FLUID COUPLING

HYDROKINETIC FLUID COUPLING

Elecon-hydrokinetic fluid coupling traction type : instruction for

INSTALLATION AND MAINTENANCE MANUAL

ELECON

Always a step ahead in technology

Manual No. : 03/G/IM/10/05/R1

ELECON-
HYDROKINETIC FLUID COUPLING
TRACTION TYPE :
INSTRUCTIONS FOR
INSTALLATION
AND MAINTENANCE

SIZE : ____

TYPE : ____

MOTOR : ______________________________ kw at __________ r.p.m

COUPLING SERIAL NUMBER : ____________________________________

OIL FILL : ____

FILL ANGLE : ______________________________________ litres

APPLICATION : ____

N.B. These instructions are intended primarily for staff carrying out installation and maintenance of the coupling unit.
It is imperative therefore to provide each mechanic with a copy.
Further copies, can be supplied on request.
Should any questions remins outstanding after consultation of this brochure, please contect us immediately and one of our specialists will provide you with further information.

C O N T E N T S

1 DESCRIPTION

♦ 1.1 General

Elecon Fluid Coupling operales on the hydrokinetic transmission principle : power is transmitted by means of a fluid, there being no cechanical contact between the motor and the driven machine. As such, it constitutes a safety feature protecting transmission components from damage due to overloas or shock. The fluid coupling permits the use of a squirrel cage induction motor with the attendant advantages of simplicity, ruggedness and low operating costs. Torque transmitted is directly proportional to the amount of fluid in the unit and hence it is very simple, by varying the oilfill, to match the coupling to the exact reqiuements of the driven machine.

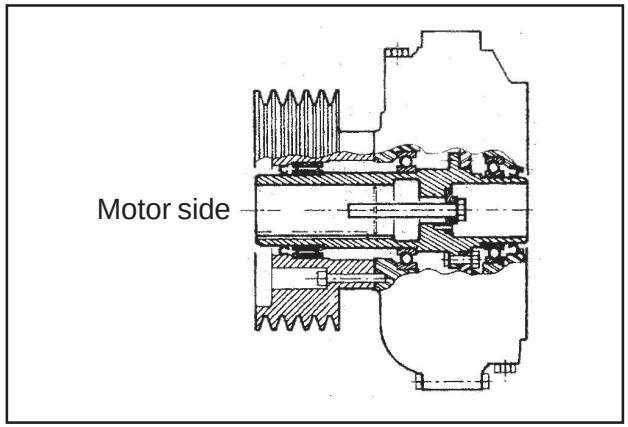
♦ 1.2 Centruction and operation

Elecon hydrokinetic Fluid Coupling comprises of three essential components :
- the impeller (2) driven by the motor
- the runner (3) fitted on the output shaft.
- the runner casing (4) which forms an oiltight assembly. It is possible also to fit a delayed filling chamber (23) to this assembly, communicating with the working circuit by means of calibrated nozzles and retaining part of the fluid when the fluid Coupling stops running. At motor switch-on, only the fluid in the work circuit is active and the torque developed is low. During the start-up phase, fluid in the deleayed filling chamber transfers progressively into the work circuit, increasing the amount of active fluid and hence the torque.

The motor thus starts under minimum load and the driven machine is brought up to speed smoothly. Different mountings are available, the type of coupling being chosen accordingly.

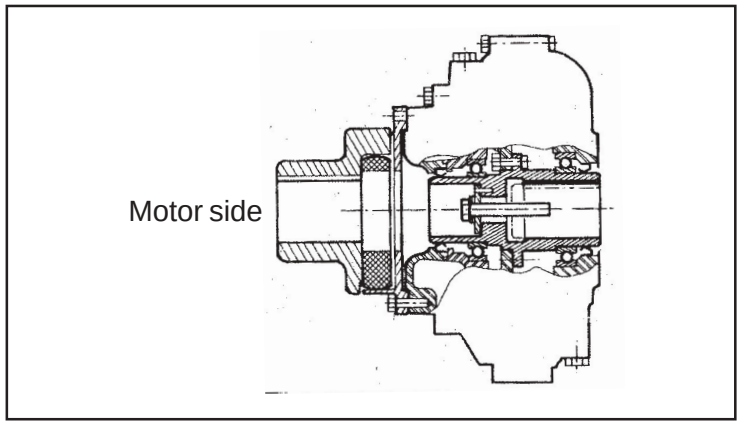
♦ 1.3 Types of Mounting

Pulley- type coupling **: PH MOUNTING**
This compact assembly features a hydrokinetic Fluid Coupling combined with a grooved pulley.
The assembly is fitted on the motor shaft and requires on additional support other that of the motor.



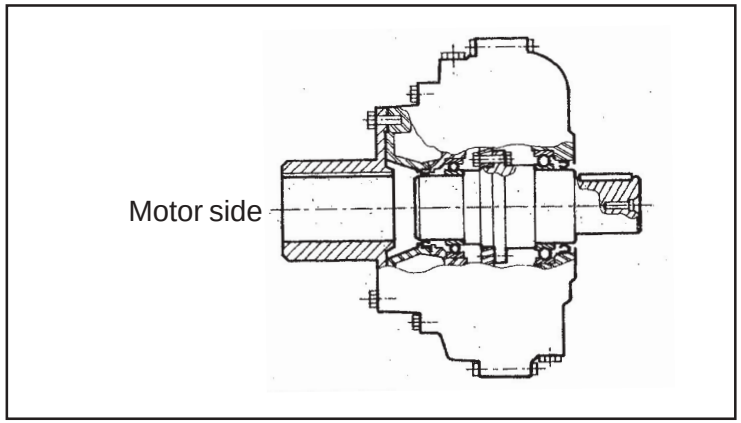
Hollow Shaft Coupling **: XR MOUNTING**

This compact assembly permits the motor and reducer unit and the driven machine to be coupled in-line by means of a Fluid Coupling with a flexible coupling on the motor side.
The coupling is supported in position by the input shaft of the reduction gear or the machine.



Solid Shaft Coupling **: R MOUNTING**

The coupling is fitted on the motor shaft and coupled to the driven machine by means of a flexible coupling mounted between the Fluid Coupling output shaft and input of the machine.



2 INSTALLATION

♦ 2.1 Installation of Coupling

Elecon hydrokinetic Fliud Coupling is delivered with its runner shaft machined to match the driven machine or motor shart dimensions.

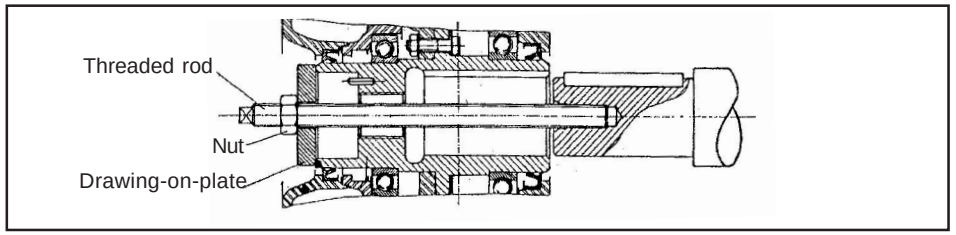
Installation operations :

1°) Check that the shafts are dead-centred.

2°) Fit the keys and grease the shaft.

3°) Fit the coupling on the motor shaft or driven shaft, as required, by means of a threaded rod and a plate (Figure 1).

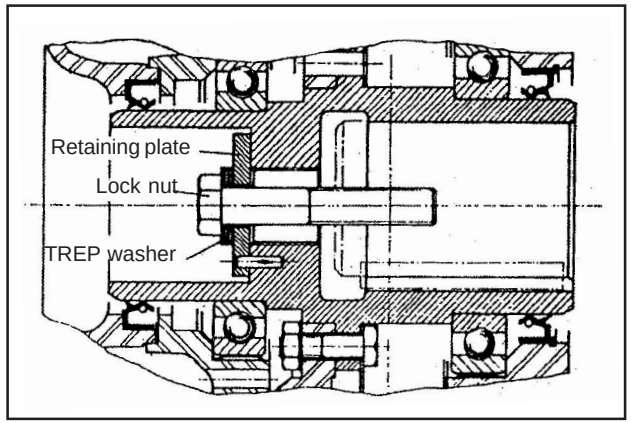
Ensure that the plate is in correct position on the hollow shaft and not on the delayed filling chamber, which would otherwise suffer damage.



4°) When the coupling is correcty in position, prevent any lateral displacement by fitting the retaining plate, TREP washer and lock nut. (Figure 2).

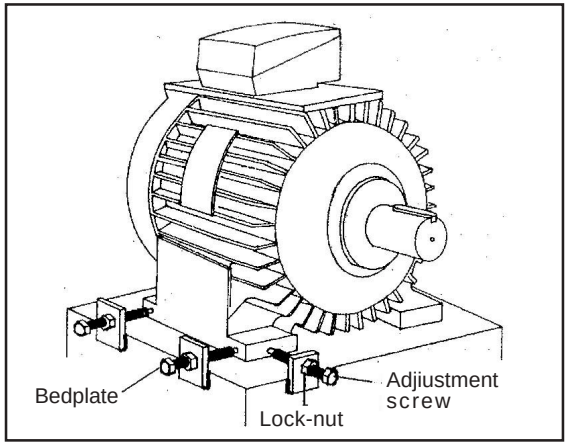
5°) For the XR mounting, fit the fleible coupling boss on the motor shaft bymeans of a threaded rod and a plate (as shown in Figure 1 for the traction coupling).

Check that the end of the motor shaft does not knock against the traction coupling.



N.B. : The use of non-recommended installation equipment (eg, hammers, clamping plates, oxyhydrogen bumers, etc.) is liable to damage the unit and may invalidate warranty claims.

♦ 2.2 Alignment



Correct alignment is essential for the correct functioning of the Fluid Coupling and the durability of the installation.

Alignment procedure :

1°) Once the driven machine is mounted in its correct position, bolt it on to the bed-plate.

2°) Fit the flexible components in the flexible coupling, or the pulley belts in the case of a PH coupling.

3°) Place the electric motor close to the traction coupling in approximately the correct position. For precise motor alignment, particularly with large motors, the use of adjustment screws with brackets attached to the bed-plate (see Figure 3) is recommended.

Various possibilties exist for motor - Fluid Coupling alignment.

♦ 2.2.1 General method of alignment

In general, correct alignment requires that **:**

a) the two half-couplings must be perfectly parallel. No angle should be formed between them.

b) while remaining parallel, the two half-couplings must not be offset radially to each other.

The first condition is met if a thickness gauge or caliper gives a constant reading of $\pm$0.1 mm. between the two half couplings when the Fluid Coupling is rotated manually through 360°.

The second condition is met if a flat laid against the external diameters of the half-couplings is perfectly flush with the surface of both.

Greater accuracy of alignment can be achieved by using a dial gauge.

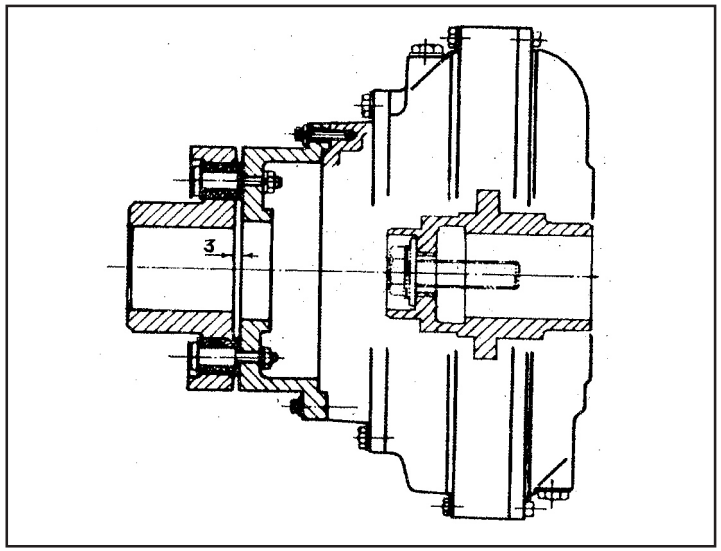
After tightening the holding-down bolts and the flexible coupling flange bolts , re-check the alignment.

♦ 2.2.2 Flexible Couplings

Method of alignment, its values and tolerances are as per IS : 2693

Size of Fluid Coupling	Size of Flexible Coupling
320	FCF 6
370	FCF 7
420	FCF 9
480	FCF 10
584	FCF 13
660	FCF 14
760	FCF 16

see : General alignment method



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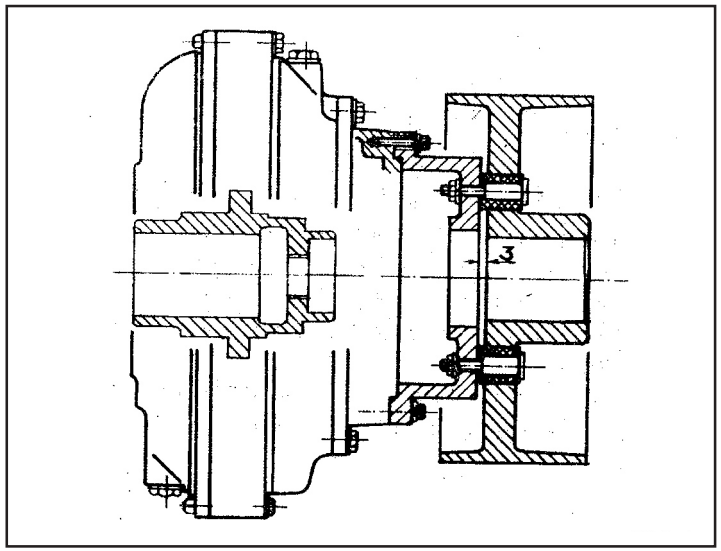


♦ 2.2.3 Fluid Coupling-pulley alignment (Types PHR-PHM)

1°) Fit the coupling on the motor shaft or the diven shaft, as required, by means of a threaded rod.

2°) Fit the pulley belts (untensioned) by moving the two pulleys as close together as possible.

3°) Ensure that the two pulleys are parallel by means of a wire or a rule.

4°) Before tensioning the belts on the pulleys, trace two thin lines transversally on the back of one of the inside belts. These marker lines should be as far apart as possible.

Progressively tighten the pulley belts, after rotating them during several period of one minute each. Between these periods, tighten the belts so as to increase the length between the marker lines by the percentages listed below :

Transmission characteristics	UNIFORM motor or resistive torque	IRREGULAR motor or resistive torque
Small diameter pulleys Short distance between centres (E<D+d)	0.6%	0.8%
Medium or large diameter pulleys Medium or large distance between centres	0.8%	1%

E = distance between pulley centres; D and d = pulley diameters

After 24 hours' check the transmission and re-tighten the pulley belts, if necessary.

For example **:** an initial distance of 1000 mm between the 2 marker lines will be increased by the tension 1006 mm (0.6%) or 1008 mm (0.8%).

♦ 2.3 Oilfilling

The choice of coupling size having been made in accordance with the rotating speed and the power transmission required, the oilfilling for the traction coupling wil be determined by :

- the power actually transmitted to the machine.
- the required starting torgue.

The maximum allowable oilfill amounts to approximately 80% of the total capacity of the Fluid Coupling. This level should never be exceeded since overfilling may cause overpressure inside the coupling and damage to the seals.

♦ 2.3.1 Types of Oil

During normal operating conditions, the fluid used (usually mineral oil) should meet the following requirements :

Density at 15°C.	0.873-0.879
Engler viscosity at 50°C	2.9 to 3
Flash pont°C.	210
Aniline point	105 to 108
Pour ponit	-30°
Viscosity index	≥105

The oil used should be antioxydant and anti-foaming.

Correspondence tables of oils, recommended for traction couplings : (Viscosities as per ISO 3448)

Make	Oil type	
	Recommended	Possible variants
Bharat Petroleum	Bharat Hydrol 46	Bharat Hydrol 32
Castrol	Castrol Hyspin VG 46	Castrol Hyspin VG 32
Indian Oil	Servosystem HLP 46	Servosystem HLP 32

♦ 2.3.2 Determination of the initial oil filling

To determine the amount of oil required :

Use

Table 3.a for CD (without delayed filling chamber)
Table 3.b for CDR (with delayed filling chamber)
Table 3. c for CDRP (with extended delayed filling chamber)
Calcuate the nominal torque co-officient, Kn, using the following formula :

$$Kn = \frac{P}{X}$$

Where P = Motor power or transmitted power in kW
X = value taken from table 1, appropriate to the coupling size and motor speed.

The co-efficient Kn corresponds to the nominal full load torque.
Claculate the co-efficient Km corresponding to the starting (or stalling) torque as shown in the follwing example :

Example

Power transmission is 75 kW at 1450 rpm
Starting torque required 1.4 full load torque (nomianl torque)
For a coupling with a delayed filling chamber (CDR) size 420
Value of X = 29

$$Kn = \frac{P}{X} = \frac{75}{29} = 2.59 \qquad Km = 2.59 \times 1.4 = 3.63$$

To allow for the fact that starting torque is delivered at a speed less then that for nominal torque, divide the value km by 0.9, i.e. $Km = \frac{3.63}{0.9} = 4.03$

From Table 2.b. filling angle for Km of 4.03 is about 65 degree and from table 3.b the quality of fluid is 11.0 litres approximately.
Referring to Table 2, to obtain a full load slip not exceeding 3%, the value of Kn should less that indicated for the chosen filling.

Oil change

Recommended every 8000 hours of working or every two years.

Table 1
VALUE of X
(for Type CD, CDR, CDRP)

Fluid Coupling	Size	185	235	270	320	370	420	480	584	660	760
	Outside Diameter Dmm	225	275	315	365	425	475	550	670	760	870
SPEED R.P.M.	750	0.06	0.2	0.38	0.90	1.90	3.57	6.85	18.7	34.4	70
	900	0.10	0.34	0.66	1.56	3.27	6.17	11.9	32.3	59.4	120
	1000	0.14	0.47	0.91	2.15	4.48	8.45	16.3	44.2	81.5	165
	1200	0.25	0.82	1.60	3.75	7.50	14.70	28.5	77.3	142	280
	1500	0.49	1.62	3.14	7.40	15.50	29.0	56.2	153	280	(565)
	1800	0.85	2.80	5.43	12.8	26.80	50.1	97.1	264	(484)	---
	3000	3.91	12.9	25.20	59.3	123	----	----	----	----	----

Table 2

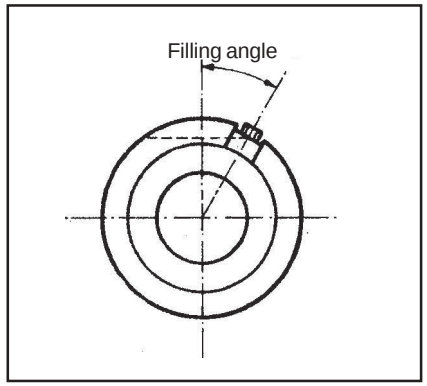
	FILLING ANGLE α°						
		Table 2.a		**Table 2.b**		**Table 2.c**	
	Coupling Type	CD		CDR		CDRP	
FILLING ANGLE α°	Co-efficient	Km	Kn	Km	Kn	Km	Kn
	50	5.6	2.4	5.7	2.7	---	---
	55	5.1	2.1	5.2	2.5	---	---
	60	4.5	1.9	4.7	2.2	4.7	2.8
	65	3.65	1.7	4.1	2.1	4.1	2.7
	70	2.66	1.6	3.2	2	3.2	2.5
	75	2	1.3	2.8	1.8	2.8	2.2
	80	1.5	0.8	2.4	1.7	2.4	2.1
	85	1.3	0.6	2.1	1.4	2.1	2
	90	1	0.4	1.8	1.2	1.6	1.8
	95	0.8	0.3	1.2	0.9	1.2	1.5
	100	0.7	0.2	0.96	0.7	0.95	1.3

	Table 3.a									
Coupling	Type	CD (without Delayed filling chamber)								
	SIZE	185	235	270	320	370	420	480	584	660
FILLING ANGLE α°	50	1	1.90	2.60	4.20	7.10	10.05	15	26.55	44.50
	55	0.97	1.86	2.45	4	6.90	9.50	14.30	26.60	42.60
	60	0.93	1.80	2.30	3.80	6.50	8.90	13.60	24.30	40.60
	65	0.88	1.70	2.20	3.60	6	8.40	12.80	23	38.20
	70	0.82	1.58	2.00	3.30	5.70	7.80	12	21.40	35.80
	75	0.76	1.50	1.90	3.10	6.20	7.20	11.20	20	33.40
	80	0.70	1.39	1.80	2.90	4.80	6.70	10.20	18.40	31
	85	0.64	1.27	1.70	2.65	4.40	6.30	9.30	16.80	28.60
	90	0.57	1.14	1.55	2.40	4	5.70	8.50	15.30	26.30
	95	0.52	1.02	1.40	2.25	3.70	5	7.80	14	24
	100	0.46	0.90	1.30	2.10	3.40	4.60	7.20	13	22

Coupling	Type	Table 3.b								Table 3.c						
		CDR (with Delayed filling chamber)								CDRP (with Extended Delayed filling chamber)						
	SIZE	320	370	420	480	584	660	760	870	370	420	480	584	660	760	870
FILLING ANGLE α°	50	5.20	9	12.50	20	34.10	52	75	111	10.90	15.20	22	36.50	59.50	90	136
	55	5	8.60	12.10	18.90	32.70	50.20	71	105	10.30	14.80	21.10	35.10	57.80	85	129
	60	4.70	8.20	11.30	17.90	31.20	47.80	67	99	10	14.20	20.20	33.60	55.10	80	122
	65	4.40	7.60	11	16.60	29.20	45	62	93	9.20	13.65	19.10	31.80	51.80	75	114
	70	4	7	10	15.30	27.20	42	57	86	8.30	13	18.10	30	48.20	68	106
	75	3.70	6.50	9.40	14.30	25	39	53	79	7.80	11.90	16.90	28.20	44.20	63	96
	80	3.30	5.90	8.60	13.30	22.80	36	49	73	7	10.80	15.70	26.20	41	58	88
	85	3.10	5.60	8.10	12.10	20.90	33	46	68	6.90	9.70	14.50	24.20	37.40	54	81
	90	2.90	5	7.25	10.90	19	30.20	42	63	6	8.60	13.20	22.20	34.10	49	75
	95	2.70	4.80	6.50	9.60	17.50	27.60	38	58	5.90	7.30	12	20	31.20	44	69
	100	2.50	4.20	5.90	8.40	15.90	25.30	34	53	6	6.50	17.80	17.80	28.60	40	62

Approximate equipment oil volume in liters at 20°C

Checking the oil fill



1°) Place filling plug in vertical position remove.

2°) Rotate the coupling slowly until the oil just comes up to the filling hole.

This position must match the angle from top-dead-centre calculated by the method given above.

3°) If necessay, remove or add some oil.

4°) Replace filling plug and tighten

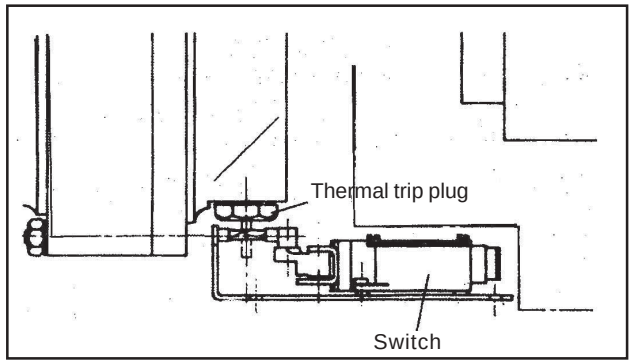
♦ **2.3.3 Fusible plug**

A fusible plug (22) is fitted at one of the filling holes, for the purpose of preventing overheating of the coupling in the event of a prolonged stall or failure of the motor thermal relay. After removing the cause of the stall, a new fusible plug must be fitted and the coupling filled with clean oil as per specifications.

For industrial applications, the maximum temperature is 140°(fusible plugs marked 1). At that temparture, the fusible plug melts, allowing the oil in the coupling to drain off and removing the load from the motor. For applications with Diesel or petrol engines, or in certain specific applications in industry, fusible plugs with a set melting point 200°are used (fusible plugs marked number 2).

Safety features

Oil losses can be prevented by using a thermal trip plug fitted instead and in the place of the fusible plug. This device actuates a motor cut-out system or triggers a warning signal in the event of the oil in the coupling reaching the set maximum temperaature. In the event of activation, re-set the motor cut-out switch and fit a new thermal trip plug.
It is preferable to refill the coupling with cold fluid to avoid downtime while the original fluid cools down.



♦ 3 MAINTENANCE

♦ 3.1 Servicing

Elecon Fluid Coupling requires virtually no servicing since there are no mechanical components in contact with each other (other than bearings and seals). Bearings are amply dimensioned.

Seals are custom-built for our equipment and can with stand pressures of three bars. They are made of viton, ie, a meterial capable of withstanding constant temperatures of up to 200°C.

Nonetheless, periodic check of the seals and the coupling alignment are necessary. A programme of three-monthly checks, for example, may well prove suitable, depending on the duration and type of service involved.

a) Checking seals and oil level

All couplings undergo checks for all seals before leaving the factory.

The oil tightness of the filling plug and the Fliud Coupling can be checked by holding a clean sheet of paper some 10 cm from the coupling-any oil leaks will be shown up by this paper test.

If the oil appears dark in colour and emits a smell of burning, this is due to overheating. The oil is liable to oxidize or acidify and must be replaced immediately. coupling temperature depends on the local operating conditions (frequency of start-ups, ambient temperature, etc). But in no case should it exceed 80°C. during normal service.

b) Checking alignment

In the event of misalignment occuring during service, this causes wear to the components of the flexible coupling. It is recommended to replace them and correct alignment.

c) Replacing fusible plugs

If the fusible plug has melted due to an overload or stall in the driven machine, it must be replaced by a a new Elecon Sime fusible plug and coupling re-fill with clean oil.

Warning :

Fusible plug should never be replaced by soild plugs or ordinary solder. This would damage the fluid Coupling and invalidate warranty claims.

♦ 3.2 Troubleshooting

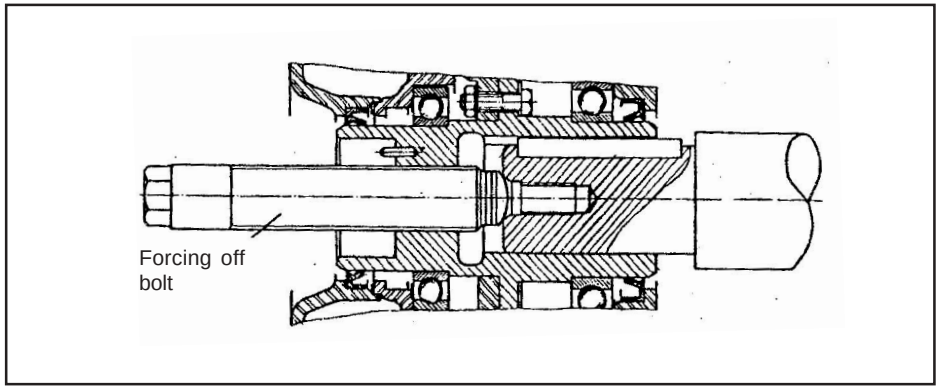
1	**Driven shaft fails to reach speed.**	
a)	Insufficient oil	Check oilfill, as per 2.3.2
b)	Coupling seals not fully oiltight	Check tightness of seals, as per 3.1
c)	Faulty motor or motor coupling	Check motor : for electric motor, check speed, power consumption, etc; for diesel/petrol engine, check fuel injection setting, etc.
2	**The fusible plug melts**	
a)	Insufficient oil	Check the oilfill as per 2.3.2
b)	Coupling seals not fully oiltight	Check tightness of seals, as per 3.1
c)	The driven machine stalls or jams	Check machine and remove cause of stall
d)	Excessive power consumption of the driven machine	Verify power consumption by means of a double wattmeter.
3	**Avnormal vibrations/noise lovels**	
a)	Incorrect alignment	Check alignment, as per 2.2, and correct, if necessary.
b)	Damage to dearings	Check the coupling. Locate noise and vibration sources by ear or by means of sound measurement instruments
c)	Nut and bolt loose assemblies	Check that holding-down bolts on motor, bed-plate and driven machine are correctly tightened.
d)	Undue vibration of the assembly	After checking point a, b and c, locate source of vibrations and eliminate cause

3.3 Removal of Fluid Coupling Unit

To remove the Fluid Coupling (XR and R mounting), the electric motor must be detached. After removing lock nuts and washers, use the special forcing-off bolt (48) to remove the coupling, having previously smeared the thread and end of the bolt with lubricant (oil or grease).

The special forcing-off bolt is supplied only on request.The same bolt can be used with the various XR and PH mountings,and for several sizes of coupling. as shown in the below :

Fluid Coupling	Forcing-off reference number	Thread
Sizes 270-320-370	———	1" BSP
Sizes 420-480-584-660	———	$1\frac{1"}{4}$ BSP



For Fluid Couplings of the 185 and 235 type, the coupligs shaft bore (tolerance F8) allows installation and removal to be carried out manually and this method must be employed.

3.4 Repairs

Whenever possible, repairs should be carried out in the workshops. All repairs must by qualified personnel working in a clean place.

Dismantling

First remove the delayed filling chamber when fitted (23) by undoing the securing bolts (25). To disconnect the chamber from its casing, insert and tighten the two bolts (25) in the specially provided forcing-off holes. drilled in the impeller flange. disconnect the impeller from casing (4).

Then diconnect the casing(4) from the shaft/runner assembly (3). In general, bearings (8) and (9) remain in position on the shaft. If due for replecement, they can be removed by means of a bearing puller. Remove seals (7) and (29) taking great care not to damage the polished surfaces on the shafts.

Reassembly is carried out by reversing the order of operations. Certain percautions must be taken :

1) Mating surfaces particularly between chamber and casing and between casing and impeller, must be thoroughly cleaned with trichloethylene to remove all traces of sealing compound. For perfect seals, CURTYLON copound is recommended.
2) Check that there is no damage to the polished sections of the where seal rings (7) and (29) are fitted.
3) Fit the seal rings (7) and (29) in position by means of a press-fitting tool.
4) Fill the space between the two seal ring rims with grease.
5) During the assembly of the impeller (2) and the casing (4), the coupling serial numbers stamped on each of these compo nents should be aligned for purose of balancing.

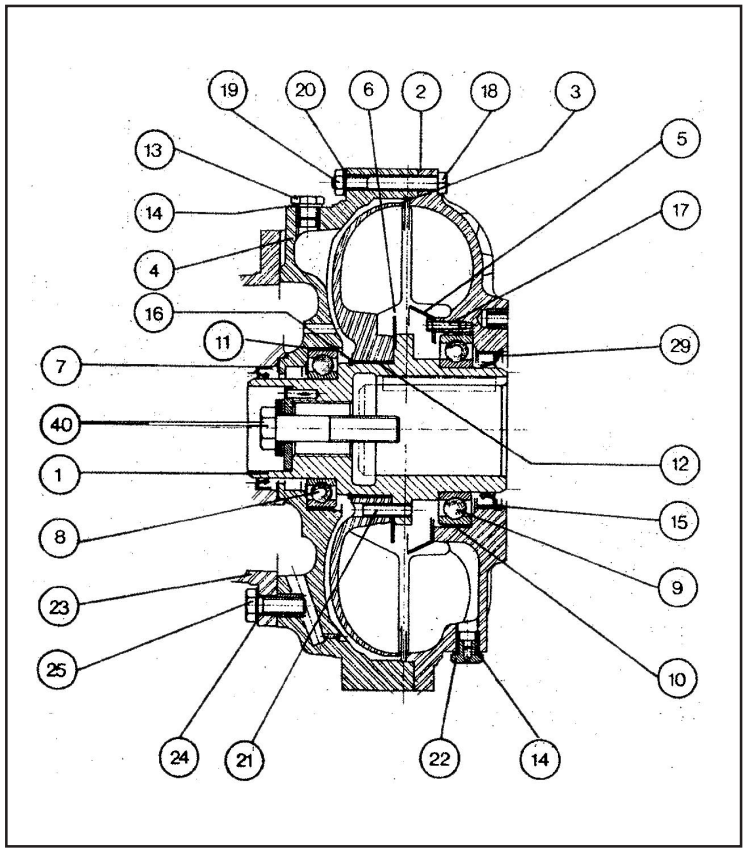
N.B. : For traction coupling 420, 480 and 584 PH, apply grease (SKF 65-2 or 65-3) to the needle bearing (50) and the space between seal ring (52) and the baffle (58).

♦ 4 SPARES

♦ 4.1 Ordering spares

1) Consult general diagram for your coupling to find reference number of the part required, eg. ball lbearing, no.8.
2) Find the size and serial number of the traction coupling for which the spare is required. The serial number is stamped on the outside of the coupling, eg. coupling 420, number 55077.
3) Order the spare by quoting as follows : Ball Bearing, reference No. 8 for Coupling 420 No. 55077.

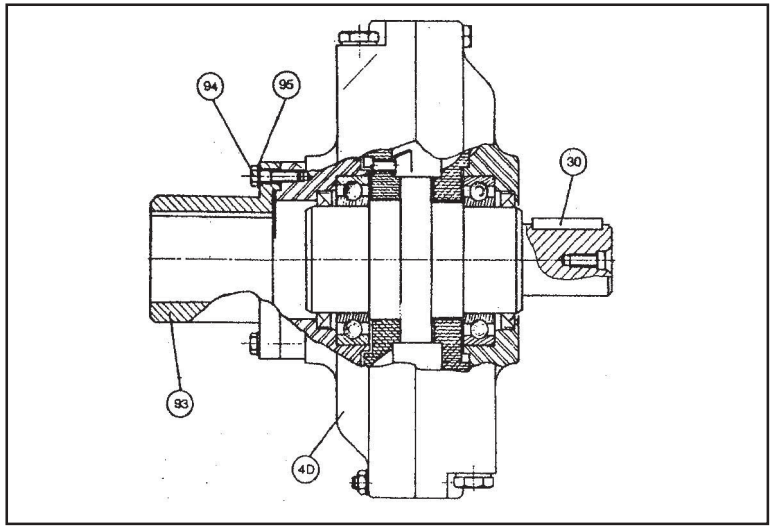
♦ 4.2 Drawings



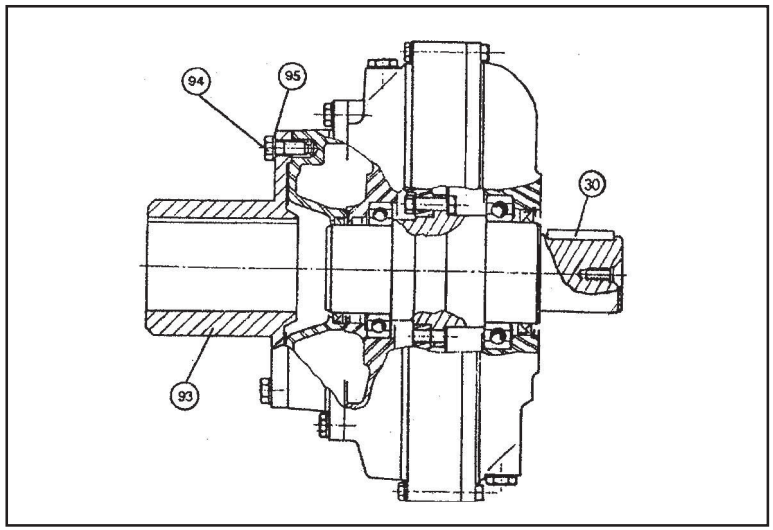
♦ 4.2.1 SIZES : 270-660 XR

N.B. : Size 270 has no delayed filling chamber (23)

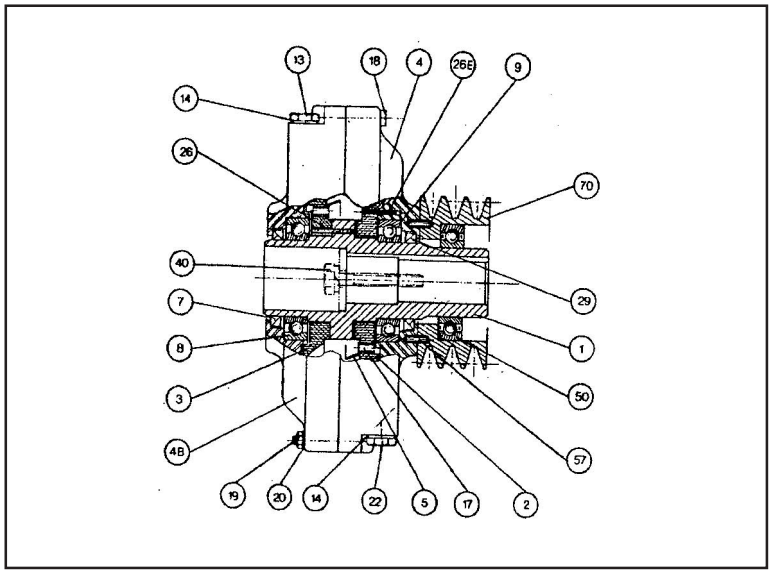
♦ **4.2.2 SIZES : 185-270 R**



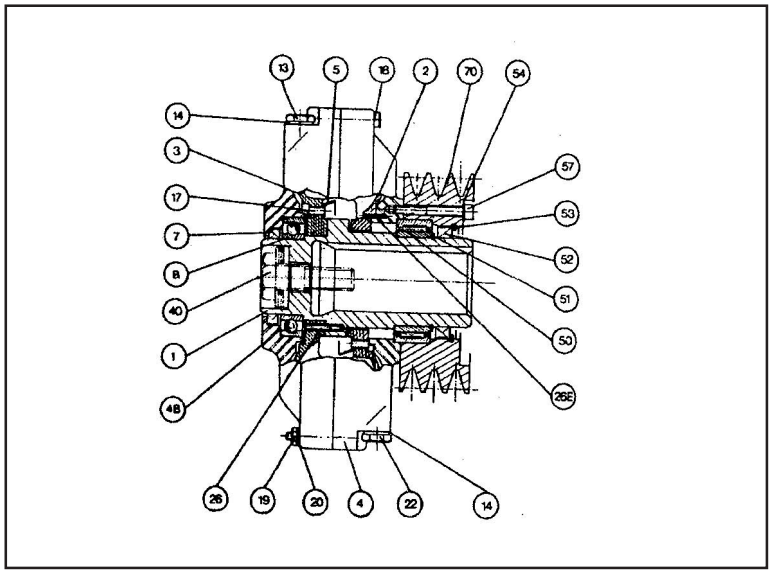
SIZES : 320-584



♦ **4.2.3 SIZES : 185-235 PHR AND PHM**

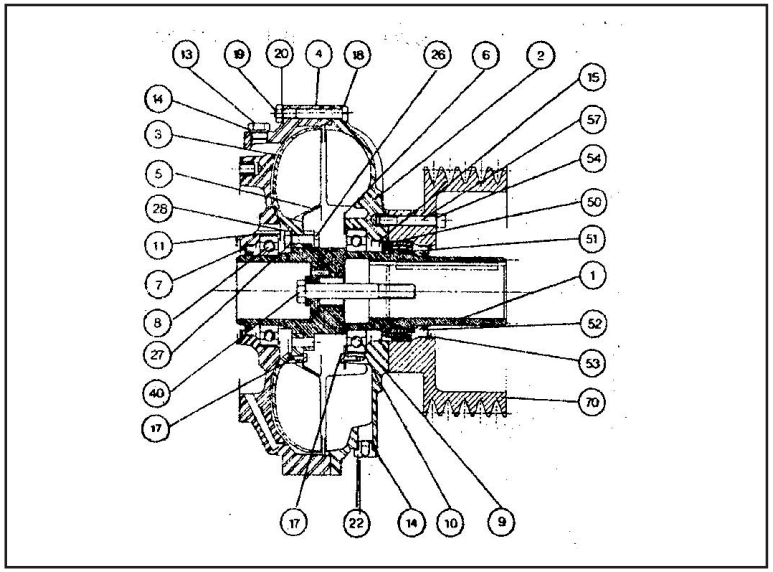


SIZES : 185-235 PHR AND PHM
(LARGE BORE)

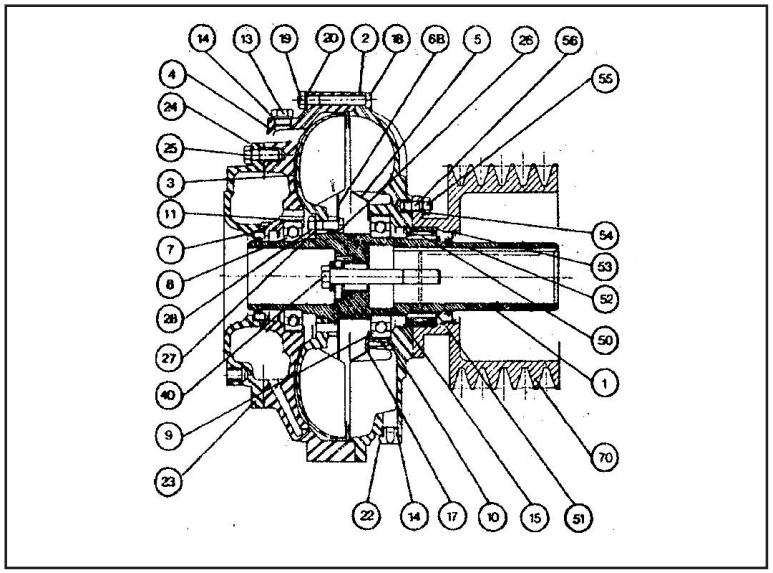


♦ **4.2.4 SIZES : 270-370 PHR AND PHM**

PHR Mounting

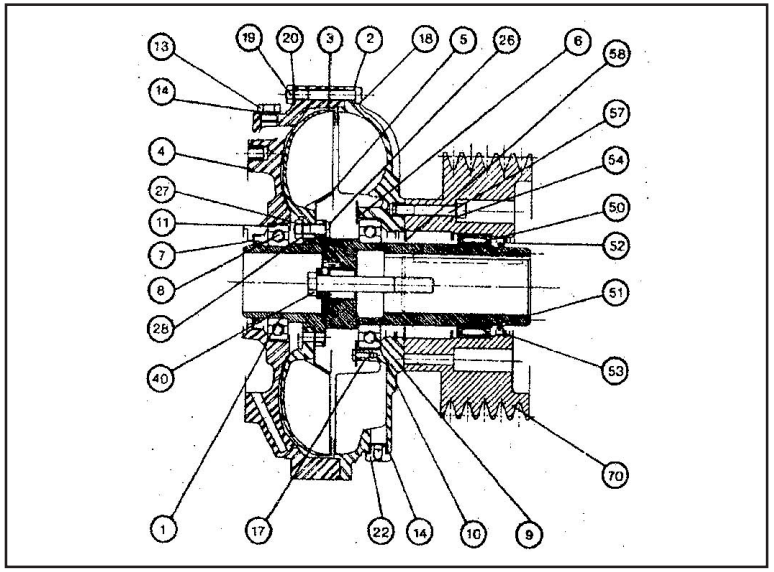


PHM Mounting

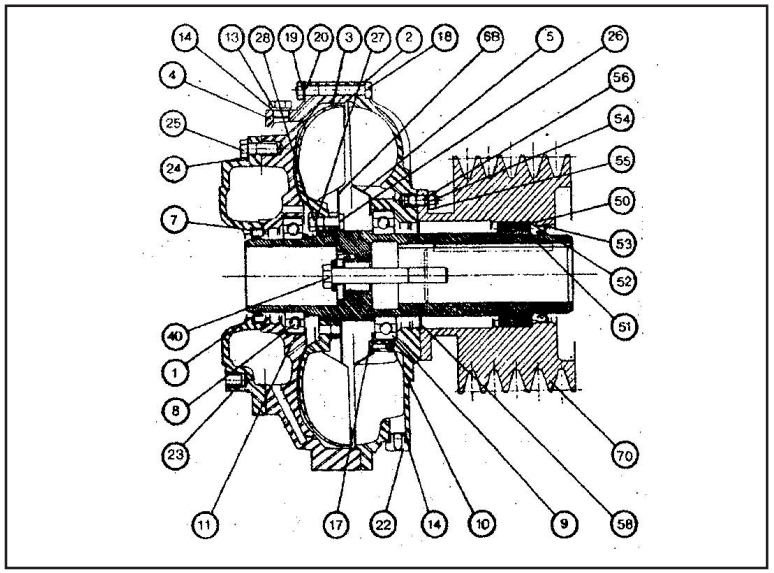


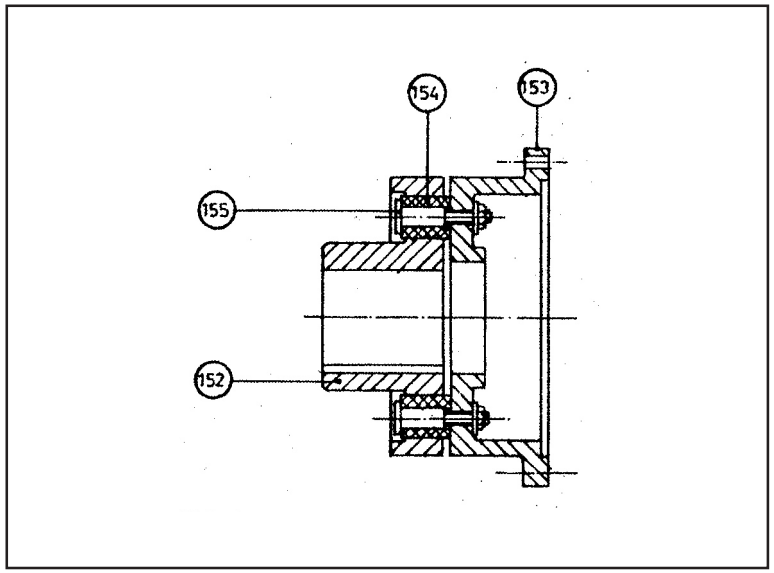
♦ **4.2.5 SIZES : 420-584 PHR AND PHM**

PHR Mounting

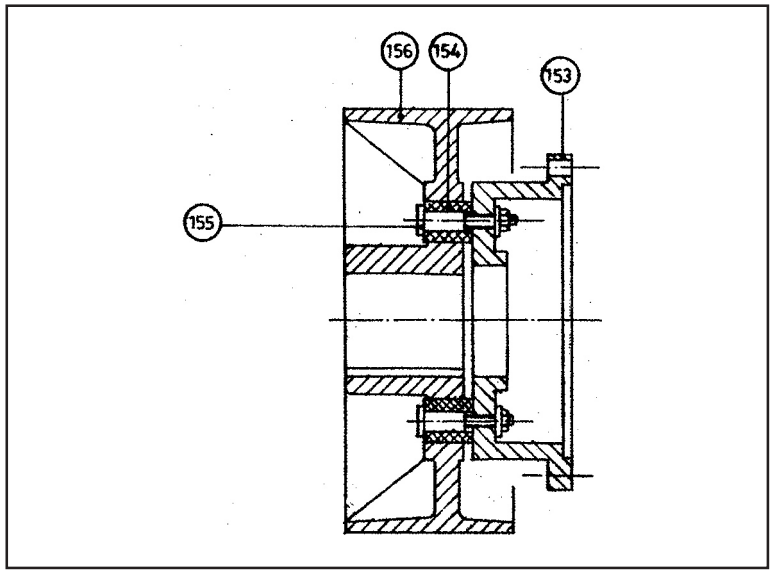


PHM Mounting





FCF Coupling



FCFB Coupling

♦ 4.3 Part List

Ref	Name of part	Ref	Name of part
1	Shaft	40	Retaining bolt assembly
2	impeller	50	Bearing
3	Runner	51	Stop segment
4	Casing	52	Shaft seal
4B	Casing	53	Internal circlip
4D	R Mounting Casing	54	Washer
5	Impeller Baffle	55	Nut
6	Runner Baffle (PHR)	56	Stud
6B	Runner Baffle (PHM)	57	Pulley bolt
7	Shaft seal	58	Grease reservoir baffle
8	Bearing	70	Grooved pulley
9	Bearing	93	Driving boss
10	Flexible ring collar - Size : 270-660	94	Driving boss bolt
11	Flexible ring collar - Size : 270-660	95	Washer
12	Flexible ring collar - Size : 270-320	152	Dirving haft
13	Filling plug	153	Flange haft
14	Fibre washer or oil seal ring	154	Rubber bush
15	Stop ring	155	Pin with hex nut & washer
16	Stop ring	156	Brake drum haft
17	Baffle retaining bolt		
18	Casing bolt		
19	Nut		
20	Lock washer		
22	Fusible plug		
23	Delayed filling chamber		
24	Lock washer		
25	Delayed filling chamber bolt		
26	Runner bolt		
26E	Circuit bolt		
27	Lock washer		
28	Nut		
29	Shaft seal		
30	Key		

NOTES.....

NOTES.....

For any service requirement, please contact our nearest office with complete name plate details

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