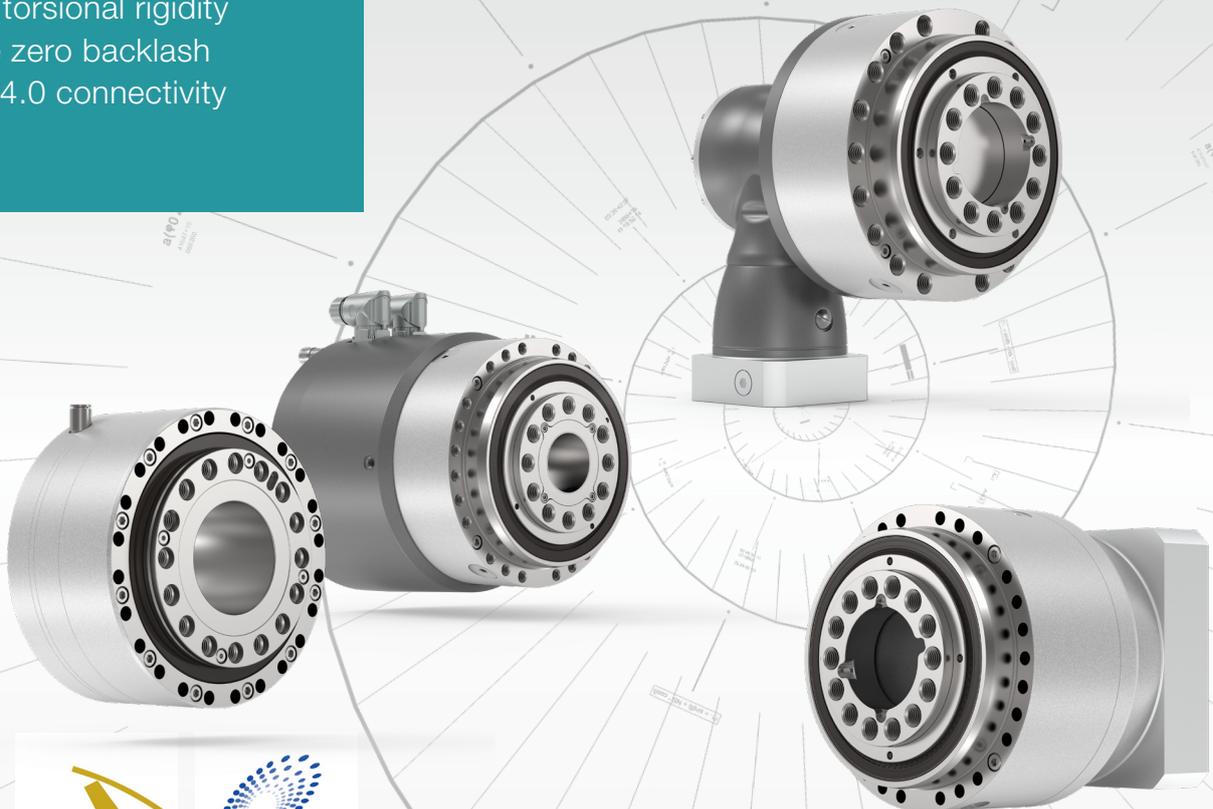


# Galaxie®

## Superior on principle

Hollow shaft  
 Highest torque  
 Extreme torsional rigidity  
 Absolute zero backlash  
 Industry 4.0 connectivity



HERMES  
 AWARD  
 2015



INNOVATIONSPREIS  
 DER DEUTSCHEN  
 WIRTSCHAFT  
 ERSTER INNOVATIONSPREIS DER WELT®



DEUTSCHER ZUKUNFTSPREIS  
 Preis des Bundespräsidenten  
 für Technik und Innovation  
 2018 Kreis der Besten

# Fundamentally new overall concept

When we developed the Galaxie®, we took it upon ourselves to subject drive concepts to a fundamental reassessment. The result: a brand new type of gearbox. It has been developed a new distinct name to describe the innovation: The term “single tooth sliding gearbox” clearly classifies the Galaxie® in terms of science, research and technology. Its unique kinematics enable virtually full surface contact during power transmission. This means that the compact Galaxie® drive systems and gearboxes with hollow shaft achieve previously inconceivable performance data, including extremely high torque density, torsional rigidity, smooth running, positioning accuracy and zero backlash.

## From linear to surface contact

The innovative core of the new Galaxie® drive system is the virtually full surface contact during power transmission. This achieves a tooth contact surface that is six and a half times larger compared to conventional involute teeth with line contact. To achieve this maximum contact, we have implemented a fundamentally new concept: individual teeth are guided simultaneously along an internal ring gear. The tooth surface geometry is based on a logarithmic spiral which allows the teeth to engage with the internal ring gear across the full surface.

## Next technology drive

The Galaxie® drive system achieves a previously unattainable performance level: the gearbox boasts maximum rigidity and zero backlash combined with the highest synchronization values. To achieve this, we have designed the components to ensure continuous smooth movement by shaping them as logarithmic spirals and the resulting contact geometries. The performance features of the single tooth sliding gearbox are all significantly better than those of traditional hollow-shaft drives with the same outer diameter.



# Contents

Introduction .....02  
Superior gearbox and drive systems .....04  
Four variants, eight sizes .....06  
Technical details .....08



# Superior gearbox and drive systems

Highest precision over complete lifetime

## Damping properties

Hydrodynamic lubricating film on the teeth contacts provides damping properties

## Rigidity

Positioning accuracy during extreme load variations exceeds the market standard by a factor of 5

## Overload capacity

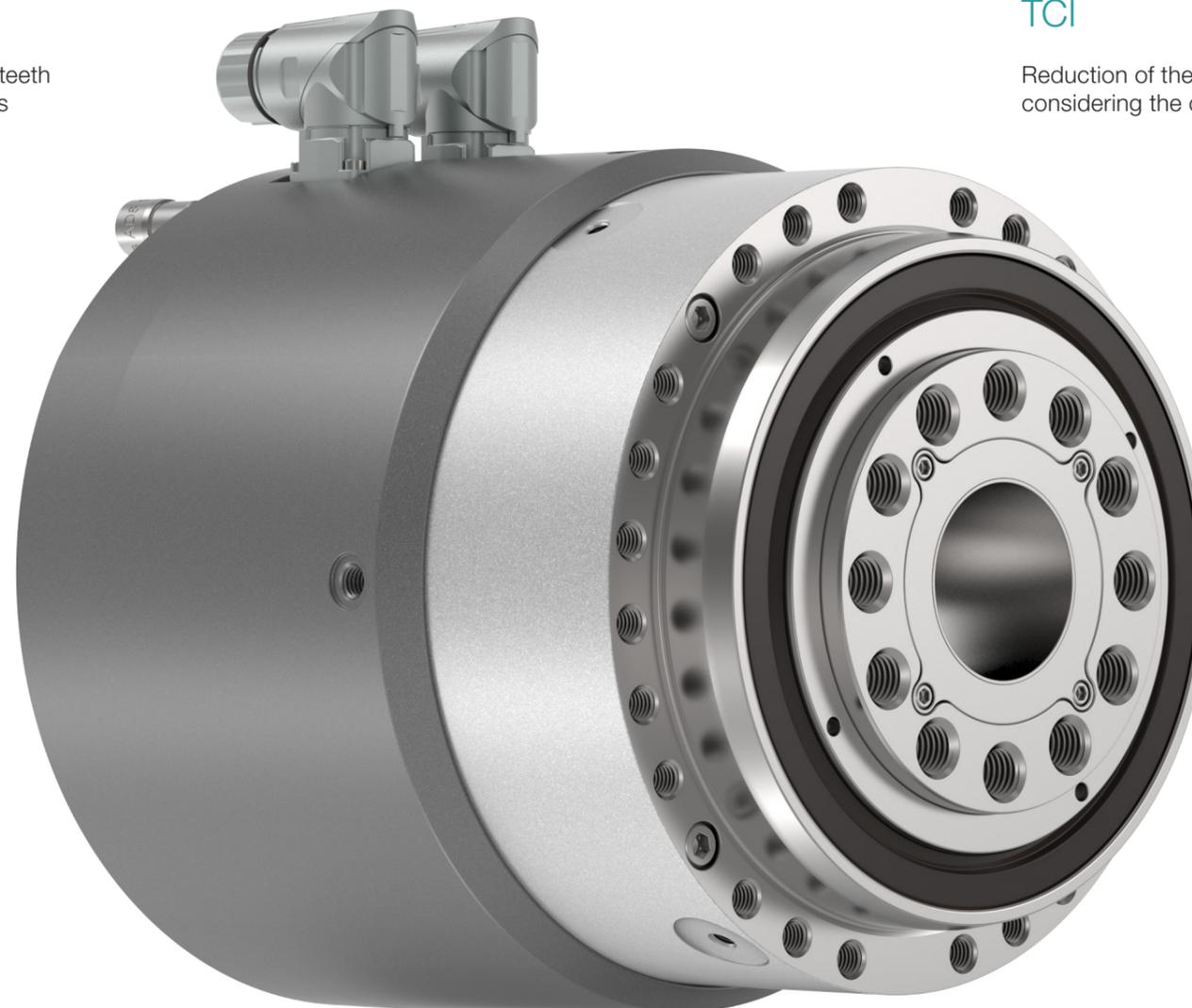
Surface contact of the teeth enables up to triple overload of the maximum torque

## True zero backlash

Over the entire lifetime

## Torque density

Torque up to 3 times higher than dimensionally similar drive solutions



## TCI

Reduction of the total cost of investment by considering the complete system

## Long service life

Virtually wear-free toothing based on a logarithmic spiral in place of an involute

## Energy efficient

Up to 50% lower energy consumption through downsizing

## TCO

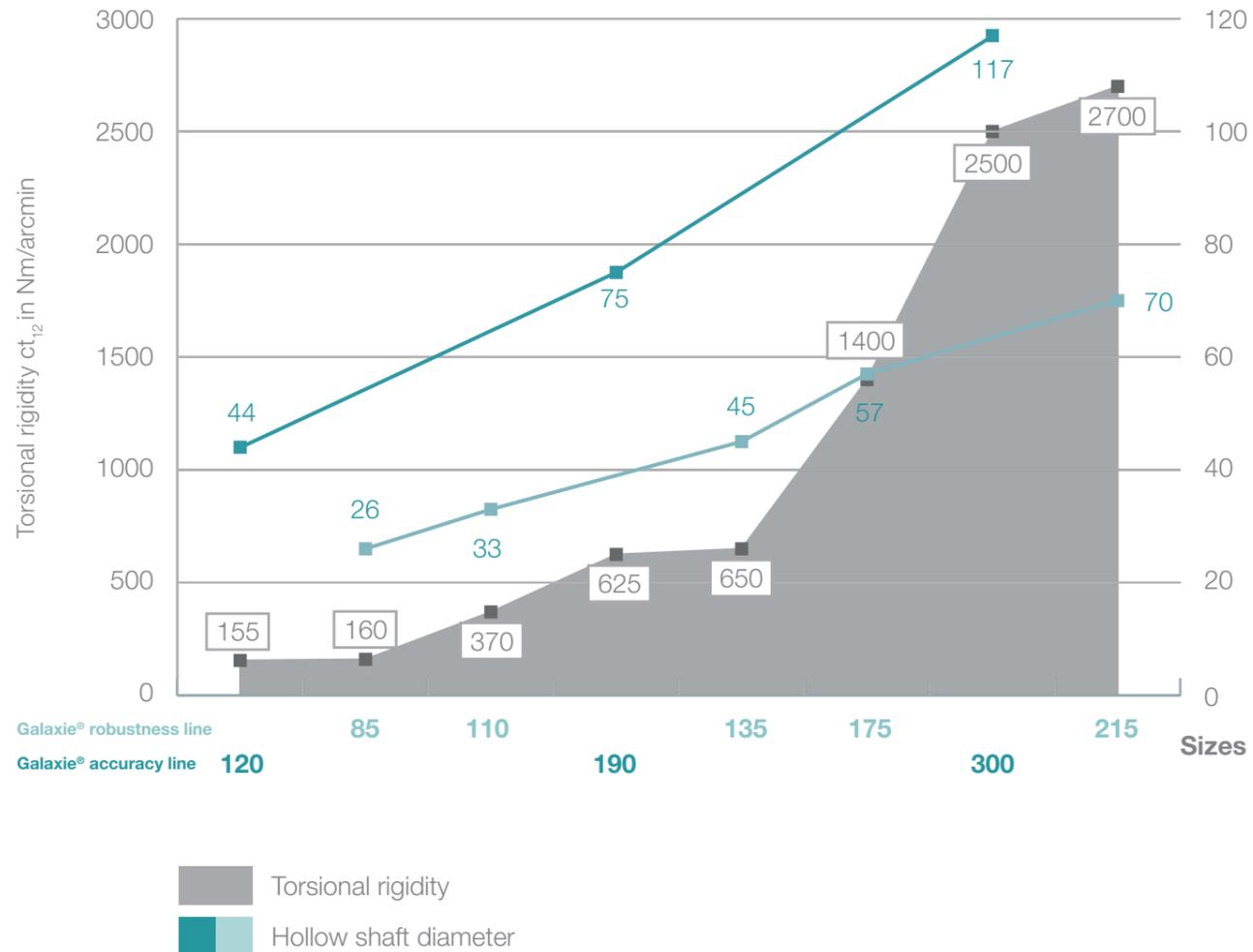
Increase in productivity by up to 40% through the use of disruptive technology

## Configurable

Perfectly adapted drive system to your application without any compromises

# An ingenious concept in two series, four variants and eight sizes

Galaxie® properties of true zero backlash with highest torque density, torsional rigidity and positioning accuracy are valid for all versions throughout the entire service life. These characteristics are available in two series: The Galaxie® accuracy line is characterized by maximum precision and accuracy, and has the largest possible hollow shaft. The Galaxie® robustness line focuses on maximum overload capacity and maximum resilience against process influences – such as external forces or vibrations.



Gearbox + adapter plate  
= maximum flexibility



## Galaxie® G

Configurable backlash-free gearbox with optional coaxial planetary pre-stage and adapter plate.



## Galaxie® GH

Galaxie® gearbox with hypoid pre-stage and adapter plate with optional additional coaxial pre-stage and hollow shaft.

Gearbox + motor  
= ultra-compact hollow shaft actuator



## Galaxie® D

Hollow-shaft compact drive with integrated permanently excited synchronous motor with standard encoder systems.

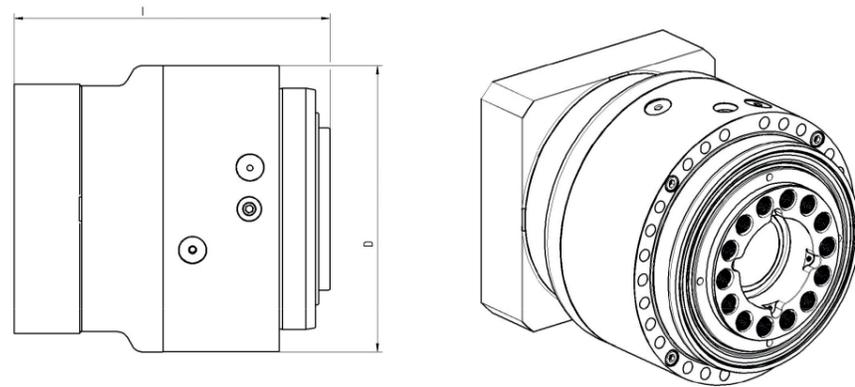
Gearbox + drive interface  
= large hollow shaft + extremely short design



## Galaxie® GS

Compact, configurable zero backlash gearbox with hollow shaft and drive interface.

# Galaxie® G



## Product characteristics:

Configurable backlash-free gearbox with optional coaxial planetary pre-stage and adapter plate.

## Typical applications:

A/B/C axis for precise positioning in cutting machine tools such as lathes, in mechanical drive technology or medical technology.

## Note:

Adapter plate and motor shaft coupling configurable for all common industrial motors. Ratio up to  $i = 301$  can be realized with planetary pre-stage.

Size	Unit	Galaxie® robustness line					Galaxie® accuracy line		
		85	110	135	175	215	120	190	300
Variant		G	G	G	G	G	G	G	G
Outer diameter <sup>1</sup>	D in mm	115	160	191	241	300	122	193	304
Length <sup>2</sup>	l in mm	157	177	226	267	316	111	151	215
Max. acceleration torque <sup>3</sup>	$T_{2B}$ in Nm	450	1086	1800	4050	7500	350	1500	6000
Max. output speed <sup>3</sup>	$n_{2max}$ in rpm	125	95	80	61	50	125	80	50
Nominal output torque <sup>3</sup> @ $n_{2N}$	$T_{2N}$ in Nm	190	450	750	1685	3130	190	750	3000
Nominal output speed <sup>3</sup> @ $T_{2N}$	$n_{2N}$ in rpm	31	23	20	15	12	75	50	31
Emergency stop torque <sup>3</sup>	$T_{2Not}$ in Nm	1350	3000	5400	12000	22500	700	3000	12000
Torsional rigidity <sup>3</sup>	$C_{t21}$ in Nm/arcmin	160	370	650	1400	2700	155	625	2500
Ratio <sup>4</sup>	i	-24					31		

<sup>1</sup> without connectors / varies depending on mounting position

<sup>2</sup> without cooling connectors / varies depending on pre-stage and motor-dependent adapter plate

<sup>3</sup> values are subject to variations due to factors beyond our control

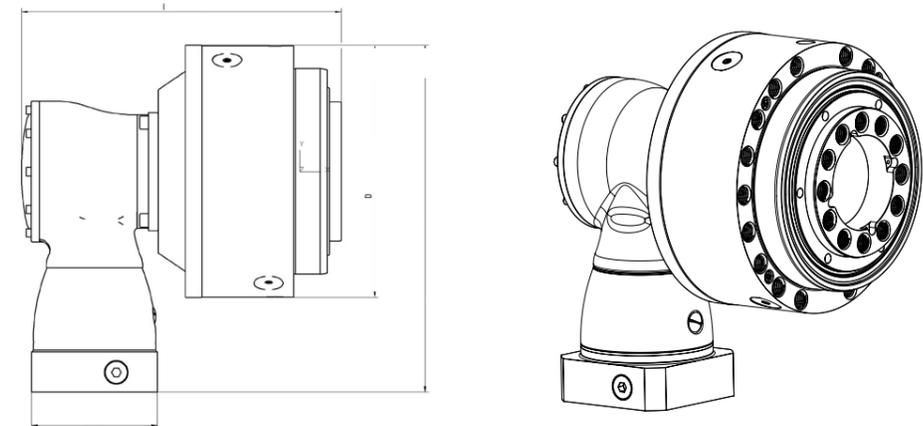
<sup>4</sup> with negative gear ratio, output turns in opposite direction to input; with positive gear ratio, output turns in same direction as input

Galaxie® robustness line: Technical data valid without water cooling.

Galaxie® accuracy line: Technical data valid with water cooling.

Technical data for reference only; technical data for 2-stage gearboxes and gearboxes with a different type of cooling may vary – available on request.

# Galaxie® GH



## Product characteristics:

Galaxie® gearbox with hypoid pre-stage and adapter plate – additional coaxial pre-stage and hollow shaft are optional.

## Typical applications:

A/B/C axis for precise positioning in machine tools, mechanical drive and assembly systems, such as positioning tasks and wafer handling.

## Note:

Optional hollow shaft with hypoid pre-stage. Ratios up to  $i = 2400$  can be realized with additional coaxial pre-stage (no hollow shaft). Adapter plate and motor shaft coupling configurable for all common industrial motors.

Size	Unit	Galaxie® robustness line			
		110	135	175	215
Variant		GH	GH	GH	GH
Outer diameter <sup>1</sup>	D in mm	160	191	241	300
Length <sup>2</sup>	l in mm	215	260	302	381
Max. acceleration torque <sup>3</sup>	$T_{2B}$ in Nm	1086	1800	4050	7500
Max. output speed <sup>3</sup>	$n_{2max}$ in rpm	95	80	61	50
Nominal output torque <sup>3</sup> @ $n_{2N}$	$T_{2N}$ in Nm	450	750	1685	3130
Nominal output speed <sup>3</sup> @ $T_{2N}$	$n_{2N}$ in rpm	23	20	15	12
Emergency stop torque <sup>3</sup>	$T_{2Not}$ in Nm	3000	5400	12000	22500
Torsional rigidity <sup>3</sup>	$C_{t21}$ in Nm/arcmin	370	650	1400	2700
Ratio <sup>4</sup>	i	72-240			

<sup>1</sup> without connectors / varies depending on mounting position

<sup>2</sup> without cooling connectors / varies depending on pre-stage and motor-dependent adapter plate

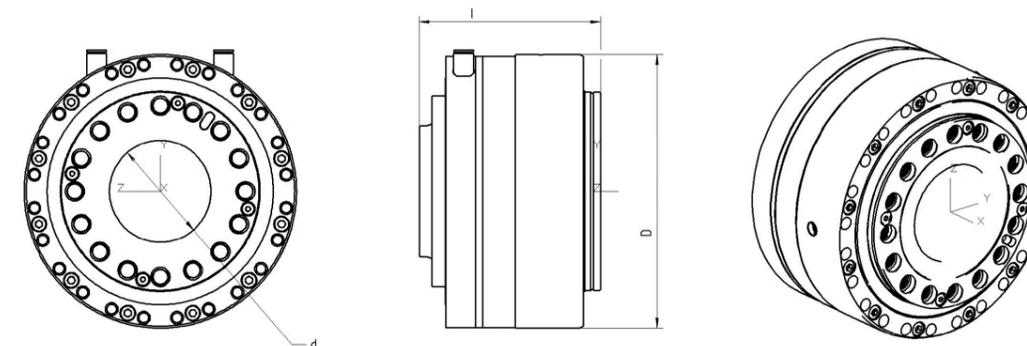
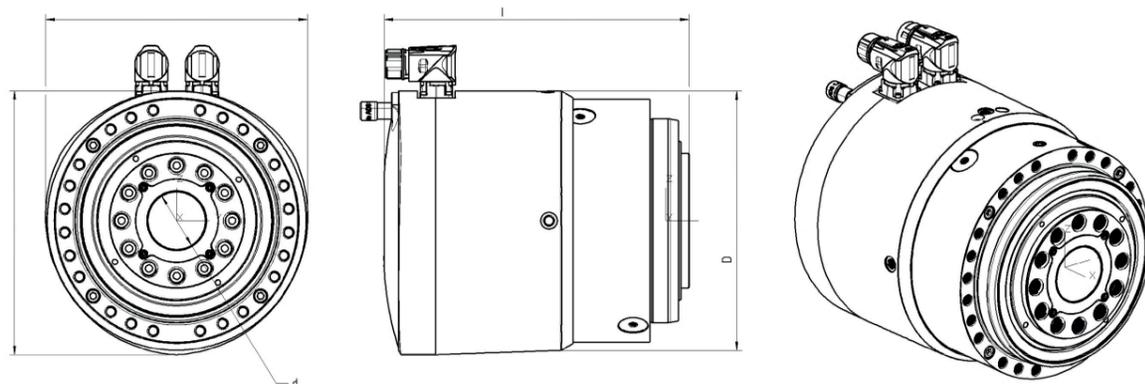
<sup>3</sup> values are subject to variations due to factors beyond our control

<sup>4</sup> output rotates in same direction as input

Technical data for reference only; values for hollow shaft design and MF3 (with additional coaxial pre-stage up to  $i=2400$ ) on request.

# Galaxie® D

# Galaxie® GS



### Product characteristics:

Compact hollow shaft drive with the same characteristics as the gearbox version: zero backlash with highest torque density, torsional rigidity and positioning accuracy with compact integrated synchronous motor.

### Typical applications:

A/B/C axis for precise positioning in cutting machine tools or packaging machines, such as gear rolling machines or milling machines.

### Note:

Different encoder options, cooling connectors, electrical connectors, cooling options (liquid cooled, convection) and an optional holding brake are available depending on application requirements.

### Product characteristics:

Configurable zero backlash gearbox with hollow shaft and drive interface.

### Typical applications:

A/B/C axis for precise positioning in cutting machine tools and automatic lathes.

### Note:

Can be driven by e.g. toothed belts and industrial motors arranged in parallel axis. Configurable variants also available for sizes 085 and 215 on request.

Size	Unit	Galaxie® robustness line				Galaxie® accuracy line
		85	110	135	175	
Variant		D	D	D	D	On request
Outer diameter <sup>1</sup>	D in mm	144	187	211	263	
Hollow shaft diameter	d in mm	26	33	45	57	
Length <sup>2</sup>	l in mm	197	232	240	325	
Max. acceleration torque <sup>3</sup>	T <sub>2B</sub> in Nm	450	1086	1800	4050	
Max. output speed <sup>3</sup>	n <sub>2max</sub> in rpm	125	95	80	61	
Nominal output torque <sup>3</sup> @ n <sub>2N</sub>	T <sub>2N</sub> in Nm	190	450	750	1685	
Nominal output speed <sup>3</sup> @ T <sub>2N</sub>	n <sub>2N</sub> in rpm	31	23	20	15	
Emergency stop torque <sup>3</sup>	T <sub>2Not</sub> in Nm	1350	3000	5400	12000	
Torsional rigidity <sup>3</sup>	C <sub>121</sub> in Nm/arcmin	160	370	650	1400	
Ratio <sup>4</sup>	i	-24				

<sup>1</sup> without connectors / varies depending on mounting position

<sup>2</sup> without cooling connectors

<sup>3</sup> values are subject to variations due to factors beyond our control

<sup>4</sup> output rotates in opposite direction to input

Technical data valid for actuators with water cooling; data for convection cooling may vary.  
Technical data for reference only.

Size	Unit	Galaxie® robustness line					Galaxie® accuracy line		
		85	110	135	175	215	120	190	300
Variant		GS	GS	GS	GS	GS	GS	GS	GS
Outer diameter <sup>1</sup>	D in mm	On request	160	191	241	On request	122	193	304
Hollow shaft diameter	d in mm		33	45	57		44	75	117
Length <sup>2</sup>	l in mm		145	161	213		84	124	183
Max. acceleration torque <sup>3</sup>	T <sub>2B</sub> in Nm		1086	1800	4050		350	1500	6000
Max. output speed <sup>3</sup>	n <sub>2max</sub> in rpm		95	80	61		125	80	50
Nominal output torque <sup>3</sup> @ n <sub>2N</sub>	T <sub>2N</sub> in Nm		450	750	1685		190	750	3000
Nominal output speed <sup>3</sup> @ T <sub>2N</sub>	n <sub>2N</sub> in rpm		23	20	15		60	40	25
Emergency stop torque <sup>3</sup>	T <sub>2Not</sub> in Nm		3000	5400	12000		700	3000	12000
Torsional rigidity <sup>3</sup>	C <sub>121</sub> in Nm/arcmin		370	650	1400		155	625	2500
Max. lateral force	F1Q(SF1) in N		2150	4500	5850		600	1980	4100
Ratio <sup>4</sup>	i	-24					31		

<sup>1</sup> without connectors / varies depending on mounting position

<sup>2</sup> without cooling connectors

<sup>3</sup> values are subject to variations due to factors beyond our control

<sup>4</sup> with negative gear ratio, output turns in opposite direction to input; with positive gear ratio, output turns in same direction as input

Galaxie® robustness line: Technical data valid without water cooling.

Galaxie® accuracy line: Technical data valid with water cooling.

Technical data for reference only.



galaxie

**WITTENSTEIN galaxie GmbH · Walter-Wittenstein-Straße 1 · 97999 Igersheim · Germany**

Tel. +49 7931 493-18860 · sales-galaxie@wittenstein.de

WITTENSTEIN Inc. · USA

Tel. +1 888-534-1222 · galaxie-info@wittenstein-us.com

WITTENSTEIN GmbH · Austria

Tel: +43 2256 65632-0 · office@wittenstein.at

WITTENSTEIN GmbH · Switzerland

Tel: +41 81 300 10 30 · sales@wittenstein.ch

WITTENSTEIN Ltd. · Japan

Tel: +81 3 6680 2835 · sales@wittenstein.jp

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**[www.wittenstein-galaxie.de](http://www.wittenstein-galaxie.de)**