

# PAC F88 E 150HP

Qmax 3,950 USgpm - Hmax 200 ft



Indicative picture of the product

## PAC Flow series

The pump system consists of a centrifugal pump and a separator, which enables air to be separated from the liquid and be sucked by a vacuum pump - making automatic priming possible. Even with suction heights of several feet the machine rapidly evacuates the air from the suction pipe and starts to pump. The PAC range is also suitable for pumping liquids with solids in suspension with best possible efficiency.

## Applications

The PAC F88 Atlas Copco pump is designed to withstand toughest applications and delivers best in class pumping efficiency. One of the most common area of utilization is the mining and Oil & Gas segment where reliability, efficiency and versatility is the key to provide a customized solution. Other suitable applications within Construction and General dewatering, Municipal as well as General Industry are ideal for the PAC F88 pump. Atlas Copco pumps are packed with features that not only meet, but exceed the needs of our customers.

## Benefits

### Efficiency

The 12" impeller with 82% efficiency at B.E.P. provides best pumping result with minimal efforts

### Solids handling

Closed impeller type with solids handling capability of 3" for trouble free operation

### Easy maintenance

Hinged cover for direct access to the impeller and pump volute

# PAC F88 E 150HP

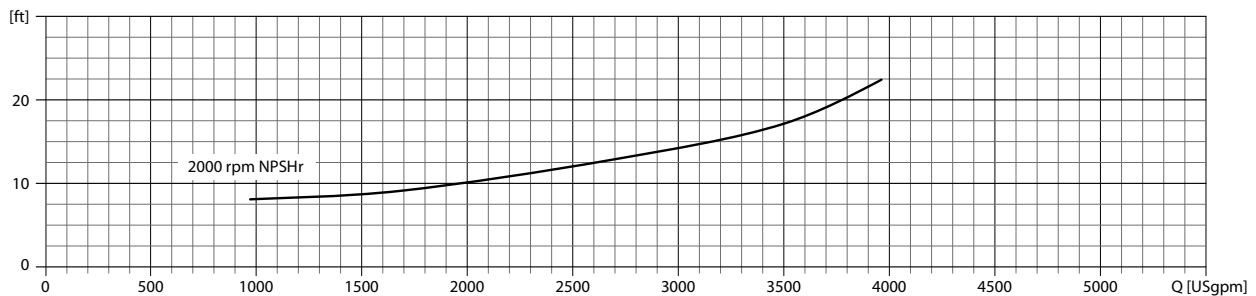
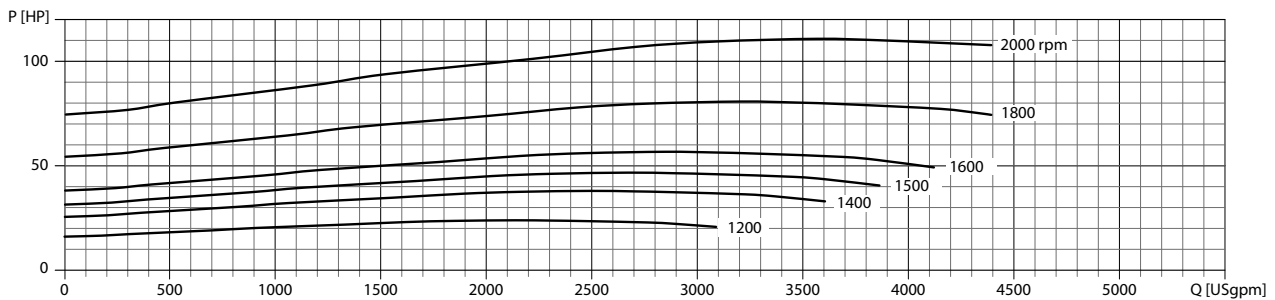
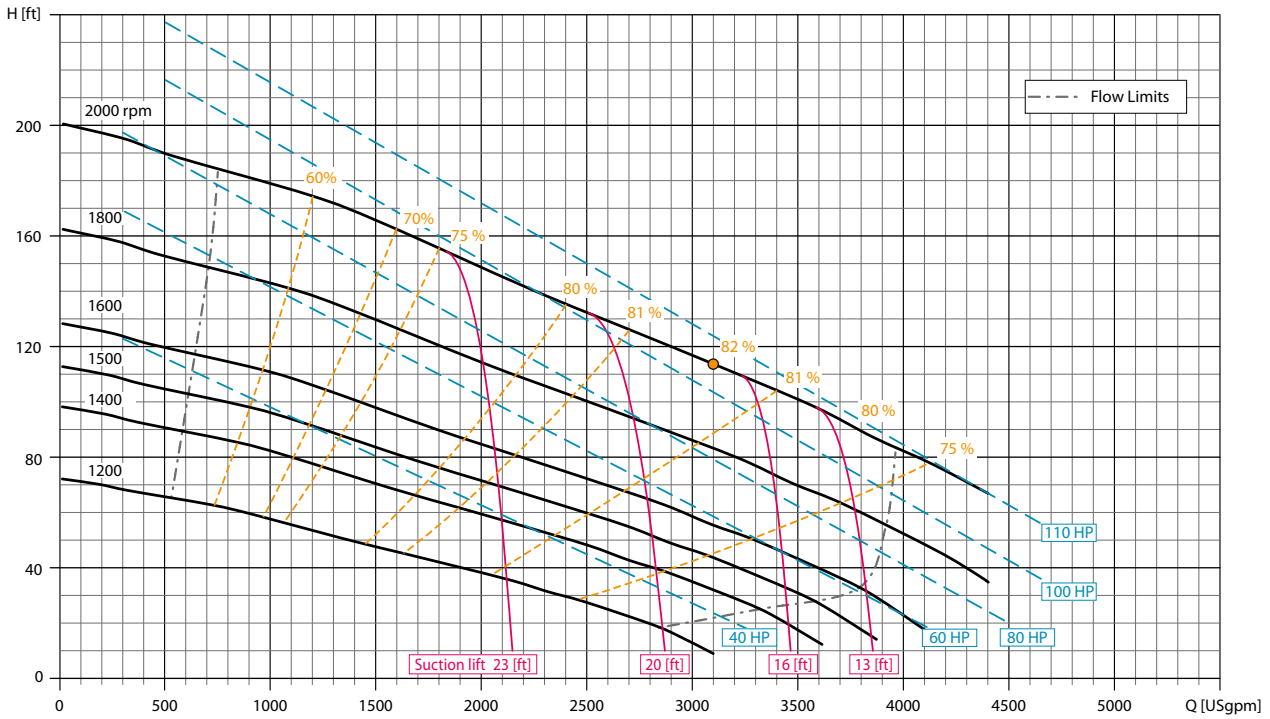
## Performance curves

Test according to UNI EN ISO 9906 standard - level 2B

Test liquid: clean water, density 62.43 lb/ft<sup>3</sup> (8.345 lb/gal)

Losses from priming system and check valve not included

Speed	Impeller Dia.	Style	Solids Dia.	Ns	Suction	Discharge	No. Vanes
Various	12" / 315 mm	Closed	3" / 76 mm	2000 rpm	8" / 200 mm	8" / 200 mm	2



# PAC F88 E 150HP

## Technical data

### Pump

<b>Model</b>	PAC F88	
<b>Qmax</b>	3,950 USgpm	
<b>Hmax</b>	200 ft	
<b>Q max eff.</b>	3,100 USgpm	
<b>Eff. max</b>	82 %	
<b>Suction port</b>	8" Flange - ANSI class 200	
<b>Delivery port</b>	8" Flange - ANSI class 200	
<b>Impeller type</b>	Closed, 2 vane	
<b>Impeller diameter</b>	12"	
<b>Solids handling</b>	3"	

Material	Standard	Stainless Steel (option)
<b>Casing</b>	ASTM A536 ductile iron	CD4MCu
<b>Impeller</b>	ASTM A536 ductile iron	CD4MCu
<b>Wear ring</b>	ASTM A48 Class 20 grey iron	PTFE
<b>Wear plate</b>	ASTM A48 Class 20 grey iron	AISI 316L stainless steel
<b>Shaft</b>	AISI 630 stainless steel	AISI 630 stainless steel
<b>Mechanical Seal faces</b>	Silicon carbide / Silicon carbide / VITON	Silicon carbide / Silicon carbide / VITON
<b>Elastomers</b>	NBR + VITON	VITON
<b>Lubrication</b>	Grease (bearings)	Grease (bearings)
<b>Check Valve</b>	ASTM A536 ductile iron + NBR rubber flap	AISI 316 stainless steel + Viton flap
<b>Separator</b>	Aluminium alloy	AISI 316 stainless steel

### Motor

<b>Make</b>	WEG
<b>Type</b>	Three Phase Induction
<b>Cooling method</b>	IC411 - TEFC
<b>No. poles</b>	4
<b>Tension supply</b>	460 V
<b>Frequency</b>	60 Hz
<b>Rated power</b>	150 HP
<b>Rated speed</b>	1,784 rpm
<b>Rated current</b>	170 A
<b>Efficiency class</b>	W22 NEMA premium efficiency
<b>Max efficiency</b>	IPW55
<b>Protection rating</b>	F
<b>Insulation class</b>	Continuous - S1
<b>Thermal protection</b>	95,8 %
<b>Duty cycle</b>	Thermistors 2 Wires - 311degF

### Priming system

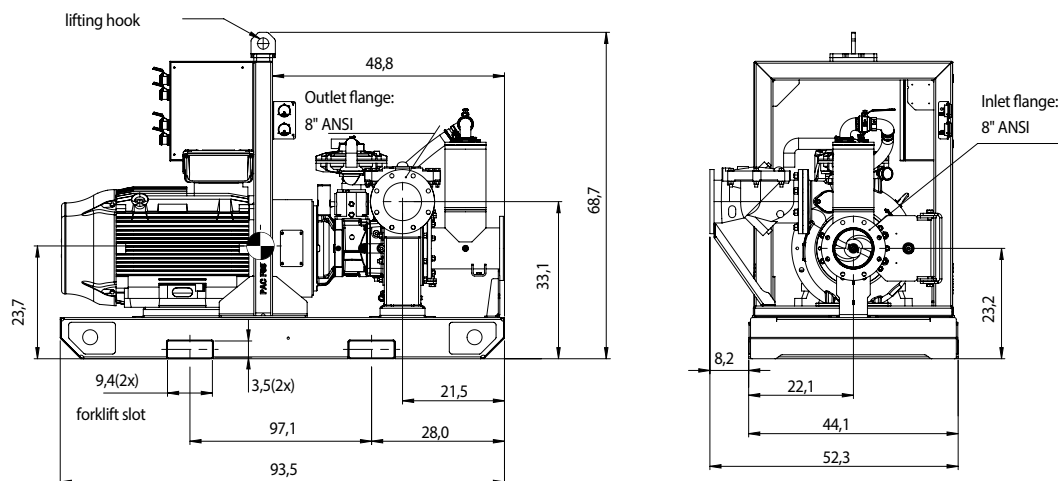
<b>Vacuum pump</b>	
<b>Vacuum pump type</b>	Diaphragm
<b>Nominal air capacity</b>	50 cfm
<b>Max vacuum</b>	- 26.6 inHg
<b>Drives</b>	Link belt

### Arrangement

<b>Technical data</b>	
<b>Material</b>	ASTM A36 steel - Frame, supports and Lifting Beam
<b>Coatings</b>	Epoxy powder, average thickness of 3 MIL
<b>Features</b>	Lifting beam. Fork lift pockets. Pump access through hinged door. 4 x 400 amp male cam-lok receptacle.
<b>Dry weight</b>	4520 lbs

## Dimensional drawing

[in]



# DATA SHEET



## Three Phase Induction Motor - Squirrel Cage

Customer : VARISCO S.P.A. ( ATLAS COPCO GROUP

Product line : W22 - IE3 Premium Efficiency Multivoltage Product code : 12881580

Frame : 315S/M	Cooling method : IC411 - TEFC
Insulation class : F	Mounting : B35T
Duty cycle : S1	Direct of rotation <sup>1</sup> : Both
Ambient temperature : -20 °C to +40 °C	Starting method : Direct On Line
Altitude : 1000 m.a.s.l	Approx. weight <sup>3</sup> : 982 kg
Degree of protection : IP55	Moment of inertia (J) : 2.89 kgm <sup>2</sup>
Design : N	

Output	110 kW (150 HP)	110 kW (150 HP)	110 kW (150 HP)	110 kW (150 HP)
Poles	4	4	4	4
Frequency	50 Hz	50 Hz	50 Hz	60 Hz
Rated voltage	380/660 V	400/690 V	415 V	460 V
Rated current	201/116 A	195/113 A	193 A	170 A
L. R. Amperes	1286/741 A	1365/791 A	1428 A	1326 A
LRC (p.u.)	6.4	7.0	7.4	7.8 x Code H
No load current	62.0/35.7 A	69.4/40.2 A	76.2 A	63.4 A
Rated speed	1488 rpm	1489 rpm	1490 rpm	1791 rpm
Slip	0.80 %	0.73 %	0.67 %	0.50 %
Rated torque	706 Nm	706 Nm	705 Nm	587 Nm
Locked rotor torque	210 %	230 %	250 %	260 %
Breakdown torque	230 %	260 %	280 %	290 %
Service factor	1.00	1.00	1.00	1.25
Noise level <sup>2</sup>	71.0 dB(A)	71.0 dB(A)	71.0 dB(A)	75.0 dB(A)
Locked rotor time	38 s (hot)	35 s (hot)	33 s (hot)	42 s (hot)
	68 s (cold)	63 s (cold)	59 s (cold)	76 s (cold)
Efficiency (%)	50%	95.0	94.7	94.4
	75%	95.5	95.5	95.4
	100%	95.5	95.6	95.5
Power factor	Start	0.38	0.38	0.39
	50%	0.76	0.72	0.71
	75%	0.83	0.81	0.79
	100%	0.87	0.85	0.83

	Drive end	Non drive end	Foundation loads
Bearing type	6319-C3	6316-C3	Maximum traction : 10735 N
Lubrication interval	11000 h	13000 h	Maximum compression : 20369 N
Lubricant amount	45 g	34 g	
Lubricant type	MOBIL POLYREX EM		

This revision replaces and cancels the previous one, which must be eliminated.

- (1) When viewed from the drive end.
- (2) Measured at 1m and with tolerance of +3dB(A).
- (3) Approximate weight subject to changes after manufacturing process.
- (4) At the rated point.

These are average values based on tests with sinusoidal power supply, subject to the tolerances stipulated in IEC 60034-1.

Rev.	Summary of changes	Performed	Checked	Date
Performed by	cheikh			205556/2021
Checked by	AUTOMATICO			Page Revision
Date	27/07/2021			1/19 0

# DATA SHEET



## Three Phase Induction Motor - Squirrel Cage

Customer : VARISCO S.P.A. ( ATLAS COPCO GROUP

Product line : W22 - IE3 Premium Efficiency Multivoltage Product code : 12881580

### Thermal protection

ID	Application	Type	Quantity	Switching temperature
01	Winding	Thermistor - 2 Wires	1 x Phase	155 °C

Standards	Specification : IEC 60034-1	Vibration : IEC 60034-14
	Tests : IEC 60034-2	Tolerance : IEC 60034-1
	Noise : IEC 60034-9	

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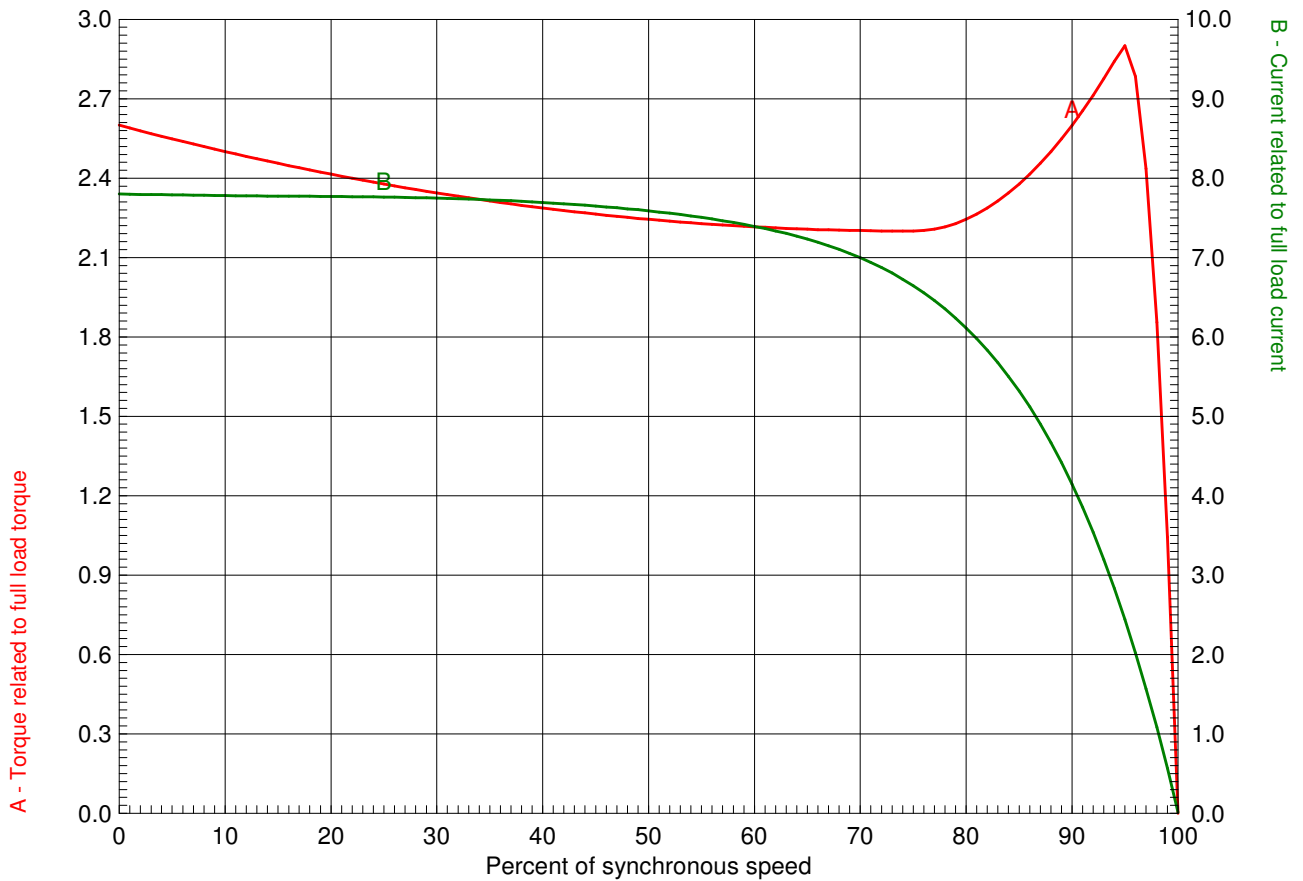
# TORQUE AND CURRENT X SPEED CURVE



## Three Phase Induction Motor - Squirrel Cage

Customer : VARISCO S.P.A. ( ATLAS COPCO GROUP

Product line : W22 - IE3 Premium Efficiency Multivoltage Product code : 12881580



Performance : 110 kW (150 HP) 460 V 60 Hz 4P 315S/M

Rated current : 170 A	Moment of inertia (J) : 2.89 kgm <sup>2</sup>
LRC (p.u.) : 7.8 Code H	Duty cycle : S1
Rated torque : 587 Nm	Insulation class : F
Locked rotor torque : 260 %	Service factor : 1.25
Breakdown torque : 290 %	Temperature rise : 80 K
Rated speed : 1791 rpm	Design : N

Locked rotor time 100% : 42 s (hot) 76 s (cold)  
 Load inertia (J=GD<sup>2</sup>/4) : 2.89325 kgm<sup>2</sup>

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Checked by	AUTOMATICO	Page	Revision	
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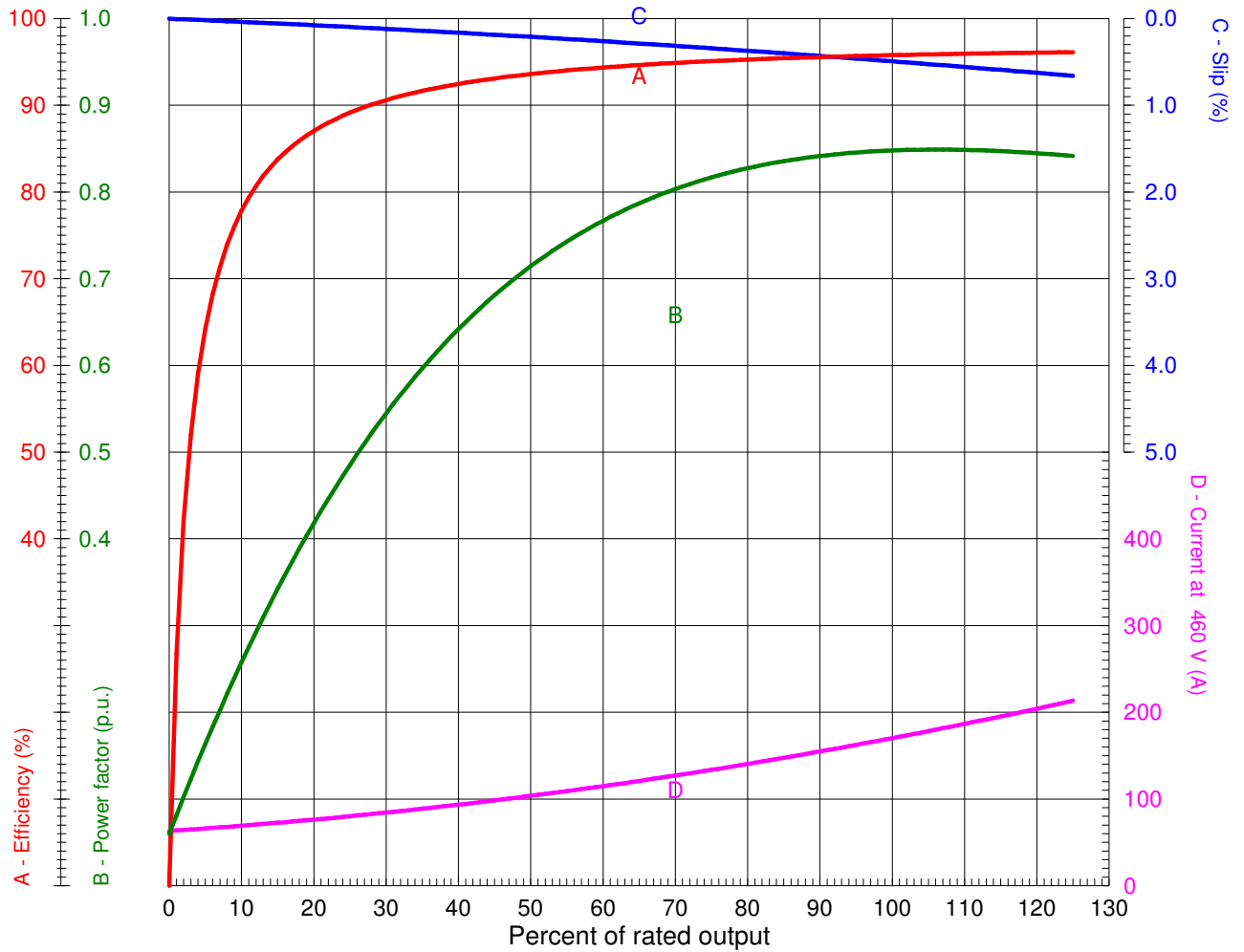
# LOAD PERFORMANCE CURVE



## Three Phase Induction Motor - Squirrel Cage

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Product line : W22 - IE3 Premium Efficiency Multivoltage Product code : 12881580



Performance : 110 kW (150 HP) 460 V 60 Hz 4P 315S/M

Rated current	: 170 A	Moment of inertia (J)	: 2.89 kgm <sup>2</sup>
LRC (p.u.)	: 7.8 Code H	Duty cycle	: S1
Rated torque	: 587 Nm	Insulation class	: F
Locked rotor torque	: 260 %	Service factor	: 1.25
Breakdown torque	: 290 %	Temperature rise	: 80 K
Rated speed	: 1791 rpm	Design	: N

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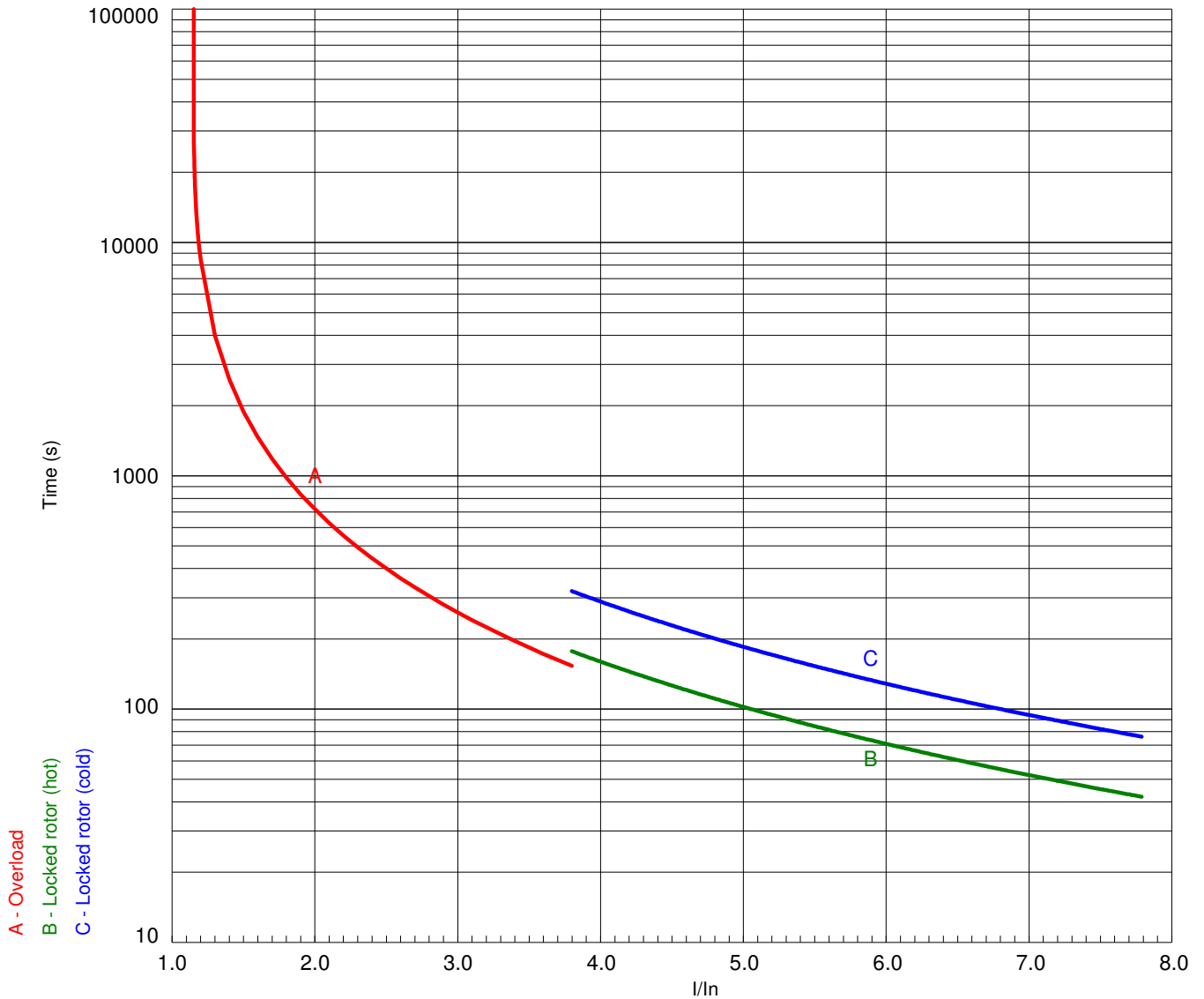
# THERMAL LIMIT CURVE



## Three Phase Induction Motor - Squirrel Cage

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Rated current : 170 A	Moment of inertia (J) : 2.89 kgm <sup>2</sup>
LRC (p.u.) : 7.8 Code H	Duty cycle : S1
Rated torque : 587 Nm	Insulation class : F
Locked rotor torque : 260 %	Service factor : 1.25
Breakdown torque : 290 %	Temperature rise : 80 K
Rated speed : 1791 rpm	Design : N

Heating constant : 34.8 min  
Cooling constant : 104.4 min

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		14/19	0	



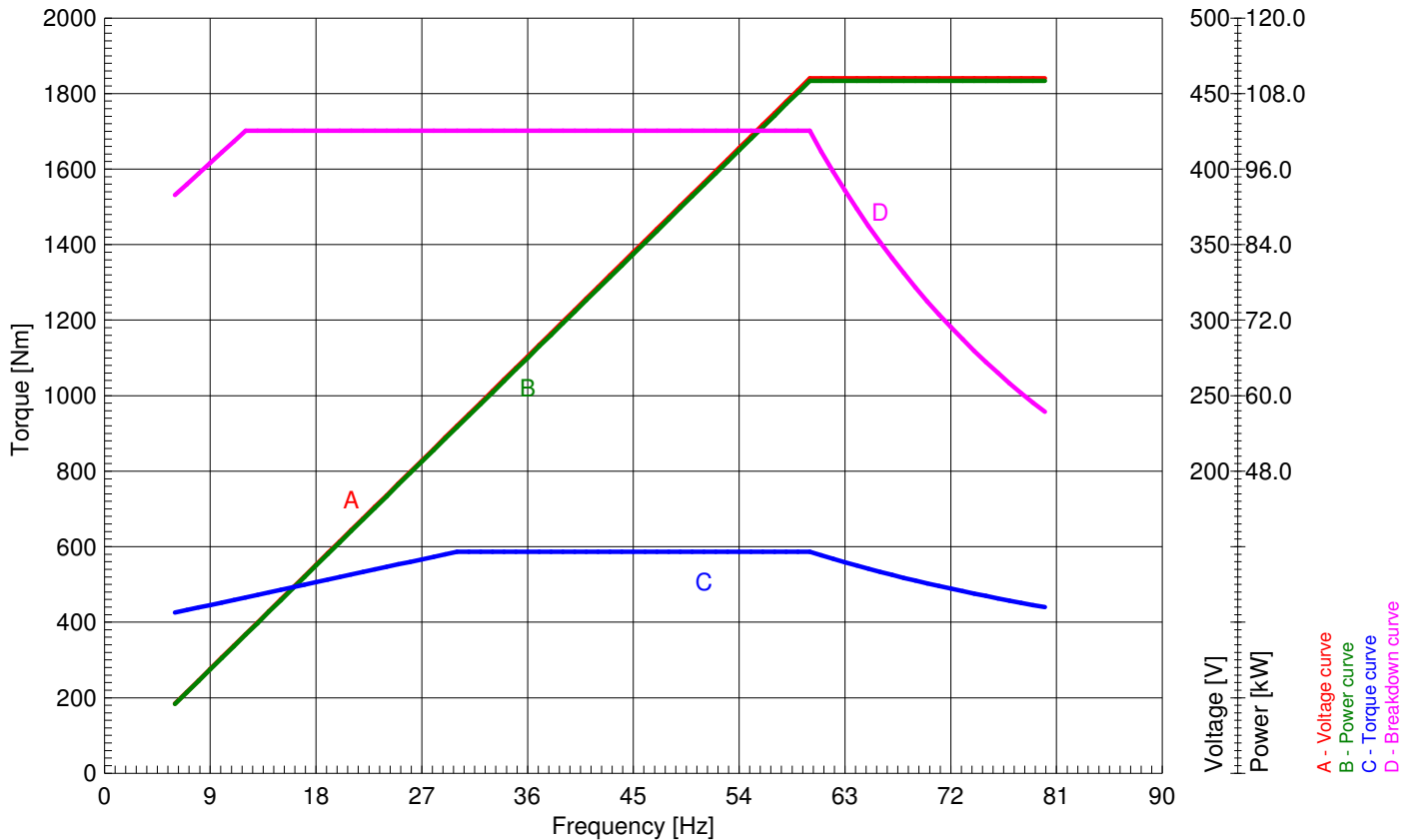
# VFD OPERATION CURVE



## Three Phase Induction Motor - Squirrel Cage

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Performance : 110 kW (150 HP) 460 V 60 Hz 4P 315S/M

Rated current : 170 A	Moment of inertia (J) : 2.89 kgm <sup>2</sup>
LRC (p.u.) : 7.8 Code H	Duty cycle : S1
Rated torque : 587 Nm	Insulation class : F
Locked rotor torque : 260 %	Service factor : 1.25
Breakdown torque : 290 %	Temperature rise : 80 K
Rated speed : 1791 rpm	Design : N
	Maximum peak voltage phase-to-phase <= 1600 V
	dV/dt <= 5200 V/μs
	Rise time >= 0,1 μs

Rev.	Summary of changes		Performed	Checked	Date
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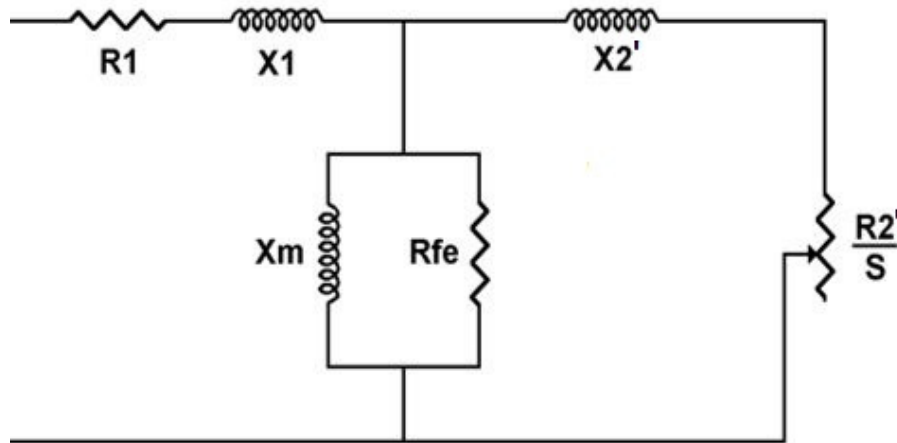
# EQUIVALENT CIRCUIT



## Three Phase Induction Motor - Squirrel Cage

Customer : VARISCO S.P.A. ( ATLAS COPCO GROUP

Product line : W22 - IE3 Premium Efficiency Multivoltage Product code : 12881580



Rated			
<b>R1</b>	0.0357 ohms / 0.0272 p.u.	<b>X1</b>	0.3005 ohms / 0.2289 p.u.
<b>R2'</b>	0.0175 ohms / 0.0133 p.u.	<b>X2'</b>	0.4268 ohms / 0.3251 p.u.
<b>Rfe</b>	271.4585 ohms / 206.7940 p.u.	<b>Xm</b>	8.3905 ohms / 6.3918 p.u.

Locked rotor			
<b>R1</b>	0.0380 ohms / 0.0289 p.u.	<b>X1</b>	0.2707 ohms / 0.2062 p.u.
<b>R2'</b>	0.1246 ohms / 0.0949 p.u.	<b>X2'</b>	0.1805 ohms / 0.1375 p.u.
<b>Rfe</b>	255.4111 ohms / 194.5693 p.u.	<b>Xm</b>	10.6134 ohms / 8.0852 p.u.

<b>T"do</b>	1.2122 s	<b>X/R</b>	7.9629 p.u.
<b>T"d</b>	0.0629 s	<b>RS</b>	0.0150 ohms / 0.0114 p.u.
<b>Ta</b>	0.0253 s	<b>X"d = Xs</b>	0.4513 ohms / 0.3438 p.u.
<b>Zbase</b>	1.3127 ohms	<b>X2(-)</b>	0.2548 ohms / 0.1941 p.u.

All parameters reflected to stator side.  
Per phase values, for T connection.  
Resistances at 20.0 °C, reactances at rated voltage and frequency.

Performance : 110 kW (150 HP) 380 V 50 Hz 4P 315S/M

R1	= Stator resistance	T"do	= Open circuit AC time constant
R2'	= Rotor resistance	T"d	= Short circuit AC time constant
Rfe	= Core loss resistance	Ta	= Short circuit DC time constant
X1	= Stator leakage reactance	X/R	= X/R Ratio
X2'	= Rotor leakage reactance	RS	= Supplementary losses resistance
Xm	= Magnetizing reactance	X"d = Xs	= Subtransient reactance
Zbase	= Base impedance	X2(-)	= Negative sequence reactance

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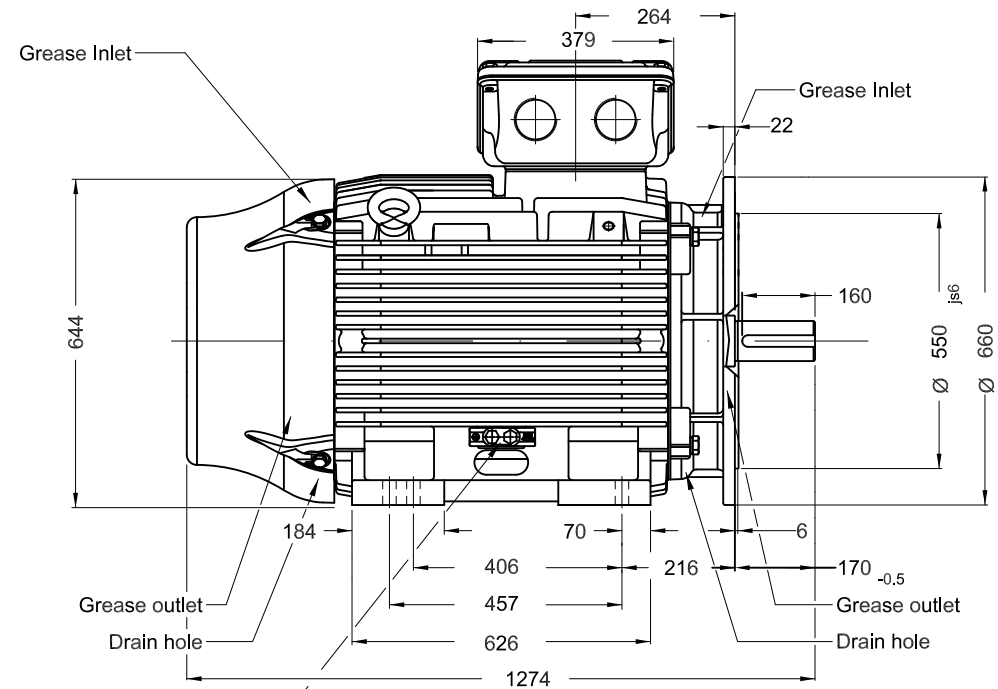
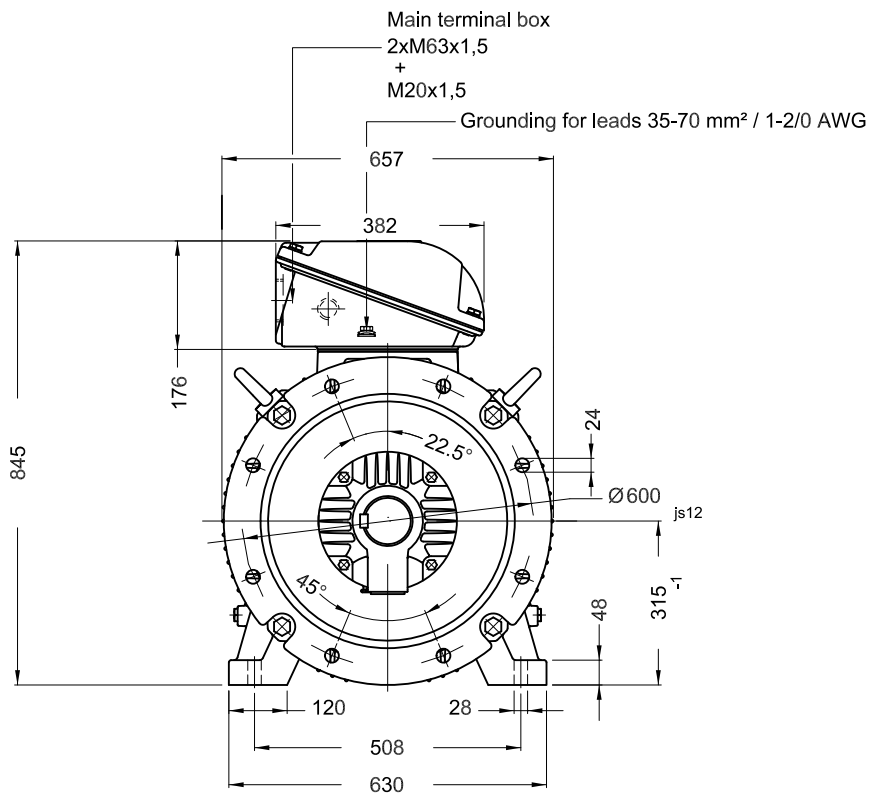
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1 2 3 4 5 6

A

B

C

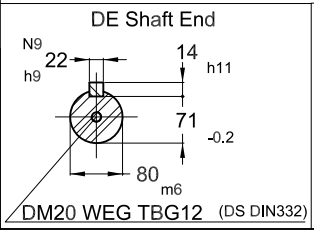


Grounding for leads 25-185 mm² / 3AWG-350MCM

D

E

Without vertical jackscrews  
 NDE endshield with electrically insulated bearing hub  
 Color RAL 5009  
 Painting plan 203A  
 Mounting B35T



110 kW 04 Poles 50 Hz A

ECM	LOC	SUMMARY OF MODIFICATIONS	EXECUTED	CHECKED	RELEASED	DATE	VER
EXECUTED	PIRWBUSER	THREE PHASE W22 MOTOR - PREMIUM EFF					
CHECKED		FRAME 315S/M IP55 TEFC					
RELEASED							
REL DT.	WMO	Jaragua do Sul	Product Engineering	SHEET	1 / 1		

PREVIEW  
 WDD

