Safety Precautions

Be sure to read this section before use.

When designing and manufacturing equipment using units, the manufacturer is obligated to ensure that the safety of the mechanism and the system that runs the electrical controls are secured. It is important to select, use, handle, and maintain CKD products appropriately to ensure their safe usage. Observe warnings and precautions to ensure device safety. Check that device safety is ensured, and manufacture a safe device.

WARNING

1 Use the product within the specifications range.

This product must be used within its stated specifications. Use with load or rotation speed outside the specifications range may result in unit damage, malfunction, or accuracy faults. In addition, never modify or additionally machine this product. This product is intended for use in general industrial machinery equipment or parts. It is not intended for use outdoors or for use under the following conditions or environments.
(Note that this product can be used when CKD is consulted prior to its usage and the customer consents to CKD product specifications. The customer should provide safety measures to avoid danger in the event of problems.)

❶Use for special applications including nuclear energy, railways, aircrafts, marine vessels, vehicles, medicinal devices, Components or applications coming into contact with beverages or foodstuffs, amusement devices, emergency operation (cutoff, release, etc.) circuits, press machines, brake circuits, or safety devices or applications.

❷Use for applications where life or assets could be significantly affected, and special safety measures are required.

2 Do not touch movable parts while the unit is operating.

This may lead to injury.

3 Do not stop the input shaft suddenly during unit output operation.

❶Sudden stop of the input shaft with an inverter, etc., causes load torque exceeding the design value to be applied. This may cause the table, etc., to overrun due to unit damage, resulting in injury or damage to the entire device.

❷If emergency stop is required to ensure safety, etc., consider measures such as avoiding sudden stops and selecting a unit large enough to withstand load torque during emergency stop.

4 Do not perform maintenance and inspection while the power is ON.

Malfunction or breakdown of the control circuit may cause sudden movement and lead to injury.

5 Do not use this product in an atmosphere that may explode or fire.

CAUTION

1 Assemble the product by a person with basic knowledge of machine assembly.

Incorrect assembly could cause injury or equipment damage.

2 Start and stop the unit at the bus stop.

If the input shaft is started/stopped outside the stop section, load torque higher than the design value will be applied, which may damage the unit, etc.

3 If there is a position detection cam on the input shaft, periodically check that the position is not misaligned.

If the detection position is misaligned due to loose screws, the device may malfunction and cause injury.

4 Do not use this product in environments where it may come in contact with water or oil. (no condensation)

This may cause unit malfunction or damage, as the product does not have waterproof or drip-proof specifications. When it will be exposed to water or oil, provide cover, etc.

5 Lubricant is supplied with the unit. Oil may ooze out from the oil seal during use. Implement periodic inspections, and install an oil absorber, etc., if this could cause accidents such as defective workpieces.

■ Precautions are ranked as "DANGER", "WARNING", and "CAUTION" in this section.

DANGER: (DANGER) In the case where the product operation is mishandled and/or when the urgency of a dangerous situation is high, it may lead to fatalities or serious injuries.

WARNING: (WARNING) If handling is mistaken, the employer may be at risk of death or serious injury.

CAUTION: (CAUTION) If handling is mistaken, the user may be slightly injured or property damage alone may occur.

Note that some items indicated with "CAUTION" may lead to serious results depending on the conditions. All items contain important information and must be observed.

Warranty

Terms of warranty
The terms and conditions related to the warranty period and scope are described below.

1 Warranty period

This warranty is valid for one (1) year after delivery to the customer's designated site.

2 Scope of warranty

In case any defect clearly attributable to CKD is found during the warranty period, CKD shall, at its own discretion, repair the defect or replace the relevant product in whole or in part and at no cost, according to its own judgment.
Note that the following failures are excluded from the warranty scope:

(1) Failures due to use outside the conditions and environments set forth in the catalog, specifications, or instruction manuals
(2) Failures resulting from factors exceeding durability (frequency, distance, time, etc.) or relating to consumable parts
(3) Failures resulting from factors other than this product.
(4) Failures caused by improper use of the product.
(5) Failures resulting from modifications or repairs made without CKD consent.
(6) Failures caused by matters that could not be predicted with the technologies in practice when the product was delivered.
(7) Failures resulting from natural disasters or accidents for which CKD is not liable. The warranty covers the actual delivered product, as a single unit, and does not cover any damages resulting from losses induced by malfunctions in the delivered product.

Note) Contact the nearest CKD Sales Office for details on durability and consumable parts.

3 Compatibility check

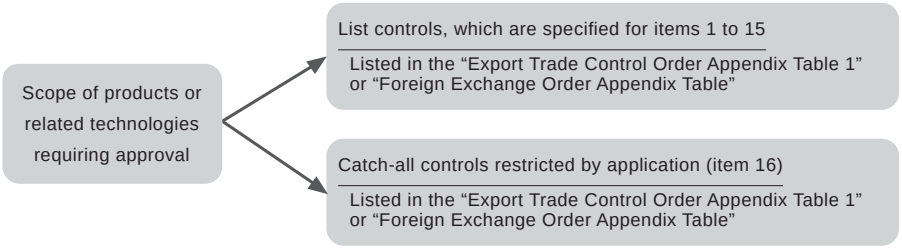
The customer is responsible for confirming the compatibility of CKD products with the customer's systems, machines and equipment.

Precautions for export

1 Security Trade Control

The products in this catalog and their related technologies may require approval before export or provision.
For the sake of maintaining world peace and safety, there may be cases in which approval under the Foreign Exchange and Foreign Trade Control Law is required in advance, depending on the country to where the product or related technology is being exported or provided.
The scope of products and related technologies requiring approval are listed in the Export Trade Control Order Appendix Table 1 or Foreign Exchange Order Appendix Table.
The Export Trade Control Order Appendix Table 1 and Foreign Exchange Order Appendix Table contain the following two types of information:

- List controls specified for items 1 to 15
- "Catch-all controls" that do not indicate specifications by Item, but restrict by application (Section 16)



An application for approval is
received by the Security Export Licensing Division of the Ministry of Economy, Trade and Industry or local bureaus of the Ministry of Economy, Trade and Industry.

2 Products and related technologies in this catalog

The products and related technologies in this catalog are subject to the catch-all controls of the Foreign Exchange and Foreign Trade Control Law. When exporting or providing the products or related technologies in this catalog, ensure that they are not used for arms or weapons.

3 Inquiries

Contact your local CKD Sales Office for information on the Security Trade Control of products and related technologies in this catalog.

Safety Precautions

Be sure to read this section before use.

IndividualCaution: Mechanical indexer ZRS Series

Design/Selection

CAUTION

1 Selection

1)Set the load torque to the Mechanical indexer's dynamic rated output torque or less.

2)When using the product with an input shaft rotation speed of 200rpm or more, assembly adjustment for the high speed rotation specifications is required. Contact CKD for details. (Special specifications)

3)The max. diameter of the allowable max. table outer diameter table should be within the allowable max. table outer diameter calculated when selecting the Mechanical indexer.
If the allowable max. table is exceeded, contact CKD.

4)Check the clutch/brake operation time when discontinuously operating the Mechanical indexer with the clutch/brake. The operation time of the clutch/brake varies depending on the characteristics of the clutch/brake itself, the rotation speed of the moving shaft/pulley, and the moment of inertia.

5)When installing the detection switch, check the response time of the detection switch.
If the input shaft rotation speed is high, it may not be detectable with the detection switch.

6)The operating ambient temperature of the Mechanical indexer body is 0°C to 40°C. (No condensation) Install a cover in dusty places or places exposed to water or oil drops, etc.

7)Note that optionally mountable parts have specifications, characteristic values, and durability set by their manufacturers; in some cases, depending on the usage environment, speed, or frequency, they may not be available for use or may have shortened service lives. Refer to each manufacturer's catalog for details.

Service life guidelines for optional parts manufacturers (example)

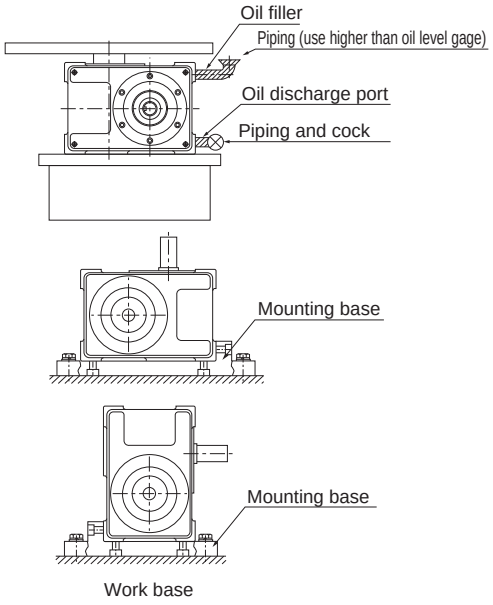
Optional parts	Estimated service life	Manufacturer
Motor with brake, motor with C/B	Operation cycles 2 million times	Oriental Motor

2 Mounting and installation design

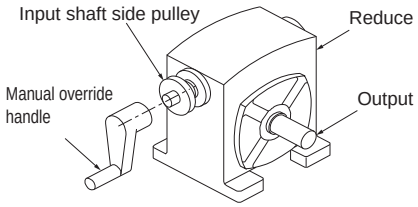
1)Consider that the product can be easily inspected, disassembled and assembled and that the oil level indicator can be confirmed.

2)If the Mechanical indexer is installed in an automatic machine, the lubricant may not be replaced. In such cases, it is recommended that the lubricant be replaced easily by piping the oil filler and exhaust port of the Mechanical indexer when assembling the automatic machine.

3)Mechanical indexer is subject to a heavy load. Fix the base not only in the vertical direction, but also in the horizontal direction as shown in the figure at right.



4)When you are forced to perform an emergency stop for safety, etc., always be sure to manually rotate the motor to the stop slowly before restarting. Provide a manual handle so that the input shaft can be manually rotated in the drive system in case of the above.

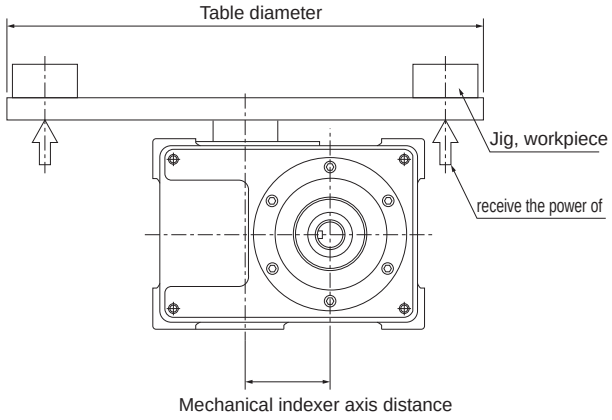


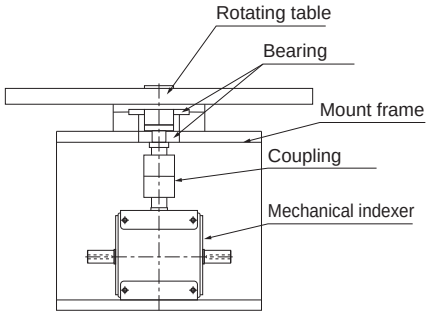
3 Output shaft design

1)Allowable thrust force of output shaft

Use the product within the allowable thrust force.

If load torque is within the dynamic rated output torque of the Mechanical indexer, and thrust force applied to the output shaft exceeds the allowable thrust force, design the rotary table so that it receives force from the thrust bearing, roller, etc., individually.



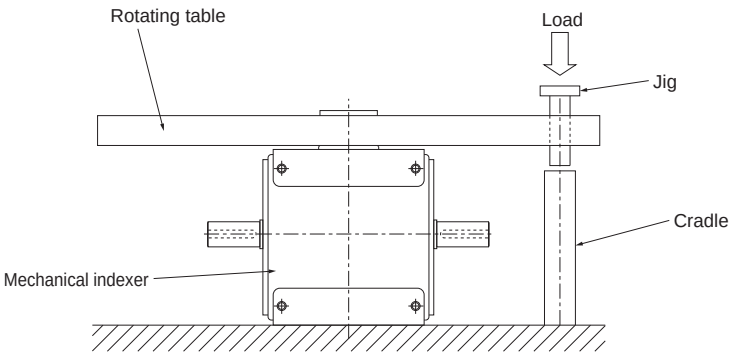


2)Design of rotary table jig

Make sure that the rotary table diameter and jig mounting pitch diameter are small and the weight is light to reduce the load on the Mechanical indexer.

In addition to bolt tightening, the rotating table should also be hit with the positioning pin in two locations to ensure reproducibility after removal. (Flange)

When applying vertical load from above during pressing, stamping, caulking, etc., do not apply load directly to the table or Mechanical indexer. Be sure to install a bearer or an alternative.



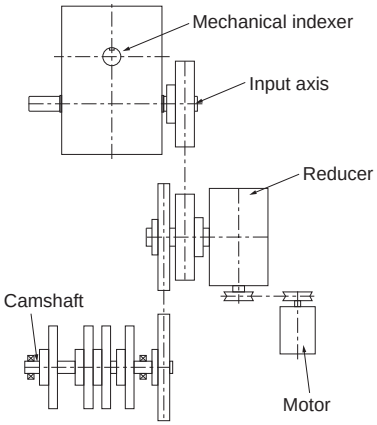
Receiving stand example

CAUTION

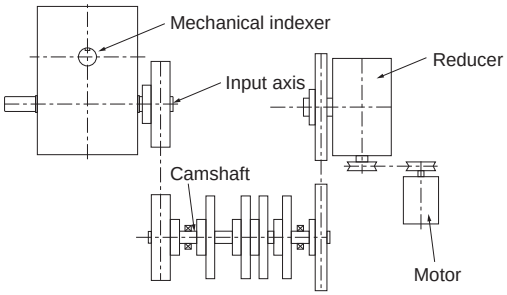
4 Design of input shaft

1)Make the drive system from the motor to the Mechanical indexer input shaft as rigid as possible and minimize backlash. Mechanical indexer's input shaft must, in principle, be rotated at a constant speed. Backlash or uneven rotation in the drive system may cause shock when rotating the table, shortened service life of the body, or damage to parts.

2)Do not put other input shafts in series between the motor and the Mechanical indexer's input shaft.



Good example of driving

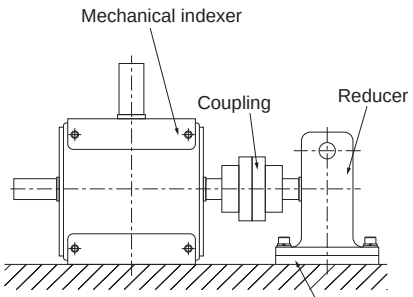


A shock-prone example

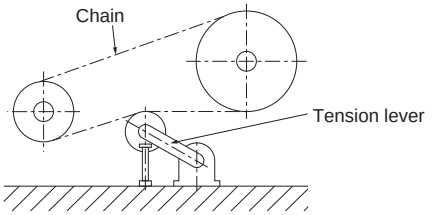
3)When directly connecting the Mechanical indexer's input shaft and the output shaft of the reducer with a coupling, etc., consider the use of a coupling that prevents backlash and the use of a mechanism that can adjust misalignment.

4)A brake motor can also be used when the starting stop frequency is 5 times/minute or less. If the frequency is higher than that, use a clutch/brake device or use a motor with clutch/brake.

5)When using a timing belt or chain, install a tension device. The absence of a tension device may cause shock or vibration.



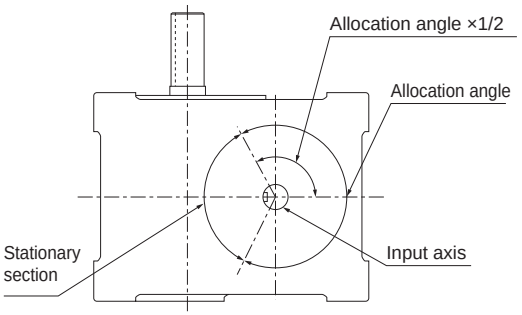
Example of drive



Example of tension lever

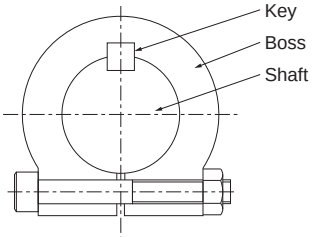
6)When timing another attachment or the like from the input axis, be careful of the relationship between the input axis keyway and output axis stop range.
(Refer to "Timing chart and keyway position" for operation instructions.)

The output shaft rotates when the input shaft keyway is within the range of the allocated angle in the figure at right, and the output shaft stops when it is within the range of the stop section. (For 1 stationary index series)



5 Shaft connection design

1)When using keys as the method for fixing shafts with couplings, gears, sprockets, pulleys, cams, bosses, etc., backlash in the keys may cause shock or vibration. The table below is recommended for key materials. When fixing especially important parts, do not rely only on the key, but also tighten securely with split types and friction tightening material, etc.



(split)

Model	Recommended standards
Standard (ZRS)	Normal (JIS B 1301-1996)

2)When connecting the axes with a coupling, etc., align the axis centers.
Misalignment of the core may lead to shaft damage.

Mounting, installation and adjustment

⚠ CAUTION

1 Be sure to stop the start of the Mechanical indexer while the input shaft is stopped.
(Refer to "Input axis keyway position and allocated angle")
Make every effort to avoid emergency stop/start and inching (jog) at the allocation section. Excessive load far exceeding the normal operating load applies to the Mechanical indexer, and this may cause deterioration of accuracy or breakdown.. When an emergency stop is unavoidable for safety, be sure to manually and slowly rotate the cylinder to the stop section before restarting. (A worm reducer is generally used to drive the Mechanical indexer. Turn the input shaft of the reducer when manually rotating the button.) If the input shaft is equipped with a one-rotation detection switch, adjust the position of the detection cam so that the input shaft stops at a stopped section.

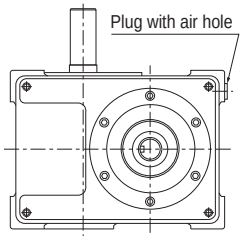
2 When attaching pulleys, sprockets, tables, etc., to the inlet and output shafts, do not apply impact with a hammer, etc. Applying impact may damage the Mechanical indexer or reduce accuracy.

3 Check for looseness and play in the I/O shaft connection.
If there is looseness or play, the table's rotation may become awkward or may cause shock.

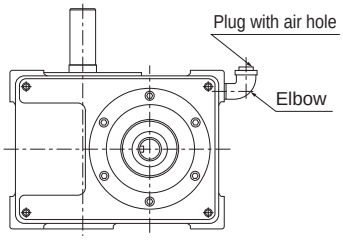
4 Install the product according to the mounting orientation of the specifications.

5 The input axis rotation speed should be the specified rotation speed.

6 Mechanical indexers are shipped with lubricant. Confirm that the oil level is near the center of the oil level indicator. Before starting operation, replace with the supplied air hole plug. Failure to replace the plug may cause oil leakage. The lubricant may leak from the air hole plug due to increases in internal pressure due to operating rotation speed, environment, etc. In this case, use a piping elbow or the like, and additionally pipe so that it does not leak.



under normal circumstances



When piping is required
(Piping must be prepared by your company.)

Use/maintenance

⚠ CAUTION

1 Check that the bolts and screws of each part are not loose.

2 Stop operation immediately if abnormal noise occurs during use. Contact the nearest CKD Sales Office or Factory as interior damage may be caused.

3 Implement waterproof and rust prevention measures
Mechanical indexer's I/O shaft and installation surface have not been anti-rust treated. Rust may occur due to the storage state or working atmosphere. Apply rust preventing agent, grease, or rust preventing agent to the processed surface.

4 Lubricant replacement
Replace the lubricant every 500 hours after the start of operation, and every 2000 hours after that.
Check the oil amount every week and refill if there is any shortfall.
Use the designated lubricant.

Type / Manufacturer	Lubricant		Grease
	Input axis rotation speed less than 200rpm	Input axis rotation speed 200rpm or more	
ENEOS (CKD standard products)	Bonnock TS220	Gear gland GL-5 80W-90	
Cooperative fat and oil (CKD standard products)			CITRUS EP No.2
ENEOS			Epinox grease AP2
Idemitsu Kosan	Daphne Super Gear Oil 220	Apollo Wide Gear LW 80W-90	Daphne Eponex EP No.2
Showa Shell	SHELL OMALA OIL 220	Shell Gelco Power Gear 80W-90	Shell Albania EP Grease R02
Exxon Mobile	Mobile gear 600XP 220	Mobile Lube HD 80W-90	Mobilux EP2
Cosmo Oil	Cosmogear SE220	GL-5 80W-90	Cosmo Grease Dynamax EP No.2

5 The service life of consumable parts such as oil seals is greatly affected by the working environment and operating conditions, and the expected service life may not be achieved. Periodically check for abnormal noise and oil leakage together with the oil amount check above.

Individual cautions: Worm reducer HO

Design/Selection

CAUTION

1. Set the load torque of the reducer to the rated output torque or less.
2. Check the clutch/brake operation time when discontinuously operating the Mechanical indexer with the clutch/brake. The operation time of the clutch/brake varies depending on the characteristics of the clutch/brake itself, the rotation speed of the moving shaft/pulley, and the moment of inertia.
3. When installing the detection switch, check the response time of the detection switch.
   Otherwise, detection may not be possible.
4. When using the reducer for applications other than driving the Mechanical indexer, check the characteristics.
5. Install the product in a location that can be easily inspected, disassembled, and assembled as well as inspected oil level.
6. PIPING FOR REPLACING LUBRICANT
   If the reducer is installed in an automatic mechanism, the lubricant may not be replaced. In such cases, we recommend that the reducer's oil filler be piped when assembling the automatic machine so that the lubricant can be easily replaced.
7. The reducer is filled with lubricant. Oil may ooze out from the oil seal during use. Be sure to conduct periodic inspections, and install an oil absorber, etc., if it leads to defective workpieces..

Mounting, installation and adjustment

CAUTION

1. When attaching a pulley, sprocket, coupling, etc., to the worm shaft, do not forcibly tap or drive in the shaft. The reducer could be damaged if impact is applied. In the case of the type with clutch, note that internal interference may occur if the mounting bolt enters more deeply than the specified depth. (Refer to Dimensions)
2. If the worm shaft is driven with a pulley or sprocket attached, use tension at the allowable O.H.L listed in the instruction manual attached with the product. Applying excessive tension could cause abnormal noise, decrease the life of bearings, damage to the worm shaft, or faulty operation of the clutch and brakes.
3. When connecting the axes with a coupling, etc., align the axis centers. Misalignment could cause abnormal noise, shortened bearing service life, or damage.
4. Install the product according to the mounting orientation of the specifications.
5. As the clutch and brake are dry type, if water or oil adheres to the friction surface, transmission torque will decrease. Do not allow water or oil to come into contact with the friction surface. In addition, when using the product in areas with a lot of dust such as iron powder and fine sand, the service life will be shortened rapidly if the dust adheres to the friction surface. Special consideration should be paid to dust-proofing.
6. The input shaft rotation speed used should be the specified rotation speed.
7. Be sure to mount the attached grease nipple before starting operation of the HO reducer with reducer orientation 5 and 6.

8 The reducer is filled with lubricant. The product can be used as is without initial lubrication. As the product is sealed with a plug at shipment, replace with the included air-hole plug before starting operation. Oil leakage may occur if not replaced with an air hole plug or pressure vent.

9 Do not use this product in an atmosphere that may cause ignition, explosion, or fire.

10 Do not touch the movable parts while the reducer is operating. This may lead to injury.

11 Wiring and connecting the clutch and brake

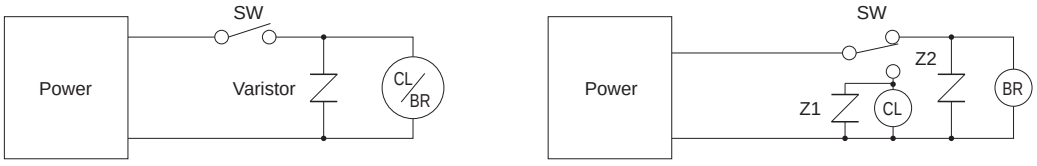
Be sure to ground the ground terminal of the motor and controller. As a grounding method, Class 3 grounding (100 Ω or less, ø1.6 mm or more) is recommended. Use an electric wire size that matches the power supply capacity. If a wire with a small current capacity is used, the insulating film may melt and result in insulation failure, which may cause electric shock or leakage of electricity and may cause fire.

(1)Wiring

The power supply for operation of the clutch/brake is 24 VDC. Keep voltage fluctuation within ±10%. Applying different voltage may cause performance degradation, coil heating, damage, etc. Even if the voltage of the power supply is as specified, if the circuit is long, the terminal voltage of the clutch/brake will drop due to circuit resistance, etc. Check using the lead wire terminals when energized. Install a switch on the direct flow side to perform ON-OFF operation of the clutch and brake. When performed on the AC side, the operation time is delayed. In this case, a time lag should be provided when switching. Do not pull or bend the lead wire.

(2)Surge absorbing protection element (varistor)

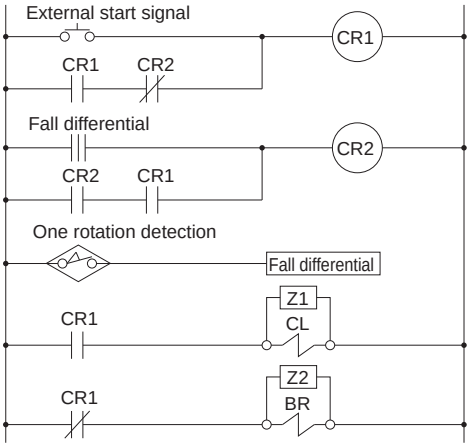
Connect the supplied surge absorbing protection element (varistor) to the clutch (or brake) in parallel. This element has no polarity.



Clutch/brake connection circuit

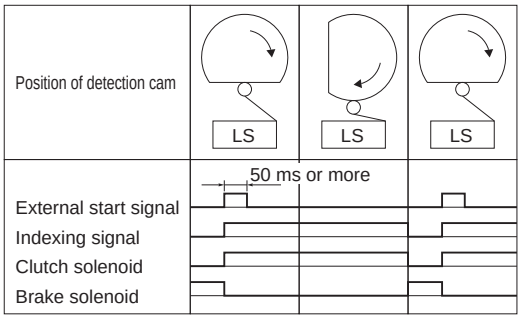
12 Reference circuit example

Design based on a general electrical design.



●Example of timing chart

One-rotation detection: For limit switch (LS)



Use/maintenance

CAUTION

1 Check that the bolts and screws of each part are not loose.

2 Do not perform maintenance and inspection while the unit is energized.
This may cause malfunction or breakdown of the control circuit, etc., and lead to injury.

3 Stop operation immediately if abnormal noise occurs during use.
Contact the nearest CKD Sales Office or Factory for damage to internal parts.

4 Lubricant replacement
Replace the lubricant as follows. In particular, be sure to replace the first time in order to remove the initial wear powder after operation. The lubricant becomes hot immediately after stopping operation. Allow one to two hours after stopping before replacing the lubricant. Check the oil amount every week. If the amount is insufficient, fill in oil with the same manufacturer and product name. If a significant reduction in oil performance (viscosity, color, etc.) is observed, increase the oil replacement cycle.

HO reducer
Perform the first replacement 50 hours after the start of operation. Replace every six months after that. When replacing the lubricant, fill in the grease nipple. Model No.: Alvania Grease S2 (Showa Shell)

5 Adjustment of air gaps
If the clutch/brake air gap is as shown below, adjust it to the appropriate air gap. If the air gap is adjusted, the braking time of the clutch/brake will change. After checking whether the machine is started and stopped within the stop section of the input shaft of the mechanical index, adjust the clutch/brake timing according to the detection cam of the input shaft.

HO reducer (unit: mm)

HO size		32	40	50	60	80
Clutch	Critical void	0.4	0.5	0.5	0.5	0.5
	Default void	0.15	0.2	0.2	0.2	0.2
Brake	Critical void	0.4	0.5	0.5	0.5	0.5
	Default void	0.15	0.2	0.2	0.2	0.2

MEMO

Product-specific cautions: Torque saver (TSF)

Design/Selection

⚠ CAUTION

1. Check that the actual load torque Te×1.3 value of the Mechanical indexer is within the release torque adjustment range.
2. If there is an external load applied while the Mechanical indexer is stopped (paused), make sure that the torque is less than release torque.
3. If emergency stop is performed during Mechanical indexer output section operation, take time to stop the torque saver so that it is not released.
4. If the drive system has backlash or lacks rigidity, a larger load than the calculation value will be applied. Carefully consider the load characteristics, select the Mechanical indexer, and adjust the release torque of the torque saver.
5. When selecting the Mechanical indexer model, select the table, workpiece, etc., to be mounted and the moment of inertia of the torque saver itself, in addition to the load conditions.
6. When the Mechanical indexer body and torque saver are ordered as a set, the output shaft of the Mechanical indexer body will be assembled at shipment with made to order mounting specifications depending on the size. When ordering the torque saver as Discrete, pay attention to the Mechanical indexer output shaft specifications on the mounting side.
7. Depending on the Mechanical indexer specifications, appropriate release torque may not be adjusted even if a torque saver is installed. Please confirm that the release torque of the torque saver does not exceed the dynamic rated output torque of the Mechanical indexer. If there is any problem, please contact CKD at the time of model selection.

Mounting, installation and adjustment

⚠ CAUTION

■Adjusting release torque

The torque saver can adjust release torque steplessly by turning the adjusting nut. Adjust the release torque with the following procedures based on the release torque adjusting range of each characteristic value and the amount of torque change per rotation of the adjusting nut. After making adjustments, use a torque indicator, etc., to confirm that the adjustment is correct.

(1)Mechanical indexer actual load torque Te.
(2)Find release torque Taj. (typically Taj=Te×1.3)
(3)A lock pin on the end face of the drive boss and a hexagon socket head cap screw on the side face of the adjusting nut are loosened.
(4)Adjust nut Tighten the adjust nut using the amount of torque change per rotation as a guide.
(5)To confirm that adjustment is correct with a torque indicator, etc. (Readjust as necessary.)
(6)To securely fix an adjusting nut.
Tighten the lock pin on the drive boss end face and the hexagon socket head cap screw on the adjusting nut side face. Refer to table below for the tightening torque.

● Lock pin tightening torque

Series	TSF5	TSF6	TSF8	TSF11	TSF14
Thread size	M4	M5	M5	M8	M8
Tightening torque (N·m)	1.7	3.1	3.1	14	14

● Hexagon socket head cap screw tightening torque on adjusting nut side

Series	TSF5	TSF6	TSF8	TSF11	TSF14
Thread size	M4	M4	M5	M5	M5
Tightening torque (N·m)	3.7	3.7	7.5	7.5	7.5

Mounting, installation and adjustment

⚠ CAUTION

[CAUTION]
1 .When not specified, the release torque is adjusted to the minimum value of the adjusting range before shipping.
Adjust the release torque when assembling the device.
(When a TSF is purchased separately, it is the median value in the adjusting range.)
2 .After adjusting release torque, use a torque indicator, etc., to confirm that the adjustment was correct.

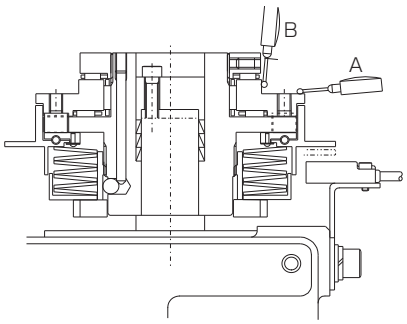
Installation

1 Securely fix the torque saver body and table.

2 With release detection switch
The proximity switch's detection distance may vary with temperature, voltage, etc. After assembling the device, check that the release of the torque saver is correctly detected.

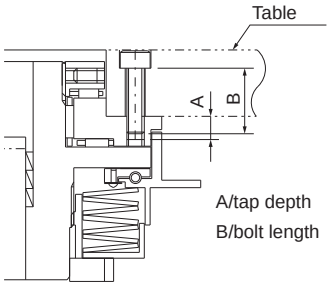
3 When attaching a table or the like to the spigot of the torque saver, if the table is forcibly driven with a hammer, etc., the surface runout or the like of the torque saver may increase.

4 When mounting the torque saver, pay careful attention to the coaxial conductor, etc.
The larger the eccentricity, the larger the indexing error.
Drive plate runout (TSF) during assembly
A: End surface runout within 0.04
B: Radial runout within 0.04
The taper ring insertion direction should be set with the inner ring down and the outer ring up. Also, to ensure sufficient transmission torque, apply oil (machine oil) to the taper ring and tighten as shown in the table below.



Tightening bolt	M4 Hexagon socket head cap screw	M5 Hexagon socket head cap screw	M6 Hexagon socket head cap screw	M8 Hexagon socket head cap screw
Tightening torque (N·m)	3.72	7.5	12.7	34.3

5 Drive plate tap depth (TSF)
When installing a table, etc., on the torque saver (TSF) drive plate, check the tap depth in the table below. Using a bolt exceeding this depth may cause internal interference and prevent proper release.



Series	TSF4	TSF5	TSF6	TSF8	TSF11	TSF14
Tap depth	4-M5 depth 4.5	6-M6 depth 7	6-M6 depth 9	6-M8 depth 10	6-M10 depth 15	6-M12 depth 16

Mounting, installation and adjustment

CAUTION

6 Do not use this product in environments where it may come in contact with water or oil. (no condensation)
This may cause malfunction or damage of the torque saver, as the product does not have waterproof or drip-proof specifications. When it will be exposed to water or oil, provide cover, etc.

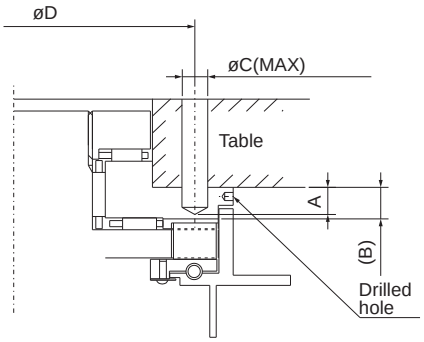
7 The torque saver is greased. Oil may ooze out during use. Ensure periodic inspections are performed, and install an oil absorber, etc., if this could cause defective accidents to the workpiece.

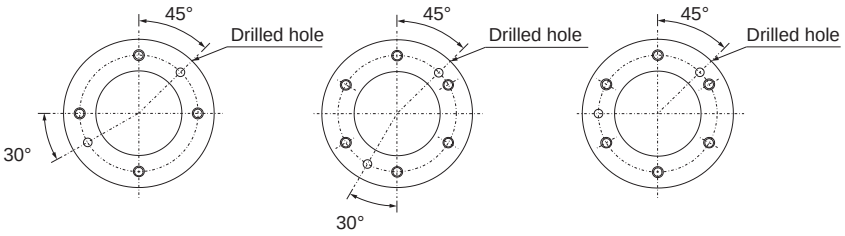
8 Do not use in atmospheres where there is a risk of explosion or fire.

9 Positioning pin hole machining When placing the knock pin for table fixing, observe the dimension positions in the table below and in the figure below.

Positioning pin hole dimensions table

Code / Model	A	B	C	D
TSF4	4.5 or less	(5.5)	5	55
TSF5	7 or less	(8.0)	6	75
TSF6	9 or less	(10)	6	100
TSF8	10 or less	(11)	8	120
TSF11	14 or less	(16)	10	150
TSF14	16 or less	(18)	12	180





TSF4 TSF5 to 8 TSF11 to 14

Use/maintenance

CAUTION

1 Do not perform maintenance and inspection while the power is ON. Malfunction or breakdown of the control circuit may cause the unit to move unexpectedly and lead to injury.

2 Mechanical indexer start/stop at the stop section. If the Mechanical indexer's input shaft is started/stopped outside the stop, load torque equivalent to or greater than the design value will be applied. When the torque saver is released, the table, etc., could overrun and cause injury or damage to the entire device.

3 During torque saver release, return the device with the stop part of the input shaft.

MEMO

Individual caution: Torque guard (TGX)

Design/Selection

⚠ CAUTION

1. Check that the actual load torque Te×1.3 value of the Mechanical indexer is within the trip torque (release torque) adjusting range.
2. If there is an external load applied while the Mechanical indexer is stopped (paused), confirm that the torque is less than the trip torque.
3. If emergency stop is performed during Mechanical indexer output section operation, take time to stop the torque guard so that it does not trip.
4. If the drive system has backlash or lacks rigidity, a larger load than the calculation value will be applied. Carefully consider the load characteristics, then select the Mechanical indexer and adjust the torque guard trip torque.
5. When selecting the Mechanical indexer model, select the table, workpiece, etc., and the moment of inertia of the torque guard itself, in addition to the load conditions.
6. When the Mechanical indexer body and torque guard are ordered as a set, the output shaft of the Mechanical indexer body will be assembled and shipped with a custom-made specification for mounting depending on the size. When ordering the torque guard with Discrete, pay attention to the Mechanical indexer output shaft specifications on the mounting side.
7. If a torque guard is installed with a specification exceeding n=12 Mechanical indexer indexing, appropriate trip torque adjustment may not be possible. Contact CKD during model selection.
8. Friction torque due to bearings, seals, etc., and work torque caused by uneven workpiece/jig mounting, etc., affect the torque guard accuracy. When designing your equipment, take measures to make it as small as possible.

Mounting, installation and adjustment

⚠ CAUTION

■Adjusting the trip torque

How to adjust trip torque

1. Mechanical indexer actual load torque Te.
2. Find the trip torque Taj. (typically Taj=Te×1.3)
3. When not specified, the torque guard is all adjusted to min point (min torque value) at shipment. Notice that the indicator indicates zero for the torque scale.
4. Remove one lock screw for the rotation-stop of the adjusting nut. (Mechanical indexer assembly at shipment)
5. Read the tightening angle of the adjusting nut corresponding to the predetermined trip torque from the tightening amount-torque correlation diagram (table at right), and tighten it. One scale of the torque scale is 60°. First set it to about 60° before the tightening value read from the correlation diagram, mount it on the machine, perform a trip test, and adjust to the optimal trip torque by sequentially tightening. The product's trip torque is not necessarily consistent with the tightening amount-torque correlation diagram in the table at right, so use this as a guideline.
6. Tighten one lock screw with the following torque. [Note 1]
   There are 2 positions where the lock screw is tightened, so if the screw comes into the cutout on the hub, tighten it in a position where the lock screw does not come into contact with the other. If there is a risk of the lock screw loosening due to vibration during operation, etc., apply LOCTITE 242 or an equivalent product to prevent loosening.

[Note] Check two points below when tightening the lock screw again.

(1)Check that the plug at the end is not dislocated. If a lock screw with the plug at the end dislocated is used, the hub threads could be damaged or the hub cutout could be bitten.

(2)Check that the plug at the end is not deformed significantly. The hub threads may be damaged if a lock screw with a significantly deformed plug is used.

* If (1) or (2) is the case or is likely to be the case, replace the locking screw with a new one.

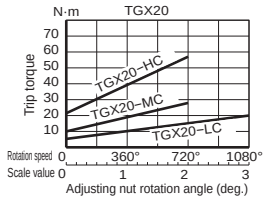
[CAUTION]

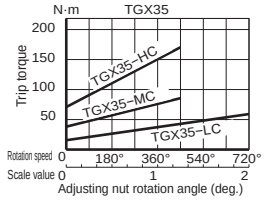
(1)When not specified, the trip torque value will be adjusted to the minimum value within the adjusting range before shipping. Adjust the trip torque when assembling the device.

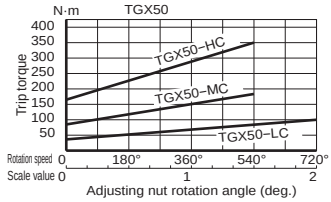
(2)After adjusting the trip torque, use a torque indicator, etc., to confirm that the adjustment was correct.

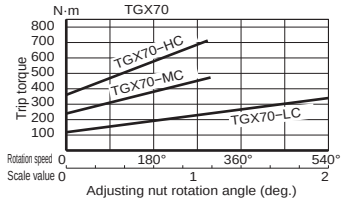
(3)Do not turn the adjusting nut more than the max. torque scale value. The screw is locked.

Tightening amount - torque correlation diagram









Tightening torque

Lock screw	Tightening torque
M5	3.8Nm
M8	16Nm

Mounting, installation and adjustment

⚠ CAUTION

Mounting

1. Securely fix the torque guard body and table.
2. With trip detection switch
   The proximity switch's detection distance may vary with temperature, voltage, etc. After assembling the device, check that the torque guard trip is correctly detected.
3. When mounting a torque guard on the shaft, if it is forcibly driven with a hammer, etc., the surface runout of the torque guard may increase.
4. Mount with sufficient attention to the coaxial line, etc., of the shaft mounted to the torque guard.
   Install within the allowable misalignment. (Table 1, 2, Fig. 1, 2)
5. Do not use this product in environments where it may come in contact with water or oil. This may cause malfunction or damage of the torque guard, as the product does not have waterproof or drip-proof specifications. When it will be exposed to water or oil, provide cover, etc.
6. The torque guard is greased. Oil may ooze out during use. Ensure periodic inspections are performed, and install an oil absorber, etc., if this could cause defective accidents to the workpiece.
7. Do not use in atmospheres where there is a risk of explosion or fire.

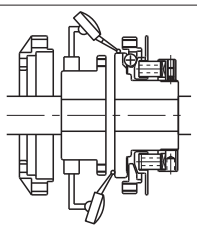
Centering method 1

a. The flange is separated from the boss and the center flange and axially slid
b. Fix the dial on the outer periphery of the boss, and measure the runout on the side and outer periphery of the hub.

(Table 1)

Model No.	Allowable angle error deg	Allowable parallelism mm	Allowable axial displacement mm
TGX20-C	0.6	0.1	±0.5
TGX35-C	0.6	0.1	±0.5
TGX50-C	0.6	0.1	±0.6
TGX70-C	0.6	0.1	±0.7

(Fig. 1)



Centering method 2

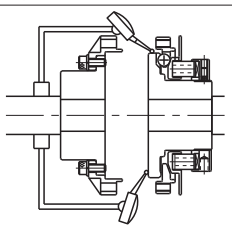
a. Separate the flange from the center flange.
b. To slide a boss with a flange on an axis.
c. Set the dial on the shaft, and measure the runout on the side and outer periphery of the hub.

(Table 2) Hub side runout value per reference angle error θ=0.1°

Model No.	O.D.	Hub runout value mm
TGX20-C	ø75	0.131
TGX35-C	ø98	0.171
TGX50-C	ø138	0.241
TGX70-C	ø177	0.309

* Mount so that the angle error is minimized.

(Fig. 2)



Use/maintenance

⚠ CAUTION

1. Grease lubrication
   Apply a light coat of grease to the ball once a year or every 1,000 trips.
2. Do not perform maintenance and inspection while the power is ON. Malfunction or breakdown of the control circuit may cause the unit to move unexpectedly and lead to injury.
3. Mechanical indexer start/stop at the stop section. If the Mechanical indexer's input shaft is started or stopped outside the stop, load torque higher than the design value will be applied. This can cause the torque guard to trip, causing the table, etc., to overrun and cause injury or damage to the entire device.
4. After a torque guard trip, return the motor at the stop part of the input shaft.

Product-specific cautions: Hollow shaft geared motor

Design/Selection

CAUTION

1. The Mechanical indexer's input shaft torque should be equal to or less than the allowable output shaft torque of the geared motor.
2. When starting and stopping a Mechanical indexer with an inverter, make sure that the total required braking times for both are within the Mechanical indexer stop time.
3. Select an inverter with a capacity equal to or higher than the geared motor capacity for the required inverter capacity.
4. When selecting an inverter, check the motor specifications, then select and design. Inverter drive may not satisfy the motor manufacturer's catalog characteristics. Explosion-proof test certification may not be accredited.
(Limited to custom-made specifications)
5. When installing the detection switch, check the response time of the detection switch.
Otherwise, detection may not be possible.

Mounting, installation and adjustment

CAUTION

1. Never place flammable materials around the geared motor. There is a risk of fire.
2. Do not place an obstacle that may prevent the ventilation around the geared motor.
Burns caused by overheat could cause fire.
3. Operate the unit with an inverter within the specified frequency. This could lead to damage.
4. When work torque such as an eccentric load is applied, depending on the mounting orientation of the Mechanical indexer, the input shaft and geared motor may exceed the set rotational speed, causing the inverter to trip with regenerative power. Install a safety device on the machine side. This may cause falling objects, etc.

Use/maintenance

CAUTION

1. Replacement of lubricating oil for geared motors
For hypoid gears
Lubrication is based on grease, so maintenance is basically unnecessary.
2. Do not perform maintenance and inspection while the unit is energized.
This may cause malfunction or breakdown of the control circuit, etc., and lead to injury.