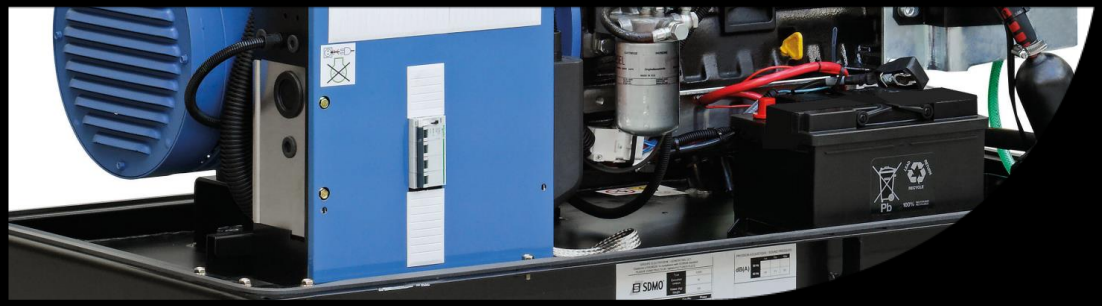
SDMO

Energy Solutions Provider



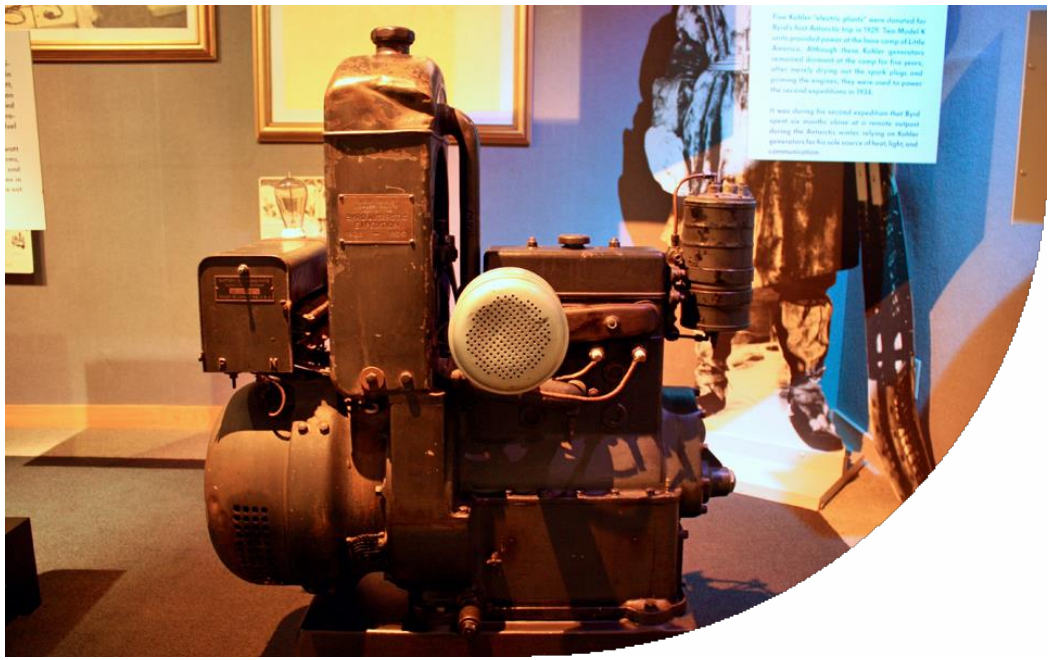
K20 / K25 Launch Presentation

February 2016

www.sdmo.com

KOHLER CORPORATION

143 years of Expertise



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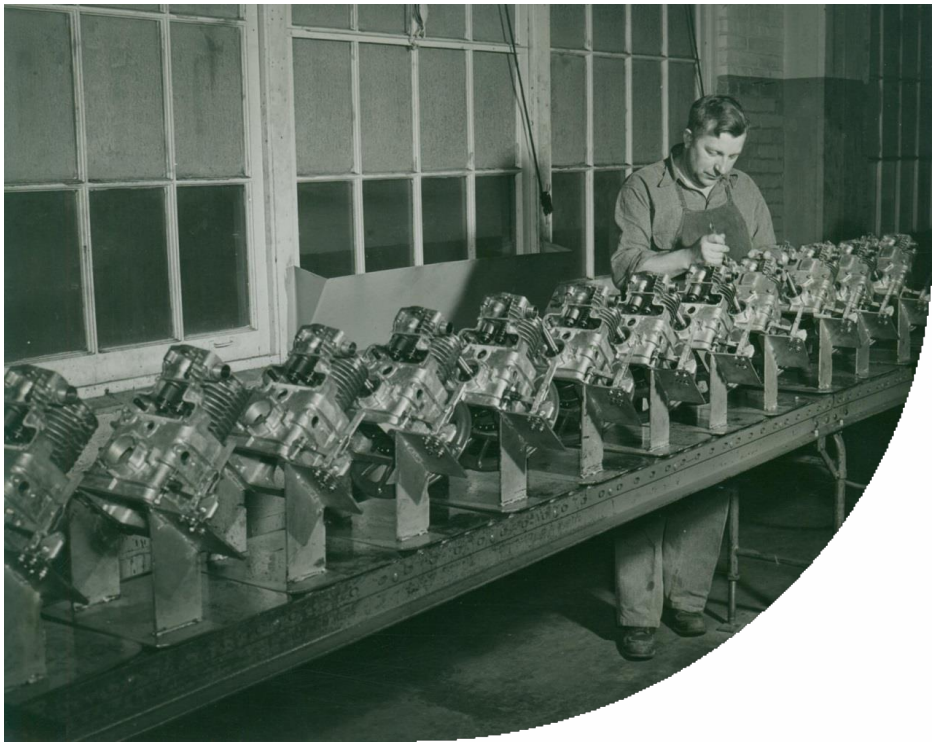
KOHLER ENGINES' EXPERTISE

1929 Byrd expedition preparation

1948 First small engines manufacture



STATE OF THE ART FACILITY

2010

30 Mio Euros invested in a new Kohler manufacturing facility for Kohler Direct Injection engines

Kohler Direct Injection engines (KDI)

ADVANTAGES OF THE 2014 KOHLER KDI ENGINE

- Mechanical Engine
- Reengineered and Redesigned
- Efficient & Cost Effective
- On The Cutting Edge of Technology
- Awarded 2012 Best Diesel engine

CUSTOMERS' NEEDS

- Low costs of ownership
- Increased Up-time
- Limited Frequency recovery time
- Small Footprint

- Compactness
- Power density

- Lowest Fuel Consumption
- Extended Oil Change intervals
- Easy and Cost Effective Maintenance
- Parts availability (strong network presence)
- Limited maintenance
  (e.g. no valve clearance adjustment due to the hydraulic valves system)
- Excellent step loader response

KDI RANGE - 50 HZ

K22	K27	K33
KDI 1903M	KDI 2504M	KDI 2504TM

ENGINE MODEL	KDI 1903M	KDI 2504M	KDI 2504TM-30	KDI 2504TM-40 EU	KDI 2504TM-40
KVA GEN SET SIZE (Intermittent – stand-by)	22	27	33.3	38.2	43
MAX ENGINE GROSS (no fan) STAND BY POWER kW	19.8	25.4	31.4	35.9	40.5
MAX ENGINE GROSS PRIME POWER kW	17.3	23.1	28.2	33.1	37.3
NET STAND-BY POWER (Power pack provision) kW	19,0	25.4	31.0	36.4	41.0
EMISSION COMPLIANCE	Stage IIIA	Stage IIIA	Stage IIIA	Stage IIIA	-

KDI RANGE - 60 HZ

K20U

KDI 1903M

K25U

KDI 2504M

ENGINE MODEL	KDI 1903M	KDI 2504M
KW GEN SET SIZE (Intermittent – stand-by)	20	25
MAX ENGINE GROSS (no fan) STAND BY POWER kW	18.8	23.4
MAX ENGINE GROSS PRIME POWER kW	18	21.1
NET STAND-BY POWER (Power pack provision) kW	20	25
EMISSION COMPLIANCE	Stage IIIA	Stage IIIA

KDI ENGINES LEXICON

Displacement = first two numbers
03 = Number of cylinders
M = Mechanical
TM = Turbo mechanical

KDI 1903M	KDI 2504M	KDI 2504TM
1.9 liters engine 3 cylinders Mechanical engine	2.5 liters engine 4 cylinders Mechanical engine	2.5 liters engine 4 cylinders Turbo mechanical

Increased up-time

- ❑ Engine designed and developed with state of the art technology already proved in heavy duty applications
- ❑ Structure design based on NVH analysis

Best comfort

- **Robustness and stiffness**
- **Lower vibration**

- ❑ Key components selected for long life and high reliability
- ❑ Low bore distortion and high structure stiffness

High Reliability

- **10,000 hours Engine design life**

- ❑ One side service
- ❑ Engine designed for easy and short maintenance activities

Limited Maintenance

- **500 Hours of maintenance intervals**

- ❑ Capillary Network
- ❑ Competitive Service Kit price

KDI ECONOMICAL ADVANTAGES

Small Footprint

Engineered For Efficiency

- Direct injection
- 4 valves per cylinder
- Central vertical injector
- Reduced Engine Heat Ejection

Compact Engine Envelope

- Most Compact genset
- SAME power
- SMALLER package

		KDI 1903M	KDI 2504M
Power	**[kVa]**	**20**	**27**
Generator dimension		**M126**	**M126**
Lenght	[mm]	1750	1750
Width	[mm]	780	780
Height	[mm]	1230	1230
Canopy surface			
Total surface	[m2]	7,567	7,567
Diffence compare to genset with KDI			
Generator weight	[kg]	660	710

KDI 20 / KDI 25 EQUIPPED UNITS

POWER PRODUCTS-50 HZ

	Type	kVA		Engine	Opening version		Enclosure	Enclosured version		
		PRP (1)	ESP (2)		Dimensions Lxwxh (m)	Weight (kg) (3)		Dimensions Lxwxh (m)	Sound level dB(A) 1m	Weight (kg) (3)
ADRIATIC	K9	8	9	KDW1003	1.22X0.70X0.92	290	M125	1.48X0.76X1.03	67	390
	K12	10	12	KDW1404	1.41X0.72X1.02	340	M126	1.75X0.78X1.23	67	510
	K16	15	16	KDW1603	1.41X0.72X1.02	410	M126	1.75X0.78X1.23	74	580
	K16H	-	16	KDW1003-H	1.41X0.72X1.02	310	M126	1.75X0.78X1.23	79	480
	K21H	-	21	KDW1404-H	1.41X0.72X1.02	350	M126	1.75X0.78X1.23	80	520
	K22	20	22	KDI1903M	1.41X0.72X1.08	490	M126	1.75X0.78X1.23	71	660
	K27	24	27	KDI2504M	1.41X0.72X1.08	540	M126	1.75X0.78X1.23	76	710
	K28H	-	28	KDW1603-H	1.7X0.90X1.12	500	M127	2.08X0.96X1.42	83	750
	K33	30	33	KDI2504TM-30	1.70X.90X1.12	500	M127	2.08X0.96X1.42	76	750
	K44	40	44	KDI2504TM-40	1.70X0.90X1.12	500	M127	2.08X0.96X1.42	76	750
	K10M	9	10	KDW1404	1.41X0.72X1.02	350	M126	1.75X0.78X1.23	67	520
	K12M	11	12	KDW1603	1.41X0.72X1.02	440	M126	1.75X0.78X1.23	74	610
	K17M	16	17	KDW1903M	1.41X0.72X1.08	530	M126	1.75X0.78X1.23	71	700

POWER PRODUCTS-60 HZ

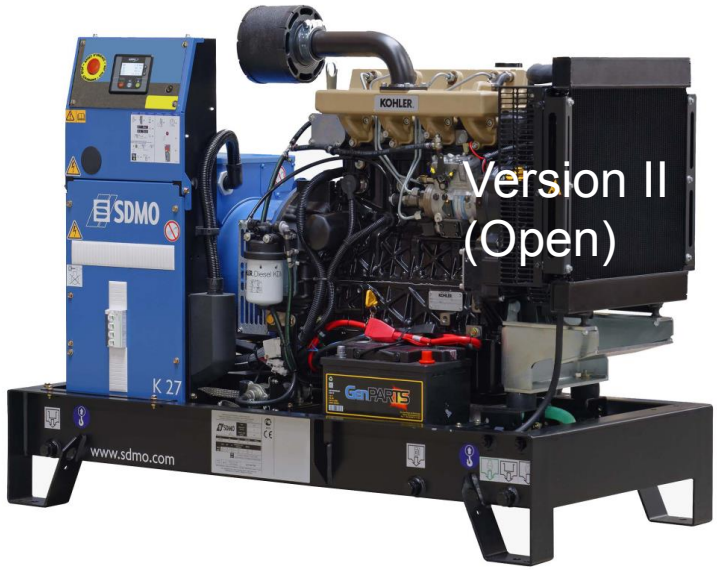
	Type	kW		Engine	Opening version		Enclosure	Canopied version		
		PRP (1)	ESP (2)		Dimensions Lxwxh (m)	Weight (kg) (3)		Dimensions Lxwxh (m)	Sound level dB(A) 7m	Weight (kg) (3)
ADRIATIC	K9U	8	9	KDW1003	1.22X0.70X0.92	290	M125	1.48X0.76X1.03	64	390
	K12U	11	12	KDW1404	1.41X0.72X1.02	340	M126	1.75X0.78X1.23	64	510
	K16U	15	16	KDW1603	1.41X0.72X1.02	410	M126	1.75X0.78X1.23	69	580
	K20U	18	20	KDI1903M	1.41X0.72X1.08	490	M126	1.75X0.78X1.23	67	660
	K25U	23	25	KDI2504M	1.41X0.72X1.08	540	M126	1.75X0.78X1.23	68	710
	K9UM	8	9	KDW1003	1.41X0.72X1.02	330	M126	1.75X0.78X1.23	64	500
	K12UM	11	12	KDW1404	1.41X0.72X1.02	350	M126	1.75X0.78X1.23	64	520
	K16UM	15	16	KDW1603	1.41X0.72X1.02	440	M126	1.75X0.78X1.23	69	610
	K20UM	18	20	KDW1903M	1.41X0.72X1.08	530	M126	1.75X0.78X1.23	67	700

GENERATORS BROCHURE PPR IN

THREE-PHASE SPECIFICATIONS

SPECIFICATIONS 50 HZ - 400 - 230 V					SPECIFICATIONS 60 HZ - 480 - 277 V					GENERAL SPECIFICATIONS					
Generating sets (1)	rpm	kVA Cos ϕ 0.8		Cons 3/4 L/h	GENERATING SETS (2)	rpm	kWe ISO 8528*		Cons 3/4 L/h	Engine			Open version (5)		
		PRP (3)	ESP(4)				PRP (3)	ESP(4)		Engine type	Cyl	CC (L)	Dimensions lxwxh (m)	Weight (6) (kg)	Fuel tank (L)
K9	1500	8	9	1,9	K9U	1800	8	9	2,3	KDW1003	3L	1,0	1.22x0.70x0.92	290	50
K12	1500	10	12	2,53	K12U	1800	11	12	2,9	KDW1404	4L	1,4	1.41x0.72x1.02	340	50
K16	1500	15	16	3,7	K16U	1800	15	16	4,5	KDW1603	3L	1,7	1.41x0.72x1.02	410	50
K16H	3000	-	16	3,63	-	-	-	-	-	KDW1003-H	3L	1,0	1.41x0.72x1.02	310	50
K21H	3000	-	21	4,9	-	-	-	-	-	KDW1404-H	4L	1,4	1.41x0.72x1.02	350	50
K22	1500	20	22	3,5	K20U	1800	18	20	4,1	KDI1903M	3L	1,86	1.41x0.72x1.08	490	50
K27	1500	24	27	4,7	K25U	1800	23	25	5,5	KDI2504M	4L	2,48	1.41x0.72x1.08	540	50
K28H	3000	-	28	7,5	-	-	-	-	-	KDW1603-H	3L	1,65	1.7x0.90x1.12	500	100
K33	1500	30	33	5,9	-	-	-	-	-	KDI2504TM-30	4L	2,5	1,70x0,90x1,12	500	100
K44	1500	40	44	7,5	-	-	-	-	-	KDI2504TM-40	4L	2,5	1,70x0,90x1,12	500	100

PRICE * - OPEN OR ENCLOSED UNITS

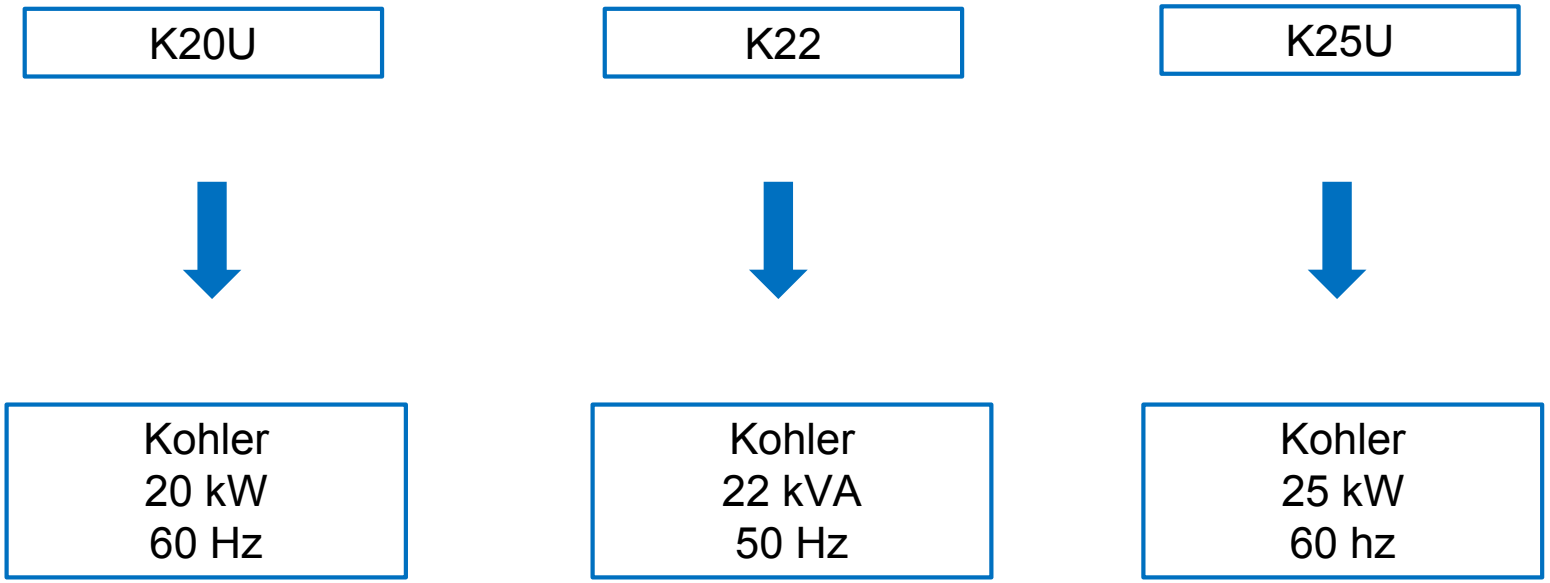


60 Hz	**K20U_IV** - 20 kW - $ 13,812	**K20U_II** - 20 kW - $ 11,385
	K25U_IV - 25 kW - $ 15,159	**K25U_II** - 25 kW - $ 12,732
50 Hz	**K22_IV** - 22 kVA - $ 13,696	**K22_II** - 22 kVA - $ 11,269
	K27_IV - 27 kVA - $ 15,021	**K27_II** - 27 kVA - $ 12,594

* List price ex-Works factory in France

SDMO GENSETS LEXICON

K = Kohler Brand
xx = ESP power in kW (60 HZ0 or kVA (50 HZ)
U = 60 Hz
M = single phase



COMPACT CANOPY DESIGN

Same Power, More Compact!

J20U / T20U

M127 canopy
208 cm x 96 cm x 142 cm

12 Gensets
in a 40 feet container

K20U / K22
K25U / K27

M126 canopy
175 cm x 78 cm x124 cm

31 Gensets
in a 40 feet container

Fuel tank
50 liters (standard)
100 liters (option)

REDUCED COSTS

Lowest Genset Cost

Economically Designed
for a 15% to 30% canopy metal sheet reduction

Lowest Transport Cost

Twice as Efficient to Transport
Fit 31 generators powered with KDI engines 1903M or 2503M in 40 feet container

Price Advantage

GENSETS IN STOCK

Check the weekly stock list for availability in our warehouses of France, Miami & Mexico.

SDMO

Energy Solutions Provider

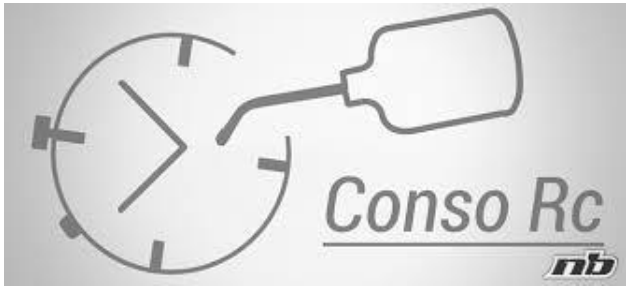
All gensets subject to availability at time of order

Update of February 9th, 2016

Stocklist & Program	60 HZ Range	WEEK 06 /2016

		Stock	*Forecast*						
Reference	Location	Available for sale	W07	W08	W09	W10	W11	W12	W13
Kohler									
XM-K016UIV	France					5			
XM-K016UMIV	France				4	1			
XM-K020UIV	France	**4**		4			2	2	2
XM-K020UMIV	France	**2**	2	2			2	2	2
XM-K025UIV	France	**2**	2	2	2				
Kohler	**Total**	**8**	**4**	**8**	**6**	**6**	**4**	**4**	**4**

Engine Maintenance Tools



This tool showcases the KDI Engine's
Easy Maintenance &
Competitively Low Operation Costs

Inside a simple Excel program.

Included in the Launch Packet

RUN-TIME CALCULATOR TOOL

1. Click on cell and select target run-time from drop-box

2. Modify aspects of “INPUT” like ‘Fuel Price’ and ‘Oil Price’ per Liter

Fuel Consumption & Total Run Cost Calculator

INPUT			OUTPUT					
KOHLER_60Hz_KDI-1903_K20								
Run Time	Fuel Price / Liter	Price of Oil / Liter	Fuel Consumed (L)	Oil Consumed (L)	Cost of Fuel	Cost of Oil	Price of Parts	Total Run Cost
3000	$0.71	$8.00	12600	53.4	$8,946.00	$427.20	$572.52	$9,945.72
MITSUBISHI_60Hz_S4Q2_T20								
Run Time	Fuel Price / Liter	Price of Oil / Liter	Fuel Consumed (L)	Oil Consumed (L)	Cost of Fuel	Cost of Oil	Price of Parts	Total Run Cost
3000	$0.71	$8.00	16800	84.5	$11,928.00	$676.00	$1,002.21	$13,606.21
JOHN-DEERE_60Hz_3029DFS29_J20								
Run Time	Fuel Price / Liter	Price of Oil / Liter	Fuel Consumed (L)	Oil Consumed (L)	Cost of Fuel	Cost of Oil	Price of Parts	Total Run Cost
3000	$0.71	$8.00	19500	36	$13,845.00	$288.00	$557.23	$14,690.23

Savings Calculator

K20 vs. T20	K20 vs. J20
$3,660.49	$4,744.51

3. Check ‘Total Run Cost’ of each Unit and Compare (at 75% Load)

4. ‘Savings Calculator’ will Automatically show how much you saved using the KDI 1903

- ❑ Tool Provided in Sales Packet

KDI 1903M & 2504M MAINTENANCE

- SDMO Recommended Maintenance Lists Included inside Run-Time Calculator Tool

K20 & K22 Replacement Items						
Item #	Description	Hours	Qty	Unit Price	Total Price	SDMO #
1	Oil Filter Cartridge	500	2	$14.29	$28.58	330371962
2	Fuel Filter Cartridge	500	1	$38.95	$38.95	330370475
3	Fuel Pre-Filter	500	1	$14.59	$14.59	30501262601
4	Air filter	1000	1	$26.60	$26.60	6400A00005
5	Alternator Belt	1000	1	$14.98	$14.98	330370482
6	Fuel Injector nozzle	4000	3	$64.91	$194.73	330373414
7	Nozzle gasket	4000	3	$1.09	$3.27	330370577
8	Top Radiator Hose	5000	1	$21.65	$21.65	330370601
9	Bot. Radiator Hose	5000	1	$19.92	$19.92	330370602

*This is the SDMO recommended Maintenance schedule and may vary slightly from Workshop manual.

	K20 & K22 Recommended Replacement Schedule									Costs	
Hours	Item.1	Item.2	Item.3	Item.4	Item.5	Item.6	Item.7	Item.8	Item.9	X	0 - X
500	X	X	X							$82.12	$82.12
1000	X	X	X	X	X					$108.72	$190.84
1500	X	X	X							$82.12	$272.96
2000	X	X	X	X	X					$108.72	$381.68
2500	X	X	X							$82.12	$463.80
3000	X	X	X	X	X					$108.72	$572.52
3500	X	X	X							$82.12	$654.64
4000	X	X	X	X	X	X	X			$321.70	$976.34
4500	X	X	X							$82.12	$1,058.46
5000	X	X	X	X	X			X	X	$150.29	$1,208.75

- Parts will be readily available from both France and US locations

- Is included along inside your Launch Packet

2.8 PERIODIC MAINTENANCE

The intervals of preventive maintenance in **Tab. 2.8 and Tab. 2.9** refer to the engine operating under normal operating conditions with fuel and oil meeting the recommended specifications.

Tab. 2.8

CLEANING AND CHECKING						
OPERATION DESCRIPTION	PERIOD (hours)					
	10	250	500	1000	1500	5000
Engine oil level	■					
Coolant level / Check of the radiator heat-exchanger surface (2)	■					
Water presence in fuel filter	■					
Dry air cleaner cartridge (1)	■					
Radiator heat-exchange surface(2)		■				
Alternator belt tension (8)		■				
Rubber hose (intake air / coolant)			■			
Fuel hose			■			
Starter Motor						■
Alternator						■

Tab 2.9

REPLACEMENT						
OPERATION DESCRIPTION	PERIOD (hours)					
	10	250	500	1000	1500	5000
Engine oil (1)			■			
Oil filter cartridge(1)			■			
Fuel filter cartridge(1)			■			
Alternator belt(3)			■			
Coolant (4)				■		
Intake manifold hose (air filter - intake manifold) (7)						■
Coolant hoses (7)						■
Fuel line hose (7)						■
Dry air cleaner cartridge (2)	After 6 checks with cleaning.					

(1) -In case of low use: 12 months.
(2) - The period of time that must elapse before checking the filter element depends on the environment in which the engine operates.
The air filter must be cleaned and replaced more frequently under very dusty conditions.
(3) - In case of low use: 36 months.
(4) - In case of low use: 24 months.
(7) - The replacement interval is only an indication, it strongly depends from environmental condition and hose status detected during regular visual inspection.
(8) - The **first** check must be done after 10 hours.

Important

- In the event one does not reach the times scheduled for maintenance, one must in any case replace the components described in **Tab. 2.9a**.

Tab 2.9a

DESCRIPTION	PERIOD MAX
Engine Oil	12 months
Oil filter cartridge	12 months
Fuel filter cartridge	12 months
Dry air filter cartridge	12 months
Coolant	24 months
Fan/alternator belt (*)	36 months

(*) Once removed, the fan/alternator belt must be replaced, even if it has not completed the hours required or the **MAX** period.

Engine Specifications Comparable’s

60 HZ ENGINE COMPARISONS

		20KW Engine comparisons			Competitor Engines	
		KDI 1903M Kohler K20U	S4Q2 SD Mitsubishi T20U	3029DFS29 John Deere J20U	X2.5 Series Cummins C20 D6	FG Wilson Perkins 404D-22G
Engine Specifications	Cylinders	3	4	3	4	4
	Dry Weight	233Kg	195Kg	315Kg	N/A	242Kg
	Bore	88mm	88mm	106.5mm	87.0mm	84mm
	Displacement	1.9L	2.5L	2.9L	2.2L	2.2L
	Stroke	102mm	103mm	110mm	92.4mm	100mm
	Oil Capacity	8.9L w/Filter	6.5L w/Filter	6L w/Filter	7.3L	10.6L
	Oil Consumption (L/h)	0.0049	0.08	0.008	N/A	N/A
	Oil type	15W40	15W40	15W40	15W40	15W40
	Type of fuel Compatible	Nato, Bio-Fuel, Jet Fuel, #1 Diesel, #2 Diesel, Artic & High Sulfur	#2 Diesel only	Road and Off-Road Diesel, #2 Diesel	#2 Diesel,Low Sulfur, Ultra Low Sulfur	A2 Diesel, Biodiesel
	Injection Pump Line	Rotary Stanadyne	Bosch A Type	Rotary Stanadyne	Indirect Injection	Cassette Type Injection
	Fuel Consumption (75%)	4.20 L/h	5.60 L/h	6.50 L/h	4.50 L/h	4.90L/h
	g/kWh (75% Load)	223	258	279	N/A	235
Maintenance	Break-In Hours	50 Hours	50 Hours	100 Hours	This document is not contractual. In a constant effort to improve quality of its products, the SDMO company reserves the right to modify, without notice, any of the characteristics stated in this document	
	Stand-By 10 Hours	Check Oil, Coolant, fuel sediment and Air Cleaner Element	Check Oil, Coolant and Air Cleaner Element	Check Oil, Coolant and Air Cleaner Element		
	50 Hour Intervals	N/A	Drain Water & Sediment from fuel separator, Check Battery Electrolyte Level	N/A		
	250 Hour Intervals	Check DC Alternator Belt	Change Oil, Oil Filter, Fuel Filter and clean Radiator Fins	N/A		
	500 Hour Intervals	Replace Oil, Oil Filter and Fuel Filter. Inspect DC Alternator and Starter.	Change Fuel Filter, Glow Plugs, Adjust Valve Clearance, fan belt &injection Pressure	Change Oil, Oil Filter, Fuel Filter & Check Belt Tension		
	1000 Hour Intervals	Replace DC Alternator Belt.	Check Starter & DC Alternator, Retighten Nuts and Bolts	Adjust Belt Tension, Valve Clearance, Clean Vent tube, Change Air Filter		
	2000 hour Intervals	N/A	Change Coolant	Adjust Engine Speed & Speed Drop governor		

60 HZ - COMPARISON WITH J20U & T20U

	K20U	J20U	T20U
Max power ESP (kVA)	25	25	25
Max power PRP (kVA)	23	23	22.7
Max power ESP (kWe)	20	20	20
Max power PRP (kWe)	18.2	18.2	18.2
Consumption @ 75% load (L/h)	**4**	6.5	5.6
Engine type	KDI1903M	3029DFS29	S4Q2-SD
Engine brand	KOHLER DIESEL	JOHN DEERE	MITSUBISHI
Displacement (L)	1.86	2.91	2.51
Alternator type	AT00404TO4N	AT00404TO4N	AT00404TO4N
Length (mm) - version II	**1410**	1700	1700
Width (mm) - version II	**720**	896	896
Height (mm) - version II	**1080**	1221	1121
Dry weight (kg) - version II	**490**	709	549
Tank capacity (L) - version II	50	100	100
Length (mm) - version IV	**1750**	2080	2080
Width (mm) - version IV	**775**	960	960
Height (mm) - version IV	**1230**	1415	1415
Dry weight (kg) - version IV	660	930	780
Tank capacity (L) - version IV	50	100	100
Acoustic pressure level @1m in dB(A) - v IV	77	78	75
Acoustic pressure level @7m in dB(A) - v IV	67	68	65
Sound power level guaranteed (Lwa)	-	91	-
Commercial reference of the enclosure	**M126**	M127	M127
Price version II	$11,385	$11,487	$10,936
Price version IV	$13,812	$14,623	$14,072

FUEL EFFICIENCY - 50 HZ *

Hourly consumption in liters @ 75% load

K22	T22	J22
3.7	4.7	5.0

Autonomous Run Time

- 50 L fuel tank: **13.5 hrs.**
- 100 L fuel tank: **27 hrs.**

Case study: T22 vs K22 vs J22 @ 8 hrs / day

T22	K22	J22
-> 1 Year: 13,724 L	-> 1 Year: **10,804 L**	-> 1 Year: 14,600 L
-> 2 Years: 27,448 L	-> 2 Years: **21,608 L**	-> 2 Years: 26,200 L
-> 3 Years: 41,172 L	-> 3 Years: **32,412 L**	-> 3 Years: 43,800 L

22% Less Fuel Consumption than Competitors

FUEL EFFICIENT - 60 HZ *

Hourly consumption in liters @ 75% load

K20	T20	J20
4.2	5.6	6.5

Autonomous Run Time

- 50 L fuel tank: **10 hrs.**
- 100 L fuel tank: **20 hrs.**

CASE STUDY: T20 VS K20 VS J20 8 HRS / DAY

T20	K20	J20
-> 1 Year: 16,352 L	-> 1 Year: **14,308 L**	-> 1 Year: 18,980 L
-> 2 Years: 32,704 L	-> 2 Years: **28,616 L**	-> 2 Years: 37,960 L
-> 3 Years: 49,056 L	-> 3 Years: **42,924 L**	-> 3 Years: 56,940 L

22% Less Fuel Consumption than Competitors

* This Document is not contractual. In a constant effort to improve quality of its products, the SDMO company reserves the right to modify, without notice, any of the characteristics stated in this document.

KOHLER ENGINE VIDEOS AND WEBSITE

KDI Why KDI?

http://www.kohlerengines.com/kdi/why-kdi.htm

KDI Assembly Line

http://bcove.me/4hzi6cwy

Kohler – Our most powerful engine ever

http://www.kohlerengines.com/kdi/videos.htm

KDI 2504TCR wins Diesel Engine of the Year award

http://turfbusiness.co.uk/product-news/kdi-diesel-year-2012/