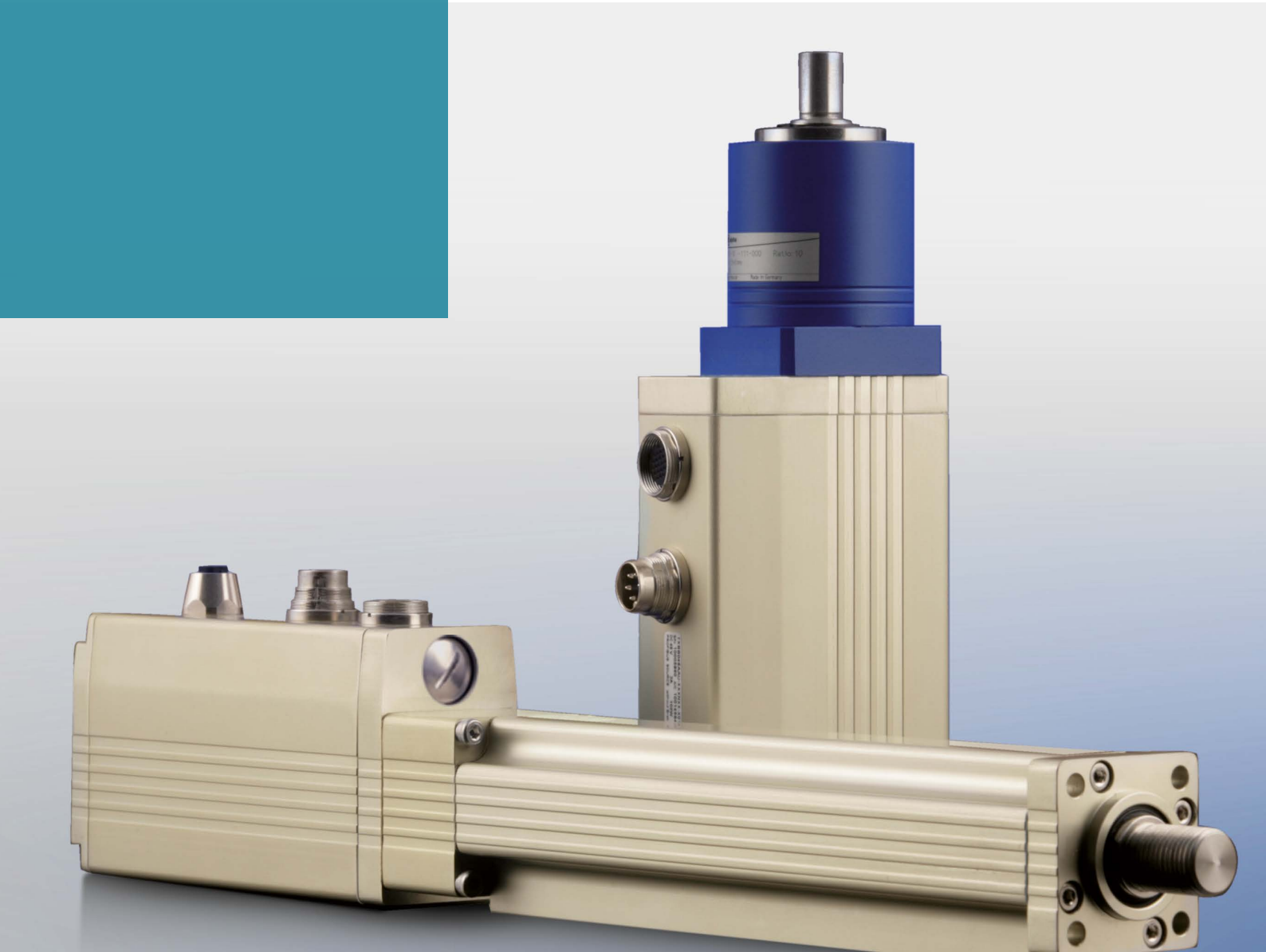
WITTENSTEIN | cyber motor

ternary All-In-One System



Contents

Our guiding principle – the belief that our systems and products make life easier for our customers and their businesses more successful and efficient. We are continually setting standards and applying advanced technology to give our customers a competitive edge on the market.

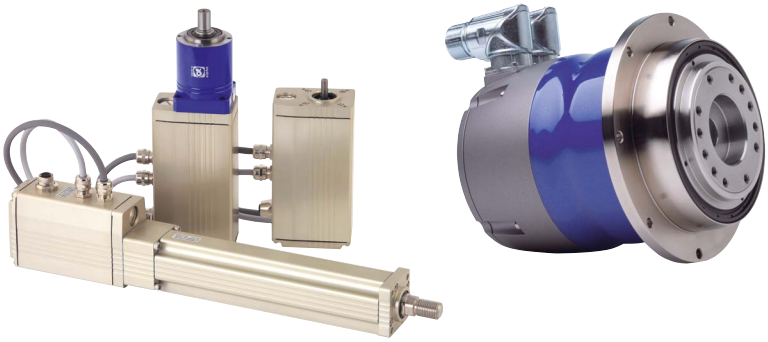
WITTENSTEIN

WITTENSTEIN develops customized products, systems and solutions for highly dynamic motion, maximum-precise positioning and smart networking for mechatronic drive technology.

It is our unique capacity for innovation that drives us to further develop the essential technology for electromechanical drive systems and pioneer new areas of application. Our latest example is the revolutionary Galaxie drive system, honored with the prestigious Hermes Award at the 2015 Hannover Trade Show.

WITTENSTEIN | cyber motor

A system functions best when all the individual parts are integrated perfectly. The harmonious combination of motors, precision gearheads, electronics, sensors and software integrated in bus-compatible, electromechanical rotary and linear servo systems manufactured by WITTENSTEIN cyber motor GmbH is more than impressive. Integration plays an innovative role here and is a decisive factor in increasing power density and dynamics.



ternary is an intelligent, fully integrated all-in-one positioning system with perfectly adapted components.

All components such as motors, electronic systems, sensors, controls, firmware and precision mechanisms are enclosed in a single housing and act as an interface between a simple pneumatic solution and a sophisticated, costly servo axle. ternary rotary and linear actuators are a genuine low-price alternative to current standard solutions because all components are already integrated, which offer countless benefits for the user.

ternary positioning drives are available in a rotary and linear design, each with 3 different variants of brushless motor. An optional, high-precision planetary gearhead with different ratios can be fitted to the rotary version. ternary linear actuators have a maintenance-free stainless steel actuator rod, which is driven by a ball screw spindle.

All drives are available with RS485, Profibus DP, CANopen, DeviceNet or EtherNet/IP. Motion data such as position, speed, acceleration and power or torque can be programmed as required and modified online.

Typical applications

Packaging machines · Filling and dosing machines · Feed motions · Joining applications · Pick&Place applications · Valve activation

Benefits at a glance

- Simple integration in existing machines and drive and control architectures
- All components are compatible and originate from the same source
- Costs easy to calculate
- Drive ready for connection
- Fewer cables and no switch cabinet reduce costs
- Maintenance-free
- All components are enclosed in a robust metal housing and protected from external influences
- Simple fieldbus connection and setup
- No additional cooling system required
- Optional PLC function modules for easy integration
- Optional TET programming software for simple parameter configuration and implementation
- Profibus hardware address switch available for easy setup and automatic initialization
- High-quality multiturn absolute encoder available on request
- Custom programming of position, speed, acceleration and power
- Sophisticated firmware allows for easy adaptation of parameters to virtually all applications

Product spectrum

Rotary actuators
Maximum torque up to 35 Nm
Maximum speed up to 5000 rpm depending on the standard gearhead ratio 1, 5, 10 and 25:1

Linear actuators
Stroke lengths from 25 to 300 mm
Maximum feed force up to 1000 N
Maximum speed up to 1000 mm/s

Technical data	Unit	TRBA046AA*-XXX*01	TRSA046AA*-XXX*05	TRSA046AA*-XXX*10	TRSA046AA*-XXX*25
Motor type		Brushless servo motor (STP)			
Gearhead ratio		–	5	10	25
Max. torque	Nm	0.33	1.4	2.8	6.9
Max. speed (output)	U/min	4500	800	400	160
Dimensions	mm	See dimension sheets on the following pages			
Shaft diameter	mm	7, D cut	12, with key		
Gearhead torsional backlash	arcmin	–	< 12	< 12	< 15
Motor mass moment of inertia	x 10^{-7} kgm²	83			
Gearhead mass moment of inertia	x 10^{-7} kgm²	–	59	59	55
Permitted lateral force on the shaft	N	70	650		
Permitted axial force on the shaft	N	50	700		
Protection class		IP65 [1]	IP64		
Ambient temperature	°C	Operation: 0 to 40, storage: -20 to 60			
Air humidity	%	Operation and storage: 90% RH_{max}			
Supply voltage/current	V/A	24 VDC ± 10% / 1.5 A (with brake 1.7 A)			
Logic supply	V/A	24 V / 0.2 A			
Interfaces		RS485 + PIO / Profibus DP + PIO / DeviceNet + PIO / CANopen + PIO / EtherNet/IP + PIO			
PIO interface		Inputs: 8, outputs: 5			
Internally stored motion profiles		16			
Control		Closed-loop control, programming of position/speed/acceleration/torque			

[1] IP67 available with air purge on request.

Encoder system

Incremental encoder resolution (relates to the motor output)	Resolution/rev	800
	arcmin	27

Optional holding brake

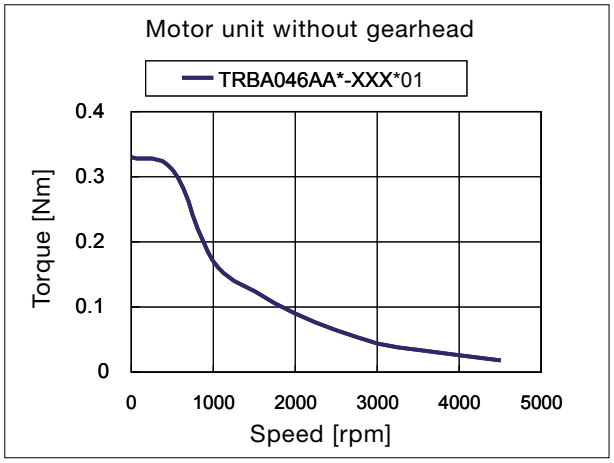
The ternary rotary actuator can be supplied with an optional holding brake, which is integrated in the mechatronic unit.
Technical data, additional dimensions and mass are as follows:

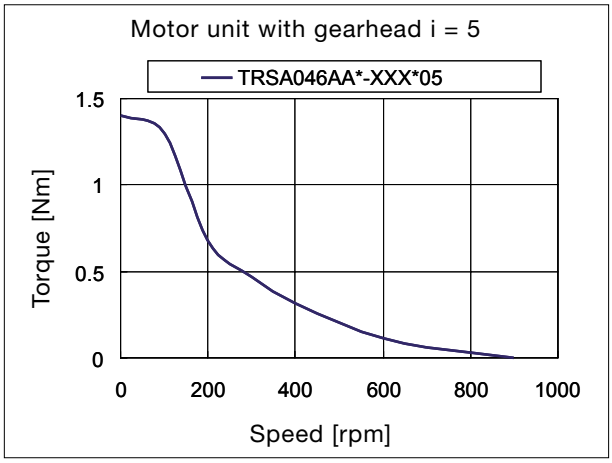
Type designation TR*A046AA* -XXX ■ **	■ = N without holding brake	■ = B with holding brake

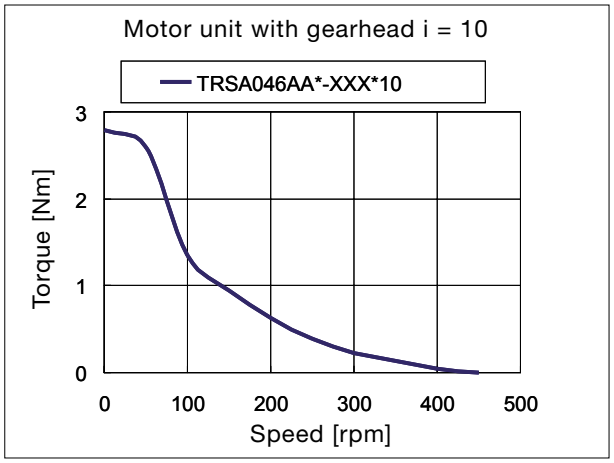
	Unit	TRBA046AA*-XXXB01	TRSA046AA*-XXXB05	TRSA046AA*-XXXB10	TRSA046AA*-XXXB25
Holding torque	Nm	0.19	0.96	1.9	4.75
Additional length	mm	26			
Additional mass	kg	0.23			
Additional mass moment of inertia	x10^{-7} kgm²	3.2			

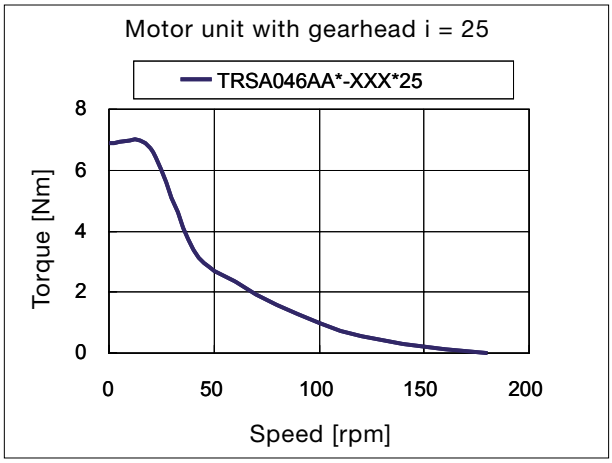
Note: The static holding brake is not suitable for dynamic braking. The brake was designed exclusively for retaining the position of the actuator when disconnected from the power.

Speed/torque characteristics







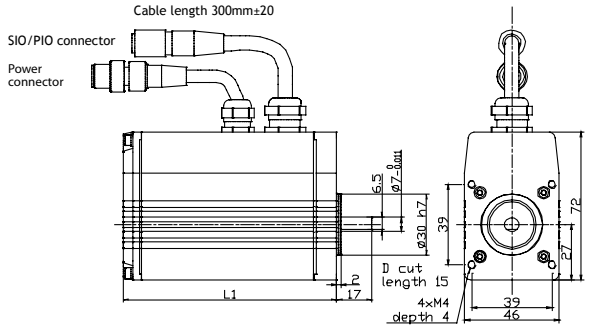


External conditions: 24 VDC supply voltage at ambient temperature of 40°C.

TRBA046 **without gearhead**

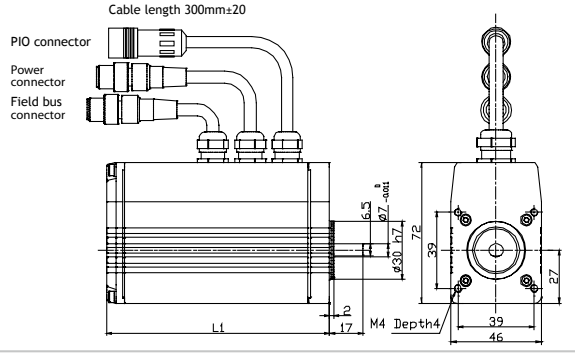
Type designation	Interface	L1 [mm]		Mass [kg]	
		without brake	with brake	without brake	with brake
TRBA046AAB-XXX*01	RS485	104	130	0.8	1.03
TRBA046AAX-XXX*01	Fieldbus	114	140	0.85	1.08

RS485 interface
TRBA046AAB

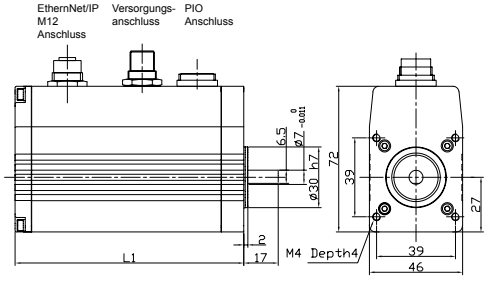


DeviceNet interface
TRBA046AAQ

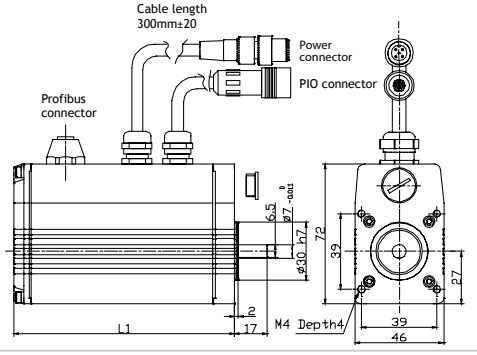
CANopen interface
TRBA046AAS



EtherNet/IP Interface
TRBA046AAH



Profibus DP interface
with address switch
TRBA046AAU

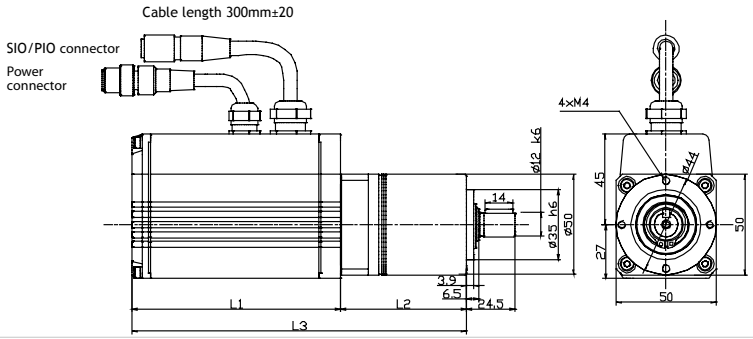


Note: Dimensional drawing can in certain cases be changed. Contact Wittenstein or visit our web site for updated CAD drawings.

TRSA046 **with gearhead**

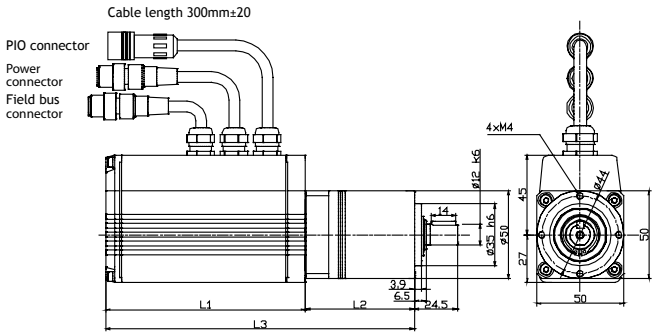
Type designation	Interface	Gearhead ratio	L1 [mm]		L2 [mm]	L3 [mm]		Mass [kg]	
			without brake	with brake		without brake	with brake	without brake	with brake
TRSA046AAB-XXX*05 / *10	RS485	5 or 10	104	130	68.4	172.4	198.4	1.55	1.78
TRSA046AAX-XXX*05 / *10	Fieldbus		114	140		182.4	208.4	1.6	1.83
TRSA046AAB-XXX*25	RS485	25	104	130	83.9	187.9	213.9	1.75	1.98
TRSA046AAX-XXX*25	Fieldbus		114	140		197.9	223.9	1.8	2.03

RS485 interface
TRSA046AAB

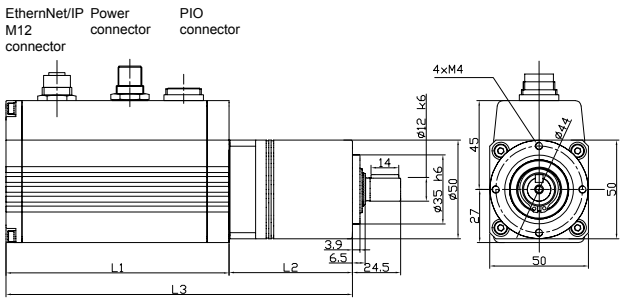


DeviceNet interface
TRSA046AAQ

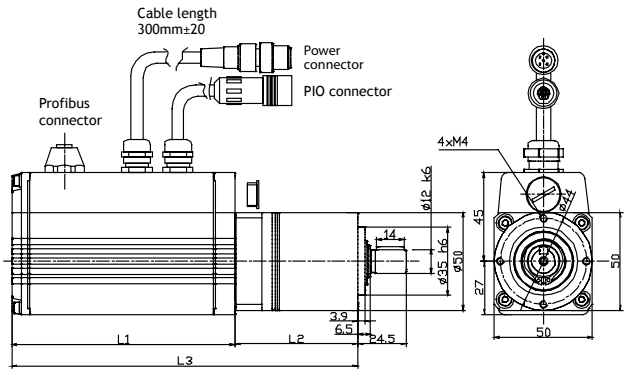
CANopen interface
TRSA046AAS



EtherNet/IP Interface
TRSA046AAH



Profibus DP interface
with address switch
TRSA046AAU



Note: Dimensional drawing can in certain cases be changed. Contact Wittenstein or visit our web site for updated CAD drawings.

Technical data	Unit	TRBB046B**-XXX*01	TRSB046B**-XXX*05	TRSB046B**-XXX*10	TRSB046B**-XXX*25
Motor type		Brushless AC servo motor (BLM)			
Gearhead ratio		–	5	10	25
Permanent torque	Nm	0.27	1.0	2.0	5.0
Max. torque	Nm	0.82	3.46	6.39	11.5
Max. speed (output)	U/min	5000	1000	500	200
Dimensions	mm	See dimension sheets on the following pages			
Shaft diameter	mm	7, D cut	12, with key		
Gearhead torsional backlash	arcmin	–	< 12	< 12	< 15
Motor mass moment of inertia	x 10^{-7} kgm²	36.5			
Gearhead mass moment of inertia	x 10^{-7} kgm²	–	59	59	55
Permitted lateral force on the shaft	N	70	650		
Permitted axial force on the shaft	N	50	700		
Protection class		IP65 [1]	IP64		
Ambient temperature	°C	Operation: 0 to 40, storage: -20 to 60			
Air humidity	%	Operation and storage: 90% RH_{max}			
Supply voltage/current	V/A	48 VDC ± 10% / 9 A max [2]			
Logic supply	V/A	12-48 V / 0.2 A			
Interfaces		RS485+PIO/Profibus DP+PIO+RS485/DeviceNet+PIO+RS485/CANopen+PIO+RS485/EtherNet/IP+PIO+RS485			
PIO interface		Inputs: 8, outputs: 5			
Internally stored motion profiles		64			
Control		Closed-loop control, programming of position/speed/acceleration/torque			

[1] IP67 available with air purge on request.
[2] The actuator can also be powered off 24 VDC with derated performance data.

Encoder system

Two encoder systems are available, an incremental encoder and a multiturn absolute encoder.

Type designation TR*B046B■* -XXX***	■ = B Incremental encoder	■ = C Absolute encoder

Incremental encoder resolution (relates to the motor output)	Resolution/rev	2000
	arcmin	10.8

Absolute encoder resolution (relates to the motor output)	Resolution/rev	65536
	arcmin	0.33
	multiturn	4096

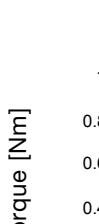
Optional holding brake

The ternary rotary actuator can be supplied with an optional holding brake, which is integrated in the mechatronic unit.
Technical data, additional dimensions and mass are as follows:

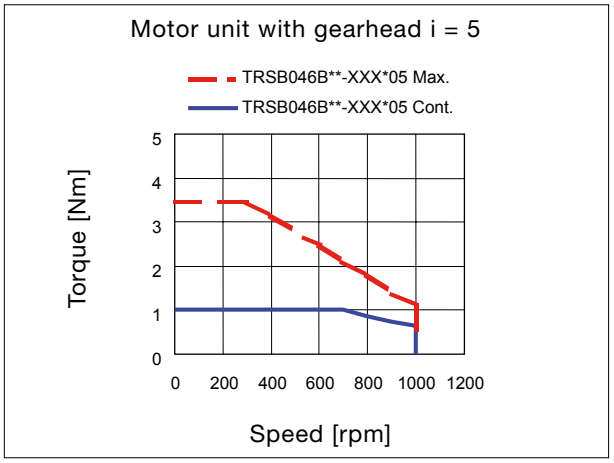
Type designation TR*B046B** -XXX ■ **	■ = N without holding brake	■ = B with holding brake

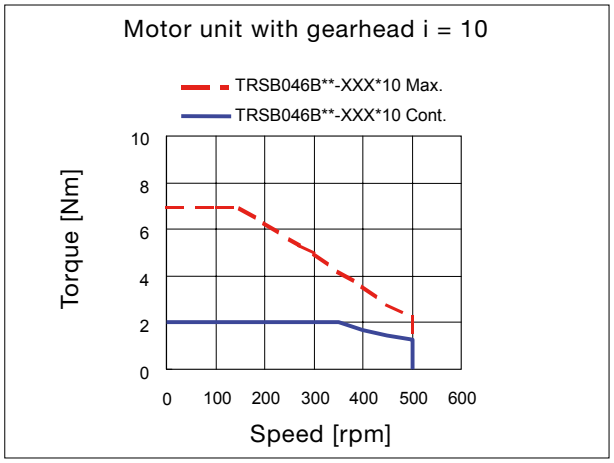
	Unit	TRBB046B**-XXXB01	TRSB046B**-XXXB05	TRSB046B**-XXXB10	TRSB046B**-XXXB25
Holding torque	Nm	0.33	1.65	3.3	8.25
Additional length	mm	26.5			
Additional mass	kg	0.18			
Additional mass moment of inertia	x10^{-7} kgm²	4			

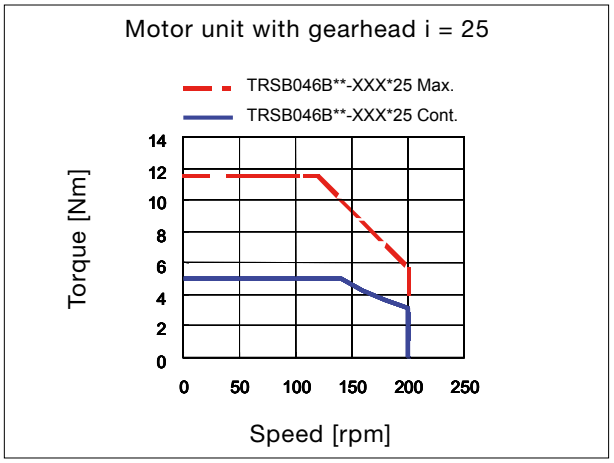
Note: The static holding brake is not suitable for dynamic braking. The brake was designed exclusively for retaining the position of the actuator when disconnected from the power.



Speed/torque characteristics





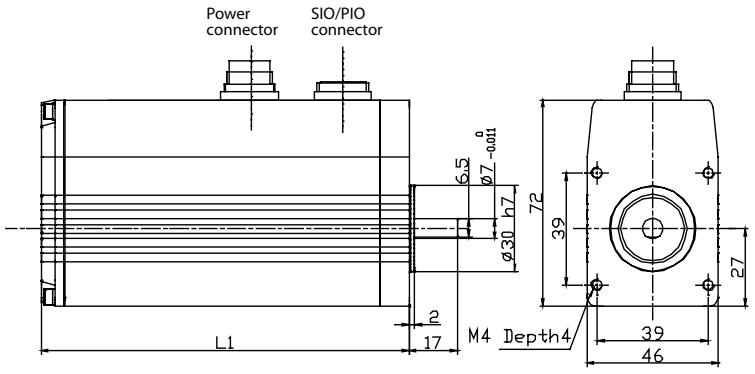


External conditions: 48 VDC supply voltage at ambient temperature of 40°C.

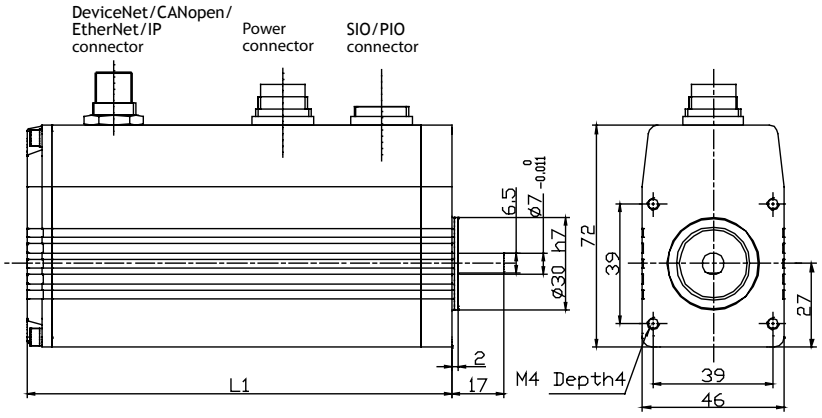
TRBB046 **without gearhead**

Type designation		L1 [mm]		Mass [kg]	
		without brake	with brake	without brake	with brake
Rotary actuator without gearhead, with incremental encoder TRBB046BB*-XXX					
TRBB046BB*-XXX*01	Fieldbus	128.5	155	0.8	0.98
Rotary actuator without gearhead, with absolute encoder TRBB046BC*-XXX					
TRBB046BC*-XXX*01	Fieldbus	139	165	0.9	1.1

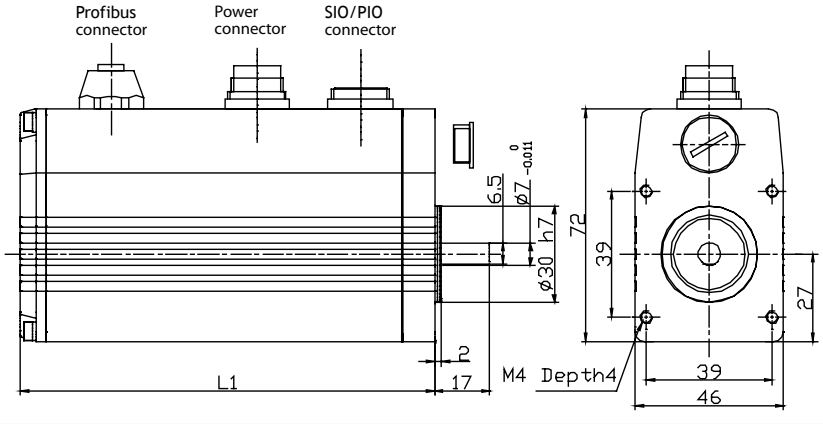
RS485 interface
TRBB046B*B



DeviceNet Interface
TRBB046B*Q
CANopen Interface
TRBB046B*S
EtherNet/IP Interface
TRBB046B*H



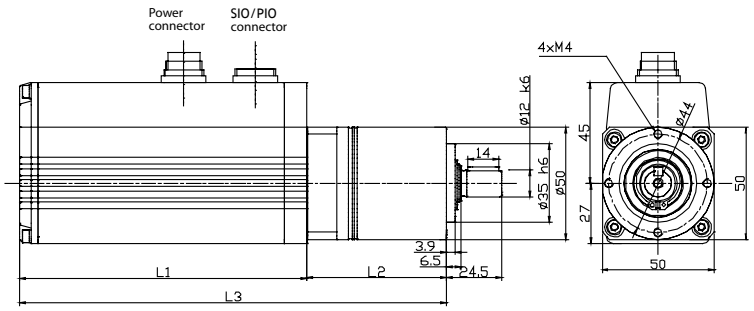
Profibus DP interface
with address switch
TRBB046B*U



Note: Dimensional drawing can in certain cases be changed. Contact Wittenstein or visit our web site for updated CAD drawings.

TRSB046 **with gearhead**

Type designation		Gearhead ratio	L1 [mm]		L2 [mm]	L3 [mm]		Mass [kg]	
			without brake	with brake		without brake	with brake	without brake	with brake
Rotary actuator with gearhead and incremental encoder TRSB046BB*-XXX									
TRSB046BB*-XXX*05 / *10	Fieldbus	5 or 10	128.5	155	68.4	196.9	223.4	1.55	1.73
TRSB046BBX-XXX*25	Fieldbus	25	128.5	155	83.9	212.4	238.9	1.75	1.93
Rotary actuator with gearhead and absolute encoder TRSB046BC*-XXX									
TRSB046BC*-XXX*05 / *10	Fieldbus	5 or 10	139	165	68.4	207.4	233.4	1.65	1.83
TRSB046BCX-XXX*25	Fieldbus	25	139	165	83.9	222.9	248.9	1.85	2.03

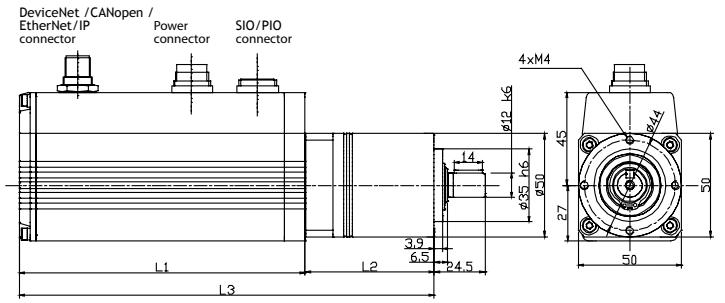


RS485 interface
TRSB046B*B

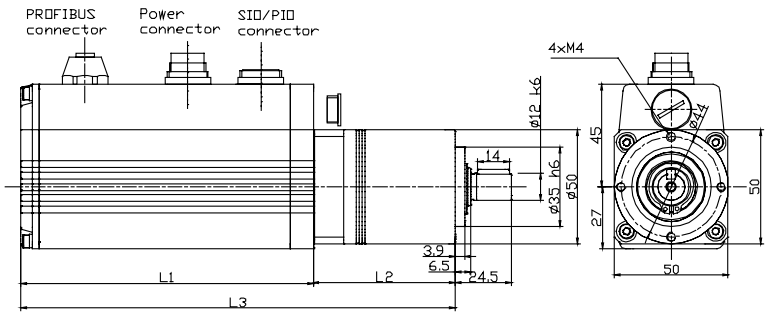
DeviceNet Interface
TRSB046B*Q

CANopen Interface
TRSB046B*S

EtherNet/IP Interface
TRSB046B*H



Profibus DP interface
with address switch
TRSB046B*U



Note: Dimensional drawing can in certain cases be changed. Contact Wittenstein or visit our web site for updated CAD drawings.

Technische Daten	Einheit	TRBB267B **-xxx*01	TRSB267B**-xxx*05	TRSB267B**-xxx*10	TRSB267B**-xxx*25
Motor type		Brushless AC servo motor (BLM high power)			
Gearhead ratio		-	5	10	25
Permanent torque	Nm	0,82	3,0	6,5	16,4
Max. torque	Nm	2,6	10,8	22,0	35,0
Max. speed (output)	U/min	5000	1000	500	200
Dimensions	mm	See dimension sheets on the following pages			
Shaft diameter	mm	14	16, with key		
Gearhead type		no gearhead	LP070	LP070	LP070
Gearhead torsional backlash	arcmin	-	< 12	< 12	< 15
Motor mass moment of inertia	x 10^{-7} kgm²	340			
Gearhead mass moment of inertia	x 10^{-7} kgm²	-	230	210	220
Permitted lateral force on the shaft	N	196	1450		
Permitted axial force on the shaft	N	68	1550		
Protection class		IP65 (IP67) [1]	IP64		
Ambient temperature	°C	Operation: 0 to 40, storage: -20 to 60			
Air humidity	%	20 to 90 (non-condensing)			
Supply voltage/current	V/A	48 VDC ± 10% / 24,2 Amax [2]			
Logic supply	V/A	12- 48 V / 0,4 Amax			
Interfaces		RS485+PIO/Profibus DP+PIO+RS485/EtherNet/IP+PIO+RS485/DeviceNet+PIO+RS485/CANopen+PIO+RS485			
PIO interface		Inputs: 8, Outputs: 5			
Internally stored motion profiles		64			
Control		Closed-loop control, programming of position/speed/acceleration/torque			

[1] IP67 available with air purge on request.
[2] The actuator can also be powered off 24 VDC with derated performance data.

Encoder system

Two encoder systems are available, an incremental encoder and a multiturn absolute encoder.

Type designation	TRBB267B■* -XXX***	TRSB267B■* -XXX***	■ = B Incremental encoder	■ = C Absolute encoder

	Resolution/rev	**arcmin**	**multiturn**
Incremental encoder resolution (relates to the motor output)	2000	10.8	–
Absolute encoder resolution (relates to the motor output)	65536	0.33	4096

Optional holding brake

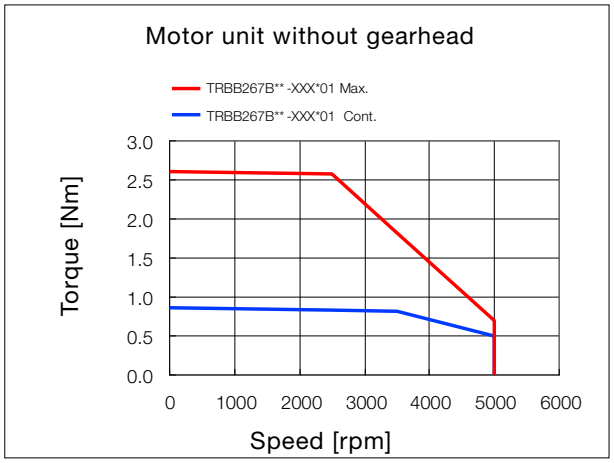
The ternary rotary actuator can be supplied with an optional holding brake, which is integrated in the mechatronic unit.
Technical data, additional dimensions and mass are as follows:

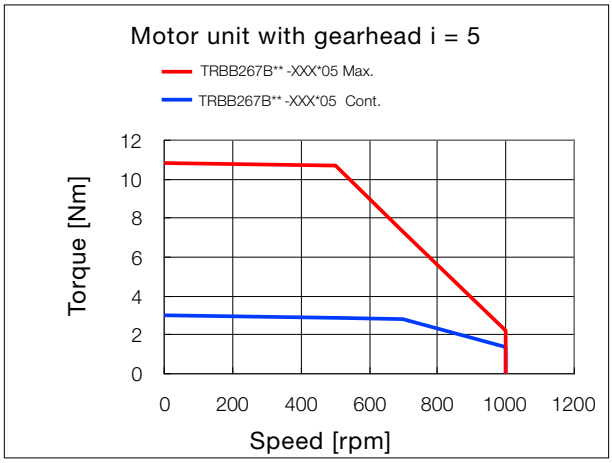
Type designation TRBB267B** -XXX ■ **	TRSB267B** -XXX ■ **	■ = N without holding brake	■ = B with holding brake

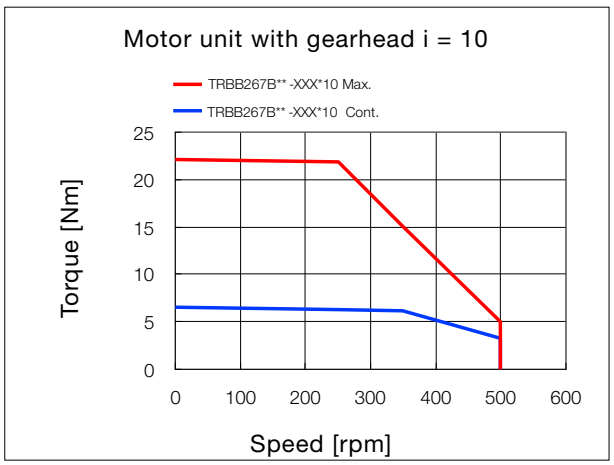
	Unit	TRBB267E**-xxxB01	TRSB267E**-xxxB05	TRSB0267E**-xxxB10	TRSB267E**-xxxB25
Holding torque	Nm	1.25	6.2	12	31
Additional length	mm	31			
Additional mass	kg	0.6			
Additional mass moment of inertia	x10^{-7} kgm^2	100			

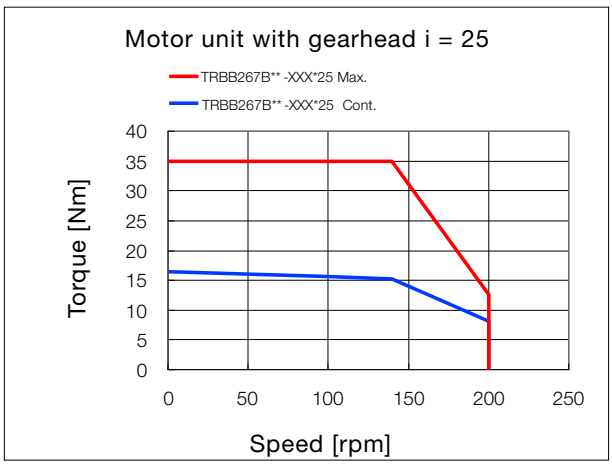
Note: The static holding brake is not suitable for dynamic braking. The brake was designed exclusively for retaining the position of the actuator when disconnected from the power.

Speed/torque characteristics





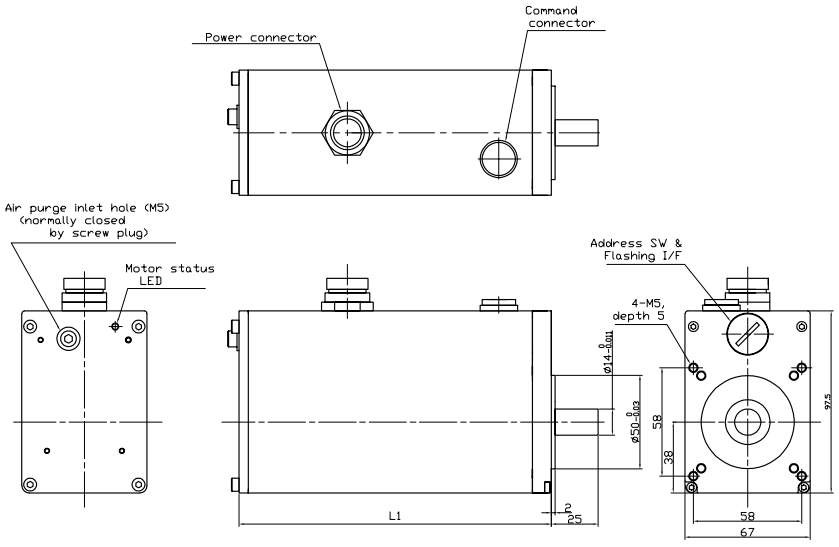




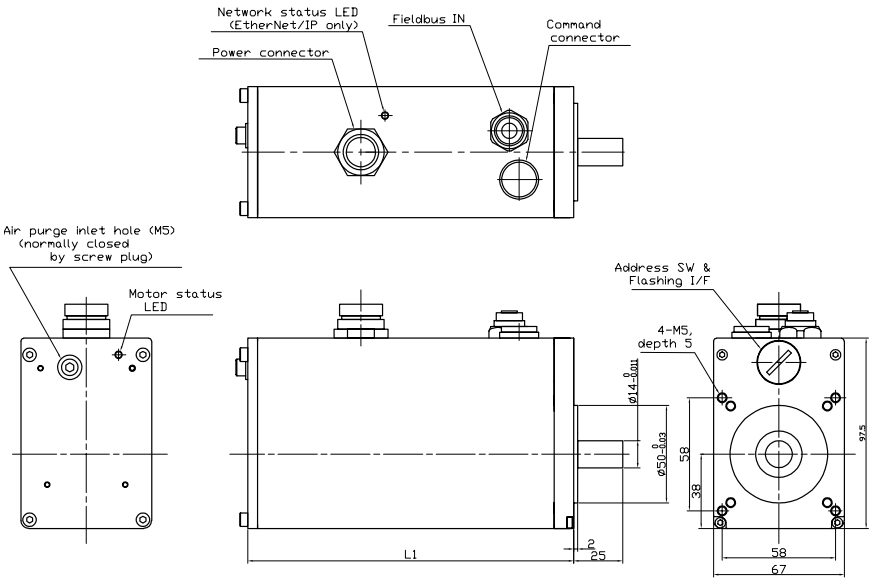
External conditions: 48 VDC supply voltage at ambient temperature of 40°C.

TRBB267B*B **without gearhead**

Type designation	L1 [mm]		Mass [kg]	
	without brake	with brake	without brake	with brake
TRBB267B	167	198	2,1	2,7



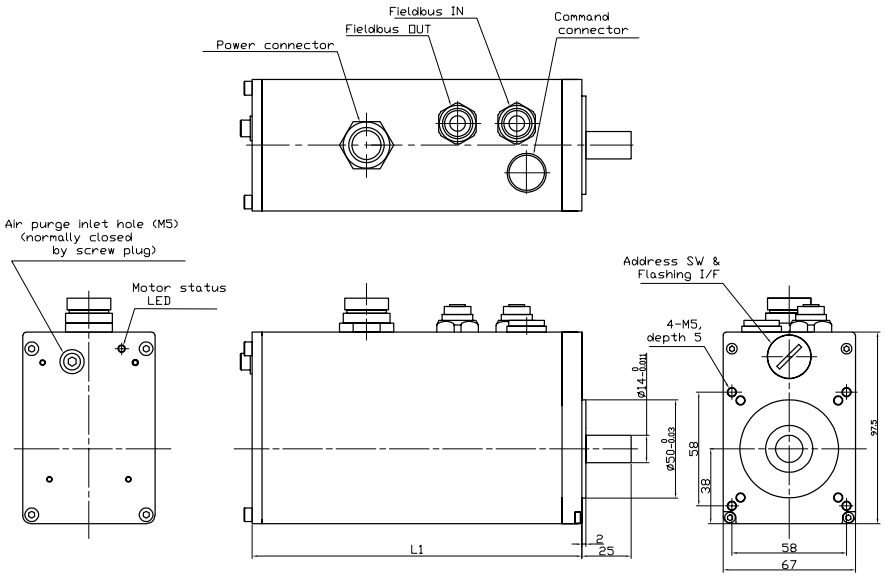
RS485 Interface
TRBB267B*B



DeviceNet Interface
TRBB267B*Q

CANopen Interface
TRBB267B*S

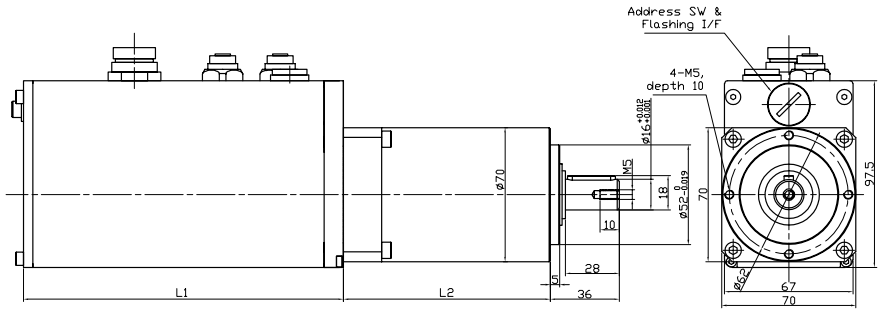
EtherNet/IP Interface
TRBB267B*H



Profibus DP Interface
TRBB267B*U

TRSB267B **with gearhead**

Type designation	Gearhead ratio	L1 [mm]		L2 [mm]	Mass [kg]	
		without brake	with brake		without brake	with brake
TRSB267B**-XXX-*05	5	167	198	88	4.1	4.7
TRSB267B**-XXX-*10	10	167	198	88	4.1	4.7
TRSB267B**-XXX-*25	25	167	198	108	4.5	5.1



TRSB267B

Note: The illustrated dimensional drawing for rotary actuator with gear reducer is only an example.
The specific illustration corresponding to the selected fieldbus interface can be found on page 18.

Technical data	Unit	TLSA046AA*-3XX*01	TLSA046AA*-6XX*01	TLSA046AA*-CXX*01
Motor type		Brushless servo motor (STP)		
Screw pitch	mm	3	6	12
Stroke length	mm	25, 50, 75, 100, 150, 225, 300		
Max. feed force	N	600	300	150
Max. movement speed	mm/s	225	450	900
Dimensions	mm	See dimension sheets on the following pages		
Actuator rod dimensions	mm			
Backlash without load	mm	0,05		
Repeat accuracy	mm	± 0.0045	± 0.009	± 0.018
Permitted torsional torque on actuator rod	Nm	0.5 (depending on position)		
Protection class		IP65 [1]		
Ambient temperature	°C	Operation: 0 to 40, storage: -20 to 60		
Air humidity	%	Operation and storage: 90% RH_{max}		
Supply voltage/current	V/A	24 VDC ± 10% / 1.5 A (with brake 1.7 A)		
Logic supply	V/A	24 V / 0.2 A		
Interfaces		RS485 + PIO / Profibus DP + PIO / DeviceNet + PIO / CANopen + PIO + / EtherNet/IP + PIO		
PIO interface		Inputs: 8, outputs: 5		
Internally stored motion profiles		16		
Control		Closed-loop control, programming of position/speed/acceleration/feed force		

[1] IP67 available with air purge on request.

Encoder system

Linear resolution with incremental encoder (Screw pitch/800)	Unit	TLSA046AA*-3XX*01	TLSA046AA*-6XX*01	TLSA046AA*-CXX*01
	µm	3.75	7.5	15

Optional holding brake

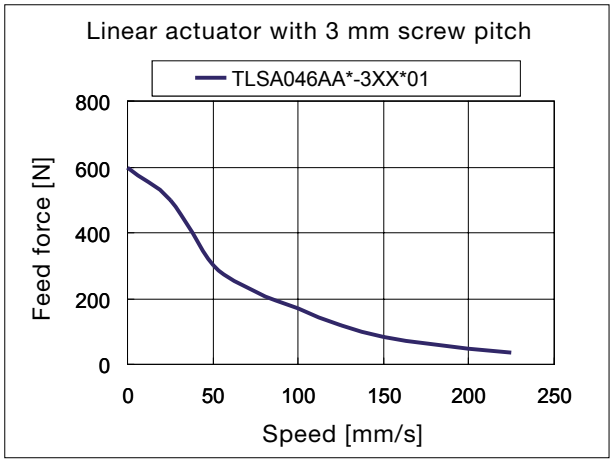
The ternary linear actuator can be supplied with an optional holding brake, which is integrated in the mechatronic unit.
Technical data, additional dimensions and mass are as follows:

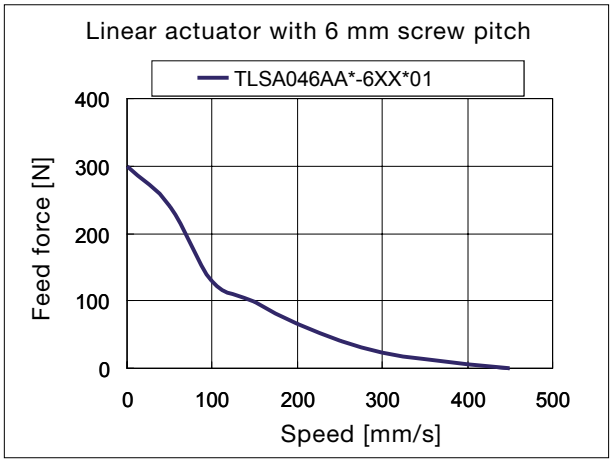
Type designation TLSA046AA* -XXX■01	■ = N without holding brake	■ = B with holding brake

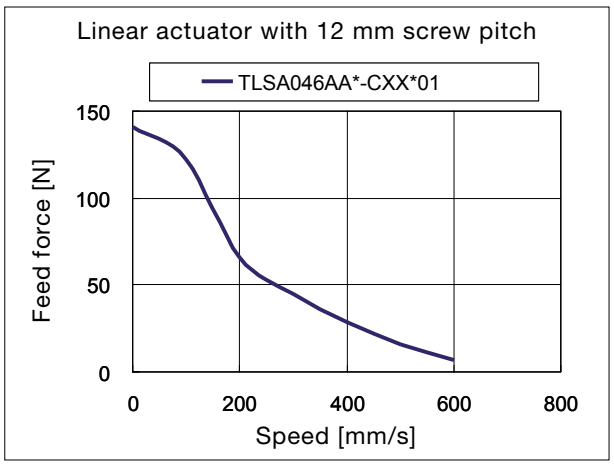
	Unit	TLSA046AA*-3XXB01	TLSA046AA*-6XXB01	TLSA046AA*-CXXB01
Holding force	N	600	300	150
Additional length	mm	26		
Additional mass	kg	0.23		

Note: The static holding brake is not suitable for dynamic braking.
The brake was designed exclusively for retaining the position of the actuator when disconnected from the power.

Speed/force characteristics





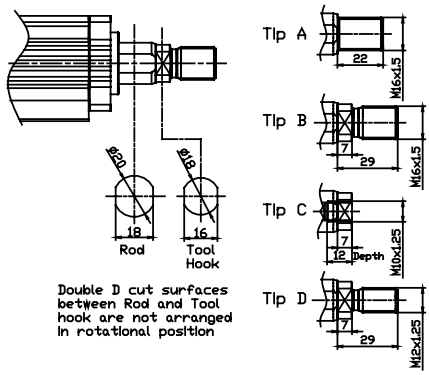


External conditions: 24 VDC supply voltage at ambient temperature of 40°C.

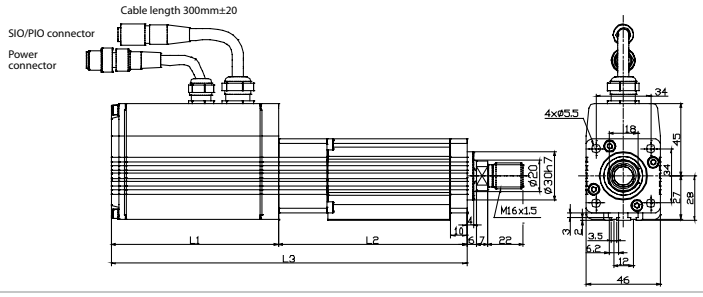
Selectable actuator rod attachment parts

Attached components	
Tip A	Outer thread M16 x 1.5
Tip B	Outer thread M16 x 1.5 with double D profile
Tip C	Inner thread M10 x 1.25 with double D profile
Tip D	Outer thread M12 x 1.25 with double D profile

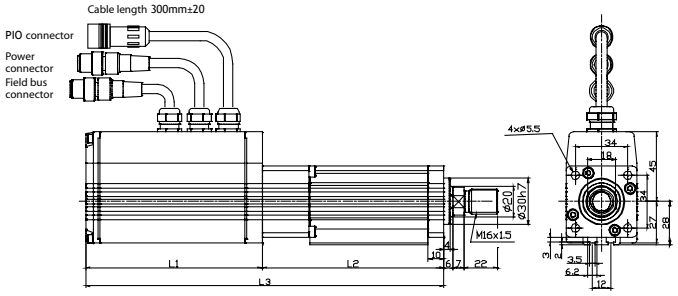
Standard attachment part Tip B is always used unless otherwise requested
Double D profile: Adjustable wrench attachment for secure attachment of parts to the actuator rod.



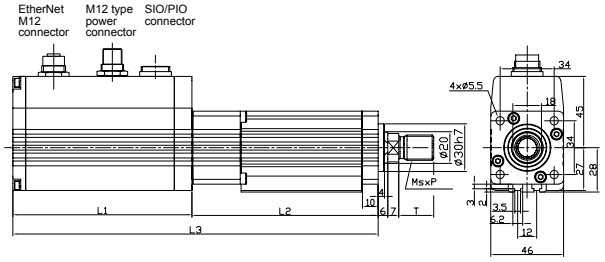
RS485 Interface
TLSA046AAB



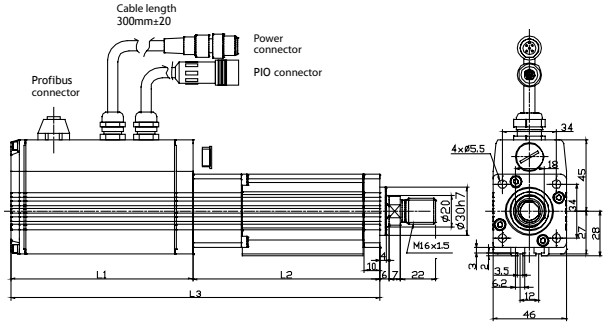
DeviceNet Interface
TLSA046AAQ
CANopen Interface
TLSA046AAS



EtherNet/IP Interface
TLSA046AAH



Profibus DP Interface
with address switch
TLSA046AAU

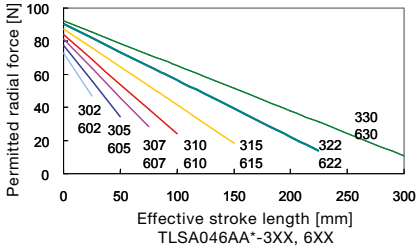


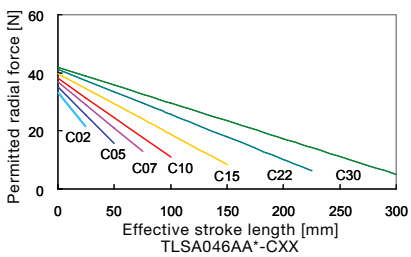
Note: Dimensional drawing can in certain cases be changed. Contact Wittenstein or visit our web site for updated CAD drawings.

Type designation	Pitch [mm/rev]	Stroke [mm]	L1 [mm]		L2 [mm]	L3 [mm]		Mass [kg]	
			without brake	with brake		without brake	with brake	without brake	with brake
Linear actuator with motor type STP TLSA046AAB with RS485 interface									
TLSA046AAB-302*01	3	25	104	130	117.5	221.5	247.5	1.5	1.73
TLSA046AAB-305*01		50			142.5	246.5	272.5	1.66	1.89
TLSA046AAB-307*01		75			167.5	271.5	297.5	1.79	2.02
TLSA046AAB-310*01		100			192.5	296.5	322.5	1.91	2.14
TLSA046AAB-315*01		150			242.5	346.5	372.5	2.16	2.39
TLSA046AAB-322*01		225			317.5	421.5	447.5	2.55	2.78
TLSA046AAB-330*01		300			392.5	496.5	522.5	2.93	3.16
TLSA046AAB-602*01	6	25			125.5	229.5	255.5	1.5	1.73
TLSA046AAB-605*01		50			150.5	254.5	280.5	1.66	1.89
TLSA046AAB-607*01		75			175.5	279.5	305.5	1.79	2.02
TLSA046AAB-610*01		100			200.5	304.5	330.5	1.91	2.14
TLSA046AAB-615*01		150			250.5	354.5	380.5	2.16	2.39
TLSA046AAB-622*01		225			325.5	429.5	455.5	2.55	2.78
TLSA046AAB-630*01		300			400.5	504.5	530.5	2.93	3.16
TLSA046AAB-C02*01	12	25			–	–	–	–	–
TLSA046AAB-C05*01		50			142.5	246.5	272.5	1.66	1.89
TLSA046AAB-C07*01		75			167.5	271.5	297.5	1.79	2.02
TLSA046AAB-C10*01		100			192.5	296.5	322.5	1.91	2.14
TLSA046AAB-C15*01		150			242.5	346.5	372.5	2.16	2.39
TLSA046AAB-C22*01		225			317.5	421.5	447.5	2.55	2.78
TLSA046AAB-C30*01		300			392.5	496.5	522.5	2.93	3.16
Linear actuator with motor type STP TLSA046AA* with fieldbus interface (Profibus, CANopen, DeviceNet, EtherNet/IP)									
TLSA046AA*-302*01	3	25	114	140	117.5	231.5	257.5	1.5	1.73
TLSA046AA*-305*01		50			142.5	256.5	282.5	1.66	1.89
TLSA046AA*-307*01		75			167.5	281.5	307.5	1.79	2.02
TLSA046AA*-310*01		100			192.5	306.5	332.5	1.91	2.14
TLSA046AA*-315*01		150			242.5	356.5	382.5	2.16	2.39
TLSA046AA*-322*01		225			317.5	431.5	457.5	2.55	2.78
TLSA046AA*-330*01		300			392.5	506.5	532.5	2.93	3.16
TLSA046AA*-602*01	6	25			125.5	239.5	265.5	1.5	1.73
TLSA046AA*-605*01		50			150.5	264.5	290.5	1.66	1.89
TLSA046AA*-607*01		75			175.5	289.5	315.5	1.79	2.02
TLSA046AA*-610*01		100			200.5	314.5	340.5	1.91	2.14
TLSA046AA*-615*01		150			250.5	364.5	390.5	2.16	2.39
TLSA046AA*-622*01		225			325.5	439.5	465.5	2.55	2.78
TLSA046AA*-630*01		300			400.5	514.5	540.5	2.93	3.16
TLSA046AA*-C02*01	12	25			–	–	–	–	–
TLSA046AA*-C05*01		50			142.5	256.5	282.5	1.66	1.89
TLSA046AA*-C07*01		75			167.5	281.5	307.5	1.79	2.02
TLSA046AA*-C10*01		100			192.5	306.5	332.5	1.91	2.14
TLSA046AA*-C15*01		150			242.5	356.5	382.5	2.16	2.39
TLSA046AA*-C22*01		225			317.5	431.5	457.5	2.55	2.78
TLSA046AA*-C30*01		300			392.5	506.5	532.5	2.93	3.16

Permitted radial force

The permitted radial force is specified as a maximum value for each individual external force. Overlapping external forces on the actuator must be avoided. The radial forces shown in the diagram must not be exceeded. Exceeding these forces during installation or operation may cause losses in output and/or wear the linear cylinder prematurely.





Technical data	Unit	TLSB046B**-3XX*01	TLSB046B**-6XX*01	TLSB046B**-CXX*01
Motor type		Brushless AC servo motor (BLM)		
Screw pitch	mm	3	6	12
Stroke length	mm	25, 50, 75, 100, 150, 225, 300		
Permanent feed force	N	470	240	100
Max. feed force	N	700 / 1000 [1]	700	370
Max. movement speed	mm/s	250	500	1000
Dimensions	mm	See dimension sheets on the following pages		
Actuator rod dimensions	mm			
Backlash without load	mm	0.05		
Repeat accuracy	mm	± 0.0045	± 0.009	± 0.018
Permitted torsional torque on actuator rod	Nm	0.5 (depending on position)		
Protection class		IP65 [2]		
Ambient temperature	°C	Operation: 0 to 40, storage: -20 to 60		
Air humidity	%	Operation and storage: 90% RH_{max}		
Supply voltage/current	V/A	48 VDC ± 10% / 9 A max		
Logic supply	V/A	12-48 V / 0.2 A		
Interfaces		RS485+PIO/Profibus DP+PIO+RS485/DeviceNet+PIO+RS485/CANopen+PIO+RS485/ EtherNet/IP+PIO+RS485		
PIO interface		Inputs: 8, outputs: 5		
Internally stored motion profiles		64		
Control		Closed-loop control, programming of position/speed/acceleration/feed force		

[1] More durable HCC cylinders (High Capacity Cylinder) are available for a screw pitch of 3 mm on request. The maximum feed force of cylinders with a stroke length of 300 mm is limited to 700 N due to the permitted buckling stress.
[2] IP67 available with air purge on request.

Encoder system

Two encoder systems are available, an incremental encoder and a multiturn absolute encoder.

	Unit	TLSB046B**-3XX*01	TLSB046B**-6XX*01	TLSB046B**-CXX*01
Linear resolution with incremental encoder TLSB046BB* (screw pitch/2000)	µm	1.5	3	6
Linear resolution with absolute encoder TLSB046BC* (screw pitch/65536)	µm	0.046	0.092	0.183

Optional holding brake

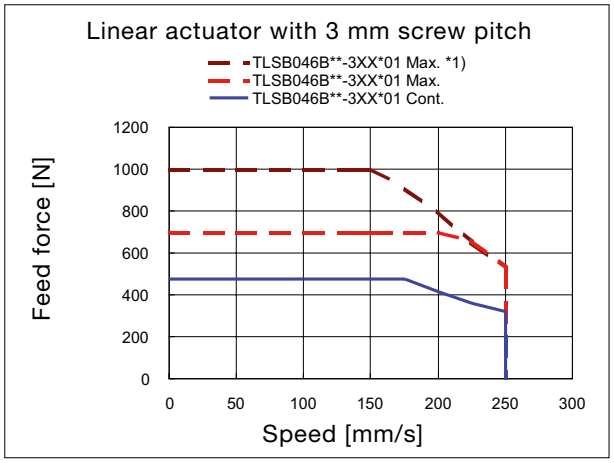
The ternary linear actuator can be supplied with an optional holding brake, which is integrated in the mechatronic unit.
Technical data, additional dimensions and mass are as follows:

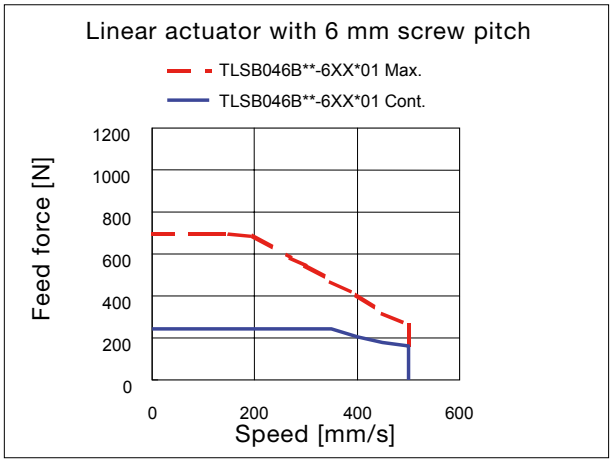
Type designation TLSB046B** -XXX■01	■ = N without holding brake	■ = B with holding brake

	Unit	TLSB046B**-3XXB01	TLSB046B**-6XXB01	TLSB046B*-CXXB01
Holding force	N	600	300	150
Additional length	mm	26.5		
Additional mass	kg	0.18		

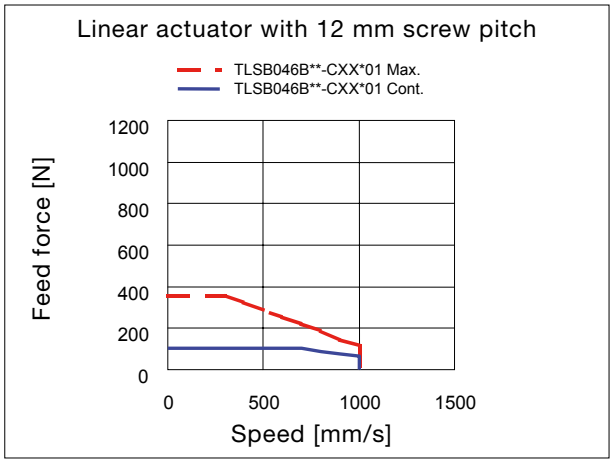
Note: The static holding brake is not suitable for dynamic braking.
The brake was designed exclusively for retaining the position of the actuator when disconnected from the power.

Speed/force characteristics





(1) Characteristic curve for HCC cylinders under higher load.

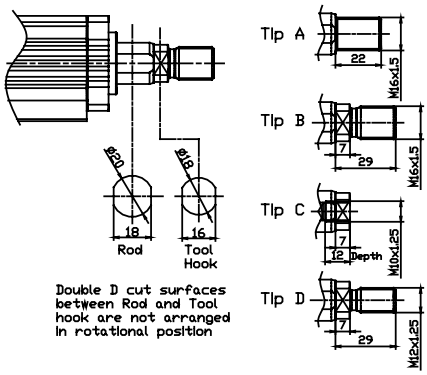


External conditions: 48 VDC supply voltage at ambient temperature of 40°C.

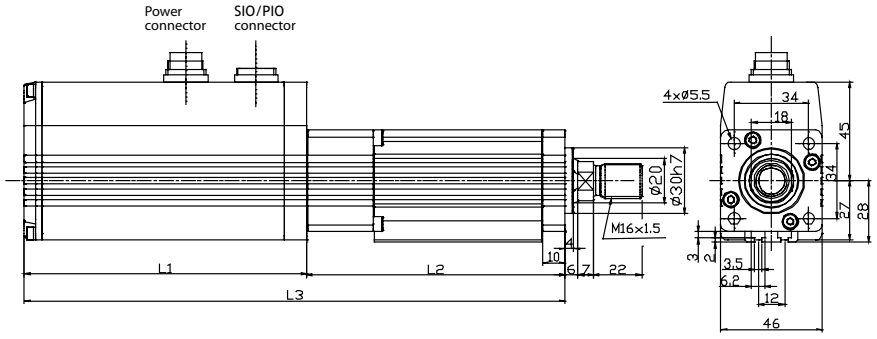
Selectable actuator rod attachment parts

Attached components	
Tip A	Outer thread M16 x 1.5
Tip B	Outer thread M16 x 1.5 with double D profile
Tip C	Inner thread M10 x 1.25 with double D profile
Tip D	Outer thread M12 x 1.25 with double D profile

Standard attachment part Tip B is always used unless otherwise requested.
Double D profile: Adjustable wrench attachment for secure attachment of parts to the actuator rod.



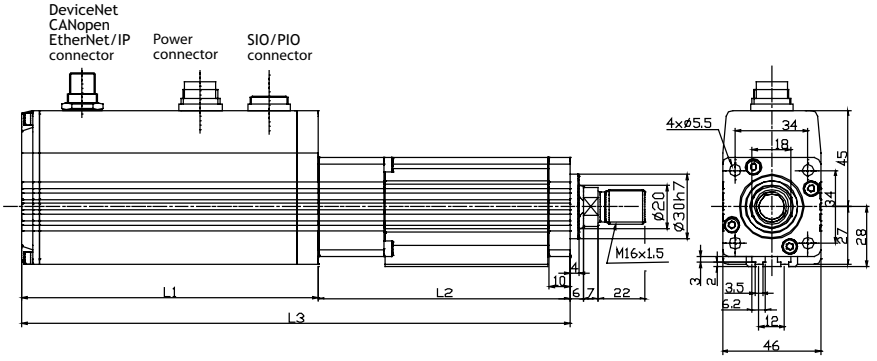
RS485 interface
TLSB046B*B



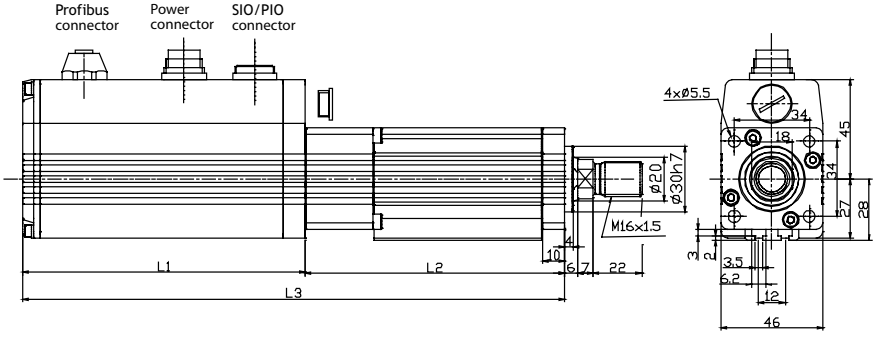
DeviceNet Interface
TLSB046B*Q

CANopen Interface
TLSB046B*S

EtherNet/IP Interface
TLSB046B*H



Profibus DP interface
with address switch
TLSB046B*U

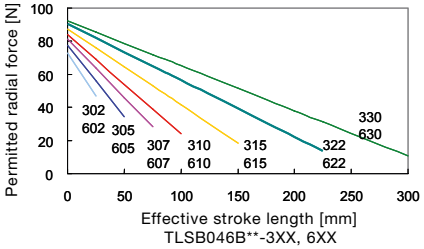


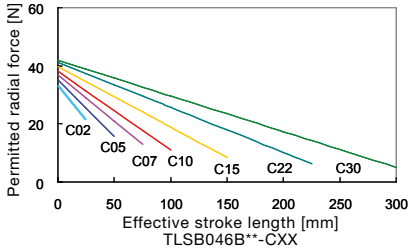
Note: Dimensional drawing can in certain cases be changed. Contact Wittenstein or visit our web site for updated CAD drawings.

Type designation	Pitch [mm/rev]	Stroke [mm]	L1 [mm]		L2 [mm]	L3 [mm]		Mass [kg]	
			without brake	with brake		without brake	with brake	without brake	with brake
Linear actuator with motor type BLM and incremental encoder TLSB046BB* -XXX*01									
TLSB046BB*-302*01	3	25	128.5	155	117.5	246	272.5	1.5	1.68
TLSB046BB*-305*01		50			142.5	271	297.5	1.66	1.84
TLSB046BB*-307*01		75			167.5	296	322.5	1.79	1.97
TLSB046BB*-310*01		100			192.5	321	347.5	1.91	2.09
TLSB046BB*-315*01		150			242.5	371	397.5	2.16	2.34
TLSB046BB*-322*01		225			317.5	446	472.5	2.55	2.73
TLSB046BB*-330*01		300			392.5	521	547.5	2.93	3.11
TLSB046BB*-602*01	6	25			125.5	254	280.5	1.5	1.68
TLSB046BB*-605*01		50			150.5	279	305.5	1.66	1.84
TLSB046BB*-607*01		75			175.5	304	330.5	1.79	1.97
TLSB046BB*-610*01		100			200.5	329	355.5	1.91	2.09
TLSB046BB*-615*01		150			250.5	379	405.5	2.16	2.34
TLSB046BB*-622*01		225			325.5	454	480.5	2.55	2.73
TLSB046BB*-630*01		300			400.5	529	555.5	2.93	3.11
TLSB046BB*-C02*01	12	25			–	–	–	–	–
TLSB046BB*-C05*01		50			142.5	271	297.5	1.66	1.84
TLSB046BB*-C07*01		75			167.5	296	322.5	1.79	1.97
TLSB046BB*-C10*01		100			192.5	321	347.5	1.91	2.09
TLSB046BB*-C15*01		150			242.5	371	397.5	2.16	2.34
TLSB046BB*-C22*01		225			317.5	446	472.5	2.55	2.73
TLSB046BB*-C30*01		300			392.5	521	547.5	2.93	3.11
Linear actuator with motor type BLM and absolute encoder TLSB046BC* -XXX*01									
TLSB046BC*-302*01	3	25	139	165	117.5	256.5	282.5	1.6	1.78
TLSB046BC*-305*01		50			142.5	281.5	307.5	1.76	1.94
TLSB046BC*-307*01		75			167.5	306.5	332.5	1.89	2.07
TLSB046BC*-310*01		100			192.5	331.5	357.5	2.01	2.19
TLSB046BC*-315*01		150			242.5	381.5	407.5	2.26	2.44
TLSB046BC*-322*01		225			317.5	456.5	482.5	2.65	2.83
TLSB046BC*-330*01		300			392.5	531.5	557.5	3.03	3.21
TLSB046BC*-602*01	6	25			125.5	264.5	290.5	1.6	1.78
TLSB046BC*-605*01		50			150.5	289.5	315.5	1.76	1.94
TLSB046BC*-607*01		75			175.5	314.5	340.5	1.89	2.07
TLSB046BC*-610*01		100			200.5	339.5	365.5	2.01	2.19
TLSB046BC*-615*01		150			250.5	389.5	415.5	2.26	2.44
TLSB046BC*-622*01		225			325.5	464.5	490.5	2.65	2.83
TLSB046BC*-630*01		300			400.5	539.5	565.5	3.03	3.21
TLSB046BC*-C02*01	12	25			–	–	–	–	–
TLSB046BC*-C05*01		50			142.5	281.5	307.5	1.76	1.94
TLSB046BC*-C07*01		75			167.5	306.5	332.5	1.89	2.07
TLSB046BC*-C10*01		100			192.5	331.5	357.5	2.01	2.19
TLSB046BC*-C15*01		150			242.5	381.5	407.5	2.26	2.44
TLSB046BC*-C22*01		225			317.5	456.5	482.5	2.65	2.83
TLSB046BC*-C30*01		300			392.5	531.5	557.5	3.03	3.21

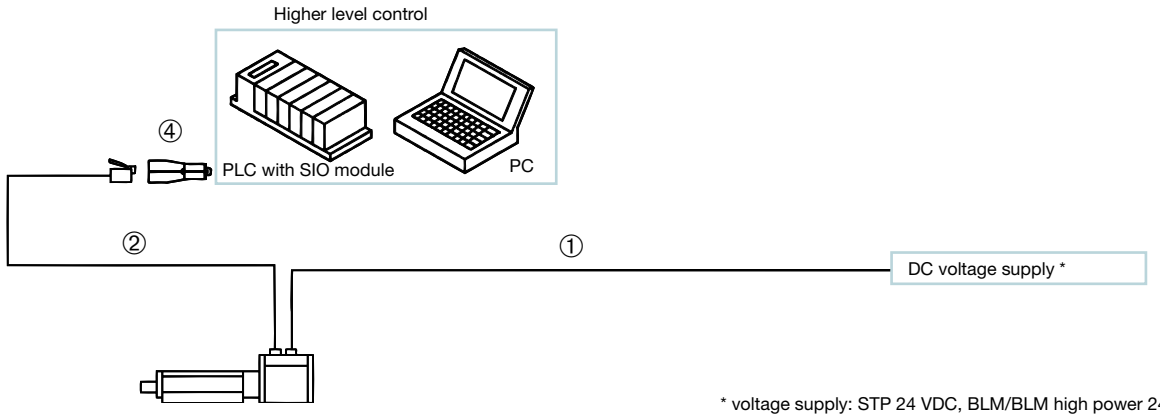
Permitted radial force

The permitted radial force is specified as a maximum value for each individual external force.
Overlapping external forces on the actuator must be avoided. The radial forces shown in the diagram must not be exceeded. Exceeding these forces during installation or operation may cause losses in output and/or wear the linear cylinder prematurely.



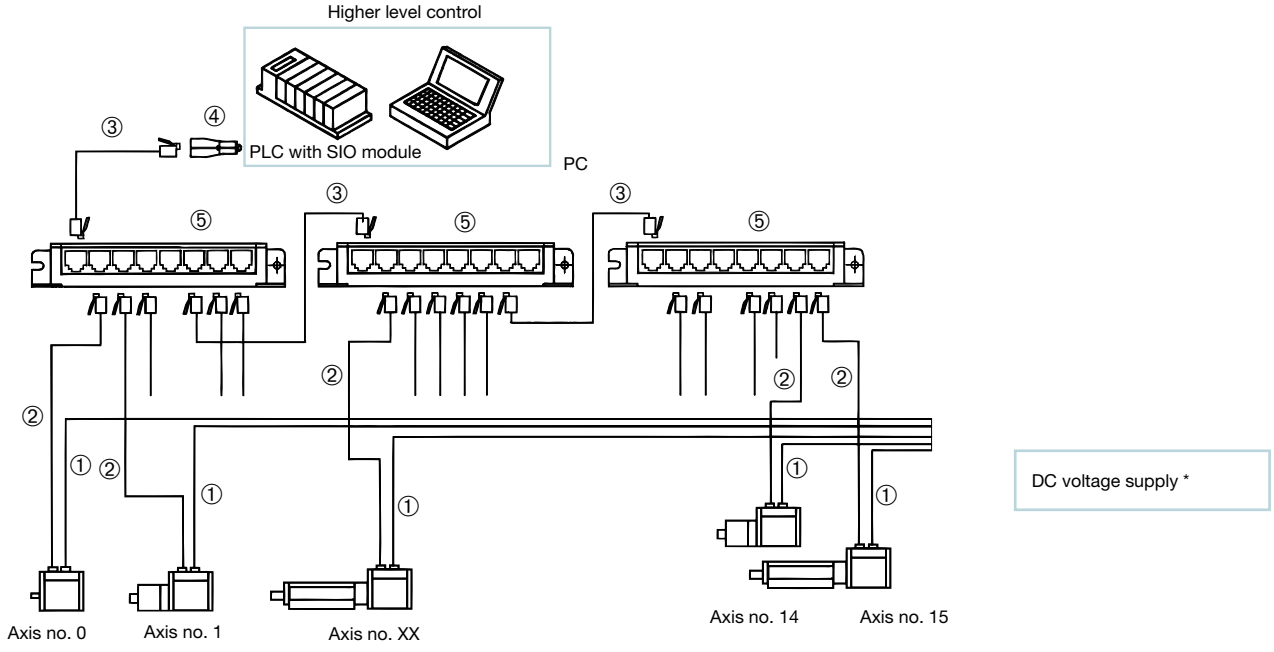


Single-axle control with serial RS485-interface



* voltage supply: STP 24 VDC, BLM/BLM high power 24-48 VDC

Multi-axle control with serial RS485 interface



* voltage supply: STP 24 VDC, BLM/BLM high power 24-48 VDC

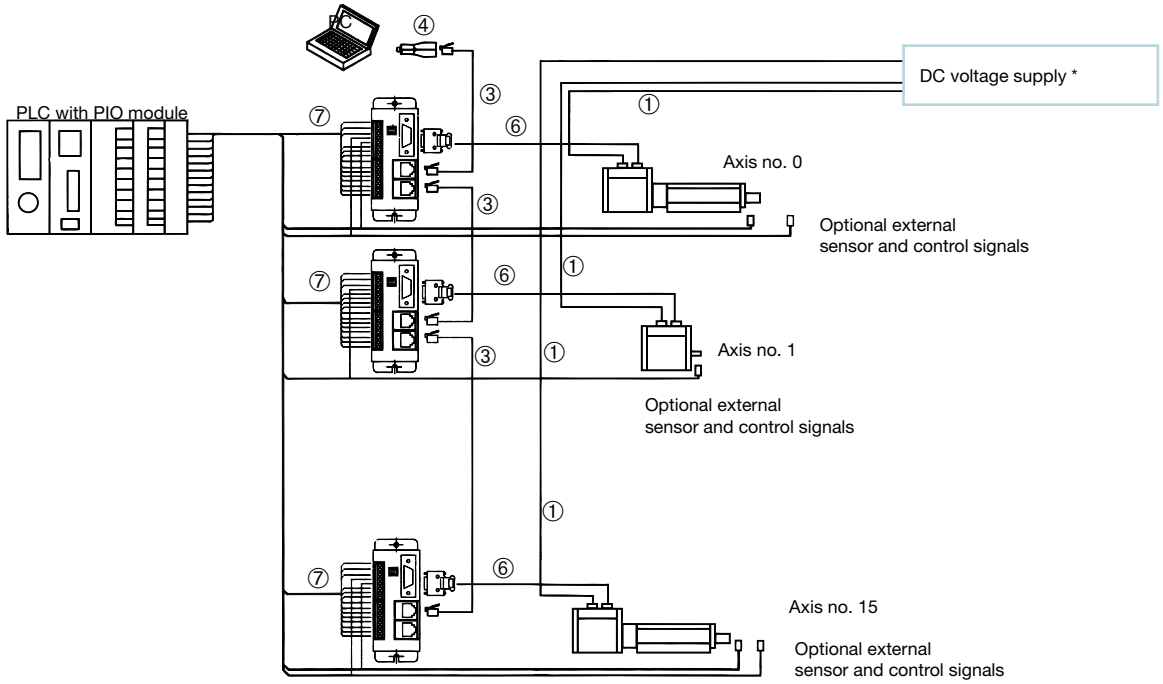
Connection accessories

Motor type	No.	Designation	Order codes
STP	1	24 V supply cable for STP	TCC 001-001-***R
STP	2	Serial command cable	TCC 002-005-***R
BLM	1	48 V supply cable for BLM	TCC 001-007-***R1-PUR
BLM high power	1	24-48 V supply cable for BLM high power	TCC 001-015-***
BLM/BLM high power	2	Serial command cable	TCC 002-024-***R1-PVC
STP/BLM/BLM high power	3	Serial daisy chain command cable	TCC 002-001-***R
STP/BLM/BLM high power	4	Bus converter RS485 to RS232	TBG 001-001
STP/BLM/BLM high power	4	Bus converter RS485 to USB	TBG 001-002
STP/BLM/BLM high power	5	Serial chaining terminal	TBG 002-004

*** indicates the cable length, available in:	
1 m	010
2 m	020
5 m	050
10 m	100
15 m	150

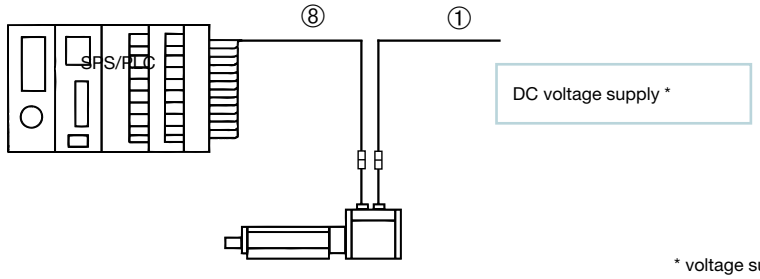
Note: The connection diagrams are only examples. Please see technical documentation for the exact geometric dimensions.

Multi-axle control with serial and parallel interface



* voltage supply: STP 24 VDC, BLM/BLM high power 24-48 VDC

Single-axle control with parallel wiring to an SPC/PLC



* voltage supply: STP 24 VDC, BLM/BLM high power 24-48 VDC

Connection accessories

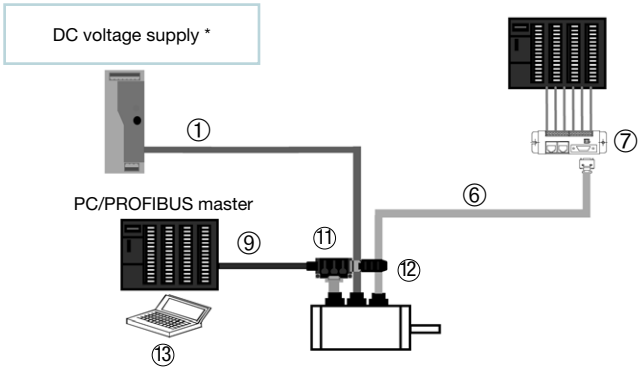
Motor type	No.	Designation	Order codes
STP	1	24 V supply cable for STP	TCC 001-001-***R
STP	6	Serial command cable	TCC 002-008-***R
STP	8	Serial/Parallel command cable	TCC 002-009-***R
BLM	1	48 V supply cable for BLM	TCC 001-007-***R1-PUR
BLM high power	1	24-48 V supply cable for BLM high power	TCC 001-015-***
BLM/BLM high power	6	Serial command cable	TCC 002-020-***R1-PUR
BLM/BLM high power	8	Serial/Parallel command cable	TCC 002-022-***R1-PUR
STP/BLM/BLM high power	3	Serial daisy chain command cable	TCC 002-001-***R
STP/BLM/BLM high power	4	Bus converter RS485 to RS232	TBG 001-001
STP/BLM/BLM high power	4	Bus converter RS485 to USB	TBG 001-002
STP/BLM/BLM high power	7	Serial/Parallel chaining board	TBG 002-003-NC

*** indicates the cable length, available in:	
1 m	010
2 m	020
5 m	050
10 m	100
15 m	150

Note: The connection diagrams are only examples. Please see technical documentation for the exact geometric dimensions.

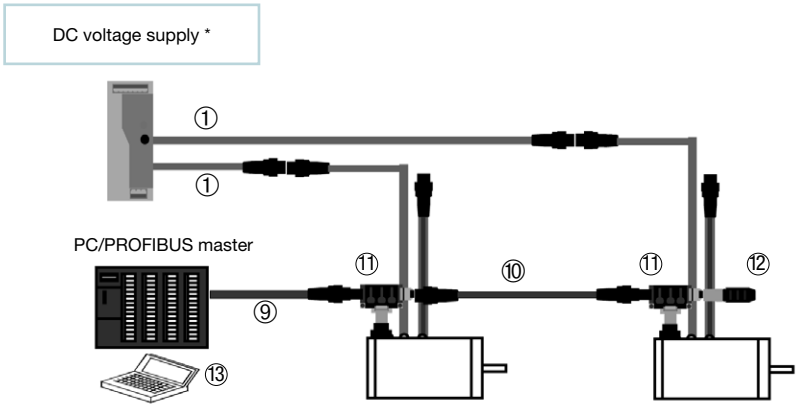
Fieldbus connection with DeviceNet, CANopen or Profibus DP

Single-axle control with parallel I/Os and fieldbus connection



* voltage supply: STP 24 VDC, BLM/BLM high power 24-48 VDC

Multi-axle control with fieldbus connection



* voltage supply: STP 24 VDC
BLM/BLM high power 24-48 VDC

Connection accessories

No.	Designation	Order codes
1	24 V supply cable for STP	TCC 001-001-***R
1	24-48 V supply cable for BLM	TCC 001-007-***R1-PUR
1	24-48 V supply cable for BLM high power	TCC 001-015-***
6	Parallel command cable for STP	TCC 002-012-***R
6	Serial/Parallel command cable for BLM/BLM high power	TCC 002-020-***R1-PUR
7	Serial/Parallel chaining board	TBG 002-003-NC

*** indicates the cable length, available in:	
1 m	010
2 m	020
5 m	050
10 m	100
15 m	150

Interface	No.	Designation	Order codes
Profibus DP	9	Profibus cable	TCC 002-018-***R
Profibus DP	10	Profibus extension cable	TCC 002-016-***R
Profibus DP	11	Profibus T connecting element [1)]	TBG 002-007
Profibus DP	12	Profibus terminating resistor	TBG 002-008
DeviceNet/CANopen	9	Fieldbus cable	TCC 002-013-***R
DeviceNet/CANopen	10	Fieldbus extension cable	TCC 002-014-***R
DeviceNet/CANopen	11	Fieldbus T connecting element	TBG 002-005
DeviceNet/CANopen	12	Fieldbus terminating resistor	TBG 002-006
DeviceNet/CANopen	13	Beckhoff PLC function modules for STP	TFB CANopenV01

[1)] Not necessary with the ternary High Power BLM since a second connection is already integrated

Note: The connection diagrams are only examples. Please see technical documentation for the exact geometric dimensions.

Kabelzubehör für EtherNet/IP

Nr.	Designation	Order codes
9	Serial command cable, Ethernet/IP, M12 to RJ45	TCC 002-025-***R
9	Serial command cable, Ethernet/IP, M12 to M12	TCC 002-026-***R
9	Serial command cable, Ethernet/IP, RJ45 to RJ45	TCC 002-027-***R
14	Converter M12 to RJ45	TBG 002 012
15	Control Cabinet Pass Through M12 to M12	TBG 002 013

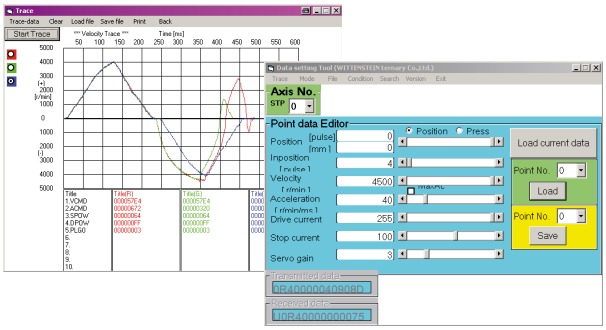
*** indicates the cable length, available in:	
1 m	010
2 m	020
5 m	050
10 m	100
15 m	150

TET setup software

Windows-based TET software is an efficient solution for the quick, easy and convenient setup and implementation of ternary actuators via a serial interface. In addition to the rapid adjustment of important technical actuator parameters, movement parameter records can be optimized and modified via the internal oscilloscope memory function. A documentation and archiving function also offers the advantage of tracing any modifications made.

Designation	Order codes
TET setup software, English	TET 002-001

Note: TET setup software is not designed to control a machine permanently.
For actuators with Fieldbus Communication (Profibus, CanOpen, Devicenet, Ethernet/IP), the TET software is not required.



Glossary

Fieldbus system

A fieldbus system is an industrial communication system that incorporates different field devices such as actuators, control elements or sensors connected to a control unit. Profibus, CANopen or DeviceNet are just some examples of fieldbus systems.

Mass moment of inertia J [kgm²]

The mass moment of inertia J is a measurement of the effort applied by an object to maintain its momentary condition (at rest or moving).

Maximum torque for BLM M_{max} [Nm]

The maximum torque is the momentarily present torque at the output shaft of a brushless AC servo motor (BLM), which is limited by the overload capacity of the electrical modules and can be a multiple of the permanent torque value.

Maximum torque for STP M_{max} [Nm]

The maximum torque for the motor type STP is the highest torque generated permanently at the output shaft of the motor.

Operating modes (continuous operation S1 and cyclic operation S5)

When designing a drive system, it is important to consider whether the motion profile is characterized by frequent acceleration and deceleration phases (S5) as well as pauses, or whether it is designed for continuous operation (S1), i.e. with long phases of constant motion.

Permanent torque for BLM M_0 [Nm]

The permanent torque is the continually present torque at the output shaft of a brushless AC servo motor (BLM) without the coil exceeding the maximum temperature limit. The torque is limited by the thermal resistance of surrounding motor components such as the housing and laminated stator core.

PIO

Parallel **I**nput **O**utput interface

Positioning accuracy [mm]

The positioning accuracy is determined by the deviation of the angle or path from the setpoint value, which is calculated from the sum of all possible backlash values and the maximum electrical resolution.

Protection class

The various degrees of protection are defined in DIN EN 60529 “Degrees of protection offered by enclosure (IP code)“. The IP degree of protection (International Protection) is represented by two digits. The first digit indicates the protection against the ingress of impurities and the second the protection against the ingress of water.

Radial force F_r [N]

The radial force acts vertically in the linear movement direction of the actuator rod. The radial force is based on the drive output, and the influence of this force is determined by the effective stroke length of the lever.

Ratio i

The gear ratio i indicates the factor by which the gearhead transforms the three relevant parameters of motion (speed, torque and mass moment of inertia). The factor is a result of the geometry of the gearing and transmission elements.

Parameter		Motor output	Factor	Gearhead output
Speed	n	3000 rpm	:i	300 rpm
Torque	M	20 Nm	*i	200 Nm
Moment of inertia	J	0.1 kgm²	*i²	10 kgm²

Example i=10

Ratio of mass moment of inertia λ

The ratio of mass moment of inertia is the ratio of external inertia at the application end to the internal inertia of the motor and gearhead and is a parameter determining the controllability of an application. Accurate control of dynamic processes becomes more difficult with differing mass moments of inertia and as λ becomes greater. A gearhead reduces the external mass moment of inertia by $1/i^2$.

RS-232 (IEA-232)

RS-232 is a serial interface standard for point-to-point transmission.

RS-485 (IEA-485)

RS-485 is a serial interface standard for cable-bound, differential and serial data transmission with multipoint capability.

Screw pitch [mm/rev]

The screw pitch is a dimension that represents linear changes in the spindle path based on a single revolution of the motor output.

SIO

Serial **I**nput **O**utput interface

Speed n [rpm]

The speed n is a motor variable generated independently of the load on the drive output shaft. The limit represents the idling speed n_0 which is primarily limited by the connected supply voltage.

SPS/PLC

PLC is the abbreviation for Programmable Logic Control and refers to an electrical module designed to control and/or regulate machines and systems in the industrial sector.

Torque M [Nm]

The torque is a rotary force consisting of the cross product of force and lever arm.

Torsional torque M [Nm]

The torsional torque is the torque that causes the actuator rod to rotate and depends on the stroke length of the linear actuator rod.

Symbols/Index

Symbols/ Index	Unit	Designation
a	m/s^2	Acceleration
F	N	Force
h	mm/rev	Screw pitch
i	–	Ratio
J	kgm^2	Moment of inertia
l	m	Lever arm
M	Nm	Torque
M_{max}	Nm	Maximum torque
M_o	Nm	Permanent torque
m	kg	Mass
n	rpm	Speed
n_o	rpm	Idling speed
v	m/s	Speed
λ	–	Ratio of mass moment of inertia

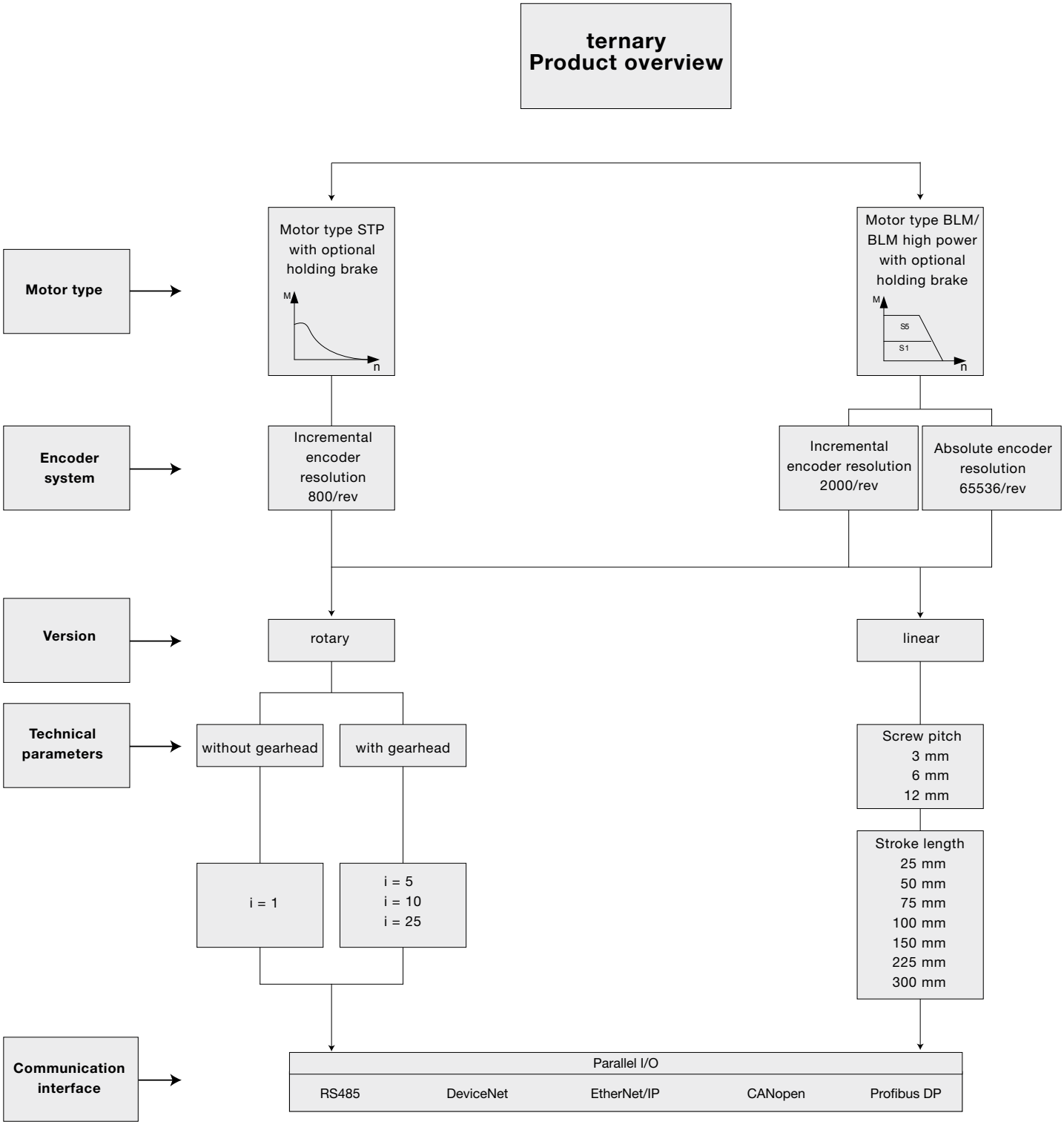
Conversion table

1 mm	= 0.039 in
1 Nm	= 8.85 in.lb
1 $kgcm^2$	= 8.85 x 10^{-4} in.lb.s^2
1 N	= 0.225 lb_f
1 kg	= 2.21 lb_m

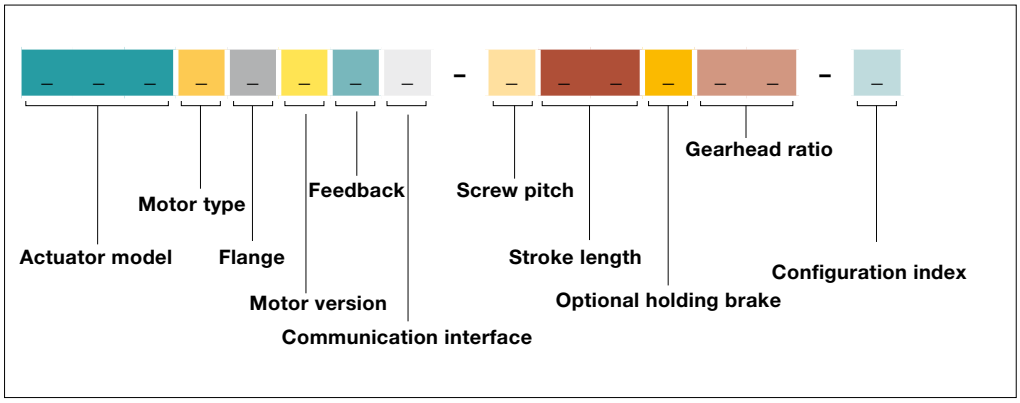
Formulae

Torque [Nm]	$M = F \cdot l$
Acceleration force [N]	$F_b = m \cdot a$
Linear velocity [m/s]	$v = (n/60) \cdot h$
Ratio of mass moment of inertia	$\lambda = J_{external} / J_{internal}$
Ratio	$i = n_2/n_1 = m_1/m_2$ $i^2 = J_2/J_1$

ternary **product overview**



Order information



Actuator model
TLS – Linear drive (not for BLM high power)
TRB – Rotary actuator without gearhead
TRS – Rotary actuator with gearhead

Motor type
A: STP
B: BLM/BLM high power

Flange
046 for STP/PLM
267 for BLM high power

Motor version
A: STP
B: BLM
E: BLM high power

Feedback
A: 800 P/U encoder for motor type STP
B: 2000 P/U encoder for motor type BLM
C: 65536 P/U absolute encoder for motor type BLM

Communication interface
B: RS485+PIO
H: EtherNet/IP+PIO+RS485*
Q: DeviceNet+PIO+RS485*
S: CANopen+PIO+RS485*
U: Profibus DP+PIO+RS485*

*RS485 only for motor type BLM

Screw pitch
X = not applicable because rotary actuator
3 = 3 mm/revolution
6 = 6 mm/revolution
C = 12 mm/revolution

Stroke length
XX = not applicable because rotary actuator
02 = 25 mm
05 = 50 mm
07 = 75 mm
10 = 100 mm
15 = 150 mm
22 = 225 mm
30 = 300 mm

Optional holding brake
N = Without brake
B = With brake

Gearhead ratio
01 = No gearhead
05 = Transmission ratio 1:5
10 = Transmission ratio 1:10
25 = Transmission ratio 1:25

Configuration index
Determined by WITTENSTEIN cyber motor.

WITTENSTEIN | cyber motor

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