

Model: MD **400**  
INDUSTRIAL RANGE  
POWERD BY HANMA



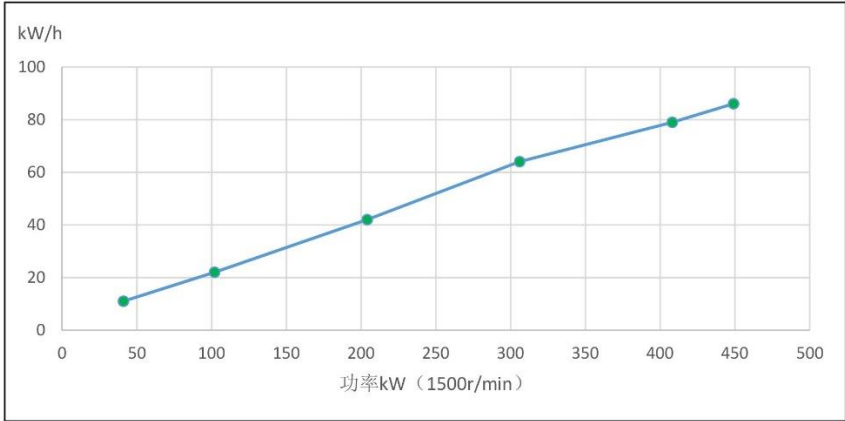
**GENERATING RATE**

POWER RATING		PRIME	STANDBY
POWER	KVA	450	510
	KW	360	408
Rated Speed	r.p.m	1500	
Standard Voltage	V	400	
Available Voltages	v	400/230-230/132-230 V	
Rated at Power Factor	Cos Phi		

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Engine model	manufacturer	emission standard	
CM6D30F.408 30	Anhui Hualing Automobile Co., Ltd Company Engine Branch	Non road three-stage GB20891—2014	
engine performance curve			
Displacement: 12.82L Power: 408KW Cylinder diameter: 130mm Travel distance: 161mm Compression ratio: 17:1 Speed: 1500@50Hz Inhalation method: Boosting, Air to Air Cooling Fuel system: High pressure common rail (1600bar) Engine type: inline, six cylinder, four stroke	operating condition	power	fuel consumption
		KW	kg/h
	Commonly used 100%	408	79
	75%	306	64
	50%	204	42
	25%	102	22
	10%	41	11
			

Engine model	manufacturer	emission standard	
CM6D30F.408 30	Anhui Hualing Automobile Co., Ltd Si Engine Branch	Non road three-stage GB20891—2014	
Main technical parameters of the engine			
Whole machine data			
type	Straight, six cylinder, four valve, four stroke		
Air Intake method	Boosting, air to air intercooling		
Cylinder diameter X stroke	130mmX161mm		
displacement	12.82L		
compression ratio	17:1		

Firing Order	1-5-3-6-2-4		
Cylinder distance	162mm		
Combustion chamber type	ω type		
Engine dimensions (length X width X height)	2000x946x1549mm		
Engine weight (including flywheel, excluding generator)	1183kg		
Flywheel moment of inertia	2.9Kgm 2		
Intake and exhaust system			
Rated point exhaust back pressure	15KPa		
exhaust gas temperature	566℃		
Exhaust flow rate	1950Kg/h		
intake flow	1870Kg/h		
Maximum allowable intake resistance (clean filter element)	3.5KPa		
Maximum allowable intake resistance (dirty filter element)	6.5KPa		
Air intake resistance alarm value	6.3KPa		
cooling system			
Main content of coolant	50:50 (ethylene glycol: water)		
Coolant outlet temperature	95℃		
Temperature difference between coolant inlet and outlet	5.2℃		
The heat dissipation capacity of the radiator	140KW		
Flow rate of radiator	446L/min		
Alarm temperature	104℃		
Air intake type	Empty air cold		
Allowable pressure drop of intercooler	11-13KPa		
Heat dissipation of intercooler	62KW		
Allowable intake temperature of intercooler	190℃		
Maximum intake volume of intercooler	1900Kg/h		
Engine model	manufacturer	emission standard	
CM6D30F.408 30	Anhui Hualing Automobile Co., Ltd Si Engine Branch	Non road three-stage GB20891—2014	
Main technical parameters of the engine			
lubrication system			
Oil pressure @ idle speed	130KPa		
Oil pressure @ rated point	500KPa		
Maximum allowable oil temperature	120℃		
Oil pan capacity low	33L		
Oil pan capacity high	41L		
Allowable tilt angle of oil pan @ forward tilt	30°		
Allowable tilt angle of oil pan @ rearward tilt	30°		
Allowable inclination angle of oil pan @ fuel pump side elevation angle	30°		
Allowable inclination angle of oil pan @ exhaust side elevation angle	30°		
fuel system			

Type of pump oil system	high-pressure common rail
Injector injection pressure	1600bar
fuel temperature	38±5℃
Maximum allowable resistance of fuel pump inlet pipe (clean filter element)	10KPa
Maximum allowable resistance of fuel pump inlet pipe (dirty filter element)	24.7KPa
<b>Electric control starting system</b>	
Standard starter starting voltage	24V
Minimum average starting speed without auxiliary cold start	130r/min
Minimum temperature without auxiliary cold start	-15℃
<p>All data is based on:</p> <p>--Obtained when the engine is running with fuel system, water pump, oil pump, fan, and filter; But it does not include AC generators, selection Use equipment and driven components.</p> <p>--The engine operation complies with the non road three-stage (GB20891-2014) standard.</p> <p>--Standard reference conditions: atmospheric pressure of 100kPa, intake temperature of 25 ° C, relative humidity of 50%. The deviation range of the data is+/- 4%.</p> <p>--Altitude and temperature correction:</p> <p>The engine can operate under the following conditions: 1500r/min below 3000m and below 40 °C without correction.</p>	

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**PDL-354C**

**Type: Brushless Synchronous Alternator**

**Rated Voltage: 120V - 690V**

**Rated Capacity: 450 kVA**

**Rated Power: 360 kW**

### Universal Parameters

Brand	PUDELI
Control System	Self-excited
Automatic Voltage Regulator	Default: MC392 SX440 Optional: AS440
Stable Voltage Regulation	± 1.0 %
Transient Voltage Regulation	-18% ~ +20%
Steady State Short Circuit	The self-excitation device does not maintain a short-circuit current
Insulation Class	Class H
Protection Class	IP23
Rated Power Factor	0.8/1.0
Stator Winding	Double-layer Winding
Winding Pitch	2/3
Winding Outlets	12
Main Stator Resistance	0.0065 Ω/phase (Y series connection, 22°C)
Main Rotor Resistance	1.55 Ω (22°C)
Exciter Stator Resistance	17 Ω (22°C)
Exciter Rotor Resistance	0.092 Ω/phase (22°C)
Waveform Distortion	No load ≤ 2.0%, non-distorted linear load balance ≤ 5.0%
Maximum Overspeed	2250 RPM
Drive End Bearing	BALL. 6220 - 2RS. (ISO)
Non-Drive End Bearing	BALL. 6314 - 2RS. (ISO)
Telephone Interference	THF ≤ 2%, TIF ≤ 50

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Frequency Parameters								
Rated Frequency	50Hz			60Hz				
Cooling Air Flow	1.035 m³/sec 2202 cfm			1.312 m³/sec 2780 cfm				
Y Series Voltage (V)	380/220	400/230	415/240	440/254	416/240	440/254	460/266	480/277
Y Parallel Voltage (V)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Δ Series Voltage (V)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Power (kVA)	450	450	450	450	525	550	581	594
Direct Axis ReactanceXd	3.3	3.28	2.77	2.44	3.94	3.69	3.57	3.35
Direct Axis Transient ReactanceXd'	0.18	0.18	0.15	0.13	0.18	0.17	0.16	0.15
Direct Axis Super Transient ReactanceXd''	0.13	0.12	0.11	0.1	0.13	0.12	0.12	0.11
Quadrature Axis ReactanceXq	2.69	2.67	2.25	1.98	3.12	2.92	2.82	2.65
Quadrature Axis Super Transient ReactanceXq''	0.27	0.26	0.22	0.2	0.34	0.32	0.31	0.29
Leakage ReactanceXL	0.07	0.07	0.06	0.05	0.08	0.07	0.07	0.07
Negative SequenceX2	0.19	0.19	0.16	0.14	0.23	0.22	0.21	0.2
Zero SequenceX0	0.11	0.11	0.09	0.08	0.11	0.1	0.1	0.09
O.C. Time ConstantTdo'	2. s							
Armature Time ConstantTa	0.017 s							
Short Circuit Ratio	1/Xd							

## Weights & Dimensions

Bearing	Single Bearing	Double Bearing
Alternator Net Weight	1150 kg	1200 kg
Stator Weight	534 kg	534 kg
Rotor Weight	432 kg	452 kg
Wooden Case Included Weight	1205 kg	1215 kg
Wooden Case Dimensions	166 x 87 x 124 (cm)	166 x 87 x 124 (cm)

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## Control Panel Technical Specifications:

Control Panel- SMARTGEN 6110/6120

The base mounted control panel in a vibration isolated sheet steel enclosure. The control panel is equipped as follows:

- a) Instruments: Analogue Voltmeter, Hours Run Meter. Water pressure Meter.
- b) Controls: Emergency Stop Pushbutton, Voltmeter Phase Selector Switch.
- c) Control module: Standard collocation is SmartGen Auto start with AMF.

### Main Features:

- Automatic mains failure
- Engine control, Generator protection
- Built-in alarms and warnings
- Remote Start operation available
- Fuel pump control
- Mains simulation
- Block heater control
- Field adjustable parameters
- Free MS-Windows Remote monitoring
- LED displays
- Configurable analogue inputs
- I/O expansion capability





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# SmartGen



## Protection Circuits

## WARNING

## Battery charge failure

Low battery voltage

## SHUT DOWNS

Fail to start

## Emergency stop

## Low oil pressure

High engine temperature

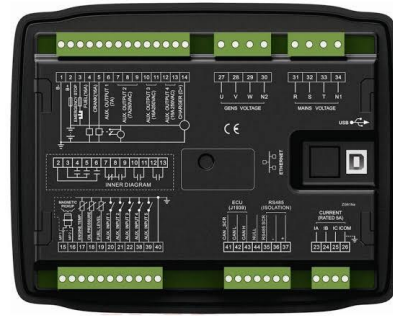
Over /Under speed

Under/over generator frequency

Failed to reach loading voltage

### Electrical trip

Generator over current



## Instruments

## ENGINE

Engine speed

Oil pressure

Coolant temperature

Run time

Battery volts

TOR

Voltage (L-N)

Current (L1-L2-L3)

Frequency

Mains Voltage (L-L, L-N)

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## Generating Sets Standard Features:

Three phase four wire, output voltage 400V/230V, 50HZ, between 0.8 lagging, protection capability according with the standard of NAME1 and IP23.

### General Features:

- Oil and fuel filter fitted, water separator
- Lube-oil drain valve fitted
- Electric Starter Charge motor 24 V.D.C
- Water-cooled
- 8-hours operation base tank/Fuel Tank Capacity 1000L
- Auto start
- Optional soundproof and weatherproof canopy
- 3 pole MCCB Delixi breaker
- Operation & Maintenance manual
- Special Integrated Steel Base tank and sprayed overall in gloss enamel paint

### Voltage Regulation:

Voltage regulation maintained within  $\pm 0.5\%$   
Between 0.8 and 1.0 lagging and unity  
From no load to full load  
At speed droop variation up to 4.5%

### Frequency Adjustable Ratio:

Change load from 0-100%, within 1.0% (electric speed regulator), within 4.5% (mechanical speed regulator)

### Frequency Undulation:

load from 0-100%, frequency undulation within 0.25%  
No load wire volts max undulation ration\ within  
Three Pharse balanced load in the order of 5%  
Effect factor of Telecom TIF better than 50  
THF to IEC60034 Part 40 better than 2% 1.8

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## Soundproofed Version Features:

### Robust Corrosion Resistant Construction

- Black finish stainless-steel lock and hinges
- Body made from steel components treated with polyester powder coating

### Excellent Access for Maintenance

- Two large doors on each side
- Radiator fill access plate
- lube oil and cooling water drains pipes to exterior of the enclosure

### Security and Safety

- Control panel viewing window in a lockable access door
- Emergency stop push button (red) mounted on enclosure interior
- Cooling fan and battery charging alternator fully guarded
- Exhaust silencing totally enclosed for operator safely



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## Generating Sets other Features

### Generating Sets Optional Features

- Low fuel level alarm shutdown
- Automatic Fuel Filling System
- Engine oil feeding and drain pump
- Auto Transfer Switch (ATS)
- Parallel control panels
- Circuit Breaker MCCB & ACB
- Remote Control Panel
- weatherproof/soundproof Canopy
- Trailer type Gensets

### Quality Standards

ISO9001:2000,ISO14000,ISO3046  
ISO8528 BS4999  
BS5514,AS1359,ICE34  
CE Compliance

### Gensets Dimensions & Weight

Open type:LxWxH (mm) Net Weight Kgs  
3600\*1400\*2100, 4300Kgs  
Silent type:LxWxH (mm) Net Weight Kgs  
4600\*1900\*2300, 5000Kgs