Swivel jaw

pneumatic

SOMMER automatic

Swivel jaws

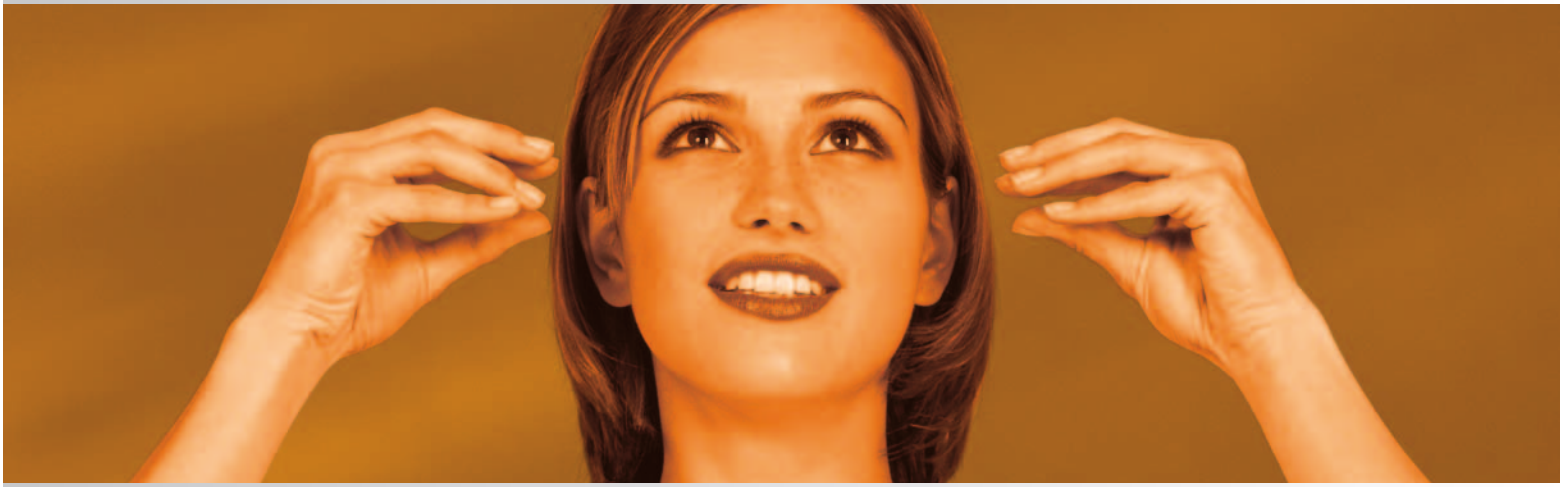
Order no./Paar	Swivel angle [°]	Torque/Paar [Nm]	Page
Product Information			6
SB32-C	90/180	0,2	10
SB40-B	90/180	0,6	12
SB54-B	90/180	3,2	14
Swivel jaws Formulas			32

Swivel jaws

Order no.	Swivel angle [°]	Torque [Nm]	Page
Product Information			18
SB50-90-B	90	1,2	22
SB50-180-B	180	1,2	22
SB50G	-	-	22
SB74-90-B	90	3,5	24
SB74-180-B	180	3,5	24
SB74G	-	-	24
SB100-90-B	90	10,0	26
SB100-180-B	180	10,0	26
SB100G	-	-	26
SB150-90	90	23,0	28
SB150-180	180	23,0	28
SB150G	-	-	28
SB190-90	90	57,0	30
SB190-180	180	57,0	30
SB190G	-	-	30
Swivel jaws Formulas			32

Swivel jaws

pneumatic



SB32-D
SB40-B
SB54-B

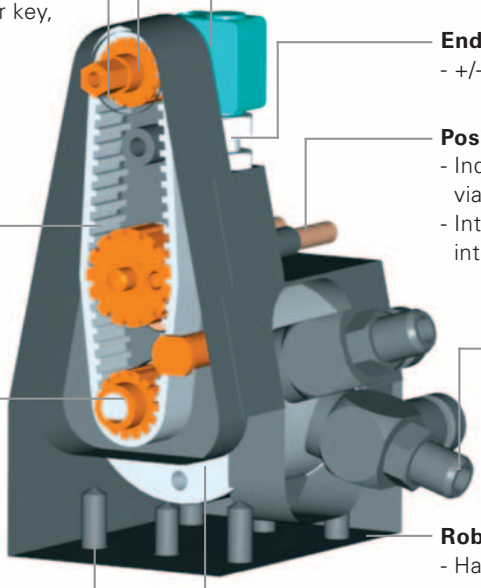
SOMMER automatic

Swivel jaws

Features

- Small compact swivel jaw in three sizes, with torque up to 3.2 Nm
- Optimally suited to low mass workpieces, for 90° or 180° swivel angle, convertible for quick batch change
- Can be screwed on directly as a gripping jaw on the gripper, gripping and rotating as a compact unit, various universal jaws available as accessories

Functional diagram



Two way bearing drive shaft
- High force and torque intake

Drive shaft
- As hexagonal or round shaft with feather key, depending on design
- Quick and cost effective positioning of application-specific workpiece intakes

Force transfer
- Stable toothed belt with steel inlay
- Quiet, reliable, durable

Drive with stable counterbearing
- low torsion for maximum force transfer

Fixing and positioning
- Alternate on several sides for individual assembly of the swivel jaws

Stop
- swivel angle of 0 – 180°
- Stable, with Fibroflex stop surface
- Alternate 0°-90°-stop included in the delivery

Endposition
- +/- 3° Adjustable end position

Position sensing
- Inquiry of end positions 0° and 90° (or180°) via inductive proximity switch
- Integrated in housing, no additional interference contour

Energy feed
- Possible from several sides (from SB40)

Robust, light housing
- Hard, coated aluminium alloy

Drive
- Double acting rotor cylinder

Terms

Torque: force moment on the swivel jaw drive shaft

Swivel time: time required to cover 0°/90° or 0°/180° swivel movement

Repeatability: dispersion of stop position at 100 consecutive swivel cycles

Cycle: Distance covered by the drive wing in one 0°/90°/0° or 0°/180°/0° swivel movement

Maintenance: maintenance free up to 10 Mio. swivel cycles
(please see the owner's manual for conditions,
download from www.sommer-automatic.com)

- long maintenance intervals keep costs down
- long durability

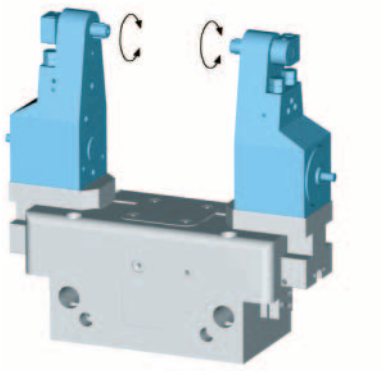
Model

Order no./pair	Swivel angle	Torque/pair
SB32-D	90° oder 180°	0,2 Nm
SB40-B	90° oder 180°	0,6 Nm
SB54-B	90° oder 180°	3,2 Nm

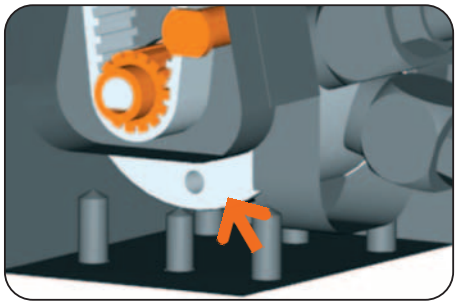
Order advice

SB32-D, SB40-B and SB54-B are delivered pairwise

Application example



Swivel jaws



Drive

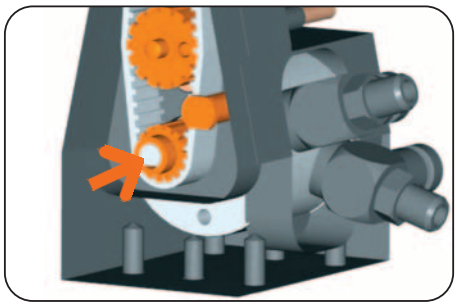
Double acting pneumatic rotor cylinder

- Maximum torque in both rotation directions
- Torque up to 3.2 Nm

Swivel angle 90° or 180°

End stop can be aligned via adjustment screw +/-3°

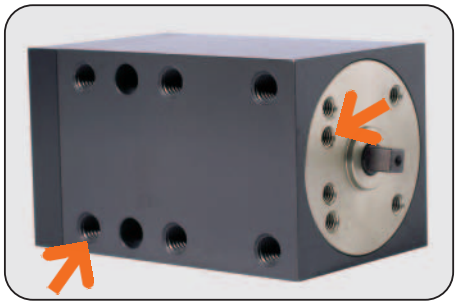
- External fix stop to absorbe the force over housing prevents overload of toothed belt and drive rotor



Force transfer

Via toothed belt

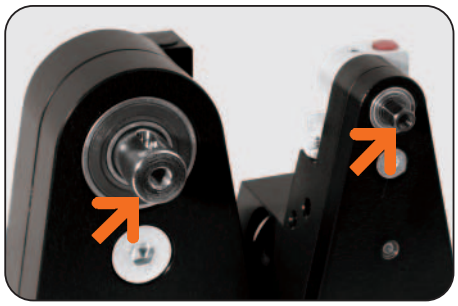
- Optimum steering of drive force in torque
- High repeat accuracy
- Two way ball bearings for high torque intake



Machine connection

Energy supply, attachment and positioning-possibilities on several sides

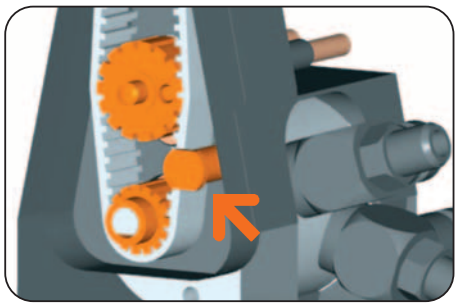
- Optimum integration into the workroom through individual mounting situation



Individual workpiece intakes

Direct screwing on drive flange via hexagon or round shaft with feather key

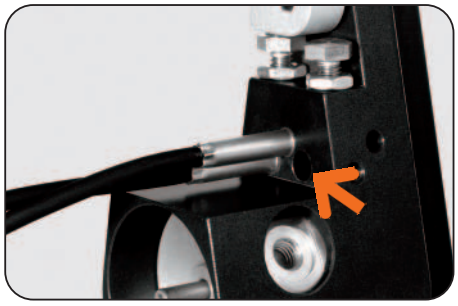
- Stable, anti-twist connection
- Low design effort
- Quick and cost effective positioning of application-specific workpiece intakes



Tension roller

Shift free swivel movement due to tension roller

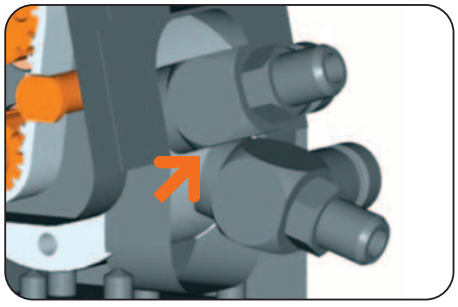
- Clean swivel movement
- High repeat accuracy



Position sensing

Intake for inductive proximity switch

- Process safe
- Low interference contour
- Compact

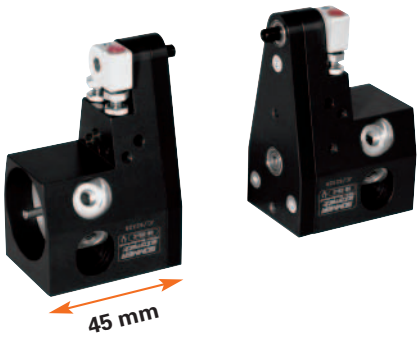


Energy feed

Recommended via one-way flow control valve

- Allows speed regulation and adapted approach to the end position

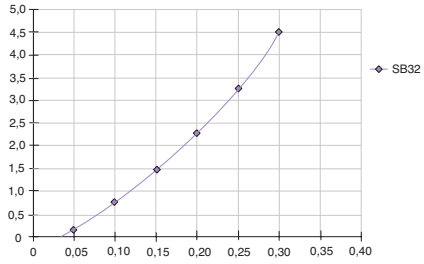
Swivel jaws



Moment of inertia

shows the expected swivel time against the calculated moment of inertia (test rig pairwise)

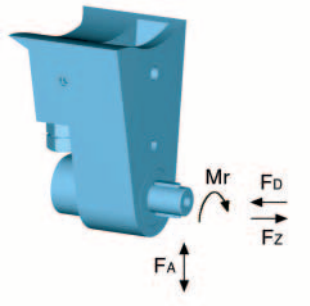
Moment of inertia [kg m²]



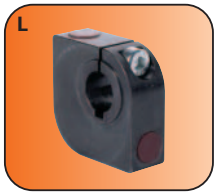
Swivel time [sec]

Forces and Moments

Shows the static bearing load

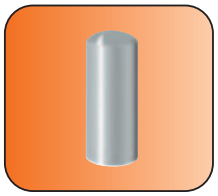


Included in the delivery



Stop
90° **Order no. BGEH03350**
180° **Order no. BGEH03340**
(180° assembled ex works)

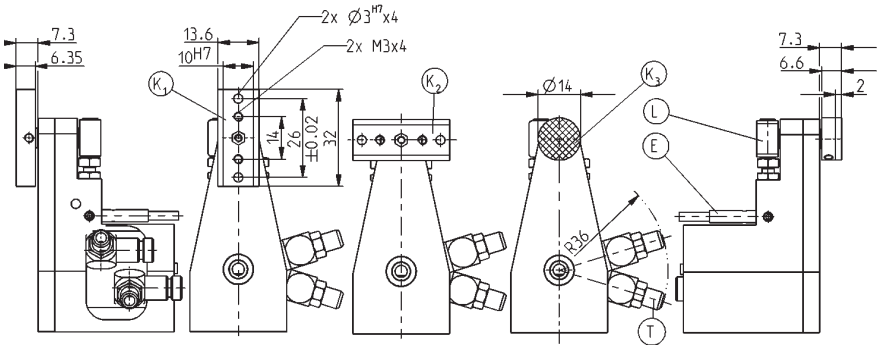
Sleeve for proxymity switch
Order no. BDMS03210



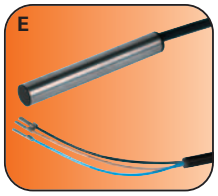
Straight pin to close the bore for proximity switch
Order no. C632504100

Pin screw for clamping of the proximity switch
Order no. C0913030089
Order no. C0913030059

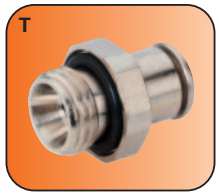
Accessories



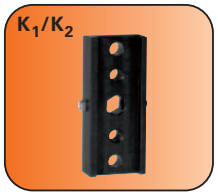
Accessory list



Proximity switch
Order no. NJ4-E2



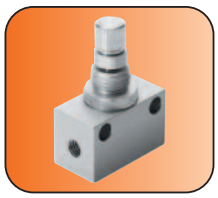
Pneumatic fittings
Order no. GVM5



Basic jaw
Order no. SB32-1-C (K1) (pair)
Order no. SB32-1-C/01 (K2) (pair)

Basic jaw (rubber coated)
Order no. SB32-2-C (pair)

Plug 3-pole
Order no. S12-G-3



One-way flow control valve
Order no. DRV1/8I

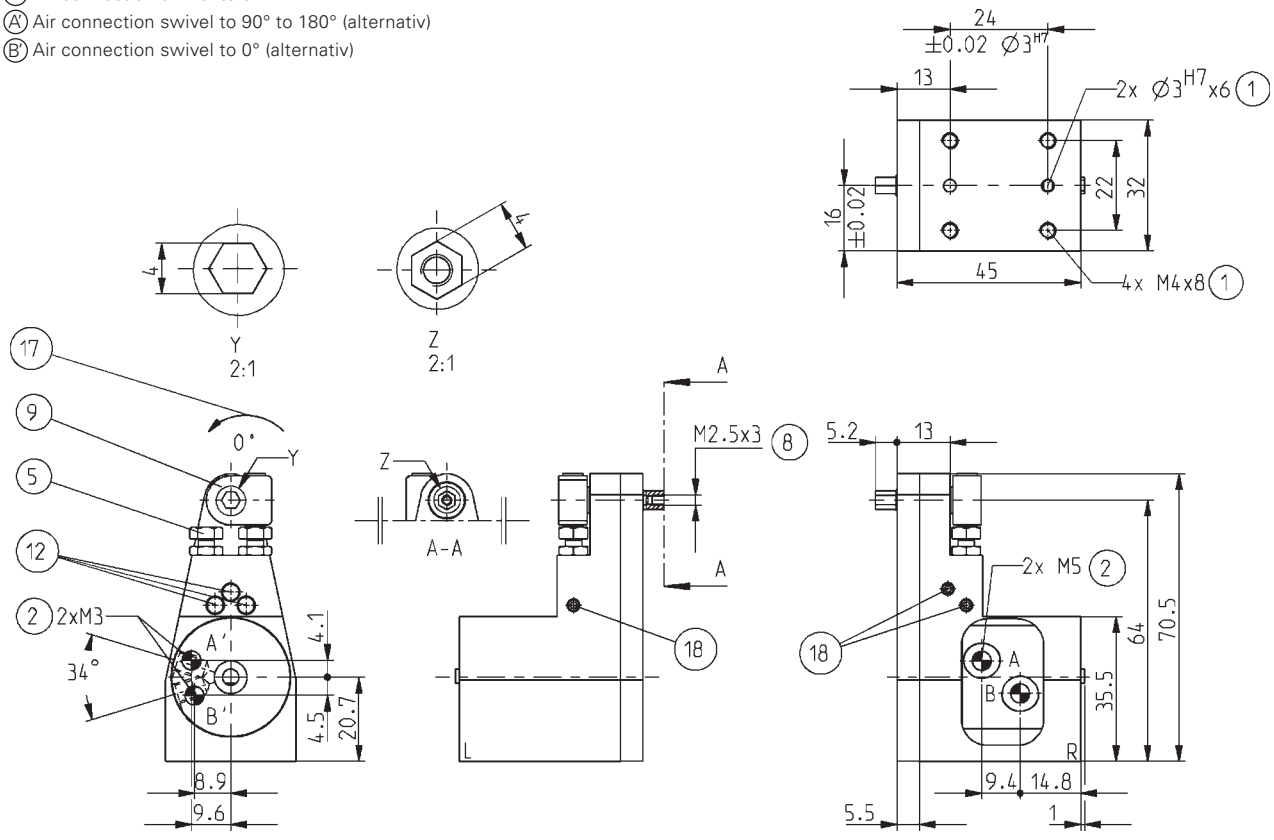
Subject to change without prior notice

Order no.:	SB32-D
Swivel angle [°]:	90/180
Torque per jaw [Nm]:	0,1
Swivel angle 90° or 180° adjustable +/- [°]:	3
Repeatability +/- [°]:	0,5
F_A [N]:	180
F_D [N]*:	90
F_Z [N]*:	90
M_r [Nm]:	2,1
Min./max. operating pressure [bar]:	3/7
Min./max. operating temperature [°C]:	5/80
Air volume per cycle [cm³]:	2
Weight [g]**:	300

All data measured at 6 bar/jaw
** Consider the force of the grippers*
*** Total weight pair*

SB32-D

① Fixing swivel jaws
② Energy supply
⑤ Adjusting screw
⑧ Fixing basic jaw
⑨ Fix stop 90° or 180°
⑫ Intake for proximity switch
⑰ Direction of rotation
⑱ Screw for clamping of the proximity switch
Ⓐ Air connection swivel to 90° or 180°
Ⓑ Air connection swivel to 0°
Ⓐ' Air connection swivel to 90° to 180° (alternativ)
Ⓑ' Air connection swivel to 0° (alternativ)

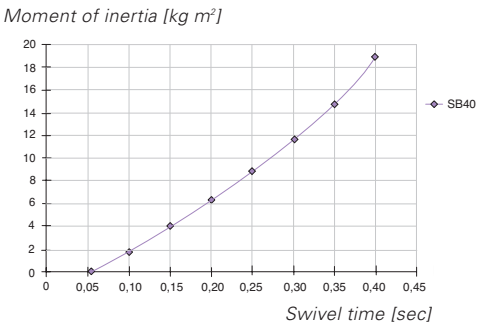


Subject to change without prior notice

Swivel jaws

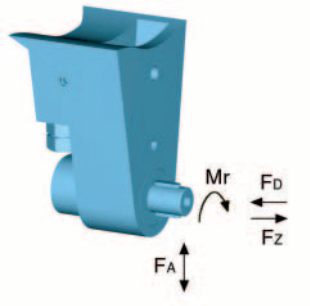
Moment of inertia

shows the expected swivel time against the calculated moment of inertia (test rig pairwise)



Forces and Moments

Shows the static bearing load



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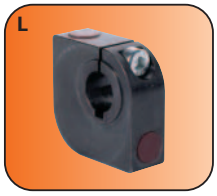
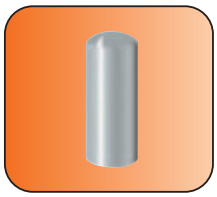


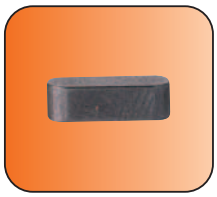
Stop
90° **Order no. BGEH03350**
180° **Order no. BGEH04150**
(180° assembled ex works)

Sleeve for proxymity switch
Order no. BDMS03210



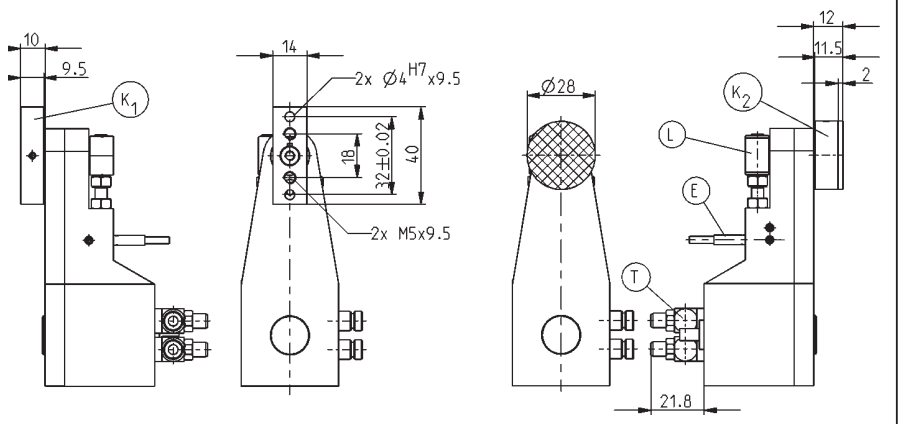
Straight pin to close the bore for proximity switch
Order no. C632504100

Pin screw for clamping of the proximity switch
Order no. C0913030089
Order no. C0913030129



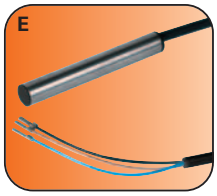
Feather key for drive shaft
Order no. C688522080

Accessories

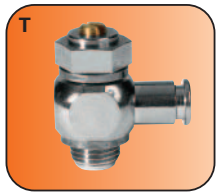


Subject to change without prior notice

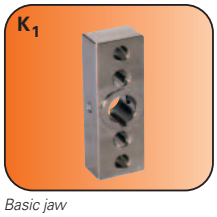
Accessory list



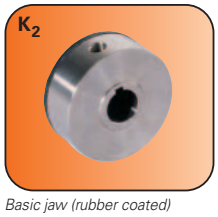
Proximity switch
Order no. NJ4-E2



Pneumatic fittings
Order no. DRVM5x4



Basic jaw
Order no. SB40-1 (pair)



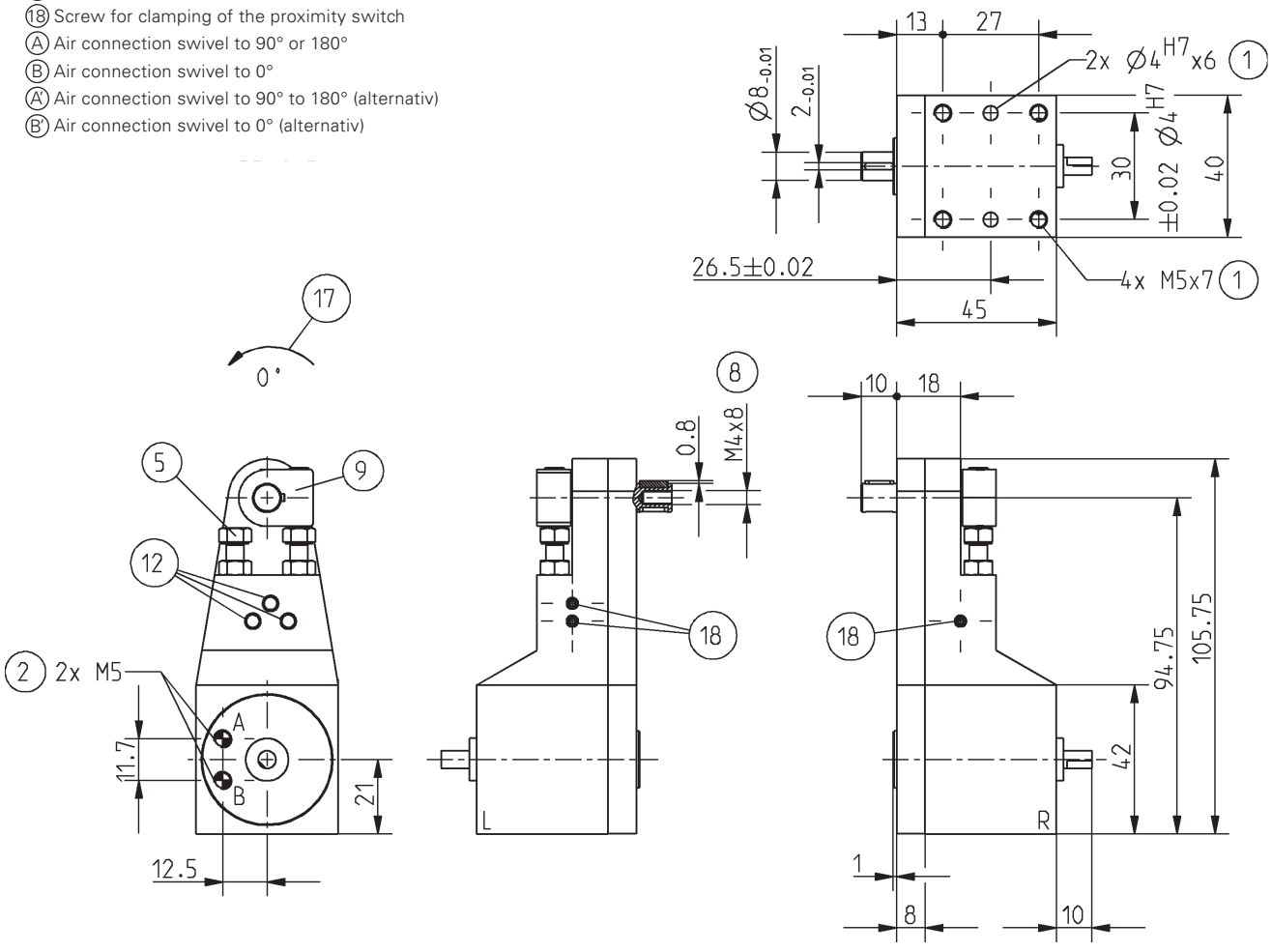
Basic jaw (rubber coated)
Order no. SB40-2 (pair)

Order no.:	SB40-B
Swivel angle [°]:	90/180
Torque per jaw [Nm]:	0,3
Swivel angle 90° or 180° adjustable +/- [°]:	3
Repeatability +/- [°]:	0,5
F_A [N]:	770
F_D [N]*:	385
F_Z [N]*:	385
M_r [Nm]:	10,8
Min./max. operating pressure [bar]:	3/7
Min./max. operating temperature [°C]:	5/80
Air volume per cycle [cm³]:	4
Weight [g]**:	700

All data measured at 6 bar//jaw
** Consider the force of the grippers*
*** Total weight pair*

SB40-B

① Fixing swivel jaws
② Energy supply
⑤ Adjusting screw
⑧ Fixing basic jaw
⑨ Fix stop 90° or 180°
⑫ Intake for proximity switch
⑰ Direction of rotation
⑱ Screw for clamping of the proximity switch
Ⓐ Air connection swivel to 90° or 180°
Ⓑ Air connection swivel to 0°
Ⓐ' Air connection swivel to 90° to 180° (alternativ)
Ⓑ' Air connection swivel to 0° (alternativ)

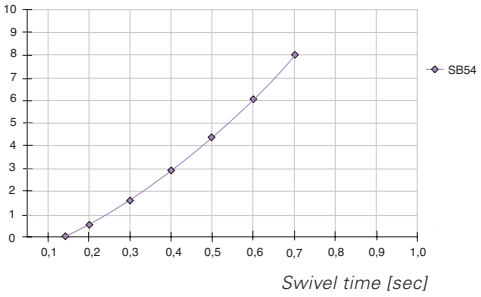


Subject to change without prior notice

Swivel jaws

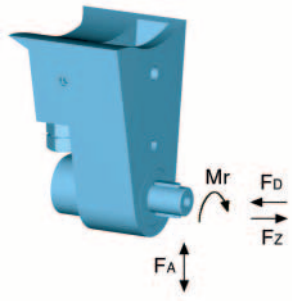
Moment of inertia

shows the expected swivel time against the calculated moment of inertia (test rig pairwise)

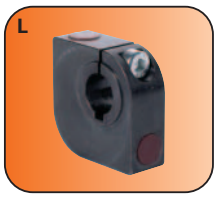


Forces and Moments

Shows the static bearing load

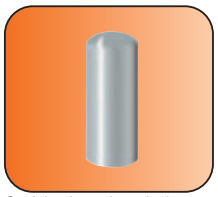


Included in the delivery



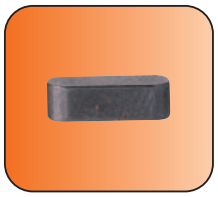
Stop
90° **Order no. BGEH05501**
180° **Order no. BGEH05491**
(180° assembled ex works)

Sleeve for proxymity switch
Order no. BDMS03210



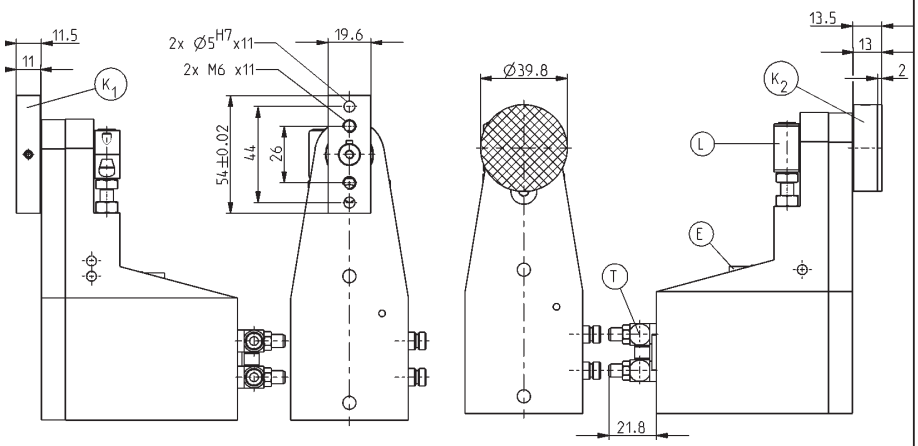
Straight pin to close the bore for proximity switch
Order no. BKUN05410

Pin screw for clamping of the proximity switch
Order no. C0913040129
Order no. C0913040069



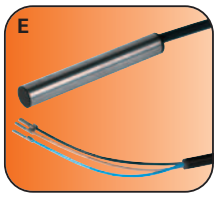
Feather key for drive shaft
Order no. C688533100

Accessories

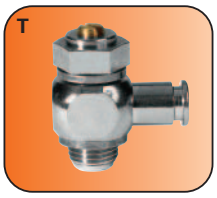


Subject to change without prior notice

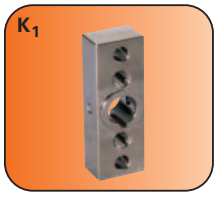
Accessory list



Proximity switch
Order no. NJ4-E2



Pneumatic fittings
Order no. WVM5



Basic jaw
Order no. SB54-1 (pair)

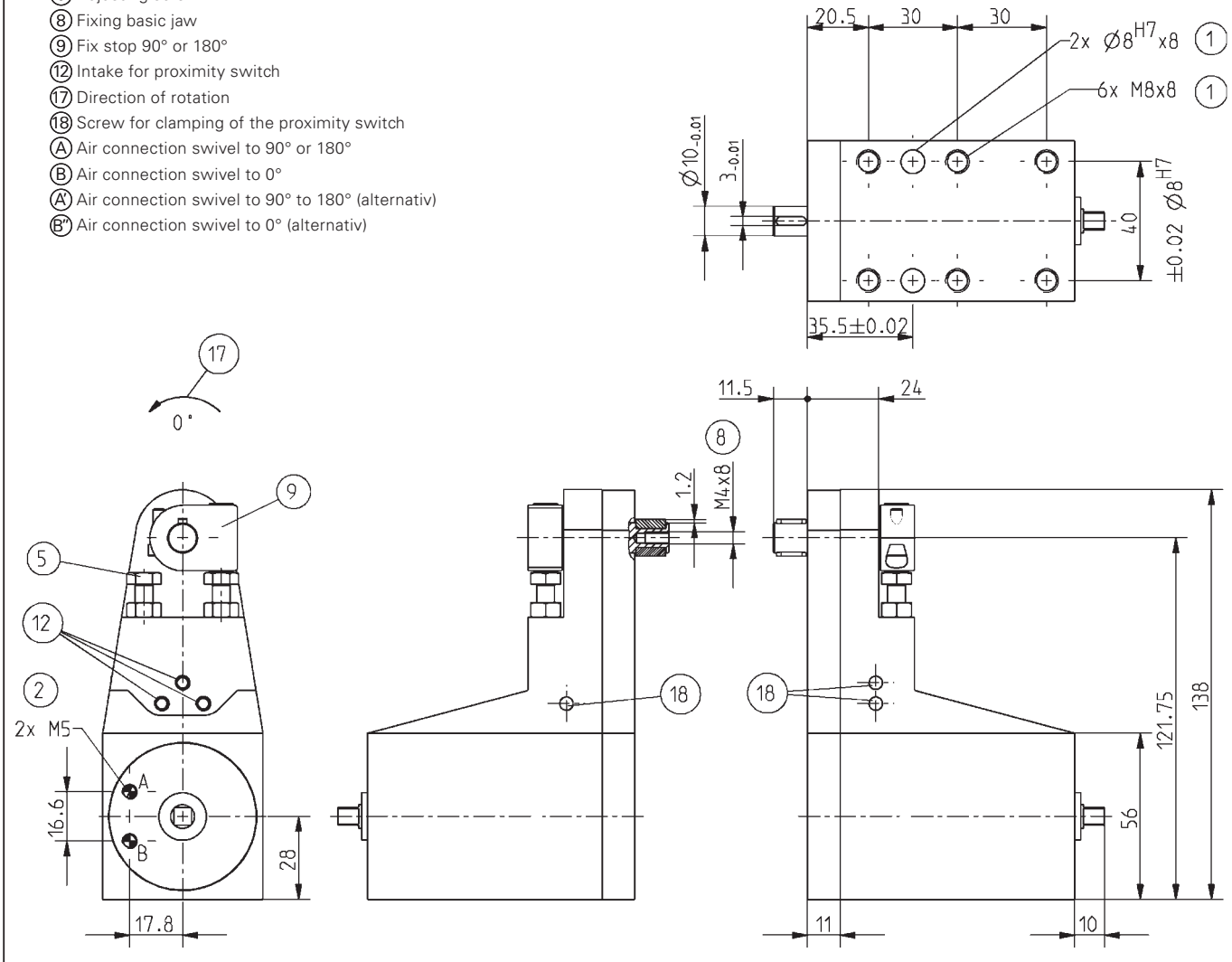
Basic jaw (rubber coated)
Order no. SB54-2 (pair)

Order no.:	SB54-B
Swivel angle [°]:	90/180
Torque per jaw [Nm]:	1,6
Swivel angle 90° or 180° adjustable +/- [°]:	3
Repeatability +/- [°]:	0,5
F_A [N]:	850
F_D [N]*:	425
F_Z [N]*:	425
M_r [Nm]:	15,3
Min./max. operating pressure [bar]:	3/7
Min./max. operating temperature [°C]:	5/80
Air volume per cycle [cm³]:	16
Weight [kg]**:	2,2

All data measured at 6 bar/jaw
** Consider the force of the grippers*
*** Total weight pair*

SB54-B

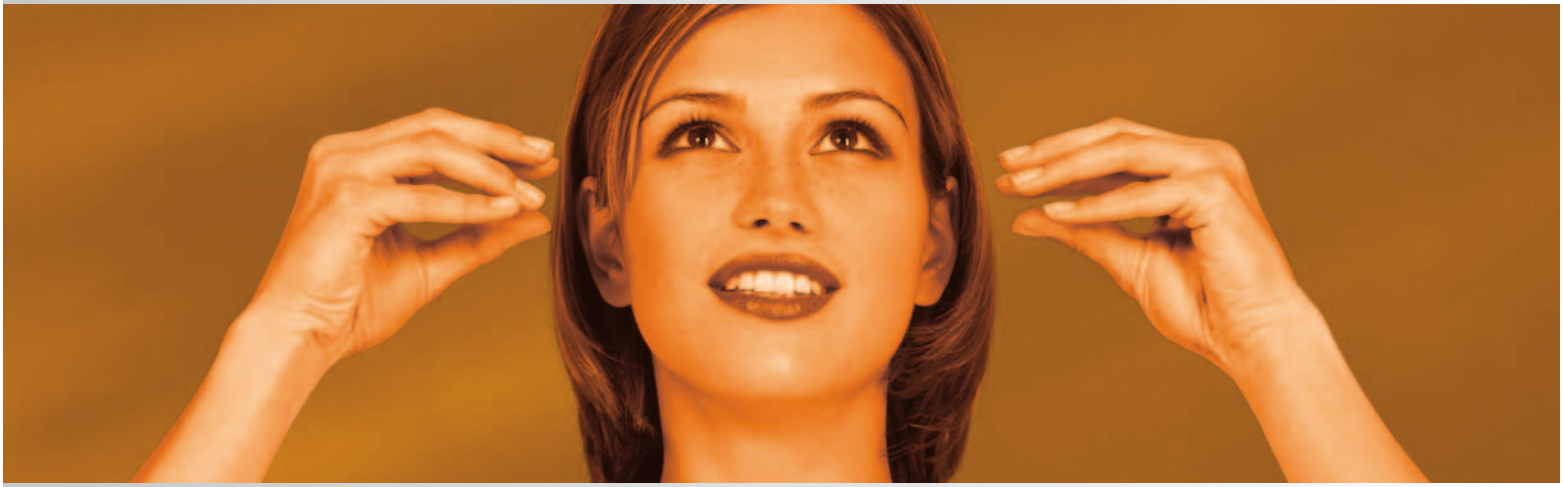
(1) Fixing swivel jaws
(2) Energy supply
(5) Adjusting screw
(8) Fixing basic jaw
(9) Fix stop 90° or 180°
(12) Intake for proximity switch
(17) Direction of rotation
(18) Screw for clamping of the proximity switch
(A) Air connection swivel to 90° or 180°
(B) Air connection swivel to 0°
(A') Air connection swivel to 90° to 180° (alternativ)
(B') Air connection swivel to 0° (alternativ)



Subject to change without prior notice

Swivel jaws

pneumatic



SB50-B
SB74-B
SB100-B
SB150
SB190

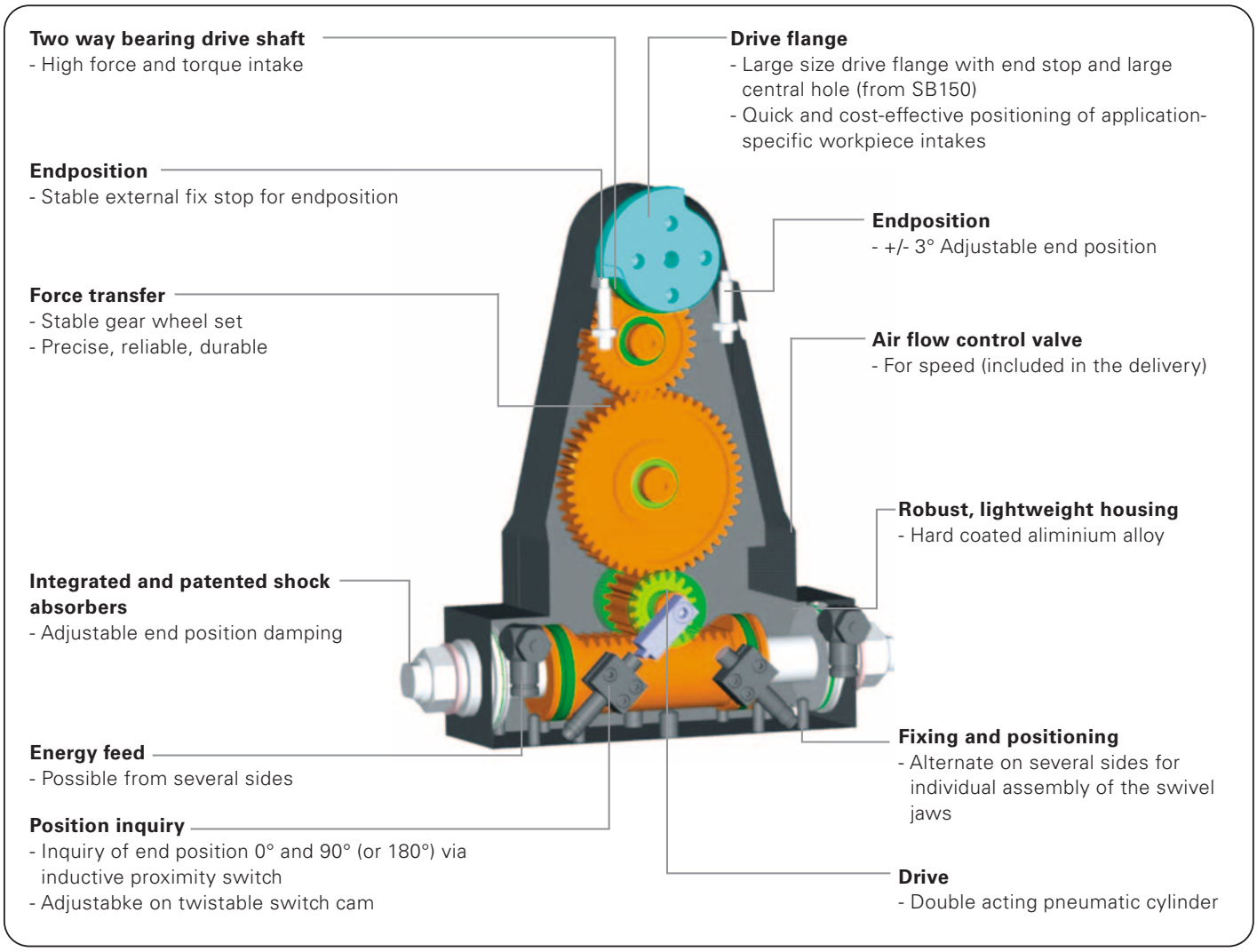
SOMMER automatic

Swivel jaws

Features

- Compacte swivel jaw in five sizes, with a torque up to 57 Nm and lare drive flange for easy connection, dual ball bearings for a high moment intake
- With integrated and patented hydraulic shock absorbers, built into the pressure chamber, cooled due to permanent air flow and therefore constant in damping behaviour
- Can be screwed on directly as a gripping jaw on the gripper, gripping and rotating as a compact unit, with large central bore on the drive shaft to feed-through supply lines (from SB150)

Functional diagram



Terms

Torque: force moment on the swivel jaw drive shaft

Swivel time: time required to cover 0°/90°or 0°/180° swivel movement

Repeatability: dispersion of stop position at 100 consecutive swivel cycles

Cycle: distance covered by the drive wing in one 0°/90°/0° or 0°/180/0° swivel movement

Maintenance: maintenance free up to 10 Mio. Swivel cycles
(please see the owner's manual for conditions,
download from www.sommer-automatic.com)

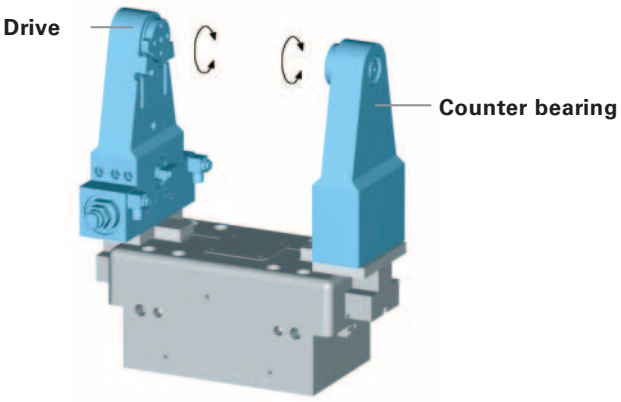
- long maintenance intervals keep costs down
- long durability

Model

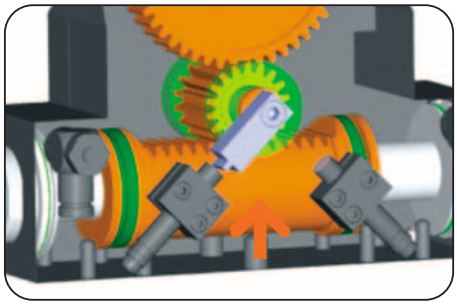
G: swivel jaw without drive and damping serves as counter bearing

Order no.	Swivel angle	Torque	Centre through-bore in the driving shaft
SB50-90-B	90°	1,2 Nm	-
SB50-180-B	180°	1,2 Nm	-
SB50G	-	-	-
SB74-90-B	90°	3,5 Nm	-
SB74-180-B	180°	3,5 Nm	-
SB74G	-	-	-
SB100-90-B	90°	10 Nm	-
SB100-180-B	180°	10 Nm	-
SB100G	-	-	-
SB150-90	90°	23 Nm	Ø 28,5 mm
SB150-180	180°	23 Nm	Ø 28,5 mm
SB150G	-	-	-
SB190-90	90°	57 Nm	Ø 34,0 mm
SB190-180	180°	57 Nm	Ø 34,0 mm
SB190G	-	-	-

Appication example



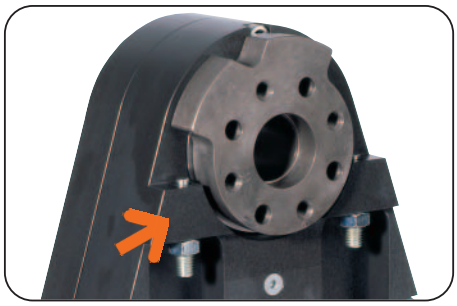
Swivel jaws



Drive

Double acting pneumatic cylinder

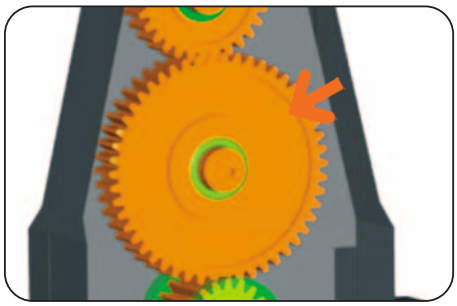
- Maximum torque in both rotation directions
- Torque up to 57 Nm



Swivel angle 90° or 180°

End stop can be aligned via adjustment screw +/- 3°

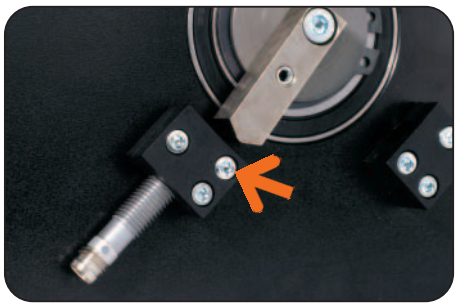
- external fix stop to absorbe the force over housing presents overload of the gear wheels



Force transfer

Via gear wheel set

- Precise steering of drive force in torque
- High repeat accuracy
- Multi way ball bearing for high torque intake



Position sensing

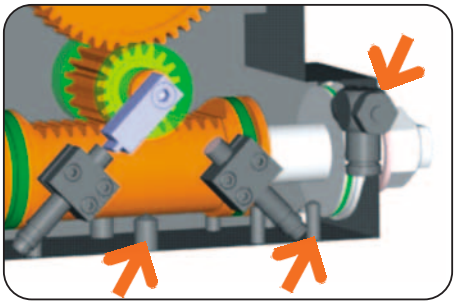
Intake for inductive proximity switch

- Process safe
- adjustable
- Compact

Large drive flange

For simple connection

- With central bore (from SB150) for cable feed-through
- Low construction and extension effort for connection of follow-up tools



Machine connection

Energy supply, attachment and positioning-possibilities on serveral sides

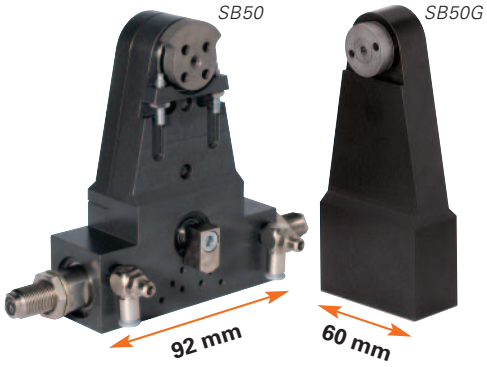
- Optimum integration into the workroom due to individual installation position

End position damping

Hydraulic shock absorber with spiral groove technology

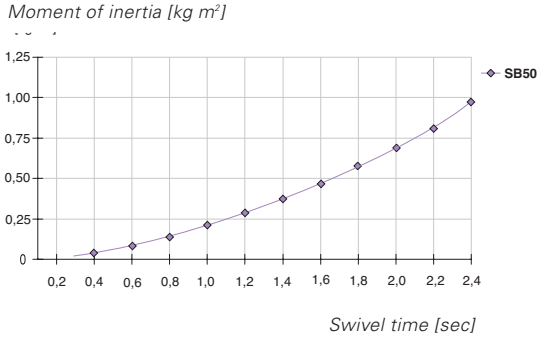
- Low wear approach to end position, gentle energy absorption due to profiled spiral groove
- The damping characteristics can be indivitually adjusted by the screw depth
- Built into the pressure chamber, cooled by permanent air flow, constant damping behavior

Swivel jaws



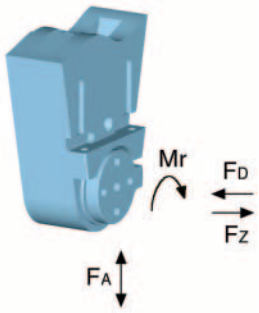
Moment of inertia

shows the expected swivel time against the calculated moment of inertia (test rig pairwise)

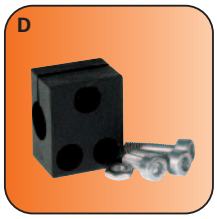


Forces and Moments

Shows the static bearing load



Included in the delivery



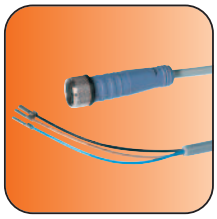
Mounting block
Order no. KB8K-02

Pneumatic fittings
Order no. DRVM5x4

Accessory list

Proximity switch
Order no. NJ8-E2S

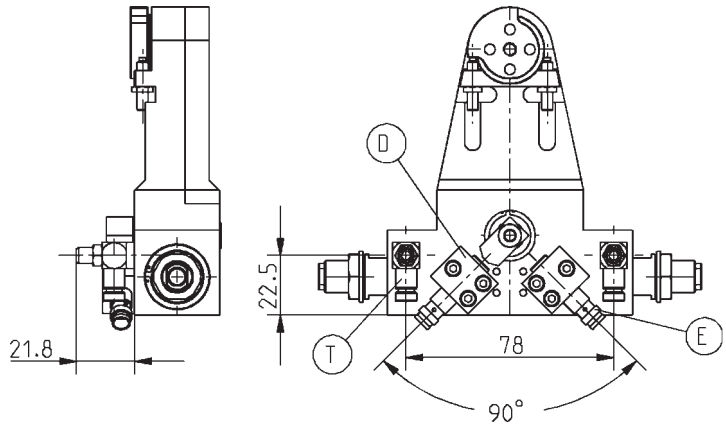
Cable angled plug
Order no. KAW500



Cable straight plug
Order no. KAG500

Plug 3-pole
Order no. S12-G-3

Accessories



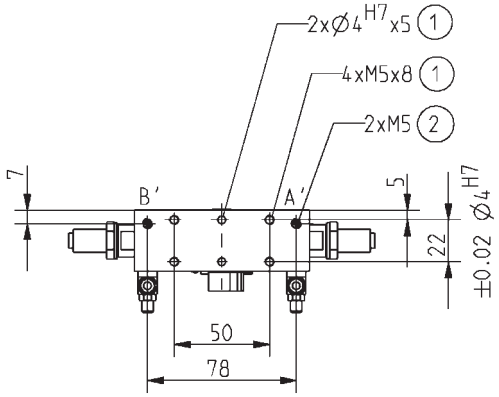
Subject to change without prior notice

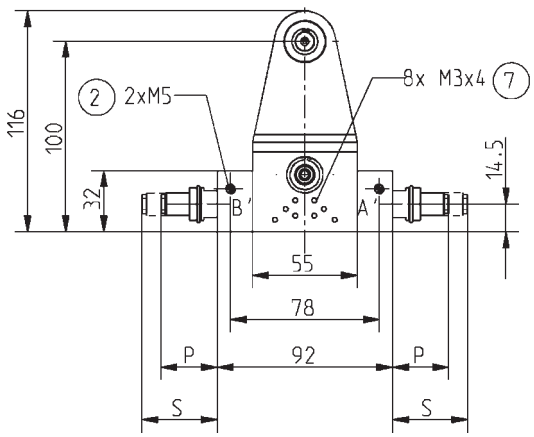
Order no.:	SB50-90-B	SB50-180-B	SB50G
Swivel angle [°]:	90	180	-
Torque per jaw [Nm]:	1,2	1,2	-
Swivel 90° oder 180° adjustable +/- [°]:	3	3	-
Repeatability +/- [°]:	0,01	0,01	-
F_A [N]:	1720	1720	1720
F_D [N]*:	860	860	860
F_Z [N]*:	630	630	630
M_r [Nm]:	15	15	15
Min./max. operating pressure [bar]:	3/8	3/8	-
Min./max. operating temperature [°C]:	5/80	5/80	-
Air volume per cycle [cm³]:	5,5	7,5	-
Weight [g]:	750	750	450

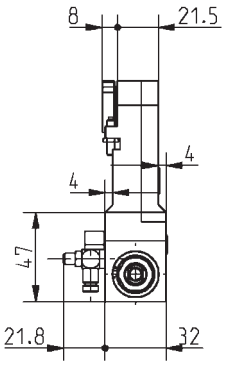
All data measured at 6 bar
** Consider the force of the grippers*

SB50-B

① Fixing swivel jaws
② Energy supply
⑤ Adjusting screw
⑦ Fixing for mounting block
⑧ Fixing tool side
⑨ Fix stop 90° bzw. 180°
⑩ Switch cam 90° bzw. 180°
⑰ Direction of rotation
Ⓐ Air connection swivel to 90° or 180°
Ⓑ Air connection swivel to 0°
Ⓐ' Air connection swivel to 90° or 180° (alternate)
Ⓑ' Air connection swivel to 0° (alternate)

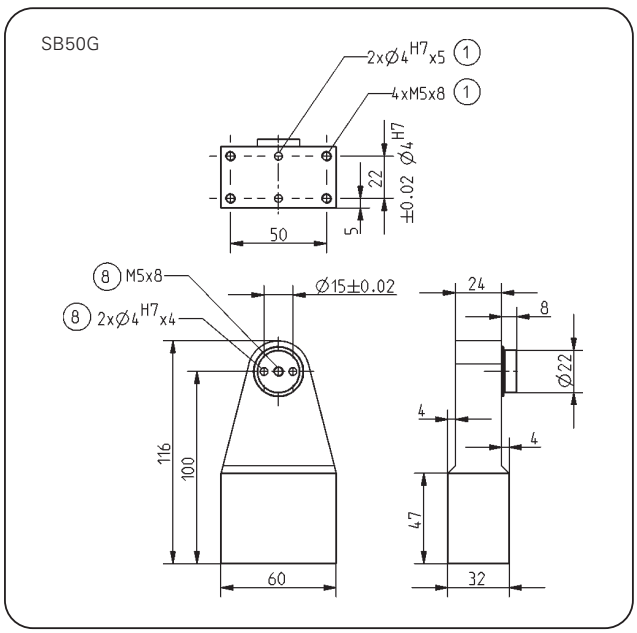


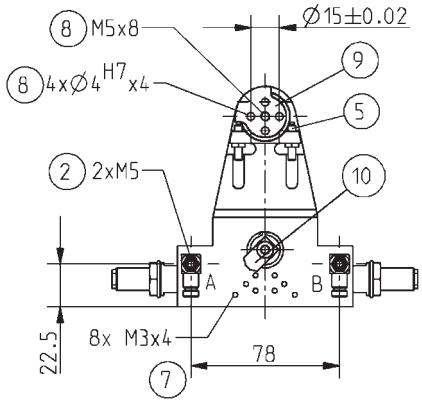




P = 29.5
S = 39.5

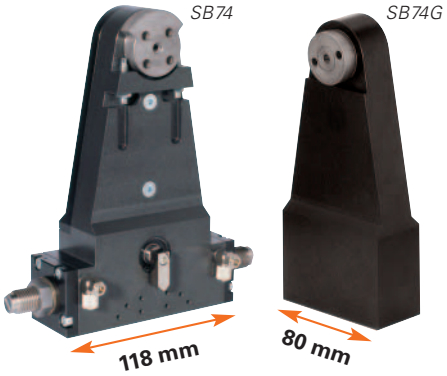
SB50G





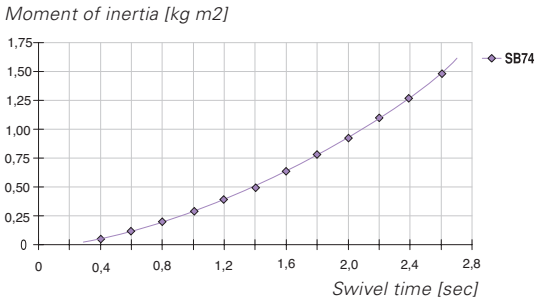
Subject to change without prior notice

Swivel jaws



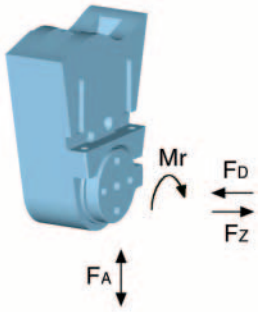
Moment of inertia

shows the expected swivel time against the calculated moment of inertia (test rig pairwise)

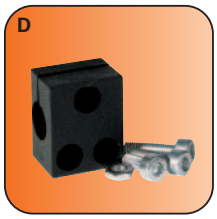


Forces and Moments

Shows the static bearing load



Included in the delivery



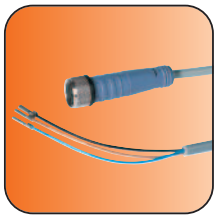
Mounting block
Order no. KB8K-02

Pneumatic fittings
Order no. DRVM5x4

Accessory list

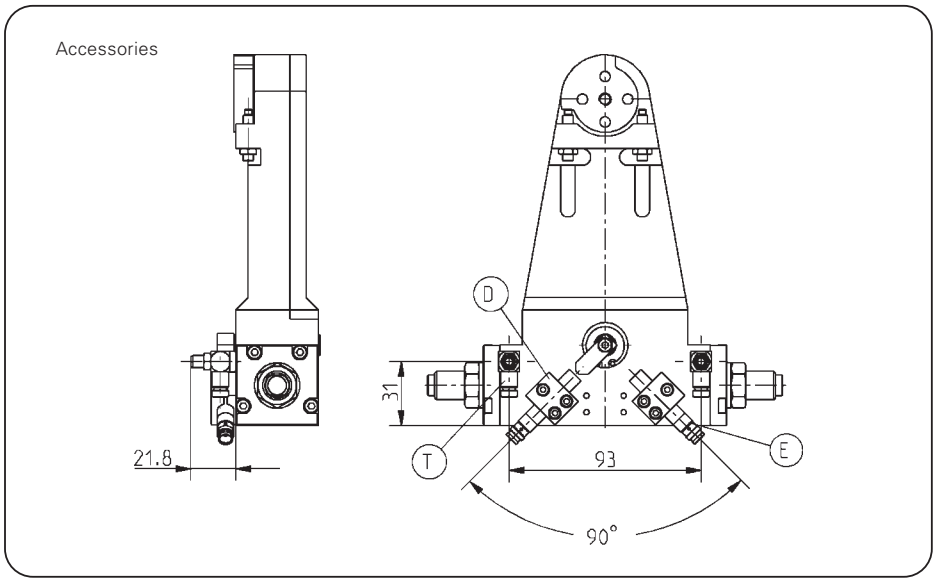
Proximity switch
Order no. NJ8-E2S

Cable angled plug
Order no. KAW500



Cable straight plug
Order no. KAG500

Plug 3-pole
Order no. S12-G-3



Subject to change without prior notice

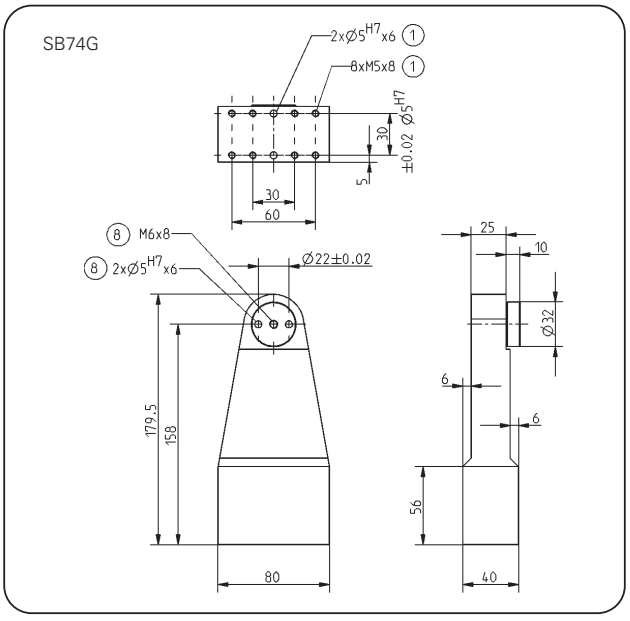
Order no.:	SB74-90-B	SB74-180-B	SB74G
Swivel angle [°]:	90	180	-
Torque per jaw [Nm]:	3.5	3.5	-
Swivel 90° oder 180° adjustable +/- [°]:	3	3	-
Repeatability +/- [°]:	0.01	0.01	-
F_A [N]:	2400	2400	2400
F_D [N]*:	1200	1200	1200
F_Z [N]*:	630	630	630
M_r [Nm]:	20	20	20
Min./max. operating pressure [bar]:	3/8	3/8	-
Min./max. operating temperature [°C]:	5/80	5/80	-
Air volume per cycle [cm³]:	16	21	-
Weight [g]:	1.7	1.7	1.1

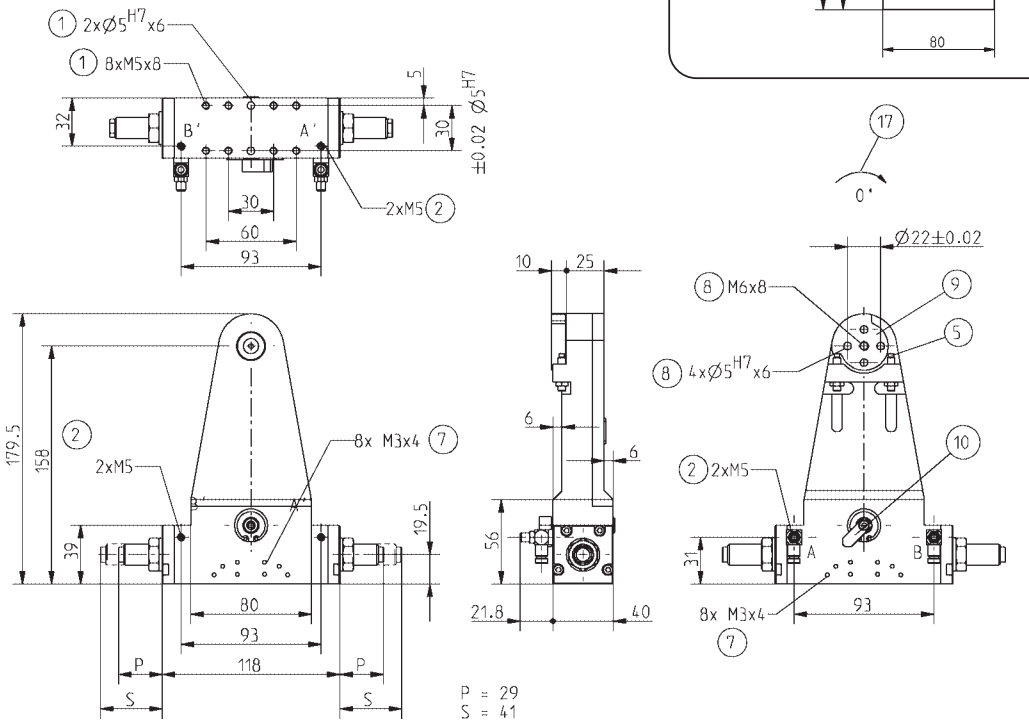
All data measured at 6 bar
** Consider the force of the grippers*

SB74-B

(1) Fixing swivel jaws
(2) Energy supply
(5) Adjusting screw
(7) Fixing for mounting block
(8) Fixing tool side
(9) Fix stop 90° bzw. 180°
(10) Switch cam 90° bzw. 180°
(17) Direction of rotation
(A) Air connection swivel to 90° or 180°
(B) Air connection swivel to 0°
(A') Air connection swivel to 90° or 180° (alternate)
(B') Air connection swivel to 0° (alternate)

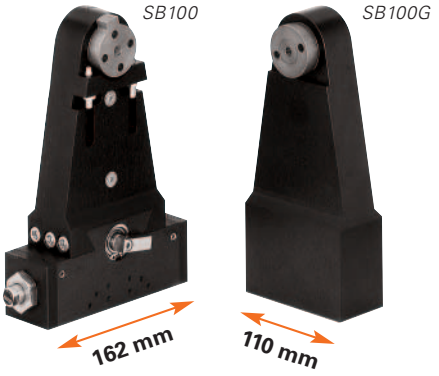
SB74G





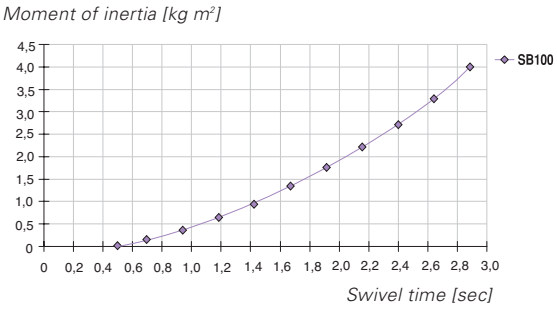
Subject to change without prior notice

Swivel jaws



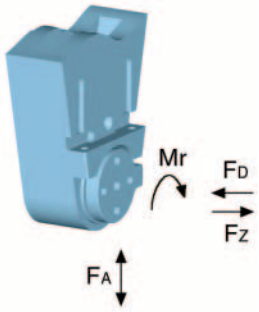
Moment of inertia

shows the expected swivel time against the calculated moment of inertia (test rig pairwise)



Forces and Moments

Shows the static bearing load



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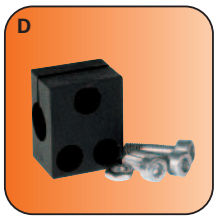


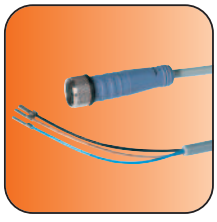
Mounting block
Order no. KB8K-02

Pneumatic fittings
Order no. DRV1/8x6

Accessory list

Proximity switch
Order no. NJ8-E2S

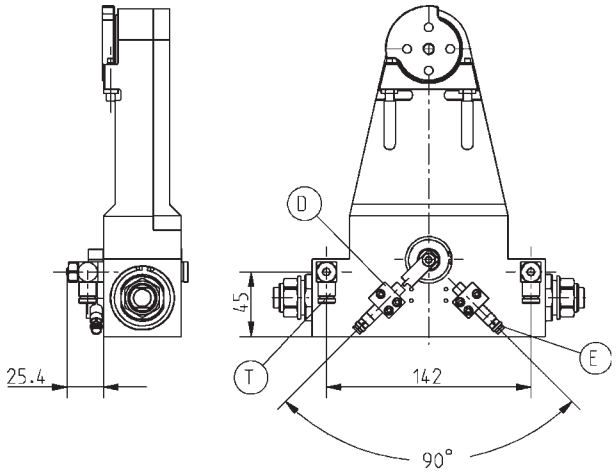
Cable angled plug
Order no. KAW500



Cable straight plug
Order no. KAG500

Plug 3-pole
Order no. S12-G-3

Accessories



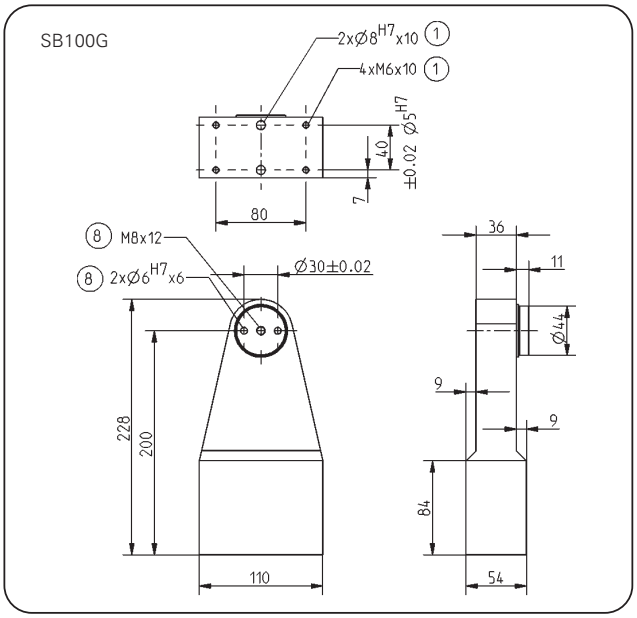
Subject to change without prior notice

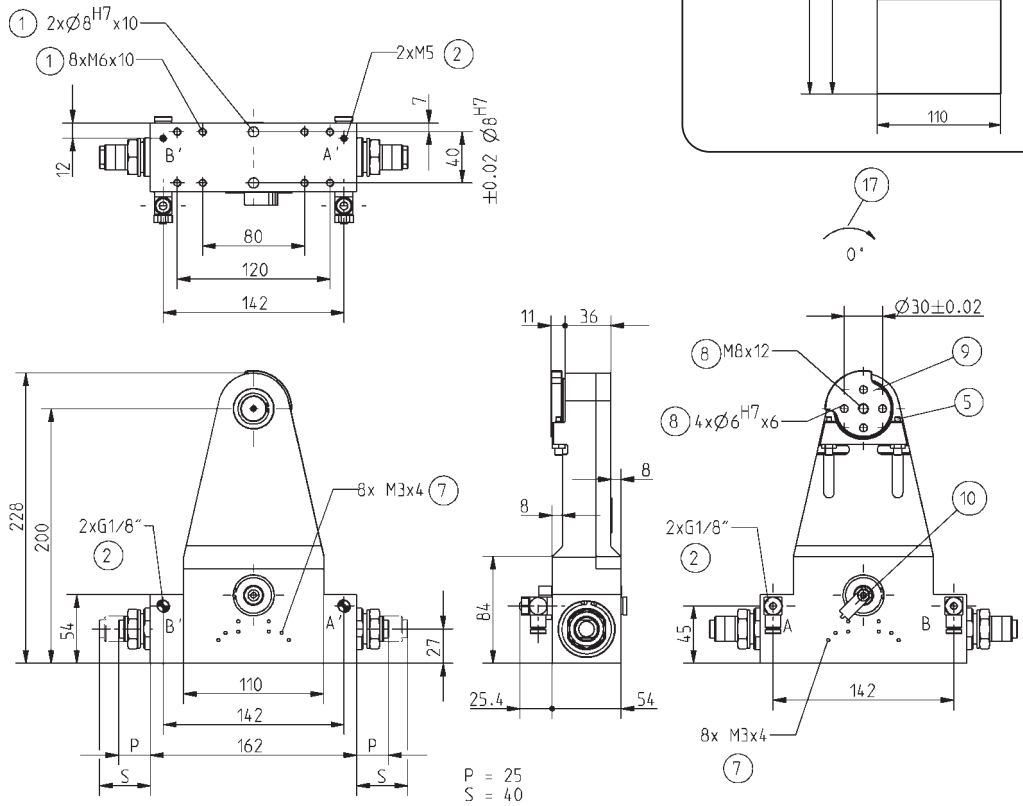
Order no.:	SB100-90-B	SB100-180-B	SB100G
Swivel angle [°]:	90	180	-
Torque per jaw [Nm]:	10	10	-
Swivel 90° oder 180° adjustable +/- [°]:	3	3	-
Repeatability +/- [°]:	0,01	0,01	-
F_A [N]:	4000	4000	4000
F_D [N]*:	2000	2000	2000
F_Z [N]*:	1200	1200	1200
M_r [Nm]:	70	70	70
Min./max. operating pressure [bar]:	3/8	3/8	-
Min./max. operating temperature [°C]:	5/80	5/80	-
Air volume per cycle [cm³]:	40	54	-
Weight [kg]:	4,0	4,0	1,5

All data measured at 6 bar
** Consider the force of the grippers*

SB100-B

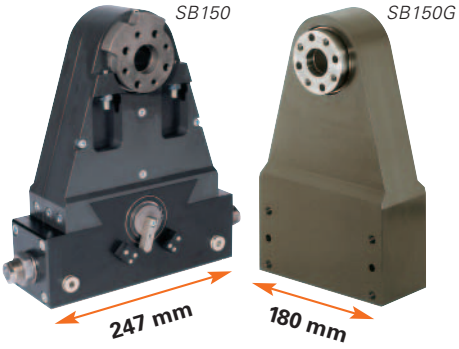
(1) Fixing swivel jaws
(2) Energy supply
(5) Adjusting screw
(7) Fixing for mounting block
(8) Fixing tool side
(9) Fix stop 90° bzw. 180°
(10) Switch cam 90° bzw. 180°
(17) Direction of rotation
(A) Air connection swivel to 90° or 180°
(B) Air connection swivel to 0°
(A') Air connection swivel to 90° or 180° (alternate)
(B') Air connection swivel to 0° (alternate)





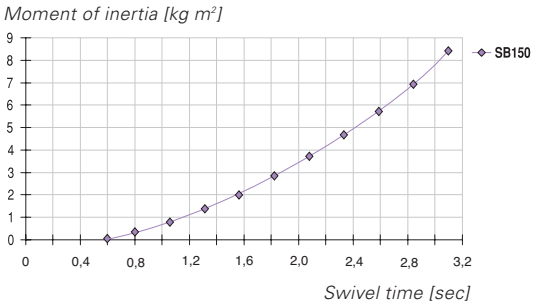
Subject to change without prior notice

Swivel jaws



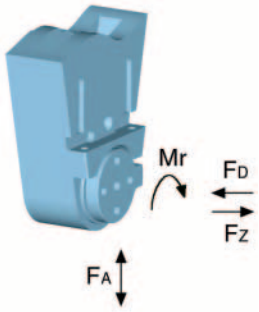
Moment of inertia

shows the expected swivel time against the calculated moment of inertia (test rig pairwise)

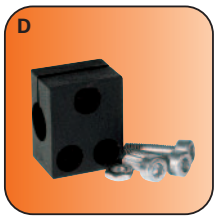


Forces and Moments

Shows the static bearing load



Included in the delivery



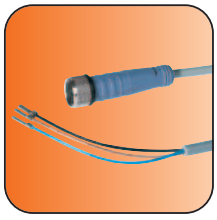
Mounting block
Order no. KB8K

Pneumatic fittings
Order no. DRV1/4x8

Accessory list

Proximity switch
Order no. NJ8-E2S

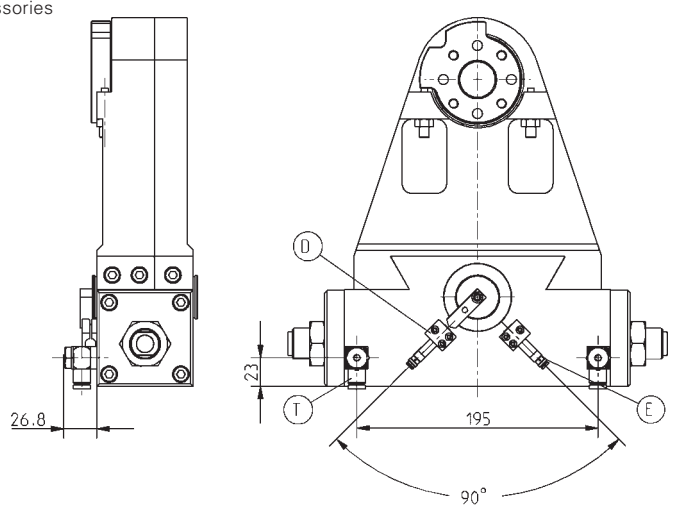
Cable angled plug
Order no. KAW500



Cable straight plug
Order no. KAG500

Plug 3-pole
Order no. S12-G-3

Accessories



Subject to change without prior notice

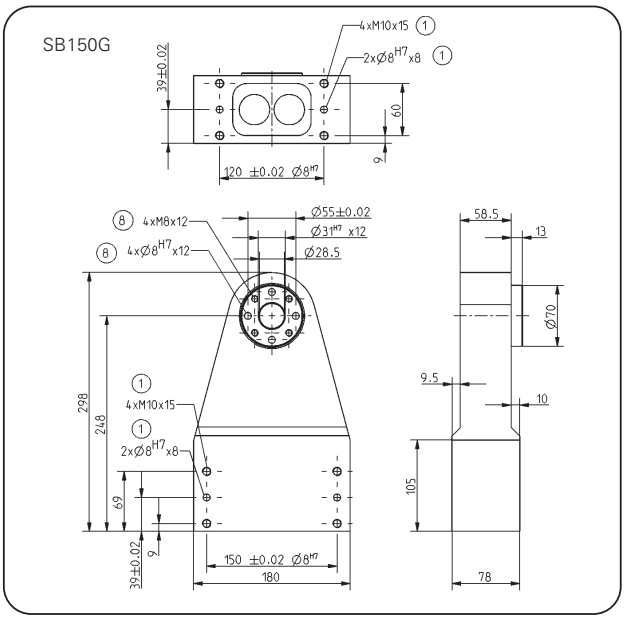
Order no.:	SB150-90	SB150-180	SB150G
Swivel angle [°]:	90	180	-
Torque per jaw [Nm]:	23	23	-
Swivel 90° oder 180° adjustable +/- [°]:	3	3	3
Repeatability +/- [°]:	0,01	0,01	0,01
F_A [N]:	15000	15000	15000
F_D [N]*:	7500	7500	7500
F_Z [N]*:	3700	3700	3700
M_r [Nm]:	270	270	270
Min./max. operating pressure [bar]:	3/8	3/8	-
Min./max. operating temperature [°C]:	5/80	5/80	-
Air volume per cycle [cm³]:	190	260	-
Weight [kg]:	11,0	11,0	6,5

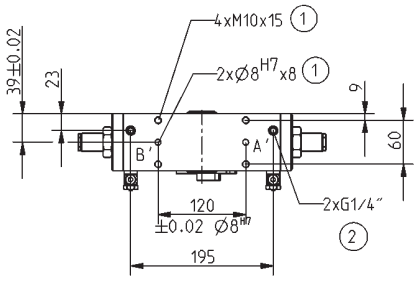
All data measured at 6 bar
** Consider the force of the grippers*

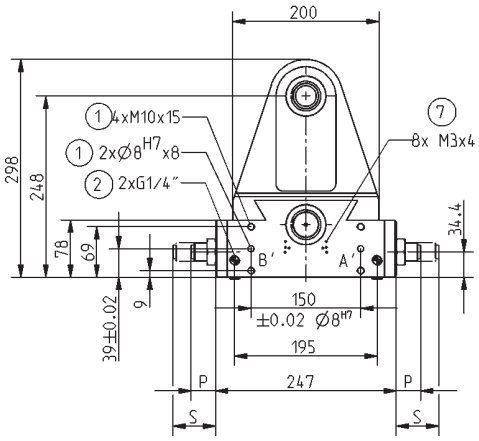
SB150

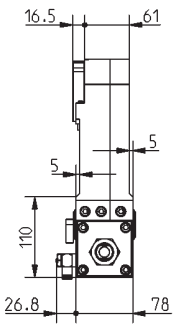
① Fixing swivel jaws
② Energy supply
⑤ Adjusting screw
⑦ Fixing for mounting block
⑧ Fixing tool side
⑨ Fix stop 90° bzw. 180°
⑩ Switch cam 90° bzw. 180°
⑰ Direction of rotation
Ⓐ Air connection swivel to 90° or 180°
Ⓑ Air connection swivel to 0°
Ⓐ' Air connection swivel to 90° or 180° (alternate)
Ⓑ' Air connection swivel to 0° (alternate)

SB150G

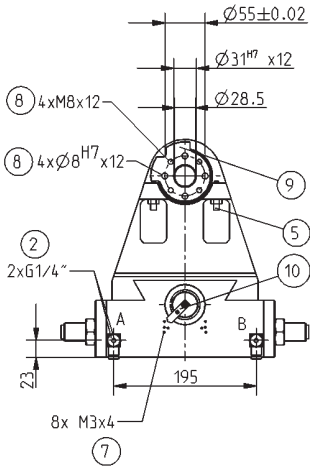






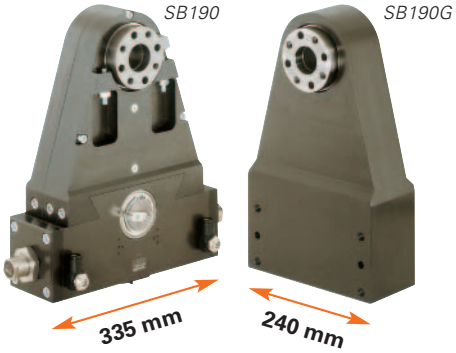


P = 33.5
S = 58.5



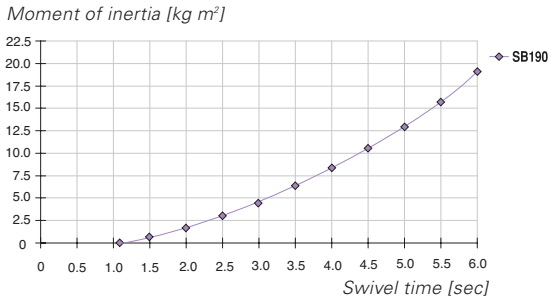
Subject to change without prior notice

Swivel jaws



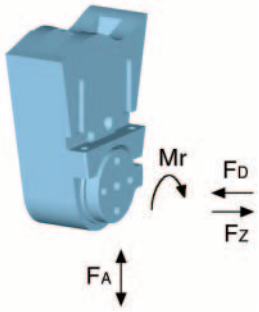
Moment of inertia

shows the expected swivel time against the calculated moment of inertia (test rig pairwise)

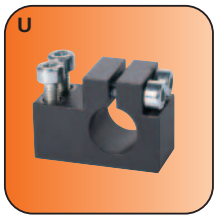


Forces and Moments

Shows the static bearing load



Included in the delivery



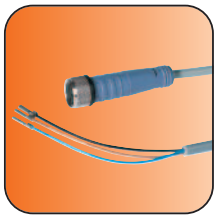
Mounting block
Order no. KB12-03

Pneumatic fittings
Order no. DRV1/4x8

Accessory list

Proximity switch
Order no. NJ12-E2S

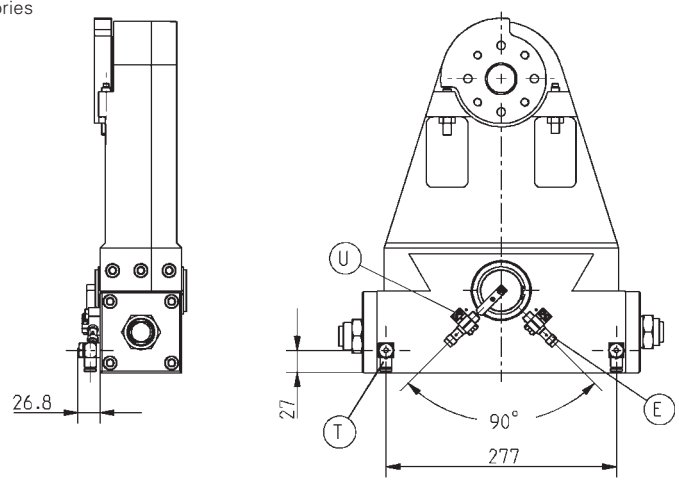
Cable angled plug
Order no. KAW500



Cable straight plug
Order no. KAG500

Plug 3-pole
Order no. S12-G-3

Accessories



Subject to change without prior notice

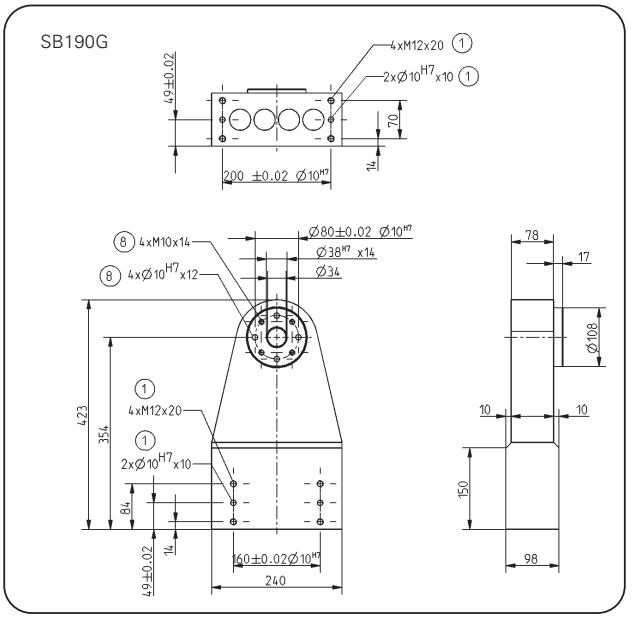
Order no.:	SB190-90	SB190-180	SB190G
Swivel angle [°]:	90	180	-
Torque per jaw [Nm]:	57	57	-
Swivel 90° oder 180° adjustable +/- [°]:	3	3	-
Repeatability +/- [°]:	0,01	0,01	-
F_A [N]:	25000	25000	25000
F_D [N]*:	12500	12500	12500
F_Z [N]*:	6100	6100	6100
M_r [Nm]:	600	600	600
Min./max. operating pressure [bar]:	3/8	10/25	-
Min./max. operating temperature [°C]:	5/80	5/80	-
Air volume per cycle [cm³]:	320	320	-
Weight [kg]:	28,0	28,0	19,5

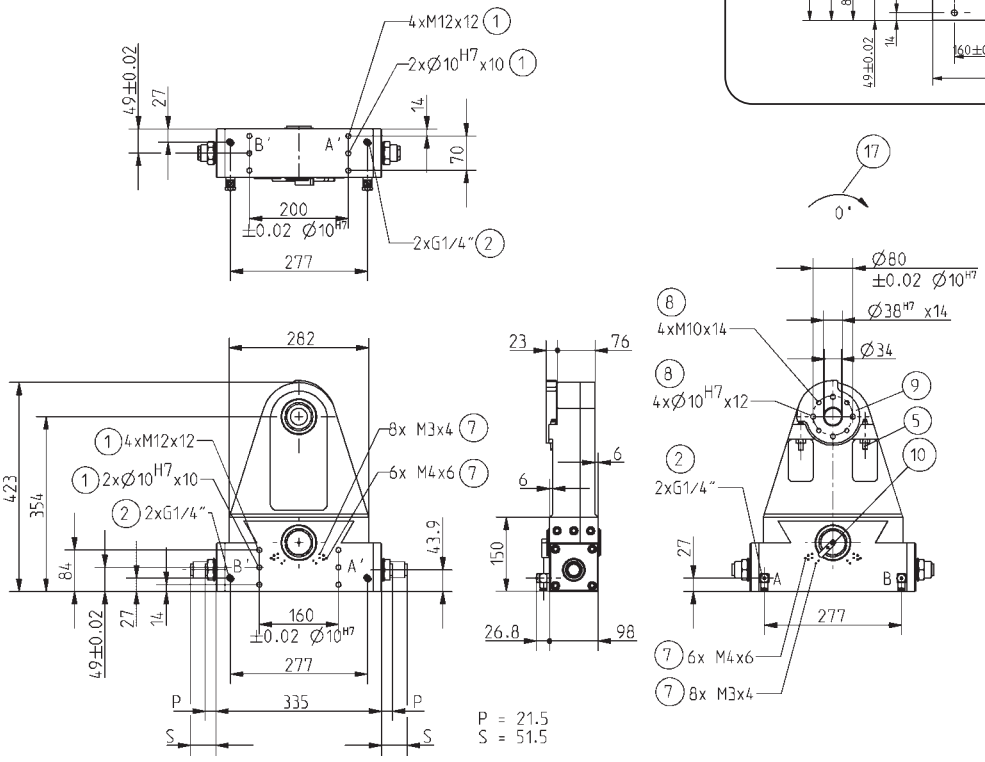
All data measured at 6 bar
** Consider the force of the grippers*

SB190

① Fixing swivel jaws
② Energy supply
⑤ Adjusting screw
⑦ Fixing for mounting block
⑧ Fixing tool side
⑨ Fix stop 90° bzw. 180°
⑩ Switch cam 90° bzw. 180°
⑰ Direction of rotation
Ⓐ Air connection swivel to 90° or 180°
Ⓑ Air connection swivel to 0°
Ⓐ' Air connection swivel to 90° or 180° (alternate)
Ⓑ' Air connection swivel to 0° (alternate)

SB190G





Subject to change without prior notice

Swivel jaws Formulas

1. Moment of Inertia Calculation

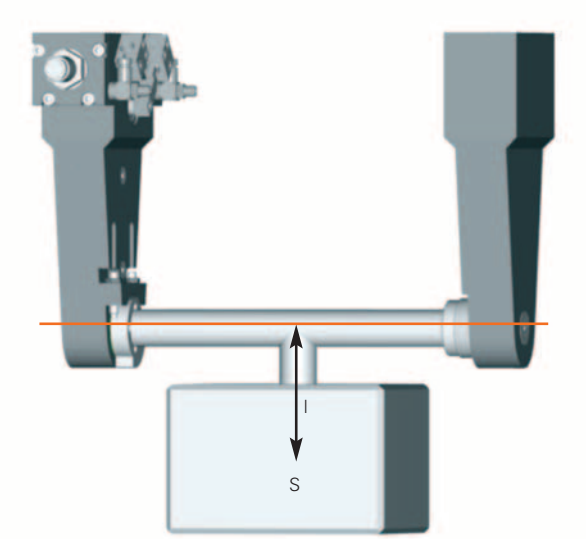
In the technical tables, the "Force" of the swivel-jaws is declared in Nm. This value declares a torque, produced by the swivel jaws, when a pressure of 6 bar is supplied.
In order to size a swivel-jaws correctly, one requires different basic data such as workpiece-weight and lever-length to center of gravity. For increased application-safety, a factor of safety may be inserted into the calculation.

In the following example calculation (1.1) a Swivel-jaw application is shown as an example.

Example Calculation 1.1.

Skizze:

S = Center of Gravity



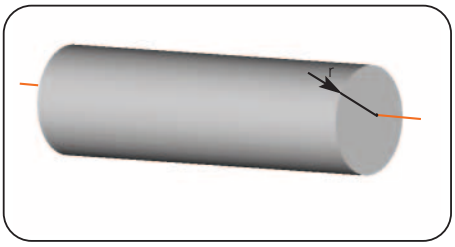
Given:	Weight of workpiece	=	$F_{Wst.}$	=	2,5 kg x 9,81m/s^2=24,53 N
	Length of Lever Wst.	=	l	=	0, 09 m
	Safety Factor	=	ν	=	1,5
Find:	Torque	=	M		
Calculations:	$M = F_{Wst.} \times l \times \nu$ M = 24,53 Nx 0,09 m x 1,5 M = 3,31 Nm				
Result:	On the basis of the torque, the selection falls to the SB74-B, with a torque of 3,5 Nm at 6 bar.				

2. Moment of Inertia Calculation

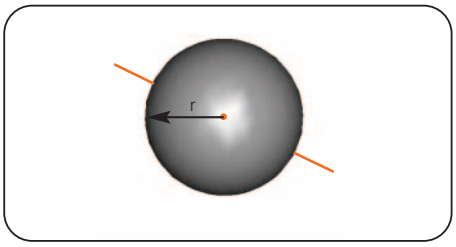
The sample calculation (2.2, page 34) shows the selection of a swivel-jaw, with symmetrical application and follower, by the moment of inertia. The moment of inertia describes the inertia of a body during a rotational movement. This unit is required to determine about the swivel-time of the respective swivel-jaws.

Should the workpiece or the gripper have a shape, the corresponding formulas (2.1) must be used to calculate the moment of inertia (J).

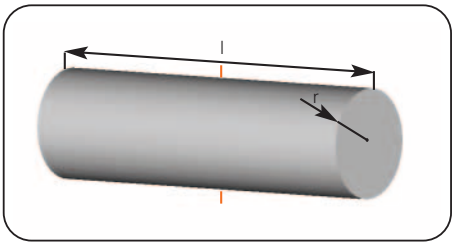
Formeln 2.1



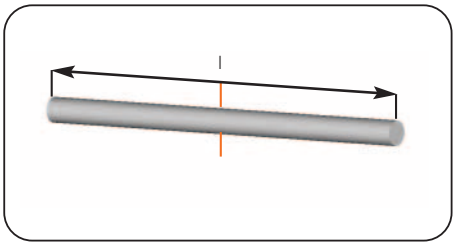
Full Cylinder:
Rotating around its body axis
$J = {}^{1}/_{2}\ m \times r^2$



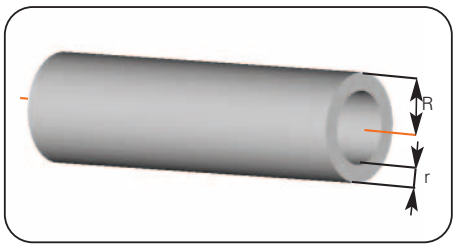
Massive sphere:
Rotating around its center of gravity
$J = {}^{2}/_{5}\ m \times r^2$



Full Cylinder:
Rotating around the center of gravity perpendicular to its body axis
$J = {}^{1}/_{4}\ m \times r^2 + {}^{1}/_{12}\ m \times l^2$

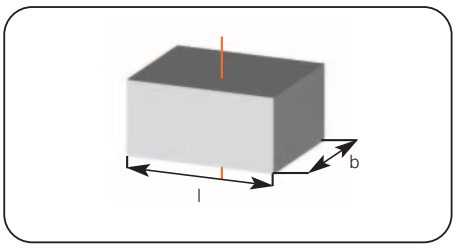


Small Diameter Rod:
Rotating around the center of gravity perpendicular to its body axis
$J = {}^{1}/_{12}\ m \times l^2$

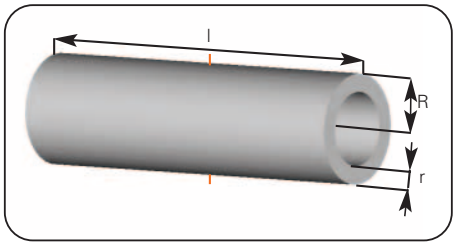


Hollow cylinder:
Rotating around its body axis
$J = {}^{1}/_{2}\ m\ (R^2 + r^2)$

R=Radius of cylinder, r= wall thickness

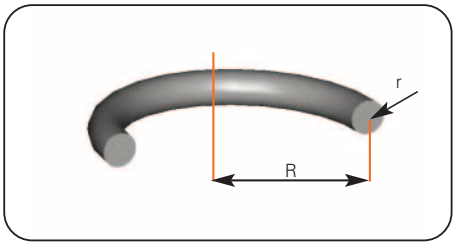


Rectangular parallelogram:
Rotating around its center of gravity
$J = {}^{1}/_{12}\ m\ (b^2 + l^2)$



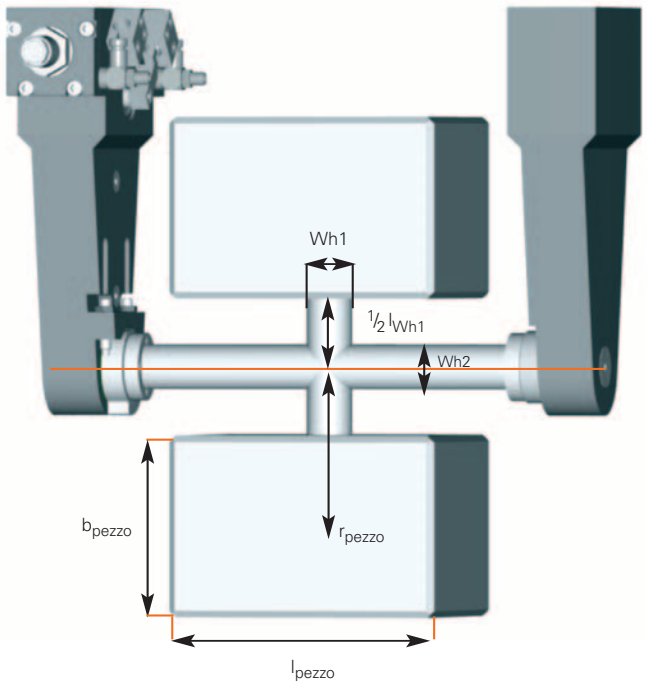
Hollow Cylinder:
Rotating around the center of gravity perpendicular to its body axis
$J = {}^{1}/_{4}\ m\ (R^2 + r^2 + {}^{1}/_{3}\ l^2)$

R=Radius of cylinder, r= wall thickness



Ring:
Rotating around its body axis
$J = m\ (R^2 + {}^{3}/_{4}\ r^2)$

Sketch



2.2 Example Calculation

General: Longitudinal-dimensions in **meters**, mass in **kilogram** yields moment of inertia into **kgm²**

Given:	Workpiece:	Mass	=	$m_{Wst.}$	=	8 kg
		Length	=	$l_{Wst.}$	=	0,12 m
		Depth	=	$b_{Wst.}$	=	0,10 m
		Radius	=	$r_{Wst.}$	=	0,12 m
	Workpiece holder:	Mass Wh1	=	m_{Wh1}	=	0,3 kg
		Diameter Wh1	=	$ø_{Wh1}$	=	0,02 m
		Length Wh1	=	l_{Wh1}	=	0,09 m
		Mass Wh2	=	m_{Wh2}	=	1 kg
		Diameter Wh2	=	$ø_{Wh2}$	=	0,038 m

Given:

Moment of Inertia workpiece	=	$J_{Wst.}$ (top)	=	$J_{Wst.}$ (bottom)	
Moment of Inertia workpiece holder 1	=	J_{Wh1}			
Moment of Inertia workpiece holder 2	=	J_{Wh2}			
Total Moment of Inertia	=	$J_{ges.}$			

Calculation:

$J_{total} = J_{Wst.}$ (top) + $J_{Wst.}$ (bottom) + J_{Wh1} + J_{Wh2}

$J_{Wst.}$ (top) $= {}^{1}/_{12}\, m_{Wst.} \times (b_{Wst.}^2 + l_{Wst.}^2) + m_{Wst.} \times r^2$

$J_{Wst.}$ (top) $= {}^{1}/_{12}\, 8\ kg \times ((0{,}10\ m)^2 + (0{,}12\ m)^2) + 8\ kg \times (0{,}12\ m)^2$

$J_{Wst.}$ (top) $= \underline{0{,}13147\ kgm^2}$

$J_{Wst.}$ (bottom) $= J_{Wst.}$ (top)

$J_{Wst.}$ (bottom) $= \underline{0{,}13147\ kgm^2}$

$J_{Wh1} = {}^{1}/_{4}\, m \times r^2 + {}^{1}/_{12}\, m \times l^2$

$J_{Wh1} = {}^{1}/_{4}\, 0{,}3\ kg \times (0{,}01\ m)^2 + {}^{1}/_{12}\, 0{,}3\ kg \times (0{,}09\ m)^2$

$J_{Wh1} = \underline{0{,}00021\ kgm^2}$

$J_{Wh2} = {}^{1}/_{2}\, m \times r^2$

$J_{Wh2} = {}^{1}/_{2}\, 1\ kg \times (0{,}038\ m)^2$

$J_{Wh2} = \underline{0{,}00072\ kgm^2}$

$J_{total} = 0{,}13147\ kgm^2 + 0{,}13147\ kgm^2 + 0{,}00021\ kgm^2 + 0{,}00072\ kgm^2$

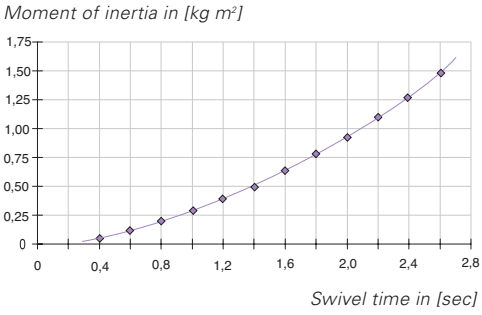
$J_{total} = \underline{\underline{0{,}264\ kgm^2}}$

Result:

By inserting the arbitrated value into the Diagram (2.3) which shows the moment of inertia in relation to time, one gets the swivel time.

The diagram (2.3) appears on the upper half of the first product page of each swivel-jaws.

Diagramm 2.3



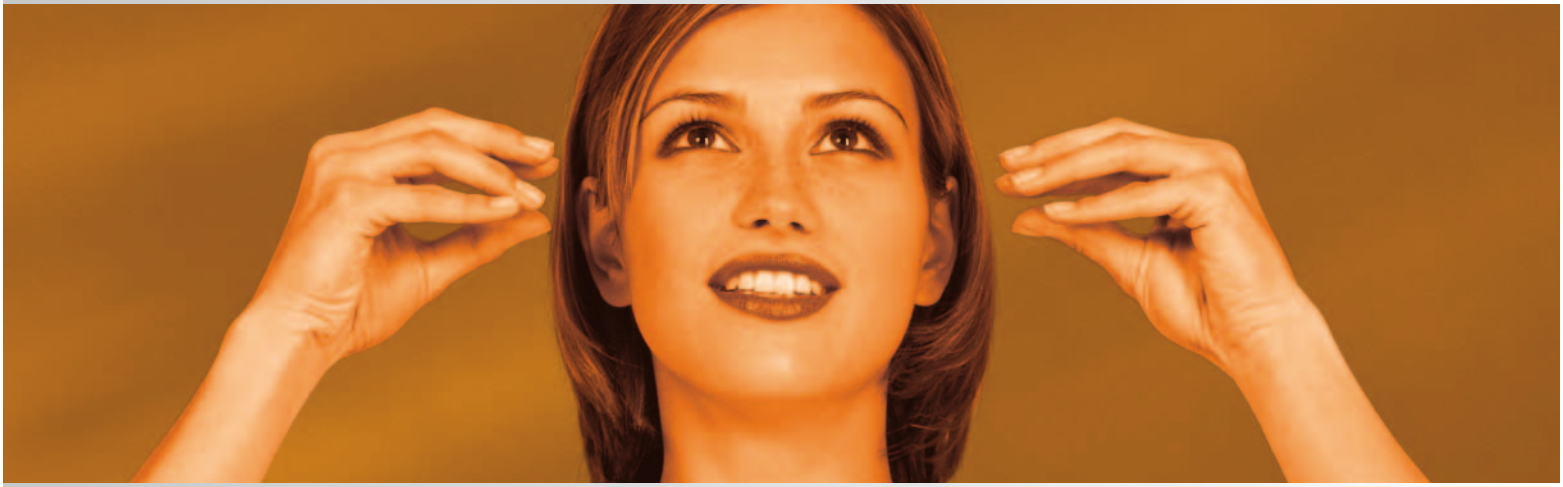
The SB74-180-B with follower SB74G, that is used in this application example, one gets a value of approximately 1 seconds.

Attention:

With this result, one must take into account, that this swivel-time is only realized with an correctly installed swivel-jaws supplied with 6 bar air pressure and calculated without factor of safety. For more information regarding the proper sizing of swivel-jaw, please go to our website, www.sommer-automatic.com.

Swivel jaws

pneumatic



SB50-B
SB74-B
SB100-B
SB150
SB190

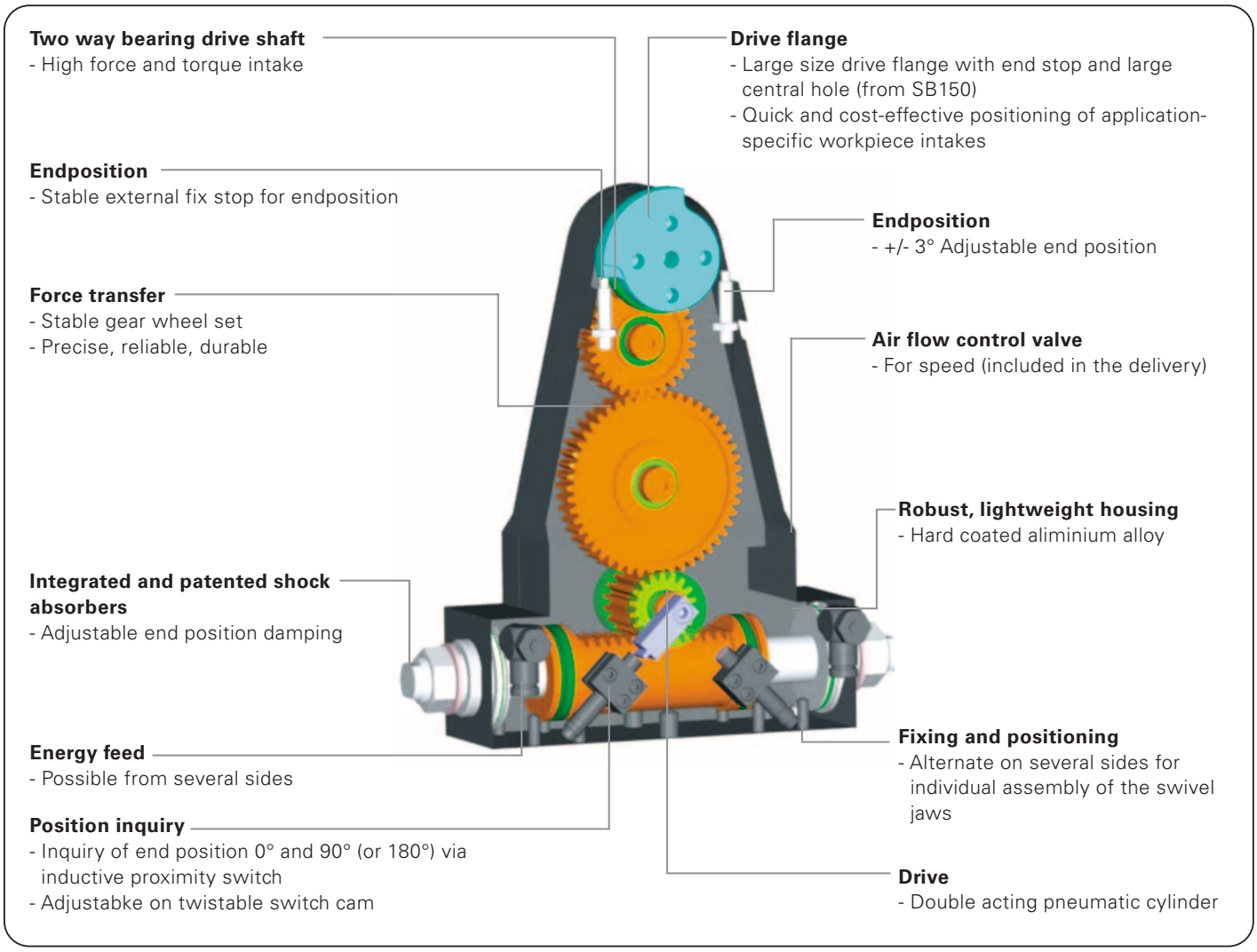
SOMMER automatic

Swivel jaws

Features

- Compacte swivel jaw in five sizes, with a torque up to 57 Nm and lare drive flange for easy connection, dual ball bearings for a high moment intake
- With integrated and patented hydraulic shock absorbers, built into the pressure chamber, cooled due to permanent air flow and therefore constant in damping behaviour
- Can be screwed on directly as a gripping jaw on the gripper, gripping and rotating as a compact unit, with large central bore on the drive shaft to feed-through supply lines (from SB150)

Functional diagram



Terms

Torque: force moment on the swivel jaw drive shaft

Swivel time: time required to cover 0°/90°or 0°/180° swivel movement

Repeatability: dispersion of stop position at 100 consecutive swivel cycles

Cycle: distance covered by the drive wing in one 0°/90°/0° or 0°/180/0° swivel movement

Maintenance: maintenance free up to 10 Mio. Swivel cycles
(please see the owner's manual for conditions,
download from www.sommer-automatic.com)

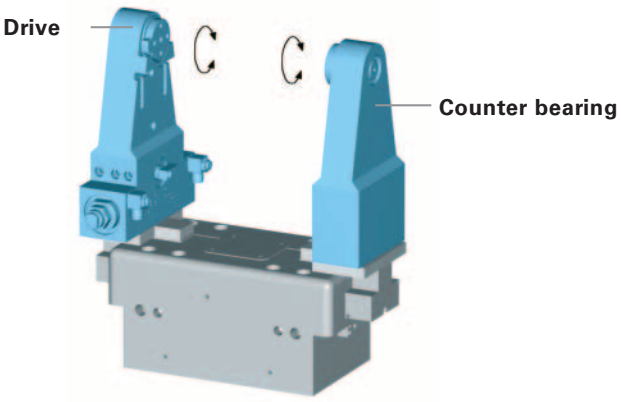
- long maintenance intervals keep costs down
- long durability

Model

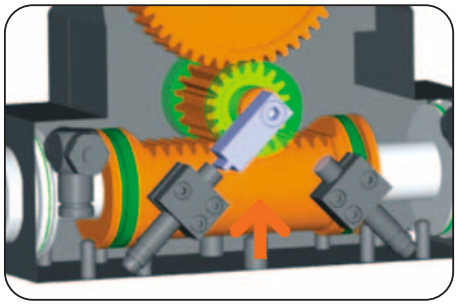
G: swivel jaw without drive and damping serves as counter bearing

Order no.	Swivel angle	Torque	Centre through-bore in the driving shaft
SB50-90-B	90°	1,2 Nm	-
SB50-180-B	180°	1,2 Nm	-
SB50G	-	-	-
SB74-90-B	90°	3,5 Nm	-
SB74-180-B	180°	3,5 Nm	-
SB74G	-	-	-
SB100-90-B	90°	10 Nm	-
SB100-180-B	180°	10 Nm	-
SB100G	-	-	-
SB150-90	90°	23 Nm	Ø 28,5 mm
SB150-180	180°	23 Nm	Ø 28,5 mm
SB150G	-	-	-
SB190-90	90°	57 Nm	Ø 34,0 mm
SB190-180	180°	57 Nm	Ø 34,0 mm
SB190G	-	-	-

Appication example



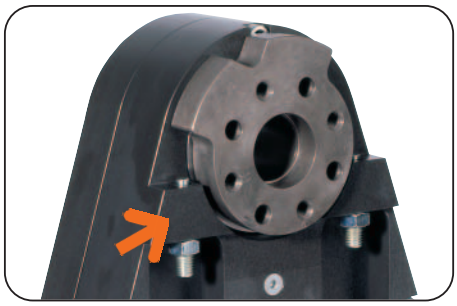
Swivel jaws



Drive

Double acting pneumatic cylinder

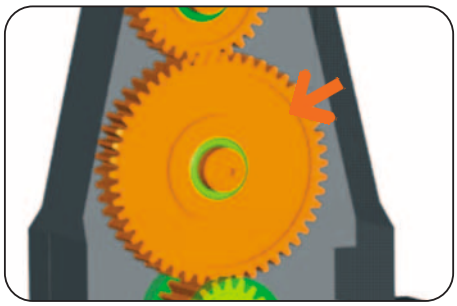
- Maximum torque in both rotation directions
- Torque up to 57 Nm



Swivel angle 90° or 180°

End stop can be aligned via adjustment screw +/- 3°

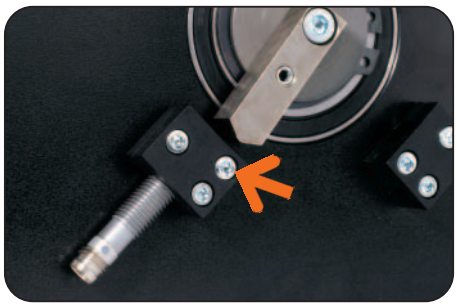
- external fix stop to absorbe the force over housing presents overload of the gear wheels



Force transfer

Via gear wheel set

- Precise steering of drive force in torque
- High repeat accuracy
- Multi way ball bearing for high torque intake



Position sensing

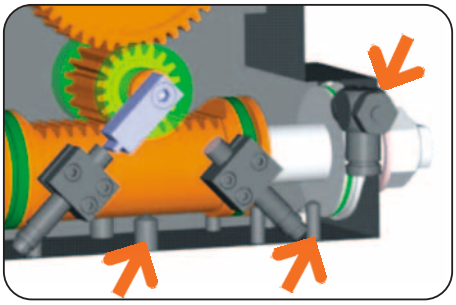
Intake for inductive proximity switch

- Process safe
- adjustable
- Compact

Large drive flange

For simple connection

- With central bore (from SB150) for cable feed-through
- Low construction and extension effort for connection of follow-up tools



Machine connection

Energy supply, attachment and positioning-possibilities on serveral sides

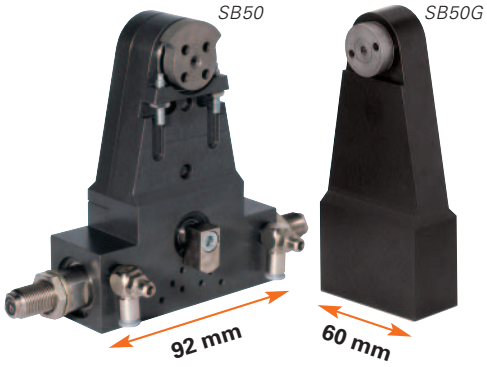
- Optimum integration into the workroom due to individual installation position

End position damping

Hydraulic shock absorber with spiral groove technology

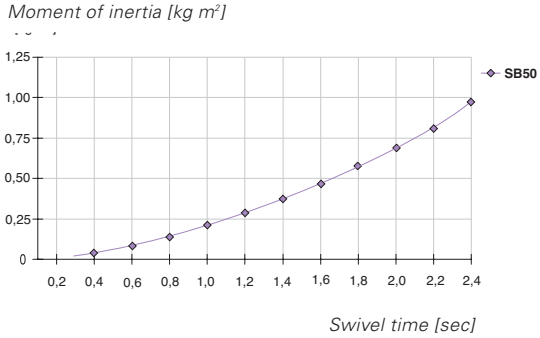
- Low wear approach to end position, gentle energy absorption due to profiled spiral groove
- The damping characteristics can be indivitually adjusted by the screw depth
- Built into the pressure chamber, cooled by permanent air flow, constant damping behavior

Swivel jaws



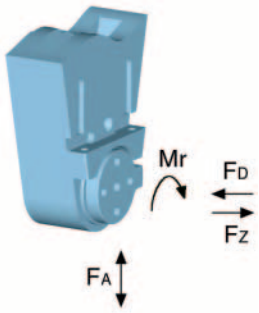
Moment of inertia

shows the expected swivel time against the calculated moment of inertia (test rig pairwise)

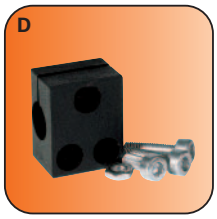


Forces and Moments

Shows the static bearing load



Included in the delivery



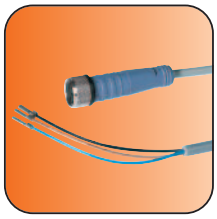
Mounting block
Order no. KB8K-02

Pneumatic fittings
Order no. DRVM5x4

Accessory list

Proximity switch
Order no. NJ8-E2S

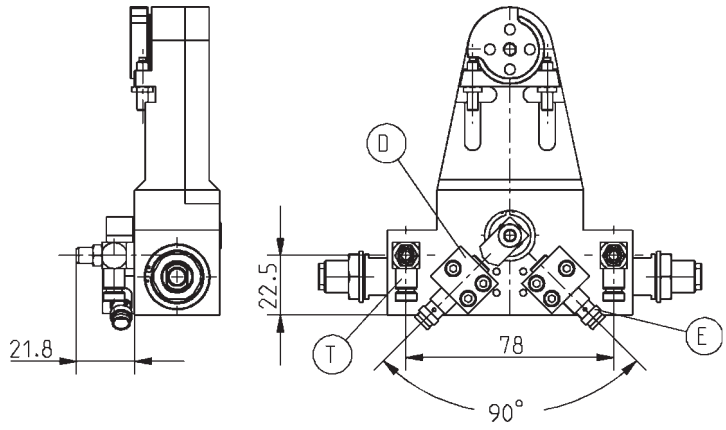
Cable angled plug
Order no. KAW500



Cable straight plug
Order no. KAG500

Plug 3-pole
Order no. S12-G-3

Accessories



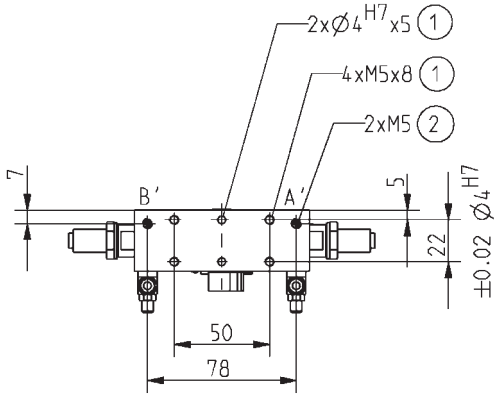
Subject to change without prior notice

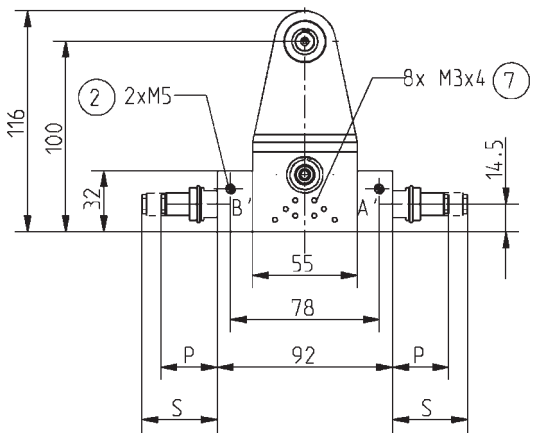
Order no.:	SB50-90-B	SB50-180-B	SB50G
Swivel angle [°]:	90	180	-
Torque per jaw [Nm]:	1,2	1,2	-
Swivel 90° oder 180° adjustable +/- [°]:	3	3	-
Repeatability +/- [°]:	0,01	0,01	-
F_A [N]:	1720	1720	1720
F_D [N]*:	860	860	860
F_Z [N]*:	630	630	630
M_r [Nm]:	15	15	15
Min./max. operating pressure [bar]:	3/8	3/8	-
Min./max. operating temperature [°C]:	5/80	5/80	-
Air volume per cycle [cm³]:	5,5	7,5	-
Weight [g]:	750	750	450

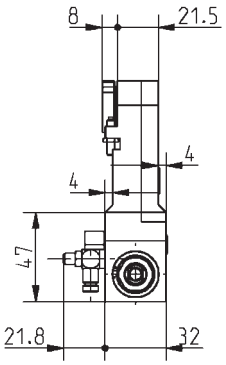
All data measured at 6 bar
** Consider the force of the grippers*

SB50-B

① Fixing swivel jaws
② Energy supply
⑤ Adjusting screw
⑦ Fixing for mounting block
⑧ Fixing tool side
⑨ Fix stop 90° bzw. 180°
⑩ Switch cam 90° bzw. 180°
⑰ Direction of rotation
Ⓐ Air connection swivel to 90° or 180°
Ⓑ Air connection swivel to 0°
Ⓐ' Air connection swivel to 90° or 180° (alternate)
Ⓑ' Air connection swivel to 0° (alternate)

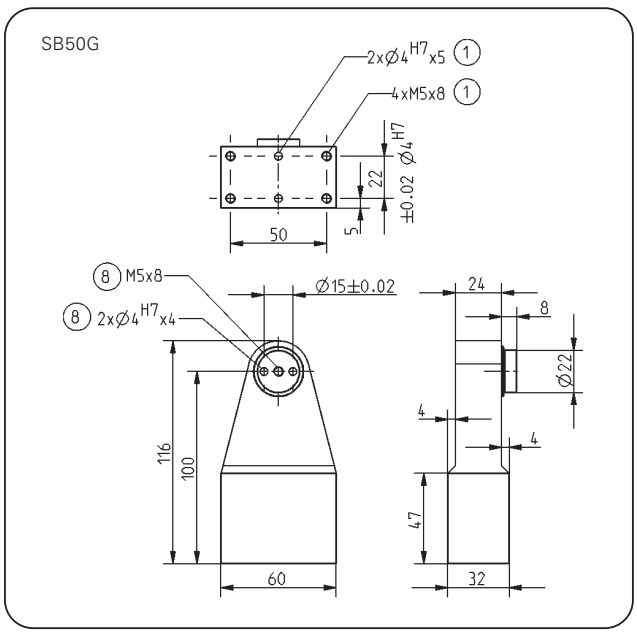


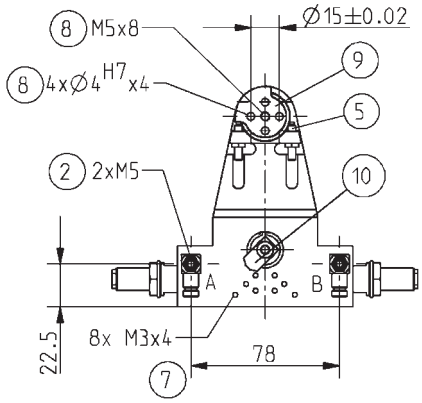




P = 29.5
S = 39.5

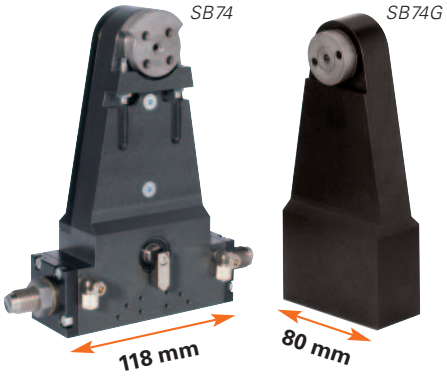
SB50G





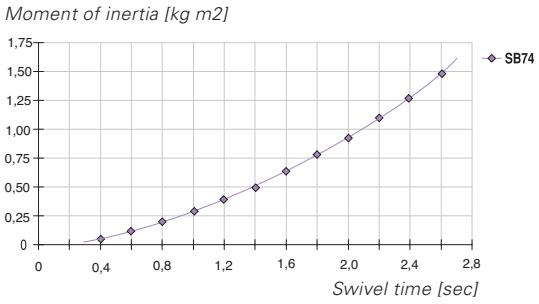
Subject to change without prior notice

Swivel jaws



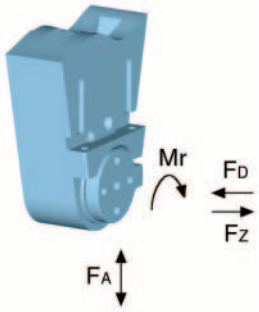
Moment of inertia

shows the expected swivel time against the calculated moment of inertia (test rig pairwise)

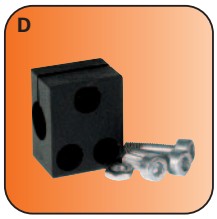


Forces and Moments

Shows the static bearing load



Included in the delivery



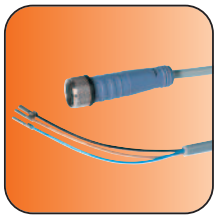
Mounting block
Order no. KB8K-02

Pneumatic fittings
Order no. DRVM5x4

Accessory list

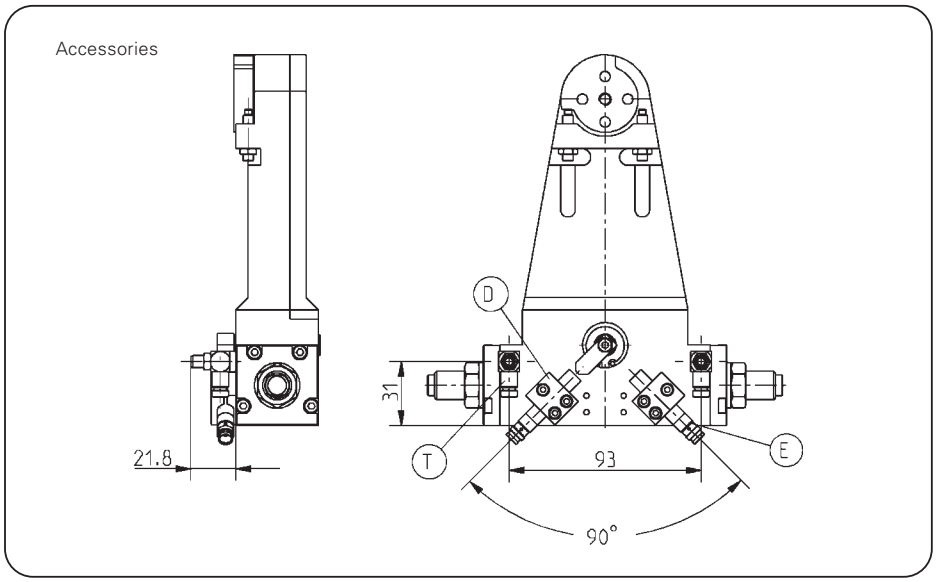
Proximity switch
Order no. NJ8-E2S

Cable angled plug
Order no. KAW500



Cable straight plug
Order no. KAG500

Plug 3-pole
Order no. S12-G-3



Subject to change without prior notice

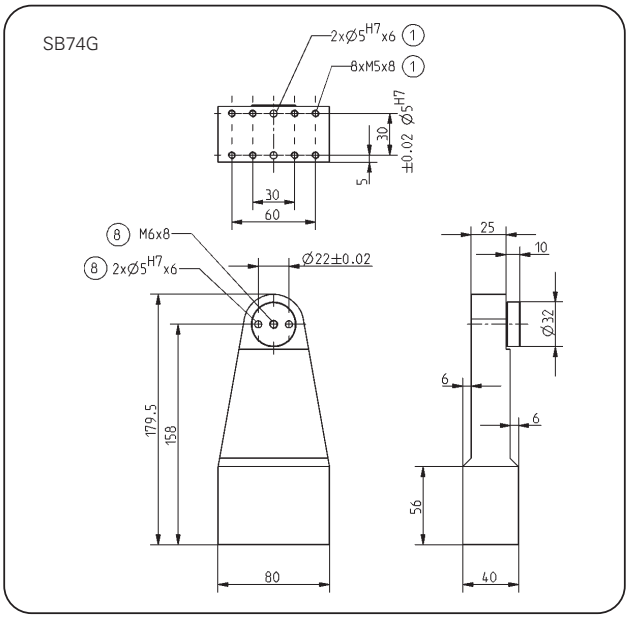
Order no.:	SB74-90-B	SB74-180-B	SB74G
Swivel angle [°]:	90	180	-
Torque per jaw [Nm]:	3.5	3.5	-
Swivel 90° oder 180° adjustable +/- [°]:	3	3	-
Repeatability +/- [°]:	0.01	0.01	-
F_A [N]:	2400	2400	2400
F_D [N]*:	1200	1200	1200
F_Z [N]*:	630	630	630
M_r [Nm]:	20	20	20
Min./max. operating pressure [bar]:	3/8	3/8	-
Min./max. operating temperature [°C]:	5/80	5/80	-
Air volume per cycle [cm³]:	16	21	-
Weight [g]:	1.7	1.7	1.1

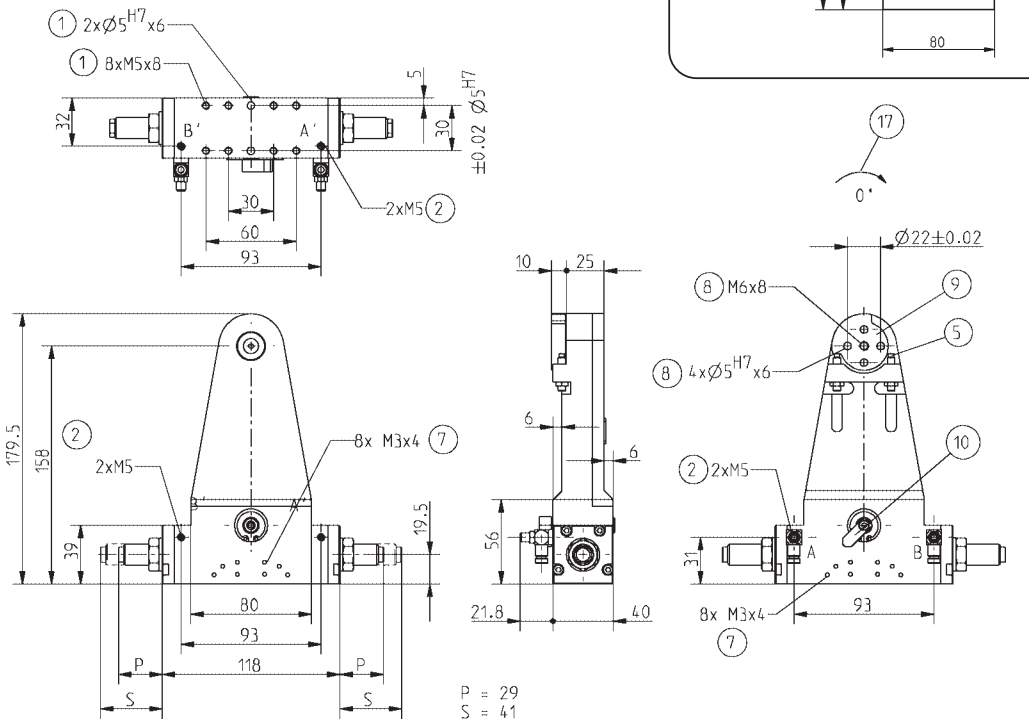
All data measured at 6 bar
** Consider the force of the grippers*

SB74-B

(1) Fixing swivel jaws
(2) Energy supply
(5) Adjusting screw
(7) Fixing for mounting block
(8) Fixing tool side
(9) Fix stop 90° bzw. 180°
(10) Switch cam 90° bzw. 180°
(17) Direction of rotation
(A) Air connection swivel to 90° or 180°
(B) Air connection swivel to 0°
(A') Air connection swivel to 90° or 180° (alternate)
(B') Air connection swivel to 0° (alternate)

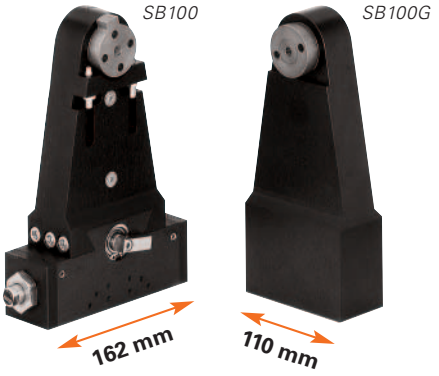
SB74G





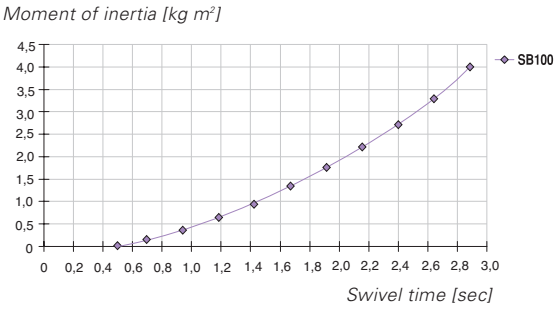
Subject to change without prior notice

Swivel jaws



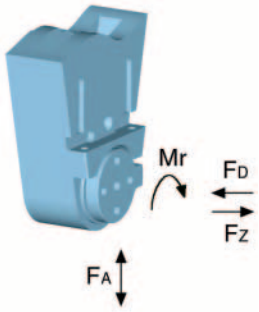
Moment of inertia

shows the expected swivel time against the calculated moment of inertia (test rig pairwise)



Forces and Moments

Shows the static bearing load



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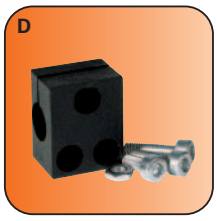


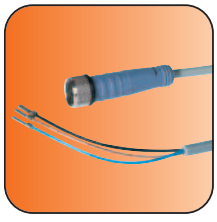
Mounting block
Order no. KB8K-02

Pneumatic fittings
Order no. DRV1/8x6

Accessory list

Proximity switch
Order no. NJ8-E2S

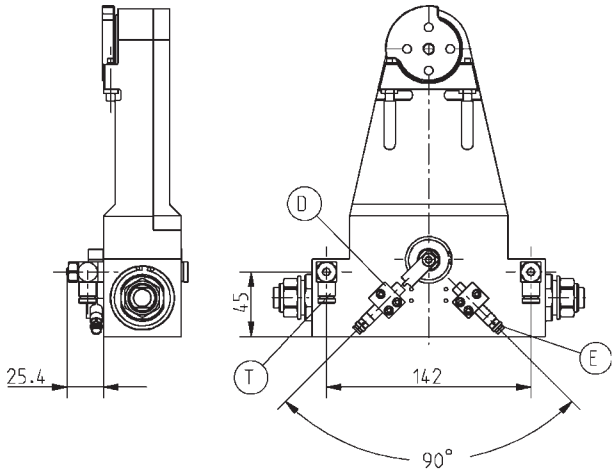
Cable angled plug
Order no. KAW500



Cable straight plug
Order no. KAG500

Plug 3-pole
Order no. S12-G-3

Accessories



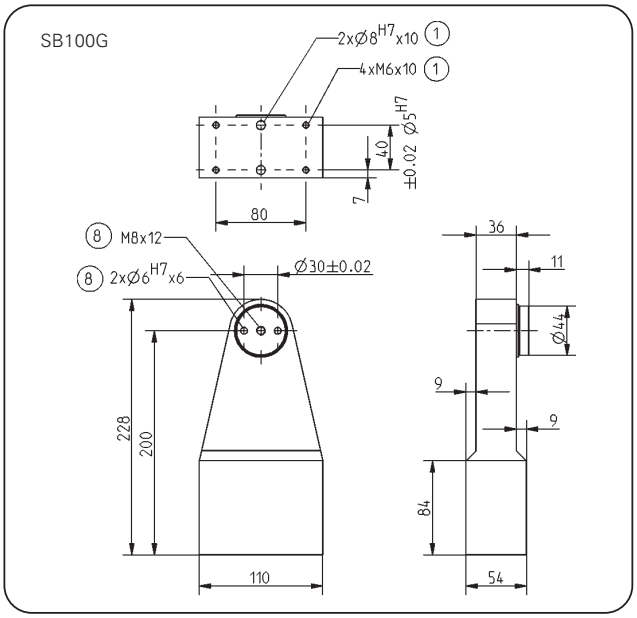
Subject to change without prior notice

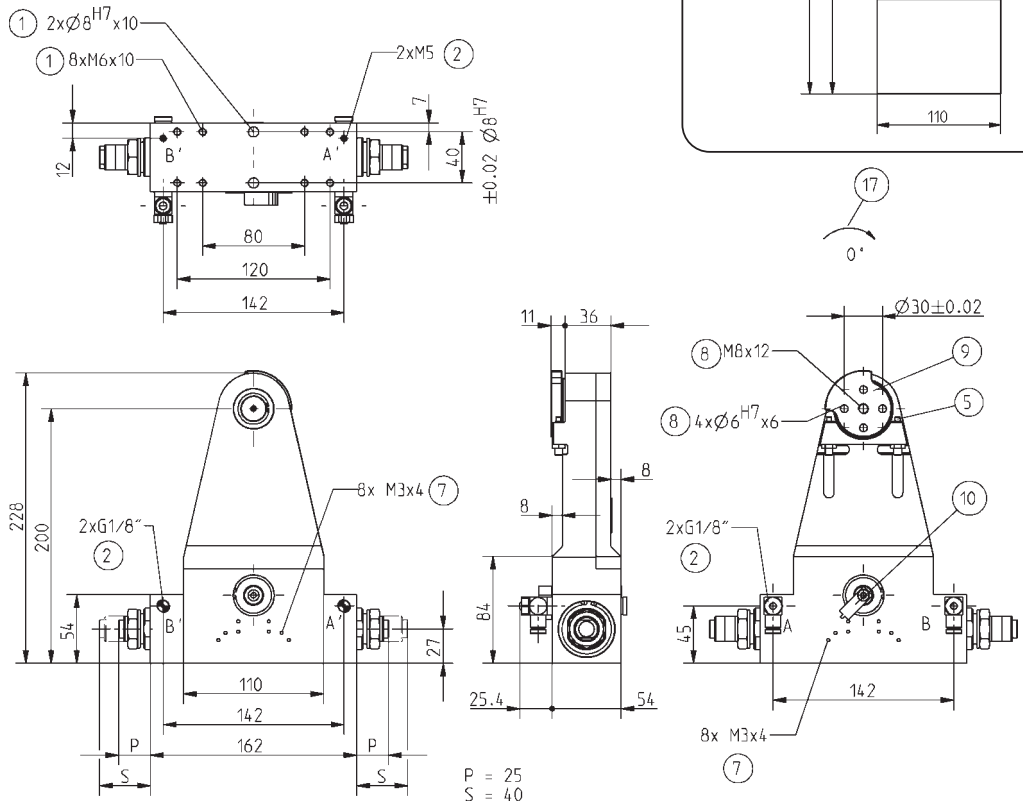
Order no.:	SB100-90-B	SB100-180-B	SB100G
Swivel angle [°]:	90	180	-
Torque per jaw [Nm]:	10	10	-
Swivel 90° oder 180° adjustable +/- [°]:	3	3	-
Repeatability +/- [°]:	0,01	0,01	-
F_A [N]:	4000	4000	4000
F_D [N]*:	2000	2000	2000
F_Z [N]*:	1200	1200	1200
M_r [Nm]:	70	70	70
Min./max. operating pressure [bar]:	3/8	3/8	-
Min./max. operating temperature [°C]:	5/80	5/80	-
Air volume per cycle [cm³]:	40	54	-
Weight [kg]:	4,0	4,0	1,5

All data measured at 6 bar
** Consider the force of the grippers*

SB100-B

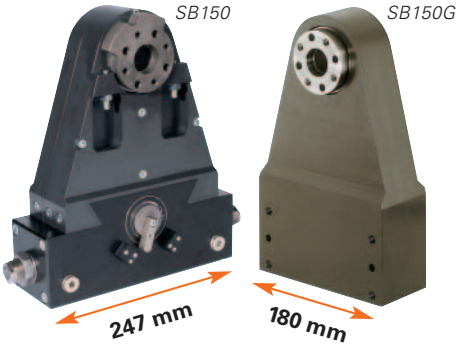
(1) Fixing swivel jaws
(2) Energy supply
(5) Adjusting screw
(7) Fixing for mounting block
(8) Fixing tool side
(9) Fix stop 90° bzw. 180°
(10) Switch cam 90° bzw. 180°
(17) Direction of rotation
(A) Air connection swivel to 90° or 180°
(B) Air connection swivel to 0°
(A') Air connection swivel to 90° or 180° (alternate)
(B') Air connection swivel to 0° (alternate)





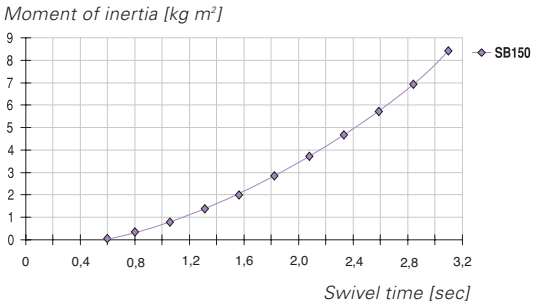
Subject to change without prior notice

Swivel jaws



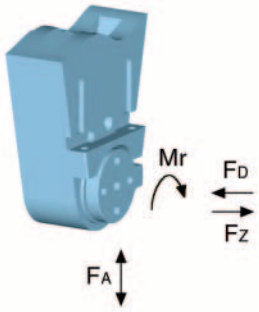
Moment of inertia

shows the expected swivel time against the calculated moment of inertia (test rig pairwise)



Forces and Moments

Shows the static bearing load



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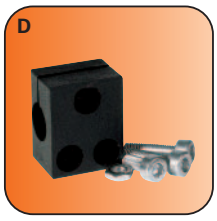


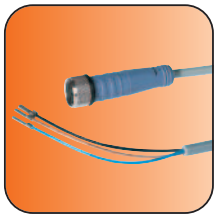
Mounting block
Order no. KB8K

Pneumatic fittings
Order no. DRV1/4x8

Accessory list

Proximity switch
Order no. NJ8-E2S

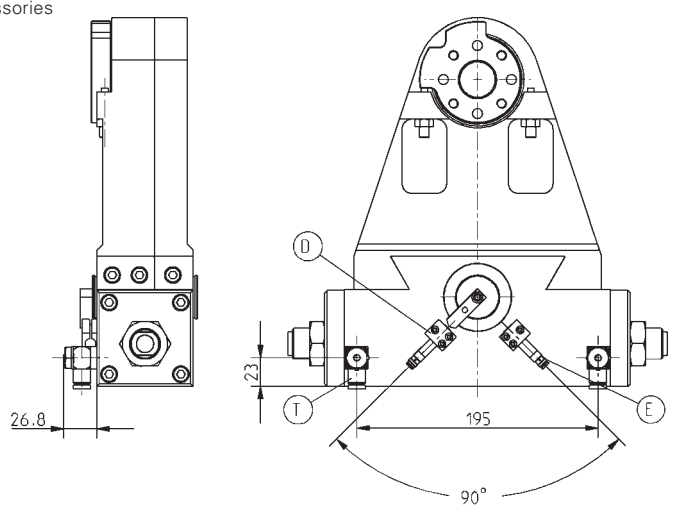
Cable angled plug
Order no. KAW500



Cable straight plug
Order no. KAG500

Plug 3-pole
Order no. S12-G-3

Accessories



Subject to change without prior notice

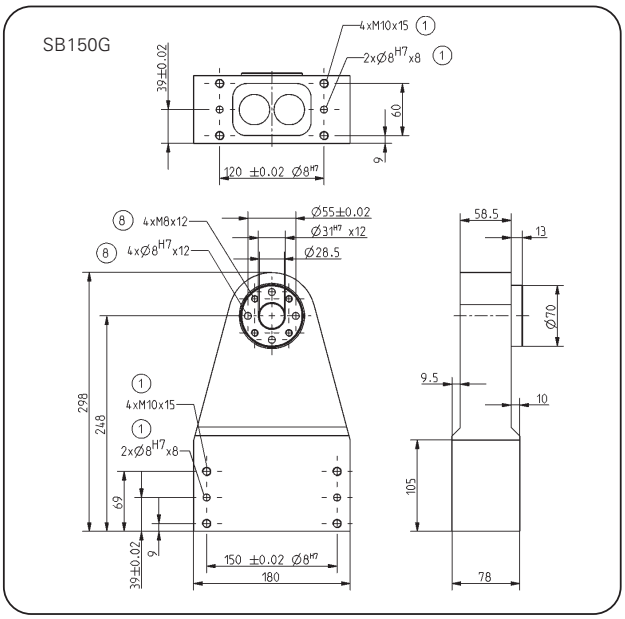
Order no.:	SB150-90	SB150-180	SB150G
Swivel angle [°]:	90	180	-
Torque per jaw [Nm]:	23	23	-
Swivel 90° oder 180° adjustable +/- [°]:	3	3	3
Repeatability +/- [°]:	0,01	0,01	0,01
F_A [N]:	15000	15000	15000
F_D [N]*:	7500	7500	7500
F_Z [N]*:	3700	3700	3700
M_r [Nm]:	270	270	270
Min./max. operating pressure [bar]:	3/8	3/8	-
Min./max. operating temperature [°C]:	5/80	5/80	-
Air volume per cycle [cm³]:	190	260	-
Weight [kg]:	11,0	11,0	6,5

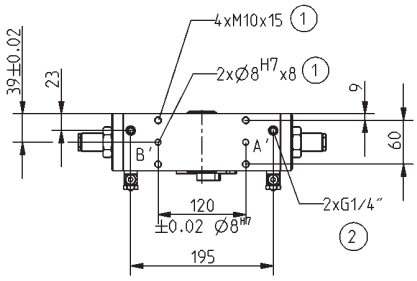
All data measured at 6 bar
** Consider the force of the grippers*

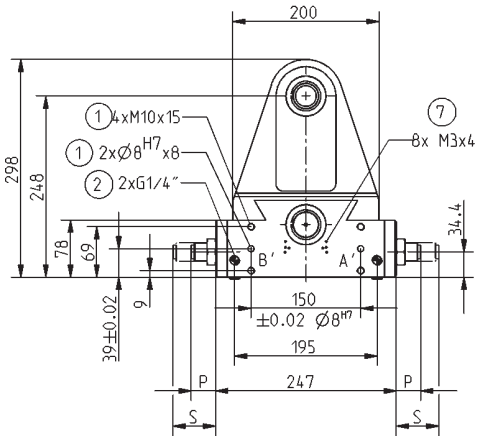
SB150

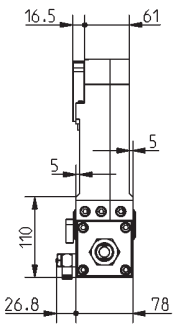
① Fixing swivel jaws
② Energy supply
⑤ Adjusting screw
⑦ Fixing for mounting block
⑧ Fixing tool side
⑨ Fix stop 90° bzw. 180°
⑩ Switch cam 90° bzw. 180°
⑰ Direction of rotation
Ⓐ Air connection swivel to 90° or 180°
Ⓑ Air connection swivel to 0°
Ⓐ' Air connection swivel to 90° or 180° (alternate)
Ⓑ' Air connection swivel to 0° (alternate)

SB150G

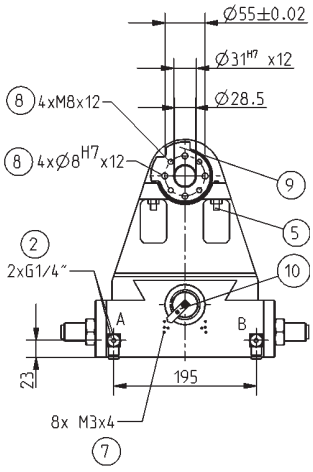






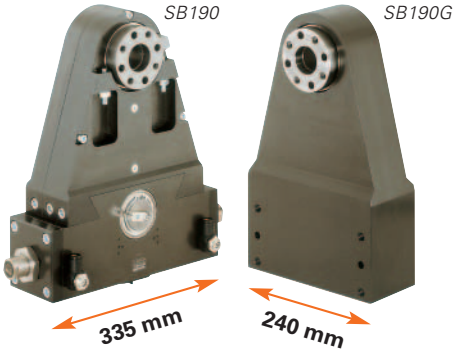


P = 33.5
S = 58.5



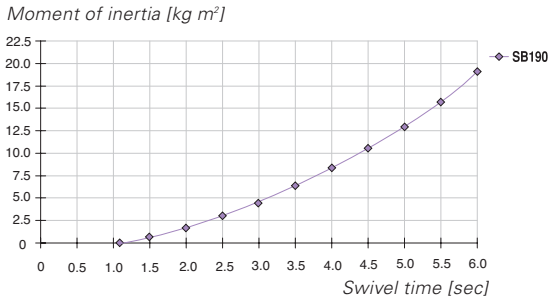
Subject to change without prior notice

Swivel jaws



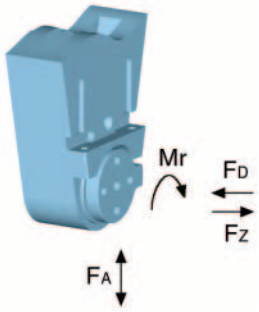
Moment of inertia

shows the expected swivel time against the calculated moment of inertia (test rig pairwise)

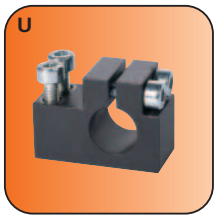


Forces and Moments

Shows the static bearing load



Included in the delivery



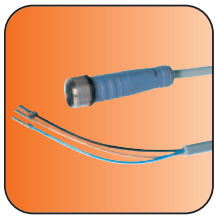
Mounting block
Order no. KB12-03

Pneumatic fittings
Order no. DRV1/4x8

Accessory list

Proximity switch
Order no. NJ12-E2S

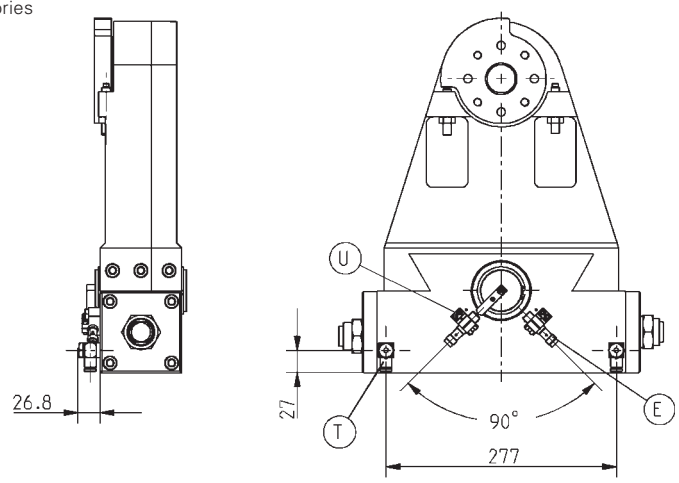
Cable angled plug
Order no. KAW500



Cable straight plug
Order no. KAG500

Plug 3-pole
Order no. S12-G-3

Accessories



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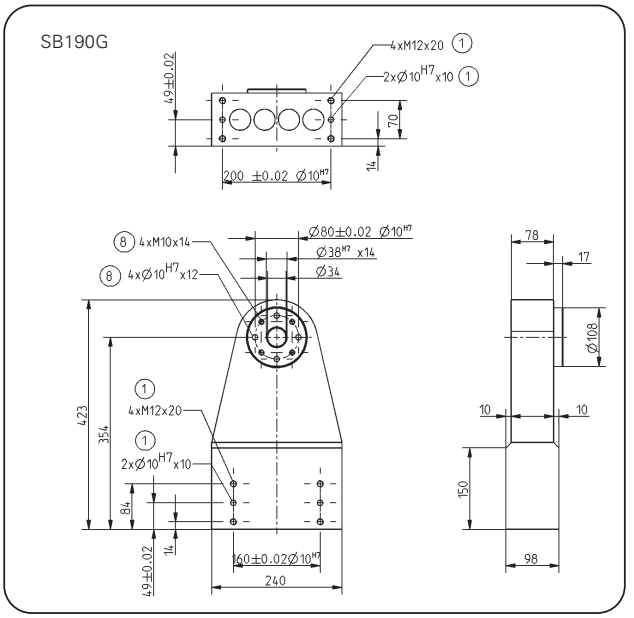
Order no.:	SB190-90	SB190-180	SB190G
Swivel angle [°]:	90	180	-
Torque per jaw [Nm]:	57	57	-
Swivel 90° oder 180° adjustable +/- [°]:	3	3	-
Repeatability +/- [°]:	0,01	0,01	-
F_A [N]:	25000	25000	25000
F_D [N]*:	12500	12500	12500
F_Z [N]*:	6100	6100	6100
M_r [Nm]:	600	600	600
Min./max. operating pressure [bar]:	3/8	10/25	-
Min./max. operating temperature [°C]:	5/80	5/80	-
Air volume per cycle [cm³]:	320	320	-
Weight [kg]:	28,0	28,0	19,5

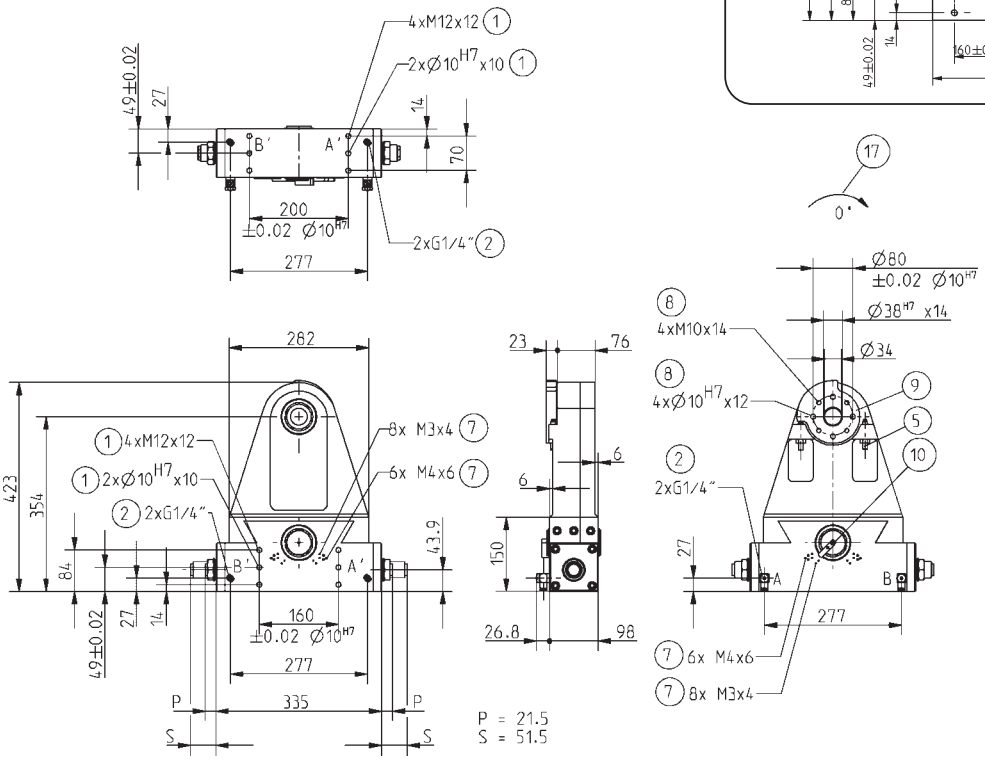
All data measured at 6 bar
** Consider the force of the grippers*

SB190

① Fixing swivel jaws
② Energy supply
⑤ Adjusting screw
⑦ Fixing for mounting block
⑧ Fixing tool side
⑨ Fix stop 90° bzw. 180°
⑩ Switch cam 90° bzw. 180°
⑰ Direction of rotation
Ⓐ Air connection swivel to 90° or 180°
Ⓑ Air connection swivel to 0°
Ⓐ' Air connection swivel to 90° or 180° (alternate)
Ⓑ' Air connection swivel to 0° (alternate)

SB190G





Subject to change without prior notice

Swivel jaws Formulas

1. Moment of Inertia Calculation

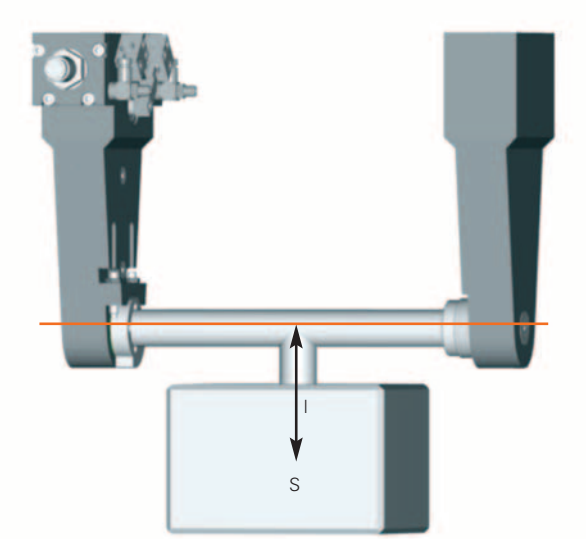
In the technical tables, the "Force" of the swivel-jaws is declared in Nm. This value declares a torque, produced by the swivel jaws, when a pressure of 6 bar is supplied.
In order to size a swivel-jaws correctly, one requires different basic data such as workpiece-weight and lever-length to center of gravity. For increased application-safety, a factor of safety may be inserted into the calculation.

In the following example calculation (1.1) a Swivel-jaw application is shown as an example.

Example Calculation 1.1.

Skizze:

S = Center of Gravity



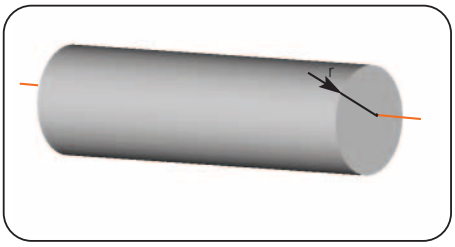
Given:	Weight of workpiece	=	$F_{Wst.}$	=	2,5 kg x 9,81m/s^2=24,53 N
	Length of Lever Wst.	=	l	=	0, 09 m
	Safety Factor	=	ν	=	1,5
Find:	Torque	=	M		
Calculations:	$M = F_{Wst.} \times l \times \nu$ M = 24,53 Nx 0,09 m x 1,5 M = 3,31 Nm				
Result:	On the basis of the torque, the selection falls to the SB74-B, with a torque of 3,5 Nm at 6 bar.				

2. Moment of Inertia Calculation

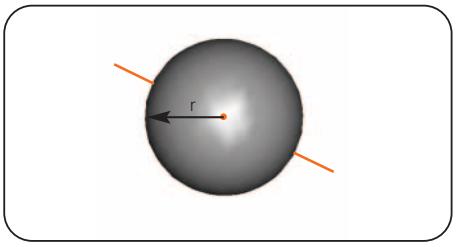
The sample calculation (2.2, page 34) shows the selection of a swivel-jaw, with symmetrical application and follower, by the moment of inertia. The moment of inertia describes the inertia of a body during a rotational movement. This unit is required to determine about the swivel-time of the respective swivel-jaws.

Should the workpiece or the gripper have a shape, the corresponding formulas (2.1) must be used to calculate the moment of inertia (J).

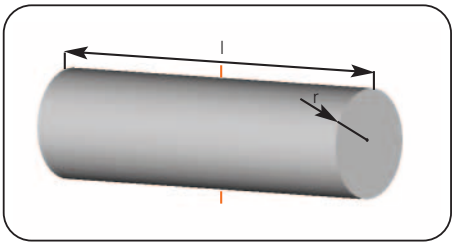
Formeln 2.1



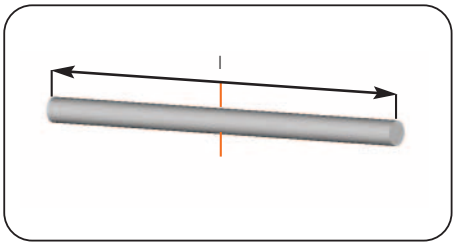
Full Cylinder:
Rotating around its body axis
$J = {}^{1}/_{2}\ m \times r^2$



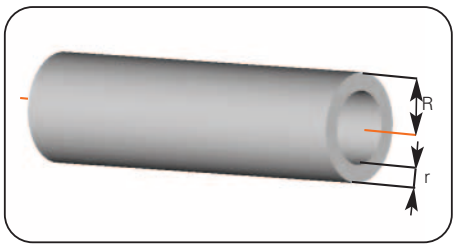
Massive sphere:
Rotating around its center of gravity
$J = {}^{2}/_{5}\ m \times r^2$



Full Cylinder:
Rotating around the center of gravity perpendicular to its body axis
$J = {}^{1}/_{4}\ m \times r^2 + {}^{1}/_{12}\ m \times l^2$

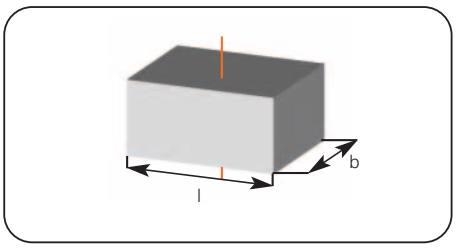


Small Diameter Rod:
Rotating around the center of gravity perpendicular to its body axis
$J = {}^{1}/_{12}\ m \times l^2$

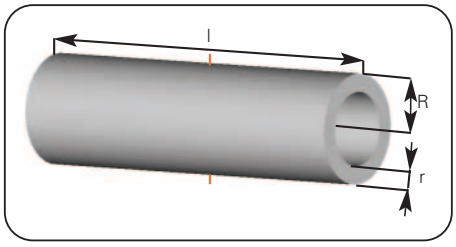


Hollow cylinder:
Rotating around its body axis
$J = {}^{1}/_{2}\ m\ (R^2 + r^2)$

R=Radius of cylinder, r= wall thickness

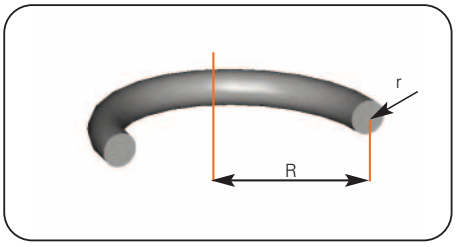


Rectangular parallelogram:
Rotating around its center of gravity
$J = {}^{1}/_{12}\ m\ (b^2 + l^2)$



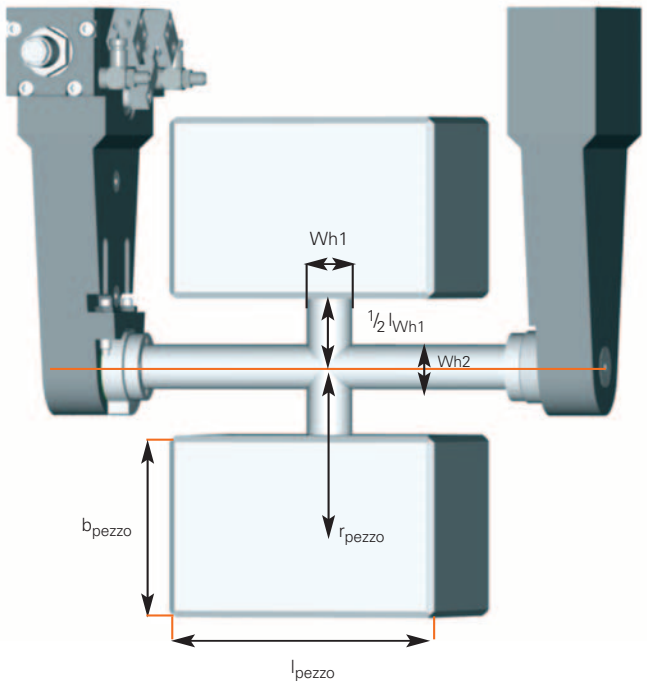
Hollow Cylinder:
Rotating around the center of gravity perpendicular to its body axis
$J = {}^{1}/_{4}\ m\ (R^2 + r^2 + {}^{1}/_{3}\ l^2)$

R=Radius of cylinder, r= wall thickness



Ring:
Rotating around its body axis
$J = m\ (R^2 + {}^{3}/_{4}\ r^2)$

Sketch



2.2 Example Calculation

General: Longitudinal-dimensions in **meters**, mass in **kilogram** yields moment of inertia into **kgm²**

Given:	Workpiece:	Mass	=	$m_{Wst.}$	=	8 kg
		Length	=	$l_{Wst.}$	=	0,12 m
		Depth	=	$b_{Wst.}$	=	0,10 m
		Radius	=	$r_{Wst.}$	=	0,12 m
	Workpiece holder:	Mass Wh1	=	m_{Wh1}	=	0,3 kg
		Diameter Wh1	=	$ø_{Wh1}$	=	0,02 m
		Length Wh1	=	l_{Wh1}	=	0,09 m
		Mass Wh2	=	m_{Wh2}	=	1 kg
		Diameter Wh2	=	$ø_{Wh2}$	=	0,038 m

Given:

Moment of Inertia workpiece	=	$J_{Wst.}$ (top)	=	$J_{Wst.}$ (bottom)	
Moment of Inertia workpiece holder 1	=	J_{Wh1}			
Moment of Inertia workpiece holder 2	=	J_{Wh2}			
Total Moment of Inertia	=	$J_{ges.}$			

Calculation:

$J_{total} = J_{Wst.}$ (top) + $J_{Wst.}$ (bottom) + J_{Wh1} + J_{Wh2}

$J_{Wst.}$ (top) $= {}^{1}/_{12}\, m_{Wst.} \times (b_{Wst.}^2 + l_{Wst.}^2) + m_{Wst.} \times r^2$

$J_{Wst.}$ (top) $= {}^{1}/_{12}\, 8\ kg \times ((0{,}10\ m)^2 + (0{,}12\ m)^2) + 8\ kg \times (0{,}12\ m)^2$

$J_{Wst.}$ (top) $= \underline{0{,}13147\ kgm^2}$

$J_{Wst.}$ (bottom) $= J_{Wst.}$ (top)

$J_{Wst.}$ (bottom) $= \underline{0{,}13147\ kgm^2}$

$J_{Wh1} = {}^{1}/_{4}\, m \times r^2 + {}^{1}/_{12}\, m \times l^2$

$J_{Wh1} = {}^{1}/_{4}\, 0{,}3\ kg \times (0{,}01\ m)^2 + {}^{1}/_{12}\, 0{,}3\ kg \times (0{,}09\ m)^2$

$J_{Wh1} = \underline{0{,}00021\ kgm^2}$

$J_{Wh2} = {}^{1}/_{2}\, m \times r^2$

$J_{Wh2} = {}^{1}/_{2}\, 1\ kg \times (0{,}038\ m)^2$

$J_{Wh2} = \underline{0{,}00072\ kgm^2}$

$J_{total} = 0{,}13147\ kgm^2 + 0{,}13147\ kgm^2 + 0{,}00021\ kgm^2 + 0{,}00072\ kgm^2$

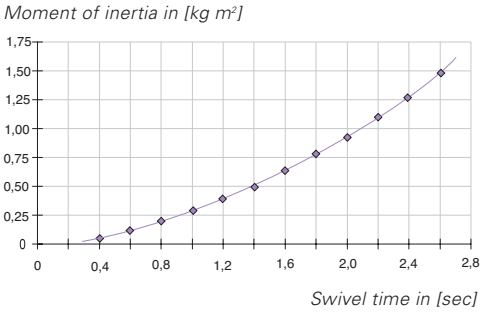
$J_{total} = \underline{\underline{0{,}264\ kgm^2}}$

Result:

By inserting the arbitrated value into the Diagram (2.3) which shows the moment of inertia in relation to time, one gets the swivel time.

The diagram (2.3) appears on the upper half of the first product page of each swivel-jaws.

Diagramm 2.3



The SB74-180-B with follower SB74G, that is used in this application example, one gets a value of approximately 1 seconds.

Attention:

With this result, one must take into account, that this swivel-time is only realized with an correctly installed swivel-jaws supplied with 6 bar air pressure and calculated without factor of safety. For more information regarding the proper sizing of swivel-jaw, please go to our website, www.sommer-automatic.com.

Grippers pneumatic 01
Grippers electrical 02
Grippers hydraulic 03
Grippers Special 04
Grip & Rotate Modules pneumatic 05
Separators 06
Swivel Units pneumatic 07
Swivel Units electrical 08
Swivel Units hydraulic 09
Rotation Jaws pneumatic 10
Axial Compensation Modules 11
Tool Changers 12
Robotics Accessories 13
Linear Cylinders 14
Shock Absorber 15
Air Vane Motors 16
Rotary Cylinders 17
Vacuum Components 18