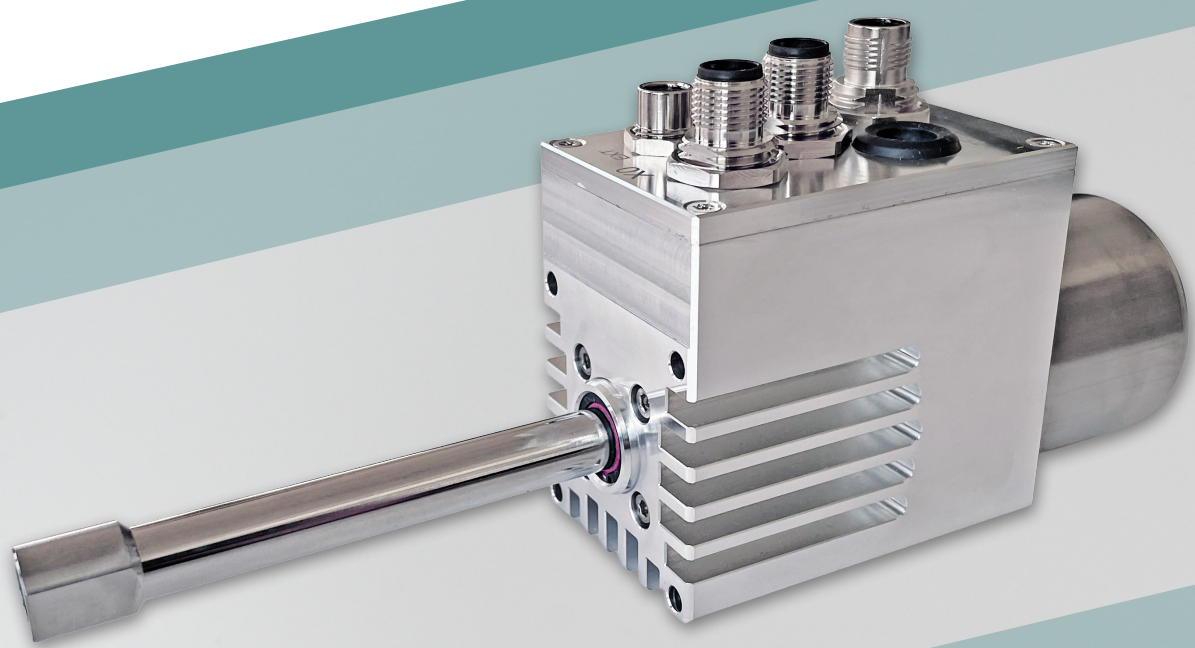
SMELA



liteECO® INTEGRATED

IDIO-STO Generation 3

Linear actuators for short stroke movements
up to 150 mm stroke and 750 N force
with integrated motion controller

liteECO® INTEGRATED IDIO-STO

LINEAR TELESCOPABLE ELECTROMECHANICAL CONCEPT

Most compact pneumatic alternative for short stroke movements

SMELA liteECO® series are the most compact electromechanical alternative to pneumatic short-stroke cylinders due to their patented telescopic concept of motor and mechanics. This makes them ideal for linear movements often required in production lines, machine tools or packaging systems.

A servo motor incl. positioning sensor enables the movement of simple to complex profiles: for fixing, adjusting, locking and following any motion profile. The highly efficient motor not only saves up to 90 % of the energy compared to pneumatic systems. Together with the smart arrangement of the mechanics, it saves up to 80 % of installation space compared to existing electrical solutions. In addition, the liteECO® series offers the possibility of a simple refurbishment. Replacing worn mechanics is very easy and helps the drives to achieve several life cycles: sustainable, cost- and resource-saving.

Control and Feedback via Digital I/Os (Pneumatic Logic)
The INTEGRATD interface variant IDIO features an integrated 24-volt drive controller. The actuator is controlled to move forward and backward via two digital pins on a dedicated circular connector (X0). An additional circular connector (X1) provides galvanically isolated feedback signals for the programmed (taught-in) end positions.

STO (Safe Torque Off) function via safe disconnection of the motor voltage
The motor power supply is provided via an additional M12L-coded connector (XD1, galvanically isolated from all other signals). This power supply is used within the actuator to generate an internal STO signal. Switching off the power supply thus puts the actuator into a safe state. This eliminates the need for additional STO wiring.

Position Teaching
A new target position is set manually via the rotor located under the rear sealed cover. Tool-free position adjustment and saving via the TEACH button make field commissioning incredibly easy. In addition, a wide variety of standalone profiles can be programmed. Please contact us regarding the implementation of your requirements.

Advantages

High power and dynamics in a compact design
High utilization of the installation length for the stroke
Up to 90 % energy savings compared to pneumatics
Up to 80 % installation space savings compared to electrical alternatives

Features

IP65 degree of protection
Robust M12 circular connectors
Easy control via IO modules
Internal STO function (Performance Level d)
Galvanically isolated signals and power supplies

Product configuration

Choose from 30 variants

LE-IDIO-STO.A.--.----.---.--.G3

Plunger configuration (connection)	
6B	M6 external thread
8N	M8 internal thread

Stroke length	
085	85 mm
115	115 mm
150	150 mm

Lead screaw type and pitch in mm/revolution

Pitch	High helix	Trapezoidal	Max. force
2	-	T020	750
4	-	T040	650
10	S100	-	300
15	S150	-	200
24	S240	-	125

other thread configurations on request

Size | Flange width	
50	Load capacity up to 750 N (depending on lead screw type)
....	Further sizes to follow

liteECO® IDIO Actuator (with integrated motion controller and simple IO control/feedback)

Dimensions, Technical data
Size 50

Specifications (depending on stroke length)	085	115	150
Stroke S [mm]	85	115	150
Length L [mm]	118,7	148,7	183,7
Width B [mm]	50		
Height H1 [mm]	71		
Height H2 [mm]	88		
Centering collar D2 [mm]	Ø 20g6		
Diameter plunger D1 [mm]	Ø 11		
Plunger configuration (connection) 6B 8N	 M6x16 external thread - AF 9 mm M8x14 internal thread - AF 12 mm		
Weight [g]	800	850	900
My, Mz (Transverse forces on the plunger) [Nm]	< 1		
Coupling / Hole distance [mm] Mounting options Tightening torque (strength class 8.8) [Nm]	42 x 42 4 x M4 through-hole (4,3 mm) 3,0		
Connections / Interfaces XD1 Power supply motor X0 control (digital IOs) X1 feedback (digital IOs) EXT External sensor c9onnection	 M12 L-coded, male, 5 pin M12 A-coded, male, 4/5 pin M12 A-coded, male, 4/5 in M8 A-coded, male, 8 pin		
Schutzgrad	IP65*		
Materials (of the external components) Plunger Flange Cover Connector Screws Wiper ring Retaining ring	 Stainless steel (1.4305) Aluminium Stainless steel (1.4301) Die-cast zinc – nickel-plated Stainless steel (1.4301) HPU (Hydrolysis resistant polyurethane) SAE 1060-1090		
Conformity (see Declaration of Conformity)	CE (Machinery Directive 2006/42/EC), RoHS (2011/65/EU and 2015/863/EU), REACH (Regulation (EC) No 1907/2006), EMC (2014/30/EU)		

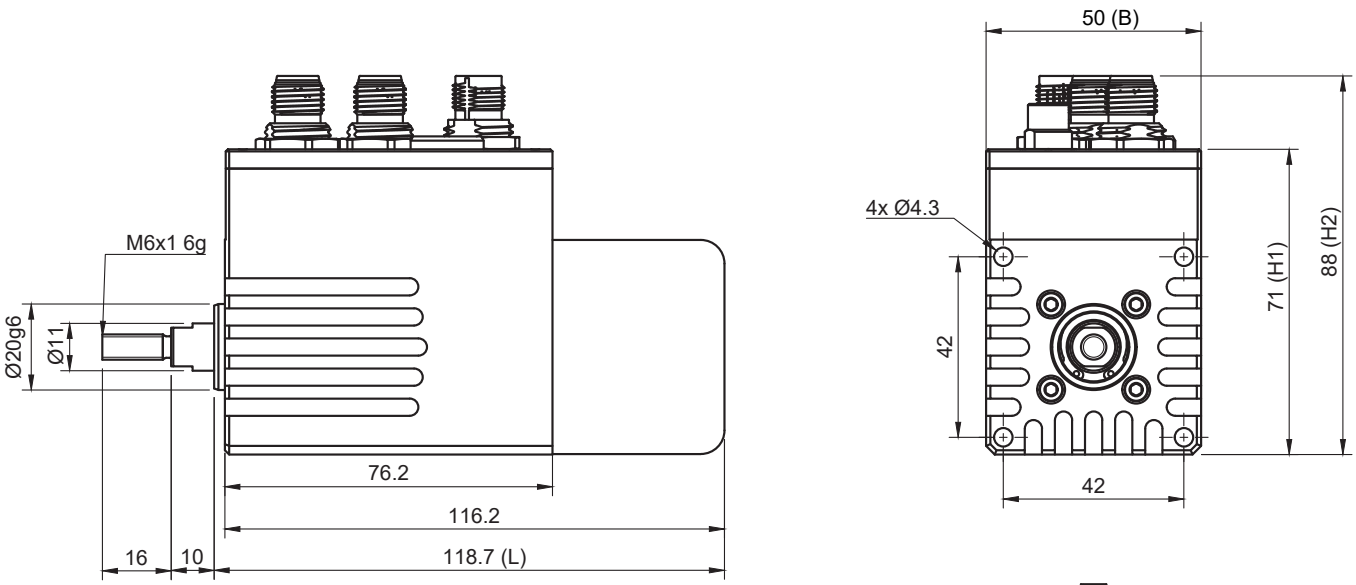
* The degree of protection is only guaranteed if all connectors are either plugged in or fitted with caps of the appropriate degree of protection.

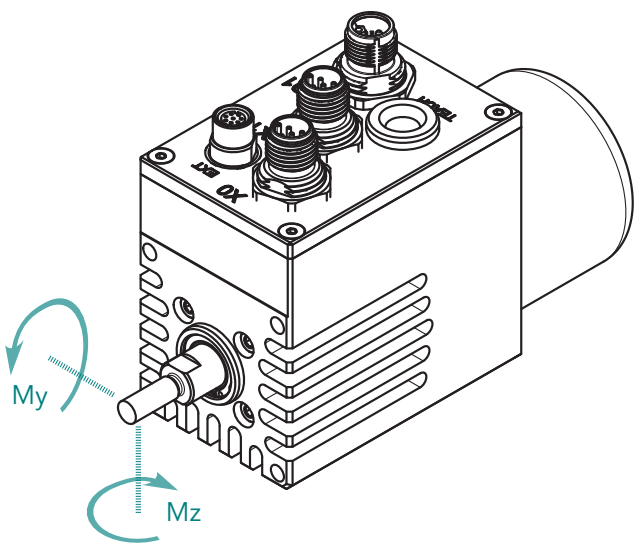
SMELA GmbH reserves the right to make changes as a result of technical improvements or new findings.

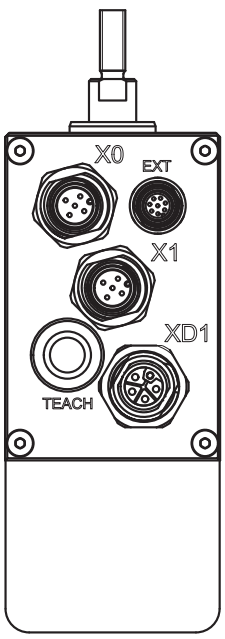
Deviations from the standard configuration are available on request.

Dimensions, Mechanical connection

Size 50 | Stroke 85 mm | Plunger configuration 6B





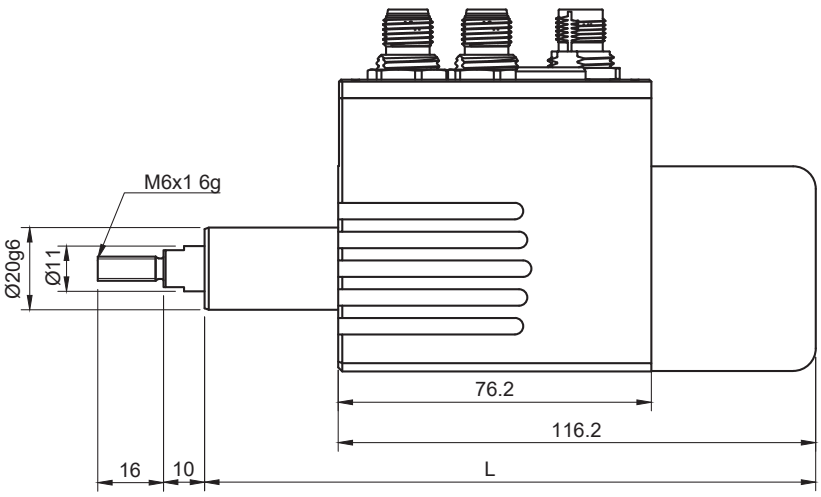


Plan the actuators directly into your design!

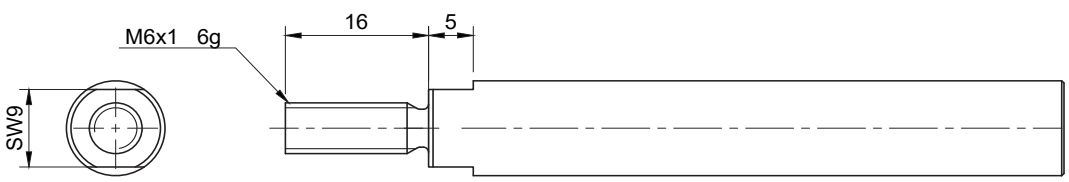
Latest data sheets and CAD models are available on request via sales@smela.com
or at: **www.smela.com**

Dimensions, Mechanical connection

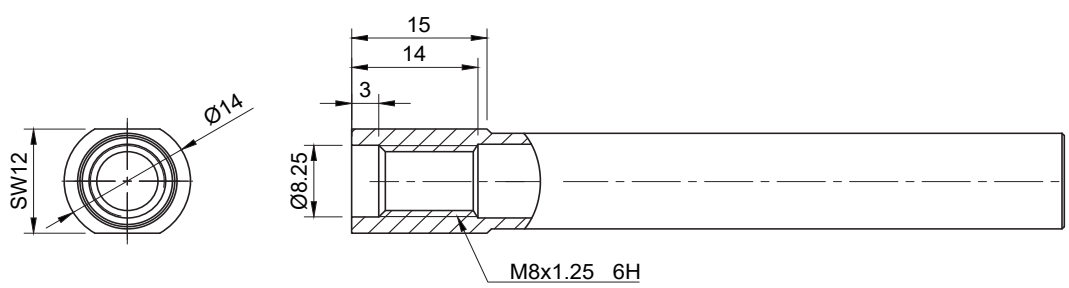
Size 50 | Stroke 115, 150 mm | Plunger configuration 6B



Plunger configuration 6B: M6x16 external thread



Plunger configuration 8N: M8x14 internal thread



Mechanical performance data
Size 50

The following maximum achievable performance data are based on the permissible load capacity for the thread pairs used and the motor. Limiting parameters are, among others, the static load capacity of the nut configuration, the permissible sliding speed and the permissible peak and nominal currents of the integrated servomotor (see following page). In practice, due to the reciprocal effects of influences, it may not always be possible to reach the limit values, in particular peak force and maximum speed cannot occur simultaneously. Any increase in the load leads to a reduction in the permissible sliding speeds and vice versa. Please do not hesitate to ask us about the technical feasibility of your motion profiles.

Lead screw configuration	Limit load capacity[1]	Backlash[2]	Peak force[3] / Peak current[3]	Nom. force[4] / Nom. current[4]	Max. speed[5]	Max. acceleration[6]	Positioning time[7]
	N	mm	N / A	N / A	mm/s	m/s²	ms
High helix							
S100	370	0,1	300 / 12	125 / 5	500	25	120
S150	370	0,2	200 / 12	83 / 5	750	37,5	85
S240	315	0,25	125 / 12	52 / 5	1.200	60	65
Trapezoidal thread							
T020	750	0,1	750 / 6	625 / 5	50	2,5	900
T040	650	0,15	650 / 12	313 / 5	100	5	450

SMELA GmbH reserves the right to make changes as a result of technical improvements or new findings.

Explanatory footnotes:

1) Limit load capacity: max. static force and axial load capacity of the internal mechanics;
exceeding loads are not permissible and must be absorbed by external mechanics or brakes
2) Specification of the maximum backlash at the time of delivery. The backlash is subject to wear. Wear depends on the load and dynamic conditions, as well as the resulting temperature. The duty cycle and ambient temperature are further influencing factors.
3) Maximum permissible force and the corresponding proportional phase current must not be exceed in order to protect the internal mechanics.
The max. phase current of the rotary motor I_{max} may furthermore be applied for max. 20 seconds in order not to exceed the internal limit temperature starting from an initial temperature of the actuator of 20°C
4) Permissible permanent nom. force / permissible nom. phase current not to exceed the internal limit temperature at an embient temperature of 20 °C
Determined by a slow and permanent movement under load (quasi-static method) for the normal case, i.e. the connection of the actuator to a metal body with a thermal contact resistance to air of 1.7 K/W. In case of a worse thermal coupling, limit to the nom. current of the worst case (3 A, see chart on page 8 and footnote 11)
5) The max. speed depends on voltage. The applied voltage (phase-phase) may be up to 48 V
The characteristics shown refer to a nom. voltage of 24 V (at the actuator);
6) During braking (negative acceleration), energy is generated and fed back into the DC link; if the DC link is not capable or regenerative braking, care must be taken to ensure that the DC link capacitance is adequately dimensioned and that an additional braking resitor is used
7) Over the stroke of 45 mm (shortest configuration) with a rated voltage of min. 24 V (at the actuator), without load
8) The applied voltage (phase-phase) can be up to 48 V. The characteristic data refer to a nominal voltage of 24 V (at the actuator);
The actual voltage at the actuator can deviate from the DC link voltage and depends, among other things, on the used inverter (voltage utilization) and the length of the connection cable
9) Max. permissible ambient temperature; The internal temperature limit must not be exceeded
10) The max. phase current I_{max} is to be applied for a duration of max. $\tau_{th,w}$ in order not to exceed the internal temperature limit of $T_{int,max}$ starting from an initial temperature of the actuator $T_{int} = T_{amb} = 20°C$
11) With thermal insulation (actuator horizontal in static air at 20°C, 80% humidity, thermal contact resistance to air = 5 K/W)
12) When connected to a metal body with a thermal transfer resistance to air of 1.7 K/W
13) Related to measured peak voltage, no RMS value, phase to phase
14) Phase to phase; without taking into account connecting cables between actuator and drive controller; measured at 1 kHz, 1V rms
15) Calculated value without linear unit

Electrical performance data
Size 50

	Symbol	Unit			
Power supplies, general			Min.	Typ.	Max.
Power supply logic via X1	U_{Logic}	V_{dc}	19	24	30
Power supply motor via XD1	U_{Motor}	V_{dc}	19	24	30
Current consumption logic via X1	I_{Logic}	mA	100	110	310
Current consumption logic via XD1	I_{Motor}	A	0	3	15
Operating temperature[9)]	T_{amb}	°C	+5	+20	+45
Internal temperature limit[9)]	$T_{int,max}$	°C			+90
Maximum operating altitude ASL	h_{amb}	m			2.500
Moist heat					85 % at 40°C
Digital IO Logic			PNP 24 V		
Only PELV power supplies should be used for the power supply!					
Safety Parameter					
Performance level of STO function			PLd / SIL2		
STO shutdown time (excluding the deceleration time of connected loads)			shutdown < 300 µs reactivate < 750 µs		
MTTFdu (Mean time to dangerous failure)			>=30 years (1.468 years)		
DC (Diagnostic coverage)			0 %		
PFH (Probability of a dangerous failure per hour)			$7{,}77 \times 10^{-8}$ 1/h		
SFF-value (Safe failure fraction)			94,79 %		
Service life of PDS(SR)			20 years		
Motor parameters (for parameterization and profile calculation)					
Max. permissible speed (equal to no-load speed at 24 V) [8)]	$n_{max} = n_0$	min^{-1}	3.025		
Max. acceleration [6)]	α_{max}	rad/s²	16.610		
Max. motor phase current [3)]	I_{max}	A	12		
Thermal time constant (winding) [10)]	$\tau_{th,w}$	s	20		
Nom. current [4)] poor thermal connection [11)] good thermal connection[12)]	 $I_{N,wc}$ $I_{N,nc}$	 A A	 3 5		
Max. torque (at I_{max})	M_{max}	mNm	750		
Torque constant	k_M	mNm/A	62,5		
Speed constant [13)]	k_n	min^{-1}/V	126		
Terminal resistance	R_S	mΩ	585		
Terminal inductance [14)]	L_S	µH	300		
Electrical time constant [14)]	τ_{el}	ms	0,512		
Number of pole pairs	z_P	-	7		
Rotor inertia [15)]	J	g · cm²	455		

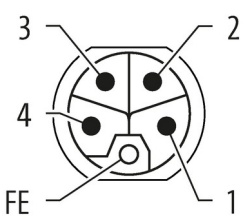
*For explanations of the footnotes, see the previous page

Connectors, interfaces
Pin assignment at the actuator

Power supply motor 24 V_{DC} and STO function (power off = STO activated)
M12, L-coded, 5 pin, male

Pin	Function
1	not used
2	0 V_{DC} (Power supply motor)
3	not used
4	24 V_{DC} (Power supply motor)
5	FE

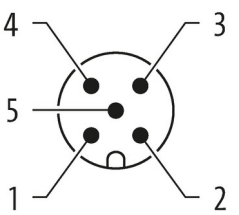
XD1



Digital IN control
M12, A-coded, male, 4/5 pin

Pin	Funktion
1	not used
2	"Retract" Command
3	0 V_{DC}
4	"Extend" Command
5	not used

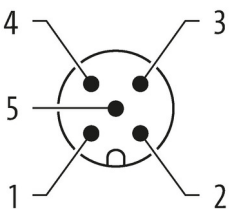
X0



Digital OUT feedback
M12, A-coded, male, 5 pin

Pin	Function
1	24 V_{DC} (Power supply logic)
2	"Retract" Feedback
3	0 V_{DC} (Power supply logic)
4	"Extend" Feedback
5	FE (optional)

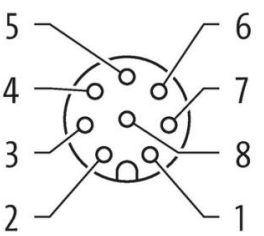
X1



EXT Connector
M8, A-coded, female, 8 pin, female

Pin	Function
1	12 V_{DC} (Power supply for external sensor)
2	Do not use
3	Do not use
4	Do not use
5	Do not use
6	Limit switch f-eedback
7	Do not use
8	0 V_{DC} (Power supply for external sensor)

EXT



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