MOTION & CONTROL
NSK

NSK One-Way Clutches

The GX Series

Combining maintenance-free operation with outstanding long life and reliability

Standard Inventory Available

New!

NSK One-Way Clutches

The GX Series

NSK's GX series One-Way Clutches are highly durable and reliable one-way clutches designed to improve the productivity and safety of a wide range of industrial machinery.

The GX series comprises 14 models available as standard inventory, which cover a wide range of performance requirements. They combine the technical excellence of NSK's ball bearing technology with outstanding performance and features including

- maintenance-free operation,
- an operating temperature range of –20 to +80°C,
- a torque capacity of 3040 N•m under high loads,
- long life, and
- standard inventory for low cost and short delivery times.

GX-series One-Way Clutches are ideally suited for use as overrun control, indexing control and backstop devices in equipment as varied as

- fans and pumps,
- printing presses,
- wrapping machinery,
- metal pressing machinery,
- turntables for machine tools, and
- belt conveyors and bucket elevators.

Features

NSK's GX-series One-Way Clutches incorporate a host of features designed to support further improvements in the productivity and safety of industrial machinery.

Maintenance-free operation

GX-series One-Way Clutches are permanently lubricated and are supplied "ready-to-use". They require no maintenance such as greasing up, cleaning or grease changing, offering significant economies of time and labor.

A broad operating temperature range

The lubricant used in GX series is a special high-performance grease developed by NSK. It assures outstanding reliability over an ambient operating temperature range of –20 to +80°C.

High torque capacity

Wide cams with a larger radius of curvature than conventional models achieve high torque capacity under high loads for improved safety. A unique cam shape allows the GX series to withstand even shock loads without slipping.

Long service life

NSK's expertise in ball bearing manufacturing technology ensures high dimensional precision of the cams, and inner and outer races, offering long service life. The high-performance grease used to lubricate the GX series also helps minimize the wear on each part and prolong its life.

Easy to use

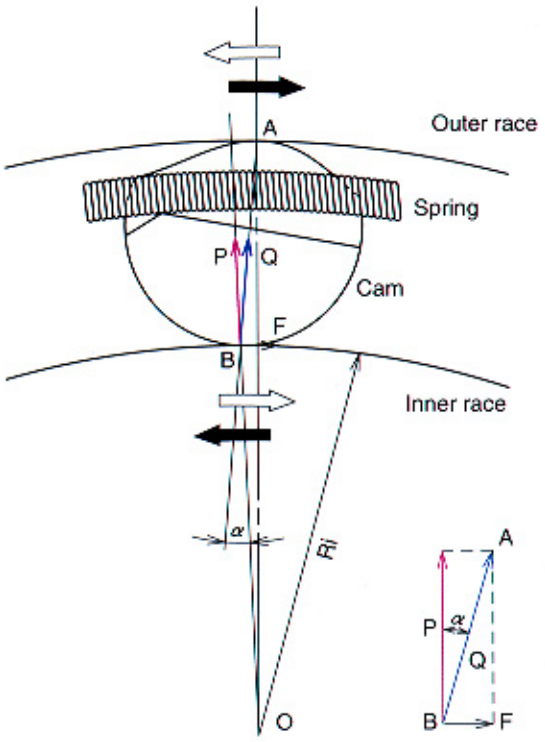
GX-series One-Way Clutches are supplied as integral systems with all components built in. They are ready to be used "as it is".

How Does The One-Way Clutch Work?

Principle of operation

The spring ensures that the cams are continually in contact with both outer and inner races at points A and B respectively. If the inner race rotates clockwise ⇨ (or the outer race rotates counter-clockwise), then $\overline{AB}$ acts as a strut so that all the cams are engaged and the torque is transmitted from the inner race to the outer race (or from the outer race to the inner race).

If, however, the inner race rotates counter-clockwise ⇦ (or the outer race rotates clockwise), then $\overline{AB}$ does not act as a strut so that the inner and outer races free-wheels and torque is not transmitted between them.



Cam engagement and strut angle

The angle α between $\overline{OB}$ (where O is the focus of the inner and outer races) and $\overline{AB}$ is known as the "strut angle". When the cams come under torque, if the force acting on $\overline{AB}$ is taken as Q and the vertical and tangential components of force acting at contact point B are taken as P and F respectively, then

$$F = P \bullet \tan \alpha$$

The transmitted torque T will therefore be

$$T = N \bullet P \bullet \tan \alpha \bullet Ri$$

where N is the number of cams and Ri is the orbital radius of the inner race.

For the cams to engage the raceway surface, tan α must be smaller than the friction coefficient μ of steel:

$$\tan \alpha < \mu$$

Unique cam design

The cams used in GX-series One-Way Clutches are wider and have a larger radius of curvature than conventional models, offering high torque capacity under high loads for improved safety. Their unique shape allows them to withstand even shock loads without slipping.

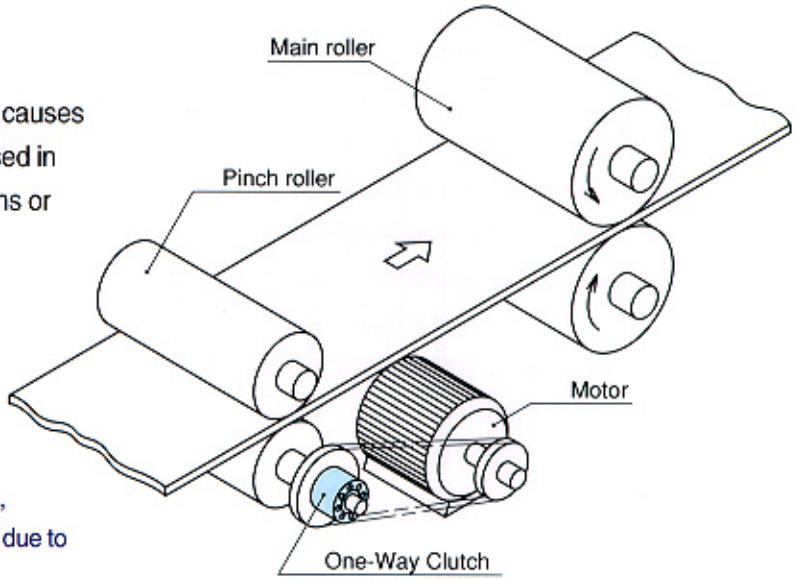
Applications

NSK's GX-series One-Way Clutches are ideal for use as overrun control, indexing control and backstop devices. The drawings below show some of their principal applications.

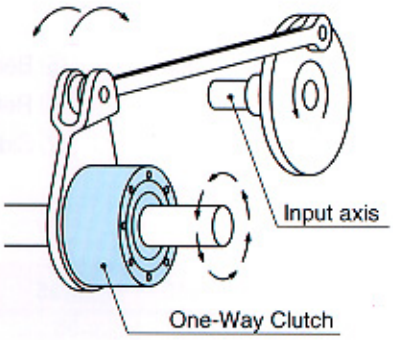
As an overrun control device

The difference in the rpm between inner and outer races causes the clutch to engage or disengage. The clutch can be used in this way as a release mechanism for excess torque in fans or gear systems in industrial machinery.

Example applications: Automated machinery, fans, pumps



The operation of the motor causes the clutch to engage so that the pinch rollers rotate, feeding the material forwards. If the rollers feed the material too fast, too slowly or stop feeding, the clutch disengages, preventing any damage to the material due to slipping.



As an indexing control device

The clutch can be used as an intermittent drive mechanism, converting the continuous rotation or reciprocating motion of an input axis into intermittent motion.

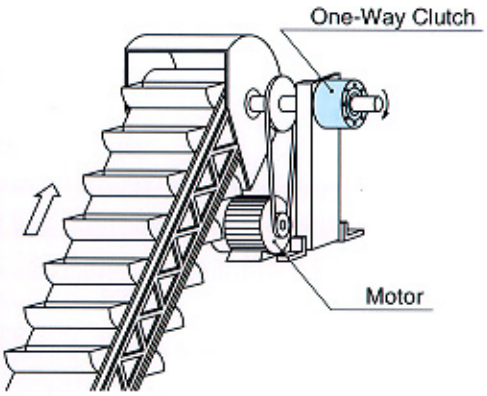
Example applications: Printing presses, wrapping machinery, metal pressing machinery, turntables for machine tools

The clutch converts the continuous rotation or reciprocating motion of the input axis into intermittent motion.

As a backstop device

The clutch can be used as a backstop device by fixing the outer race and allowing only the inner race to rotate. If the inner race comes under a backward force, the cams engage, stopping any backward motion.

Example applications: Belt conveyors, bucket elevators

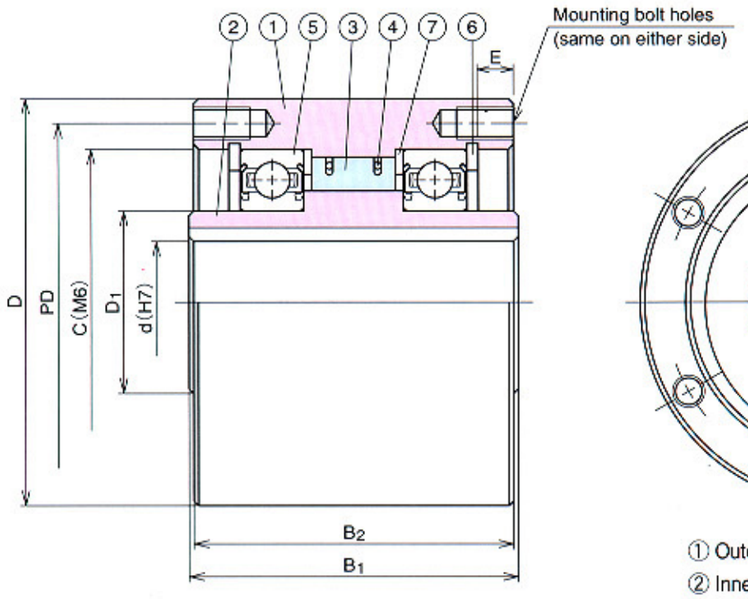


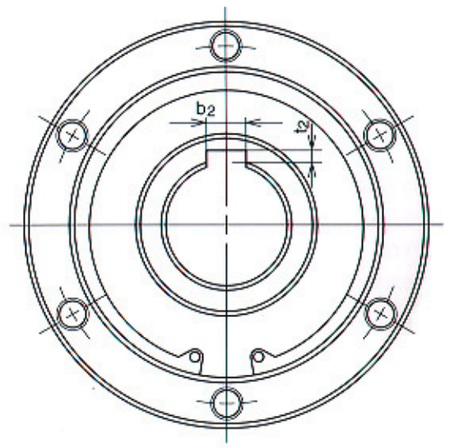
While the motor is running, the inner race of the clutch free-wheels. If the conveyor slips or the motor stops, the clutch engages and prevents the conveyor from moving backwards.

Selecting a GX-series One-Way Clutch

These two pages list the dimensions and specifications of all 14 standard inventory models in NSK's GX-series of One-Way Clutches. Page 6 describes important information on the selection of the right models for your application, the correct use of your One-Way Clutch and on Safety.

Structure and specifications





① Outer race
② Inner race
③ Cam
④ Garter spring
⑤ Bearing
⑥ Retaining ring
⑦ Side plate

(unit: mm)

Clutch Number	GX15	GX17	GX20	GX22	GX25	GX30	GX35	GX40	GX45	GX50	GX55	GX60	GX65	GX70
Internal diameter[1] d (H7)	15	17	20	22	25	30	35	40	45	50	55	60	65	70
Socket JT diameter[2] C (M6)	47	52	55	75	75	75	80	95	95	125	125	125	145	145
Socket JT depth E	6.0	8.0	7.5	8.5	8.5	8.5	11.0	11.0	11.0	11.0	11.0	11.0	10.5	10.5
Outer diameter D	68	75	80	100	100	100	110	125	125	155	155	155	175	175
Inner race width B_1	62	66	67	82	82	82	87	92	92	102	102	102	105	105
Outer race width B_2	60	64	65	80	80	80	85	90	90	100	100	100	103	103
Boss diameter D_1	25	28	30	45	45	45	50	60	60	80	80	80	95	95
Key groove[3] $b_2 \times t_2$	5×2.3	5×2.3	6×2.8	6×2.8	8×3.3	10×3.3	10×3.3	12×3.3	14×3.8	14×3.8	16×4.3	18×4.4	18×4.4	20×4.9
Mounting bolt holes														
PD	58	64	68	88	88	88	95	110	110	140	140	140	162	162
Number—tap diameter×depth	6–M5×10	6–M5×10	6–M6×12	6–M8×16	6–M8×16	6–M8×16	6–M8×16	8–M8×16	8–M8×16	8–M8×16	8–M8×16	8–M8×16	8–M8×16	8–M8×16
Rated torque N•m (kgf•m)	186 (19)	215 (22)	323 (33)	735 (75)	735 (75)	735 (75)	1080 (110)	1620 (165)	1620 (165)	2110 (215)	2110 (215)	2110 (215)	3040 (310)	3040 (310)
Maximum revolutions (rpm)														
Inner race	2,000	1,800	1,700	1,600	1,600	1,600	1,500	1,500	1,500	1,400	1,400	1,400	1,200	1,200
Outer race	1,000	900	800	700	700	700	500	500	500	300	300	300	300	300
Weight (kg)	1.3	1.7	1.9	3.8	3.7	3.6	4.6	6.2	6.0	10.6	10.2	9.8	13.2	12.8
Ball Bearing Number	6005ZZ	60/28ZZ	6006ZZ	6009ZZ	6009ZZ	6009ZZ	6010ZZ	6012ZZ	6012ZZ	6016ZZ	6016ZZ	6016ZZ	6019ZZ	6019ZZ

Selecting the right One-Way Clutch for your application

- Calculate the theoretical maximum torque your application will involve and use the table to find the One-Way Clutch that provides the required rated torque.
- Before selecting a One-Way Clutch, ensure that you have a true picture of the torque acting on the clutch by taking actual measurements of the shock values when the maximum torque acts on a clutch. The torque acting on the clutch must not exceed the rated value shown in the table.

Care in use

- The clutch may fail if it is exposed to severe vibration. Avoid subjecting the clutch to vibration, otherwise install adequate safety devices.
- If the One-Way Clutch is subject to thrust forces, take suitable measures to protect it against these thrust forces.
- Verify the direction in which the clutch is required to make free-wheel. The direction in which the inner race should make free-wheel is indicated by an arrow and the letter F (→F) on the inner edge of the inner race.
- Make sure that such mating components as sprockets or gears which are to be installed on the outer race of One-Way Clutch, are firmly secured with bolts using the bolt holes provided at the edge of the outer race, with the socket joints fixed between the inner and outer races.
- If the One-Way Clutch is to be mounted on an axis, make sure that you press only on the inner race when fitting the clutch onto the axis.
- Use the clutch in an ambient temperature range of –20 to +80°C.

Safety Precautions

- Your NSK One-Way Clutch is unlikely to fail. However, if the clutch is to be installed in a location where failure could result in danger to personnel, please be sure to install adequate safety devices.
- Be sure to conduct a full trial operation of your One-Way Clutch prior to starting up your equipment.

Notes to table:

(1) The recommended maximum permissible error of axis dia. is h7.

(2) The recommended maximum permissible error of dia. of mating socket joints is f7.

(3) Use a parallel key (standard) conforming to JIS (Japan Industrial Standard) B1301-1976.