Friction Hinges

Constant torque hinges (also known as friction hinges, frictional hinges, positioning hinges) are purely mechanical components that serve to automatically hold an object that has been brought into any angular position there. Typical applications include laptop screens, monitors in industrial applications, special cases, office equipment, equipment protection devices, access hatches, etc.

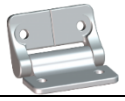
The operating principle of constant torque hinges is based on friction; to achieve this, several "clips" are pushed over the shaft depending on the desired moment. In this way it is possible to obtain various gradations in torque per size. In order to maintain a constant characteristic over the service life, these hinges are "run in" in the factory.

The most important characteristics of our friction hinges are:

- constant torque over the entire operating range
- extremely compact design
- backlash-free (low spring back when the actuating torque is removed)
- developed for indoor use (special corrosion protection required for outdoor applications)
- high durability up to >50.000 cycles
- custom solutions possible

Special attention must be paid to the installation. Our hinges offer a lot of torque in a small space. Therefore the assembly environment must be able to absorb the high forces and torques without deformation or material breakage due to fatigue.

Overview table for friction hinges: models and torques

series	picture	angle	torque		remarks
RT050		360°	0.11 Nm 0.23 Nm	0.34 Nm	• up to 50,000 cycles • torque +/-20% • spring back <1°
RT070			0.34 Nm 0.45 Nm 0.56 Nm	0.68 Nm 0.79 Nm 0.90 Nm	
RT100			0.90 Nm 1.36 Nm	1.81 Nm 2.26 Nm	
RT120			2.26 Nm 3.39 Nm	4.52 Nm 5.65 Nm	
8mm (PHA)		360°	**0.28 Nm** 0.37 Nm	0.46 Nm 0.55 Nm 0.65 Nm	• up to 25,000 cycles • torque +/-15% • spring back <1°
PHC PHCS PHCA		270°	**0.44Nm** 0.78Nm 0.9Nm 1.22Nm	1.57Nm 1.8Nm **2.01Nm** 2.35Nm **2.79Nm**	• up to 20,000 cycles • torque +/-20% • spring back <1° • available also in stainless steel and Aluminum
PHL		270°	0.9 Nm 1.4 Nm **1.8 Nm**	**2.3 Nm** 2.8 Nm 3.4 Nm	• up to 20,000 cycles • torque +/-20% • spring back <1°
MH12		270°	0.4 Nm 0.8 Nm	1.2 Nm 1.6 Nm	• up to 25,000 cycles • torque +/-10% • spring back <1°
MH13		270°	1.0 Nm 2.0 Nm	3.0 Nm	• up to 25,000 cycles • torque +/-20% • spring back <1°

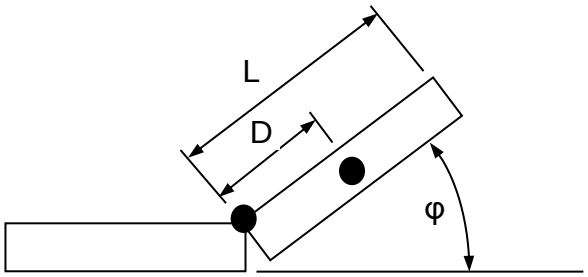
The following finishes are available (depends on model): cinc, black, other colours on request
Marked in bold = available ex stock normally

series	picture	angle	torque		remarks
MH14		270°	1.4 Nm 1.8 Nm **2.2 Nm** 2.6 Nm 3.0 Nm 3.4 Nm	**3.8 Nm** 4.2 Nm 4.6 Nm 5.0 Nm 5.4 Nm **5.8 Nm**	• up to 10,000 cycles • torque +/-20% • spring back <1°
MH15		270°	2.0 Nm / 1.25 Nm 3.0 Nm / 1.88 Nm 4.0 Nm / 2.50 Nm 5.0 Nm / 3.13 Nm 6.0 Nm / 3.75 Nm 7.0 Nm / 4.38 Nm 8.0 Nm / 5.00 Nm		• up to 20,000 cycles • torque +/-10 …25% • spring back <1° • optional reduced torque for one direction
MH18		270°	4.0 Nm / 1.8 Nm 6.0 Nm / 1.8 Nm 8.0 Nm / 1.8 Nm		
PH35		270°	5.65 Nm / 1.13 Nm 6.78 Nm / 1.13 Nm 7.91 Nm / 1.13 Nm 9.04 Nm / 1.13 Nm 10.17 Nm / 1.13 Nm 11.30 Nm / 1.13 Nm		• up to 20,000 cycles • torque +/-20% • one way (**max.** 1.13 Nm in opposite direction) • spring back <1°
TI-120 (früher MH20-0yy)		360°	0.25 Nm 0.35 Nm 0.50 Nm 0.65 Nm	0.80 Nm 1.00 Nm 1.20 Nm	• up to 25,000 cycles • torque +/-20 … 45% • spring back <1°
TI-130		360°	1.0 Nm 1.5 Nm	2.0 Nm	• up to 25,000 cycles • torque +/-0.3 … 0.4Nm
TI-140 (früher MH40-0yy)		360°	1.4 Nm 1.8 Nm 2.2 Nm 2.6 Nm	3.0 Nm 3.4 Nm 3.8 Nm 4.2 Nm	• up to 25,000 cycles • torque +/-20 … 30% • spring back <1° • with 1 or 2 wings
TI-150		360°	2.0 Nm 3.0 Nm	4.0 Nm	• torque +/-10% • spring back <1° • reduced torque for one direction
TI-160		360°	4.0 Nm 5.0 Nm	6.0 Nm	
TI-220 / TI-240		360°	1.5 Nm / 0.94 Nm 2.0 Nm / 1.25 Nm 2.5 Nm / 1.56 Nm 3.0 Nm / 1.88 Nm 3.5 Nm / 2.19 Nm 4.0 Nm / 2.50 Nm 5.0 Nm / 3.13 Nm 6.0 Nm / 3.75 Nm 7.0 Nm / 4.38 Nm 8.0 Nm / 5.00 Nm		• up to 10,000 cycles • torque +/-12 … 32% • spring back <1° • reduced torque for one direction
TI-320		360°	0.50 Nm 0.75 Nm 1.00 Nm	1.25 Nm 1.50 Nm	• up to 50,000 cycles • torque +/-12 … 26% • spring back <1°
TI-340		360°	2.0 Nm 3.0 Nm	4.0 Nm 5.0 Nm	• up to 25,000 cycles • torque +/-20% (2Nm +/-25%) • spring back <1° • optional: one way
TI-360		360°	6.0 Nm 8.0 Nm	10.0 Nm	
TI-C5M		360°	0.15 Nm 0.25 Nm 0.30 Nm		• up to 30.000 cycles • torque +/-20% … 30% • spring back <1°
vTilt VESA Monitor Mount		180°	3.0 Nm / 1.88 Nm 4.0 Nm / 2.50 Nm 5.0 Nm / 3.13 Nm 6.0 Nm / 3.75 Nm 5.0 Nm / 0.9 Nm 6.0 Nm / 0.9 Nm 7.0 Nm / 0.9 Nm 8.0 Nm / 0.9 Nm		• up to 20.000 cycles • torque +/-20 … 35% • reduced torque for one direction • max. monitor weight: 11.3kg

Selection of Friction Hinges

Every application for a friction hinge has unique requirements. The following is a list of the most common features of a friction hinge that will help you choose a hinge that will perform to your desired results.

Torque Requirement: Proper torque built into the hinge that will allow your application to work the way you envision it should.



L = Length oft he load
D = Distance to Center of Gravity (when weight is evenly distributed. distance to CG is Length / 2)
Φ = angle against horizontal. from which the load is allowed to drop down
Drehmoment = Masse x D x cosφ

Package Size: The smaller the footprint of your hinge the more you can focus your design on the product itself. A small hinge package typically offers you more flexibility in your design.

Life Requirement: Determine the expected life of your application in terms of the number of cycles you expect the hinge to be opened and closed over the life of the product.

Consistent Torque Over Life: This is a key for reliable performance of the hinge over the life of the product. Quality hinges will meet your torque specifications over the entire life of your application.

Dynamic Torque: The resistance experienced during rotation of the hinge.

Static Torque: The resistance required to start the rotation of the hinge.

Spring Back: The amount of motion (specified in degrees) that results when the hinge "flexes" after the force that is moving the hinge is removed.

Free Play: The amount of motion (specified in degrees) that the hinge will move before you feel torque at a given position.

Aesthetic Appeal: Will your hinge be visible? Choose one that will compliment your application's design.

Environmental Conditions: Will the hinge perform to your expectations in the environment of your application?

Custom Designs: Deal with a supplier that has the capability to create products to fit your specific requirements.

Breadth Of Product Line: Save yourself time and effort by finding a supplier whose products and overall capabilities are best suited to meet your needs.

Frequently asked questions for Friction Hinges:

Can I get a friction hinge with a different mounting configuration?
Many manufacturers, including Reell, are able to produce custom configurations for mounting. The additional cost of a custom design must be considered.

Can I get a friction hinge with detent stops?
We are not aware of any standard friction hinges that currently offer this feature. Reell has developed custom applications with the detent feature in a friction hinge.

Are friction hinges available with lift assist?
Many companies offer non-friction hinges with this capability. We are not aware of anyone who offers this feature with a standard friction hinge. However. Reell can provide this feature in a custom hinge application.

Are corrosion resistant friction hinges available?
We are aware of one manufacturer that offers an all-plastic adjustable torque hinge. In general, most hinges have internal steel shafts and torque engines that are greased and must be sealed to prevent corrosion. Currently, Reell offers the model PHL hinge with o-ring seals to provide weatherproofing. This provides limited protection in an outdoor application but is not suitable for applications requiring submersion in fluids.

Are friction hinges available with different torque in opposite directions?
Reell offers differential torque hinges with 100% of nominal torque in one direction and 65% of nominal torque in the opposite direction or one way hinges. This feature is generally desirable in high torque applications over 30 pound-inches.

Are friction hinges available with adjustable torque?
Several manufacturers offer friction hinges with adjustable torque. Reell does not currently offer a hinge with this feature.

Are friction hinges available that lock in place?
We are not aware of any standard products with this capability. Reell can provide this feature in a custom hinge application.

Are friction hinges available with a hollow shaft to allow wires or cable to pass through?
There is one manufacturer we know of that offers this feature in a standard product. Reell has designed this feature into custom applications but does not have a standard hinge with this feature.

Is there such a thing as a friction hinge that will allow you to remove one half from the other and reassemble it later? (Example: Remove a door from a cabinet and put it back together without removing the fasteners.)
We are aware of this feature in a non-friction hinge but not in a friction hinge. Reell can provide this feature in a custom hinge application.

If I need fewer cycles (life) in a friction hinge, can I get a lower price?
Most manufacturers do not offer this flexibility. Reell friction hinges are based on a technology that provides consistent torque over the life of the product. We cannot adjust the life performance of this technology without adversely affecting the torque consistency over that life.

What is the operating temperature range for friction hinges?
You will have to contact the manufacturer of the hinge for this information. At Reell, most of our life testing is performed at room temperature but we have successfully tested our hinges at 0 degrees Celsius and +60 degrees Celsius.

Common Torque-Engine Technologies of Friction Hinges

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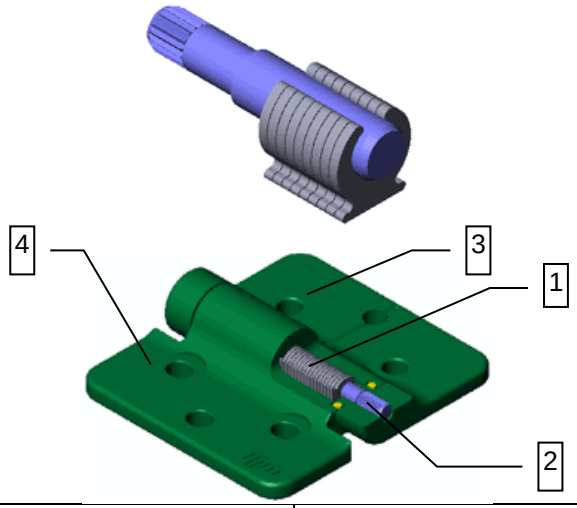
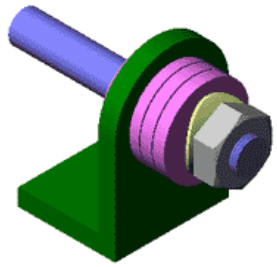
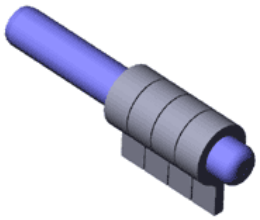
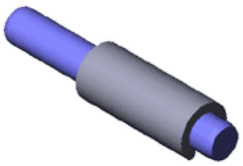
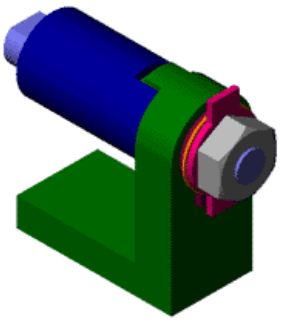
<tr><td colspan="2"> 
</td><td colspan="2">Clip technology: the patented clip technology transmits the torque through several clips (1). which are pressed onto the shaft (2) One part of the hinge (3) is connected to the ends of the shaft. the other part (4) is attached to the "foot" of the clips. When rotating around the axis. a consistent static and dynamic frictional torque is generated between the axis and the clips.</td></tr>
<tr><td>  </td><td>Friction disc: a waved spring is clamped on the shaft against a stop by means of a nut or a retaining bracket. The torque is generated by the tension of the wave spring.</td><td>  </td><td>“Question Mark” spring band: a steel band with approximately the shape of a question mark is mounted on the shaft. One end of the steel band is firmly connected to the stationary part of the hinge. the other to the moving part of the hinge. The torque is generated by pressure from the inside of the steel band on the outside diameter of the shaft.</td></tr>
<tr><td>Roll pin: a steel tension pin is pressed over the shaft. The roll pin is anchored in the hinge. The torque is generated by friction between the inner surface of the roll pin and the outer surface of the shaft</td><td>  </td><td>Tapered shaft: a tapered shaft with a thread. a correspondingly shaped sleeve is inserted; the thread is pushed through an anchor plate and screwed together. By tightening the nut. the shaft is pulled into the sleeve. thus generating a frictional torque</td><td>  </td></tr>
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