dripping water and dust, and is free from humidity.

- Ensure that the switch is in the "TRACTELEC" position (standby).
- After engaging the power take-off shaft, accelerate gradually, keeping an eye on the voltmeter. The voltage should be 420V (50Hz) or 500V (60Hz).
- Start up a motor and check its direction of rotation. If necessary, reverse two phase wires on the "TRACTELEC" switch to obtain the opposite direction of rotation.
- Switch on the various motors, start them in decreasing order of power, then start the other equipment to be used, and monitor the voltage reading on the voltmeter. This should be approximately 400V at 50 Hz or 480V at 60 Hz. If not, increase the tractor speed. If the voltage does not increase sufficiently, the "TRACTELEC" or tractor power is insufficient.
- In the case of a star-delta starter, wait for a clear motor startup before switching to delta position. The voltage reading on the voltmeter should return to approximately 400V at 50 Hz or 480V at 60 Hz. If not, increase the tractor speed.
- To break the "TRACTELEC" general power supply, switch off the electrical circuit and set the reversing switch to the mains "NORMAL" position. Stop the tractor motor.



The earth must meet electrical standards and safety rules in force in that country.



The GEARLEC version must also be fitted with a control and protection unit enclosing all electrical accessories.

4 - SERVICING - MAINTENANCE



All operations carried out on the alternator should be undertaken by qualified personnel, trained in the commissioning, servicing and maintenance of electrical and mechanical components.

4.1 - Safety measures



The machine should be inspected during operation with all protective devices and panels mounted.

4.2 - Normal maintenance

4.2.1 - Checks after startup

After approximately 20 hours in operation, check that all the fixing screws on the machine are tight, verify the state of the gearbox (for traces of oil) and the various electrical connections in the installation.

4.2.2 - Ventilation circuit

- Take care that the suction grilles are not blocked by foreign bodies (straw, feathers, wool etc.).

4.2.3 - Bearings

The bearings are greased for life (see the alternator manual). A quick check of all the generator bearings can be made by turning the shaft end by hand; the assembly should turn freely without sticking.

4.2.4 - Gearbox

The gearbox oil should be emptied and replaced after 50 hours of operation, then every 500 hours and in all cases, at least once each year. Quality of oil to be used : synthetic oil **MOBIL SHC 629** - PAO ISO, VG 150.

Quantity of oil for GT 41.1 , 42.1 : **1 litre**
 Quantity of oil for TF.1/ TM.1 27,38. : **1 litre**
 Quantity of oil for GT 44.1 : **2 litres**
 Quantity of oil for TF.1/ TM.1 70. : **2 litres**

Before use, check the gearbox oil level using the oil level screw (586), and top up if necessary.

Check that the gearbox temperature does not exceed 60°C above the ambient temperature. If this is exceeded, the machine must be stopped and checked.

4.2.5 - Storage

- Do not clean the TRACTELEC with a water jet spray.
 - Put away your machine in a dry, airtight place to avoid condensation.

4.3 - Fault detection

If, on commissioning, the alternator does not work normally, the source of the malfunction will need to be identified.

In order to do this, check that :

- the protective devices are switched on,
- the connections conform to the diagrams in the maintenance manuals included with the machine,
- the speed of the generator set is correct, see section 2.2 (use a frequency meter rather than a revolution counter),

Repeat all operations set out in section 3.

4.4 - Mechanical faults

See the alternator maintenance manual. For the gearbox, follow the troubleshooting guide below. Mechanical faults should be noted and the machine disconnected from the mains.

	FAULT	ACTION	SOURCE OF FAULT
	Excessive gearbox temperature rise	Check oil level	Lack of oil or incorrect oil level
	Abnormal gearbox noise	Change the bearings	Faulty lubrication
	Gearbox vibration	Stop the machine	Faulty universal joint coupling

4.5 - Electrical faults

See the alternator maintenance manual. For the generator, follow the troubleshooting guide below. Electrical faults should be noted and the machine disconnected from the mains.

	FAULT	ACTION	SOURCE OF FAULT
	Voltage too high or too low	Check the speed	Voltmeter faulty, speed incorrectly set
	No voltage	Check the alternator	See the alternator maintenance manual
		Check protective devices	Circuit breaker, reversing switch, sockets
		Check connections	Wire disconnected in the terminal box

4.6 - Electronic faults

See the alternator maintenance manual.

4.7 - Dismantling the gearbox



During the guarantee period, this operation must only be undertaken in an approved LEROY SOMER workshop or in our factories, otherwise the guarantee will be rendered null and void.

4.7.1 - Dismantling

- Drain the gearbox.
- Remove the cover of the primary housing (553).
- Check the state of the sealing ring (554).
- Remove the splined input shaft + input wheel assembly and the bearings.
- Remove the bearing (559) and the input wheel (560) by applying pressure to the splined shaft end, dismantle the other bearing using a type U.35 (FACOM) extractor.
- Check the teeth of the input wheel and the bearings.
- Unscrew the tie rod nuts on the non-drive end shield.
- Remove the 2 fixing screws (570).
- Take the gearbox secondary housing (550) out of the alternator assembly.
- Check the state of the gear pinion (563) and bearing (567), for dismantling purposes, remove the circlips (565) and dismantle the gear pinion / bearing assembly using a U.35 (FACOM) extractor.
- Check the state of the sealing ring (569) and lipseal (572).

4.7.2 - Reassembly

- Fit the inner bearing retainer (568) and the lipseal (572) on the shaft end of the alternator.
- Position the sealing ring on the bearing retainer (568).
- Fit the spacer (573) and a new bearing (567).
- Install the key (601) in its slot, fit the gear pinion (563) and the circlips (565).
- Fix a screw rod in the inner bearing retainer (568) (length : approx. 200 mm).
- Mount the gearbox housing (550) by sliding the inner bearing retainer screw rod into one of the two holes to assist assembly.
- Screw home one fixing screw (570), remove the screw rod and fit the other screw.
- Finish mounting the housing with 4 nuts on the non-drive end shield.
- Mount the gear pinion (56) and the two new bearings (559) on the input shaft (557).
- Slide this assembly into the housing.
- Position the sealing ring (554) in the end shield (553) and fit the lipseal (558).
- Mount the input shield (553) on the housing (550).
- Refit the drain plug and refill with oil (see section 4.2.4).

4.8 - Tightening torque

4.8.1 - Class 6/8 screws

Screw	M4	M5	M6	M8	M10	M12	M14	M16	M20
Torque : Nm	1,8	3,6	6,2	15,2	24	52	83	130	254

4.8.2 - Class 8/8 screws

Screw	M4	M5	M6	M8	M10	M12	M14	M16	M20
Torque : Nm	2,5	4,8	8,3	20	40	69	110	170	340

4.8.3 - Class 6/8 & 8/8 screws (tightening without pressure or electrical tightening)

Screw	M4	M5	M6	M8	M10	M12	M14	M16	M20
Torque : Nm	1	2,5	4	10	20	35	55	85	170

5 - REPLACEMENT PARTS

5.1 - First maintenance parts

Emergency kits are also available for the gearboxes.

They comprise the following :

Ref	Description	Qty	GT 41.1 - TF.1/TM1 . 27	Code
559	Input wheel bearing	2	6307	-
567	Shaft bearing	1	3308 D	-
558	Lipseal	1	35 x 47 x 7	-
572	Lipseal	1	50 x 65 x 8/10	-

Ref	Description	Qty	GT 42.1 - TF.1/TM1 . 38	Code
559	Input wheel bearing	2	6307	-
567	Shaft bearing	1	22309 CC	-
558	Lipseal	1	35 x 47 x 7	-
572	Lipseal	1	55 x 68 x 8/10	-

Ref	Description	Qty	GT 44.1 - TF.1/TM1 . 70	Code
559	Input wheel bearing	2	6309	-
567	Shaft bearing	1	6411 C3	-
558	Lipseal	1	45 x 62 x 8	-
572	Lipseal	1	70 x 100 x 10	-

5.2 - Technical helpline

Our technical helpline will be able to deal with all your enquiries.

When ordering replacement parts, please indicate the machine type, number and information shown on the nameplate.

Contact :

LEROY-SOMER MOTORS

Usine de Sillac/Alternateurs

16015 ANGOULEME CEDEX - FRANCE

Tel. : (33) 05.45.64.45.64

Helpline : (33) 05.45.64.43.69

Fax : (33) 05.45.64.43.24

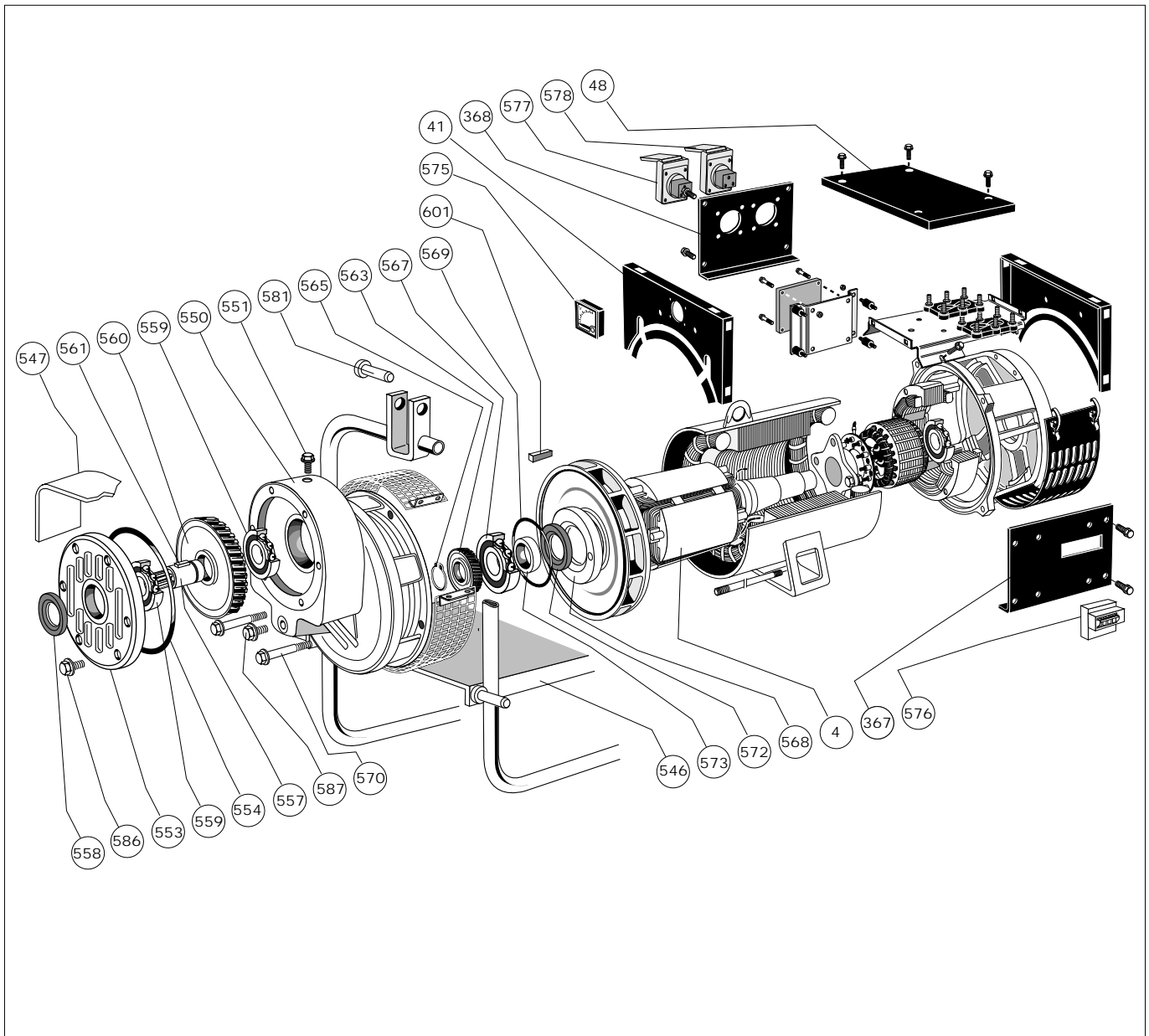
References for the various parts can be found on the exploded views and their description on the nameplate.

Our large network of service centres can supply the necessary parts without delay.

To ensure optimum machine operation and safety, we recommend using original manufacturer replacement parts.

If not, the manufacturer cannot be held responsible for any damage.

5.3 - Exploded view, parts list for GT41.1, 42.1,44.1 - TF.1/TM.1- 27 - 38 - 70.



Ref.	Qty	Description	Ref.	Qty	Description
4	1	Rotor assembly	554	1	Sealing ring
41	1	Front part	565	1	Internal circlips
48	1	Upper part of cover	567	1	Bearing
367	1	Inspection door, circuit-breaker side	568	1	Inner bearing retainer
368	1	Cover door, socket side	569	1	Sealing ring
546	1	Chassis	572	1	Lipseal
547	1	Universal joint protection	573	1	Ring
550	1	Secondary housing	575	1	Voltmeter
551	1	Breather plug	576	1	Circuit-breaker
553	1	Housing shield	577	1	3-phase socket
557	1	Splined input shaft	578	1	Single phase socket
558	1	Lipseal	581	1	Coupling shaft
559	2	Bearing	586	1	Level screw
560	1	Input wheel	587	1	Drain plug
561	1	Key	601	1	Key
563	1	Pinion			