



**M15**

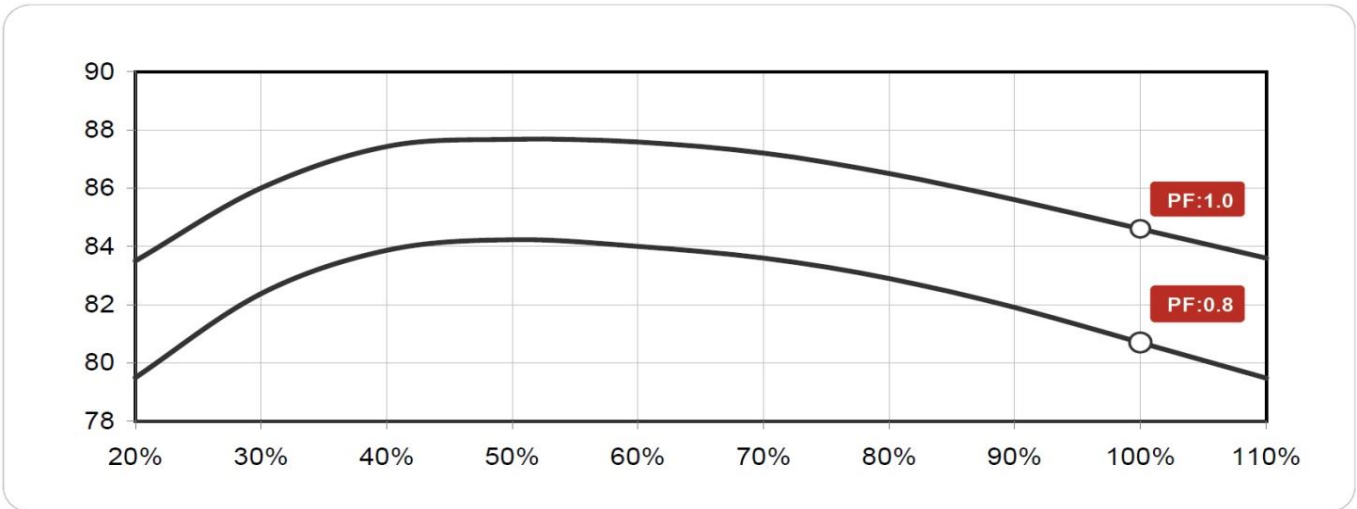
CONT 13,5 kVA



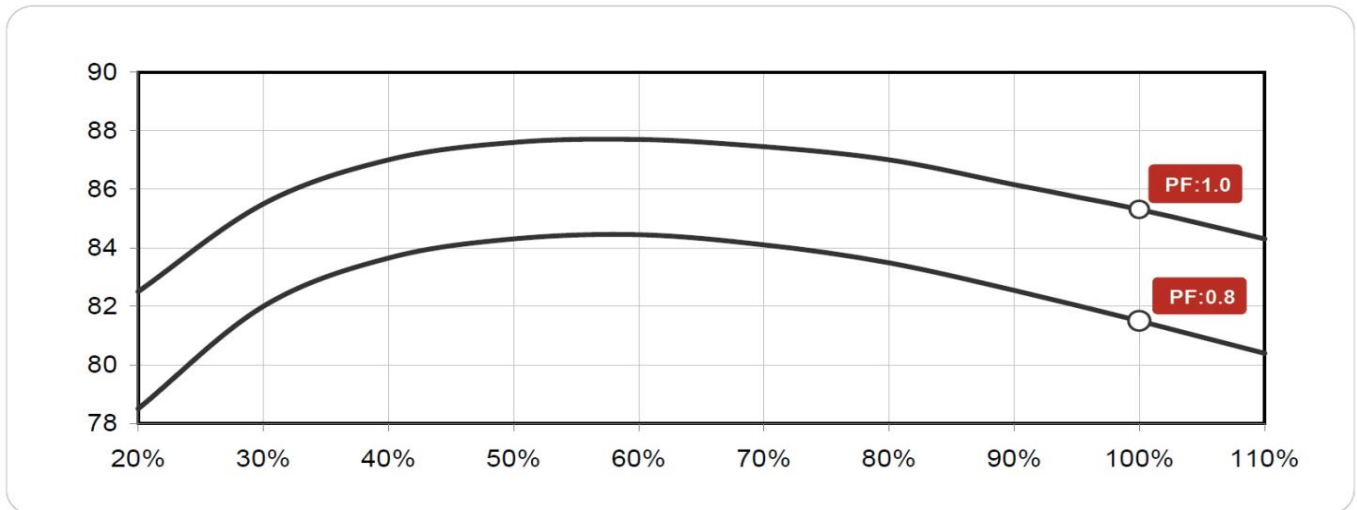


# Efficiency and Motor Starting

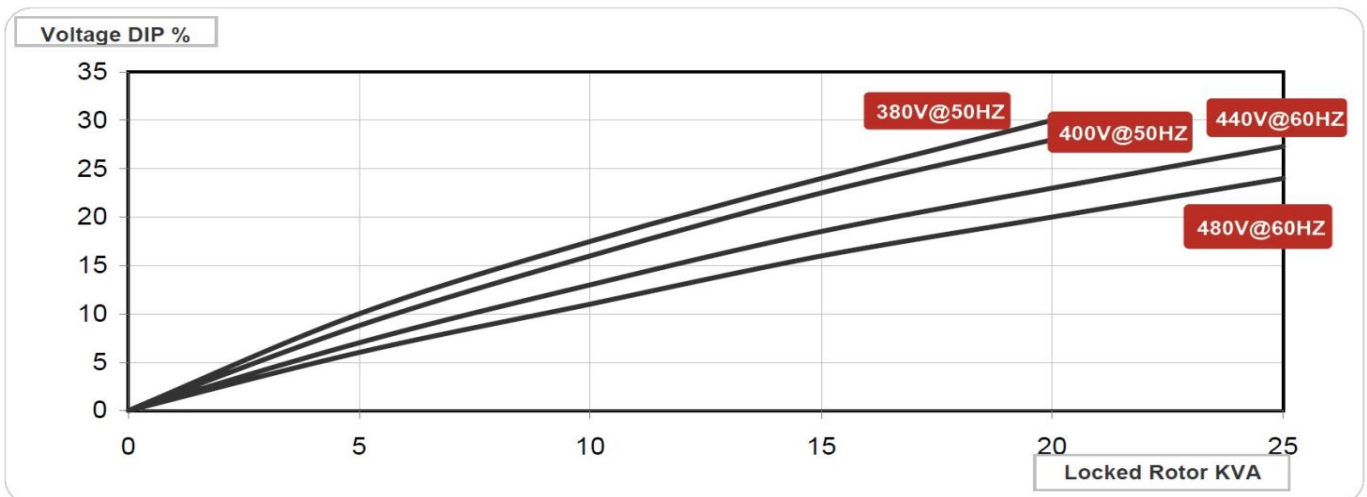
## Efficiency Curve @ 50 Hz, 400V



## Efficiency Curves @ 60 Hz, 480V



## Motor Starting Curves @ 50 Hz, 60 Hz Locked Rotor



## Technical Data Sheet

STANDARD(S) OPTIONAL(O) INFORMATION (I)			SPECIFICATION
EXCITATION SYSTEM	SELF-EXCITED	<b>S</b>	SUSTAINED SHORT-CIRCUIT: NOT AVAILABLE
	ARAP		
	PMG		
AVR	M-AVR 46	<b>S</b>	REGULATION PRECISION : +/-1,0 %
	M-AVR 44	<b>O</b>	REGULATION PRECISION : +/-1,0 %
	M-AVR 32		
	M-AVR 34		
WINDING INSULATION	H	<b>S</b>	
	F		
WINDING PITCH	2/3	<b>S</b>	HIGHER FLEXIBILITY IN USE,BETTER MOTOR STARTING ABILITY
	5/6	<b>O</b>	COST-EFFECTIVE POWER SUPPLY SCHEME
WINDING PROTECTION	STANDARD	<b>S</b>	
	"ANTI-HARSH"	<b>O</b>	SPECIAL TREATMENT OF WINDING TO AGINST HASRH ENVIROMENT
	SPACE HEATER	<b>O</b>	TO HEAT UP AIR TO REMOVE THE HUMMINITY AROUND WINDING
	THERMAL SENSOR	<b>O</b>	TO DETECT THE WINDING TEMPERATURE OR BEARING'S
PARALLEL OPERATION	CT100	<b>O</b>	
	CT200		
	CT400		
	CT600		
	CT1000		
WINDING LEADS	12	<b>S</b>	12 LEADS OF WINDING ENDS,
	6	<b>O</b>	6 LEADS OF WINDING ENGS
MACHINE PROCTIION	IP23	<b>S</b>	STANDARD MACHINE PROTECTION
	IP44	<b>O</b>	TO AGINST : 1mm OBJECT AND SPLASHING WATER
	IP54		
POWER FACTOR	1	<b>O</b>	
	0,8	<b>S</b>	
CONNECTION TO ENGINE	SINGLE BEARING	<b>S</b>	
	DOUBLE BEARING	<b>O</b>	
	BELT DRIVE	<b>O</b>	
	VERTICAL		
OVERSPEED		<b>I</b>	MAX ROTATING SPEED : 2250 RPM
ATTITUDE	<=1000m	<b>I</b>	DERATING IS NO NEED
	>1000m	<b>I</b>	DERATING NEEDED, REFERS TO RATING BOOK
ELECTIRICAL FEATRUES	TDF/THC	<b>I</b>	NO LOAD < 1,5 %, NON DISTORATING BALANCED LINEAR LOAD< 5,0 %
	TIF	<b>I</b>	<50
	THF	<b>I</b>	<2%
BEARING	DRIVE -END	<b>I</b>	BALL 6309 - 2RS DOUBLE BEARING : 83 KG
	NON DRIVE END	<b>I</b>	BALL 6309 - 2RS
WEIGHT	NET	<b>I</b>	SINGLE BEARING 98 KG DOUBLE BEARING : 101 KG
	GROSS	<b>I</b>	SINGLE BEARING 126 KG DOUBLE BEARING : 129 KG
PACKING SIZE		<b>I</b>	SINGLE B. : 1120 x680x700 mm DOUBLE B. : 1120X680X700

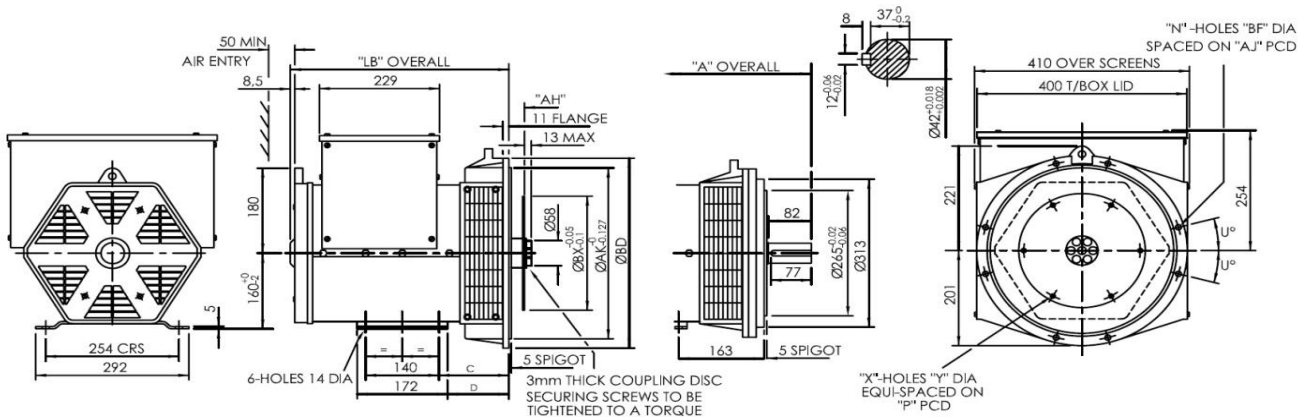
# Technical Data Sheet

## STANDARD(S) OPTIONAL(O) INFORMATION (I)

## SPECIFICATION

SERIES STAR (V)	380	400	415	440	416	440	460	480
PARALLEL STAR (V)	190	200	208	220	208	220	230	240
SERIES DELTA (V)	220	230	240	254	240	254	266	277
Xd - Direct axis synchro. Reactance unsaturated	1,943	1,754	1,629	1,780	2,303	2,174	1,989	1,827
X'd - Direct axis transient reactance saturated.	0,198	0,179	0,166	0,182	0,236	0,223	0,204	0,187
X''d - Direct axis sub transient reactance saturated	0,124	0,112	0,104	0,114	0,147	0,139	0,127	0,117
Xq - Qadro. Axis synchro.reactance unsaturated.	0,966	0,872	0,810	0,885	1,144	1,081	0,989	0,908
X''q - Quadro. Axis sub transient reactance saturated.	0,223	0,201	0,187	0,204	0,263	0,249	0,228	0,209
X2 - Negative sequence reactance unstrated	0,186	0,168	0,156	0,171	0,221	0,208	0,191	0,175
Xo -Zero sequence reactance unsaturated.	0,084	0,076	0,071	0,077	0,100	0,094	0,086	0,079
T'd- Short - Circuit transient time constant	0,016s							
T''d - Sub Transient time constant	0,004s							
T'do- Open circuit time constant	0,3s							
Ta- Armature time constant	0,005s							
Kcc - Short Circuit Ratio	1/Xd							

## Outline Drawing



DIMENSIONS (mm)			2-BRG
SAE	TYPE	LB	A
SAE 3	SMF160D	403.5	511.5
SAE 4/5	SMF160D	391.5	

	FLANGE(mm)							
	BD	AK	AJ	U°	BF	N	C	D
SAE5	356	314.32	333.38	22.5	11	8	133	117
SAE4	402	361.95	381	15	11	8	133	117
SAE3	451	409.58	428.62	15	11	8	145	129
SAE2	489	447.68	466.72	15	11	12	172	156

COUPLING DISC					
SAE	BX	P	X	Y	AH
11.5	352.42	333.38	8	11	39.6
10	314.32	295.28	8	11	53.8
8	263.52	244.48	6	11	62
7.5	241.3	222.25	8	9	30.2
6.5	215.9	200.02	6	9	30.2

Maranello designs, manufactures and markets the alternators which comply with the national and international standards. The alternator can be broadly used in the all-purposed application, such as backup, rental, telecom and marine, and also can be used in a.

### **Compliant with Standards**

Other certifications can be considered on request.

### **Electrical Features**

#### **Automatic Voltage Regulator (AVR)**

The high efficiency semiconductors of the AVR ensure positive build-up from initial low levels of residual voltage.

#### **2/3 Winding Pitch**

Effectively eliminates the effect of the third harmonics so as to avoid excessive neutral currents.

#### **Variable Voltage Output**

Standard voltage output can be achieved through the reconnectable 12 wire, and the beyond-the-standard voltage might be achieved by optional winding.

#### **Overload Capability**

Be capable of running at constant load limited to the insulation class with the possibility of overload up to 10% for 1 hour every 12 hours.( Continuous Duty -S1).

#### **High Efficiency and Motor Starting Capacity**

Optimizing design greatly improves the efficiency and motor starting capacity.

### **Mechanical Features**

#### **Bracket + Flexible Disc**

The combination of casting bracket and flexible disc makes product to be coupled with any brand of engine whose interface is international design

#### **Terminal Box**

Metal-made and accessed easily, it also can be customized on requests.

#### **Shaft and Key**

Rotors assembly is dynamically balanced under ISO8528 and BS5000 regulation, and double-bearing is balanced with half-key.

#### **Bearing**

Bearing is greased in the factory for life, and regreasable bearing is available on request.

#### **Machine Protection**

The standard protection is IP23, and IP44 is optional

### **Insulation and Impregnation**

#### **H-class Insulation**

Materials used in the insulation system is classed "H", specially the copper wire applied is able to withstand 200°C

#### **Vacuum Pressure Impregnation (VPI)**

The advanced impregnation equipment is applied to ensure the electrical insulation and mechanical strength.

### **Winding Protection**

#### **Standard:**

The winding is protected against relative humidity < 95%.

#### **Optional:**

The special-treated winding ("ANTI-HARSH") is recommended to apply for the environment humidity > 95%, or harsh environment such as atmospheric contaminants or salty water spr