ROLLING SHUTTERS

MECHANICAL
DRIVE SOLUTIONS

GEIGER
ANTRIEBSTECHNIK

Dimensioning of rolling shutter operating systems

Please find below assistance for the correct dimensioning of a rolling shutter operating system. Several components are to be considered:

Step 1	Step 2	Step 3
Gear	**Crank**	**Universal**

- **Rolling shutter gears**
  Determine the max. output torque and reduction ratio to be used.
- **Crank handles**
  Determine the suitable crank working radius for an easy operation according to standard.
- **Universals**
  Determine the correct universal according to the occurring load.

Our service for the rolling shutter manufacturer – the right rolling shutter gear.

Our performance:

We offer you „to measure" your rolling shutters. We calculate the „load profile" of your rolling shutter on-site which enables you to select the optimal gear for each shutter element.

Your advantage:

We often notice that rolling shutters are equipped with oversized gears. We try to select the best gear for our customers, with optimum technical and economic results. That's the best way to save money.

Step 1: Step 1: Calculating the necessary output torque with a "constant value"

To easily calculate the required output torque a constant value has been determined through extensive testing. The gear selection process requires several steps:

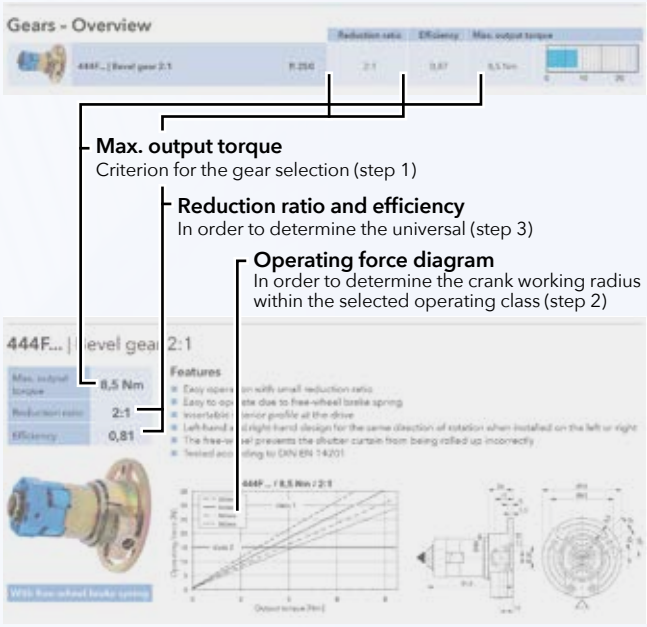
Determine the curtain weight
Curtain **width** in m x curtain **height** in m x **sqm weight** of the used profile in kg (manufacturer specification) = **curtain weight in kg**

Selecting the corresponding constant value determined by the curtain height, the used profile and the applied tube.

	Profile	**Mini profile (8 mm)**		**Maxi profile (14 mm)**
Curtain height	Tube	Octagonal tube, 40 mm	Octagonal tube, 60 mm	
Up to 140 cm		0,35	0,60	0,60
Up to 240 cm		0,42	0,60	0,65

Output torque calculation
Curtain weight x constant = required gear **output torque**

Please select the right gear and output torque from the chart on the following page or from the product data sheets.



You will find on the product data sheets the gear-specific information for the dimensioning of rolling shutter operating systems.

Example:

A rolling shutter with a width of 125 cm and a height of 220 cm is mounted in a door element. A mini-profile on a 60 mm tube is used. The specific hanging weight is 3.4 kg per m^2. Operation class 1 is required.

Sample calculation:

Curtain weight calculation:
1,25 m x 2,20 m x 3,4 kg = 9,35 kg

Output torque calculation:
9,35 kg x 0,6 (constant) = 5,6 Nm

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The „constant" includes the conversion from kg to Newton, the effective lever length as well as a friction loss calculation.

When calculating the output torque please note that various mechanical factors play a role which cannot be considered in this „constant".

These are, for example:

- Tube geometry and shape
- Geometry and winding performance of the slats
- Run-in behaviour in the guide rails
- Different bottom rails materials
- Friction in the whole system

Therefore, these results are only reference values for which we assume no liability. The exact determination of the values can only be done by a qualified technician.

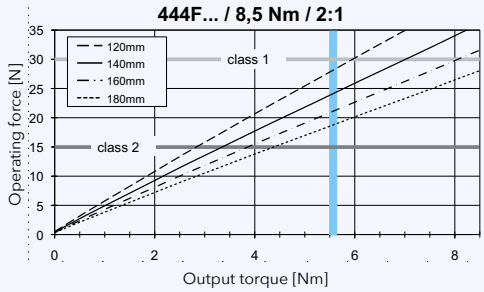
Step 2: Determining the suitable crank working radius

For normal operation the force needed at the crank handle should not exceed 30 N (corresponds to about 3 kg) . This force corresponds to the **operating class 1** according to DIN EN 13659.

For light and comfortable operation the force needed at the crank handle should not exceed 15 N (corresponds to about 1,5 kg). This force corresponds to the **operating class 2** according to DIN EN 13659.

The operating force diagram which you will find with the selected gear helps you find out the required crank working radius according to operating class 1 or 2.

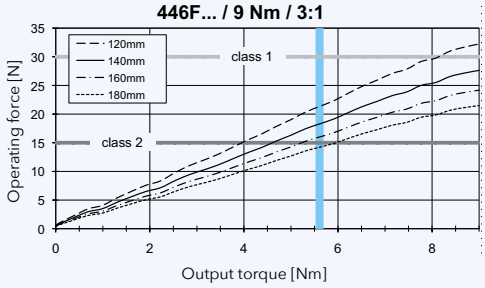
Example: Gear 444F… with a 8,5 Nm output torque and a 2:1 reduction ratio



As shown with the blue lines, the class 1 is reached with a crank working radius of 120 mm.

In order to reach the class 2, a different gear with a higher output torque and / or another reduction ratio must be selected.

Alternative: Gear 446F ... with a 9 Nm output torque and a 3:1 reduction ratio



With the 3:1 gear reduction ratio the operating class 2 is reached with a working radius of 180 mm.

Step 3: Determining the universal

For the dimensioning of the universal, it is important to know the resulting torque on the universal joint.
For this purpose, after selection of the gear, the output torque (determined in step 1) is calculated with the values (reduction ratio and efficiency) of the gear.

Calculation of the universal torque:
(output torque: reduction): efficiency = universal torque

Example:

The selected gear 446F ... has a 3:1 reduction ratio (3: 1 = **3**) and an efficiency of **0,86**.

Sample calculation:

Calculation of the universal torque:
(5,6 Nm : 3) : 0,86 = **2,17 Nm**

Up to 3 Nm torque, a universal 816F... made of steel can be used. Between 3 and 5 Nm, a universal 816F... made of aluminium should be used.

Colour specifications and printing

The colours shown in the catalogue are indicative only. They can slightly differ from the RAL specifications depending on the surface structure or the base materials being used. The colour fields in the charts may vary from the actual colours due to printing technical reasons.

Drawings dimensions

The technical drawings shown in this catalogue are related to one specific product of a series. The drawing dimensions may vary from one item to the other.

We will be happy to provide you with the exact dimensions and drawings for the article you selected.

Subject to technical modifications and errors

Gears – Overview

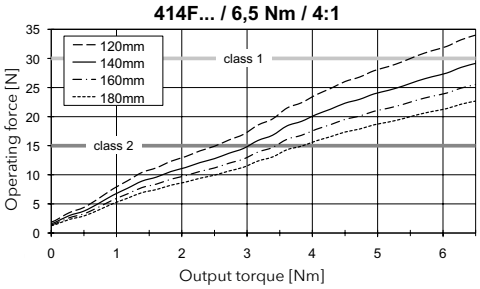
			Reduction ratio	Efficiency	Max. output torque	
	462F... | Bevel gear 2,7:1	P. 259	2,7:1	0,66	6,0 Nm	0 10 20
	415F... | Worm gear 4,33:1	P. 239	4,33:1	0,36	6,0 Nm	0 10 20
	414F... | Worm gear 4:1	P. 238	4:1	0,39	6,5 Nm	0 10 20
	421F5.. | Worm gear 5,33:1	P. 244	5:1	0,40	7,5 Nm	0 10 20
	419F5.. | Worm gear 6:1	P. 241	6:1	0,46	8,0 Nm	0 10 20
	419F... | Worm gear 5,33:1	P. 240	5,33:1	0,45	8,0 Nm	0 10 20
	419F55. | Worm gear 5,7:1	P. 241	5,7:1	0,36	8,0 Nm	0 10 20
	414F... | Worm gear 6:1	P. 238	6:1	0,31	8,0 Nm	0 10 20
	444F... | Bevel gear 2:1	P. 250	2:1	0,87	8,5 Nm	0 10 20
	444F6.. | Reversible bevel gear 2:1	P. 250	2:1	0,65	8,5 Nm	0 10 20
	446F... | Bevel gear 3:1	P. 252	3:1	0,86	9,0 Nm	0 10 20
	446F6.. | Reversible bevel gear 3:1	P. 252	3:1	0,61	8,5 Nm	0 10 20
	447F... | Bevel gear 3:1	P. 256	3:1	0,65	9,0 Nm	0 10 20
	456F... | Bevel gear 4:1	P. 254	4:1	0,85	12,0 Nm	0 10 20
	456F6.. | Reversible bevel gear 4:1	P. 254	4:1	0,66	12,0 Nm	0 10 20
	461F... | Bevel gear 5:1	P. 257	5:1	0,77	14,0 Nm	0 10 20
	419F... | Worm gear 8:1	P. 240	8:1	0,40	16,0 Nm	0 10 20
	421F8.. | Worm gear 8:1	P. 246	8:1	0,39	20,0 Nm	0 10 20
	460F... | Bevel gear 8:1	P. 257	8:1	0,75	22,0 Nm	0 10 20

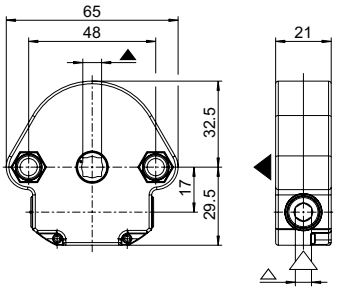
414F... | Worm gear 4:1

Max. output torque	**6,5 Nm**
Reduction ratio	**4:1**
Efficiency	**0,39**

Features

- The small power package: high performance with minimal gear dimensions
- With end stop after max. 19 rotations (available also without end stop)
- Continuous interior profile at drive and output
- Matching free-wheel and cap 414F9..





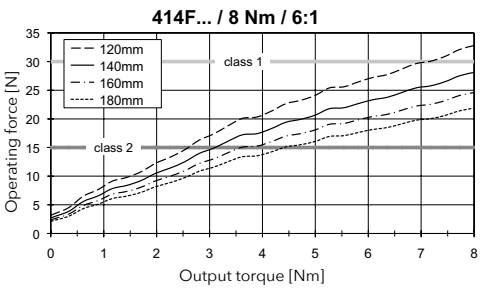
Part Nr.	End stop	Drive △	Output ▼
414F002	With end stop	6 mm	6 mm
414F008	With end stop	6 mm	7 mm
414F011	Without end stop	6 mm	7 mm
414F012	With end stop	6 mm	7 mm
414F023	Without end stop	6 mm	7 mm
414F024	With end stop	6 mm	7 mm
414F039	With end stop	8 mm	7 mm

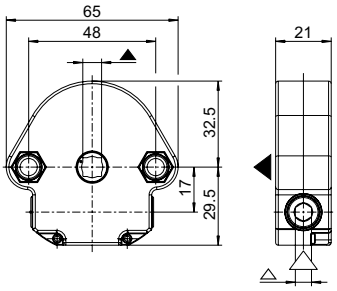
414F... | Worm gear 6:1

Max. output torque	**8,0 Nm**
Reduction ratio	**6:1**
Efficiency	**0,31**

Features

- The small power package: high performance with minimal gear dimensions
- With end stop after max. 19 rotations (available also without end stop)
- Continuous interior profile at drive and output
- Matching free-wheel and cap 414F9..



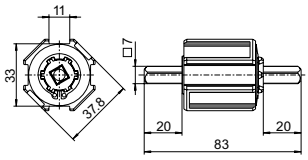


Part Nr.	End stop	Drive △	Output ▼
414F602	With end stop	6 mm	7 mm
414F624	With end stop	6 mm	7 mm
414F625	Without end stop	6 mm	7 mm
414F643	Without end stop	6 mm	7 mm

414F906 | Free-wheel

Features

- For worm gear 414F... (max. 8 Nm)
- Prevents the shutter curtain from being rolled up incorrectly
- One design for left-hand or right-hand installation
- A stop ring to act as an assembly stop for the roller tube of the shutter is available

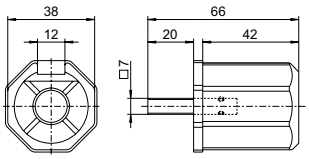


Part Nr.	Drive	Output	Note
414F906	■ 7 mm	● 37,8 mm	Free-wheel left and right

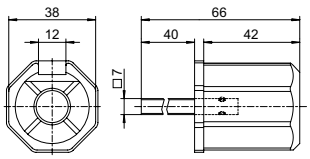
414F9.. | Tube drive

Features

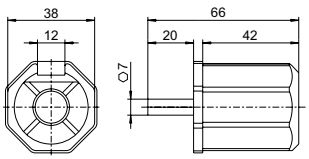
- For worm gear 414F...



Part Nr.	Drive	Output
414F900	■ 7 mm	● 38 mm



Part Nr.	Drive	Output
414F902	■ 7 mm	● 38 mm



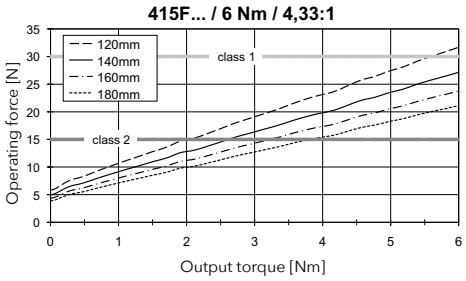
Part Nr.	Drive	Output
414F909	⬢ 7 mm	● 38 mm

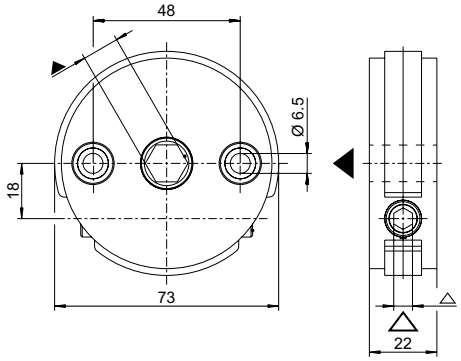
415F... | Worm gear 4,33:1

Max. output torque	6,0 Nm
Reduction ratio	4,33:1
Efficiency	0,36

Features

- Diecast zinc housing
- Continuous interior profile at drive and output
- Without end stop





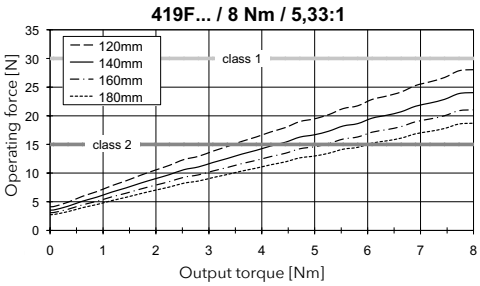
Part Nr.	Drive △	Output ▼	Installation side
415F001	○ 6 mm	○ 12 mm	Left
415F003	○ 6 mm	▢ 10 mm	Left
415F007	○ 6 mm	○ 10 mm	Left
415F002	○ 6 mm	○ 12 mm	Right

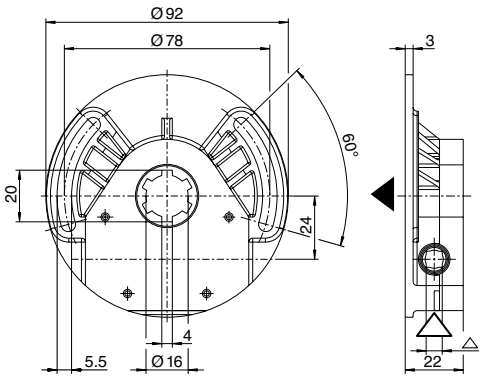
419F... | Worm gear 5,33:1

Max. output torque	**8 Nm**
Reduction ratio	**5,33:1**
Efficiency	**0,45**

Features

- Housing made out of high-strength plastic
- Universally applicable due to adapter systems
- Continuous interior profile at drive and output
- One design for left-hand or right-hand installation
- Can also be mounted in handcaps with bearing journals
- Matching free-wheel and cap 419F9..
- Without end stop





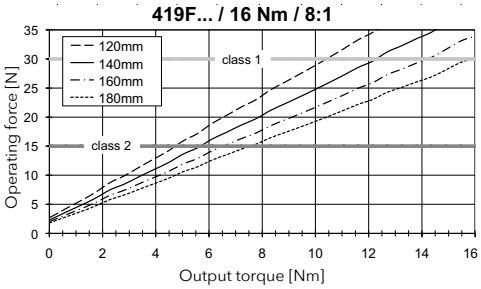
Part Nr.	Drive △	Output ▼
419F003	6 mm	16 mm

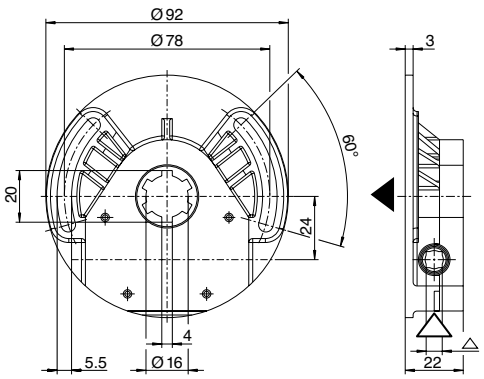
419F... | Worm gear 8:1

Max. output torque	**16 Nm**
Reduction ratio	**8:1**
Efficiency	**0,40**

Features

- Housing made out of high-strength plastic
- Universally applicable due to adapter systems
- Continuous interior profile at drive and output
- One design for left-hand or right-hand installation
- Can also be mounted in handcaps with bearing journals
- Matching free-wheel and cap 419F9..
- Without end stop





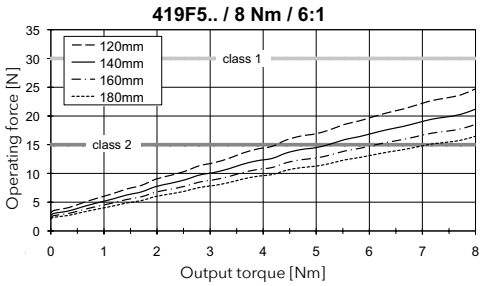
Part Nr.	Drive △	Output ▼
419F001	6 mm	16 mm
419F012	7 mm	16 mm

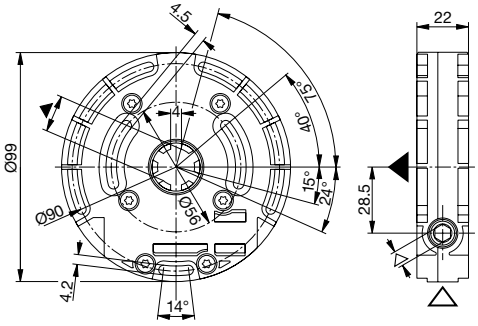
419F5.. | Worm gear 6:1

Max. output torque	8 Nm
Reduction ratio	6:1
Efficiency	0,46

Features

- With or without end stop
- One design for left-hand or right-hand installation
- Continuous interior profile at drive and output
- Housing made out of high-strength plastic
- Hardened steel endless worm and diecast zinc worm wheel
- Universally applicable due to adapter systems
- Can also be mounted in handcaps with bearing journals
- Matching free-wheel and cap 419F9..





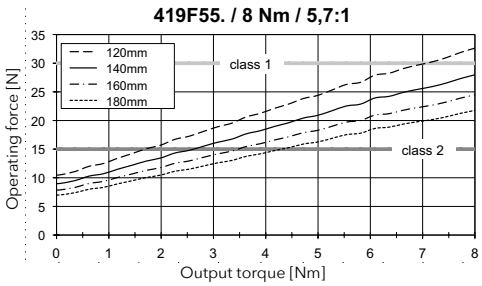
Part Nr.	End stop	Drive △	Output ▼
419F500	With end stop	8 mm	16 mm
419F501	Without end stop	8 mm	16 mm
419F502	With end stop	6 mm	16 mm
419F503	Without end stop	6 mm	16 mm
419F504	With end stop	7 mm	16 mm
419F508	With end stop	8 mm	10 mm
419F511	Without end stop	7 mm	10 mm
419F515	With end stop	8 mm	13 mm

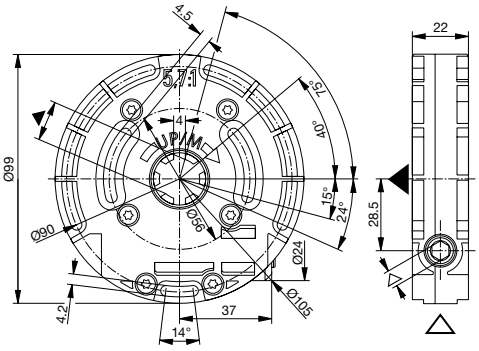
419F55. | Worm gear 5,7:1

Max. output torque	8 Nm
Reduction ratio	5,7:1
Efficiency	0,36

Features

- Integrated double-sided overload protection system on the drive-side allows optimized protection of the whole device
- With or without end stop
- One design for left-hand or right-hand installation
- Continuous interior profile at drive and output
- Can also be mounted in handcaps with bearing journals
- Universally applicable due to adapter systems
- Housing made out of high-strength plastic
- Worm and worm wheel out of plastic
- Matching tube drive 419F9..



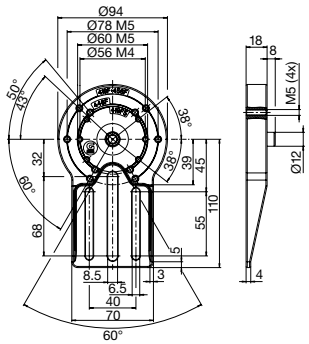


Part Nr.	End stop	Drive △	Output ▼
419F550	With end stop	7 mm	16 mm
419F551	Without end stop	7 mm	16 mm
419F554	Without end stop	7 mm	10 mm
419F555	With end stop	7 mm	10 mm
419F557	With end stop	7 mm	8 mm
419F558	Without end stop	7 mm	8 mm

444F800 | Universal gear holder

Features

- Height adjustable: oblong holes for fixation with stud bolts
- Suitable for gears 419F..., 419F5.., 419F55., 444F..., 446F..., 447F... and 456F...

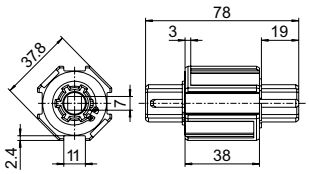


Part Nr.	
444F800	

419F901 | Free-wheel

Features

- For worm gear 419F... (only 5,33:1, max. 8 Nm) and 421F5..
- Prevents the shutter curtain from being rolled up incorrectly
- One design for left-hand or right-hand installation
- A stop ring to act as an assembly stop for the roller tube of the shutter is available

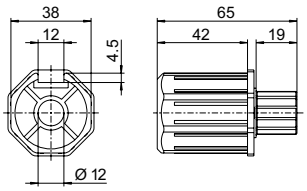


Part Nr.	Drive	Output	Note
419F901	✱ 16 mm	● 37,8 mm	Free-wheel left and right

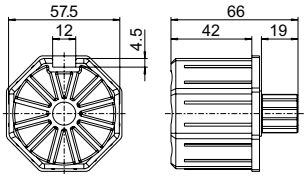
419F9.. | Tube drive

Features

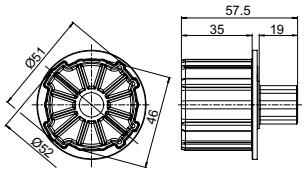
- For worm gear 419F... and 421F5..



Part Nr.	Drive	Output
419F903	16 mm	38 mm



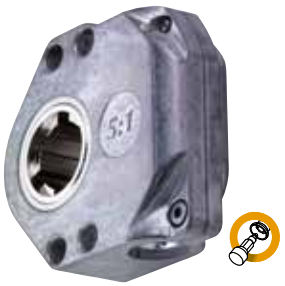
Part Nr.	Drive	Output
419F904	16 mm	57,5 mm



Part Nr.	Drive	Output
419F912	16 mm	ZF 54

421F5.. | Worm gear 5,33:1

Max. output torque	7,5 Nm
Reduction ratio	5,33:1
Efficiency	0,40

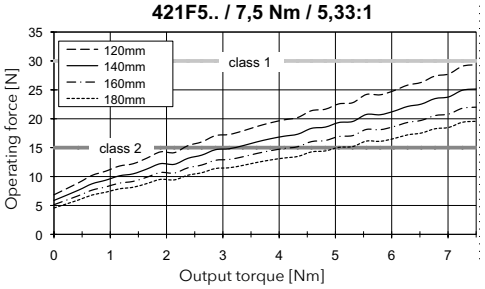


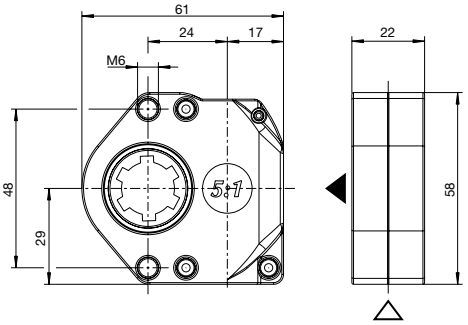
Features

- Without end stop
- Housing and worm wheel made out of diecast zinc
- Continuous interior profile at drive and output

Note

- Coloured versions on request
- Designs with extensions, mounted universal joints, zinc or plastic eyelets or 8 mm square adaptor on request





Part Nr.	Drive △	Output ▼
421F504	▢ 6 mm	▢ 13 mm
421F542	○ 7 mm	▢ 13 mm
421F544	▢ 6 mm	✹ 16 mm
421F546	○ 7 mm	✹ 16 mm

421F5.. | Worm gear 5,33:1 with end stop

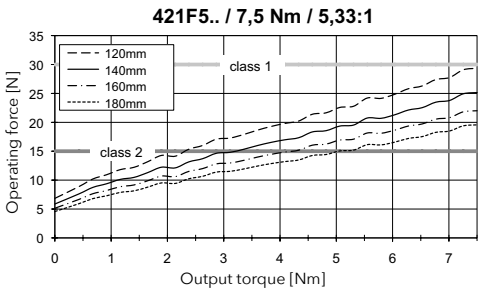
Max. output torque	7,5 Nm
Reduction ratio	5,33:1
Efficiency	0,40

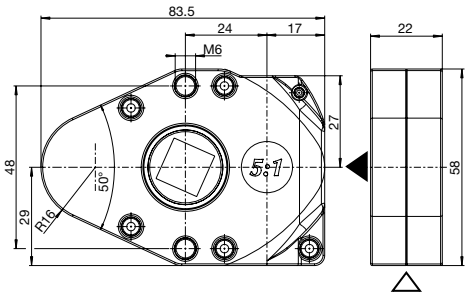
Features

- With end stop
- Diecast zinc housing, worm wheel out of steel
- Continuous interior profile at drive and output
- Available in three different housing designs

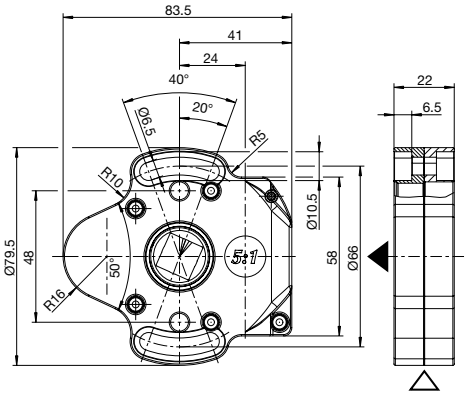
Note

- Coloured versions on request
- Designs with extensions, mounted universal joints, zinc or plastic eyelets or 8 mm square adaptor on request

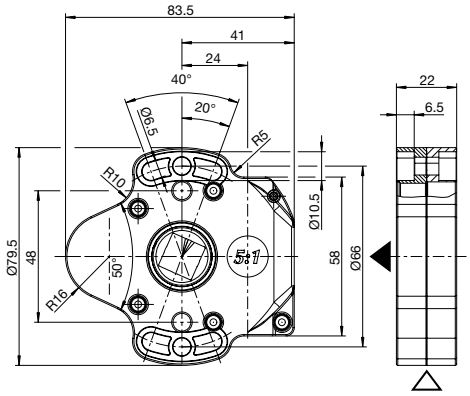




Housing design A (TK 48 mm)



Housing design B (TK 66 mm)



Housing design C (TK 66 mm with fixation)

Options for worm gear 5,33:1 with end stop	
Drive	○ 6 mm and ○ 7 mm, continuous interior profile
Output	○ or ○ 13 mm and ✹ 16 mm, continuous interior profile
Pitch circle Ø	48 mm, 66 mm and 66 mm with fixation
Colours	Bright finish or powder-coated

Housing design A

Part Nr.	Drive △	Output ▼
421F556	○ 6 mm	✹ 16 mm
421F557	○ 7 mm	✹ 16 mm
421F558	○ 7 mm	○ 13 mm
421F559	○ 6 mm	○ 13 mm

Housing design B

Part Nr.	Drive △	Output ▼
421F552	○ 6 mm	✹ 16 mm
421F553	○ 7 mm	✹ 16 mm
421F554	○ 7 mm	○ 13 mm

Housing design C

Part Nr.	Drive △	Output ▼
421F561	○ 6 mm	✹ 16 mm
421F562	○ 7 mm	✹ 16 mm
421F563	○ 7 mm	○ 13 mm
421F564	○ 6 mm	○ 13 mm

421F8.. | Worm gear 8:1

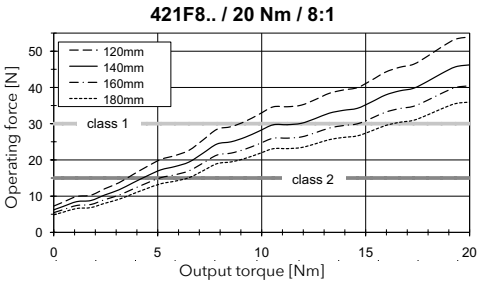
Max. output torque	**20 Nm**
Reduction ratio	**8:1**
Efficiency	**0,39**

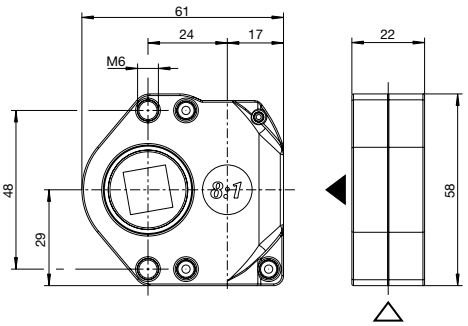
Features

- Without end stop
- Diecast zinc housing
- Worm and worm wheel out of steel
- Continuous interior profile at drive and output
- Tested according to DIN EN 14201

Note

- Coloured versions on request
- Designs with extensions, mounted universal joints, zinc or plastic eyelets or 8 mm square adaptor on request





Part Nr.	Drive △	Output ▼
421F892	○ 7 mm	□ 10 mm
421F804	□ 6 mm	□ 13 mm
421F842	○ 7 mm	□ 13 mm

Gerhard Geiger GmbH & Co. KG | 100W0070 EN 0620 | Subject to technical modifications

421F8.. | Worm gear 8:1 with end stop

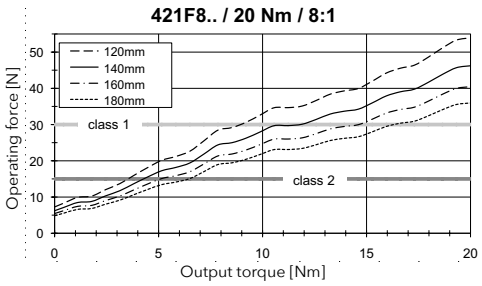
Max. output torque	20 Nm
Reduction ratio	8:1
Efficiency	0,39

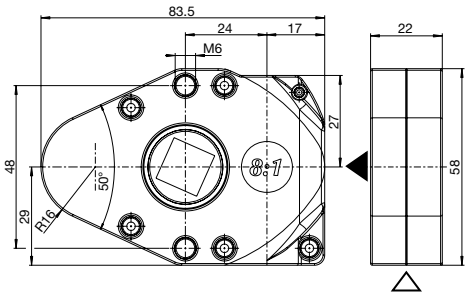
Features

- With end stop
- Diecast zinc housing, worm wheel out of steel
- Continuous interior profile at drive and output
- Available in three different housing designs
- Tested according to DIN EN 14201

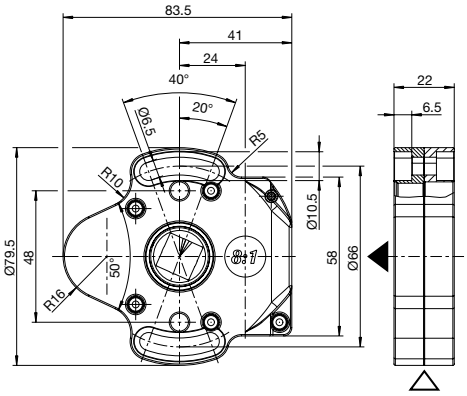
Note

- Coloured versions on request
- Designs with extensions, mounted universal joints, zinc or plastic eyelets or 8 mm square adaptor on request

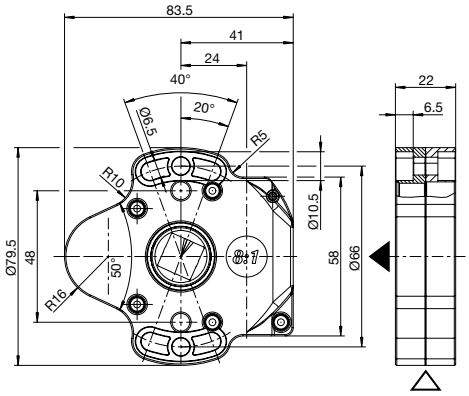




Housing design A (TK 48 mm)



Housing design B (TK 66 mm)



Housing design C (TK 66 mm with fixation)

Options for worm gear 8:1 with end stop	
Drive	▢ 6 mm and ◯ 7 mm, continuous interior profile
Output	▢ or ◯ 13 mm and ✹ 16 mm, continuous interior profile
Pitch circle Ø	48 mm, 66 mm and 66 mm with fixation
Colours	Bright finish or powder-coated

Housing design A

Part Nr.	Drive △	Output ▼
421F855	▢ 6 mm	✹ 16 mm
421F856	◯ 7 mm	✹ 16 mm
421F857	◯ 7 mm	▢ 13 mm
421F861	▢ 6 mm	▢ 13 mm

Housing design B

Part Nr.	Drive △	Output ▼
421F851	▢ 6 mm	✹ 16 mm
421F853	◯ 7 mm	▢ 13 mm

Housing design C

Part Nr.	Drive △	Output ▼
421F862	▢ 6 mm	✹ 16 mm
421F863	◯ 7 mm	✹ 16 mm
421F864	◯ 7 mm	▢ 13 mm
421F865	▢ 6 mm	▢ 13 mm

Bevel gears series 444F..., 446F..., 456F...

The GEIGER bevel gears series 444F..., 446F... and 456F... have proven their reliability millions of times and have set new standards in terms of operating comfort and safety. The high degree of convenience is a decisive advantage for industry and trade.

Comfort with low operating force and easy crank operation

The main requirement of a rolling shutter gear is to operate curtains in all sizes with little effort and few crank rotations. The GEIGER bevel gears 444F.../446F.../456F... meet these ergonomic requirements.

The **unique brake spring with free wheel** – similar to a freewheel bike – switches the brake spring off when the curtain opens.
The efficiency can thereby be improved above 85%. Compared to gears without brake spring with freewheel the operation is here **smoother** and faster.

Optimized safety with integrated free wheel clutch

A faulty winding of the curtain in the lower position is excluded. Damages caused by an improper winding are avoided when using the GEIGER bevel gears series 444F..., 446F... and 456F...

If the curtain runs against the window sill or any obstacle: the -GEIGER freewheel clutch triggers reliably.
This system offers -complete safety while lowering the number of unnecessary -customer service calls.

Optimized assembly with integrated free wheel clutch

The GEIGER bevel gears allow you to save time during installation or replacement: no need to adjust the limit stop. The gear adapts to any given situation and automatically activates the free wheel clutch when reaching the lower end stop.

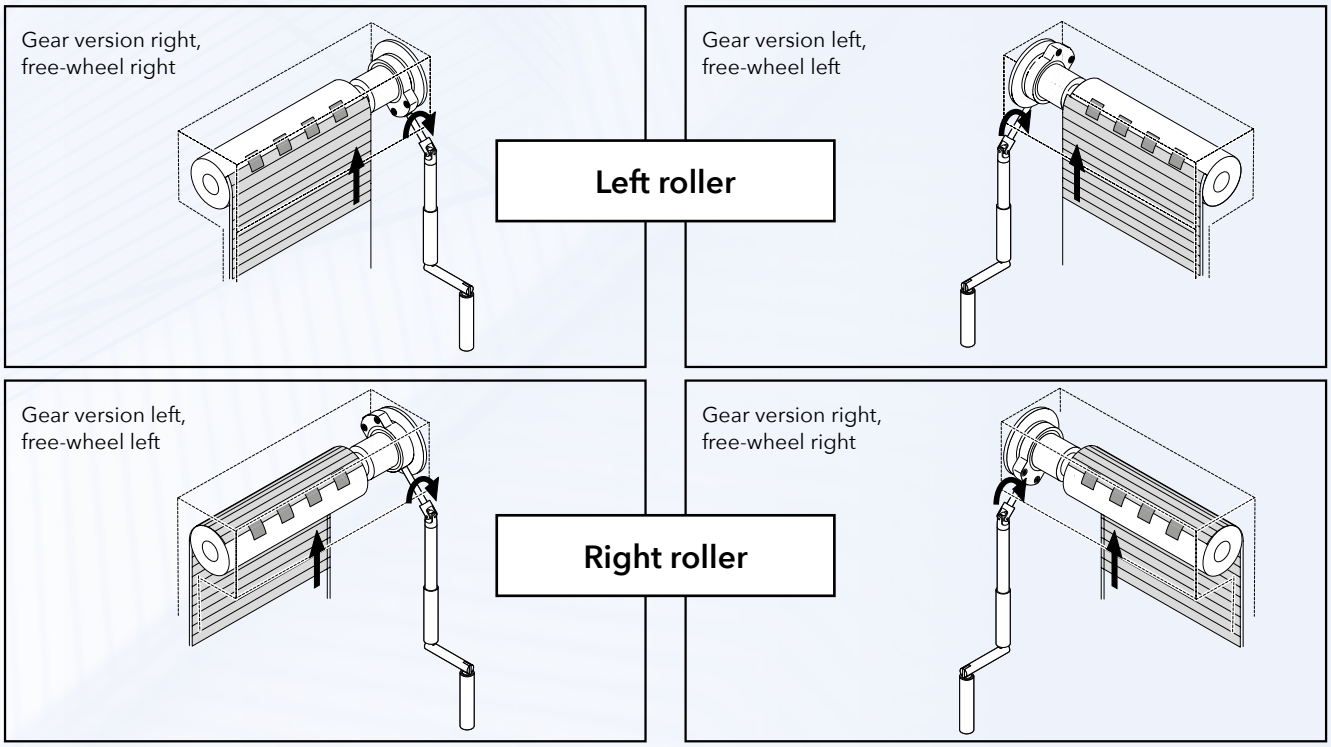
Durability and operating reliability with the GEIGER brake unit

GEIGER bevel gears are designed to achieve more than 10,000 -rotations. This corresponds to a lifetime of over 10 years -depending on the efficiency.

Determining the gear version

The crank handle should be rotated clockwise in order to open the rolling shutter.

Since the direction of rotation should stay the same for different types of assembly, please observe the drawings below when placing your order.



Identify left-hand and right-hand gears

This is very easy with our bevel gears 444F..., 446F... and 456F... Just place the gear with the mounting side on the palm of your hand. When the coupling parts show to the left, it is the left version and vice versa.

Left version

Right version

Reversible bevel gears

Through constant further development we improve our products and make our customers' job easier. Thanks to an innovative solution, the bevel gears of the 444F6.., 446F6.. and 456F6.. series are now suitable for left-hand and right-hand installation. Without retrofitting, without tools and without effort - but with a simple handling operation.

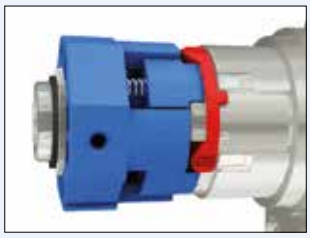
Customer benefits and product advantages

A simple changeover function of the overrun clutch has been integrated in the gear so that the gear can be installed both on the left and right. Since this is a tool-free system, the switchover is possible at any time without any problem.

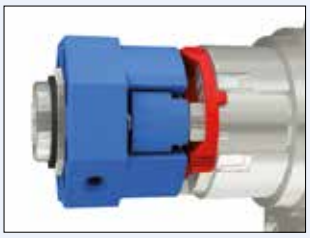
Since the patented changeover function is integrated in the gear, no components have to be dismantled or reconnected.

So no parts can get lost and the process goes much easier and faster. Protection against unintentional switching is provided via a reliable locking mechanism with a marking (L/R) on the switching mechanism.

The inner features of the gear remain almost unchanged – the millionfold proven technology remains the same.



For gears pre-set for right fitting, turn tube drive to the right …

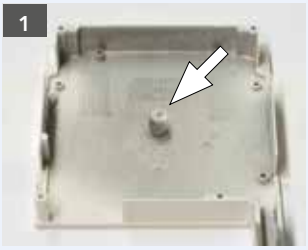


… until the latching of the overrun clutch are released and the switch mechanism is free.

Turn switch mechanism to the left until it stops …

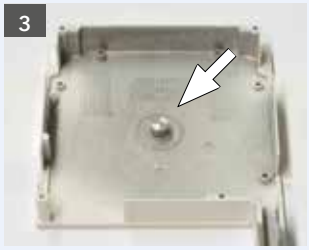
… and turn tube drive to the left until the latching elements of the overrun clutch snap into place.

Fitting of the bracket



Since the trunnion of the bracket is too high …

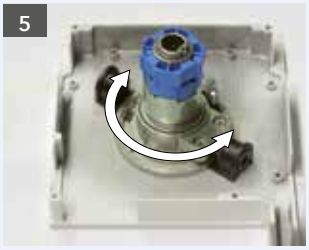
… it must be shortened to the dimension of 8,5 mm.



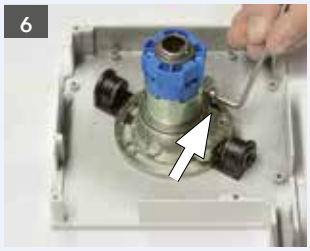
When the trunnion has been reduced to the specified dimension, you can proceed with the gear installation.

Installation of the bevel gear with the quick assembly system

Place the bevel gear with the quick assembly system and the clamping plate on the trunnion.



Align roughly the gear with the drive rod (45° or 90°)



Tighten the screw on the clampingplate (screwable from both sides) with a 3 mm Allen key.
Tightening torque: 3-4 Nm.

The final alignment with the drive rod is made on site **without** removing the clamping screw.

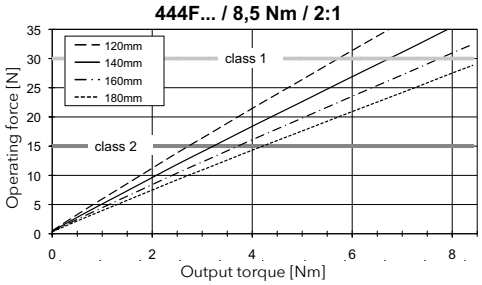
444F... | Bevel gear 2:1

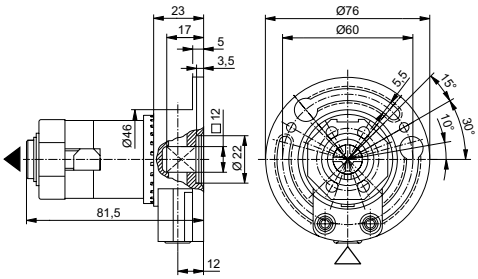
Max. output torque	8,5 Nm
Reduction ratio	2:1
Efficiency	0,81

With free-wheel brake spring

Features

- Easy operation with small reduction ratio
- Easy to operate due to free-wheel brake spring
- Insertable interior profile at the drive
- Left-hand and right-hand design for the same direction of rotation when installed on the left or right
- The free-wheel prevents the shutter curtain from being rolled up incorrectly
- Tested according to DIN EN 14201





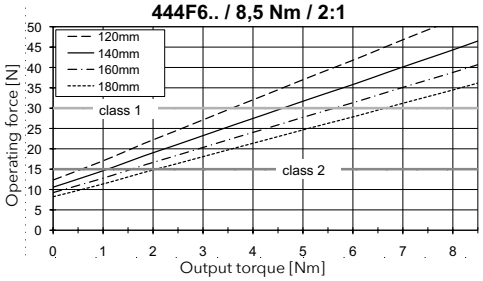
Part Nr.	End stop	Drive △	Output ▼
444F003	Free-wheel left	▢ 6 mm continuous interior profile	● 36,7 mm
444F004	Free-wheel right	▢ 6 mm continuous interior profile	● 36,7 mm
444F035	Free-wheel left	▢ 6 mm continuous interior profile	● 38 mm
444F036	Free-wheel right	▢ 6 mm continuous interior profile	● 38 mm
444F011	Free-wheel left	▢ 6 mm continuous interior profile	● 57,5 mm
444F012	Free-wheel right	▢ 6 mm continuous interior profile	● 57,5 mm

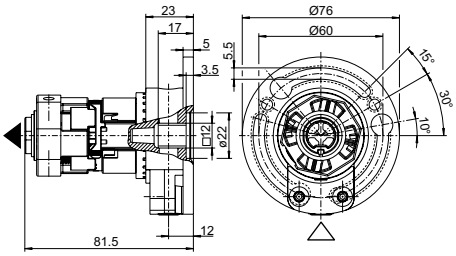
444F6.. | Reversible bevel gear 2:1

Max. output torque	8,5 Nm
Reduction ratio	2:1
Efficiency	0,65

Features

- Easy operation with small reduction ratio
- Left-hand and right-hand design for the same direction of rotation when installed on the left or right
- The free-wheel prevents the shutter curtain from being rolled up incorrectly
- Tested according to DIN EN 14201
- Delivery state: rotation direction right





Options for bevel gear 446F6..	
Drive	▢ 6 mm and ▢ 6 mm continuous interior profile
Output	● 38 mm, 50 mm, 60 mm (see adapter)
Housing design	Standard, with trunnion or with quick assembly system
Pitch circle Ø	Ø 60 mm

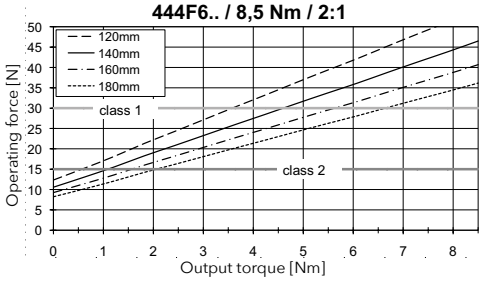
Part Nr.	End stop	Drive △	Output ▼
444F635	Free wheel clutch left/right	▢ 6 mm continuous interior profile	● 38 mm

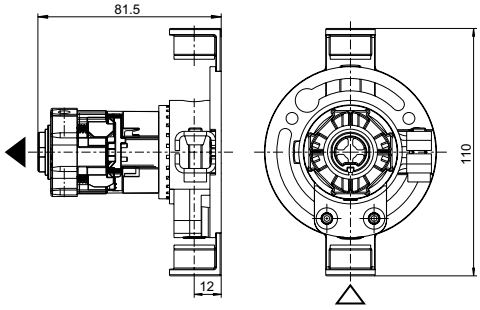
444F7.. | Reversible bevel gear with quick assembly system 2:1

Max. output torque	**8,5 Nm**
Reduction ratio	**2:1**
Efficiency	**0,65**

Features

- Bevel gear 444F6.. with special housing
- Tested according to DIN EN 14201
- Delivery state: rotation direction right
- Quick assembly system: Tensioning the gear unit with the holding pin
- Safe absorption of radial forces due to two additional bearing points
- No drilling and countersinking of the blind cap required
- Easy readjustment of the gearbox without tools
- Supplied as complete assembly kit with gear, rod bush and locking mechanism



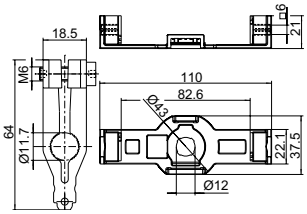


Part Nr.	End stop	Drive △	Output ▼
444F735	Free wheel clutch left/right	6 mm continuous interior profile	36,7 mm

444F705 | Quick assembly kit

Features

- Only use with gears 444F7.. and 446F7..
- Including bearing bushes and clamping plate with screw



Part Nr.	
444F705	

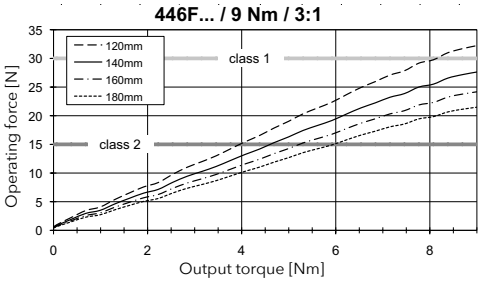
446F... | Bevel gear 3:1

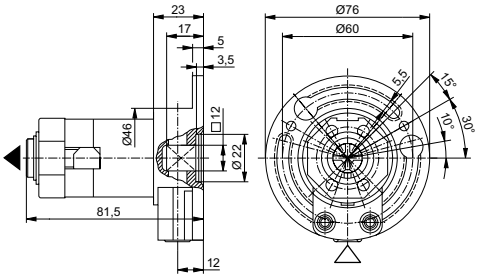
Max. output torque	9 Nm
Reduction ratio	3:1
Efficiency	0,86

With free-wheel brake spring

Features

- Easy to operate due to free-wheel brake spring
- Insertable interior profile at the drive
- Left-hand and right-hand design for the same direction of rotation when installed on the left or right
- The free-wheel prevents the shutter curtain from being rolled up incorrectly
- Tested according to DIN EN 14201





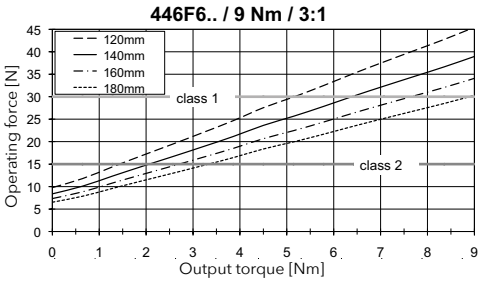
Part Nr.	End stop	Drive △	Output ▼
446F003	Free-wheel left	▢ 6 mm continuous interior profile	● 36,7 mm
446F004	Free-wheel right	▢ 6 mm continuous interior profile	● 36,7 mm
446F011	Free-wheel left	▢ 6 mm continuous interior profile	● 57,5 mm
446F012	Free-wheel right	▢ 6 mm continuous interior profile	● 57,5 mm
446F035	Free-wheel left	▢ 6 mm continuous interior profile	● 38 mm
446F036	Free-wheel right	▢ 6 mm continuous interior profile	● 38 mm

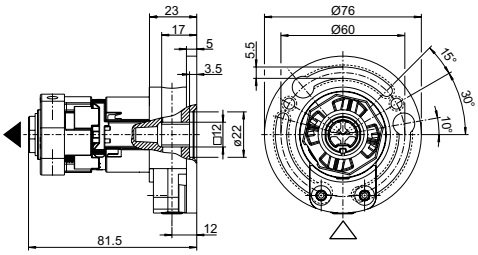
446F6.. | Reversible bevel gear 3:1

Max. output torque	9 Nm
Reduction ratio	3:1
Efficiency	0,61

Features

- Easy operation with small reduction ratio
- Left-hand and right-hand design for the same direction of rotation when installed on the left or right
- The free-wheel prevents the shutter curtain from being rolled up incorrectly
- Tested according to DIN EN 14201
- Delivery state: rotation direction right





Options for bevel gear 446F6..	
Drive	▢ 6 mm and ▢ 6 mm continuous interior profile
Output	● 38 mm, 50 mm, 60 mm (see adapter)
Housing design	Standard, with trunnion or with quick assembly system
Pitch circle Ø	Ø 60 mm

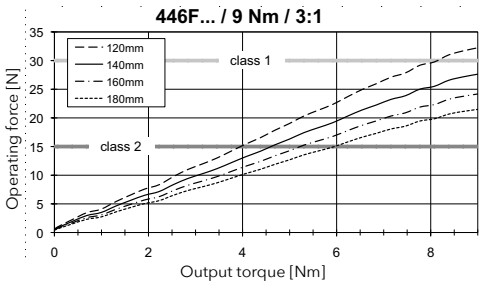
Part Nr.	End stop	Drive △	Output ▼
446F635	Free wheel clutch left/right	▢ 6 mm continuous interior profile	● 38 mm

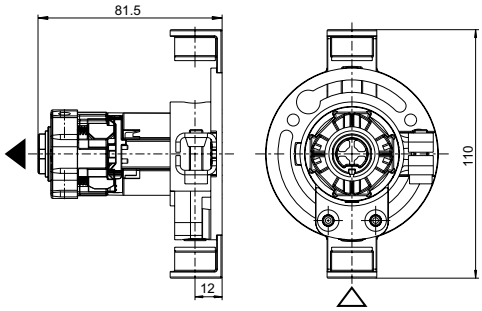
446F7.. | Reversible bevel gear with quick assembly system 3:1

Max. output torque	**9 Nm**
Reduction ratio	**3:1**
Efficiency	**0,61**

Features

- Bevel gear 446F6.. with special housing
- Tested according to DIN EN 14201
- Delivery state: rotation direction right
- Quick assembly system: Tensioning the gear unit with the holding pin
- Safe absorption of radial forces due to two additional bearing points
- No drilling and countersinking of the blind cap required
- Easy readjustment of the gearbox without tools
- Supplied as complete assembly kit with gear, rod bush and locking mechanism



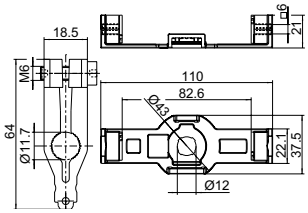


Part Nr.	End stop	Drive △	Output ▼
446F735	Free wheel clutch left/right	⬡ 6 mm continuous interior profile	● 38 mm

444F705 | Quick assembly kit

Features

- Only use with gears 444F7.. and 446F7..
- Including bearing bushes and clamping plate with screw



Part Nr.	
444F705	

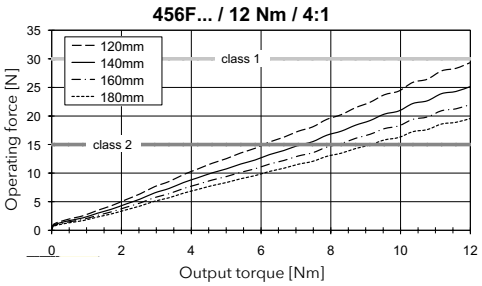
456F... | Bevel gear 4:1

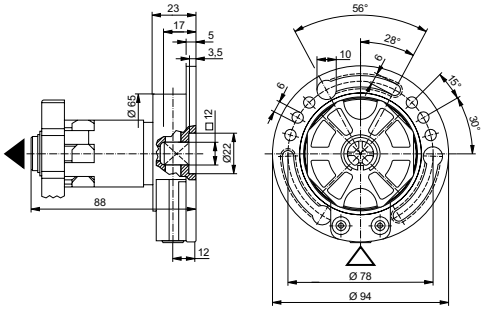
Max. output torque	12 Nm
Reduction ratio	4:1
Efficiency	0,85

With free-wheel brake spring

Features

- Easy to operate due to free-wheel brake spring
- Insertable interior profile at the drive
- Left-hand and right-hand design for the same direction of rotation when installed on the left or right
- The free-wheel prevents the shutter curtain from being rolled up incorrectly
- Tested according to DIN EN 14201





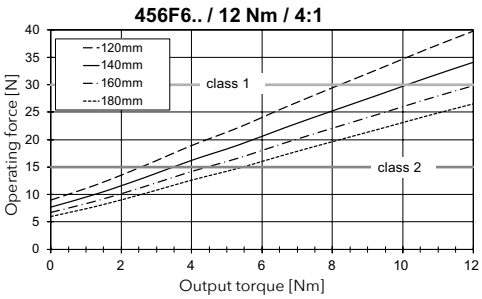
Part Nr.	End stop	Drive △	Output ▼
456F003	Free-wheel left	▢ 6 mm continuous interior profile	● 36,7 mm
456F004	Free-wheel right	▢ 6 mm continuous interior profile	● 36,7 mm
456F011	Free-wheel left	▢ 6 mm continuous interior profile	● 57,5 mm
456F012	Free-wheel right	▢ 6 mm continuous interior profile	● 57,5 mm
456F023	Free-wheel left	▢ 6 mm continuous interior profile	● 38 mm
456F024	Free-wheel right	▢ 6 mm continuous interior profile	● 38 mm

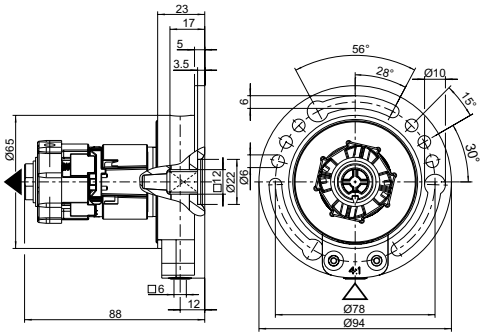
456F6.. | Reversible bevel gear 4:1

Max. output torque	12 Nm
Reduction ratio	4:1
Efficiency	0,66

Features

- Left-hand and right-hand design for the same direction of rotation when installed on the left or right
- The free-wheel prevents the shutter curtain from being rolled up incorrectly
- Tested according to DIN EN 14201
- Delivery state: rotation direction right





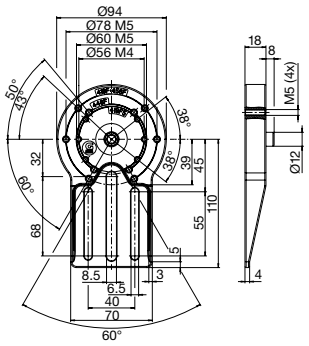
Options for bevel gear 446F6..	
Drive	▢ 6 mm and ▢ 6 mm continuous interior profile
Output	● 38 mm, 50 mm, 60 mm (see adapter)
Housing design	Standard
Pitch circle Ø	Ø 78 mm

Part Nr.	End stop	Drive △	Output ▼
456F603	Free wheel clutch left/right	▢ 6 mm continuous interior profile	● 36,7 mm

444F800 | Universal gear holder

Features

- Height adjustable: oblong holes for fixation with stud bolts
- Suitable for gears 419F..., 419F5.., 419F55., 444F..., 446F..., 447F... and 456F...



Part Nr.	
444F800	

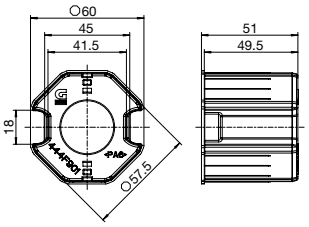
444F90. | Adaptation ring

Features

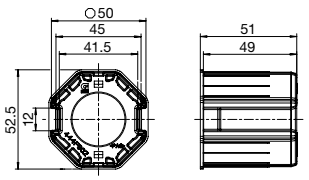
- High-strength plastic
- For the adaptation of the gear output to the shutter shaft
- Suitable for gears 444F..., 446F... and 456F... with output profile 36,7 or 38 mm

Note

- Please note that the torque is modified when using the shaft adapter
- Recommendation: Secure adapter with oval head screw 4 x 16 mm



Part Nr.	Drive	Output
444F901	● 38 mm	● 60 mm



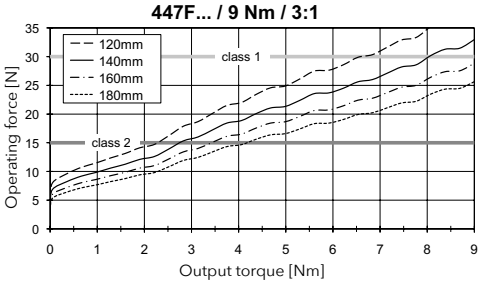
Part Nr.	Drive	Output
444F902	● 38 mm	● 50 mm

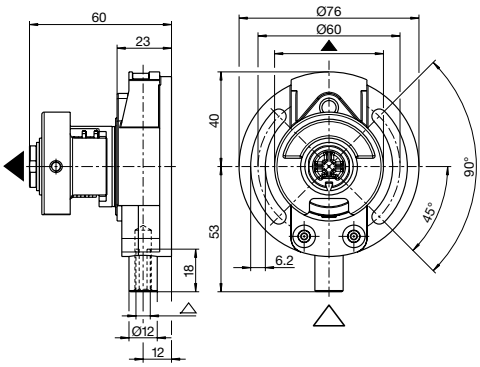
447F... | Bevel gear 3:1

Max. output torque	**9 Nm**
Reduction ratio	**3:1**
Efficiency	**0,65**

Features

- With end stop after max. 15 rotations



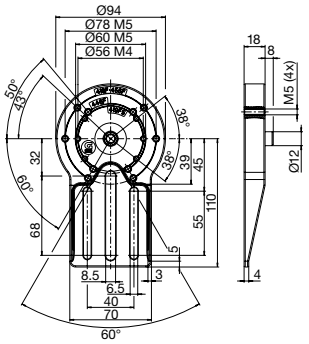


Part Nr.	End stop	Drive △	Output ▼
447F001	With end stop	▢ 6 mm	Ø 46 mm
447F002	With end stop	○ 6 mm	Ø 46 mm
447F004	With end stop	▢ 6 mm	● 38 mm

444F800 | Universal gear holder

Features

- Height adjustable: oblong holes for fixation with stud bolts
- Suitable for gears 419F..., 419F5.., 419F55., 444F..., 446F..., 447F... and 456F...



Part Nr.	
444F800	

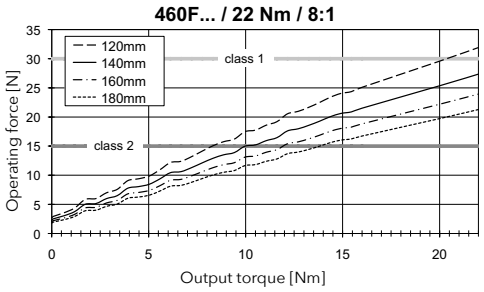
Gerhard Geiger GmbH & Co. KG | 100W0070 EN 0620 | Subject to technical modifications

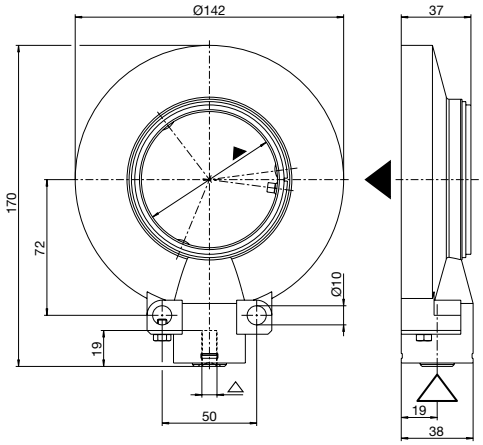
460F... | Bevel gear 8:1

Max. output torque	**22 Nm**
Reduction ratio	**8:1**
Efficiency	**0,75**

Features

- Bevel gear enclosing the shaft
- With end stop after max. 10 rotations
- Adapter for 60 mm octagonal, see 460F100
- Matching gear holder, see 460F12.





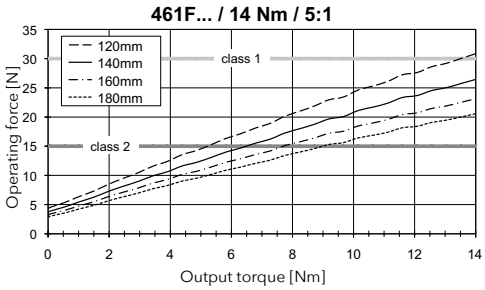
Part Nr.	Drive △	Output ▼
460F001	O 8 mm	Inner-Ø 70 mm
460F002	O 8 mm	Inner-Ø 60 mm

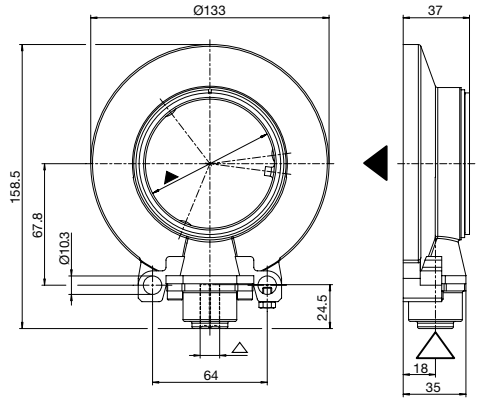
461F... | Bevel gear 5:1

Max. output torque	**14 Nm**
Reduction ratio	**5:1**
Efficiency	**0,77**

Features

- Bevel gear enclosing the shaft
- With end stop after max. 13 rotations
- Adapter for 60 mm octagonal, see 460F100
- Matching gear holder, see 460F12.



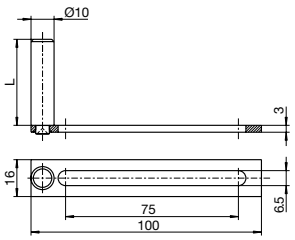


Part Nr.	Drive △	Output ▼
461F001	O 8 mm	Inner-Ø 70 mm
461F002	O 8 mm	Inner-Ø 60 mm

460F12. | Gear holder

Features

- Steel
- Zinc-plated

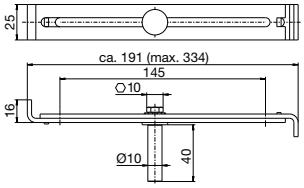


Part Nr.	Fixation
460F120	Ø 10 mm, L=60 mm
460F121	Ø 10 mm, L=80 mm

460F125 | Gear holder

Features

- Steel
- Zinc-plated
- Adjustable from 143 mm to 334 mm

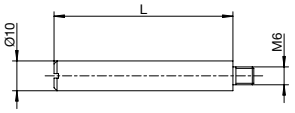


Part Nr.	
460F125	

460F11. | Pivot

Features

- Steel
- Zinc-plated



Part Nr.	Description
460F110	M6 Ø10, L=60 mm

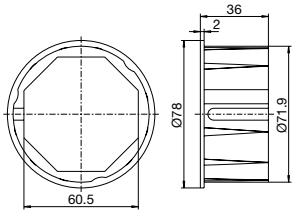
460F100 | Adaptation ring

Features

- 60 mm octagonal roller tube
- Made of plastic
- The adaptation ring must be fixed in case of a floating bearing

Note

- Only for gear output Ø 70 mm, part nr. 460F001 and 461F001



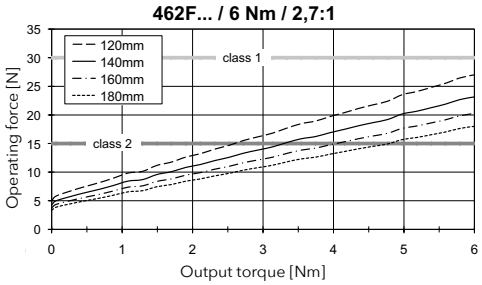
Part Nr.	
460F100	

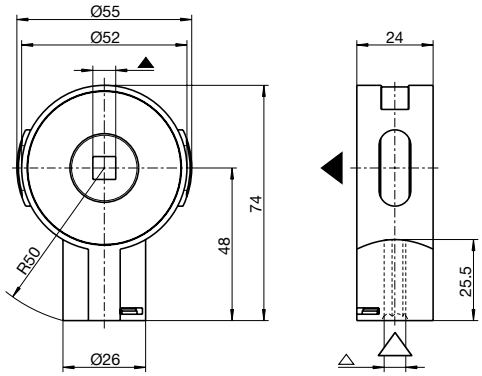
462F... | Bevel gear 2,7:1

Max. output torque	**6,0 Nm**
Reduction ratio	**2,7:1**
Efficiency	**0,66**

Features

- Same direction of rotation whether installed on left or right
- Only for universal drive
- Connecting piece for 8 mm square, see 462F093
- Fixation with gear holder 462F070 or 462F071



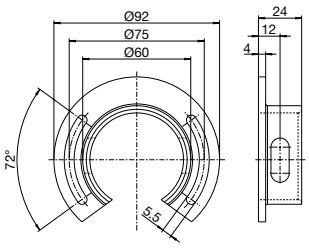


Part Nr.	End stop	Drive △	Output ▼
462F007	Without end stop	6 mm	12 mm
462F013	Without end stop	6 mm	10,2 mm
462F021	Without end stop	6 mm	14 mm

462F070 | Gear holder

Features

- High-strength plastic
- Side fixing
- Gear can be fixed on both sides

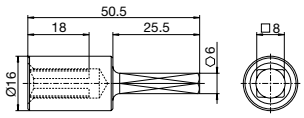


Part Nr.	
462F070	

462F093 | Connection piece for gear 462F...

Features

- Steel
- Zinc-plated

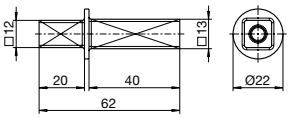


Part Nr.	Drive	Output
462F093	⬡ 8 mm	⬢ 6 mm

462F080 | Adaptor for tube drive 462F085

Features

- Diecast zinc
- For tube drive 13 mm square, 462F085

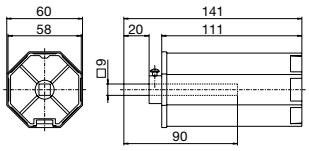


Part Nr.	Drive	Output
462F080	■ 12 mm	■ 13 mm

462F087 | Tube drive

Features

- Made of plastic
- Octagonal shaft
- With adjustable steel pin



Part Nr.	Drive	Output
462F087	■ 9 mm	● 58 mm