TR Generator Engines

TR Generator Engine

BUILT ON A LEGACY, FOCUSED ON THE FUTURE

TR SERIES

fixed speeds
1500 | 1800 r/min

5.9 - 23.9 kVA | 4.7 - 19.1 kWe
5.5 - 22.2 kWm | 7.4 - 29.8 bhp[1]

OVERVIEW

The **TR Generator Engines** are specifically designed as a Power generating engine suitable for use in unregulated emissions territories. It is durable, reliable and easy to maintain with oil and filter changes up to 250 hours, dependant on operational conditions. It is designed for operation in ambient temperatures up to 40°C (104°F).

BASIC ENGINE CHARACTERISTICS

- diesel fuelled and approved for operation on biodiesel, that conform with ASTM D6751 and EN14214, concentrations of up to 20%
- direct injection
- 1, 2 or 3 cylinders
- air cooled
- naturally aspirated
- electric start (hand start optional)

Note:
These engines do not comply with Harmonised International Regulated Emissions Limits.

T range genset engines are configured to accept dedicated single bearing alternators manufactured specifically to suit the TR bare flywheel arrangement. For alternators other than these it will be necessary to add to the specifications a ventilated adaptor (SAE4 or SAE5) and a drive member (6.5" or 7.5").

DESIGN FEATURES AND EQUIPMENT

- medium duty air cleaner *
- oil cooling by means of air flow over a deep crankcase finning
- inlet and exhaust manifolds
- fuel injection pump and self-vent fuel system
- fuel filter
- fuel lift pump *
- self-regulating plunger type lubricating oil pump
- spin-on lubricating oil filter
- decompressor lever
- flywheel with cooling fan **
- SAE 4 flywheel housing **
- mechanical governing
- 12V starter motor *
- safety switches *
- fuel control solenoid (energised to run) *
- standard skid base packing
- 250 hour service intervals
- operators' handbook

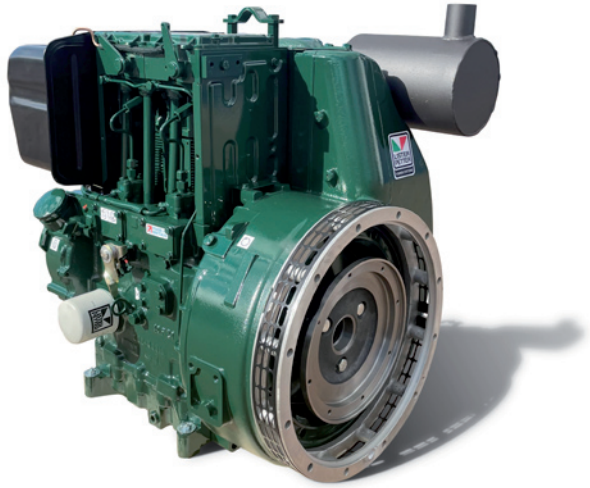
OPTIONAL ITEMS

- 12V battery charge windings
- SAE4:5 ventilated adaptor
- SAE4:4 ventilated adaptor
- 6.5" or 7.5" drive member
- heavy duty air cleaner

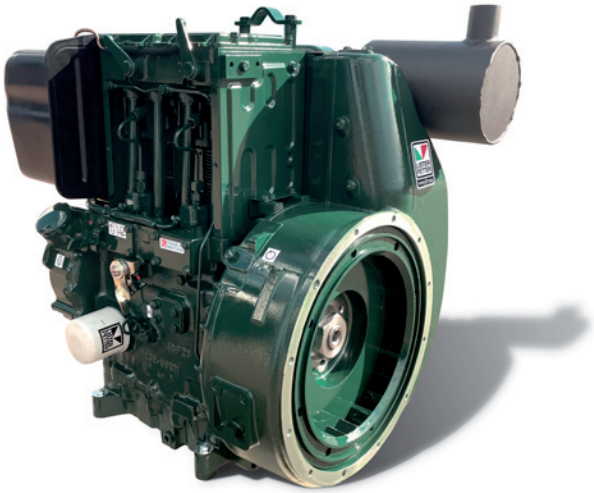
See also items with asterisk under Design Features and Equipment.

* Optional items standard on most builds
** Options available
*** Please refer to Applications Department for cyclic irregularity implications

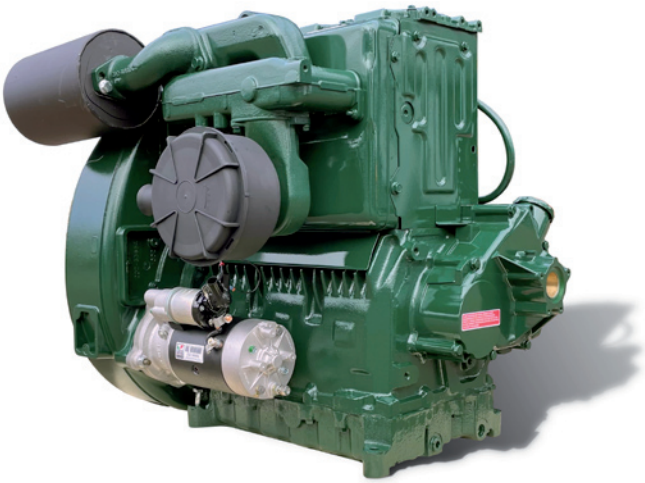
TR2 | TR2G1500-FB I 11.8 kVA PRP 50Hz
Including 13.5 litre fuel tank



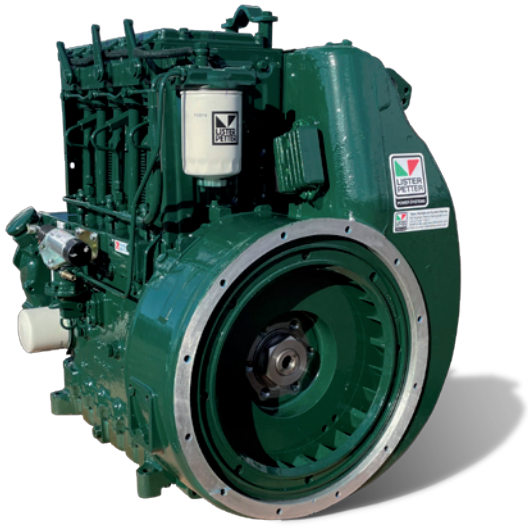
TR2G1500FSFBSAE4 | 11.8 kVA PRP 50Hz
Including SAE4 J620 7.5" engine connection option and 13.5 litre fuel tank



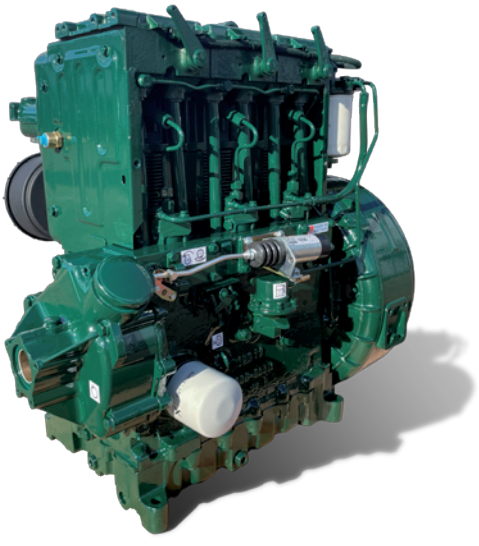
TR2G1800FSHS-FB I 12.4 kWe ESP 60Hz
Including 13.5 litre fuel tank option



TR3 – TR3G1500FS I 19.9 kVA ESP 50Hz



TR3G1500FS I 18.1 kVA PRP 50Hz



TR3G1500FS I 18.1 kVA PRP 50Hz
Including 12V fuel control solenoid

POWER OUTPUTS [1]

Engine Model	Speed, r/min	Power	Engine Power (ISO3046)				Typical Net Generator Output (ISO8528)		
			Gross		Net		Rating	kVA	kWe
			kWm	bhp	kWm	bhp			
TR1	1500	Continuous	5.5	7.4	5.5	7.4	PRP	5.9	4.7
		Fuel stop	6.1	8.2	6.1	8.2	ESP	6.6	5.2
	1800	Continuous	6.7	9.0	6.7	9.0	PRP	7.2	5.8
		Fuel stop	7.4	9.9	7.4	9.9	ESP	8.0	6.4
Engine Model	Speed, r/min	Power	Engine Power (ISO3046)				Typical Net Generator Output (ISO8528)		
			Gross		Net		Rating	kVA	kWe
			kWm	bhp	kWm	bhp			
TR2	1500	Continuous	11.0	14.7	11.0	14.7	PRP	11.8	9.5
		Fuel stop	12.1	16.2	12.1	16.2	ESP	13.0	10.4
	1800	Continuous	13.1	17.6	13.1	17.6	PRP	14.1	11.3
		Fuel stop	14.4	19.3	14.4	19.3	ESP	15.5	12.4
Engine Model	Speed, r/min	Power	Engine Power (ISO3046)				Typical Net Generator Output (ISO8528)		
			Gross		Net		Rating	kVA	kWe
			kWm	bhp	kWm	bhp			
TR3	1500	Continuous	16.8	22.5	16.8	22.5	PRP	18.1	14.4
		Fuel stop	18.5	24.8	18.5	24.8	ESP	19.9	15.9
	1800	Continuous	20.2	27.1	20.2	27.1	PRP	21.7	17.4
		Fuel stop	22.2	29.8	22.2	29.8	ESP	23.9	19.1

* The power output of the generator data is calculated using a figure of 86% efficiency of the AC generator.
* The kVA and kWe values are converted as per standard power factor 0.8.
* Generator data is for reference only.

TECHNICAL DATA

Model		TR1	TR2	TR3
Type of fuel injection		Direct	Direct	Direct
Number of cylinders		1	2	3
Aspiration		Natural	Natural	Natural
Direction of rotation looking on flywheel end		Anti clockwise	Anti clockwise	Anti clockwise
Nominal cylinder bore	mm	98.42	98.42	98.42
	in	3.875	3.875	3.875
Stroke	mm	101.6	101.6	101.6
	in	4.0	4.0	4.0
Total cylinder capacity	litre	0.773	1.55	2.32
	in^3	47.17	94.35	141.52
Compression ratio		15.5:1	15.5:1	15.5:1
Minimum idling speed	r/min	850	850	850
Number of flywheel ring gear teeth		110	110	110
Crankshaft end thrust (maximum continuous)	kgf	132	132	132
	lbf	290	290	290
Crankcase vacuum (minimum)	mbar	2.0	2.5	3.0
	in H_2O	0.8	1.0	1.2
Crankcase vacuum (average)	mbar	3.5	4.6	7.5
	in H_2O	1.4	1.8	2.9
Lubricating oil pressure (mean) with the oil at 110°C (230°F)	bar	2.0	2.0	2.0
	lbf/in^2	29	29	29

RATING DEFINITIONS TO ISO 3046

ISO Standard Conditions

Barometric pressure 100 kPa
Relative humidity 30%
Ambient air temperature at the inlet manifold 25°C

Fixed Speed: Continuous Power (ICN)

The power in kW which the engine is capable of delivering continuously at the stated crankshaft speed, under ISO 3046 standard conditions, measured at the flywheel without powerabsorbing accessories, provided that the engine is overhauled and maintained in good operating condition and that fuel to BS EN 590 Class A1 or A2, and lubricating oils to the correct performance specification and viscosity classification as recommended by Lister Petter Power Systems Limited are used.

Fixed Speed (Fuel Stop): Overload Power (ICXN)

The maximum power in kW which the engine is capable of delivering intermittently at the stated crankshaft speed for a period not exceeding one hour in any period of twelve hours of continuous running, immediately after working at the continuous power, under ISO 3046 standard conditions and with the provisions specified for continuous power in item (1) above, but with the fuel limited so that the fuel stop power cannot be exceeded.

Notes:

1. Power ratings measured at the flywheel apply to a fully run-in, non derated engine without a radiator and fan fitted, and without power absorbing accessories or transmission equipment.
2. The overload capability applies to a fully run-in engine. This is normally attained after a running period of about 50 hours.

ENGINE EXHAUST SYSTEM DETAIL

Parameter	Engine Model		
	TR1	TR2	TR3
Maximum allowed back pressure (kPa)	10.3	10.3	10.3
Bosch smoke level at rated output	5.5	5.5	5.5
Exhaust gas temperature, continuous (°C)	520	520	520
Exhaust gas temperature, overload (°C)	550	550	550
Exhaust pipe diameter - recommended O/D	48	48	48

ENGINE NOISE LEVELS

Parameter	Engine Model		
	TR1	TR2	TR3
Sound pressure level at 1m	≤ 94 dB(A)	≤ 93 dB(A)	≤ 93 dB(A)

ENGINE LUBRICATING OIL SYSTEM DETAIL

Parameter	Engine Model		
	TR1	TR2	TR3
Lubrication method	Pressure		
Sump capacity (L)		4.0	5.5
Total capacity (L)		4.5	6.0
Oil filter type	Full flow paper element		
Oil consumption (g/kW h)	≤ 0.25		
Lubrication oil temperature (°C)	120 (max. 135)		
Lubrication oil pressure at running conditions (kPa)	100-450		
Oil pump type	Plunger type		
Maximum operation angle (degrees)	Front / Rear / Fuel Pump Up 15 / Manifold Down - 10		

ENGINE COOLING SYSTEM DETAIL

Parameter		Engine Model		
		TR1	TR2	TR3
Cooling method		Air		
Cooling fan		Flywheel		
Cooling package operating temperatures	°C	40		
Maximum cooling airflow (litres/sec)	1500 r/min	70	110	160
	1800 r/min	90	130	200
Maximum cowling pressure (mmWG)	1500 r/min	25	30	30
	1800 r/min	37	43	43
Ducting sectional area	cm^2	190	330	530
	in^2	30	51	82

Note:
The duct trunking must be the same cross sectional area throughout its length
For trunking lengths greater than 1.5m (5ft) then the above figures are multiplied by the following factors:
* 1.5m - 3.0m (5-10ft) x1.4
* 3.0m - 7.5m (10-25ft) x2.25
* 7.5m - 15.0m (25-50ft) x3.5

RATING DEFINITIONS TO ISO 8528-1

Standard Reference Conditions

A Lister Petter generating set is designed to operate in the following ISO 3046 environmental reference conditions.
Barometric pressure 100 kPa
Relative humidity 30%
Ambient air temperature at the inlet manifold 25°C

1. Prime Power (PRP)

This rating is for the supply of the maximum power which a generating set is capable of delivering continuously whilst supplying a variable electrical load when operated for an unlimited number of hours per year.
The permissible average power output over 24 hours of operation shall not exceed 70 % of the PRP unless otherwise agreed by Lister Petter Power Systems Limited.

2. Emergency Standby Power (ESP)

Emergency standby power is defined as the maximum power available during a variable electrical power sequence, for which a generating set is capable of delivering in the event of a utility power outage or under test conditions for up to 200 hours of operation per year.
The permissible average power output over 24 hours of operation shall not exceed 70% of the ESP unless otherwise agreed by Lister Petter Power Systems Limited. The actual average power output shall be below or equal to the permissible average power output as defined for ESP. The above ratings are subject to the following ISO 3046 standard operating conditions, the use of fuel to BS EN 590 Class A1 or A2, lubricating oils of the correct performance specification and viscosity classification and that the maintenance intervals and procedures are carried out as prescribed by Lister Petter Power Systems Limited.

3. Continuous Power (COP)

This rating is for the supply of a constant load for an unlimited number of hours annually.

Derating

For non-standard site conditions, reference should be made to relevant BS, ISO & DIN standards.

Power Standards

The engine performance corresponds to ISO 3046, BS 5514 and DIN 6271. The technical data applies to an engine without cooling fan and operating on a fuel with calorific value of 42.7 MJ/kg (18360 BTU/lb) and a density of 0.84 kg/litre (7.01 lb/US gal, 8.42 lb/Imp gal).

APPROXIMATE FUEL CONSUMPTION							
Speed, r/min	Load, %	TR1		TR2		TR3	
		g/kWh	l/h	g/kWh	l/h	g/kWh	l/h
1500	100	229	1.5	237	3.1	230	4.6
	75	244	1.2	244	2.4	240	3.6
1800	100	238	1.9	237	3.7	229	5.5
	75	251	1.5	248	2.9	238	4.3

OPTIONAL ACCESSORIES

As part of your engine package from Lister Petter, we can offer you a full range of optional accessories to enhance your engine. Please consult Lister Petter for full details.

(CA) SAE 4 - SAE 5 Adapter
(CB) SAE 4 Spacer Ring

(CL) SAE J620 7.5" Drive Member
(CM) SAE J620 6.5" Drive Member

*Use with SAE Adapter (CA, CB)

(FA) 8.25L Fuel Tank
(FB) 13L Fuel Tank

(FE) Fuel Lift Pump

(WG) Keyswitch Start Panel

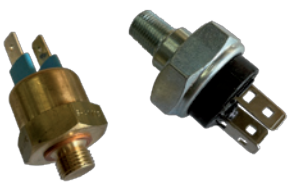
(WI) Start Panel with 12V hr Recorder

(EK) 12V Starter Motor
(EL) 24V Starter Motor

(JE) 12V Fuel Control Solenoid
(JQ) 24V Fuel Control Solnoid

(NA) Engine mounted exhaust silencer
(NJ) Exhaust outlet bend *

* Included in NA exhaust kit



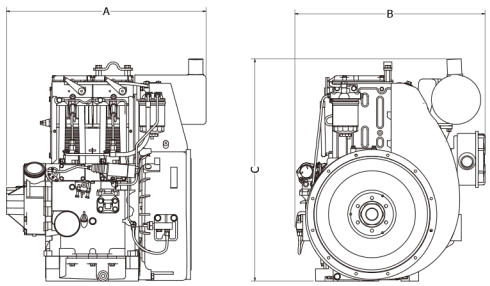
(JA) Engine temperature switch
(JD) Oil pressure switch *

* Included oil distribution block - Not shown

(EA) Short Starting Handle (TR1)
(EB) Long Starting Handle (TR2/3)

Service Kits
500, 1000, 2000, 4000 & 6000 hrs

APPROXIMATE DIMENSIONS AND WEIGHT



		TR1	TR2	TR3
Dry weight	kg	153	185	230
	lb	337	408	507
Length (A) without fuel tank	mm	476	620	747
	in	18.7	24.4	29.4
Width (B)	mm	583	591	591
	in	23.0	23.3	23.3
Height (C)	mm	691	691	691
	in	27.2	27.2	27.2

Note:
These weights are for a fully dressed G build configured engine.

TYPICAL PACKING CASE DIMENSIONS

Packing case dimensions					Container quantities	
Engine	Length (mm)	Width (mm)	Height (mm)	Gross weight (kg)	20ft	40ft
TR1	770	550	850	180	60	120
TR2				235	56	94 *
TR3	880			285	48	78 *

Note:
Optional accessories require the use of wider packing cases.
TR1 engine fitted with fuel lift pumps.
TR1, TR2 and TR3 engines with starting panels and ducting.

All	800	670	850	see above	42	84

* Weight limited by container

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