HYDRODYNAMIC COUPLINGS

FROM 0,37 TO 1,470 KW

Products by Turbostart made in Italy

The Hydrodynamic Coupling is a device of transmission of primary importance has a large eld of application. It is simultaneously a gradual starter and a stress eliminator and it is able to create in every moment and automatically an equilibrium between the motor and the transmission of the operating machine;
therefore it eliminates every dangerous and unexpected overload and protects the motor and the transmissions as well.

PRINCIPLE OF OPERATION

The Hydrodynamic Coupling Technoex consists of two impellers with symmetric vanes, a primary (pump) and a secondary (turbine). The primary impeller driven by a motor sends a continuous ow of oil against the second impeller, transmitting therefore power to the other device.
Since the two impellers are opposite and have symmetric vanes, the result is that the Hydrodynamic Coupling has a perfect revesible function; also it is able to work horizontally, vertically or inclined (for size 18-19-110 P it's important to specify).

The output speed of the standard Hydrodynamic Coupling is always lower than the input speed; the difference between the two speeds is commonly called "slip" and it is measured in persentage (%). Under a constant torque the slip is maintained constant but if the output load increases, the secondary impeller (turbine) will slow down.

As a consequence there is an increase of liquid velocity into the uid coupling and resultingin an increase of kinetic energy. This increase of energy on the secondary impeller (turbine), balances the increate output load.

If this new output load is maintained constant and the motor is capable of suppling the equivalent power, a new equilibrium is established, characterised by a greater constant slip. On the contrary, at a decreasing output load, everything described above is inverted and the slip diminshes.

According to the slip we can determine the efciency of the coupling and the value of power that is trasformed into heat.
An accurate selection based on the effective power absorbed by the driven equipment determines the selection of the Hydrodynamic Coupling able todissipate by natural ventilation the heat produced. A Hydrodynamic Coupling with normal seals can normally withstand a maximum temperature of ap-proximately 100 C and, with special seals, approximately 200 C.

ADVANTAGE

The Hydrodynamic Coupling, inserted into a transmission for starting up a high inertia machine controller by an asynchronous electric motor with Direct on Line Starting has the following advantages;
- Eliminates the rigidty of the mechanican transmissions and guarantees the exibility of a Hydraulic transmission with standing all the shocks, torsinal vibrations and unexpected overloads, and protects the motor and driving machine.
- Reduces peak Current during start-up, The electric motor repidly reaches the operating speeds with low peak current.
- Permits smaller motor sizes according to the power demand of the driven machine.
- Permits a high stop start duty cycle even under load, sudden changes of direction and p;ug (reverse) braking.
- Distributes the load in installations where two or more motors are installed. The Hydrodynamic Coupling allows every motor to reach its owe operating speed, automatically distributing load demand.

EXAMINATION OF THE BEHAVIOUR OF THE ELECTRIC MOTOR AND THE HYDRODYNAMIC COUPLING DURING THE START-UP

To fully realize the above mentioned advantages, it is necessary to select the correct hydrodynamic couping. Let us consider the behaviour of both the motor and hydrodynamic coupling when the two items are working together, from the moment of the start to full speed.

Examining the diagram Torque (C) vs Speed (V) Fig. 1 on which the curves:

M - torque curve of a direct a dieect start (DOL) asynchronous electric motor.

I - Current vs Speed (v).

Following the curve M during starting (when v=0) wenotice that the available torque C" is approximately 1.5 time the rated torque Ca on DOL starting and approximately 0.6 times Cn on Star Delta Starting (Cst).

Normally the motor operates at speed n1 where the rated torque Cn is equal to the working torque.

It should be noted that the motor produces maximum torque Cm of 2.5 times the rated torque Cn at the speed nm (90% of rated speed).

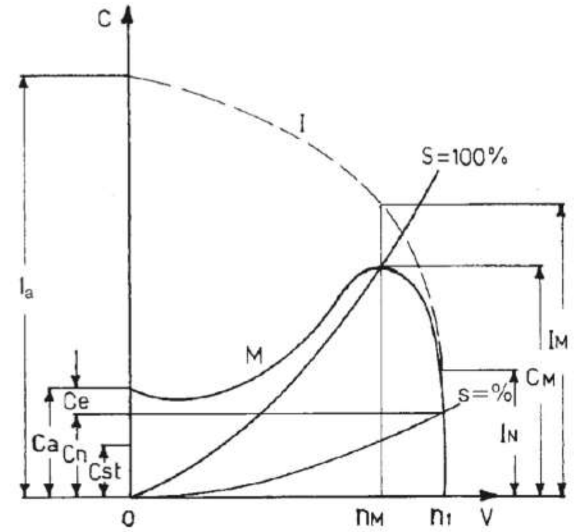


Fig. 1

Following curve I we note that the current at start la is 5-6 times the nominal rated current.

At this the motor temperature is rather high.

At speed nm the current Im is about 3 times the rated currently Im and the temperature of the motor is noticeable reduced; also the elevated speed of the motor facilitater its own cooling.

Therefore, during startup the motor must reach speed nm as quickly as possible in order to avoid overheating, and to deliver maximum available torque to the driven machine.

If there is an exceeding torque Ce, comparatively low, and no hydraulic coupling is used, the duty will be quite slow, and this could result in damage being done to the motor, unless the motar has adequately oversized.

VARIATION OF START CONDITIONS UTILISING THE HYDRODYNAMIC COUPLING

Let us consider a coupling having a slip S=100% crossing the curve M at the point nearest to the maximum torque (g.1).
Since a speed v=0 the coupling transmits no torque, the electric motor has all torque Ca available for the rotor acceleration.
During the acceleration the ail moved by the pump element of the hydrodynamic coupling, gets in greater quantity into the circuit, acting more and more on the tubine element connected to the driven machine.

As soon as the torque produced by the coupling overcomes the resisting torque, the driven machine starts moving.
At this stage the torque available for the acceleration of the driven machine is Cm-Cn therefore of higher value of torque Cn, which is the starting torque available if no hydraulic coupling is used.
It is important to note that the availability of the high accelerating torque is obtained at a current Im which is approximately half of the value of the current la, corresponding to the acceleration torque C_a and the heating of the electric motor is reduced.

As the oil enters the circuit, the difference of speed between the motor and the driven machine diminisher, until an equilibrium is reached between the dragging torque and the resisting torque when the motor reaches its operating sprrd n_1.
Then the coupling will work at normal slips.

THE BEST USE OF MAX MOTOR TORQUE

If the curve of motor torque M meets the curve of coupling torque S before the point of max value, it means that the selected coupling is overdimensioned, or there is too much oil inside. Under this condition the rotor has difculty to accelerate and the hydrodynamic coupling rotates without being able to accelerate the driven machine.
To obviate the inconvenient it is necessary to drain some oil to get a lower slip curve of the hydrodynamic coupling.
Instead, if the curve meets after the point of maximum torque value, it means that the selected coupling is underdimensioned.
It is to be born in mind that the slip of a coupling-lled with a special quality of oil- is a function of the rotating speed, of the resisting torque and of the quantity of oil.
Moreover, if a coupling is requested to operate at different speeds, at equal silp the power and torquetransmitted are directly proportional to the cube and square of the requested speeds.
The standard Turbostart Hydrodynamic Coupling can be tted with a partial oil drainage device, allowing the best use of the maximum motor torque (page 10).

USE OF THE HYDRODYNAMIC COUPLING WITH DIESEL ENGINES

The diesel engine has an unstable torque curve and a minimum operating speed below which the engine stalls.
When the stall is caused by overloads the use of the hydrodynamic coupling eliminates the problem and offers the following advantages.

- Stabilizes the operation of the engine. Considering the curve M (g.2) obtained with a partial supply, we reach a point of equilibrium P4 when the engine output torque at a speed of V1, is equal to the resistive torque transmitted by the hydrody namic coupling with a slip s=%.

At increassing of resistive torque the point of equilibrium is transferred to P3, at an engine speed V3, and the coupling gradually reaches a 100% slip.

At this stage the governor of the diesel engine increases the speed to V2, and the torque to a new point of equilibrium C1, is obtained with an output torque supplied by the coupling with a slip of 5%.

These variations are controller by the hydraulic coupling, which maintains the engine very stable.

- Facilitates the starting of the engine. On starting and at low input speed, the hydrodynamic coupling does not oppose to the engine which isfree the rated speed. When it is inserted between the engine and a mechanical clutch, noticeably it reduces clutch wear.

- Prevents the engine stall. When the driven torque, is higher than the supplied torque the slip of the coupling goes to 100% maintaining the engine a speed higher than the stall speed. Obviously at this condition the driven machine should be disengaged to avoid build up of temperature into the hydrodynamic coupling.

- Absorbes torsional vibrations. This feature is very important when controllino machines operating at frequent load variations.

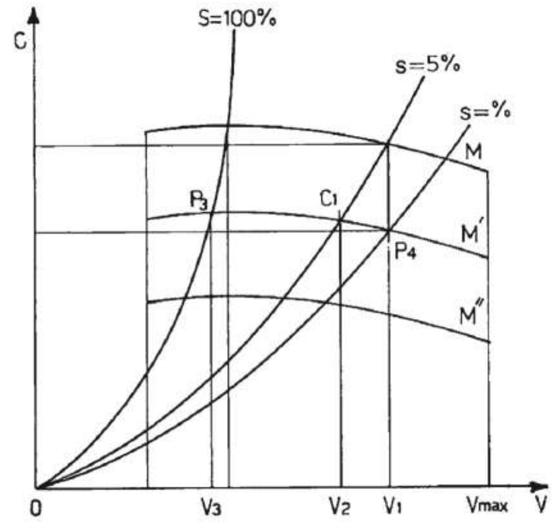
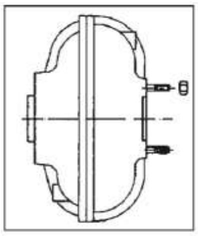
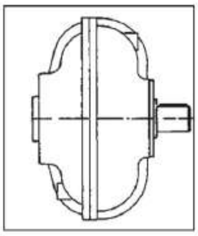


Fig. 2

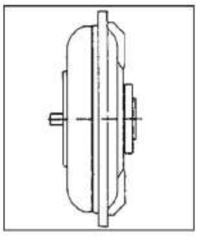
PRODUCTION PROGRAM



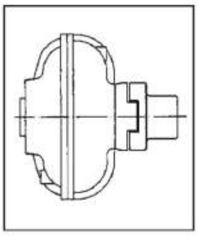
L/S with stud bolts



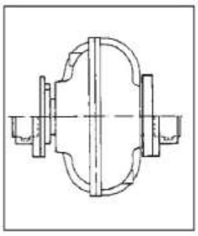
L/MU with stub shaft



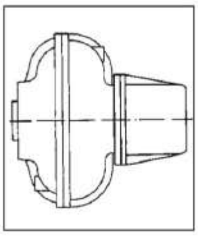
VD for diesel engine



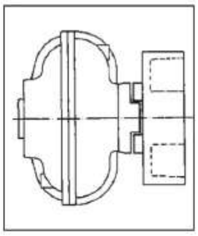
L/E with exible coupling



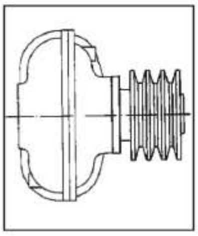
CF with anges for half gear couplings



All version (VD excepted) can be tted out with partial



FF with exible coupling and brake drum or brake disc



P for pulleys

Knowing the input power and speed of the coupling, we use the diagram on page 5 (to select the right coupling).
For a continuous operation it is enough to consider the power demand of the driven machine.

For higher start-stop duty cycle and if the selection point (input speed/power) is close to the high limit of the band that denes the characteristics of the coupling, we have to select the net size up of the coupling and use high temperature seals. The oil level must be adjusted to not overload the motor during the start.

PERFORMANCE CALCULATION AND CHECK

Data:

Speed of driven machine: n^2 (RPM)

Inertia: I (kgm^2) $\left(\frac{PD^2}{4} \text{ or } \frac{GD^2}{4}\right)$

Absorbed power: Pa (kW)
Input speed: n^1 (RPM)
Ambient temperature: T (C)

Inertia of driven machine referred to Motor shaft (kgm^2) $I_{n_1} = I \cdot \left(\frac{n_2}{n_1}\right)^2$

Coupling output speed (RPM)

$n_g = n_1 - s$
s = slip

You cam get it form diagram input speed according to the absorbed torque C_c (Nm) or by using an average from 5 to 3 (from small to big units)

Motor power (kw) $P_m = \frac{I_{n_1} \cdot n_1^2}{9.12 \cdot 10^4 \cdot t_a}$ t_a = starting time

Nominal torque (Nm) $C_m = \frac{9550 \cdot P_m}{n_1}$

Torque absorbedby driven machine (Nm) $C_c = \frac{9550 \cdot P_a}{n_g}$

Starting torque (Nm) $C_a = 1.6 \cdot C_m - C_c$

For couplings with R, reduec from 1.6 to 1.4

Starting time (sec) $t_a = \frac{n_g \cdot I_{n_1}}{9.55 \cdot C_a}$

Temperature generatef during acceleration (K cal.)

$$Q = \frac{n_g}{10^4}\left(\frac{I_{1n} \cdot n_g}{76.25} + \frac{C_C \cdot t_a}{8}\right)$$

Thermal capacity of the coupling (Mo) (K cal/°C)
Add metal+oil (see table)

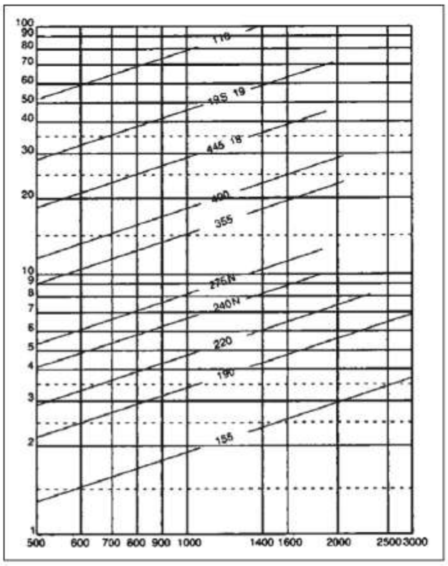
THERMAL Capacity

Coupling size	Metal K cal/C	Oil K cal/C
155	0.75	0.43
190	1.16	0.92
220	1.63	1.26
240 N	2.24	1.73
275 N	3.20	2.10
355	5.60	3.60
400	7.20	4.30
445	12.1	6.60
18	12.1	6.60
195	17.4	12.3
19	17.4	12.3
110	33.7	23.7

Forcouplings with "R", multiply values by 1.15 about.

Increase of temperature during acceleratiom (°C) $T_i = \frac{Q}{Mo}$

Factor K



Increase of temperature during steading running (°C) $T_\Delta = 2.4 \cdot \frac{P_a \cdot s}{K}$

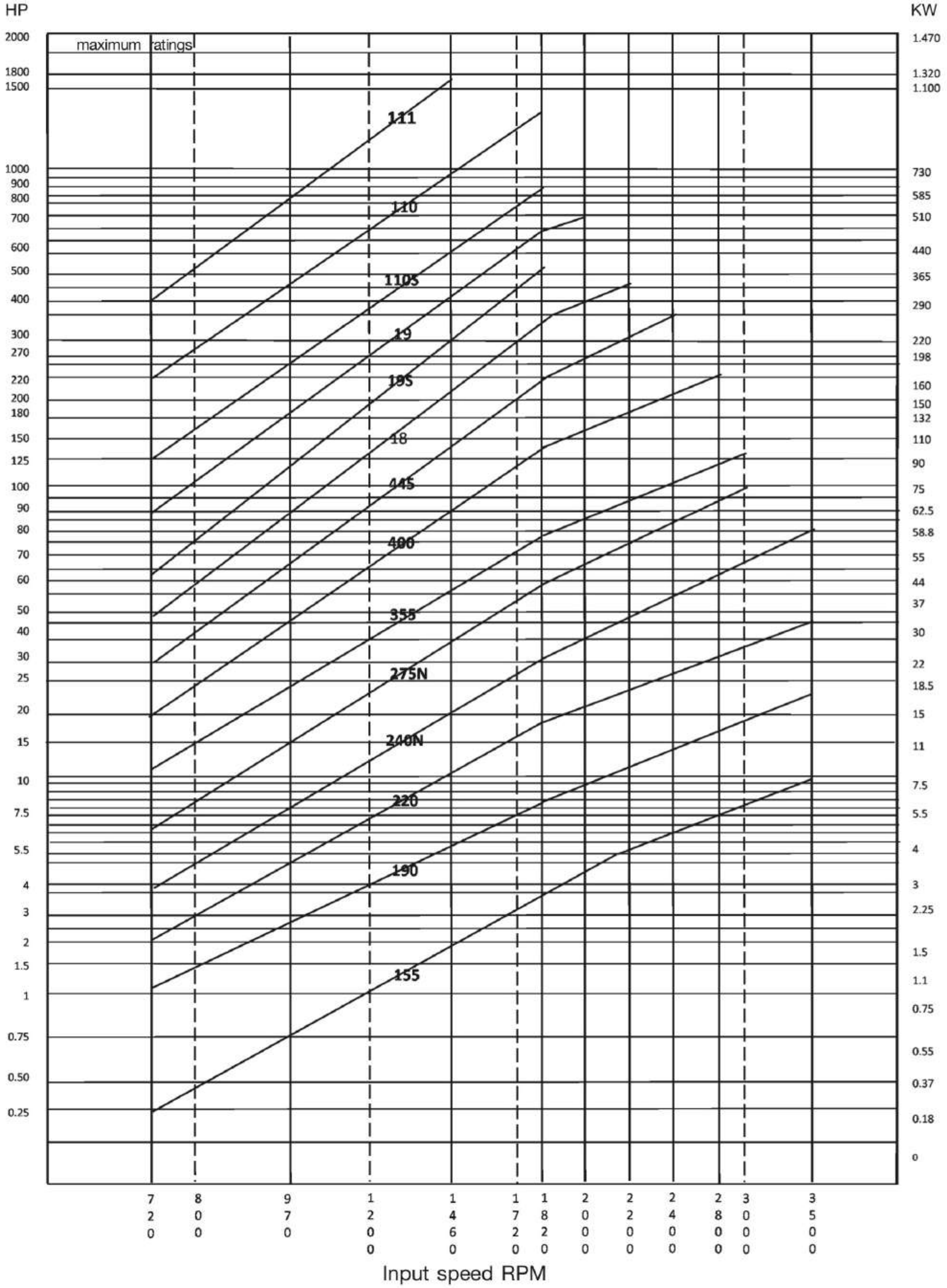
Final temperature (°C) $T_t = T + T_i + T_\Delta$

T : ambient temperature
T_t : has to be lower than 110 °C
For higher temperature and till 175 °C, special seals are necessary

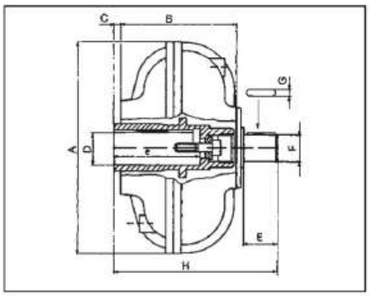
Minimum working time at continuous running (sec) $t_w = 10^3 \cdot \frac{Q}{T_i \cdot K}$

Maximum working cycle for hour $A = \frac{3600}{t_a + t_w}$

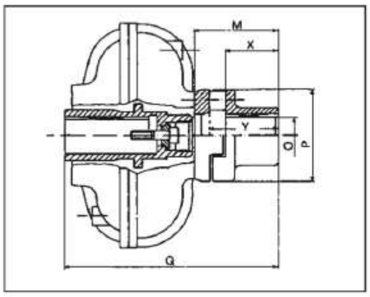
SELECTION DIAGRAM



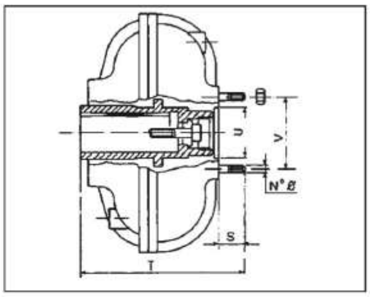
INLINE VERSION TYPE L-LR



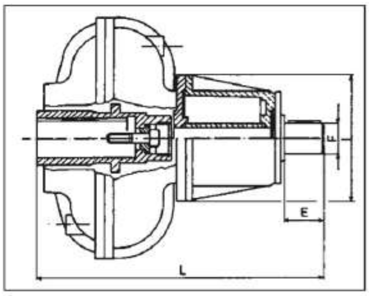
L/MU with stub shaft



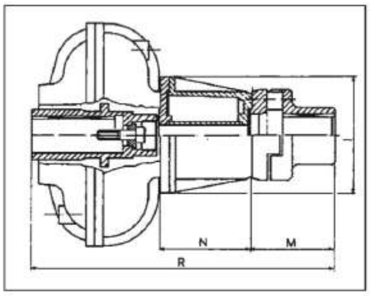
L/E with exible coupling



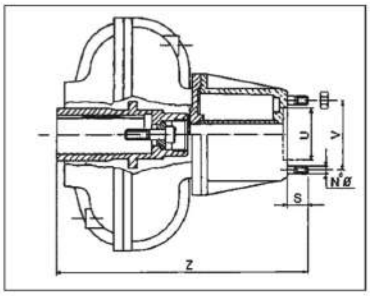
L/S with stud bolts



L-R/MU with parrtial draining device and stub shaft



L-R/E with partail drainingdevice and exible conpling



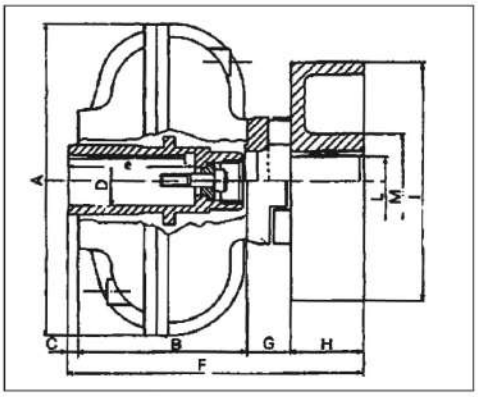
L-R/S with pratial draining device and stud bolts

DIMENSIONS (mm)																																
C.SIZE	FLEXIBLE COUPLING	A	B	C	D G7	e min	E	F h6	G	H	I	L +/-1	M +/- 0.5	N	O MAX	P	Q +/- 0.5	R	S	T +/- 0.5	U G7	V +/- 0.2	X	Y	Z +/- 0.5	N°	Ø
155	E10	193	91	10	19-24 28*	40-50 60	30	19	6	139	126	243	52	104	24	70	153	257	16	117	40	52	30	40	221	6	M6
190	E20	232	113	10	19-24 28-38*	40-50 60-80	31 38*	24 38*	8 10*	162 173*	126	266 277*	76	104	38	96	199 277*	303 315*	16	139 151*	47	73	42	60	243 255	6	M6
220	E30	280	157	10	28-38 42-48*	60-80 110	46	38	10	221	156	320	95	99	48	122	262	361	25	192	62	89	55	72	291	6	M8
240 N	E30	296	161	9	38-42 48	80 110	46	38	10	224	156	345	95	121	48	122	265	386	25	195	62 68	89	55	72	316	6	M8
275 N	E40	340	176	25	48-55 60	110 140	66	48	14	277	185	417	119	140	60	150	320	460	30	231	72 90	112	73	95	371	8	M10
355	E40	430	190	15	48-55 60-65	110 140	66	48	14	281	186	421	119	140	60	150	324	463	30	235	72 85	112	73	95	375	8	M10
400	E50	468	197	23 43	55 60-65 75*	110 140 140	66	55	16	296 316	240	447 467	119	151	70	175	339 359	490 510	30	250 270	85	136	73	95	401 421	8	M10
445	E60	527	230	35	65-75 80	140 170	70	55	16	347	250	517	142	170	80	220	407	577	35	300	120	168	88	115	470	8	M10
18	E60	527	240	32	65-75 80	140 170	70	55	16	354	250	556	142	214	80	220	414	616	35	307	120	168	88	115	509	8	M10
19 S	E70	626	236	54	75 80-90 100	140 170 210	85	70	20	401	290	621	181	220	100	250	471	691	45	355	140	196	110	145	555	10	M12
19	E70	626	261 316	20 15	80-90 100*-110*	170 210-230	85	70	20	392 442	290	636 686	181	267	100	250	162 512	706 756	45	326 376	140	196	110	145	570 620	10	M12
110 S	E75	800	B+C 300	B+C 300	80-90 100-120	170 210	100	80	22	425	530	535	185	110	120	320	485	595	50	350	180	250	140	180	460	10	M14
110	E80	800	330	26	80-90 100-120	170 210	100	80	22	481	365	752	228	291	120	320	584	855	50	406	180	250	141	190	677	10	M14
111	E90	1000	B+E 387	B+E 387	MAX 150	265	150	140	36	587	537	718 818	208	131 231	160	425	595	726 826	60	447	200	570 480 V1	180	185	578 678	12 10 V1	M14 M16 V1

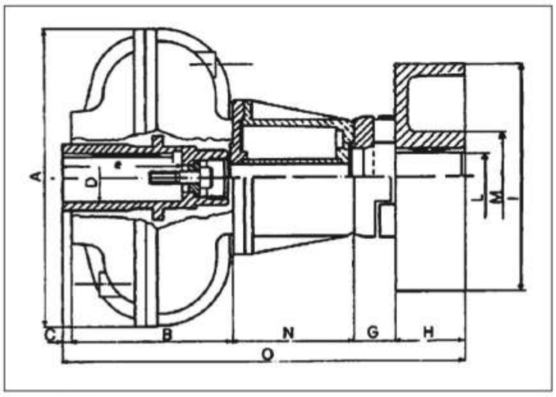
Special manufactured on request
Keyways as per UNI 6604-69
DIN 6885/1

- Fixing screws and washers as per DIN 332
- Fixing screw and waschers supplied on request
- For size 1105 and 111, consult manufacturer for recomentations

INLINE VERSION TYPE L/E BD L-R/E BD



L/E BD with brake drum



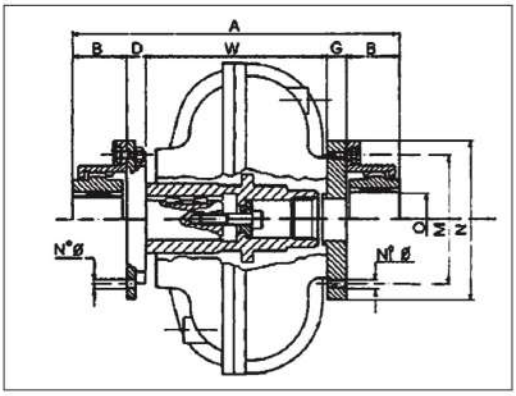
L/R/E BD with pratial draining device and brake drum

DIMENSIONS (mm)													
Coupling size	A	B	C	D G7	e min	F +/- 1,5	G	H	I	L G7	M	N	O +/- 1,5
155	193	91	10	19-24 28*	40-50 60	183	22	60	160	24	50	104	287
190	232	113	10	19-24 28-38*	40-50 60-80	217	34	60	160	28	60	104	321
220	280	157	10	28-38 42-48*	60-80 110	267	40	60	160	48	80	99	366
240 N	296	161	9	38-42 48	80 110	285	40	75	200	48	80	121	406
275 N	340	176	25	48-55 60	110 140	306 321	46	60 75	160 200	55	90	140	446 461
355	430	190	15	48-55 60-65	110 140	326 346	46	75 95	200 250	65	90	140	466 486
400	468	197	23	55 60-65 75*	110 140 140	362 385	47	95 118	250 315	65	110	151	513 536
445	527	230	35	65-75 80	140 170	437 469	54	118 150	315 400	80	130	170	607 639
18	527	240	32	65-75 80	140 170	444 476	54	118 150	315 400	80	130	214	646 678
19 S	626	236	54	75 80-90 100	140 170 210	478 510	70	118 150	315 400	80	130	220	698 730
19	626	261 265	20 0	80-90 100*	170 210	501 541	70	150 190	400 500	90	160	267	745 785
110 S	800	300 b+c	300 b+c	80-90 100-120	170 210	570	80	190	500	120	200	110	680
110	800	330	26	80-90 100-120	170 210	626	80	190	500	120	200	291	897
111	1000	387 b+c	387 b+c	MAX 150	265	595	-	265	630	Max 160	-	131 231	726 826

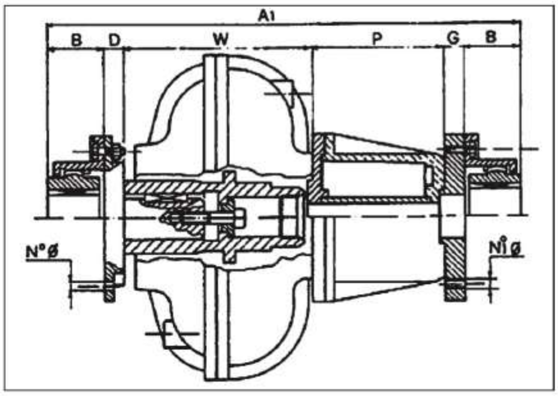
* Special on request

INLINE VERSION TYPE CF, CF-R

(Disassembling without removing either of the shafts)



CF for half gear coupling



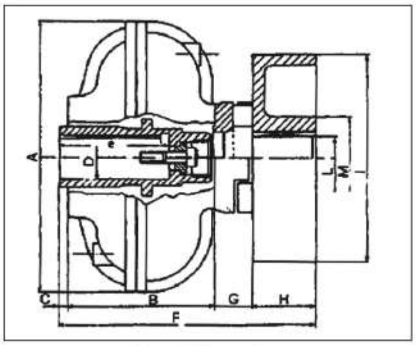
CF/R with pratial device for half gear couplings

	DIMENSIONS (mm)											
COUPLING SIZE	A +/-1	Ai +/-1,5	B	D	G	W	M +/-0,2	N	O Ø MAX	P	N° Ø	N°1 Ø
155	222	326	44.5	16	16	101	96	116	44	104	6 8	6 MB
190	244	348	44.5	16	16	123	96	116	44	104	6 8	6 MB
220	308	407	51.5	19	19	167	122	152	60	99	8 10	8 M10
240 N	335	456	63.5	19	19	170	148	180	75	121	10 10	10 M10
275 N	402	542	78.5	22	22	201	178	215	95	140	10 12	10 M12
355	406	546	78.5	22	22	205	178	215	95	140	10 12	10 M12
400	421	572	78.5	22	22	220	178	215	95	151	10 12	10 M12
445	494	664	92.5	22	22	265	203	240	110	170	12 12	12 M12
18	489.5	703.5	92.5	22	22	290.5	203	240	110	124	12 12	12 M12
19 S	564	784	108	28.5	28.5	291	236	280	132	220	12 16	12 M16
19	531	798	108	28.5	28.5	258	236	280	132	267	12 16	12 M16
110 S	603	713	123	28.5	28.5	300	270	320	150	110	14 16	14 M16
110	639.5	930.5	123	28.5	28.5	336.5	270	320	150	291	14 16	14 M16
111	717	880 980	123	34	50	387	279.4	318	160	163	8 19.05	8 3/4 UNC

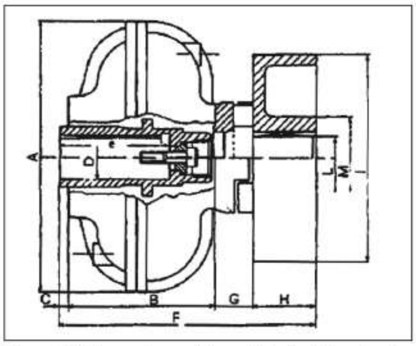
Half gear couplings supplied on request

For the size 110 S and 111, consult manufacturer for recomentations

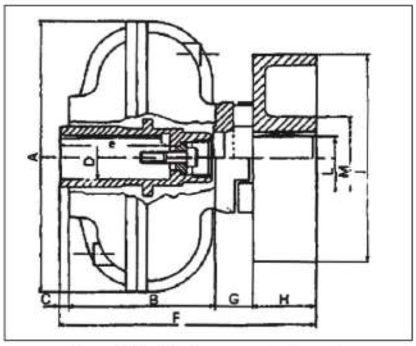
INLINE VERSION TYPE L/E BD L-R/E BD



Type P for pulley



Type P/R for pulley with partial draining device



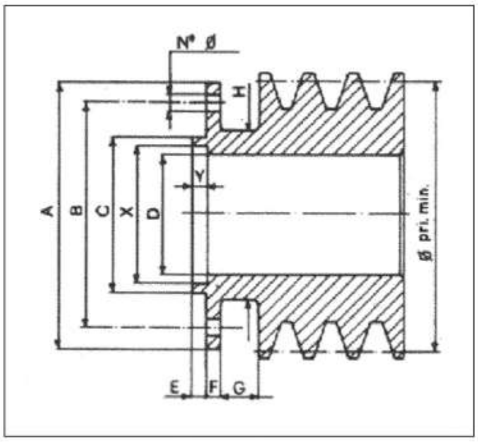
Type P/I with incorporated pulley

DIMENSIONS (mm)

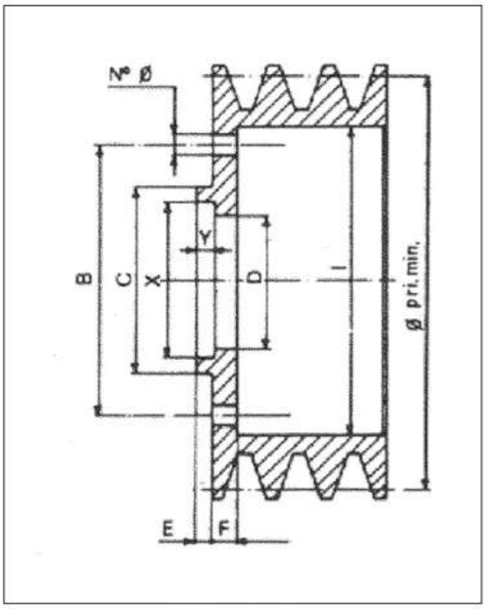
Coupling size	A +/-1	B +/-1	C +/-1	D G7	e min	F +/-1	G	H +/-0,2	I G7	L	M	N	O	P +/-1,5	Stud bolts N°	Stud bolts Ø	E	Coupling size
155	193	91	147 163	19-24 28*	40-50 60	56 72	35 40	75	62 68	85	6	126	104	251 267	6	M6	17	155
190	323	113 125	169 185 181-197	19-24 28 38*	40-50 60 80	56 72 72	40 40 55	80	55 65	95	6	126	104	273 289 301	6	M6	17	190
220	280	157	271	38-42 48*	80-110 110	114	56	105	90 95	130	6	156	99	370	8	M8	25	220
240 N	296	161	275 292	38-42 48	80-110 110	114 131	65	114	80	130	6	156	121	396 413	8	M8	25	240 N
275 N	340	176	325	48-55 60	110 140	149	75	150	130	165	7	186	140	465	8	M10	30	275 N
355	430	20	357	48-55 60-65	110 140	155	85	140	105	165	7	186	140	497	8	M12	30	355
400	468	225	380	55 60-65 75*	110 140 140	155	85 95	140	105 115	165	7	210	151	531	8	M12	30	400
445	527	262	442	65-75 80	140 170	180	110	170	130	190	7	250	170	612	8	M12	30	445
18 F	527	308	498	65-75 80	140 170	190	110	190	170	210	7	250	214	712	10	M12	30	18 F
19 SF	626	266	456	75 80-90	140 170	190	120	205	180	226	7	290	220	676	10	M12	30	19 SF
110 S	800	330	585	80-90 100-120	170 210	255	150	240	210	265	6	530	110	695	12	M12	30	110 S

* Special on request

- Keyways as per UNI 6604-69 DIN 6885/4
- Fixing screws and waschers as per DIN 332
- Fixing screws and waschers are supplied on request



Flanged Pulley

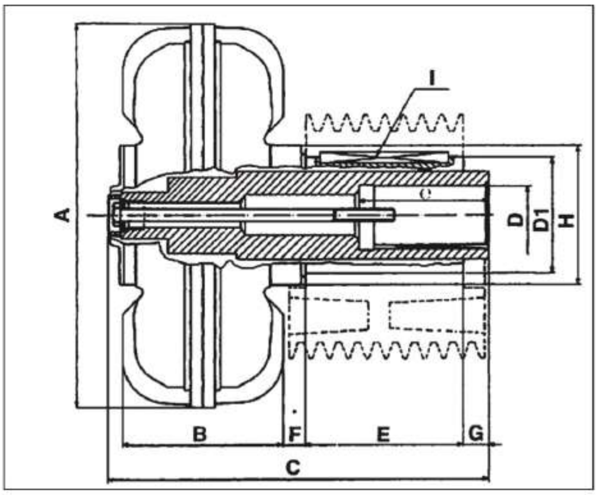


Hollowed pulley

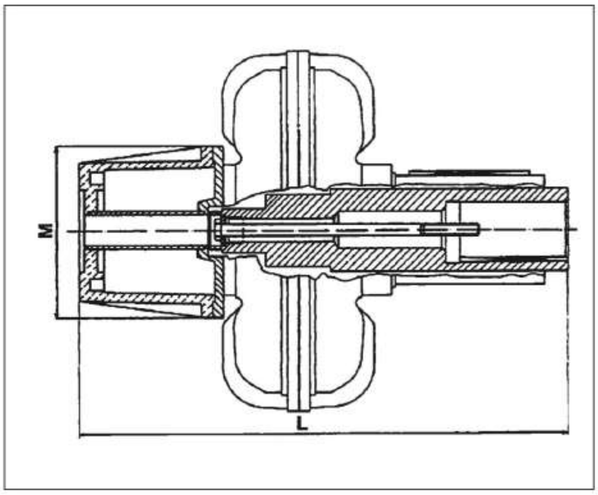
Coupling size	DIMENSIONS (mm)													PULLEY	
	A	B +/-0.2	C g6	D Min.	E -0.1	F	G	H	I Min.	X	Y	N	Ø	Flanged P.D in mm	Hollowed P.D. in mm
155	85	75	62	36 41*	4	5	14	60	86	-	-	6	6.5	A 65-70* B 75-80*	A 115 B 125
190	95	80	55	41-57*	5	5	14	66	95	-	-	6	6.5	A 70-88* B 80-95*	A 125 B 135
220	130	105	90-95*	57 62*	5-10*	10	16	85	100 110*	-	-	8	8.5	A 90-95* B 95-100*	A 155 B 165
240 N	130	114	80	67	5	10	16	85	130	-	-	8	8.5	A 98 B 105	A 162 B 170
275 N	165	150	130	77	6	14	20	125	168	120	7	8	10.5	B 120 C 128	B 210 C 218
355	165	140	105	87	6	15	20	115	160	-	-	8	12.5	B 130 C 140	B 205 C 210
400	165	140	105	87 97*	6	15	20	115	160	-	-	8	12.5	B 130-140 C 140-150	B 205 C 210
445	190	170	130	112	6	15	20	145	190	-	-	8	12.5	B 160 C 170	B 235 C 250
18 F	210	190	170	112	6	15	20	155	210	150	7	10	12.5	B 160 C 170	B 255 C 268
19 SF	225	205	180	112	6	20	20	160	225	160	7	10	12.5	C 180	C 280
110 S	265	240	210	153	4	20	20	215	260	-	-	12	12.5	C 220	320

* For motor shaft diameter D of the above table

PULLEY VERSION FOR KEYED PULLEY TYPE P,P-R



Type P

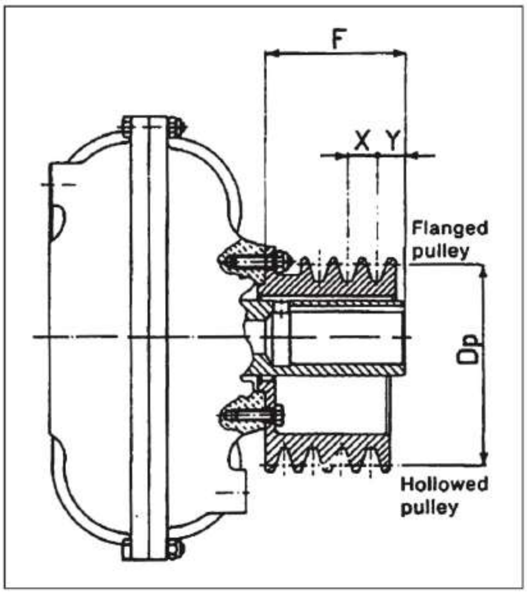


Type P/R with partial draining device

COUPLING SIZE	DIMENSIONS (mm)												
	A	B +-2	C +-2	D G7	E min	Di h6	E	F +-	G	H	I	L +-	M
18	527	240	516	65-75 80-90	140 170	160	220	20	31.5	195	20	708	250
19S	626	220	535	80-90 100	170	185	307	7-8	0	225	25	755	290
19	626	260	568	89-90 100	170 210	185	250	24	20	225	25	805	290
110S	800	190	610	80-90 100-120	170 210	220	300	18	2	275	25	720	530
110	800	350	670	80-90 100-120	170 210	260	300	15	5	290	25	951	365

IMPORTANT : For versions P-R, when mounting is vertical axis, it is essential for the coupling to be placed under the motor.

RECOMMENDED PULLEYS



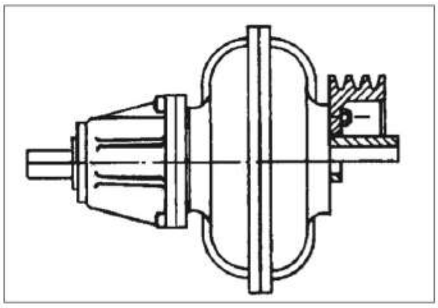
COUPLING SIZE	F		N° grooves		Ø Pr.	Y	X	Weight Kg.
155	56		2A-2SPA		70-80-100	12	15	1-1.3
190	56	72	2A 2SPA	3A 3SPA	90-100 125*-150*	12 13 31 32	15	1.4-2
220 240N	114		5A-5SPA 4B-4SPB 3B-3SPB		112 125-150 180*	18 18.5 63.5	15 19	4-5
275N	149		5B-5SPB 4B-4SPB 4C-4SPC		150 180 224*	26.5 45.5 64	19 26.5	7-12
355	155		6B-6SPB		150-180 205	12.5 47.5	19	9-11
400	155		6B-6SPB 5C-5SPC		180 250*-280*	12.5 44.5	19 25.5	9-25
445	180		10B-10SPB		250* 300*	31	19	25-45

COUPLING SIZE	WEIGHTS WITHOUT OIL (Kgs)					
	P	P-R	L/MU	L-R/MU	L/E	CF
155	3.2	3.7	3.2	3.7	3.9	5.4
190	5	5.6	5	5.6	6.7	7.2
220	10	11	10	11	12.5	15.5
240N	11	12.5	11	12.5	14.5	19
275N	26	30	26	30	31	39
355	36.5	41.5	31.5	36.5	35.5	43.5
400	47	53	40	46	48	52
445	74.5	83.5	63	72	75	80.5
18	90	100	65	75	77	82.5
19S	100	113	91	104	113	122
19	140	155	100	115	119	128
110S	200	210	130	140	190	185
110	230	245	150	165	210	185
111	--	--	358	373-383	449	436

Weights are approximate and change according to the bore on the shaft and on the exible coupling (L/E, L-R/E.)

PARTIAL DRAINING DEVICE-R

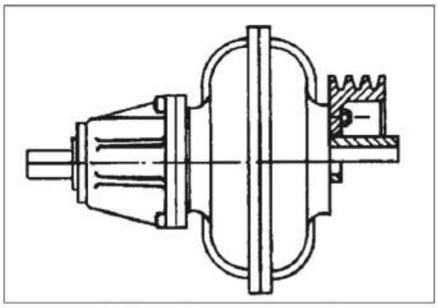
During start the hydrodynamic couplings with the standard oil level do not allow the produced torque to increase above 200% of motor rated torque. It is possible to reduce this limit further without reducing the quantity of oil by using the device R which, when the coupling is stationary, collects some of the oil from the circuit.



Oil level at rest (phase1)

During start the low level of oil facilitates the fast acceleration of the electric motor and causes the coupling to transmit a very limited torque (phase1).

Subsequently the oil contained in the tank of the device R is gradually brought into the circuit by the internal movement through the calibrated holes of the diaphragm situated between the device R and the coupling (phase2).

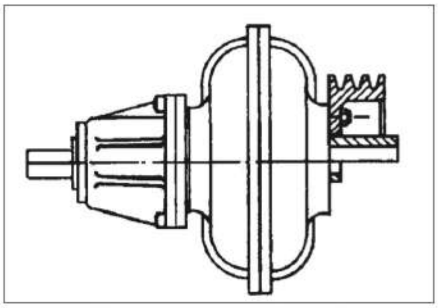


Oil level at startup (phase2)

When the driven machine is up to operating speed, all the oil is into the coupling which is now capable to produce the maximum work (phase3).

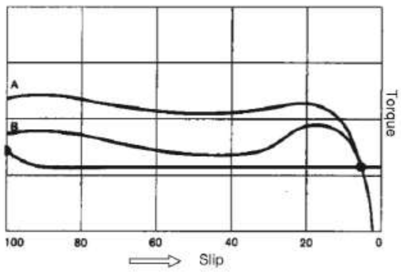
With the device R the starting torque can therefore be reduced to 140% of the rated motor torque.
The use of the option is sugguested for the starting of :

- Machines with high inertia
- Machines driven at high speed
- Machines that require soft starting.



Oil level during work (phase3)

All the Hydrodynamic Turbostart models can be tted with the device R (VD excepted).



Acceleration torque of Turbostart Hydrodynamic Coupling

A with standard circuit

B with partial draining device

Part numbering system

190 L R S dia.... dia.... mm

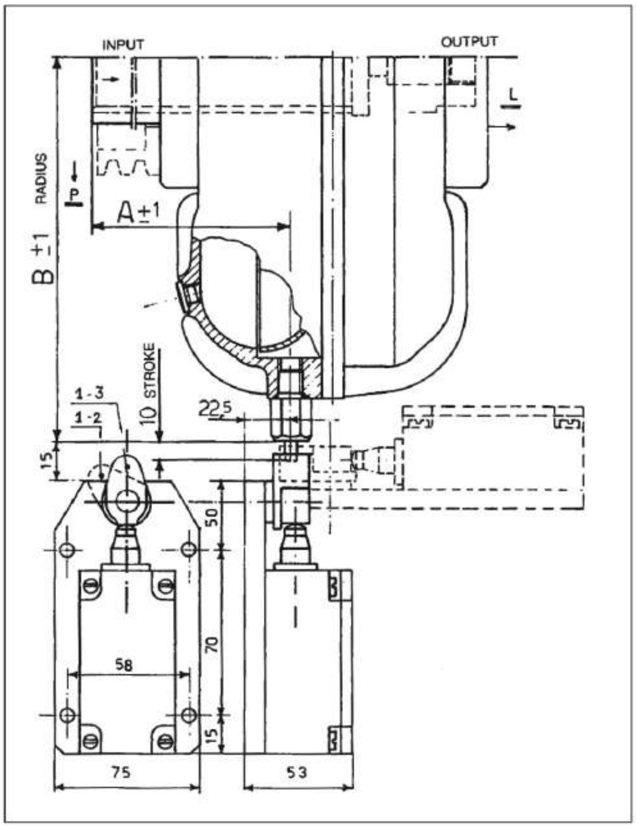
- Size — 190
- Version — L
  - L = in line
  - P = for pulley
  - CF = with anges
- Dispositivo R — R
- In Linr version — S
  - /S = stud bolts
  - /E = exible coupling
  - /MU = stub shaft
- Motor shaft — dia....
- Output bore Zonly L/E - L-R/E) — dia....

PROTECTION DEVICE

On request hydrodynamic and hydromechanic Technoex couplings can be supplied with protecting devices for the protection of the coupling against possible estended overloads.

THERMAL TRIGGER DEVICE

At a certain predeterminated temperature the little piston leaves its seat and acts on a limit switch, stopping the machine or giving a warning signal. The device is reset by replaceme not this trigger.



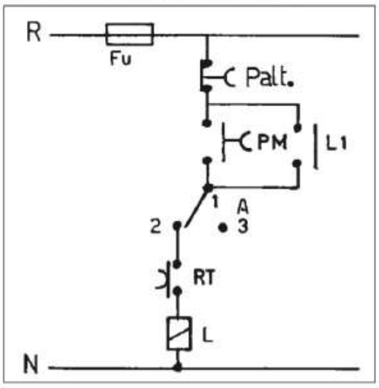
Coupling size		A±1	B±1
240N	L	65,5	171,5
	P	169,5	
275N	L	90,5	194
	P	224,5	
355	L	94	238
	P	246,5	
400	L	75	260
	P	237	
445	L	137	286,5
	P	314	

Coupling size		A±1	B±1
18	L	130	286,5
	P	369,5	
	PF	347	
19S	L	162	336
	P	327	
19	L	119	336
	P	399	
110	L	162	423
	P	470	

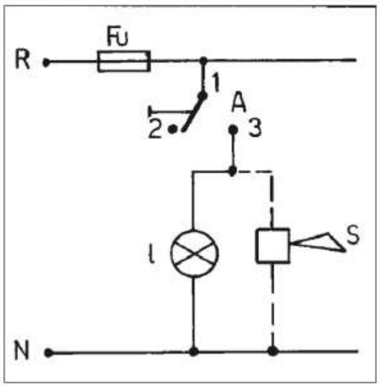
For the size 110S and 111, consult manufacturer for recomentations

In case of extended overload the high slip produced causes the oil temperature to rise triggering the protective device which can be used to stop the machine or give an acoustic or visible alarm.

SHUTDOWN WIRING DIAGRAM

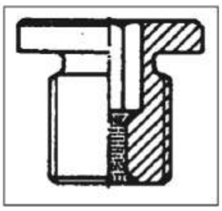


ALARM SYSTEM WIRING DIAGRAM



FUSIBLE PLUG DEVICE

At the selected temperature (145"C or 175"C) the fusible material of the plug melts and the oil gets out of the coupling and causes the transmission stall.



Fusible at 145°C or 175°C on request

ALIGNING FLEXIBLE COUPLING

Technoex exible couplings with high torsional strenght, can be supplied according to standard version with two stub shafts or ange and stub shaft version for mounting on Technoex Hydraulic Coupling.
They have a rational easy mounting and can affar the following advantages :

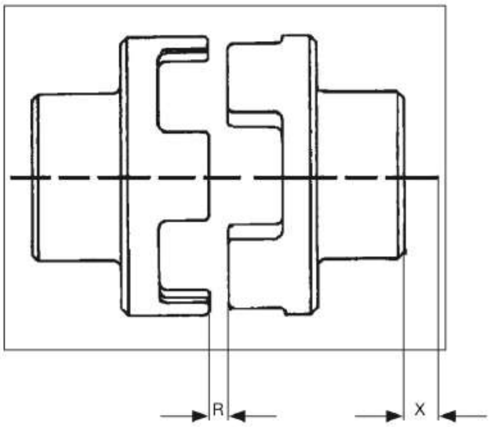
- Neutralisation of misalignment effects
- Protection of transmission.

Performance - Service factor 1

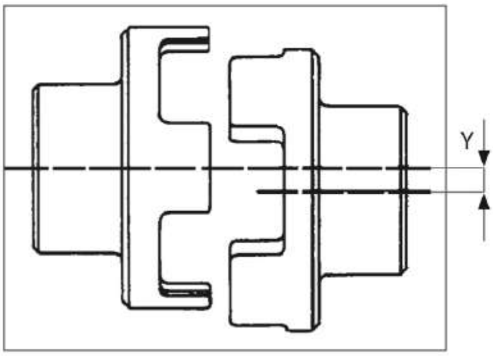
Flexible coupling Tipe	E-10	E-20	E-30	E-40	E-50	E-60	E-70	E-80
Torque max. (Nm)	20	70	15	360	540	1500	3050	5350
Speed max. (RPM)	6000	5000	4000	3200	2800	2500	2000	2000

MAXIMUM DISPLACEMENT

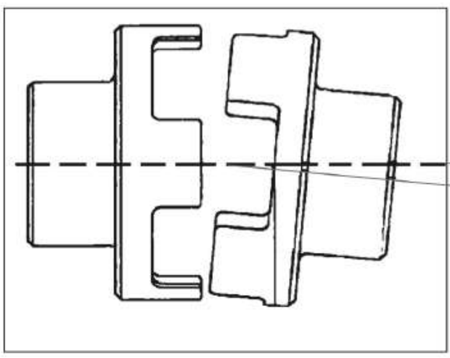
AXIAL



RADIAL



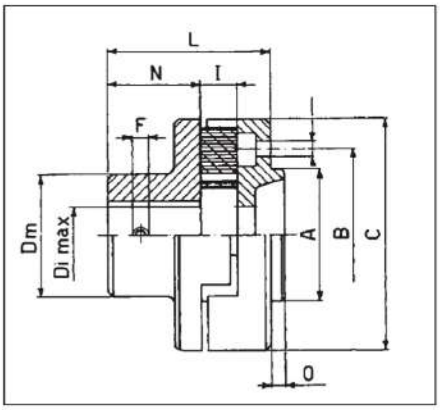
ANGULAR



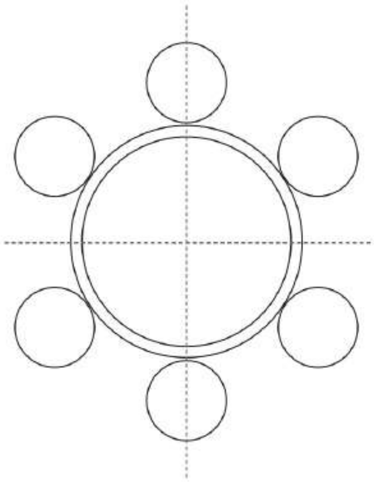
Flexible coupling Tipe.	E-10	E-20	E-30	E-40	E-50	E-60	E-70	E-80
R	12	20	20	25	25	30	40	50
X (max)	1.3	1.7	2.0	2.2	2.8	3.2	4.0	4.8
Y (max)	0.7	1.0	1.0	1.3	1.3	1.6	1.8	2.0
α (max)	1°30	1°30	1°30	1°30	1°30	1°30	1°30	1°30

R : minimum travel to disengage half coupling to replace the insert.

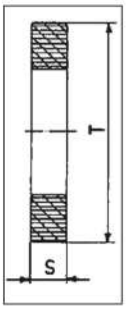
Type A



Flange and stub shaft type for L/E Turbostart Hydrodynamic Couplings.

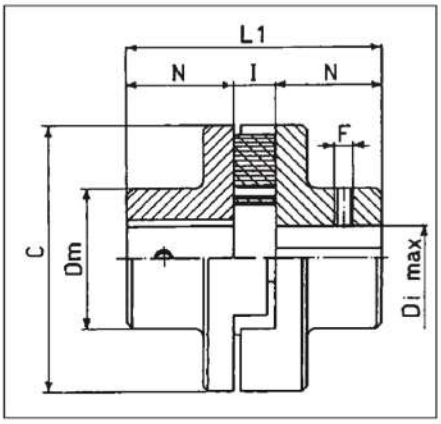


Rubber insert



Flexible element
6 rubber cylindres (E10-E20-E30)
8 rubber cylindres (E40-E50-E60)
10 rubber cylindres (E70-E80)

Type B



Standard type with two stub shaft

The couplings can be supplied with nisched and Keyed bores on request.

Flexible coupling	DIMENSIONS (mm)															Weight Kg.		Rubber Insert Cyl.N°
	max bore G_7 (Di)	Dm	N	I	L	L1	A F7	B	O	d	N° fori	C	F	S	T	Type	Type	
E 10	24	46	30	12	52	72	40	52	3	6.5	6	70	M 6	12	65	0,800	1,000	6
E 20	38	55	42	20	76	104	47	73	3	6.5	6	96	M 8	20	92	1,800	2,000	6
E 30	48	76	55	20	95	130	62	89	3	8.5	6	122	M 8	20	112	4,000	4,000	6
E 40	60	86	73	25	119	171	72	112	3	10.5	8	150	M 10	25	140	6,000	7,200	8
E 50	70	105	73	25	119	171	85	136	4	10.5	8	175	M 10	25	164	9,000	11,000	8
E 60	80	124	88	30	142	206	120	168	8	10.5	8	220	M 12	30	200	16,000	19,000	8
E 70	100	150	111	40	181	262	140	196	9	12.5	10	250	M 12	40	235	26,000	32,000	10
E 80	110	200	141	50	221	332	180	250	10	14.5	10	320	M 14	50	300	70,000	90,000	10

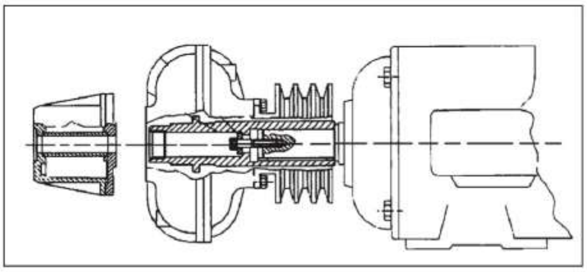
INSTRUCTIONS FOR INSTALLATION AND MAINTENANCE

PRINCIPLE OF OPERATION

Lubricate the surfaces to be assembled with oil or antiseize grease.
Check that the connection to the driven shaft is slighty loose but precise to avoid vibrations.

Model with pulley P

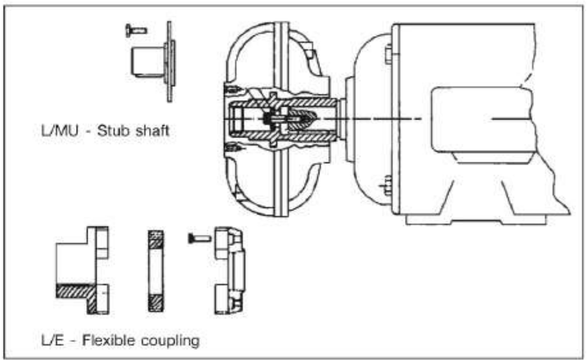
After having checked the correct balancing, assemble the pulley on the hydrodynamic coupling.
Secure the coupling on the shaft with the xing screw B and washer C (g.1)
Check pulley alignment and belt tension to avoid bearing damage.



Draining device with through hole Fig.1

In line model L

Remove the exible coupling (L/E) or remove the output shaft (L/MU).
Secure the hydrodynamic coupling on the shaft with the xing screw B and washer C (g.2)



Ret the exible coupling on the driven shaft (L/E) or reinstall the output shaft (L/MU).
Align the electric motor to the machine leaving 2+-3 mm. gap in the exible coupling (L/E)
Check the radial alignment of the exible coupling by making sure that the alignment of the external machined surfaces are within 0,5 mm. maximum using a rule.

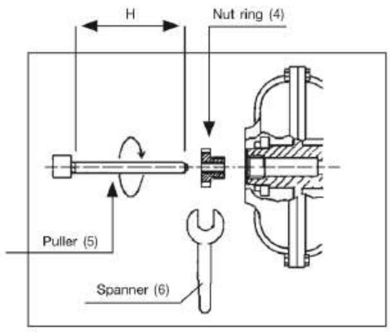
Check with a feeler guage the angular alignment of the exible coupling by turning the coupling 360 and testing with the guage every 90, the T.I.R. difference should be within 35' of one angular degree.
A good alignment prevents premature wear of the exible coupling element.

Models with the delay chamber device "R"

Proceed as per models P or L. The coupling is xed on the shaft with the xing screw through the hole in the device (g.1)

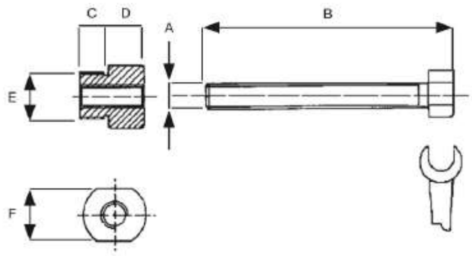
DISASSEMBLY

Remove the xing screw and washer (B,C) and with the puller dislocate the coupling from the shaft (g.3).
Arrest the housing with a spanner on nut ring and screw the puller.



(parts 4 - 5 - 6 are supplied on request)

PULLER



Coupling Size	A	B	C	D	E	F
155 190	M12	250	10	20	M26xp.2 left	Key 28
Da220 a110	M24	450	15	55	M40xp.2 left	Key 42
111	M45	700	-	-	-	

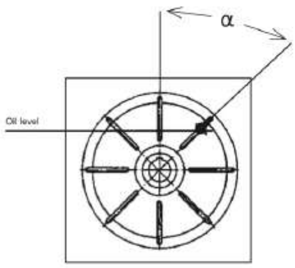
OIL FILLING

The Technoex hydrodynamic coupling are normally supplied complete weith oil lling and ready to put into operation. To rel the oil during maintenance, proceead as follow :

Arange the coupling with horizontal axis;

Place the arrow marked on he casting at 12 o'clock position (rotating towards the top the ller plug will be at an inclination in relation to vertical according to the angle inclinated in the table below and g.2.

Fill oil through one of the ller parts untill the oil begin running out, paying attention that no air bubble is present. The coupling have never to be totally lled in order to avoid damages to the seals due to the inner pressure. For the oil quantity required please refer to the table below.



Recommended oils SAE 10 :

Agip OSO 32	Fina Hydran 32
BP Energol HLP 32	Mobil DTE 24
CHEVRON Hydraulic oil EP 32	SHELL Tellus 32
ESSO NUTO H 32	Total Azolla 32

For special conditions (temperature, ambient) please contacts Technodrive.

OPERATION

The maximum operative temperature should not exceed 90 C. In heavy duty working cycle, it is possible to exceed this value by using special seals.

High operating temperature can be caused by :

insufcient oil lling

high absorbed power, due to an estended overload

long starting time and too frequent starts

high ambient temperature

insufcient air ventilation due to carter. Adeguate ventilating tamperatures shoud be provided.

MAINTENANCE

After few hours of operation, check the tightness of bolts and screws.

From time to time check that no oil leackages are present. Check the oil level once a month.

The oil should be changed every 4000 hours of operation or every 12 months.

GUARANTEE

The couplings are guaranteed for 6 months of operation and in any case no more than 12 months from the date of invoice. The grarantee is void If the inslallation and maintenance instruction are not complied with, if non bilance accessories are used, if connecting dimenslons are out of tolerance.

OIL QUANTITY

Coupling Size	Standard version			Version with devicr R		
	Angle	litres	Kgs	Angle	litres	Kgs
155 L e P	30°	0,770	0,670	70°	0,800	0,700
190 L e P	30°	1,300	1,130	70°	1,350	1,180
220 L e P	30°	2,100	1,830	60°	2,200	1,920
240 N	30°	2,850	2,500	60°	3,000	2,620
275 N	30°	4,370	3,800	60°	4,610	4,010
355 L e P	30°	5,570	4,850	60°	5,900	5,140
400 L e P	30°	8,700	7,400	70°	9,300	7,900
445 L e P	45°	10,300	9,000	70°	11,000	9,580
18 L	45°	15,520	13,500	80°	16,670	14,500
18P	45°	15,670	13,630	80°	16,830	14,640
19 SL	45°	20,000	17,400	80°	21,400	18,620
19 SP	45°	20,150	17,530	80°	21,560	18,760
19 L	45°	23,570	20,510	80°	25,220	21,950
19 P	45°	23,720	20,640	80°	25,380	22,090
110 SL	45°	45,000	39,300	58°	53,000	46,000
110 L	45°	55,200	48,030	80°	59,500	51,700
111 L	59°	82,500	72,100	72°	92,500	80,900

For the sizes 110 S and 111, consult manufacturer for recomentaions