Installation and Operating Instructions

Constant Filling Couplings

GUANGDONG ZHONGXING POWER TRANSMISSION CO.LTD.

Contents

1. Preface

This manual will help you to use our coupling in a safe, proper and economical way.

This manual shall always be read and used by every person before working on the coupling, it shall be available on the machine site for easy reference.

The coupling is manufactured to the state of art and approved safety regulations. Nevertheless, proper installation, maintenance and handling is indispensable for the coupling to provide best performance and service life as well as to safeguard the safety of operating personnel.

The coupling is designed to transmit power at rated values and under definite conditions. Incorrect use including incorrect installation or filling, use for other purpose or excessive power or speed etc, will cause damages to the coupling and other machines and may even endanger the safety of operating personnel. The manufacturer is not liable for any responsibility on all losses out of incorrect handling of the coupling.

This manual has been issued with utmost care. However, in case you need any further information, please contact

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2. Safety

2.1 General Always follow instructions in this manual, incorrect handling of the coupling will lead to damages and even fatal injury!

2.2 Lifting Make sure the lifting device has sufficient loading capacity for the coupling and check that it is in sound condition.

2.3 Mounting Coupling must be mounted securely and a protective cover must be installed. In no case shall the coupling be started without a protective cover.

2.4 Filling oil Only recommended filling oil shall be used, improrer filling oil may

affect performance
cause corrosion to the coupling
cause irritation when contact with skin
cause fire hazard

2.5 Handling of Oil Some of the oils are caustic, irritating or harmful. Put on protective gloves and wear glasses when handling them. Wash hands carefully after the work is finished.

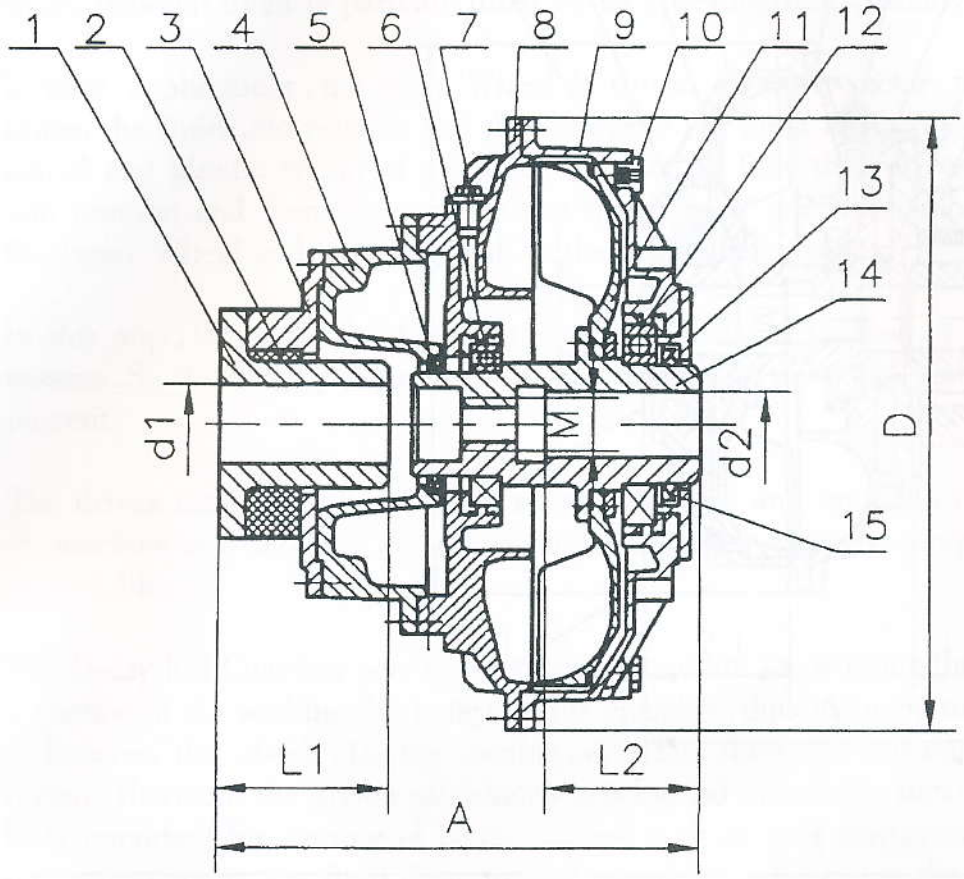
2.6 Filling Control Follow recommended filling leel.
The coupling must never be filled to over 80% of its internal volume, otherwise the excessive internal pressure produced by heating may cause serious damages to the coupling and may even lead to fatal injury!

2.7 Fusible Plug The fusible Plug protects the coupling from overheated which may lead to serious damages to the coupling and even causes fire hazard. Never replace the Fusible Plug with a screw, a Fusible Plug of different response temperature or anything else.

2.8 Maintenance Power must be switched off before any maintenance work is carried out. Lock shall be used to avoid unauthorised switch on. Replace the protective cover before switch on power.

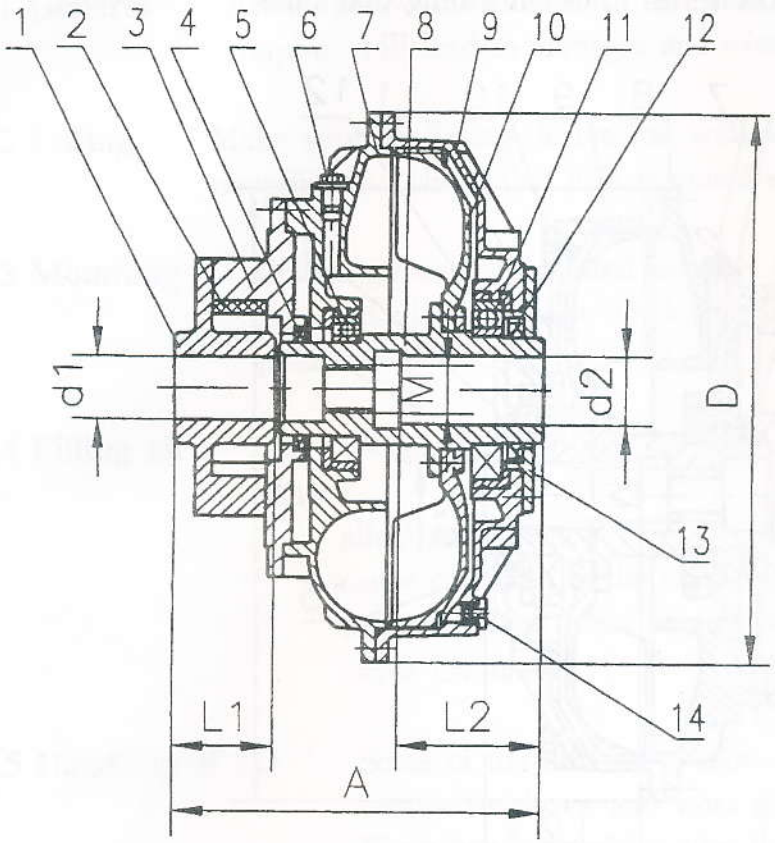
3. Construction

Fig:1.1: Construction of YOX series Constant Filling Couplings



Item No.	Description	Item No.	Description
1	Driving Connection	9	Shell
2	Flexible Element	10	Fusible Plug
3	Driven Connection	11	Inner Wheel
4	Delay Fill Chamber	12	Bearing
5	Seal Ring	13	Seal Ring Cover
6	Bearing	14	Coupling Hub
7	Filler Plug	15	Seal Ring
8	Outer Wheel		

Fig.1.2: Construction of YOP series Constant Filling Couplings



Item No.	Description	Item No.	Description
1	Driving Connection	8	Coupling Hub
2	Flexible Element	9	Shell
3	Driven Connection	10	Lnner Wheel
4	Seal Ring	11	Bearing
5	Bearing	12	Seal Ring
6	Filler Plug	13	Seal Ring Cover
7	Outer Wheel	14	Fusible Plug

4. Operation Principle

The Fluid Coupling is a hydrodynamic coupling based on Foettinger's principle. Its main components are two bladed wheels – an Outer Wheel and an Inner Wheel, the space between them is partially filled by an operating fluid, usually oil.

In most applications, the outer Wheel is driven by input motor, the rotating wheel brings the fluid into rotation and thus converts the input mechanical energy into potential and kinetic energy of the fluid, The rotating fluid then drives the Inner Wheel into rotation and therefore converts the energy back into mechanical energy through the Inner Wheel and Coupling Hub to the driven machine.

In this way, the motor is started at very small load regardless of the heavy driven masses. So the motor can run up very quickly and be protected against heavy starting current.

The driven machine is then started slowly. The slow and smooth acceleration on driven machine also protects the driven machine from excessive torque to prolong its service life.

The Delay Fill Chamber acts as a temporary store for the working fluid. At stand still, a portion of the working fluid stays in the chamber, thus reducing the quanitity of fluid between the wheels. During starting, with less fluid, the transmitted torque is reduced. Therefore the driven machine is accelerated even more slowly. This is particularly important for starting of heavy masses such as long conveyors. After the motor has run to speed, the fluid flows through small holes back into the working chamber and the coupling retrieve its design performance.

The Fusible Plug is a device to protect the coupling against overheating. If the output of the coupling is braked or blocked, the input power will completely turns into heat in heating up the working fluid. If the problem is not remedied within certain time, the working fluid will reach the response temperature of the Fusible Plug, the core of it will melt and the working fluid will escape through this opening and thus separates the input and output drives. This can prevent the working fluid from getting too hot and causes serionus damages or even fire hazard. Never replace a Fusible Plug with any other screw.

In some special cases, the coupling can be installed in the opposite direction, i.e. the motor drives the Inner Wheel which then transmits the energy to the Outer Wheel and then to the driven machine. This is called Inner Wheel Drive while the most usual arrangement of Outer Wheel drivivng Inner Wheel is called Outer Wheel Drive. Both arrangements can transmit energy but will have slightly different performance characteristics.

5. Specification

Size	Input Speed n(rpm)	Rated power N(kW)	Overload coeff. Tg	Efficiency η	Diameter Fig.1 D(mm)	Length Fig.1 A(mm)	Input Bore Max. (mm)	Output Bore Max (mm)	min. Filling qmin(1)	Max. filling qmax(1)	Weight (kg)
YOX 150	100 1500	0.05 – 0.2 0.2 – 0.55	2 – 2.7	0.97	ø195	175	ø25 L40	ø20 L40	0.2	0.42	6
YOX 180	1000 1500	0.1 – 0.3 0.5 – 1.1	2 – 2.7	0.97	ø232	207	ø30 L50	ø25 L50	0.24	0.48	7
YOX 200	1000 1500	0.2 – 0.55 0.8 – 2.2	2 – 2.7	0.97	ø254	194	ø35 L60	ø30 L60	0.6	1.2	8.8
YOX 220	1000 1500	0.4 – 1.1 1.5 – 3	2 – 2.7	0.97	ø278	225	ø40 L80	ø35 L80	0.76	1.52	13
YOX 250	1000 1500	0.8 – 1.5 2.5 – 5.5	2 – 2.7	0.97	ø305	249	ø50 L80	ø40 L80	1.1	2.1	16
YOX 280	1000 1500	1.5 – 3 4.5 – 8	2 – 2.7	0.97	ø345	252	ø55 L80	ø45 L110	1.4	2.8	21
YOX 320	1000 1500	2.5 – 5.5 9 – 18.5	2 – 2.7	0.97	ø380	276	ø55 L110	ø50 L110	2.2	4.4	28
YOX 340	1000 1500	3 – 9 12 – 22	2 – 2.7	0.97	ø390	298	ø60 L100	ø50 L110	2.7	5.3	36.5
YOX 360	1000 1500	5 – 10 16 – 30	2 – 2.5	0.96	ø428	310	ø60 L110	ø55 L110	3.4	6.7	42
YOX 400	1000 1500	8 – 18.5 28 – 48	2 – 2.5	0.96	ø472	338	ø70 L140	ø60 L140	5.2	10.4	65
YOX 450	1000 1500	15 – 30 50 – 90	2 – 2.5	0.96	ø530	384	ø75 L140	ø75 L140	7.5	15	79.5
YOX 500	1000 1500	25 – 50 68 – 144	2 – 2.5	0.96	ø582	435	ø90 L170	ø90 L170	10.3	20.5	105.5
YOX 560	1000 1500	40 – 80 120 – 270	2 – 2.5	0.96	ø634	447	ø100 L210	ø100 L210	13.2	26.4	152
YOX 600	1000 1500	60 – 115 200 – 360	2 – 2.5	0.96	ø695	490	ø100 L210	ø115 L210	16.8	33.6	185
YOX 650	1000 1500	90 – 176 260 – 480	2 – 2.5	0.96	ø760	556	ø125 L210	ø130 L210	24	48	230
YOX 750	1000 1500	170 – 330 480 – 760	2 – 2.5	0.96	ø860	578	ø140 L250	ø50 L250	34	68	350
YOX 875	750 1000	145 – 280 330 – 620	2 – 2.5	0.96	ø992	705	ø150 L250	ø150 L250	56	112	495
YOX 1000	600 750	160 – 300 260 – 590	2 – 2.5	0.96	ø1138	733	ø150 L250	ø150 L250	74	148	650
YOX 1150	600 750	265 – 615 525 – 1195	2 – 2.5	0.96	ø1312	850	ø170 L300	ø170 L300	85	170	810

6. Performance Parameters

6.1 Calculation of Torque and power

The following formulae can be used to calculate the Transmitted Torque and Transmitted Power at different input speed n_B

$$M = \lambda_B \cdot \gamma \cdot n_B^2 \cdot D^5$$
$$N = 1/975 \cdot \lambda_B \cdot \gamma \cdot n_B^3 \cdot D^5$$

where: M – Transmitted Torque(kg·m)
γ – Density of fluid (for # 32 turbine oil $\gamma = 860 kg/m^3$)
n_B – Input speed(rpm)
λ_B – Effective Diameter of Wheel(min^2/m). IF con be obtain from Fig2
D – Effectiue Diameter of wheel(m)
N – Transmitted Power(kW)

λ_B is obtained from Fig. 2 with different Speed Ratio i(i = Output speed n_T/ Input speed n_B) and at different filling quantity q_c

6.2 Determination of filling Quantity

The filling quantity depends on
1. Input Torque
2. Input speed
3. Slip at rated torque(Slip = 1 – efficiency η)
4. Orientation of installation

User shall follow the recommended filling quantity when it is provided.

User may also obtain the filling volume from fig.3, but it can only be used as a guide for trial. And depending on the trial result, filling level shall be adjusted to meet actual power transmitted by:

– Incresase filling quantity if transmitted torque is not enough or
– Reduce filling quantity if transmitted torque is too high

However, the filling quantity can never exceed the maximum value nor less then the minimum value shown in Table 1.

Fig. 2 – 1: Characteristic Curves for YOX Couplings

Filling Quantity: 80% and 55%
Working Fluid: # 32 Turbine oil, Density $\gamma = 830$ kg/m^3
Operating Temperature: 70℃ ~ 80℃

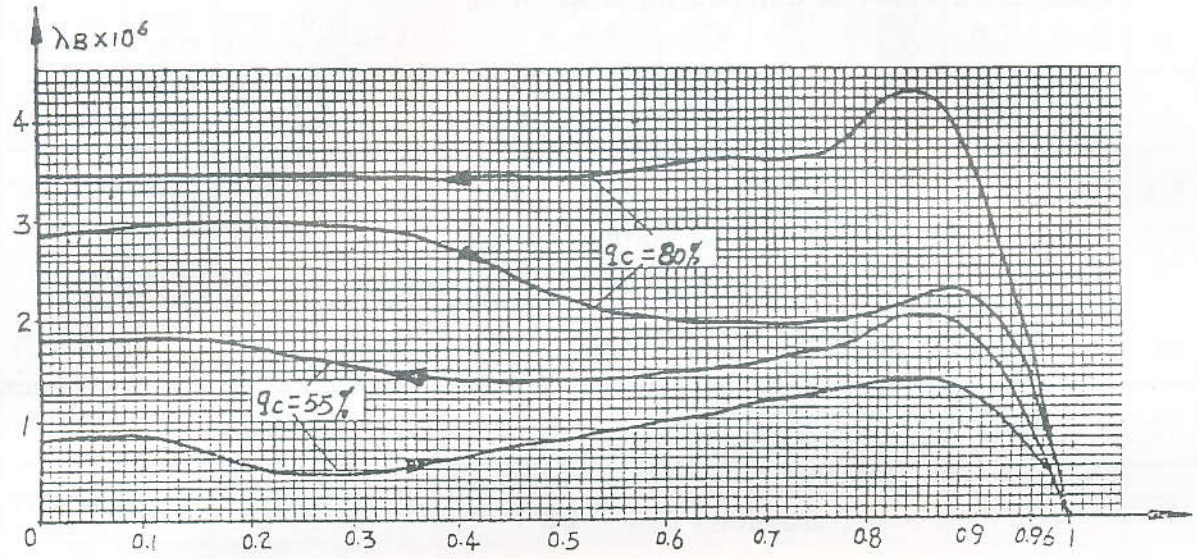


Fig. 2 – 2: Characteristic Curves for YOX Couplings
Filling Quantity: 70% and 50%
Working fluid: # 32 Turbine Oil, Density $\gamma = 830$kg/m^3
Operating Temperature: 70℃ ~ 80℃

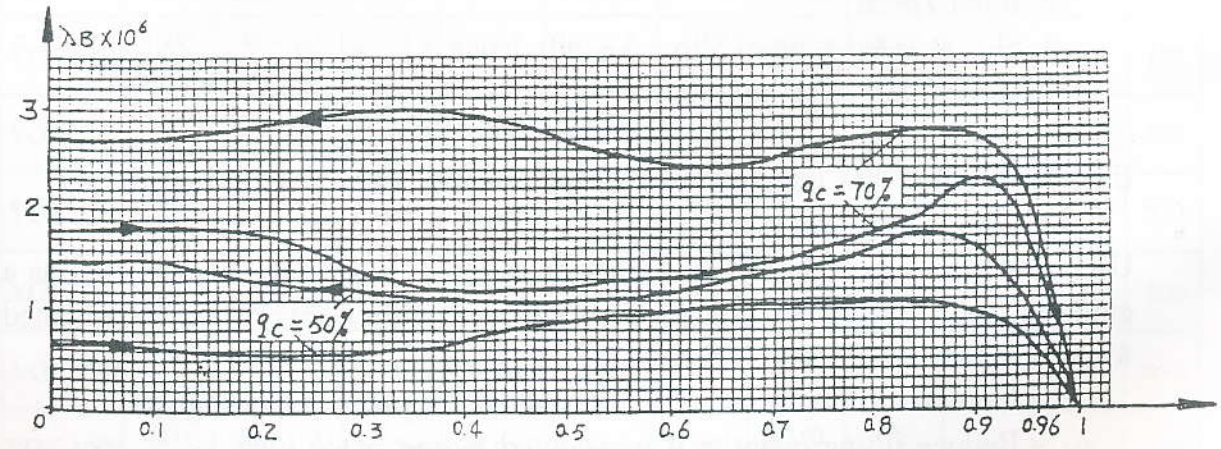


Fig.2 – 3: Characteristic Curves for YOX Couplings

Filling Quantity: 62.5%
Working fluid: # 32 Turbine Oil, Density $\gamma = 830 kg/m^3$
Operating Temperature: 70℃ ~ 80℃

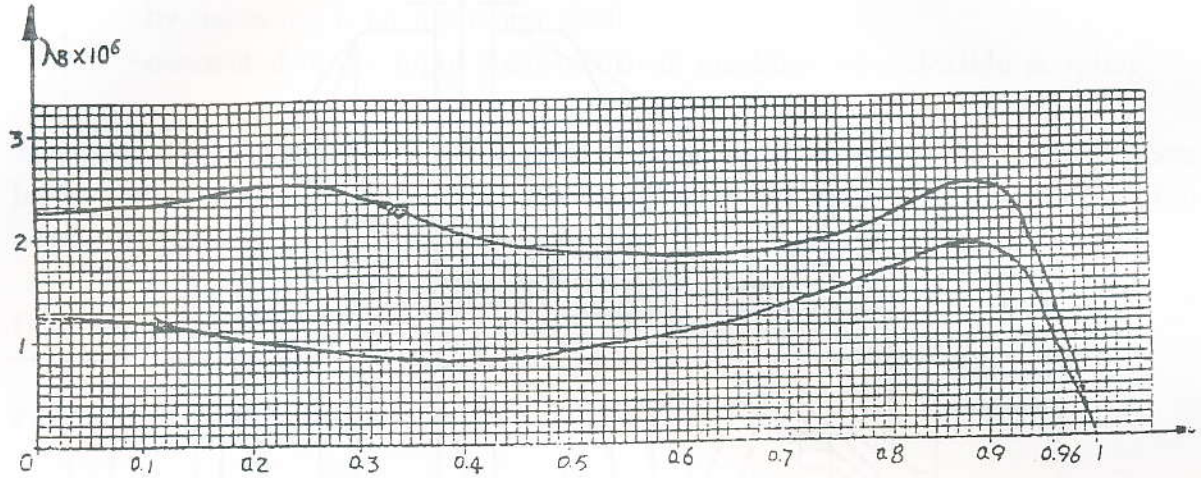
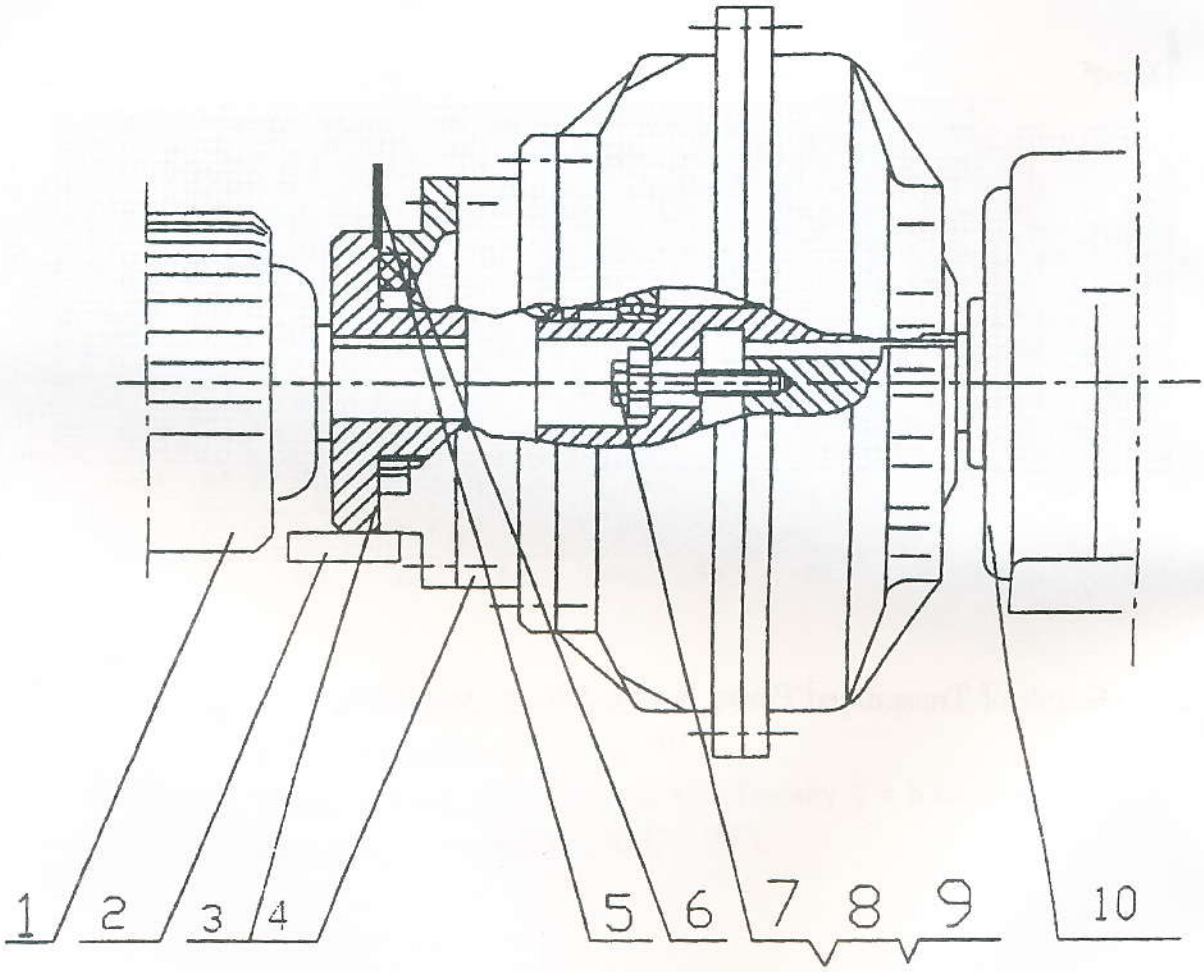


Fig.3: Graph of Transmitted Power N with Filling Quantity q_c

7. Installation

Fig.4: Installation of Coupling (Outer Wheel Drive)



Item NO.	Description	Item NO.	Dscription
1	Motor	6	Flexible Element
2	Straight Edge	7	Mounting Spindle
3	Driving Connection	8	Holding Disc
4	driven Connection	9	Pin
5	Feeler Gauge	10	Driven Machine

The coupling is installed

– In case of outer wheel drive (fig.4)

- by mounting it on the input shaft of the driven machine
- connected to the motor via a flexible coupling

– In case of inner wheel drive

- by mounting it on the motor shaft
- connected to the input shaft of driven machine via a flexible coupling

For most applications, the coupling shall be used as outer wheel drive which gives a better performance. For some cases, the coupling may be specially designed for Inner wheel drive.

Couplings shall only be installed as they are designed for.

Follow this sequence to install the coupling:

1 Check radial runout of shafts of motor and driven machine

2 Fit suitable keys on the shafts of motor and driven machine, apply a suitable lubricant

3 Fix the coupling on the input shaft of driven machine

4 Secure the coupling on the shaft end by the Mounting Spindle(7), Holding Disc(8) and Pin(9) as per Fig.4

5 Push the motor shaft into the bore on the Driving Connection(3)

6 Slightly fasten bolts on the motor, check alignment of input shaft and output shaft with dial gauge, place shims under the motor bracket to correct alignment, make sure that they fall within the following admissible values

Admissible radial misalignment in mm				
Speed	YOX 150 – 320	YOX 360 – 450	YOX 500 – 650	YOX 750 – 1150
< 750rpm	< 0.5	< 0.6	< 0.8	< 0.8
750 – 1200rpm	< 0.4	< 0.5	< 0.6	< 0.7
1200 – 1500rpm	< 0.3	< 0.4	< 0.5	< 0.6

7 Fasten the motor securely, recheck alignment

8. Operating Fluid

8.1 Function of Operating Fluid

The operating fluid is the medium which transmits torque and power from driving wheel to driven wheel. The quantity of fluid affects the transmitted torque directly.

In gieneral, within the specified linits, the more the filling, the higher the torque that can be transmitted.

With constant transmitted torque, the more the filling, the higher the efficiency. However, the starting torque will also increase and the overload coefficient will also increase, that is, less overload protection to the driven machine.

Therefore, for any one size of coupling, we can use different filling quantity to meet various requirements of different power and different driven machines.

8.2 Selection of working fluid

The operating fluid shall has low viscosity μ, high density γ, high flash point, low pour point, long service life and must be non – corrosive.

We recommend the following values:

Viscosity $\mu = 32mm^2/s$
Density $\gamma = 0.84 \sim 0.86g/cm^3$
Flash point $> 180℃$
Pour point $< -10℃$

A lot of mineral oil including hydraulic oil, turbine oil, motor oil etc. meet these requirements and can be used, we also recommended # 32 turbine oil.

9. Filling and Filling Control

9.1 Filling Quantity

The quantity of oil filled shall lie within 40% ~ 80% of the total volume, quantity beyond these limits is not allowed, particularly, a coupling must not be fully filled.

For filling above 80%, the rise in temperature during operation or overload will induce excessive internal pressure causing the coupling to leak or even causes serious damages.

For filling below 40%, insufficient lubrication to the bearings will cause higher noise and early failure.

9.2 Sequence of Filling

1. After the coupling is installed, turn it until the Filler Plug and Fusible Plug are both on the top.
2. Unscrew Filler Plug and Fusible Plug.
3. Fill in appropriate amount of oil (refer to 6.2 "Detrmination of filling quantity"), the oil must pass through a 80 ~ 100 mesh filter, any particle in the oil will cause serious wear to the coupling.
4. Screw back and tighten the Fusible Plug.
5. Turn the coupling slowly until oil start to flow out from the Filler Hole, measure and record down the height of the centre of Filler Hole to ground. Also mark this height on the motor or protective cover so that the oil level can be easily checked at any time.
6. Replace and tighten Filler Plug.
7. Special filling device and oil level checking device are required for a coupling mounted in vertical position.

9.3 Checking on Filling Level

The level of oil in the coupling shall be checked regularly to ensure no oil has leaked out. The following sequence shall be followed.

1. Turn the coupling until one of the Filler Plug is on the top.

2. Unscrew the Filler Plug.

3. Turn the coupling slowly until the centre of Filling Hole lies at same level as the mark on motor or protective cover made in above section 9.2 step5.

4. Oil should start to overflow, otherwise, there may be some leakage. Top up to original level with same oil.

5. Replace and tighten Filler Plug.

6. If step 4 reflects that there may be leakage, run the coupling for some time and check for oil leaking out. The coupling must be repaired if leakage is found.

10. Precautions

1. Direction of Rotation: The coupling can be used for both directions of rotation.

2. A protective cover must be installed over the coupling.

3. The driven machine shall start after the motor has run to speed, if the driven machine doesn't start, stop the motor immediately. Check whether the machine is blocked or whether there is appropriate amount of oil in the coupling.

4. Check the coupling regularly for any leakage. Leakage must be repaired before the coupling is put into use again.

5. During continuous operation, the temperature of oil must not exceed 90℃.

6. Check the oil after every 3000 hours of operation for aheing, change the oil if necessary. Do not mix different oils.

7. Check the Flexible Elements regularly for wear, replace worn Elements.

8. Check the alignment of motor shaft and output shaft regularly.

9. Never dismantle the coupling unless it is absolutely required. Couplings are dynamically balanced, mark relative position on parts before dismantling. Reassemble of the coupling must be carried out with utmost care on alignment of parts, tiFting of bearings and oil seal rings as well as cleanliness.

10. The Fusible Plug protects the coupling from overheated which may lead to serious damages to the coupling and even causes fire hazard. Never replace the Fusible Plug with a blind screw, a Fusible Plug of different response temperature or anything else.

11. A Star/Delta connection to the motor is not required unless for a weak power supply. In this case, set the changeover time from Star to Delta as short as short as possible (2 to 5 secomds).

11. Trouble Shooting

11.1 Driven Machine Cannot Reach Rated Speed

Cause	Action
1. Problem with motor or incorrect-connection to motor.	Check motor speed, connection and current.
2. Driven machine blocked.	Check for blockage and eliminate.
3. Insufficient oil.	Check oil quantity and refill.
4. Coupling leaks.	Cheek for leakage, repair and refill oil.

11.2 Core of Fusible Plug Melted

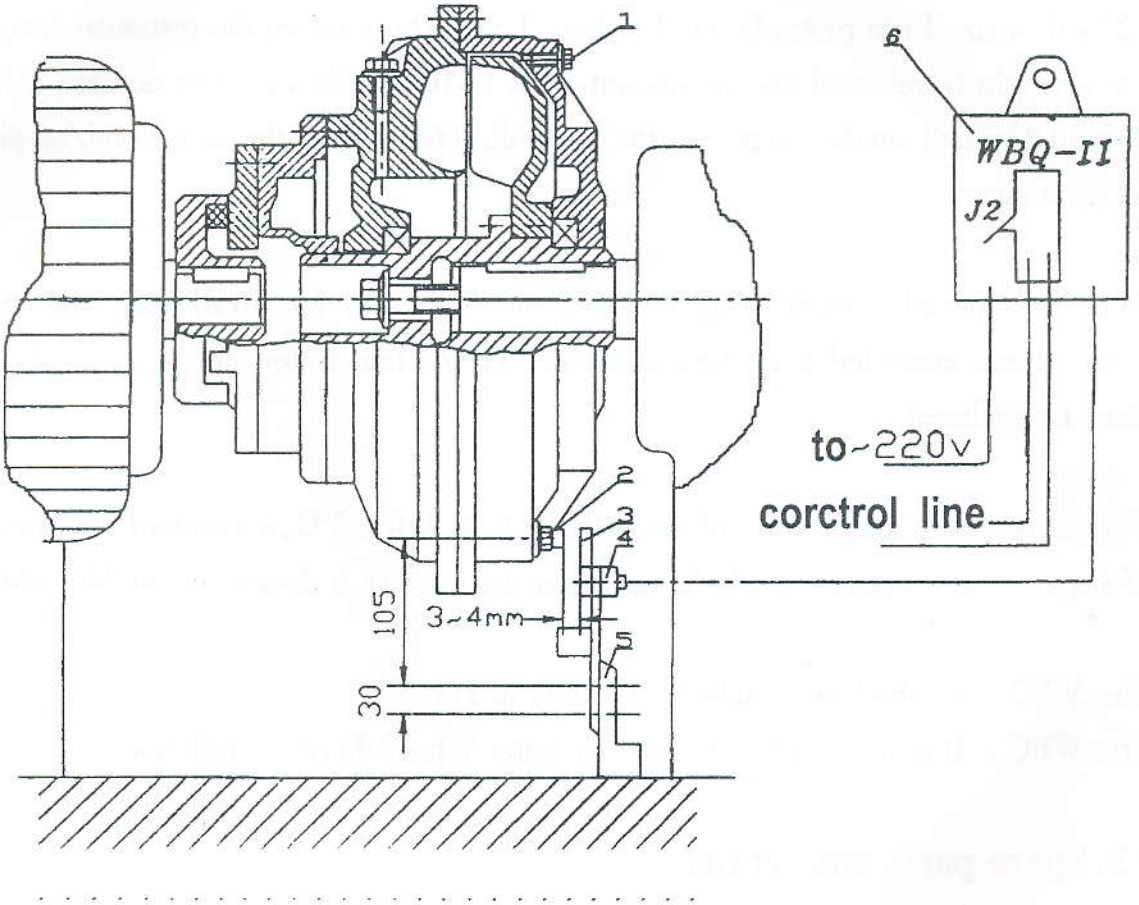
Cause	Action
1. Insufficient oil.	Check oil quantity and refill.
2. Coupling leaks.	Check for leakage, repsir and refill oil.
3. Coupling overloaded.	Check power rating of coupling and driven machine.
4. Driven machine overloaded.	Check loading condition on driven machine.
5. Driven machine blocked.	Check for biockage and elimminate.
6. Frequent starting.	Coupling is heated up on every starting, avoid frequent starting.
7. Frequent or prolong braking of driven machine.	Coupling is heated up on every braking, avoid frequent or prolong braking.
8. Motor remains in Star connection for too long.	Set changeover time for Star/Delta connection to minimum(2 – 5 second).
9. Incorrect Fusible Plug.	Use fusible plug of correct respond temperature.

11.3 Excessive Noise or Vibration

Cause	Action
1. Excessive misalingment on motor shaft and shaft of driven machine.	Check alignment and correct where necessary.
2. Bearings failed.	Check and replace Bearings, also Check that sufficient oil was filled.
3. Loose foundation.	Check and tighten foundation fixing xcrews, recheck alignment.
4. Worn flexible element.	Replace.

12. Mechanical Thermal Switch WBQ - Ⅱ

Fig.5: Installation Diagram of Mechanical Thermal switch WBQ - Ⅱ



Item No.	Description	Item No.	Description
1	Standard Fusible Plug	4	Limit Switch
2	Special Fusible Plug	5	Bracket
3	Lever	6	Controller

The Mechanical Thermal Switch WBQ – Ⅱ is an optional controlling device used to protect the coupling against overheating. Its main difference with the Fusible Plug is that is switches the motor off when response temperature is reached without loss of the working fluid.

Its construction and connection is shown in fig.5. It Consists of a special fusible Plug (2) with a small pin protrudin out by about 1 mm. On reaching the response temperature, the pin is released and moves out by 8 to 10 mm. It will then actuate a Limit Switch(4) which sends a signal to the Controller(6) to stop the motor and/or giving an alrm signal.

After the special Fusible Plug is actuated, the cause for overheating has to be checked and corrected according to section 11.2 Then a new Special Fusible Plug shall be replaced.

Normal response temperature of the WBQ – Ⅱ is 110 ± 5℃, a standard Fusible Plug of response temperature of 140℃ must also be used as a device for double safety.

The WBQ – Ⅱ shall be installed according to Fig.5.
The WBQ – Ⅱ is not suitable for use on Inner Wheel Drive installation.

13. Spare parts and service

On every coupling you will find its Serial Number Stamped on the aluninium Shell. In case you need any spare part or service, please inform us the Type of the coupling, its Serial Number and the part number and Part description (refer to Fig.1) at

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