Industrial loading brake

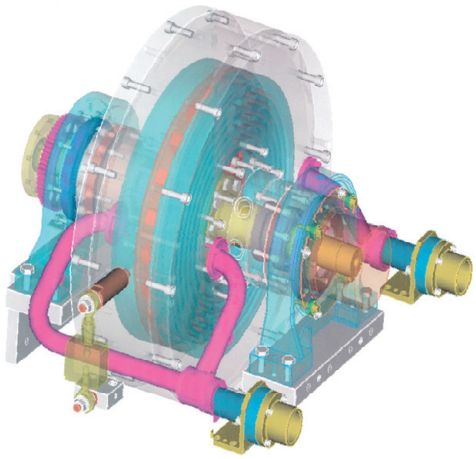
Brake load by Eddy current

- Water cooled Eddy current loading brake.
- A range of products rated from 5 to 1000 hp.
- 1,2,3 or 4 rotor technology.
- Digital control and visualisation unit.

ROTRONICS, specialists in engine test beds, offers a range of industrial loading brakes which are Eddy current brakes.

ROTRONICS

OPERATING PRINCIPLE



The brake allows application of a load to an engine undergoing dynamometer testing for measurement of its speed and torque.
The brake essentially comprises a rotor and a stator.
The stator is mounted on the chassis and circumferentially retained. Rotational force acting upon it is measured by a load cell. The stator also incorporates electrical windings and ducts for water cooling.
The rotor turns inside the stator where it is subjected to a magnetic field generated by the electrical windings. When the rotor turns, it cuts the lines of force and induces Eddy currents. These currents generate forces which oppose the movement that gave rise to them. The force of the engine is hence transmitted to the stator, and measured by the load cell. Knowing the magnitude of the lever arm and the rotational speed, the engine's torque can therefore be measured.

The mechanical energy absorbed by the brake is transformed into heat. The heat is removed by cooling water circulated through ducts within the stator. The cooling circuit is dimensioned in order to dissipate the heat energy produced when the dynamometer is running at its maximum power rating.

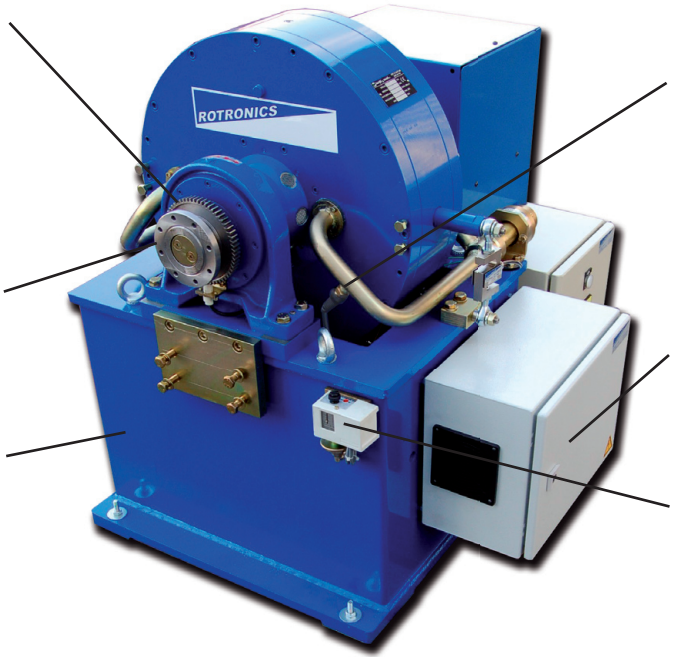
The speed of rotation is measured by a magneto-resistive sensor in association with an indexed wheel.

STANDARD LOADING BRAKE EQUIPMENT

• A magneto-resistive probe scanning an indexed (60 tooth) wheel mounted on the engine drive shaft for speed measurement.

• An engine coupling plate with standardised drillings.

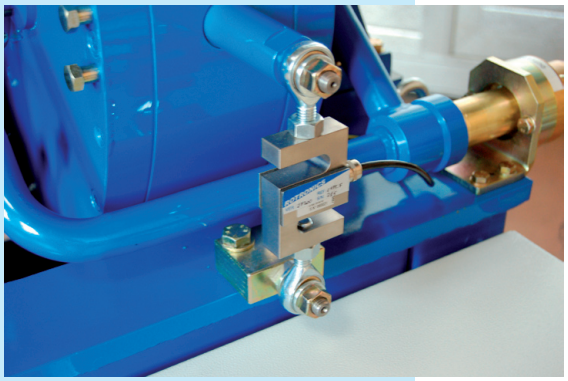
• A low pedestal supporting the brake and allowing fixing to the ground.



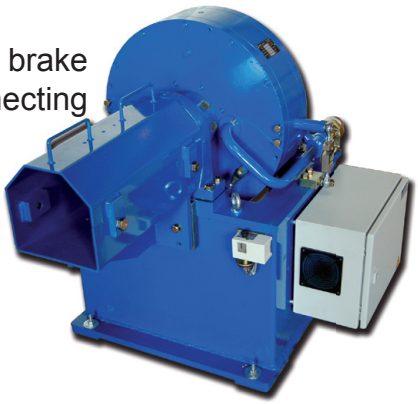
• Thermo-contacts located on the cooling water output collector to monitor water temperatures.

• A high output unit supplying power to the brake windings.

• A pressure controler mounted on the cooling water outlet tubing for detection of flow rate.



• A protective barrier fixed to the brake base plate and enclosing the connecting shaft.



• A load cell with digital signal conditioning unit allowing measurement of the braking torque.

• Two arms allowing calibration of the torque measurement (calibration weights not supplied).

• 8m of cable with connectors for connections between the dynamometer control cabinet and the control rack. Alternate lengths are available at extra cost.

• A digital control rack allows operation of the brake and visualisation of rotational speed, braking torque and power, as well as the current settings.

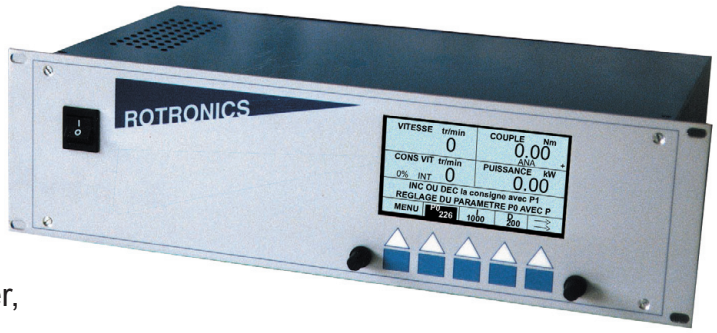
OPTIONAL EQUIPMENT

• A “double output” option (supplementary engine coupling plate at the other end of the brake shaft) is available across the model range. This allows the addition of a starter or the mounting of two engines, one at either side of the brake.

• An engine starter unit mounted on the brake.

OPERATION

Description:



As standard, the loading brakes are equipped with the **RRN104 Rack** command unit allowing total control of the device. Its twin processor digital technology allows simultaneous management of the brake, its configuration (fast and accurate) and the real time display of data being measured : speed, torque, power, load, settings and alarm status.
The **RRN104 Rack** allows several operating modes, extensive configuration possibilities and a wide range of applications.

Visualisation module :

- Visualisation of speed, torque, power, load, of settings for the chosen brake unit.
- Clear display of alarm status.

Available operating modes :

- Operation at constant speed.(n=K)
- Operation at constant torque.(M=K)
- Operation under manual load setting.(M)
- Load as a function of speed squared. (Mn^2)

Available inputs / outputs :

Outputs of 0..10V to relay values of speed, torque and of power.
Inputs of 0..10V for external definition of settings (speed, torque, load...)
Digital outputs of alarm signals.
Digital input switch for external selection of the different modes of regulation.
RS232C / 485 Interface with monitoring PC for communication of all settings and measured values.

Speed measurement :

By magneto-resistive probe associated with an indexed (60 tooth) wheel.
Accuracy : Better than 1 rpm.

Torque measurement :

Numerically thanks to the digital strain gauge conditioner located on the dynamometer base plate (better accuracy and immunity from interference).
Accuracy : 0.01 % or that of the probe.

Available alarm settings :

Excess speed.
Flow of brake cooling water.
Temperature of brake cooling water.
Brake electrical circuit. (open-circuit, short-circuit conditions)

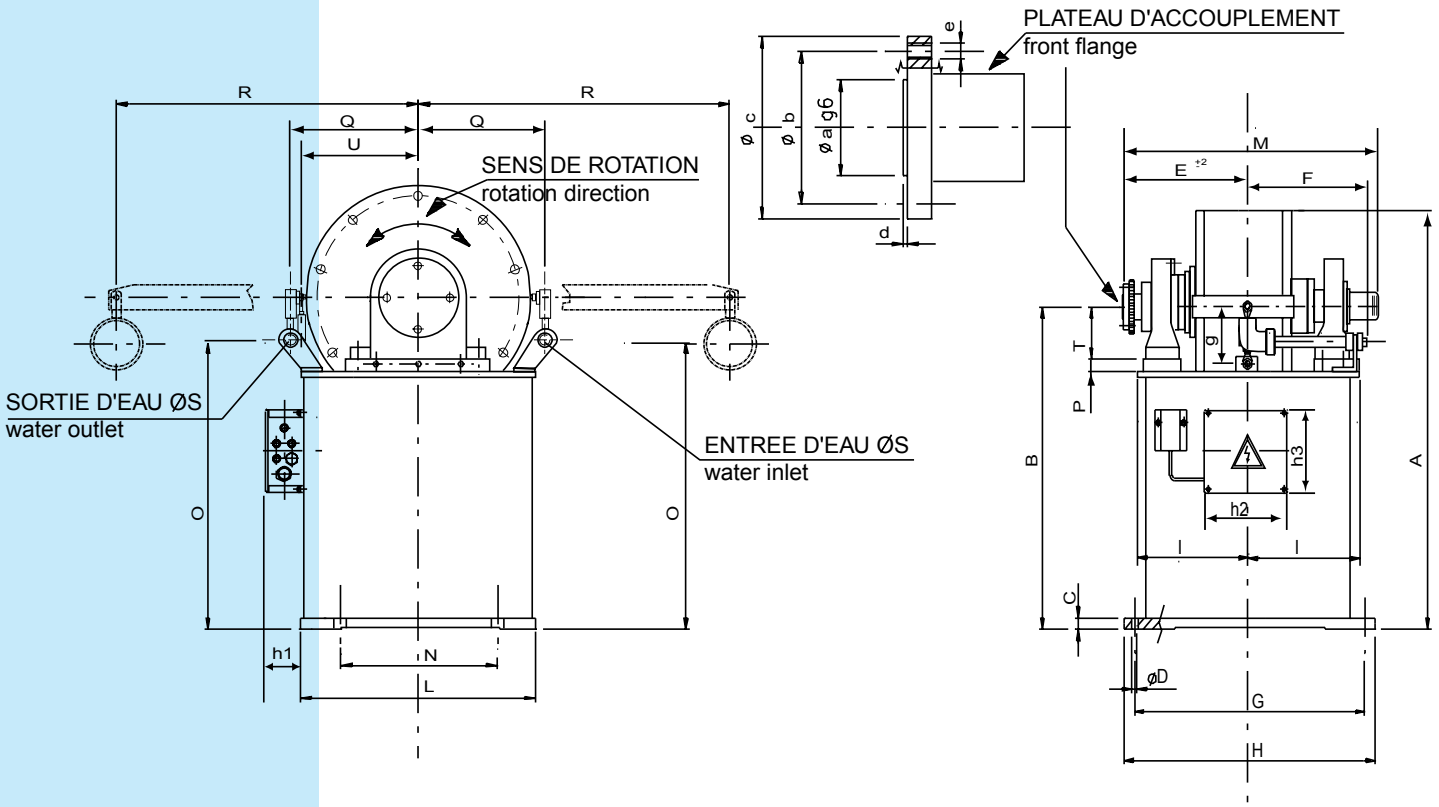
TECHNICAL SPECIFICATIONS

Brake	Shaft diameter	Number of rotors	Rotor diameter	Max. Torque	Max. speed	Power rating		Acceptable mass in connection	Moment of inertia	Water flow	Net weight
	mm		mm	Nm	rpm	hp	kW	kg	m².kg	m^3./h	kg
FA 3/30 SLV	35	1	175	19,5	15 000	5	3,68	0,8	0,0072	0,5	120
FA 10/30 SLV				28		10	7,36				
FA 20/30 SLV				36		20	14,72				
FE 60 S			280	130	13 000	60	44,11	1,3	0,0343	5,0	230
FE 100 S				210		100	73,52				
FE 100 SV					17 000				0,0210		
FE 150 S				235	13 000	150	110,89		0,0470		
FE 260 S				610					0,1540		
FE 300 S						300	220,00			9,5	
FE 350 S	60		506	1 400	8 000	350	257,40	9,0	0,6180	11,0	723
FE 350 SA				1 500	10 000	400	294,12				
FE 600 S	90		700	2 850	5 500	600	441,30	19,0	2,8560	18,8	1 300
FE 600 SP				3 670							
FE 900 S	100		916	4 000	4 000	900	662,00	32,5	9,8100	28,2	2 280
FE 600 SD	50	2	380	850	13 500	500	368,00	3,0	0,2870	16,0	650
FE 600 SDP				1 800	10 000	600	441,20		1,1680	19,0	
FE 600 DV	90		700	4 700	5 500	1 000	735,00	19,0	5,6000	31,1	2 200
FE 900 DV	100			10 000	5 000	1 700	1 250,00		25,3100	47,4	4 200
FE 1000 ST	50	4	320	850	18 000	800	588,00	2,2	0,4500	28,5	1 200
FE 1200 ST	60	3	484	1 800	10 000	1 000	735,00	8,0	1,3900	31,1	1 500
FE 1200 ST 1200						1 200	882,00		1,5000	38,0	1 530

- The indicated (cooling) water flow corresponds to that which results in a 20° rise in water temperature when operating the brake at maximum power. At this flow there is a 1 Bar pressure loss across the brake.
- The brake's high speed bearings are oil lubricated.
- Direction of rotation : reversible
- Design of the cooling water input and output allows easy connection to the cooling water circuit (not supplied). The brake cooling circuit is completely watertight and operates under pressure. The cooling water circuit has no effect on brake hysteresis , which remains well with the stated accuracy.
- Color : light grey (RAL 7035) as standard, other colors available on demand.

TECHNICAL CHARACTERISTICS

Monorotor
FA 3/30 SL
FA 20/30 SL
FA 10/30SL

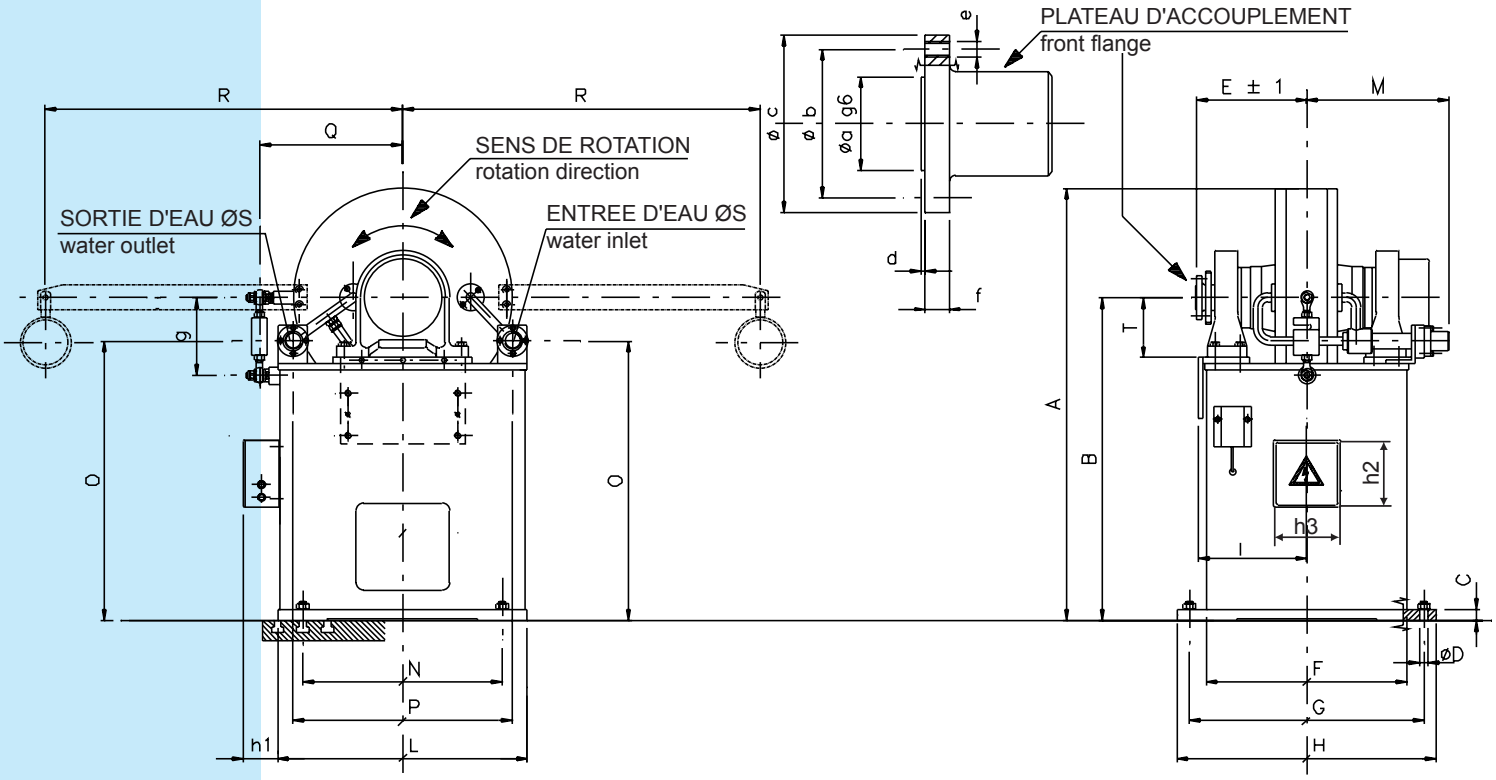


Type de frein Brake model	A	B	C	D	E	F	G	H	I	L	M	N	O	Q	R	S	T	U
FA 3/10 SLV	779	647	23	16	236	191	400	454	187	380	456	260	595	174	1020	G 1/2	100	146
FA 10/30 SLV																		
FA 20/30 SLV																		

Type de frein Brake model	a	b	c	d	e x nb de trous	g	h1	h2	h3	Poids Weight kg
FA 3/10 SLV	Ø42g6	Ø62	Ø74,5	Ø1,5	M6 x 6	102	200	300	300	120
FA 10/30 SLV										
FA 20/30 SLV										

TECHNICAL CHARACTERISTICS

Monorotor

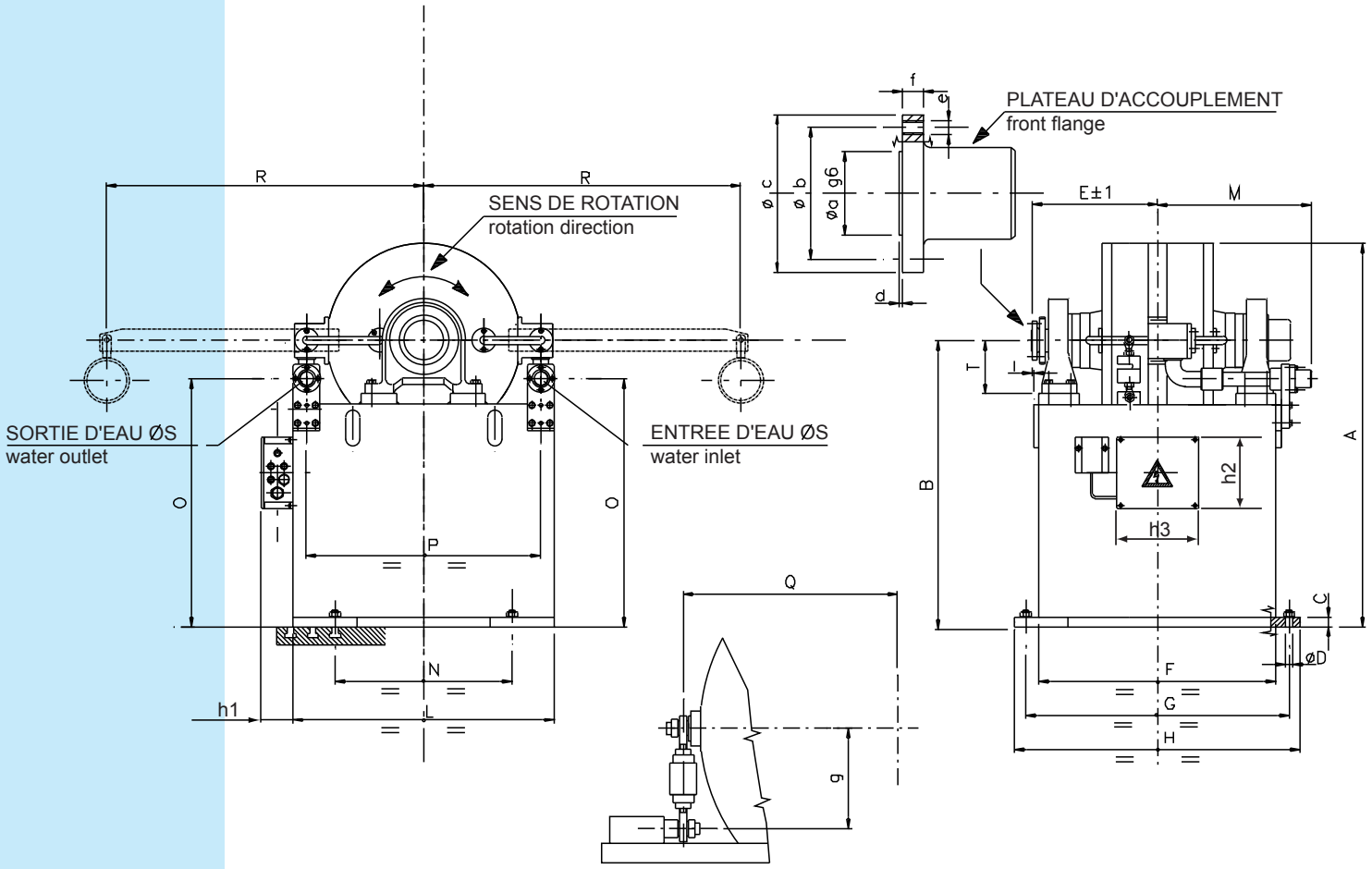


Type de frein Brake model	A	B	C	D	E	F	G	H	I	L	M	N	O	P	Q	R	S	T
FE 60 S	866	647	28	M14	221	390	470	520	227	500	285,5	400	560	440	286,5	1019	1"	120
FE 100 S																		
FE 100 SV																		
FE 150 S																		
FE 260 S	934,5	662		M20	295	500	580	630	283	660	334	540	539	570	365		1"1/2	140
FE 300 S																		
FE 350 S	1040	700			361,5	604	660	710	334,5	770	381	636	578	690	384,7	1529		175
FE 350 SA																		
FE 600 S	1242	800	22		458	738	798	848	79	1020	452	900	628	870	526,5		2"	200
FE 600 SP																		
FE 900 S	1410	850			545	940	1000	1060	75	1280	560	1130	673	1124	647	2038	2"1/2	210

Type de frein Brake model	a	b	c	d	e x nb de trous	f	g	h1	h2	h3	Poids Weight kg
FE 60 S	Ø47	Ø74,5	Ø89	2	M6x6	12	156	200	300	300	230
FE 100 S											
FE 100 SV											
FE 150 S											
FE 260 S	Ø75	Ø101,5	Ø120		M8x8						474
FE 300 S											
FE 350 S	Ø90	Ø130	Ø150		M10x8	15					723
FE 350 SA											
FE 600 S	Ø110	Ø155,5	Ø180	2,5	M12x8	20					1300
FE 600 SP											
FE 900 S	Ø140	Ø230	Ø280	3	M20.5x6	20,5	172				2280

TECHNICAL CHARACTERISTICS

Birotor

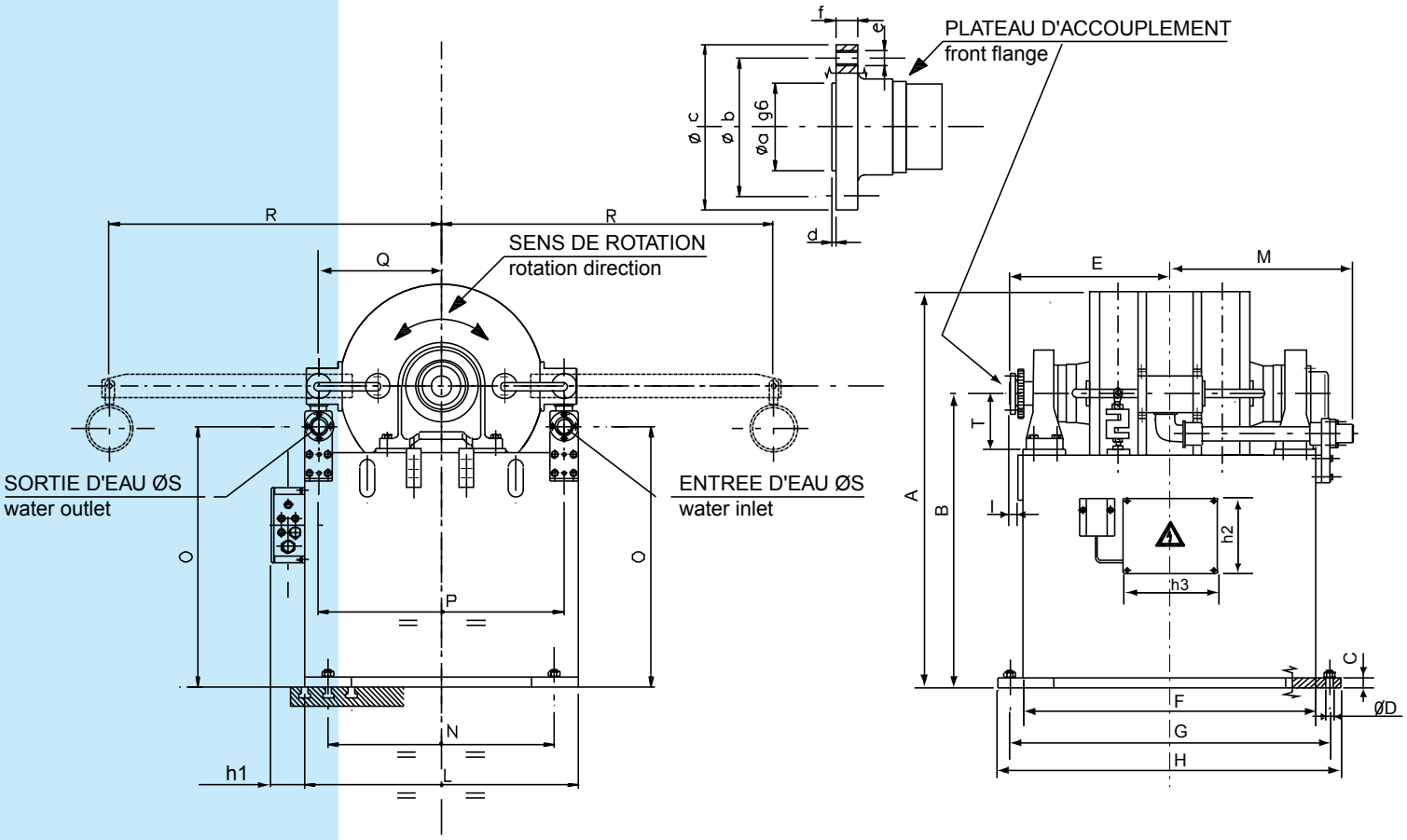


Type de frein Brake model	A	B	C	D	E	F	G	H	I	L	M	N	O	P	Q	R	S	T
FE 600 DV	1242	800	22	M24	569,5	966	1056	1106	71,5	1108	570	958	665	988	527	1530	2"1/2	200
FE 600 SD	934	662	28	M20	371,5	660	730	780	359	780	418	654	559	673	301	1019	2"	140
FE 600 SDP	1040	700		M24	448	804	874	924	424	920	467,5	636	580	807	368	1530		175
FE 900 DV	1310	750	38	M32	664,5	840	940	920	187	1730	550	1650	560	1305	816	2039	2"1/2	320

Type de frein Brake model	a	b	c	d	e x nb de trous	f	g	h1	h2	h3	Poids Weight kg
FE 600 DV	Ø110	Ø155,5	Ø180	2,5	8xM16	22	156	200	300	300	2200
FE 600 SD	Ø75	Ø101,5	Ø120	2	8xM8	12					650
FE 600 SDP	Ø90	Ø130	Ø150		8xM10	15					1155
FE 900 DV	Ø220	Ø310	Ø350	7	10xM22	35	300				4500

TECHNICAL CHARACTERISTICS

Trirotor

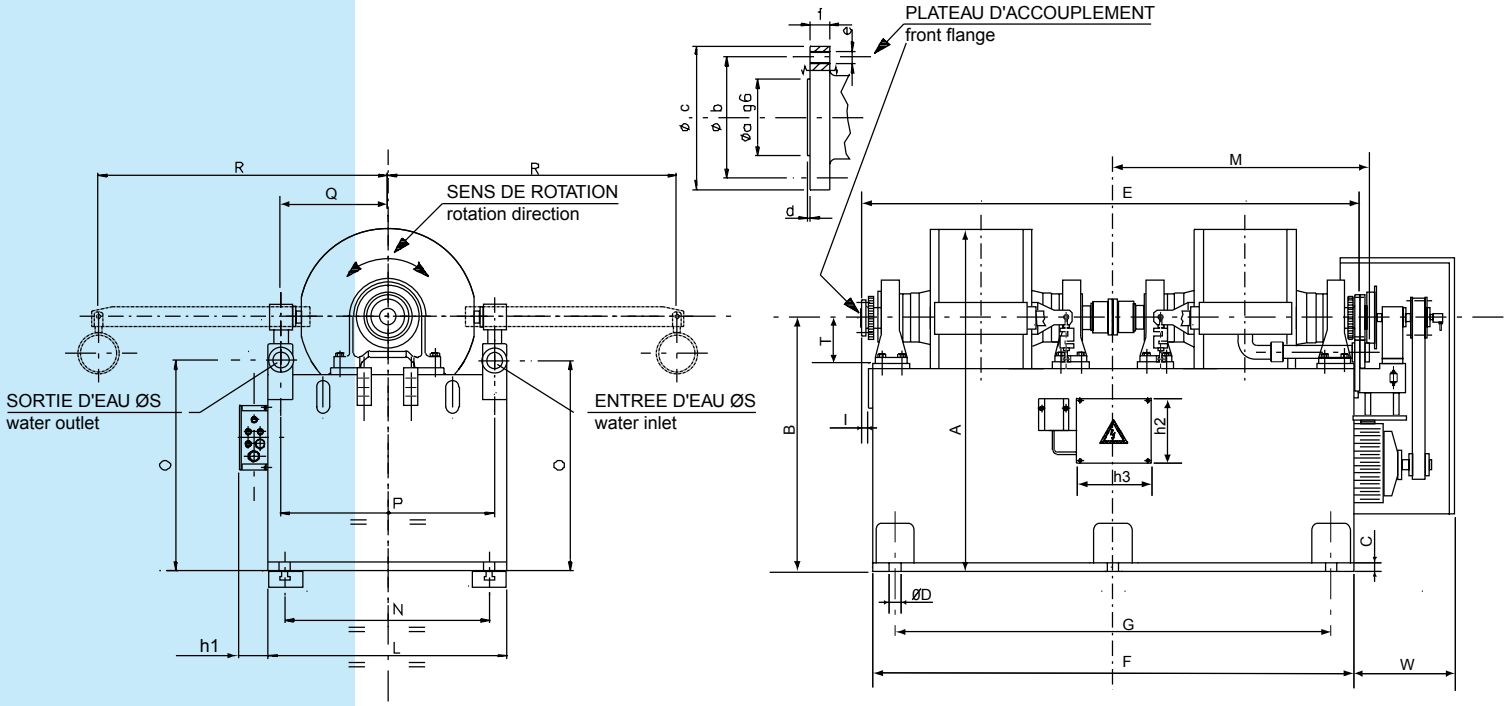


Type de frein Brake model	A	B	C	D	E	F	G	H	L	M	N	O	P	Q	R	S	T
FE 1200 ST	1040	700	22	M24	534,5	975	1045	1095	920	571,5	770	580	807	368	1530	2"1/2	175
FE 1200 ST 1200			28		474,5	832	928	978		439,5							

Type de frein Brake model	a	b	c	d	e x nb de trous	f	h1	h2	h3	Poids Weight kg
FE 1200 ST	Ø110	Ø155,5	Ø179,5	2	8xM12	18	200	300	300	1420
FE 1200 ST 1200										1580

TECHNICAL CHARACTERISTICS

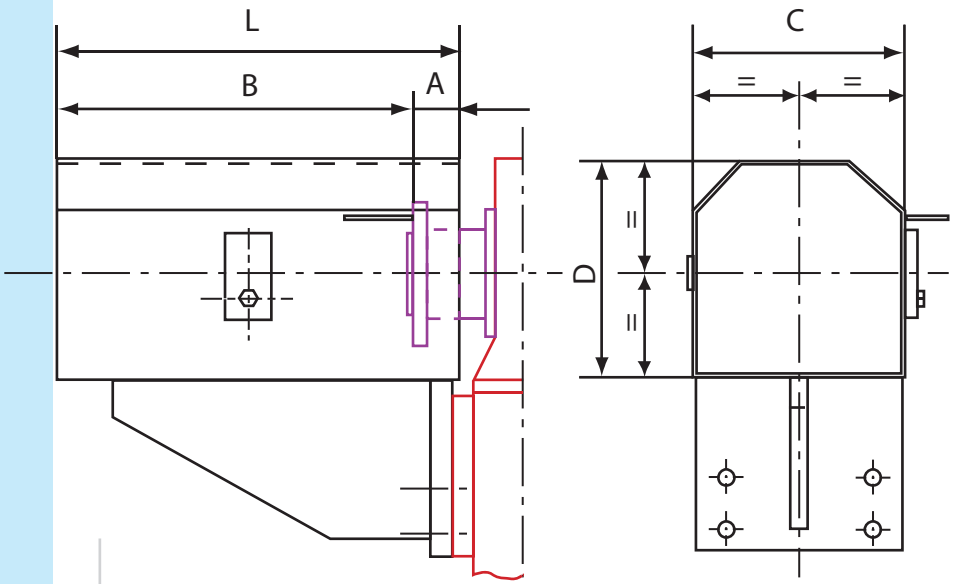
Quadrirotor



Type de frein Brake model	A	B	C	D	E	F	G	I	L	M	N	O	P	Q	R	S	T	W
FE 1000 ST	912	662	22	22,5	1252	1220	1102	9	750	690	654	560	630	248,5	1019,7	2"1/2	140	415

Type de frein Brake model	a	b	c	d	e x nb de trous	f	h1	h2	h3	Poids Weight kg
FE 1000 ST	Ø90	Ø130	Ø163	3	Ø12x8	10	200	300	300	1200

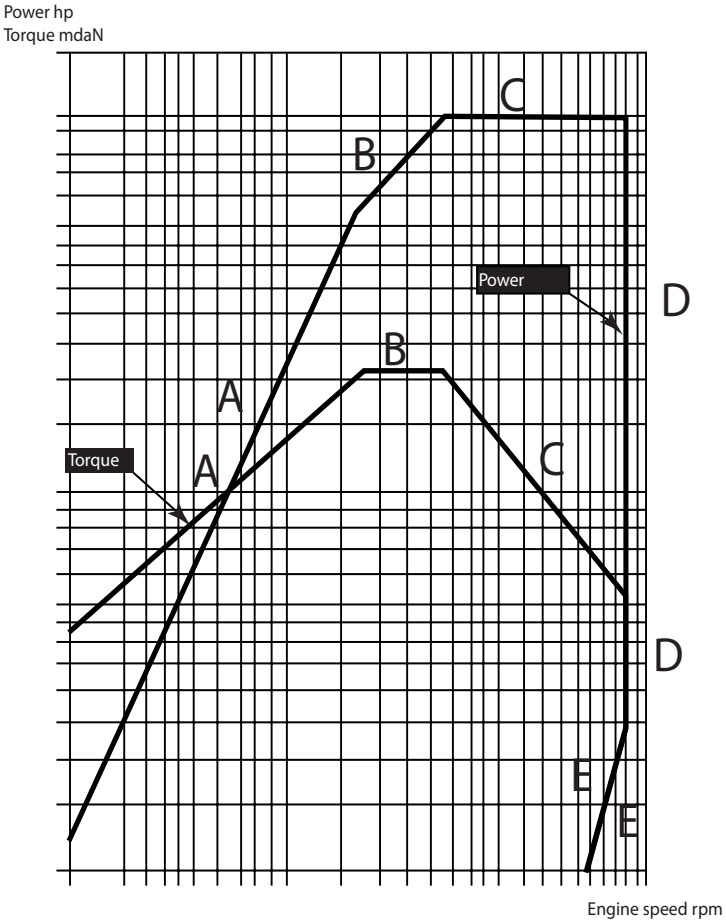
PROTECTIVE BARRIER OVER THE ENGINE COUPLING



The dimension «L» can be the standard length or can be modified on demand.

FREIN / BRAKE	A	B	C	D	L	Poids/Weight kg
FE 60 S FE 100 S FE 100 SV FE 150 S	29	296	156	156	325	12
FE 260 S FE 300 S	63	393	220	220	456	24
FE 350 S FE 350 SA	59,5	408,5	272	272	468	44
FE 600 S FE 600 SP FE 600 DV	92	620	426	426	712	90
FE 600 SD	62,5	295,5	220	220	358	20
FE 600 SDP	59,5	408,5	272	272	468	44
FE 900 S FE 900 DV	45	633	486	486	678	110
FE 900 ST	58,5	299,5	220	220	358	20
FE 1200 ST FE 1200 ST 1200	59,5	408,5	272	272	468	44

OPERATING LIMITS



The operating limits are represented by the straight lines of a log-log graph. The representative segments are the following :

A : Maximum power at low speed, deduced from the maximum excitation current applied to the brake.

B : Maximum brake torque deduced from the maximum mechanical capacity of the brake elements.

C : Maximum brake power rating, deduced from the water cooling capacity.

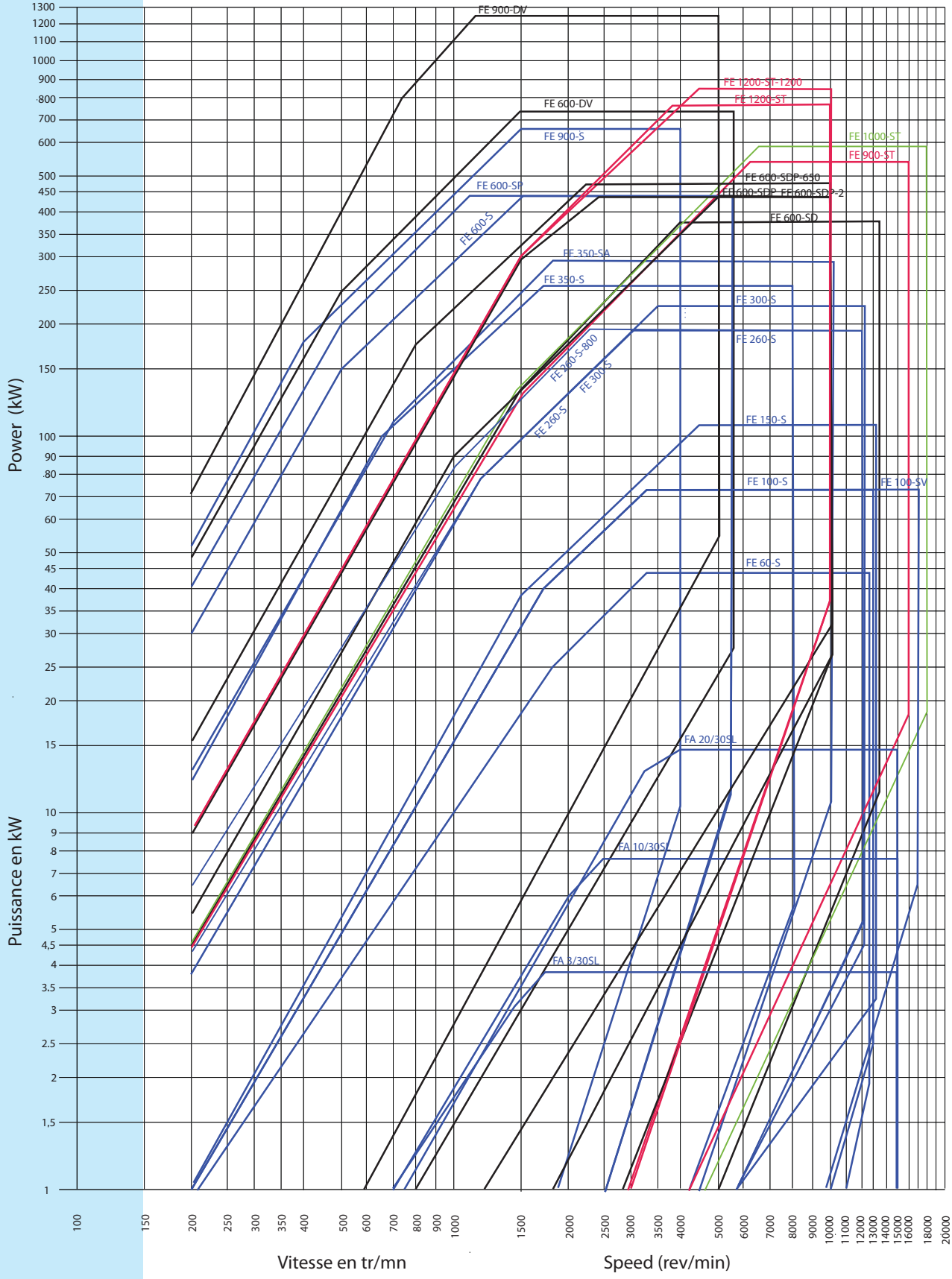
D : Maximum brake speed, determined from the mechanical performance of loaded bearings.

E : Minimum applied power. Minimum power necessary in order to overcome the internal resistance of the brake.

N.B : For maximum brake durability the user is advised to remain always within these given operating limits.

BRAKE LOADING CURVES

Monorotor — Birotor — Trirotor — Quadrirotor —



ROTRONICS
39, impasse de l'étang. Z.I. des Dragiez
74800 LA ROCHE SUR FORON - FRANCE

http://www.rotronics.com
email : info@rotronics.com
Tel : + 33 (0)450 030 859
Fax :+ 33 (0)450 030 597