1. GENERAL CONCEPTS

Design

Designed and manufactured with the latest technology for Rotating Machines, they are capable of standing high mechanical and electrical overloads and meeting the demanding performances of today's advanced electronic dc. 2 and 4 quadrant speed variators equipped with thyristor rectifier bridge circuits or switching transistor drives.

Construction

The armature design bases on low loss magnetic sheets. Due to be fully laminated, the field circuit shows a very compact size, therefore offering a quick dynamic response and very high torque despite its small size. A low noise level and a practically vibration free operation have also been achieved.

Supply

The voltages envisaged to supply both armature and field circuits, are standardised ones in taking three phase nets of 230/400 VAC at 50/60 Hz.

Standards

Motors are manufactured following the regulations and recommendations of the International Electrotechnical Commission (IEC), for Rotating Machines **EN60034, IEC 34-1 and IEC 72**.

2. WORKING CONDITIONS DEFINITION

S1 Continuous Duty

The outputs listed in the tables are based on S1 continuous duty with an overload capability of 1,6 tomes de rated torque for 15 seconds every 5 minutes, without surpassing the mean square current during a maximum period of 5 minutes.

Operating Environment

The maximum ambient temperature may reach 40º C; a maximum altitude of 1000 m. a.s.l. can be admitted.

IP 23 and IP54 Protection

IP23 Protection, against solid objects greater than 12 mm in diameter and against water spray directed at an angle of up to 60º with regard to the vertical.

IP44 Protection, against solid objects greater than 1 mm in diameter and to water spray in all directions.

Insulation

All our direct current motors are insulated with class H insulation, able to withstand a temperature of 180º C. Nevertheless we limit temperatures to those specified for **class F** (140º C) in order to achieve a longer life of all components.

3. COSTRUCTIVE PARTICULARS

Magnet circuit

The armature's magnetic circuit consists of low magnetic sheets stacked on the steel shaft.

Frame

The frame is fully laminated. Sizes from 90 mm to 112 mm shaft centre height are manufactured with integrated poles, whilst the rest of machines with shaft heights from (132 -280) are equipped with poles fitted to the frame by means of keyways.

Windings

Windings are made of enamelled cooper wire or flat sections (depending on the conductor section), with temperature Class H and degree 2 insulation. All connections are brazed.

ID Motors, have one field winding and one auxiliary winding. IDM Motors, in addition to the auxiliary winding, have a compensating coil under the field winding.

Cooling

The cooling assembly consists in an electrofan properly sized to each motor and provided with an air intake filter fitted to avoid the intake of foreign bodies.

Terminal Box

Until size 200 frames the terminal boxes are made of aluminium and include a metallic cover plate in which the openings for the passage of the required supply cables can be drilled. Internally, a terminal block has been fitted and terminals properly marked.

Thermal Protection

All machines are provided with one thermistor fitted to the field winding and another fitted to the auxiliary poles winding. Both are serially connected and duly identified on the terminal plate.

Balancing

Balancing is carried out to EN 60034-14 standard with **half key and in class N.** Under request, class R balancing can be supplied.

Tests

Each motor is submitted to several quality checks during its manufacturing process. After manufacture, the following individuals tests are run: Insulation test, dielectric strength test at 2000 V, measurement of winding resistance, brushes running-in, idling and full load tests, 150% overload test, 70% field weakening test, reverse rotation tests and neutral zone final adjustment.

Bearings

Bearings are located in the frame shields, which also incorporate the supporting feet granting the whole assembly a great sturdiness.

Tipo de motor *Motor Type*	Rodamiento *Bearing*		n max rpm	n rpm	L10h h	C N	P max N	A mm	B mm	Xmax mm	Fr max N (**)
ID 090	*D.E.*	*6206ZZC3*	*10000*	1500	20000	*19500*	1603	18,5	279	60	1000
	N.D.E.	*6205ZZC3*	*12000*	1500	20000	*14000*	1151	18,5	279	60	3300
ID 100	*D.E.*	*6307ZZC3*	*8500*	1500	20000	*33200*	2729	24	317,5	80	1600
	N.D.E.	*6207ZZC3*	*9000*	1500	20000	*25500*	2096	24	317,5	80	5100
ID 112	*D.E.*	*6308ZZC3*	*7500*	1500	20000	*41000*	3370	26	371	80	2100
	N.D.E.	*6208ZZC3*	*9000*	1500	20000	*30700*	2524	26	371	80	7100
ID 132	*D.E.*	*6310ZZC3*	*6300*	1500	20000	*61800*	5080	35,5	448,5	110	3100
		N310 (*)	*5000*	1500	20000	*110000*	11609				7000
	N.D.E.	*6208ZZC3*	*8500*	1500	20000	*30700*	2524	35,5	448,5	110	6200
ID 160	*D.E.*	*6312ZZC3*	*5000*	1500	20000	*81900*	6733	38,5	538	110	4200
		N312 (*)	*4300*	1500	20000	*151000*	15937				10000
	N.D.E.	*6308ZZC3*	*7500*	1500	20000	*41000*	3370	38,5	538	110	9800
ID 180	*D.E.*	*6313ZZC3*	*4800*	1500	20000	*92300*	7588	50	679	140	4700
		N313 (*)	*4000*	1500	20000	*183000*	19314				12100
	N.D.E.	*6311ZZC3*	*5600*	1500	20000	*71500*	5878	50	679	140	16800
ID 200	*D.E.*	*6315ZZC3*	*4300*	1500	20000	*114000*	9372	55	757	140	6000
		N315 (*)	*3400*	1500	20000	*242000*	25541				16200
	N.D.E.	*6313ZZC3*	*4800*	1500	20000	*92300*	7588	55	757	140	23600
ID 225	*D.E.*	*6218 C3(***)*	*3800*	1500	20000	*96500*	7933	56	940	170	5100
		NU218 (*)	*4300*	1500	20000	*183000*	19314				12500
	N.D.E.	*6216 C3(***)*	*4500*	1500	20000	*104000*	8550	56	940	170	28400
ID 250	*D.E.*	*6220 C3(***)*	*3400*	1500	20000	*122000*	10029	56	940	170	6500
		NU220 (*)	*3800*	1500	20000	*250000*	26385				17000
	N.D.E.	*6218 C3(***)*	*3800*	1500	20000	*96500*	7933	58,5	1065	170	29600
ID 280	*D.E.*	*6222 C3(***)*	*3000*	1500	20000	*143000*	11756	56	940	210	7300
		NU222 (*)	*3400*	1500	20000	*290000*	30607				19100
	N.D.E.	*6220 C3 (***)*	*3400*	1500	20000	*122000*	10029	58,5	1065	210	31800

DE = Delantero / *Drive end* ; N.D.E. = Trasero / *Non Drive End*

(*) Ejecución bajo pedido / *Under request*

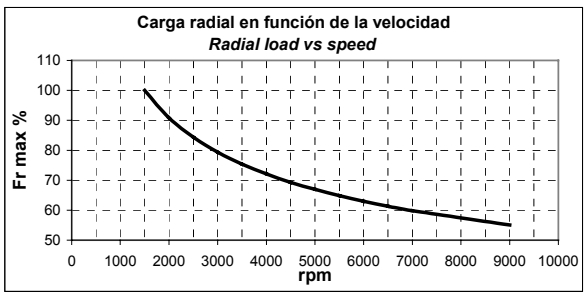
(**) El esfuerzo radial máximo en la polea es el menor de los valores del juego de rodamientos seleccionado
The maximum radial load on the pulley is the minimum value for the selected couple of bearings

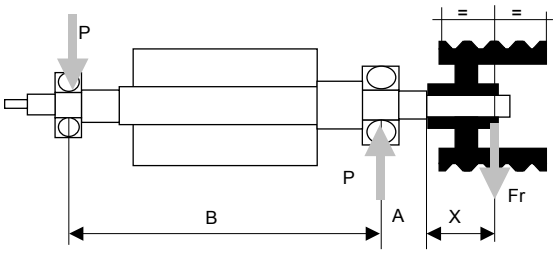
(***) Rodamientos de bolas sin placas de obturación. / B*all bearings without obturating plates*

Los rodamientos de bolas con placas de obturación ZZ están engrasados de por vida.
Ball bearings with obturating plates type ZZ are greased for life

Los rodamientos de rodillos y los de bolas sin placas de obturación deben ser engrasados regularmente con grasa ESSO UNIREX N3.
Roller bearings and ball bearings without obturating plates must be greased regularly with ESSO UNIREX N3 grease.

n max	Velocidad maxima / *Maximum speed*
n	Velocidad de trabajo / *Working Speed*
L10h	Vida util del rodamiento, en h / *Bearing Life in hours*
C	Carga dinámica nominal del rodamiento / *Rated Dynamic Load*
Pmax	Carga radial admisible en el rodamiento para L10h y n / *Max. Radial load on the bearing for L10h and n*
Fr max	Esfuerzo radial máximo en la polea / *Maximum radial load on the pulley*

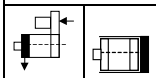
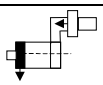




4. COOLING TYPES

As standard cooling types, IC06, IC17 and IC37 are used. Under request, we also supply machines with cooling types, IC0641 and IC041 as special types. For these latter, forced ventilation systems are used, fitting electric independent blowers. The electrical features of these are shown in each motor technical sheet.

COOLING AND PROTECTION TYPES

EN60034-6	COOLING	PROTECTIÓN	90	100	112	132	160	180	200	225	250	280
	IC06	IP23	√	√	√	√	√	√	√	√	√	√
	IC16	IP23	√	√	√	√	√	√	√	√	√	√
	IC17	IP23	√	√	√	√	√	√	√	√	√	√
	IC37	P54	√	√	√	√	√	√	√	√	√	√
	IC416	IP54	x	x	x	x	x	x	x	x	x	x

5. DESINGS AND FITTINGS

EN60034 – 7		DIMENSIONS									
		90	100	112	132	160	180	200	225	250	280
	IM B3 (1001)	√	√	√	√	√	√	√	√	√	√
	IM V5 (1011)	√	√	√	√	√	□	□	□	□	□
	IM V6 (1031)	√	√	√	√	√	□	□	□	□	□
	IM B5 (3001)	√	√	√	√	x	x	x	x	x	x
	IM V1 (3011)	√	√	√	√	√	□	□	□	□	□
	IM V3 (3031)	√	√	√	√	√	□	□	□	□	□
	IM B3/B5 (2001)	√	√	√	√	√	√	√	√	√	√
	IM V1/V5 (2011)	√	√	√	√	√	□	□	□	□	□
	IM V3/V6 (2031)	√	√	√	√	√	□	□	□	□	□

√: Construction available X: Not in program □: Construction available under request

6. OPERATING TYPES AND CORRECTION FACTORS

Standard Operation

The data supplied in the dc Motor selection tables and graphs described in the Technical Selection Sheets refer to the following working conditions:

Continuous Service S1
Maximum altitude 1000 m above sea level

Maximum ambient temperature: 40ºC
Heating level corresponding to class F insulation

Operation at different ambient temperature And altitude to standard.

For temperature and altitude conditions different to the standard ones described above, the torque and nominal power of the ID motor must be multiplied by a factor K1.

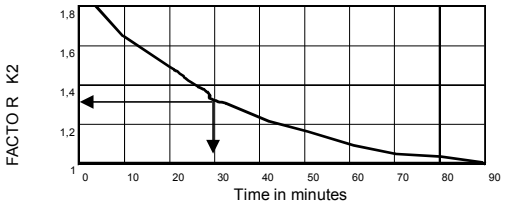
Altitude	Temperature (ºC) 30ºC	40ºC	50ºC	55ºC
1000	1.00	1.00	0.92	0.86
2000	1.00	0.93	0.85	0.77
3000	0.93	0.85	0.76	0.69
4000	0.86	0.78	0.67	0.60
	Factor K1			

Operation at different ambient temperature And altitude to standard.

Example :
For an ID 7,5 kW Motor at 1500 rpm, situated at an altitude of 2000 m and with ambient temperatures which may reach 50°C, the correction factor K1 will be 0.85. Therefore the real Nominal Power developed by the motor is 7,5 kW x 0.85 = 6.3 kW. To obtain a real Power of 7.5 kW, a MAC Motor of 7.5 kW / 0.85 = 9 kW must be selected.

Service S2
Intermittent Service

The operating time of the motor in relation to idle time is very short, which makes it impossible for the motor to reach working temperature. During the idle time, the motor cools back down to its initial temperature.

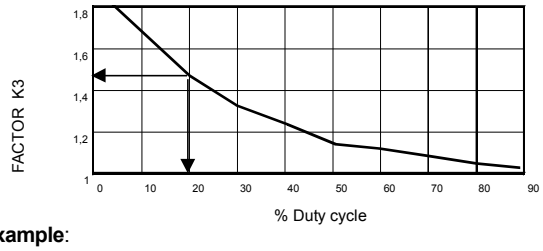


Example:
An ID motor of 7,5 kW at 1500 Rpm is made to work under S2 service of 30 minutes.
The nominal power of the motor under S2 service will be:
Pn = Pc x K2 = 7.5 x 1.37 = 10.27 kW.
and catalogue nominal power under S1 service to be chosen will be equivalent to:
Pc = Pn/K2 = 7.5/1.37 = 5.5 kW.

Pn = Nominal Power under S2 Pc = Nominal Power (catalogue) under S1
K2 = Correction Factor

Service S3
Intermittent Service

The motor performs work cycles during which operating time is significantly lower than idle time.



Example:
A ID motor of 7,5 kW at 1500 rpm is made to work at 20% intermittence, i.e. for every 50 minutes it works for 10 minutes and is idle for 40 minutes. The nominal power of the motor under S3 service will be:
Pn = Pc x K3 = 7.5 x 1.5 = 11.25 kW.
And catalogue nominal power under S1 to be chosen will be equivalent:
Pc = Pn/K3 = 7.5/1.5 = 5.kW

Pn = Nominal Power under S3 Pc = Nominal Power (catalogue) under S1
K3=Correction Factor