

SINGLE LINE LUBRICATING SYSTEMS

MODEL : KEPS-16

MOTOR-DRIVEN LUBRICATING PUMPS

INSTRUCTION MANUAL

KOWA CORPORATION

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PRECAUTIONS OF SAFETY

Before the installation, operation, maintenance and inspection, read carefully this instruction manual and other accompanying documents for correct service.

Familiarize with the knowledge of equipment, information of safety and all of cautionary instructions for service.

The precautions of safety is shown in each equipment of the centralized lubricating system by using safety mark.

Particular attention should be called to the places where these safety marks are given.

The safety marks are divided into "WARNING" and "CAUTION".



If mishandled; In case a dangerous situation may occur, it could result in death or serious injury



If mishandled; In case a middle injury or light injury, and in case a physical damage may occur.

For the matter being mentioned in the CAUTION, it may result in an importance according to circumstances. The important content is given to all of safety mark, and obey it without fail.

This system provides the max. working pressure 21MPa(210kg/cm²). When each equipment is disassembled and inspected, stop the operation of pump, and release the pressure to perform the operation as 0MPa(0kg/cm²).

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Introduction

Thank you very much for purchasing the KOWA SINGLE LINE LUBRICATING SYSTEM.

This Instruction Manual has been compiled as a practical guide for the operation and maintenance of lubricating system which incorporates the model KEPS16 motor driven lubricating pump.

All descriptions contained here in are based on the standard system, which may, therefore, be different from those of the purchased system. Such a problem can be solved by referring to the final specifications. However, it is required to understand that some changes caused by the modification of equipment may not be described in the final specifications.

Guarantee

The guaranteed period for this system will be one year from the commencement of operation.

Any defect or failure occurring during the guaranteed period, for which KWK is liable in design and manufacturing, shall be corrected and / or eliminated by KWK without compensation.

However, any defect or failure caused by improper operation which is not described in this Instruction Manual shall not be guaranteed, even though the defect or failure occurs within the guaranteed period.

1.CONSTITUTION

This system consists of the motor-driven lubricating pump which feeds grease & outside piping, measuring valve and the control panel for operating the system. The motor-driven lubricating pump being used for this system is provided with the lubricating pump body, motor and pump block on steel common base. Reservoir with indicator rod which reads the amount of oil is mounted on the top of pump body. Pressure gauge is attached to the pump block in order to read the discharge pressure.

The outside piping is connected to the single line measuring valve from one (1) lubricating main pipe, and furthermore the piping is made from primary measuring valve to secondary measuring valve.

For the single measuring valve, its most suitable type is selected from the number of lubricating point and capacity.

In addition the control panel is provided for automatically operating the lubricating system, and also the filling pump is provided for supplying the fresh grease to the reservoir of motor-driven lubricating pump.

2.SPECIFICATION OF EQUIPMENT

(1) Motor-driven Type Lubricating Pump

Section of constitution	Item	Type & Specification of lubricating pump
		KEPS-16
Pump body ※2	Grease	NLGI No.00~No.1
	Discharge capacity (cm ³ /min)	37/50Hz, 45/60Hz
	Discharge pressure	Max.20.6MPa
	Pump's revolutions (rpm)	75/50Hz, 90/60Hz
Reduction gear motor ※3	Motor type	Totally-enclosed, Three-phase induction motor, Continuous, rating, Class "E" insulation
	Output, Pole	0.1kW, 4P
	Reduction gear ratio	1/20
	Voltage, Frequency	AC200/220V, 3 ϕ , 50/60Hz AC400/440V, 3 ϕ , 50/60Hz
Reservoir	Capacity	6 lit.
	Level switch	Low level switch 1-stage
Pump block	Adjustable range of pressure switch	8~19MPa
	Outside connections	Rc(PT)3/8
Gross mass	43kg	

※1 : For the outside dimensions and the internal construction, refer to the principal equipments drawings at the end.

※2 : In case of the motor's synchronous operation.

※3 : Make sure of the voltage & frequency by the final specification.

3.CONSTRUCTION AND PREFORMANCE OF MOTOR-DRIVEN LUBRICATING PUMPS STATION

(1) Lubricating pump body

The lubricating pump body is located below the reservoir.

The power is transmitted to the cam shaft via reduction gear from the motor.

Then, the cam is turned.

The reciprocating motion of two plungers is made by the turning of cam.

Grease is sucked from the reservoir by the function of check mechanism, and is discharged to the outside from the discharge port.

The suction of grease is accomplished in the return process by the plunger guide, and the discharge is performed in the push process by the cam.

Grease is alternately discharged by two plungers. Since the oil line is by-passed internally, the discharge port provides one (1) port.

(2) Reservoir

The reservoir is provided for storing the grease.

In order to make the top of grease flat and to prevent the foreign matter from mixing, the inside is furnished with the follower plate.

The center of follower plate is vertically provided with the level rod, and it is Capable of monitoring the oil level from the outside. The top of level rod is provided with a cylindrical cam for level switch.

With excessive filling of grease, the top is provided with a relief port so that the grease can overflow.

i) Low level switch

With the consumption of grease, the storage of grease reduces in the reservoir.

When the grease reaches the minimum, the cam of level rod actuates the limit switch.

(3) Pressure switch

Pressure switch is installed in the pump block. Its purpose is to sense thereby when the system pressure of line increases abnormally owing to the clogging or the measuring valve's choking in the single line lubricating system.

The pressure switch is capable of performing the adjustment of 8MPa~19MPa : a clockwise motion of the screw will increase the pressure, and a counterclockwise motion of the screw will decrease it.

4.SINGLE LINE MEASURING VALVE

The single line measuring valves (KL, KM, KJ types) are made of a high carbon steel.

The basic construction of these valves is such that the M-block having a measuring function of one or two ports is sandwiched by an I-block (the block into which lubricant makes entry) and an E-block (final block). The M-blocks having the discharge port can be combined as desired from minimum 3 pieces up maximum 8pieces.

The discharge capacity and the number of discharge ports are set by selecting the number of the M-blocks. The original gaskets are used in the combination of these blocks to provide superior sealing performance. Each discharge port is provided with check valves to prevent back flow.

5. TEST OPERATION

(1) Confirmations before Test Operation

Before the test operation, it is confirmed that the installation, piping and wiring are made.

(2) Grease Filling to Reservoir

Carefully supply the grease by the filling pump to prevent the entry of dust or air from the supply hole (snap on hose coupling) at the side of lubricating pump body.

〈NOTE〉: Removing the cover and follower plate of the reservoir and filling the grease from the top cause any trouble, and never conduct it.

(3) Direction of Pump's Rotation

Turn the main power switch and the operation switch and the operation switch to on, and instantaneously run the motor to make sure of the direction of rotation.

The problem is not in both a right rotation and a left rotation.

(4) Selection of Grease

Grease includes various kinds, and is respectively different in quality and characteristics. Hence select the grease adaptable for the service conditions from the following recommended grease.

Ordinarily, any grease is applicable within the range of NLGI standard No.00~No.1 (fluidity 430 to 310).

Note:

1. Molybdenum or graphite-filled grease

Solid lubricant is on will affect the life of the pump (wear).

If the particle size is 1 μ m or less, it can be used almost without problems.

If the particle size is about 1~3 μ m, it can be used. But wear becomes violently.

It can not be used if the particle size is greater than 3 μ m. (Pump life will be extremely short.)

2. Grease containing metals in powder form such as copper and zinc can not be used.

Name of company	Brand
ESSO Standard oil Co.	LITHTAN No.0~1 LITHTAN EP No.0~1
Shell international Petroleum Co.	ALVANIA EP GREASE No.0~1 ALVANIA GREASE No.0~1 EP GREASE No.0~1
Mobil oil Co.	MOBIL PLEX 45,46 MOBILUX 1

(5) Flushing

Foreign matter such as spatter & dust in the piping cause the malfunction in the measuring valve as well as the failure of bearing. Hence perform fully cleaning in the piping.

6.MAINTENANCE-INSPECTION

(1) Grease replacement of Reduction Gear Motor

With the shipping, the grease is already charged in the reduction gear.

However, after starting the operation, replace the grease with new one for each 20,000 hours (4 to 5 years).

Method of supply	Amount to be supplied	Brand
Filling after the cleaning of the inside	0.27kg	NIPPON GREASE NIGHTIGHT LMS No.000

In the case when the other maker's grease is employed, make inquiries about it.

(2) Cautionary Instructions in case of Grease Supply

i) Grease supply port is provided with filter.

When the grease is supplied, its filter prevents foreign matter from flowing in. If foreign matter collects in quantity, it results in increased supply pressure. Therefore, perform the cleaning as required.

ii) If the grease is mixed with other brand, it is liable to change in quality of grease.

When it is desirable to change the brand, refer to the opinion of oil & Grease Makers.

(3) Check

Periodically check the following items :

- i) Lubricating time, discharge pressure
- ii) Leakage of piping
- iii) Failure of equipments
- iv) Residue in the grease reservoir and grease can

7.FAULT FINDING AND REMEDIES

No.	Fault	Possible Cause	Remedies
1	Even if the starting button is depressed, the pump does not start.	Power is not turned to ON.	Turn the power switch operation switch to ON. Check to see if the power is turned ON to the primary side.
		Fuse or breaker drops.	Turn the Molded Case Breaker to ON. Replace the fuse.
		Disconnection of motor circuit.	Repair and check of wiring.
2	Alarm lamp goes on. Even if the clear button is depressed, the alarm button goes on, and pump is not capable being operated.	Reservoir is emptied.	Supply the grease by the filling pump.
		Overload of motor. Galling of reduction gear.	Check & repair. Replacement of reduction gear.
		Disconnection of motor circuit. (Voltage is exerted upon two-phase only of three-phase.)	Repair of wiring or replacement of motor.
		Pressure switch goes ON.	Decrease the pressure in the piping.
3	The needle's movement of pressure gauge for pump is large.	Mixing of the air in the piping.	Release the air in the piping.

No.	Fault	Possible Cause	Remedies
4	<p>Alarm lamp goes on.</p> <p>The clear lamp is depressed. (Or the operating power supply is once turned off.)</p> <p>When the operation is conducted, the pump runs. The alarm lamp soon goes on, and the pump stops.</p>	(1) Lubrication is delayed.	
		a. Galling of plunger or its breakage.	Replacement of cylinder plunger.
		b. Shortage of discharge capacity or discharge pressure caused by wear of cylinder plunger.	Replacement of cylinder plunger.
		c. Check valve is catching dust.	Disassembly & cleaning : When there is any failure on the steel ball & seat surface, perform the replacement.
		d. Air is included in the pump.	Loosen the air vent of pump block, and operate the pump until the air is eliminated. When the air collects in the reservoir, remove the supply hole to discharge the grease.
		e. Since the service grease is hard, the suction is not made.	Replace it with soft grease.
		f. Leakage and disengagement.	Repair of piping.
		g. Improper setting of protective timer.	Reset.
		h. Improper function of pressure switch.	Check or repair of pressure switch.
		(2) Abnormal high pressure occurs.	
		a. Measuring valve is choked.	Disassembly and cleaning

		b. Piping is choked.	Repair of piping.
No.	Fault	Possible Cause	Remedies
4		c. Bearing is choked.	Examination and correction of bearing.
		d. The discharge port of measuring valve is plugged.	Make the correction as per the plan.
		e. Erroneous setting of pressure switch.	Reset.
5	High operating sound or abnormal noise of pump.	Wear.	Check and repair of reduction gear & lubricating pump body.
6	Water collects in the reservoir.	a. Improper properties of the supplied grease.	Check the grease, and make inquiries to the oil grease makers about it.
		b. Pump is sprinkled with water.	Fit up the cover.
		c. Defective check valve or it is forgotten to fit up. (In case of water-wheel)	Installation or disassembly. Cleaning of check valve.

8.DISASSEMBLY – REASSEMBLY

(1) Replacement of Cylinder – Plunger set

*Since the cylinder plunger is precisely machined, perform the replacement in the set without fail.

- 1-1. Method of removal of cylinder-plunger set washing oil, waste cloth as well as tools are used.

Select a clean working place. With incorporation, care must be exercised not to mix the foreign matter.

- a. Remove the grease in the reservoir.

Take out the joint at the filling port, and push in the level rod of reservoir, and the grease flows out.

- b. Remove the reduction gear motor.

Since the grease remaining in the reservoir flows out, receive it using the waste cloth etc.

- c. Cylinder is set by using C-type snap-ring from the inside. Hence it is readily pulled out by the pliers for snap-ring.

1-2. Method of incorporation of cylinder plunger set

- a. Apply the grease to the periphery of cylinder set, and smoothly put it in the body.

- b. Put the cylinder set, and set C-type snap-ring by using the pliers for snap-ring. Then, the attention should be taken not to deform extremely C-type snap-ring.

- c. Set so that the suction port of grease can provide the upper part.

- d. Apply the grease to the periphery of plunger set, and smoothly put it in the cylinder. Place the plunger guide therein to incorporate it in the cylinder.

- e. Alternately push the plunger by hands, and make sure that it moves smoothly to the right and left.

- f. When the octagonal nut of cylinder set moves in the paragraph b, slightly fix the cylinder set, and again fix by the set-screw.

(2) Incorporation of Reduction Gear Motor

- a. Make sure that the cam is securely fixed to the shaft.

- b. Incorporate the reduction gear motor in the body to prevent the plunger and cam from the failure.

- c. Tighten four (4) bolts diagonally, and avoid the unequal fastening.

9.SINGLE LINE MEASURING VALVE

DISASSEMBLY · REASSEMBLY

When the malfunction of measuring valve occurs owing to the foreign matter, remove the foreign matter by the disassembly and cleaning of measuring valve.

In case of the disassembly and reassembly, take care of the following:

(1) Basic matter

- 1) The measuring valve is precisely manufactured, and therefore care must be taken to prevent the piston and hole from causing damage.
- 2) Prior to disassembly, make the memorandum of the positions of arrangement, piping connection port, plug with the actual measuring valve watched. For reassembly, care must be paid not to mistake.
- 3) Select a clean working place. In case of the incorporation, care must be taken to prevent the foreign matter from entering.
- 4) The torque wrench service is required.
- 5) The packing which once used is not capable of employing. Hence prepare new packing. (Place an order with us or our agent.)
- 6) Washing oil service is required.

(2) Cleaning of piston

- 1) Remove the hexagon socket washer head plug.
- 2) Depress the piston using a small round bar, and ensure that it moves smoothly, and then find the inoperative piston.
- 3) If there is inoperative piston, depress it from the opposite side, and it may take out easily.
- 4) Since the fitting of piston and piston hole is made precisely, care must be exercised not to cause the burr in the piston and the hole.
- 5) Since the piston must be incorporated in the original body without fail, provide the marking so that it can be known thereby whether it is the piston of any body.
- 6) Carefully strike outwards the inoperative piston by setting the round bar thereto.
- 7) Repair of flaw of piston

Remove the flaw using oil stone or sand paper (#600).

As the clearance between piston and piston hole is very precisely made, remove the flaw only without narrowing the piston.

8) Flaw of piston hole

It requires the repair by honing. However, it is not capable of repairing on job-site.

- 9) Upon the completion of repair of piston, clean the piston by the washing oil.
Then, apply a clean grease thereto, and put it in the piston hole which care.
Surely incorporate it into the piston hole in which its piston is put.

- 10) Tighten the hex socket washer head plug. Then, tighten so that the copper washer can provide the center.

(3) Disassembly-Reassembly of Measuring Valve Body

Each block of measuring valve is connected by tie bolts (KJ-type; 2pcs, KM-type, KL-type; 4pcs). If these blocks are loosened, each block separates.

The block is sometimes adhered by the packing, and then strike by the plastic hammer to separate.

Reassembly:

- 1) Incorporate the body in the tie bolt. Then, perform as per the first incorporation so as to mistake the order.
- 2) New packing is employed for packing.
- 3) Clamping torque of tie bolt

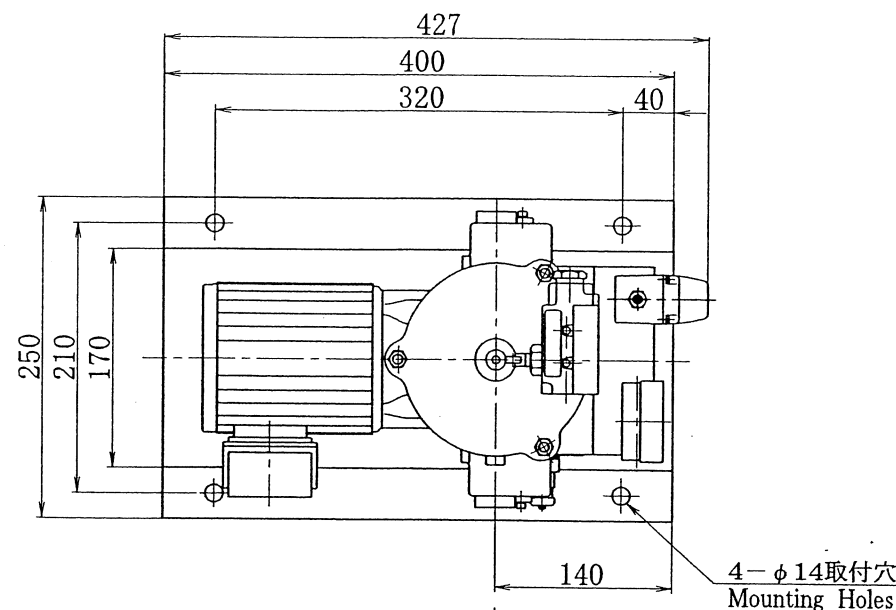
Careless tightening of tie bolt results in inoperativeness. Surely tighten diagonally by the torque wrench and gradually tighten up to the clamping torque.

KL-type measuring valve	700 kgf · cm
KM-type measuring valve	300 kgf · cm
KJ-type measuring valve	150 kgf · cm

(4) Inspection

Upon the completion of all operation, connect to the grease gun, and actually feed the grease, and then make sure that the measuring valve is securely actuated. If the actuation is made within 1.5MPa (15kg/cm²), it is normal.

図 面 来 歴	
△	圧力スイッチ変更。(メーカー変更のため。) '98. 11. 24 下野
△	モータ圧力スイッチ変更。(メーカー変更のため。) 2002.10.10 下野
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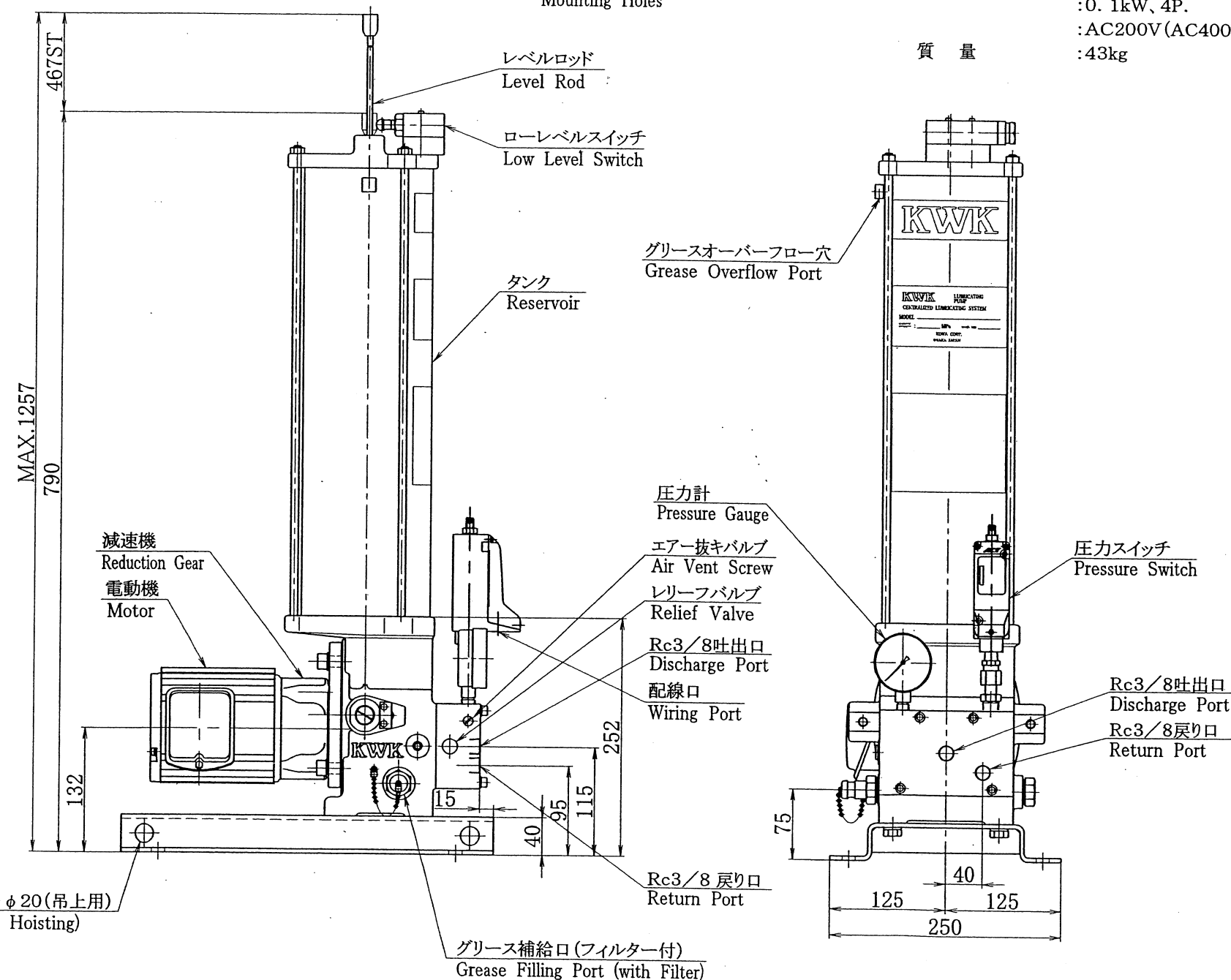


仕様

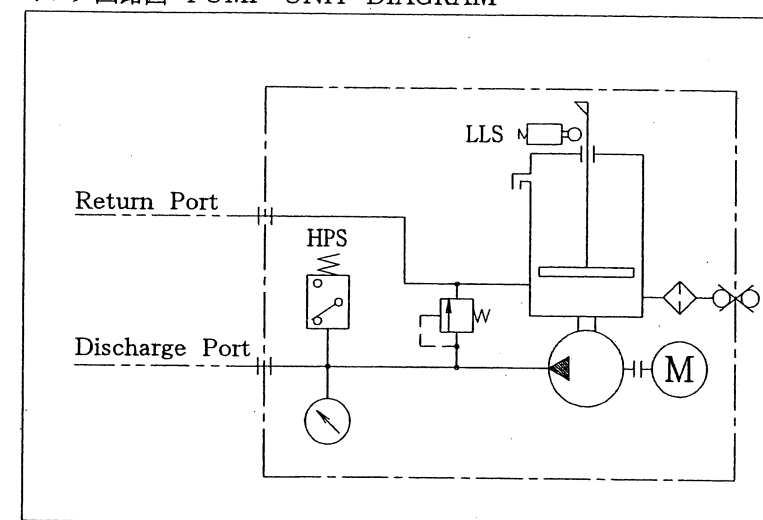
形 式	: KEPS-16
駆動方式	: 電動式
吐出圧力	: 20.6MPa(Max.)
吐出量	: 37/45cm ³ /min. (50/60Hz)
	: 0.5cm ³ /ストローク
減速比	: 1/20
ポンプ回転数	: 75/90rpm. (50/60Hz)
タンク容量	: 6lit.
配管方式	: シングルライン方式
圧力スイッチ設定値	: 18MPa (工場出荷時)
電動機	: 三相全閉形誘導電動機
	: 0.1kW, 4P.
	: AC200V(AC400V)
質 量	: 43kg

SPECIFICATION

Model	: KEPS-16
Driving system	: Motor drive
Discharge pressure	: 20.6MPa(Max.)
Discharge capacity	: 37/45cm ³ /min. (50/60Hz)
Reduction ratio	: 1/20
Pump revolution	: 75/90rpm(50/60Hz)
Reservoir capacity	: 6lit.
Piping system	: Single line type
Operation pressure of pressure switch	: 18MPa(Standard operation pressure)
Electric motor	: Three-phase induction motor (Totally Enclosed Type)
	: 0.1kW, 4P., AC200V, (AC400V)
Mass	: 43kg

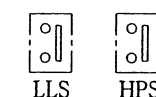


ポンプ回路図 PUMP UNIT DIAGRAM

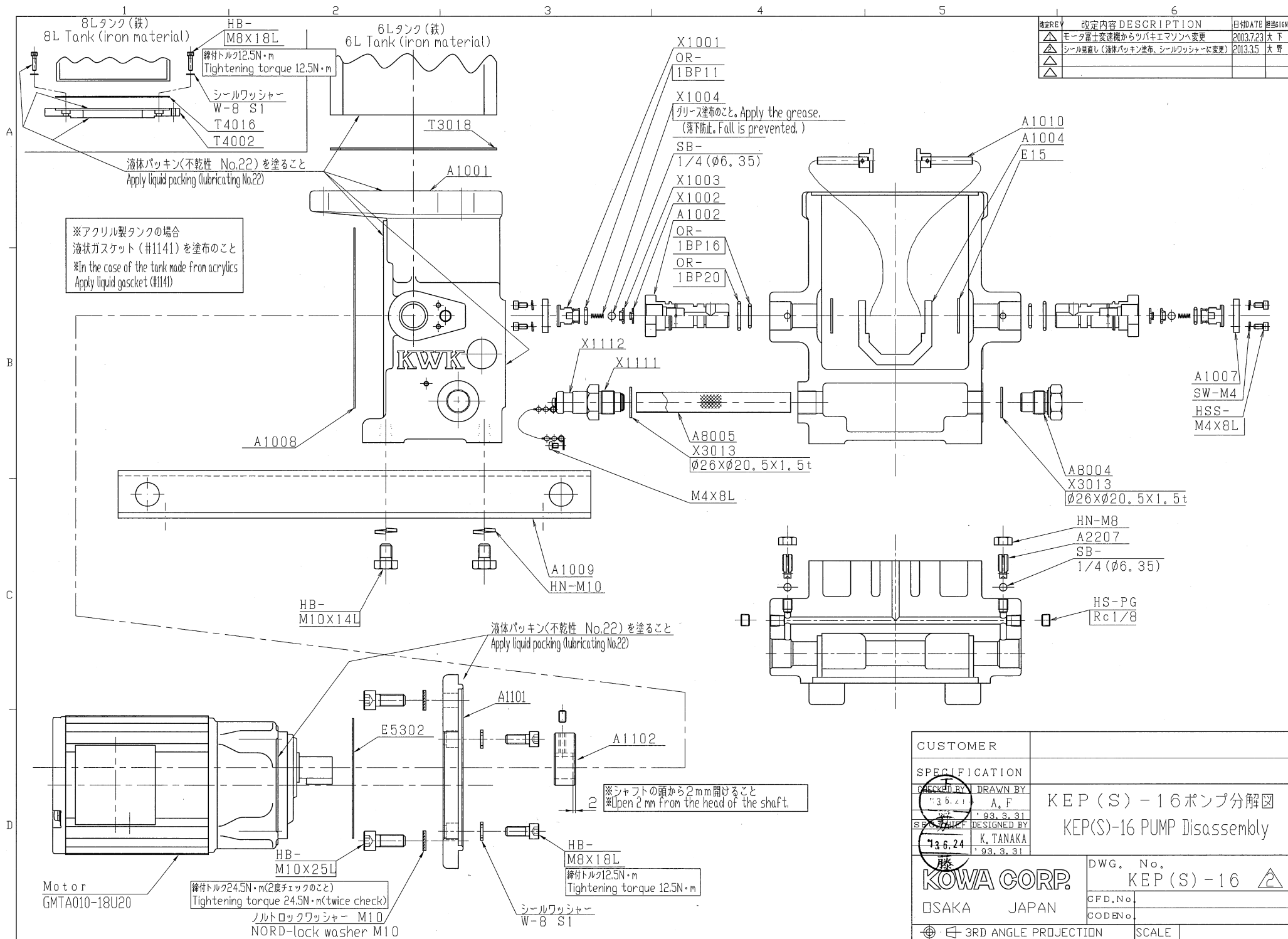


記号 Mark	名称	Name	配線 Wiring
HPS	圧力スイッチ	Pressure switch	0.75mm ²
LLS	ローレベルスイッチ	Low level switch of reservoir	1.25mm ²

電気配線図
ELECTRIC WIRING



CUSTOMER			
SPECIFICATION			
CHECKED BY	DRAWN BY	電動式給油ポンプ LUBRICATING PUMP (Motor-Driven Type) KEPS-16	
15.10.20	M.Shimono		
DESIGNED BY	DESIGNED BY		
M.Shimono	M.Shimono		
03.11.18	03.11.18		
KOWA CORP.			
OSAKA JAPAN			
3RD ANGLE PROJECTION		DWG. No.	KS-803918 △2
		CFD. No.	
		CODE No.	
		SCALE	1/4



改訂REV	改定内容 DESCRIPTION	日付DATE	担当SIGN
△	モータ富士変速機からツバキエマソンへ変更	2003.7.23	大 下
△	シール見直し(液体パッキン塗布、シールワッシャーに変更)	2013.3.5	大 野
△			

CUSTOMER			
SPECIFICATION			
CHECKED BY "3.6.21 A. F.	DRAWN BY "93.3.31 K. TANAKA	KEP(S)-16ポンプ分解図 KEP(S)-16 PUMP Disassembly	
DESIGNED BY "93.3.31 K. TANAKA			
KOWA CORP.		DWG. No. KEP(S)-16	
OSAKA JAPAN		CFD.No.	
		CODENo.	
3RD ANGLE PROJECTION		SCALE	