

**TEIKOKU CANNED MOTOR PUMP  
TEIKOKU CANNED MOTOR AGITATOR**

# **INSTRUCTION MANUAL**

**IECEX, ATEX(\*) and/or UKCA(\*)**

## IMPORTANT INFORMATION

- Before operating canned motor pump or agitator, read this “Instruction Manual” and “Caution Notes for Your Safety” to avoid wrong operation or work. It is essential for your safety and avoiding disaster.
- Keep this “Instruction Manual” near the pump or agitator to be available at any time.
- Check the standard of mark (\*) on the name plate.

## TEIKOKU CORPORATION

### **Plant & Business HQs**

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# 1. CAUTION NOTES FOR YOUR SAFETY TEIKOKU Canned motor pumps and agitators.

## FOR YOUR SAFETY (1)

The safety precautions are divided into 2 sections as follows.



**DANGER**

Ignoring this warning can cause serious injury or even death



**CAUTION**

Ignoring this warning can cause personal injury and/or damage to the pump



**CAUTION**

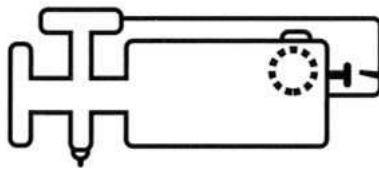
### DO NOT RUN DRY!

If the pump is allowed to run dry, the bearings and other components could be damaged and serious overheating of the motor windings can occur.

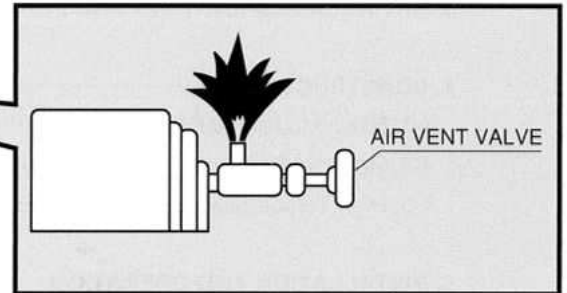


**DANGER**

### OPEN VENT VALVE SLOWLY!

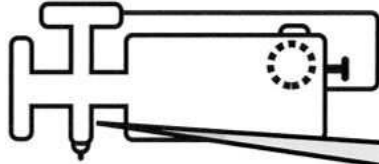


You must exercise caution, even when the pump is not operating, internal pressures can be high at any time. For toxic or high temperature liquids, proper safety methods must be observed.

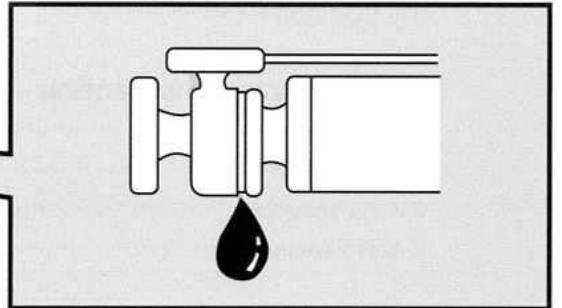


**CAUTION**

### AVOID RAPID TEMPERATURE CHANGES!

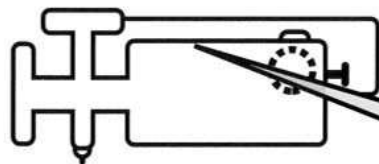


Large changes in temperature must be avoided. Rapid changes can cause leaks to occur in gaskets. Published procedures for proper heating and cooling must be followed. If published procedures are not available check with Teikoku before operating the equipment.

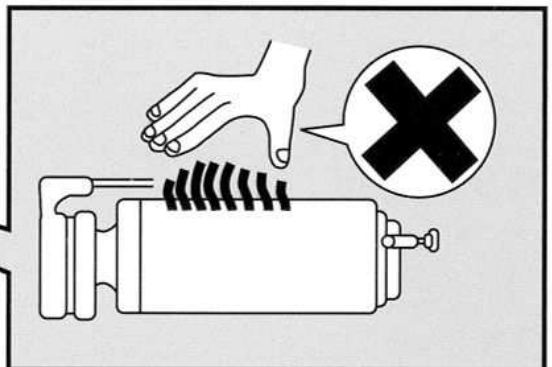


**CAUTION**

### HOT – DO NOT TOUCH!



Be very careful if the liquid inside the pump is hot or when the motor part of the pump does not have a cooling jacket.

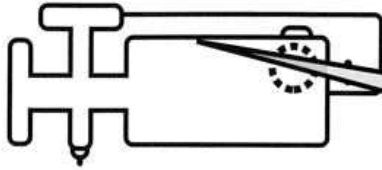


**FOR YOUR SAFETY (2)**

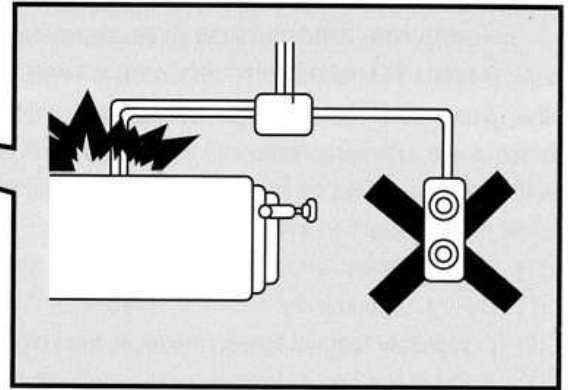
TEIKOKU Canned motor pumps and agitators



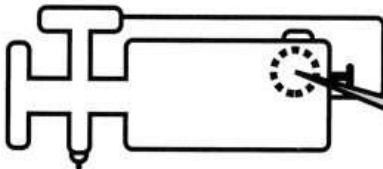
CAUTION

**IF MOTOR TRIPS, DO NOT RESTART BEFORE DETERMINING THE CAUSE!**

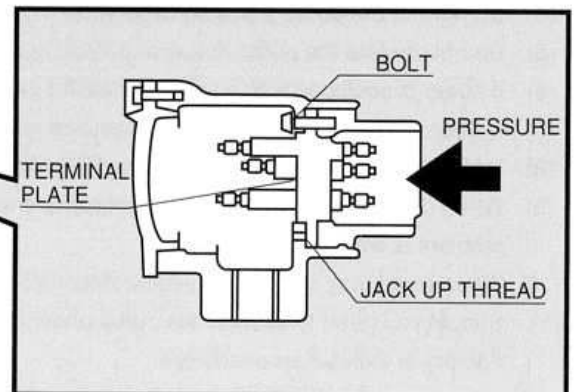
In case that over-current relay or thermostat is activated, investigate the cause. Restart the motor only after taking countermeasures. Restarting the motor before ascertaining the cause may result in excessive heat, causing pump or motor failure.



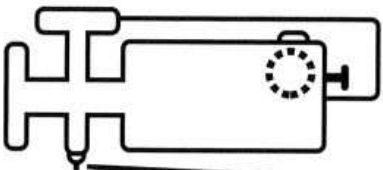
DANGER

**DO NOT REMOVE INTERNAL BOLTS IN TERMINAL BOX!**

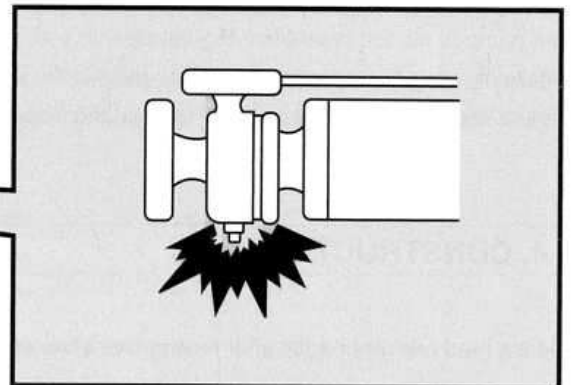
It is necessary to remove the terminal box for any reason, first loosen the bolts by 2 or 3 turns to check if any internal pressure or liquid is present. You must take measures if the possibility exists that the gas or liquid is toxic or hazardous to personnel or the



CAUTION

**DO NOT REMOVE ANY BOLTS ON PUMP, MOTOR OR DRAIN PLUGS!**

The internal pressure can be higher than the atmosphere. Ensure that the pump and motor are properly depressurized and decontaminated prior to performing any work. Proper protective measures must be taken if the possibility exists that the gas or liquid is toxic or hazardous to personnel or the



CAUTION

**ALWAYS ASSUME THAT THERE IS LIQUID LEFT IN THE PUMP!**

There is always the possibility that residual liquid could remain in the pump and motor in spite of through decontamination. Pay particular attention to the clearance between the shaft and the impeller, bearings, sleeves, bearing housings, internal bolting and gaskets. You must take adequate precautions to protect personnel and the environment if the liquid could be considered hazardous.

## 1. PREFACE

This is the common instruction manual meant for the standard models of Teikoku Canned Motor Pumps and Agitators.

- Website URL: <https://www.teikokucp.co.jp/products-top/support/>

In regards to the respective customized design, please refer to the adherent customized manual.

The followings must be kept strictly in practice in relation to the operation of Teikoku Canned Motor Pumps or Agitators.

- (1) Do not run pump or agitator dry.
- (2) Completely remove foreign solid materials from piping, system and tank before operation.
- (3) Venting must be completely done before the continuous operation.
- (4) Do not run the pump with discharge valve closed for overtime.
- (5) Do not run the pump or agitator by reverse rotation.
- (6) If pump or agitator is equipped with cooling or heating jackets, do not operate it without running the required amount of coolant or heating media to these jackets first.
- (7) No sooner any abnormal noise or vibration is detected than you find the causes and make proper amendments.
- (8) Do not keep the pump or agitator running when TRG (Teikoku Rotary Guardian) meter indicates to RED zoon.
- (9) When any protection device triggers, never restart the pump or agitator till you find the root cause thereof and the amendments are properly made.
- (10) When the pumping fluid has the nature which might possibly freeze or crystallize during the shutdown of the pump or agitator, the proper countermeasure should be taken to prevent it in advance.
- (11) Do not operate the pump or agitator under different condition from the nominal specifications.

## 2. RATING, SPECIFICATIONS AND PERFORMANCE

The pump or agitator is manufactured in accordance with your specified requirements. Please refer to "Drawings for Confirmation" for the details of rating and specifications. Pertaining to the base performance parameters, please refer to the "Test & Inspection Report". Please be responsible to keep these essential documents together with this instruction manual in store.

## 3. Unpacking and Conveyance

### 3-1. Unpacking

- (1) Inspect the packaging and the content whether they have suffered any damage during the transportation or not.
- (2) Inspect whether no deficiency is found with the spare parts and accessories, etc.
- (3) Inspect the nameplate whether the data thereon perfectly tally with the required specification or not.
- (4) In case the delivered goods has been found damaged during the transportation, please liaise with the transporter or with us right away.

**3-2.Storage**

If the delivered pump or agitator is to be stored for a long time, please store it in the virgin condition upon the reception thereof with the proper additional rust-prevention on it. In prior to being put into operation, please assure that the insulation of the power-supply terminals against earth is not less than  $10M\Omega$  by a mega-tester charged by 500V. If it is found less than that, please liaise with us.

**3-3.Conveyance**

Check the pump or agitator weight specified on the dimensional drawing compiled in "Drawings for Confirmation". With the reference to it, convey the pump or agitator carefully so that pump or agitator may not be damaged. If a crane is used for such conveyance, lift it up by slings tied on the center of gravity around the motor-frame, and convey it to the installation site. Slings must be strong enough for lifting of goods of this weight.

## REQUIREMENTS FOR PUMPS OR AGITATORS TO BE RETURNED FOR REPAIR

From the view points of pollution control and safety of workmen when you need repairs and return chemical pumps or agitators to us. Please pay special precautions to the remaining liquid in pumps and motors.

1. Before you dispatch pump or agitator to us, please advice us damaged conditions. The name of liquid and handling care of the liquid and so on and attach them also to the pump or agitator.
  
2. Almost care should be taken for the pump or agitator which handles following fluid.
  - (1) Toxic material listed in the law of water pollution control.  
Cadmium (Cd) and its compound, cyanide (CN), organic phosphoric acid compound, lead (Pb) and its compound, Cr (VI) compound, arsenic (As) and its compound
  - (2) Contaminants listed in the law of water pollution control  
n-Hexane extracts, phenol, copper (Cu), zinc (Zn), dissolved iron, dissolved manganese, chromium (Cr), flurine (F)
  - (3) Poisonous liquids
  - (4) Explosive liquids
  - (5) Toxic gasifying liquids
  - (6) Liquids with bad smell
  - (7) Strong acid and alkali
  
3. Pump or agitator handling the above fluids should be treated in the following manner:
  - (1) Completely disassemble pump or agitator into parts.
  - (2) Wash pump or agitator completely according to 4. Procedure of washing.
  - (3) In case there are any possibilities of break of casing jacket (for pump) or heat exchanger, those shall also be washed completely.
  - (4) Re-assemble pump or agitator and sent to us.
  
4. Procedure of washing
  - (1) After liquid draining, disassemble pump or agitator in accordance with the instruction manual.
  - (2) Wash out remained liquid in casing (for pump), impeller or propeller, rotor assembly and bearing housings.
  - (3) Circulation pipe and tubes of heat exchanger shall be washed out.
  - (4) As for stator assembly. Wash all wetted parts in stator assembly including bolt holes and screws.
  - (5) In case stator can is broken due to corrosion and/or winding is spoiled. Terminal box shall be removed first.  
The terminal box can be removed from the stator by using jack screw. There might be a case that gas bursts out when terminal box is removed, so please do not face to it during the work. When liquid is in stator winding, supply washing water from the opening for 1 to 2 hours continuously. After washing is completed, drain all water.



# IECEX and/or ATEX Instruction manual addendum sheet

## TEIKOKU CANNED MOTOR PUMP / TEIKOKU CANNED MOTOR AGITATOR

### 1. Introduction

This pump or agitator has been designed for use in potentially explosive atmospheres and conforms to the IECEx system by Certification Bodies / ATEX directive 2014/34/EU ('ATEX' – Atmospheres Explosibles) by Notified Bodies / UKCA regulations SI 2016 No.1107 ('UKCA' – United Kingdom Conformity Assessed) by Approved Bodyis. This sheet should be kept with the instruction manual. **Please retain it safely for future reference.**

### 1-1 Application

- (1) This canned motor pump or agitator has been marked on the name plate with regards to the Ex protection. Please see NAME PLATE drawings.
- (2) In using a canned motor pump or agitator in a hazardous area, please check that the installed equipment is of explosion proof structure corresponding to the classification of a hazardous area, or that such characteristics are indicated in the product datasheet and on the name plate. Note that the pump cannot be used if there is no indication of explosion protection marking.
- (3) The stator chamber and terminal box of canned motor pump or agitator can be designed optionally in the protection type (d) or (e).

The canned motor with pump or agitator is composed of the stator winding space with terminal compartment, the rotor space and the flange-mounted pump. The stator and rotor assembly are hermetically sealed with their individual cans. The stator chamber is isolated from the pumped (or stirred) liquid.

The rotor space will be connected to a pump (or tank). It will be permanently filled with pumping liquid avoiding formation of an explosive atmosphere. And the rotor space is not subject to zonal classification. If required, the liquid level is monitored.

- (4) To avoid potential static electricity hazards, avoid any charging mechanism stronger than manual rubbing of painting surface of pump.
- (5) The marking "II2G ck IIB (or IIC) TX (or T1 to T6)" on the name plate indicate for the explosion protected non-electrical equipment. Temperature class of non-electrical equipment is determined by the maximum liquid temperature handled in pump or agitator on the data sheet. When liquid temperature exceed 425°C, temperature class is indicated as "TX". The table below shows the maximum temperature of liquid handled in pump or agitator of each temperature class.

Table 1. Maximum temp. of liquid

Temperature class	Maximum temperature of liquid handled in pump or agitator
T6	75°C
T5	90°C
T4	125°C
T3	185°C
T2	280°C
T1	425°C
TX	X = Maximum temperature of liquid + 10°C

### 1-2 Installation

- (1) Before operation, be sure to connect the protection earthing terminal to the earth in accordance with IEC/EN60204-1. The protective conductor shall have a cross-sectional area of at least 10mm<sup>2</sup> Cu or 16mm<sup>2</sup> Al. In particular, when handling liquids with low conductivity (1000 pS/m or less), take safety precautions such as grounding of all piping and tanks to prevent ignition due to static electricity discharge.
- (2) Please perform the wiring work certainly without error referring to the connection diagram. Moreover, please tighten the wire connecting terminal screw completely. If the tightening screw is loosening, it will become the cause of loose connection and a rise in heat.

- (3) For conduit and cabling works, please perform them certainly based on IECEx requirements, ATEX directive (2014/34/EU), UKCA regulations (SI 2016 No.1107). Especially in the case of cable work, please check that the cable gland to be used is fully bound and its packing is effective. As a cable gland, it is necessary to use an IECEx / ATEX / UKCA -certified gland. The thread types of Metric, NPT or G-thread are available depending on the type. Actual type of thread and size are indicated in TEIKOKU MOTOR PUMP DATA SHEET. If G-thread are used, be sure class B according to standard ISO 228-1 (equivalent to standard JIS B 0202). If Metric-thread are used, be sure class 6H/6g according to standard ISO 68-1, 261, 262, 724, 965-1 (equivalent to standard JIS B 0205, 0209). If NPT-thread are used, be sure according to standard ANSI / ASME B 1.20.1.
- (4) Please seal every unused cable entry hole with an IECEx / ATEX / UKCA -certified explosion proof plug.
- (5) When closing terminal covers, please check that there is no foreign body to the bonded surface of terminal boxes and covers. If adhered foreign bodies are found, please wipe them off with a cloth. Please attach a gasket and tighten removed bolts and spring washers evenly and securely. Please do not use anything other than the supplied bolts.
- (6) For cable and cable gland selection, please consult with TEIKOKU to select appropriate ones.
- (7) For speed/torque curves for machines intended to be supplied by a converter, please refer to the pump datasheet.
- (8) For the selection and installation of any necessary overload protection or overtemperature protection of the motor, please refer to the pump datasheet.
- (9) The torque for the threads and stripping length for the conductors of Ex component parts, please refer to the table of Ex component parts used in terminal box.

Table. Ex component parts used in terminal box

No	Name	Model	Manufacturer	Marking	IECEx certification number	ATEX certification number	UKCA certification number	Technical information
1	STUD BUSHING	PD8/1100 PD12/1100 PD16/1100 PD20/1100	Emil A. Peters GmbH & Co. KG	Ex db eb IIC Gb	IECEx PTB 08.0052U	PTB 98 ATEX 1068U	None	Thread-torque M8-10N·m M12-25N·m M16-50N·m M20-85N·m
2	LINE BUSHING	07-9602-B063G XH1	BARTEC GmbH	Ex db eb IIC Gb	IECEx CML 14.0003U	CML 13 ATEX 1009U	None	None
3	FEED-THROUGH MODULAR TERMINAL BLOCK	264-120	WAGO Kontakttechnik GmbH & Co. KG	Ex eb IIC Gb	IECEx PTB 04.0003U	PTB 98 ATEX 3129U	None	Strip length 8...9mm
4		MSB2,5	PHOENIX CONTACT GmbH & Co. KG	Ex eb IIC Gb	IECEx PTB 08.0048U	PTB 08 ATEX 1075U	CSAE 22 UKEX 1245U	Strip length 8mm
5		MUT2,5	PHOENIX CONTACT GmbH & Co. KG	Ex eb IIC Gb	IECEx SEV 13.0012U	SEV 13 ATEX 0178U	CML 22 UKEX 1226U	Strip length/torque 9mm/0.5...0.6 N·m
6		SSK 0525 KER-EX	PHOENIX CONTACT GmbH & Co. KG	Ex eb IIC Gb	IECEx KIWA 17.0009U	KIWA 17 ATEX 0022U	CSAE 22 UKEX 1188U	Strip length/torque 9mm/0.5...0.6 N·m

- (10) Do not disassemble the TRG, THG™ I, or THG™ II meter cable and cable gland.

### 1-3 Operation

- (1) Before operating this canned motor pump or agitator, it is required that the rotor cavity is permanently filled with pumping liquid, so that the atmosphere in the rotor compartment is not explosive.  
If the operator of the system cannot guarantee this condition, adequate monitoring devices shall be provided (e.g. liquid level gauge, dry-run protection relay, or others).

- (2) As for pump or agitator with a cooling jacket and/or a heat exchanger, please be sure to operate them after flowing cooling water in an amount more than the regulation flux indicated in the data sheet and apparatus' nameplate. Set the cooling water entrance temperature to 35°C or lower.
- (3) In case of the XG type, the liquid level in the pot shall be monitored with a level gauge. When the liquid level on the level gauge is not visible, the liquid shall be supplied.
- (4) When a damaged sight glass of a pot assembly for XG type is found, stop the pump operation immediately.
- (5) Please operate pump or agitator at a handling liquid temperature below the temperature condition indicated on the nameplate as "MAX. LIQUID TEMP. AT MOTOR INLET \_\_\_\_°C". For pump or agitator with a heat exchanger, be sure to confirm that the heat exchanger outlet temperature is lower than the above-mentioned condition, "MAX. LIQUID TEMP. AT MOTOR INLET \_\_\_\_°C".
- (6) When it is necessary to open a terminal cover due to trouble occurrence, please be sure to cut power off and to check in the state under the no-voltage condition.
- (7) For motors of increased safety, the allowable locked rotor time is indicated in the data sheet. When a rotor is locked condition, please install, before operation, the protection device which can detect and cut off the bound current within these allowable locked rotor time

#### 1-4 Inspection & Maintenance

Though every electrical apparatus for explosion proof is designed and manufactured based on IECEx system / ATEX directive (2014/34/EU) / UKCA regulations (SI 2016 No.1107), it can stand up to a safe and prolonged use by performing maintenance or inspection once or twice a year. Please perform the work for inspection and maintenance, etc. in consideration of the following items.

- (1) Before performing inspection and maintenance, be sure to shut off the power supply. In addition, when the apparatus installation location has an atmosphere which cannot be judged to be a non-hazardous area, please move apparatus to a non-hazardous area, then perform inspection and maintenance.
- (2) Check whether the clearance has become larger than the normal condition or not due to rust on the bonded surface of terminal boxes and covers. A repair and overhaul of the flameproof gaps are only allowed according constructive information given from the original manufacturer. A repair according the values given in Table 2 or Table 3 of IEC60079-1(2014) is not permitted. If there is so much rust, remove rust carefully with a nylon abrasive scrubber paying attention not to damage the bonded surface, then apply noncombustible rust-proof oil

(grease\*<sup>1</sup>, etc.) on the bonded surface. After inspection, when closing covers, also check foreign bodies adhered on the bonded surface before mounting. Please be sure to attach a spring washer, and tight certainly tightening bolts of terminal covers. Please do not use anything other than the supplied bolts.

\*1 Applied grease: APLLOIL AUTOLEX A

Consistency Grade: NLGI Consistency No.2, Penetration 280

- (3) For any apparatus which did not open the terminal cover, we also recommend you check whether there is any loosen tightening screw.
- (4) Unless otherwise allowed, never remove bolts in a terminal box except for bolts of a terminal cover.
- (5) In an explosive atmosphere, there are a lot of places where corrosive gas exists. Rust-proof treatment is required if it seems that rust is generated on the surface of electrical apparatus. If there is so much rust, since it is also considered that the explosion pressure cannot be borne when explosion should take place inside apparatus, it is necessary to replace it with a non-defective product or repair it
- (6) Please check whether there is blockade or clogging inside the motor jacket or the heat exchanger. The inside of a jacket needs to be cleaned periodically. If rust and/or a scale will collect and cooling water will not fully flow, due to overheating a motor, there is a possibility of not only spoiling the life of winding but exceeding surface temperature required for explosion proof apparatus. In such a case, please stop the operation promptly, investigate the cause and take countermeasures.
- (7) In cable wiring, please check whether the cable is pulled by a loosened gland packing. If the gland packing is loosening, a cable may scoot down by its own weight. In this case, please retighten the gland packing, and check that it is surely tightened. It is recommended to replace the internal packing with a new one if needed.
- (8) In case of wiring using a conduit, please check that the compound in ceiling fitting is effective, and check whether the lock nut is loosening or not.
- (9) As an electrical check, please check that there is no looseness of a terminal part. The looseness of a terminal area may cause a heat generation, resulting in a burnout accident.

(10) Please measure the insulation resistance periodically. In case of explosion proof apparatus, there is a clearance, and the humidity which absorbed moisture once is not easily emitted to the exterior. Especially for apparatus with high start-stop frequency and those which had been stopped for a long time or which are installed outdoor, please perform priority inspection.

(11) Bearing

There is a possibility that a long-term operation makes it difficult to remove the bearings. Do not remove them forcibly. If there is nothing wrong with the following points, reuse them.

- ① Sliding surface (Luster, Scratches, etc.)
- ② Wear inside bore (Refer to Table 2)
- ③ Wear and tear on thrust surface

If replacement of bearing is needed, remove the Set Screw and take out bearing. Allowable Bearing Wear limits are identified in Table 2.

Table 2. Bearing Wear Limit

Motor Frame No.	$\phi A - \phi B$	L
118, 119	0.3 mm (0.012 inches)	44.2 mm (1.740 inches)
215, 216, 217	0.4 mm (0.016 inches)	49.2 mm (1.937 inches)
315, 316, 317	0.4 mm (0.016 inches)	59.2 mm (2.331 inches)
325, 326, 415, 416, 417	0.4 mm (0.016 inches)	69.2 mm (2.724 inches)
425, 426, 436, 515, 516, 517, 518	0.5 mm (0.020 inches)	78.2 mm (3.079 inches)
525, 526, 538, 615, 616, 617	0.5 mm (0.020 inches)	113.0 mm (4.449 inches)
625, 626, 636, 715, 716, 717	0.5 mm (0.020 inches)	119.0 mm (4.685 inches)
725, 726, 736, 727, 728, 815	0.6 mm (0.023 inches)	128.5 mm (5.059 inches)
825, 829	0.7 mm (0.028 inches)	163.5 mm (6.437 inches)

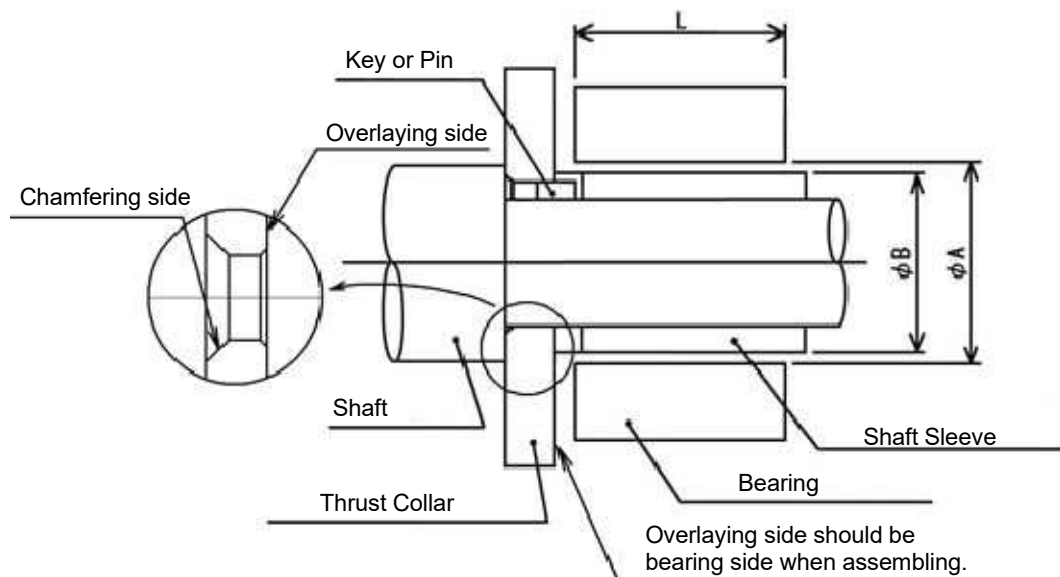


Fig-1

(12) When the necessity for repair arises exceeding the range of inspection, any user cannot perform any repair by itself in principle. Please consult to our nearest office or distributor.

(13) Do not disassemble TRG, THG™ I, or THG™ II by the customer. Explosion-proof performance may be impaired.

### 1-5 Recycle and Disposal

When Teikoku Canned Motor Pumps or Agitators need to be decommissioning, local authorities' instructions and laws shall be followed for recycle or disposal.

**1-6 Remarks**

The reference number of technical documents for explosion protected non-electrical equipment is;

**LCIE 16 AR 012**

**1-7 Subsidiaries (Importer)****•EU and EFTA****Teikoku Electric GmbH**

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TEL : +886-2-2567-9800 FAX : +886-2-2568-2670

- End -



To ensure continuous improvement in our service to you, We would appreciate hearing about your experience with our products and our job processing works.

## Customer Satisfaction Questionnaire

(Symbol) A=Excellent / B=Good / C=Average / D=Lower than average / E=Bad

	Description	<b>Please tick the relevant column in each item</b>				
		A	B	C	D	E
Product	Quality					
	Performance					
	Price					
	Design					
	Durability					
	Variation of products					
	Please write down your special advice or request, if any.					
Documentation work	1 <sup>st</sup> documentation submission period					
	Revision making to your comment					
	Manual(s) is easily understandable					
	Test report described all requirement					
	Please write down your special advice or request, if any.					
Logistics	Delivery time					
	Goods condition on receipt					
	Please write down your special advice or request, if any.					
Our staff in charge of your account	Manner					
	Frequency of visit					
	Knowledge of products					
	Provision of information					
	Complaints handling					
	Please write down your special advice or request, if any.					
Others	If any request, comment, please fill out					
Your company name						
Department, Title						
Name						
Date						

Please return your answer to Teikoku Electric GmbH  
 E-mail: info@teikoku-electric.de / Fax : +49-(0)211749-0011