03 | 2013

PositionLine | Position Indicators

1

Mechanical digital position indicators
Electronic digital position indicators
Control knobs
Mechanical analog position indicators and handwheels

SIKO

Success is the result of a commitment to precision, innovation and customer benefit

"Precision is SIKO's top priority and standard!" True to this philosophy, SIKO has been developing and producing innovative solutions in distance and angle measurement technology for about 50 years now. Based in Buchenbach in the foothills of the Black Forest, the company produces its own measurement technologies, which are a global success in all areas of mechanical engineering. Even today, SIKO's core concept is still manifest in its innovative power, product development and company spirit. Since taking over the business in 1990, industrial engineer Horst Wandres, son of its founder, has continued to develop this philosophy with impressive results.

Intelligent solutions

Attentive ears will always find the right solution. Automation and process optimization are the cornerstones of SIKO's ambitious new technologies and goal-oriented measurement solutions. The company pursues a clear, consistent line of development, ranging from digital position indicators and handwheels through incremental encoders, absolute encoders and measurement displays to future-oriented technologies with electronically programmable or magnetic measurement systems (MagLine).

SIKO again follows the road to success with its compact, ultra-resilient actuators (DriveLine), which enable automated adjustment of machine axles.

5 distinctive product lines

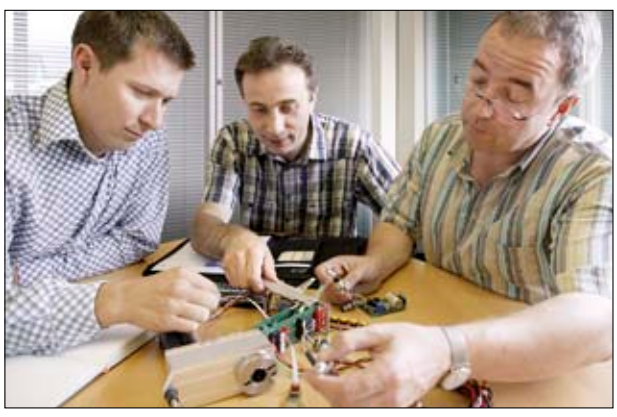
PositionLine	Mechanical and electronic position indicators, handwheels with analog indicators, control knobs
RotoLine	Magnetic and optical encoders, geared potentiometers
LinearLine	Wire-actuated encoders
DriveLine	Actuators
MagLine	Magnetic length and angle measurement systems

Consistent teamwork

The secret of SIKO's development prowess lies in the motivation and team spirit of its workers. SIKO has a conscious policy of integrating the experiences of its 170 employees, which has a dynamic effect on all areas of company life. Outstanding individual performances blend together to enhance the efficiency of the whole organization.

Not one for all but all together – this motto typifies SIKO's synergetic development process, delivering solutions which dominate the market in all aspects of "measurement technology in mechanical engineering".

This is SIKO today. Precision in motion, dynamic and open for the future ...



We speak the same language: At SIKO, a willingness to participate in open dialog enhances engineering performance. Our production site advantages are not interchangeable.

1.0 | PositionLine

1.0

Mechanical or electronic: Absolute tracking of path and angle positions

PositionLine is a track-proven range of products which has grown in line with customers' needs. The latest generation of SIKO programmable electronic indicators is a consistent further development of the versatile mechanical digital position indicators and handwheels and also ensures outstanding performance in bus-controlled applications.

The mechanical control knobs are a special feature, combining miniaturized handwheel technology with the gear unit assisted, mechanical digital indicators in orange.

Mechanical digital position indicators

Position values on shafts and spindles can be simply and clearly controlled with the original SIKO counters. High mechanical precision and fully developed details combined with easy readability and a long service life have put these orange counters at the forefront of this technology market. Extremely simple installation and retrofitting is one of the decisive advantages of the SIKO position indicators. The displayed value can be adapted to the required spindle pitch with an integrated gear unit.

Mechanical displays
Hollow shaft diameters ranging from 6 – 35 mm
Maximum digit height 7 mm
Mechanical detent/lock
Selectable design (reading position)
Plastic or metal housing

Electronic digital position indicators

Electronic position indicators have additional advantages over mechanical indicators for automation applications. With this functional principle, the axis motion is tracked either magnetically or capacitively and then evaluated. The spindle pitch, direction of rotation and decimal point can be freely programmed. As they are battery-powered, they can also be used as absolute indicators. Depending on the version, the position values are communicated to a computer or controller through an interface for further processing.

Electronic displays
LCD displays
Absolute, battery-buffered
Programmable parameters
Resolutions up to 0.001 mm
RS 485 bus interface

Control knobs

This sophisticated new SIKO development combines precise functionality with modern industrial design. An innovative gear unit permits integration of the mechanical digital display directly in the control knob. The mechanical control knobs stand for economy, a wide application range, easy handling and outstanding design.

Control knobs with display
Hollow shaft diameters of 6–20 mm
Display integrated in adjustment element
Analog and digital displays
Selectable design (reading position)
Rotary knob made of metal or plastic

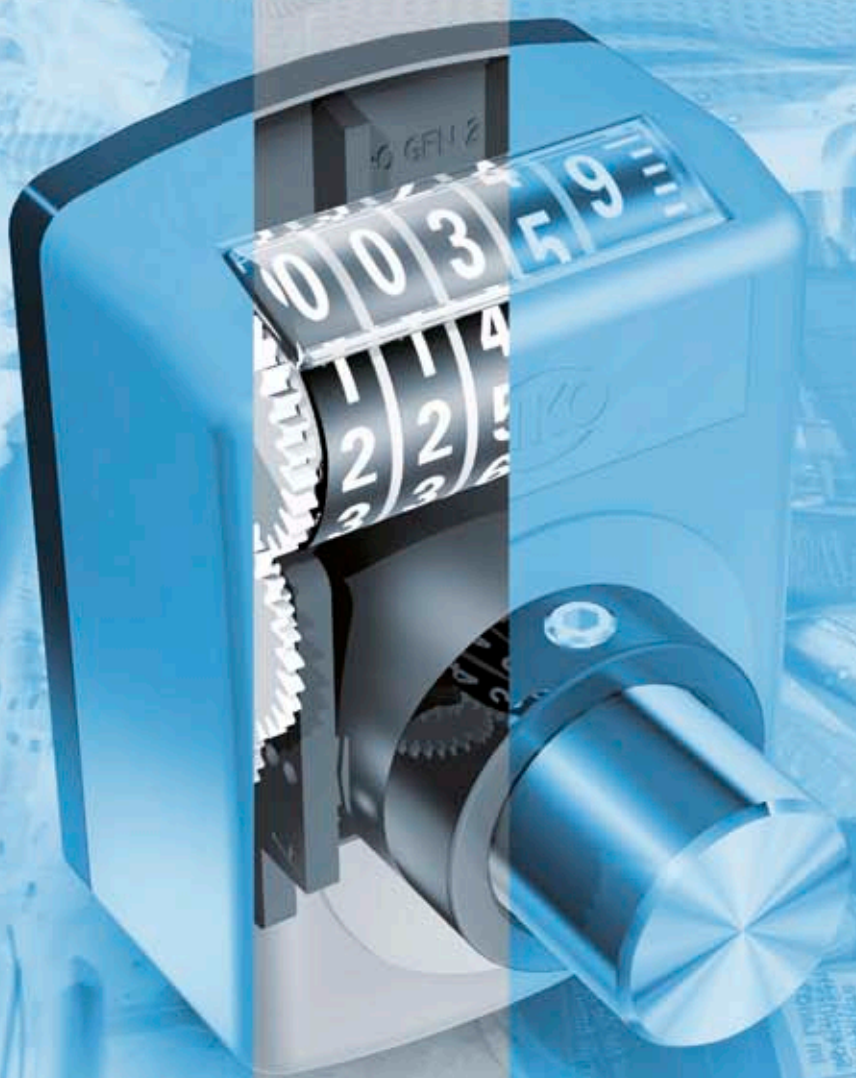
Mechanical analog position indicators and handwheels

If machine spindles are not only adjusted manually but the position is to be displayed at the same time, then handwheels with an integrated position indicator are the right choice.

Handwheels with display
Handwheel diameters of 56–200 mm
Analog display with scale
Digital via integrated display
Corrosion and vibration-resistant, oil-filled
Handwheel made of metal or plastic

This reliable combination can also be simply mounted on horizontal or vertical spindles under demanding conditions. Exact manual positioning is therefore possible without additional adjustment elements. Everything is in full view: Individual scale division or even integrated digital indicators guarantee reliable readability.

1.1



1.1 | Mechanical digital position indicators

Measurement and indication directly on the shaft – always clearly readable and versatile.

With its mechanical digital position indicators, SIKO offers customers an original and mature product line. The highly adaptable, functional concept is world-famous and the interaction of variable gear ratios and modular roll indicators is unique.

Digital indicators are a further development of the handwheel with analog displays. However, their "nonius", a type of vernier on handwheel indicators, can only display the values of one spindle rotation. But what happens if you have to log several rotations?

This requires technology which is functional and robust and has two outstanding features:

- A multi-digit display including a digital point and fine reader for optimum reading precision
- A gear unit that can be customized to suit individual requirements which "converts" a shaft rotation into an easily understandable unit of measurement.

Position values can be monitored reliably and directly on the shaft or spindle with the original SIKO counters. Simply slip onto the shaft, secure in place – ready! With their mature technology, the small "orange indicators" are in untiring use in millions of applications all over the world.

Seeing what's important: Indication precision even after the decimal point – you won't miss anything with the effective SIKO magnifying lens.

Benefits:

- Long service life due to consistent further development
- Clear and precisely controllable, readable digital values
- Modifiable displays due to individual ratios
- Simple and cost-effective retrofitting
- Easy slip-on hollow shaft mounting

1.1

Clever solution: Window with magnifying lens permits an even more compact design.

The digital indicator gear units can be adapted flexibly to specified ratios.

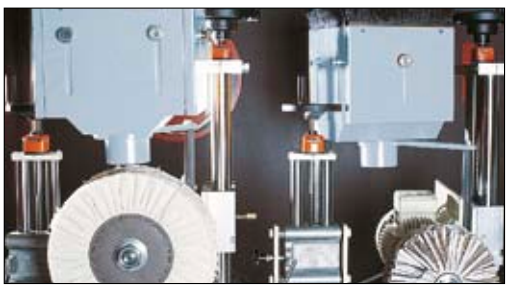
Simple and practical: Variable gear unit versions, functional overall design with a simple slip-on and locking method make the digital indicators a true classic.

Applications

SIKO position indicators are used in a wide range of sectors and for all production environments, as almost all machines and systems feature guide elements, material stops or tools which require precise and reliable positioning or alignment.

The digital position indicators are ideal for monitoring roller adjustment on sheet metal bending machines. The solid cast design of the counters withstands the extreme mechanical influences under tough conditions such as those on round sheet polishing machines, ensuring exact manufacturing. They are also suitable for a wide range of wood-processing applications. Several work steps are often performed on a single machine, panels cut and milled and edges glued and polished.

SIKO counters are ideal adjustment aids in the metal, plastic and wood processing industries.



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2

3

4

[1] Surface processing in the furniture industry: Tools which are perfectly coordinated with digital indicators ensure a perfect finish. [2] Edge jointing and forming – in manual operation number settings must be accessible quickly and reliably. [3] Both as original equipment or retrofitted components, digital position indicators mounted on a shaft can be effectively integrated into all machine configurations. [4] Within the metal forming process chain, digital indicators are responsible for the workpiece alignment.

Photographs provided by the companies according to the sequence of numbers: Ott, Hymnen, Hebrock, Dreistern

Determining decimal points

The following table shows the digital point principle of the digital indicators. For example, to obtain the reading “10.0”, the indicator must count “100” with the decimal place 1 after the first rotation. During series production, the decimal point is marked by a colored intermediate ring. SIKO deals with the relationship between the spindle pitch and decimal point as follows: The spindle pitch serves as a reference. If this is 4 mm, the gear unit is designed so that 4.0 appears on the display after the first rotation.

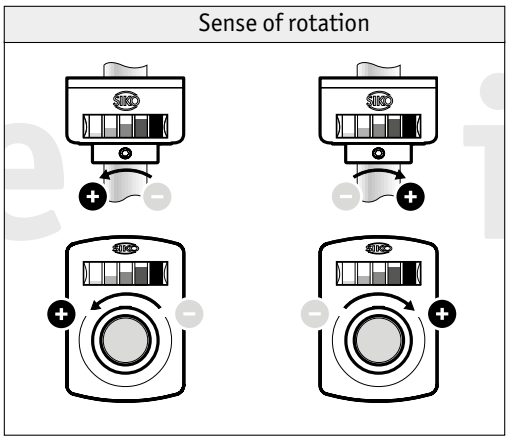
Ordering code	Indication	Display
for decimal place	e.g., 5-digit	
0	00000	00000
1	0000.0	0000|0
2	000.00	000|00
3	00.000	00|000
4	0.0000	0|0000

Sense of rotation

The sense of rotation of the axis influences the gear unit installed in the digital indicator. Digital position indicators are available in two directions of rotation in relation to the machine axis:

“i” stands for clockwise
“e” stands for counter-clockwise

Ascending values are shown on the display in accordance with the “i” and “e” ordering code.

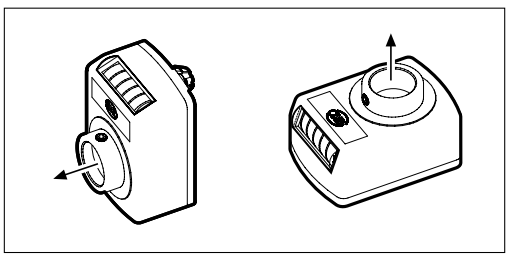


“+” shows the direction of rotation of the respective machine shaft. The ordering codes “e” and “i” specify in which direction of rotation the increasing values appear on the display.

Mounting position

Two factors determine this ordering code:
a) The orientation of the machine shaft
b) The line of vision to the window (decades)

The number and orientation of the digital indicator window and the visible decades are determined with a numeric code (e.g., 02, 04, etc.).



Orientation aid for the counting direction

The “direction arrow” can be printed on the DA04 and DA09S models as an option. Combined with “+” and “-”, this shows clearly in which direction of rotation of the shaft/spindle the decades are increased or decreased [Fig. 1]. Printing is not available on black housings.

Axial seal

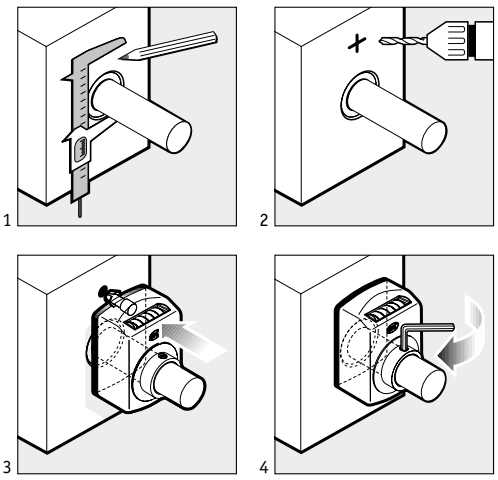
When axial seals are used [Fig 2], the set screw should not protrude over the shaft surface. Please screw in until it is flush; if necessary provide a recess in the shaft.


1


2

Mounting torque support

The radius of the shaft is added to the space measurement between the hollow shaft and torque shaft. This measurement is marked on the mounting surface with a slide gauge and scriber [1], then center-punched [2] and drilled (for the drilling diameter and depth refer to the technical drawings). After correct pre-drilling, stress-free mounting of the position indicator must be possible [3, 4].



Locking on the shaft

The set screw is screwed in and tightened for reliable locking on the shaft. If axial seals are used, the set screw must be screwed in until it is flush (if necessary provide a recess in the shaft).

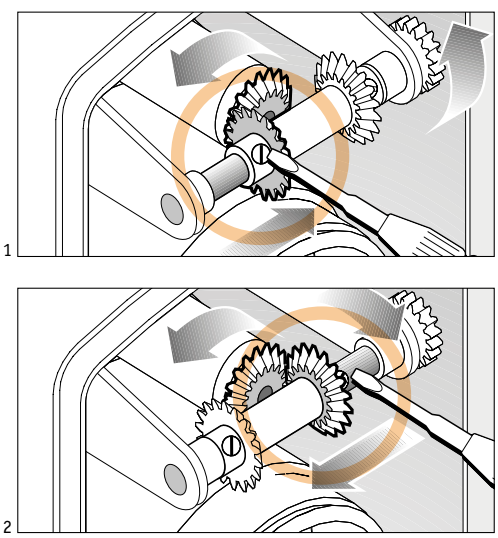
Torque support (2 versions)

You have the choice between the pin [A] or umbrella [B] versions on almost all position indicators. The umbrella type torque pin is the optimum solution for compensating for installation tolerances.

Changing the counting direction

The counting direction can be subsequently changed on the position indicators DA05/1 and DA08. To this purpose carefully open the housing. Slacken the clamping screws of the bevel gears on the shaft, so that they can be moved. These must be subsequently firmly re-tightened. When moving the gears, ensure correct meshing and smooth running.

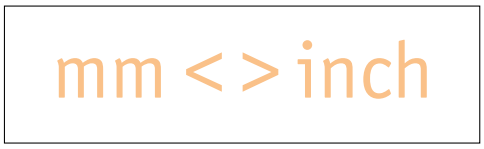
If the left gear wheel is engaged [1], the counting direction is positive in a clockwise direction; if the right gear wheel is engaged [2], the counting direction is positive in an anti-clockwise direction. The diagram shows a view from the rear.



Inch display: Advantages of the analog principle

While digital principles depend on the resolution, axial rotation has an infinite resolution. Theoretically the smallest of rotation dimensions can be divided into any required number of intermediate steps. This means that loss-free display of metric pitches is also possible in inches. The gear unit makes the conversions.

Example:
4 mm in inches; display value is 4/25.4 = 0.15 (748). Although the last 3 digits "748" are not shown, they are "carried along" in the gear unit due to the analog measuring principle.



Ambient conditions	Examples of use	Benefits

Direct rotation:
Direct action via axle or spindle. The principle of action corresponds to that of a compound table or of linear guides.



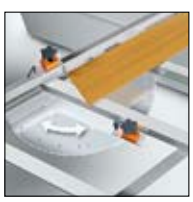
E.g., compound tables, planing or dowel drilling machines ...

- Direct display after x,y adjustment
- Easy mounting
- Precise positioning
- Flexible indication of values
- mm or inch


E.g., tooling in the lumber and metal industries

E.g., rewind cutting machines in the paper/foil industries

Indirect rotation:
Indirect action (offset) on racks via cogwheel or worm gear.



E.g., angle adjustment units on saws, rotary and milling tables

- Exact angle indication
- Variable diameters
- Variable mounting positions

E.g., end stop systems

Mechanical digital position indicators

	DA02	DA04	DA05/1	DA08	DA09S	DA10	DA10R/1
Page	14	16	22	22	18	20	23
Housing							
Plastic	•	•			•	•	•
Zinc die-cast			•	•	•		
Displays							
3 decades*	•						
4 decades*		•		•			
5 decades*			•	•	•	•	•
Digit height							
in mm,approximately	4	6	7	4,5	7	7	7
Hollow shaft							
Diameter (mm)	10	14	20	20	20	30	30
Dimensions							
WxHxD (mm), approx.	22x33x26	33x47x31	56x82x70	57x107x59	48x67.5x38.5	56x75x52	56x84x70

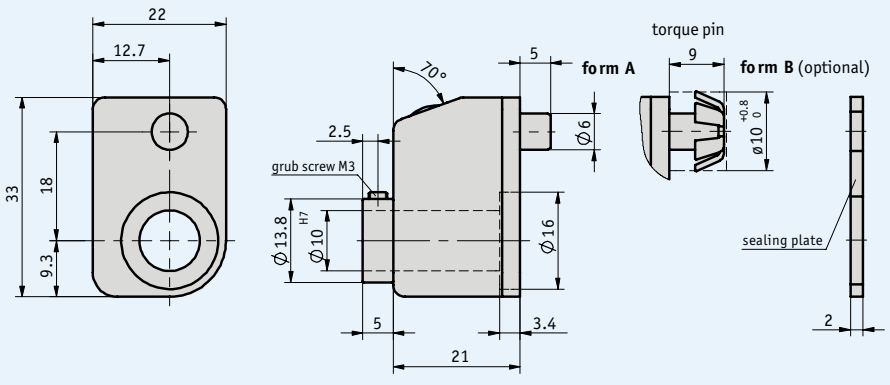
* Decade = digit ring with 10-division

1.1

Mechanical digital position indicator DA02
Very small design

Profile

- Ultra-small design
- Hollow shaft with max. Ø of 10 mm
- Minimum axle base of 19 mm
- Counter can be designed for “mm” or “inch”
- With stainless-steel driving shaft as an option



Mechanical data

Feature	Technical data	Additional information
Counter	3 decades	
Digit height	approx. 4 mm	
Housing	plastic, reinforced	
Weight	0.02 kg	
Ambient temperature	max. +80 °C	

Max. speed

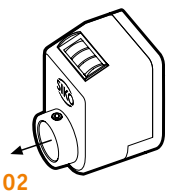
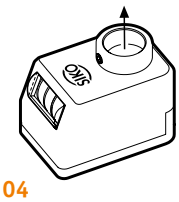
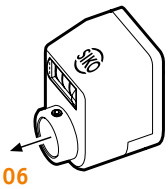
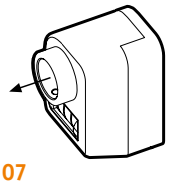
Indication after 1st revolution	**Max. speed** (rpm)
010	500 *(1500)*
015	500 *(1000)*
020	500 *(750)*
025	500 *(600)*
030	500
040	375
050	300
060	250
080	180
100	150

Formula for max. speed = $\frac{15\,000}{\text{Indication after 1st revolution}}$

Speeds >500 rpm must only be run for short periods.

Order

Design

Display	Mounting position				Counting direction
123	 02	 04	 06	 07	

Note: Characters highlighted in orange are order features

Order table

Feature		Order data	Specification	Additional information
Design/mounting position	A	...	02, 04, 06, 07	see the icons illustrating the mounting position
Indication after 1st revolution	B	...	7/5, 10, 12/5, 15, 17/5, 20, 25, 30, 40, 50, 60, 80, 100	/5 = arithmetical value not displayed
			others on request	
Decimal place	C	0	0 = 000	
		1	1 = 00.0	
		2	2 = 0.00	
Counting direction = ascending values	D	i	clockwise	
		e	counter-clockwise	
Hollow shaft/diameter (mm)	E	10	Ø 10 mm	
		...	VA10	stainless steel
		...	RH6, RH7, RH8	reducing bush
Housing color	F	0	orange RAL 2004	
		S	black	

Order code

DA02 – [A] – [B] – [C] – [D] – [E] – [F] – A

Scope of delivery: DA02

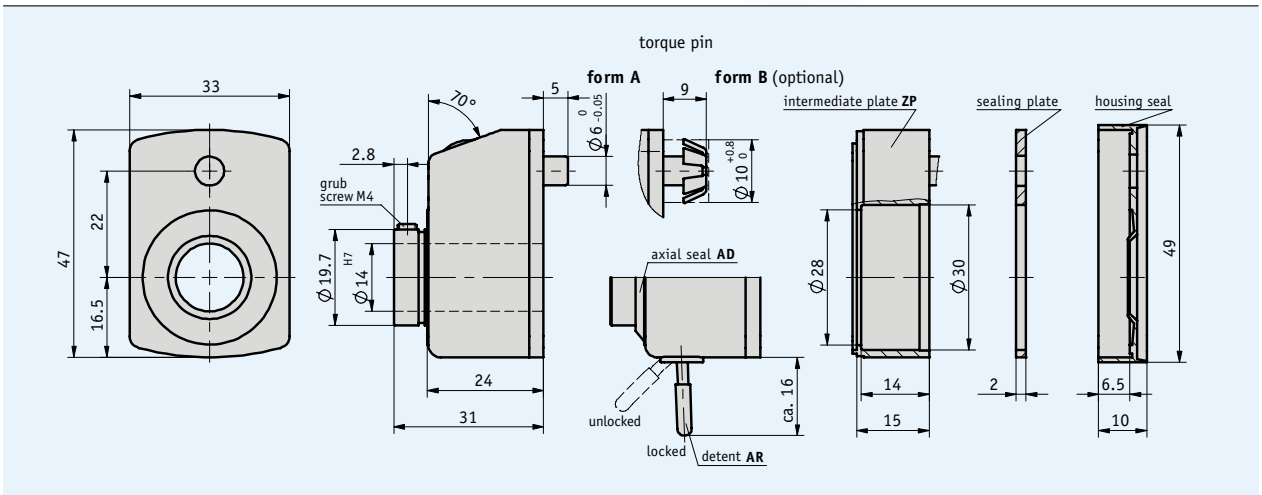
Accessories:
Reducing bushes Page 110

Additional information:
General information and areas of application Page 8 cont.

Mechanical digital position indicator DA04
Basic device with 4 decades

Profile

- Hollow shaft, max. Ø 14 mm
- Counter with 4 decades and fine reading
- Detent as an option
- Magnifying function for good readability
- Stainless-steel driving shaft as an option
- Axial seal, dustproof and hose-proof
- Clamping plate (see accessories)



1.1

Mechanical data

Feature	Technical data	Additional information
Counter	4 decades, fine reading	
Digit height	approx. 6 mm	
Housing	plastic, reinforced	
Window	plastic	optional mineral glass
Weight	0.05 kg	
Ambient temperature	max. +80 °C	

Max. speed

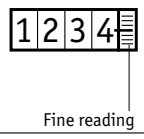
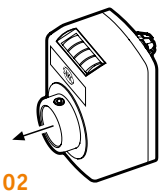
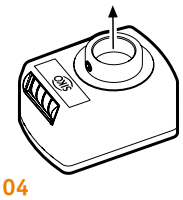
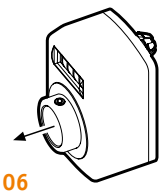
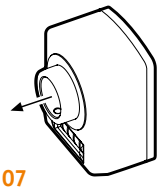
Indication after 1st revolution	**Max. speed** (rpm)
0010	500 *(1500)*
0015	500 *(1000)*
0020	500 *(750)*
0025	500 *(600)*
0030	500
0040	375
0050	300
0060	250
0080	180
0100	150

Formula for max. speed = $\frac{15\,000}{\text{Indication after 1st revolution}}$

Speeds >500 rpm must only be run for short periods.

Order

Design

Display	Mounting position				Counting direction
 Fine reading	 02	 04	 06	 07	

Note: Characters highlighted in orange color are order features

Order table

Feature	Order data		Technical data	Additional information
Design/mounting position	...	A	02, 04, 06, 07	see the icons illustrating the mounting positions
Indication after 1st revolution	...	B	10, 12/5, 15, 17/5, 20, 25, 30, 35, 40, 50, 60, 80, 100	/5 = arithmetical value not displayed
			others on request	
Decimal place	0	C	0 = 0000	
	1		1 = 000.0	
	2		2 = 00.00	
	3		3 = 0.000	
Counting direction = ascending values	i	D	clockwise	
	e		counter-clockwise	
Hollow shaft/diameter (mm)	...	E	14, 12.7, 15, 16	
	...		VA5, VA10, VA14, VA15	stainless steel
	...		RH4, RH6, RH8, RH10, RH12	reducing bush
Housing color	0	F	orange RAL 2004	
	S		black RAL 9005	
	GR		gray RAL 7035	
	FR		blazing red	
Seal	OAD	G	without additional seal	
	AD		with axial seal	
	GD		with axial and housing seal	
Detent/hollow shaft	OAR	H	without detent	
	AR		with detent	anti-vibration protection M ~ 20 Ncm
Intermediate plate	OZP	I	without intermediate plate	
	ZP		with intermediate plate	not with seal „GD“

Order code

DA04 - [ ] - [ ] - [ ] - [ ] - [ ] - [ ] - A - K - [ ] - [ ] - [ ] - BP - ORP

A B C D E F G H I

Scope of delivery: *DA04*

Accessories:

Reducing bushes *Page 110*
Clamping plate KP04 *Page 104*

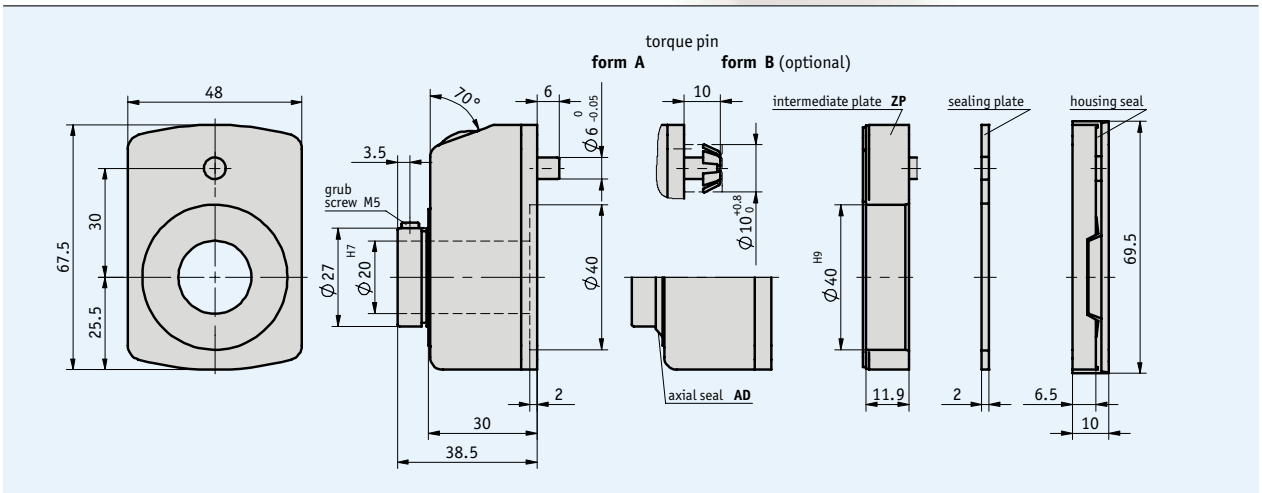
Additional information:

General information and areas of application *Page 8 cont.*

Mechanical digital position indicator DA09S
Basic device with 5 decades

Profile

- Most-used size in slim design
- Hollow shaft, max. Ø 20 mm
- Counter with 5 decades and fine reading
- Display can be designed for “mm” or “inch”
- Magnifying function for perfect readability
- With stainless-steel driving shaft as an option
- Axial seal, dustproof and hose-proof
- Clamping plate (see accessories)



Mechanical data

Feature	Technical data	Additional information
Counter	5 decades, fine reading	
Digit height	approx. 7 mm	
Housing	plastic, reinforced zinc diecasting with housing MCM	
Window	plastic	optional mineral glass
Weight	0.1 kg	
Ambient temperature	max. +80 °C	

Max. speed

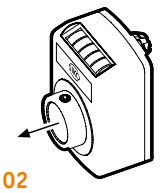
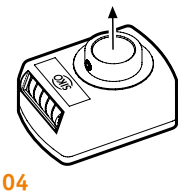
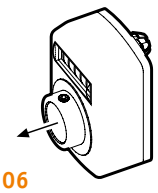
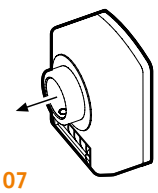
Indication after 1st revolution	**Max. speed** (rpm)
00010	500 *(1500)*
00015	500 *(1000)*
00020	500 *(750)*
00025	500 *(600)*
00030	500
00040	375
00050	300
00060	250
00080	180
00100	150

Formula for max. speed = $\frac{15\,000}{\text{Indication after 1st revolution}}$

Speeds >500 rpm must only be run for short periods.

Order

Design

Display	Mounting position				Counting direction
12345 Fine reading	 02	 04	 06	 07	

Note: Characters highlighted in orange are order features

Order table

Feature	Order text		Specification	Additional information
Design/mounting position	...	A	02, 04, 06, 07	see the icons illustrating the mounting positions
Indication after 1st revolution	...	B	10, 12/5, 15, 15/75, 17/5, 20, 25, 30, 39/375, 40, 50, 60, 78/75, 80, 100	/5 = arithmetical value not displayed
			others on request	
Decimal place	0	C	0 = 00000	
	1		1 = 0000.0	
	2		2 = 000.00	
	3		3 = 00.000	
	4		4 = 0.0000	
Counting direction = ascending values	i	D	clockwise	
	e		counter-clockwise	
Hollow shaft/diameter (mm)	20	E	Ø 20 mm	
	...		VA8, VA10, VA14, VA20	stainless steel
	...		RH8, RH10, RH12, RH14, RH18	reducing bush
Housing	0	F	orange RAL 2004, plastic	
	S		black RAL 9005, plastic	
	GR		gray RAL 7035, plastic	
	FR		blazing red, plastic	
	MCM		chromatized matt, metal	
Seal	OAD	G	without additional seal	
	AD		with axial seal	
	GD		with axial and housing seal	
Intermediate plate	OZP	H	without intermediate plate	
	ZP		with intermediate plate	not with seal „GD“

Order code

DA09S - [A] - [B] - [C] - [D] - [E] - [F] - A - K - [G] - [H] - BP - ORP

Scope of delivery: *DA09S*

Accessories:

Reducing bushes *Page 110*
Clamping plate KP09 *Page 104*

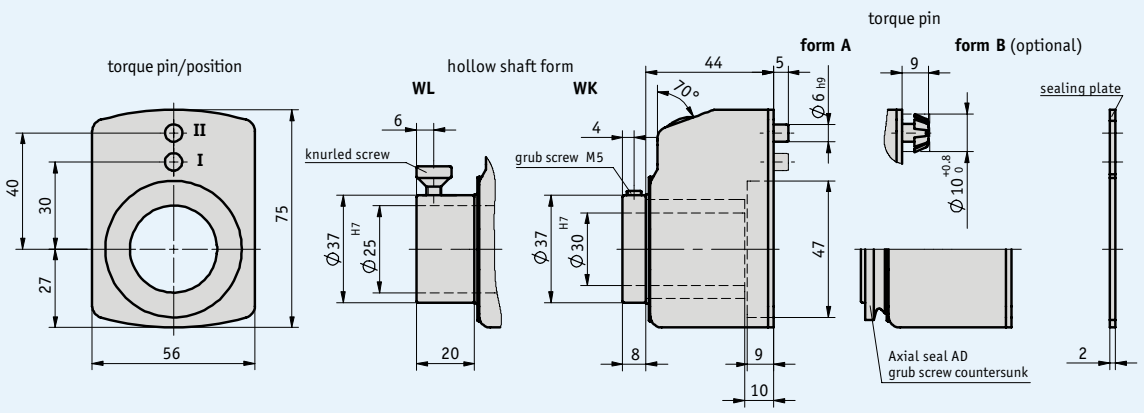
Additional information:

General information and areas of application *Page 8 cont.*

Mechanical digital position indicator DA10
For large shaft diameters

Profile

- Designed for large diameters
- Hollow shaft, max. Ø 30 mm
- Counter with 5 decades and fine reading
- Display can be designed for “mm” or “inch”
- Magnifying function for perfect readability
- Stainless-steel driving shaft as an option
- Axial seal, dustproof and hose-proof



Mechanical data

Feature	Technical data	Additional information
Counter	5 decades, fine reading	
Digit height	approx. 7 mm	
Housing	plastic, reinforced	
Window	plastic	optional mineral glass
Weight	0.1 kg	
Ambient temperature	max. +80 °C	

Max. speed

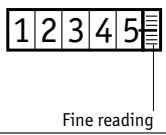
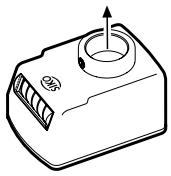
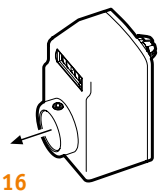
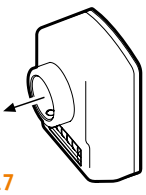
Indication after 1st revolution	**Max. speed** (rpm)
00010	500 *(1500)*
00015	500 *(1000)*
00020	500 *(750)*
00025	500 *(600)*
00030	500
00040	375
00050	300
00060	250
00080	180
00100	150

Formula for max. speed = $\frac{15\,000}{\text{Indication after 1st revolution}}$

Speeds >500 rpm must only be run for short periods.

Order

Design

Display	Mounting position				Counting direction
 Fine reading	 12	 14	 16	 17	

Note: Characters highlighted in orange are order features

Order table

Feature	Order text		Specification	Additional information
Design/mounting position	...	A	12, 14, 16, 17	see icons illustrating the mounting position
Indication after 1st revolution	...	B	6/5, 10, 15, 17/5, 20, 25, 30, 39/4, 40, 50, 60, 80, 100	/5 = arithmetical value not displayed
			others on request	
Decimal place	0	C	0 = 00000	
	1		1 = 0000.0	
	2		2 = 000.00	
	3		3 = 00.000	
	4		4 = 0.0000	
Counting direction = ascending values	i	D	clockwise	
	e		counter-clockwise	
Hollow shaft/diameter (mm)	...	E	25, 30	
	VA30		Ø 30 mm	stainless steel
	...		RH10, RH12, RH14, RH16, RH20, RH25	reducing bush
Hollow shaft/form	WK	F	short hollow shaft	
	WL		long hollow shaft	
Torque support/position	I	G	position I	
	II		position II	
Housing color	0	H	orange RAL 2004	
	S		black RAL 9005	
Axial seal	OAD	I	without axial seal	
	AD		with axial seal	see technical details

Order code

DA10 - [ ] A - [ ] B - [ ] C - [ ] D - [ ] E - [ ] F - A - [ ] G - [ ] H - K - [ ] I - BP

Scope of delivery: DA10

Accessories:
Reducing bushes Page 110

Additional information:
General information and areas of application Page 8 cont.

Profile DA05/1

- Robust design in a metal housing
- Hollow shaft, max. Ø 20 mm
- Counter with 5 decades and fine reading
- Display can be designed for “mm” or “inch”
- Attenuated counter system
- Fine setting for correction of dimensions
- Reversible counting direction

1.1

Accessories:
Reducing bushes *Page 110*

Additional information:
General information and areas of application *Page 8 cont.*
Data sheet *www.siko.de*

Profile DA08

- Extremely sturdy design in a metal housing
- Hollow shaft, max. Ø 35 mm
- Counter with 4 or 5 decades
- Zeroing function
- Clamp lever integrated in the design
- Stainless-steel driving shaft as an option
- Reversible counting direction

Accessories:
Reducing bushes *Page 110*

Additional information:
General information and areas of application *Page 8 cont.*
Data sheet *www.siko.de*

Profile DA10R/1

- Version with two counters (4 or 5 decades) and fine reading
- Predestined for use with wood milling machines
- Hollow shaft, max. Ø 30 mm
- Display can be designed for “mm” or “inch”

1.1

Accessories:

Reducing bushes — *Page 110*

Additional information:

General information and areas of application — *Page 8 cont.*

Data sheet — *www.siko.de*

1.2

1.2 | Electronic digital position indicators

High-resolution measuring technology – flexibly programmed, robust and precise

Mechanical position indicators are already used successfully on shafts and spindles for displaying position values. Electronic digital position indicators are, formally speaking, a logical further development of their mechanical counterparts. Thanks to comparable outer dimensions and the track-proven slip-on principle on the shaft, reconfiguration from mechanical to electronic-programmable indicator technology is a matter of minutes.

The standalone indicators of the DE range are particularly effective as an alternative to mechanical counters if no suitable gearing is available for these. Their free programmability also permits positive and negative display values or operation in angled mode.

The ProTool DE software solution is mainly of interest for mechanical engineering applications, because it can be used to program DEs directly before they are mounted on adjustment spindles.

Therefore only one basic device type has to be kept on stock, which is set up in accordance with the respective application requirements.

Automated manual work

As an extension to the electronic standalone units of the DE range, the AP models also feature a bus interface. During bus-controlled operation,can be communicated setpoint and actual values between the individual absolute position indicators and a higher-level controller.

Teamwork in bus operation

This semi-automated spindle adjustment offers a much higher level of process reliability and shortens set-up times during format changes considerably. Due to the display of the set value directly on the shaft and feedback of the manually correctly set actual value, incorrectly set stops and tool positions are a thing of the past. The overall system is only enabled when all spindle positions have been correctly signaled, so that off-spec material or damaged tools caused by incorrectly set adjusting shafts are no longer possible.

Benefits

The electronic SIKO position indicators feature a series of software assisted functions:

- The spindle pitch, direction of rotation and decimal point can be freely programmed
- Length or angle indication: Two modes are possible
- Incremental measurement function, offset input: Flexible adaptation to user specifications is possible
- Zero setting of the shaft is performed at the touch of a button

Truly SIKO – the AP04 has a functional industrial design in a highly-integrated electro-mechanical construction. Its 2-line LCD display provides maximum reading accuracy directly on the shaft.

The ultimate achievement: Maximum dimensioned hollow shaft opening in relation to its size.

The magnetic measuring technology coupled with bus-compatible electronics means efficient setpoint-actual value comparison.

Applications

In an industrial environment, our customers really appreciate the precise and reliable measurement of the electronic position indicators. The shaft motion is no longer tracked by a gear unit but with non-contacting magnetic or capacitive methods. The magnetic measuring method is particularly robust and insensitive to soiling and vibration, and covers applications in particularly rough environmental conditions. The large LCD display also permits reliable reading of the respective position values. A typical application: Stop adjustment on miter saws requires very precise display values.

Additional flexibility is ensured by the implemented chain dimension function and offset input.

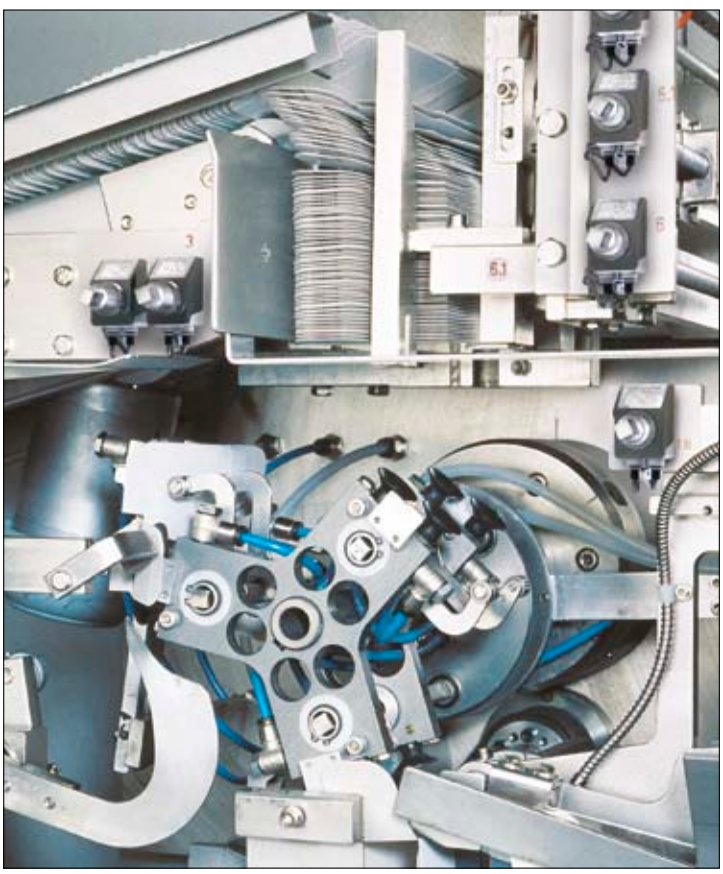
With the AP range it is also possible to perform easily controllable, semi-automated adjustment processes in complex machine environments. Communication "in the team" is standardized, and faulty adjustment is immediately visible during bus operation.

IEF Werner GmbH

1

Wittels Albert GmbH

2



3

4

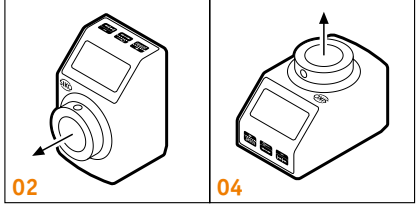
[1] Highest flexibility: The same basic device with programming adjusted to the application. [2] Easy optical upgrading via compatible mounting dimensions of mechanical and electronic position indicators. [3] Multiple format settings with AP04: Folding box production requires a number of adjustments. [4] Automated handiwork: bus-compatible position indicator AP04 for controlled spindle positioning.

Mounting position

Two factors determine this feature:
a) The orientation of the machine shaft
b) Display viewing direction

The number and orientation of the LCD display and the reading direction in the display are determined with a numeric code (e.g., 02, 04, etc.).

Fitting position



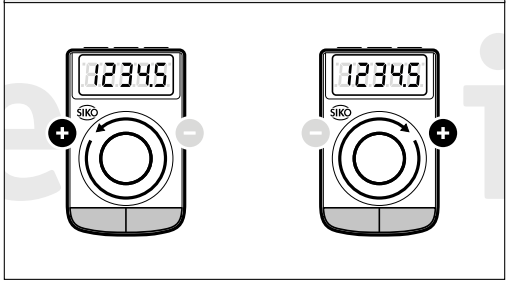
Sense of rotation

The sense of rotation of the axis influences the parameters programmed in the devices. Digital position indicators are available in two directions of rotation in relation to the machine axis:

"i" stands for clockwise
"e" stands for counter-clockwise

Ascending values are shown on the display in accordance with the "i" and "e" ordering code.

Sense of rotation



"+" shows the direction of rotation of the respective machine shaft. The ordering codes "e" and "i" specify in which direction of rotation the increasing values appear on the display.

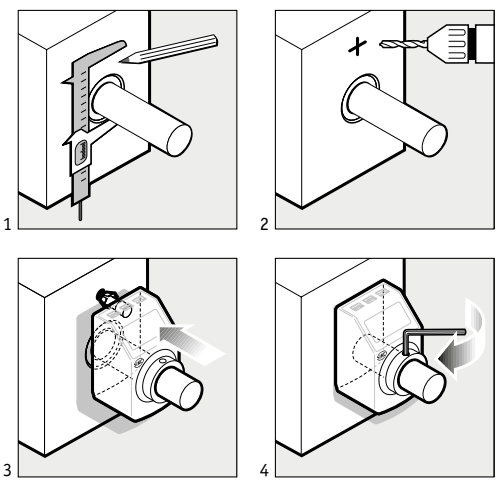
1.2

Mounting the torque support

The radius of the shaft is added to the space measurement between the hollow shaft and torque shaft. This measurement is marked on the mounting surface with a slide gauge and scriber, then center-punched and drilled (for the drilling diameter and depth, refer to the technical drawings). With correct predrilling, stress-free mounting of the position indicator must be possible.

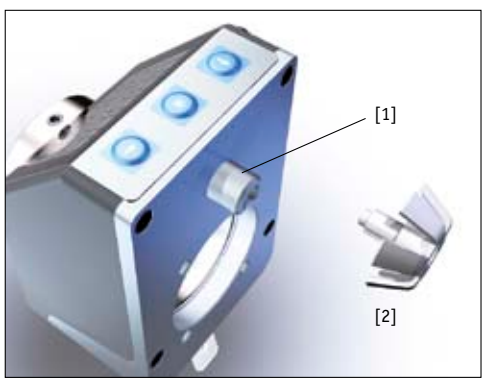
Locking on the shaft

Only the set screw is screwed in and tightened to achieve a positive connection with the shaft.



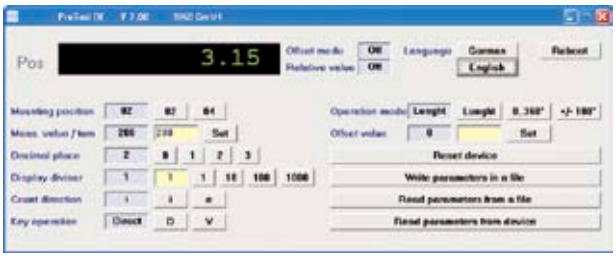
Torque support (2 versions)

On all electronic position indicators you have the choice between two different designs: [1] Either the pin belonging to the housing or [2] an additional umbrella. The umbrella is an optimum solution for compensating for mounting tolerances.



Programming software

ProToolDE is a convenient software solution for programming the electronic DE04 and DE10 digital indicators. This tool permits programming of a specific display value after one rotation, depending on the respective use of the device. The use of ProToolDE is particularly advantageous when several unprogrammed DE devices are to be kept in stock. Each digital indicator can be freely programmed with this software in accordance with the respective different demands.



ProTool DE offers:

- Free programming of all parameters
- Switchover mode between angle and linear measurement
- USB connection cable included

Gateway modules

The IF09 gateway module serves to connect the electronic indicators type AP with standardized field bus systems. Three bus connections are available. SIKO offers a specific converter for each of the listed connections. Connection of up to 31 stations is possible via the RS485 interface to Profibus or CAN-bus, and up to 8 stations to InterBus-S.

Ambient conditions	Examples of use	Benefits

Direct rotation:
Direct action via axle or spindle. The principle of action corresponds to that of a compound table or of linear guides.



E.g., compound tables, planing or dowel drilling machines ...

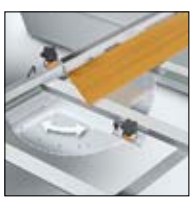
- Direct display after x,y adjustment
- Easy mounting
- Precise positioning
- Function keys for reset and incremental measurement
- Freely programmable display values

Special AP04 features
- Bus operation
- Indication of actual value on the spindle


E.g., tooling in the lumber and metal industries ...

1.2

Indirect rotation:
Indirect action (offset) on racks via cogwheel or worm gear.



E.g., angle adjustment units on saws, rotary and milling tables

- Linear or angular modes
- Freely programmable display values
- Easy battery change
- Reset and incremental measurement

E.g., end stop systems ...

Electronic digital position indicators

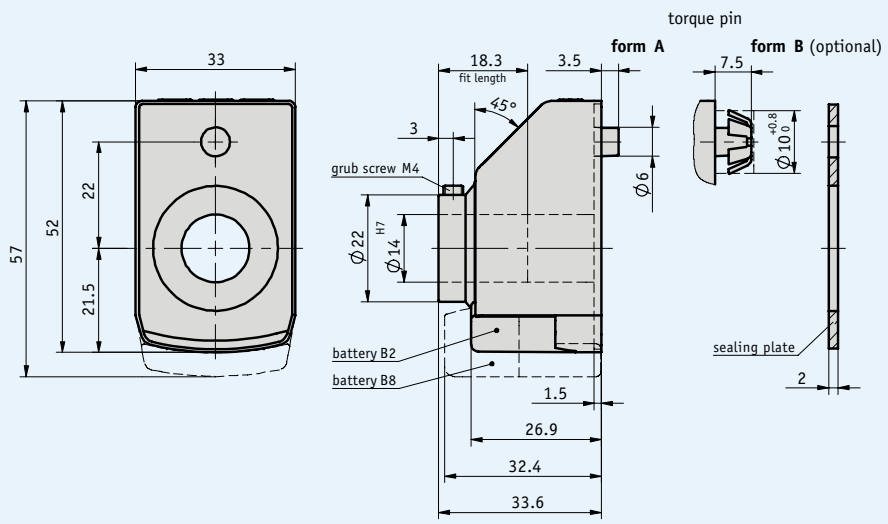
	DE04	DE10	DE10P	AP04	AP04S	AP24
Page	32	35	www.siko.de	38	40	www.siko.de
Display						
5-digit LCD	•	•		•	•	•
6-digit LCD			•			
Special characters	•	•	•	•	•	•
Interface						
RS485				•	•	•
CANopen (option)				•	•	•
Key functions						
Incremental measurement	•	•	•	•	•	
Offset input	•	•	•	•	•	
Calibration	•	•	•	•	•	
Confirmation						•
Programming	ProTool DE	ProTool DE	•	•	•	•
Digit height						
mm,approximately	8	12	11	7	7	7
Hollow shaft						
Diameter (mm)	14	30	30	20		
Dimensions						
WxHxD (mm),approximately	33x52x34	48x71x39	54x76x39	35x52x35	37x54x42	35x52x31

1.2

Digital position indicator DE04
Freely programmable

Profile

- Freely programmable electronic digital display for length or angular measurement
- Hollow shaft, max. Ø 14 mm
- LCD display with 5 digits and special characters
- Digit height approx. 8 mm
- Reset, incremental measurement, offset via keyboard
- Long battery life
- Easy battery change without dismantling of the device



Mechanical data

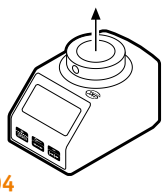
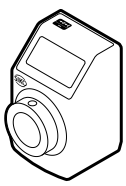
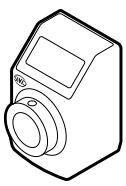
Feature	Technical data	Additional information
Weight	approx. 0.05 kg	
Hollow shaft	Ø 14H7, plain bearing, browned steel	(max. Ø 16H7)
Rotational speed	max. 600 rpm (100 % operation time)	
Protection category	IP51	
Operating temperature	-10 ... +60 °C	
Storage temperature	-30 ... +80 °C	
Housing	plastic	
Shock resistance	30 g /15 ms	according to DIN EN 60068-2-27
Vibration resistance	10 g /(5 ... 150 Hz)	according to DIN EN 60068-2-6
	20 g /(100 ... 2.000 Hz)	according to DIN EN 60068-2-6

Electrical data

Feature	Technical data	Additional information
Display	LCD display, 5-digit, 8 mm digit height	
Display range	-19999 ... 99999	
Battery	lithium coin cell, 3 V, CR2032 type	~2 years of service life
	lithium coin cell, 3 V, CR2477 type	~8 years of service life
EMC	DIN EN 61000-4-2	
	DIN EN 61000-4-4	

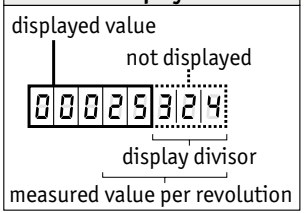
Order

- **Order note**

Mounting position		Key pad operation			Counting direction
					
02	**04**	**D/V**	**K**	**OF**	

Note: Characters highlighted in orange are order features

Display



Display divisor
The indication of the measured value on the display can be influenced by means of the divisor (divider). The divisor shifts figures of the measured value into the invisible sector of the display unit. Although the figures are not displayed, they are also calculated by the lectronics unit and mathematically rounded.

Calculation of value displayed (example: order text):

Measured value per revolution	25324
Display divisor	1000

Feature	Value displayed	Measured value
1st revolution	25	25324
2nd revolution	51	50648
3rd revolution	76	75972

Order table

Feature	Order text		Specification	Additional information
Design/mounting position*	02	A	horizontal spindle	
	04		vertical spindle	
Measured value per revolution*	...	B	2 ... 90 000	see calculation of value displayed
	W3600		angular mode 0 ... 360°, resolution 0.1°	only for decimal point „1“
	Z3600		angular mode -180 ... +180°, resolution 0.1°	only for decimal point „1“
Decimal place*	0	C	0 = 00000	
	1		1 = 0000.0	
	2		2 = 000.00	
	3		3 = 00.000	
Display divisor*	...	D	1, 10, 100, 1000	see calculation of value displayed
Counting direction* = ascending values	i	E	clockwise	
	e		counter-clockwise	
Key pad operation	D	F	zero setting, directly*	
	V		zero setting, delayed by 5 s*	
	K		only incremental measurement key	
	0F		without function keys	
Hollow shaft/diameter (mm)	...	G	14, 16	
	...		RH6, RH8, RH10, RH12	reducing bushes
			others on request	
Color	0	H	orange RAL 2004	
	R		red RAL 3000	
	S		black RAL 9005	
Battery	B2	I	~2 years of service life	
	B8		~8 years of service life	pay attention to the technical drawing

* programmable by means of ProTool DE programming software

Order code

DE04 – [A] – [B] – [C] – [D] – [E] – [F] – [G] – [H] – A – [I]

Scope of delivery: *DE04, User information*

Accessories:

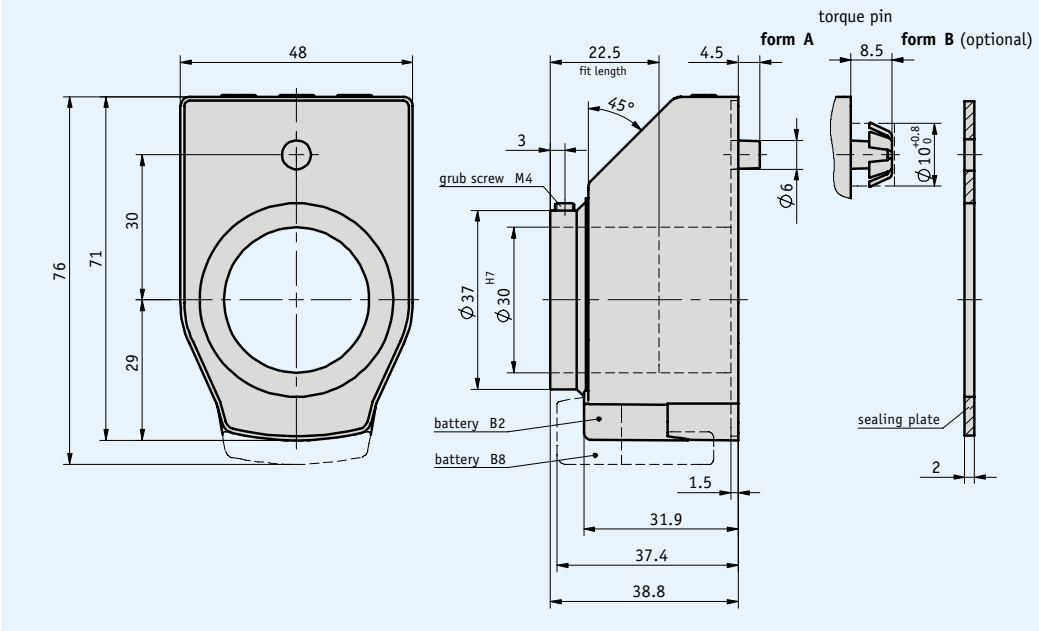
Programming software ProTool DE *Page 109*
Reducing bushes *Page 110*
Clamping plate KPE04 *www.siko.de*

Additional information:

General information and areas of application *Page 26 cont.*

Profile

- Freely programmable electronic digital display for length or angular measurement
- Hollow shaft, max. Ø 30 mm
- LCD display with 5 digits and special characters
- Digit height approx. 12 mm
- Reset, incremental measurement, offset via keyboard
- Long battery life
- Easy battery change without dismantling of the device



Mechanical data

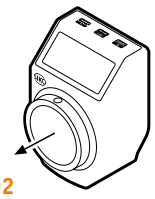
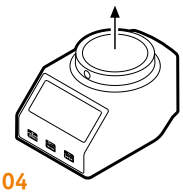
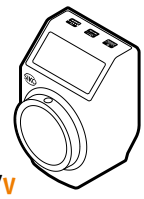
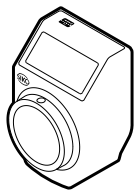
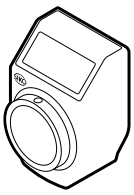
Feature	Technical data	Additional information
Weight	approx. 0.1 kg	
Hollow shaft	Ø 30H7, plain bearing, browned steel	
Rotational speed	max. 600 rpm (100 % operation time)	
Protection category	IP51	
Operating temperature	-10 ... +60 °C	
Storage temperature	-30 ... +80 °C	
Housing	plastic	
Shock resistance	30 g /15 ms	according to DIN EN 60068-2-27
Vibration resistance	10 g /(5 ... 150 Hz)	according to DIN EN 60068-2-6
	20 g /(100 ... 2.000 Hz)	according to DIN EN 60068-2-6

Electrical data

Feature	Technical data	Additional information
Display	LCD display, 5-digit, 11.5 mm digit height	
Display range	-19999 ... 99999	
Battery	lithium coin cell, 3 V, CR2032 type	~2 years of service life
	lithium coin cell, 3 V, CR2477 type	~8 years of service life
EMC	DIN EN 61000-4-2	
	DIN EN 61000-4-4	

Order

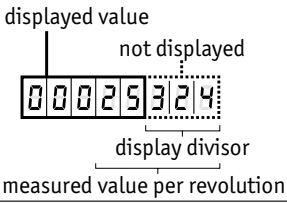
- **Order note**

Mounting position		Key pad operation			Counting direction
					
02	04	D/V	K	OF	

Note: Characters highlighted in orange are order features

1.2

Display



Display divisor
The indication of the measured value on the display can be influenced by means of the divisor (divider). The divisor shifts figures of the measured value into the invisible sector of the display unit. Although the figures are not displayed, they are also calculated by the lectronics unit and mathematically rounded.

Calculation of value displayed (example: order text):

Measured value per revolution	25324
Display divisor	1000

Feature	Value displayed	Measured value
1st revolution	25	25324
2nd revolution	51	50648
3rd revolution	76	75972

Order table

Feature	Order text		Specification	Additional information
Design/mounting position*	02	A	horizontal spindle	
	04		vertical spindle	
Measured value per revolution*	...	B	2 ... 90 000	see calculation of value displayed
	W3600		angular mode 0 ... 360°, resolution 0.1°	only for decimal point „1“
	Z3600		angular mode -180 ... +180°, resolution 0.1°	only for decimal point „1“
Decimal place*	0	C	0 = 00000	
	1		1 = 0000.0	
	2		2 = 000.00	
	3		3 = 00.000	
Display divisor*	...	D	1, 10, 100, 1000	see calculation of value displayed
Counting direction* = ascending values	i	E	clockwise	
	e		counter-clockwise	
Key pad operation	D	F	zero setting, directly*	
	V		zero setting, delayed by 5 s*	
	K		only incremental measurement key	
	0F		without function keys	
Hollow shaft/diameter (mm)	30	G	Ø 30 mm	
	20		Ø 20 mm	
	...		RH16, RH24, RH25, RH26	reducing bushes
			others on request	
Color	0	H	orange RAL 2004	
	R		red RAL 3000	
	S		black RAL 9005	
Battery	B2	I	~2 years of service life	
	B8		~8 years of service life	pay attention to the technical drawing

* programmable by means of ProTool DE programming software

Order code

DE10 – [A] – [B] – [C] – [D] – [E] – [F] – [G] – [H] – A – [I]

Scope of delivery: *DE10, User information*

Accessories:

Programming software ProTool DE *Page 109*
Reducing bushes *Page 110*

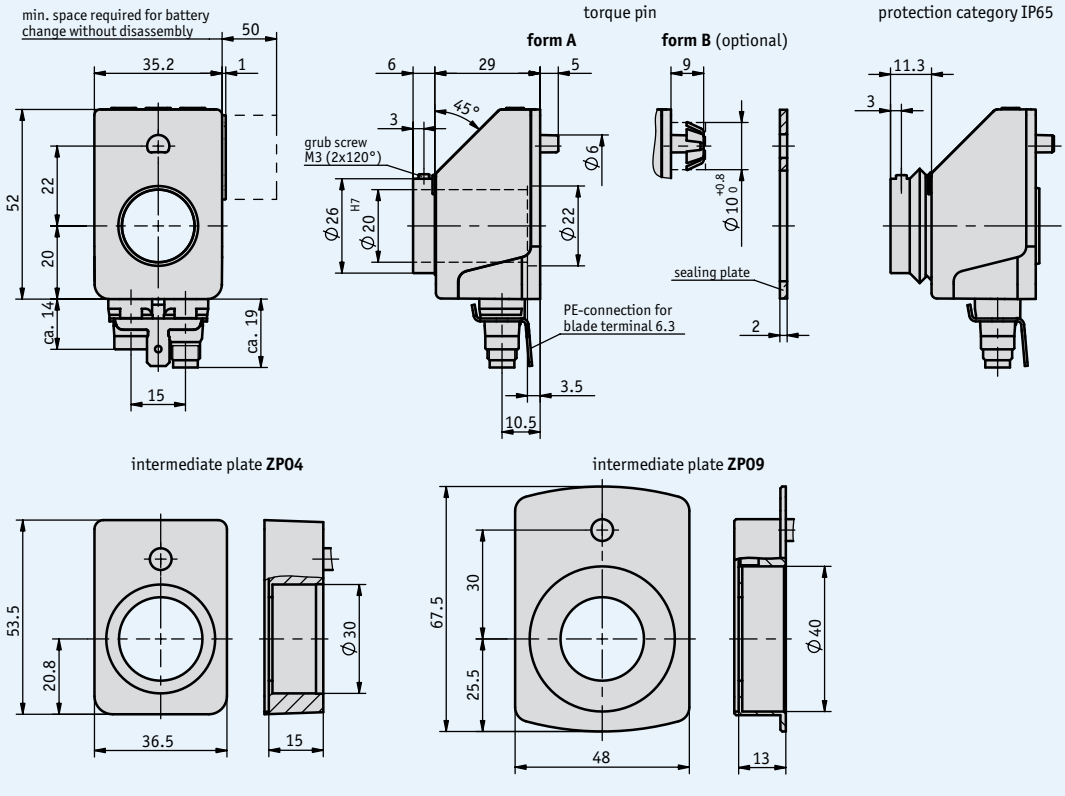
Additional information:

General information and areas of application *Page 26 cont.*

Digital position indicator AP04
With bus interface

Profile

- Electronic position indicator with bus interface
- Compact design
- Hollow shaft, max. Ø 20 mm
- Easily readable, two-line LCD for target and actual values
- Reset, incremental measurement, offset via keyboard
- Integrated RS485 interface, CAN bus as an option
- Robust sensor technology unit thanks to magnetic scanning
- User guidance via bicolor LED



Mechanical data

Feature	Technical data	Additional information
Max. speed	≤500 rpm	
Operating temperature range	0 ... 60 °C	
Storage temperature range	-20 ... +80 °C	
Protection category	IP53	in the mounted state, standard version
Housing	plastic reinforced	metal connector thread
Hollow shaft	stainless steel	
Housing color	black, RAL 9005	

Electrical data

Feature	Technical data	Additional information
Operating voltage	24 V DC ±20 %	
Current consumption	approx. 20 mA	
Battery life	approx. 5 years	
Type of connection	2x M8 connector	4-pin, 1x bush, 1x connector, additionally screen connection via flat-cable plug 6.3 mm
Bus connection	CAN bus or RS485	no galvanic isolation
Display	LCD display	7-segment + decimal points; 2 lines of 5 digits each, special characters
Special characters	left arrow, right arrow, increm. measurem.	
	replace battery	
Display size	approx. 7 mm digit height	
Signal indicator	bicolor LED (red/green)	
Keys	incremental measurement function,	
	parameterization , reset	
Scanning	magnetic	
Resolution	720 increments/revolution	
Display resolution	freely parameterizable between	
	1 and 65535 increments/revolution	
Coded number of revolutions	max. 7281	

Pin assignment

Interfaces

RS485	CAN bus	PIN
TxRx-/DÜB	CANL	1
TxRx+/DÜA	CANH	2
+24 V DC	+24 V DC	3
GND	GND	4

Order

Order table

Feature		Order text	Specification	Additional information
Interface/protocol	A	S3/00	RS485/SIKONETZ3, 4	
		S3/09	RS485/SIKONETZ5	
		CAN	CANopen	
Hollow shaft/diameter (mm)	B	20	Ø 20 mm	
		...	RH10, RH12, RH14, RH16	reducing bushes
			others on request	
Intermediate plate	C	OZP	without	only with protection category IP53
		ZP04	intermediate plate	
		ZP09	adapter plate	
Protection category	D	IP53	IP53	
		IP65	IP65	only with intermediate plate ZP04 or ZP09

Order code

AP04 - [A] - [B] - A - [C] - S - [D]

Scope of delivery: *AP04, User information*

Accessories:

Reducing bushes *Page 110*
Mating connectors *Page 106*
Cable extension *Page 107*
Battery unit *Page 108*
Clamping plate KPE04 *www.siko.de*

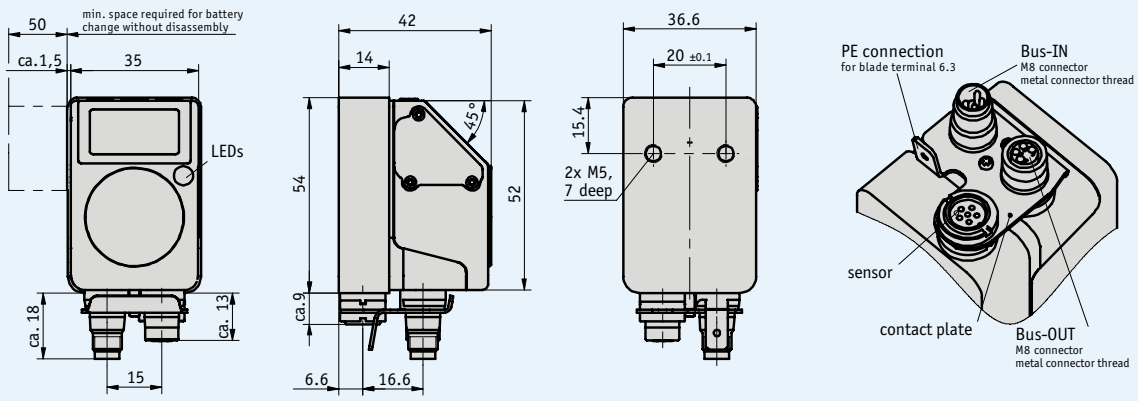
Additional information:

General information and areas of application *Page 26 cont.*

Digital position indicator AP04S
With bus interface, for positioning by means of an external sensor

Profile

- Electronic position indicator with plug connection for magnetic sensor
- Requires magnetic sensor MS500H and magnetic band MB500
- Easily readable, two-line LCD for target and actual values
- Integrated RS485 interface, CAN bus as an option
- Display accuracy up to 0.01 mm
- Absolute function via internal backup
- User guidance via bicolor LED



Mechanical data

Feature	Technical data	Additional information
Operating temperature range	0 ... 60 °C	
Storage temperature range	-20 ... +80 °C	
Protection category	IP54	optional IP65
Housing	plastic reinforced	metal connector thread
Mounting plate	steel browned	
Housing color	black, RAL 9005	

Electrical data

Feature	Technical data	Additional information
Operating voltage	24 V DC ±20 %	
Current consumption	approx. 20 mA	
Battery life	approx. 5 years	
Type of connection	2x M8 connector	4-pin, 1x bush, 1x connector, additionally screen connection via flat-cable plug 6.3 mm
Sensor connection	M8 connector	
Bus connection	CAN bus or RS485	no galvanic isolation
Display	LCD display	7-segment + decimal points; 2 lines of 5 digits each, special characters
Special characters	left arrow, right arrow, increm. measurem., replace battery	
Display size	approx. 7 mm digit height	
Signal indicator	bicolor LED (red/green)	
Keys	incremental measurement function, parameterization , reset	
Scanning	external sensor	
System accuracy	±35 µm	for use with MS500H
Measuring length	±655 m	for use with MS500H
Resolution	720 increments/revolution	for use with GS04
Encoded number of revolutions	≤7281	for use with GS04

Pin assignment

Interfaces

RS485	CAN-Bus	PIN
TxRx-/DÜB	CANL	1
TxRx+/DÜA	CANH	2
+24 V DC	+24 V DC	3
GND	GND	4

Order

Order Note

The following system components are required (optionally):

Magnetic sensor MS500H, Magnetic band MB500 *Page 42, 44*
Hollow shaft sensor GS04 *www.siko.de*

Order table

Feature	Order text		Specification	Additional information
Interface/protocol	S3/00	A	RS485/SIKONETZ3	
	S3/09		RS485/SIKONETZ5	
	CAN		CANopen	
Protection category	IP54	B		
	IP65			

Order code

AP04S - [A] - S - [B]

Scope of delivery: *AP04S, User information*

Accessories:

Mating connectors *Page 106*
Cable extension *Page 107*
Battery unit *Page 108*

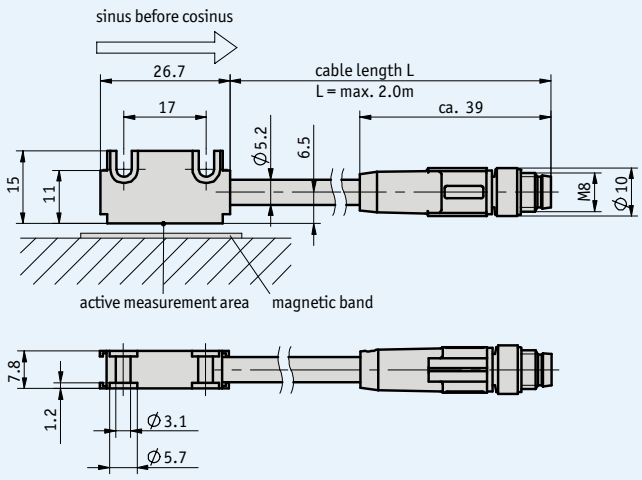
Additional information:

General information and areas of application *Page 26 cont.*

Magnetic Sensor MS500H
System component for AP04S

Profile

- Compact design of sensor and connector
- To be connected to AP04S
- Works with magnetic band MB500, MR500, MBR500
- Max. sensor/band reading distance 2 mm



Mechanical data

Feature	Technical data	Additional information
Scale embodiment	MB500, MR500, MBR500	
System accuracy	depends on downstream electronics unit	
Repeat accuracy	depends on downstream electronics unit	
Sensor/band reading distance	0.1 ... 2 mm	
Travel speed	depends on downstream electronics unit	
Housing	aluminum, varnished red	
Sensor cable	PUR	
Bending radius	52 mm	dynamic
Operating temperature	0 ... +60 °C	
Storage temperature	-20 ... +70 °C	
Humidity	100 % rh	condensation permitted
Protection category	IP67	

Electrical data

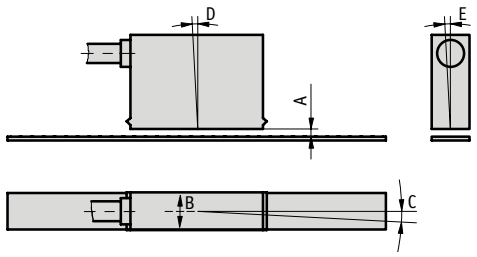
Feature	Technical data	Additional information
Operating voltage	feed via Position Indicator/ downstream electronics unit	
Current consumption	depends on Position Indicator/ downstream electronics unit	
Type of connection	M8 connector	6-pin, 1x connector
Resolution	depends on downstream electronics unit	
Measuring range	depends on downstream electronics unit	

Mounting instruction

Sensor/band reading distance A	max. 2 mm
Lateral offset B	max. ±2 mm

The connection must not be changed(e.g., different cable, cable length ...)

Sensor/band reading distance (symbolic sensor representation)



Order

Order table

Feature	Order data	Specifications	Additional information
Cable length L	... A	0.5 ... 2.0 m, in steps of 0.5 m	

Order code

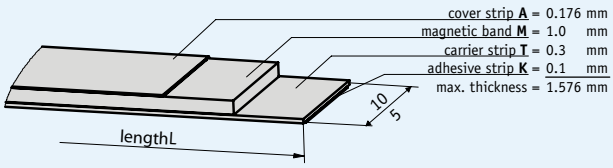
MS500H - L - E15 - [ ] A

Scope of delivery: *MS500H, User information, Allen fastening screws M3 x 14 mm ISO 4762, lock washers M3 DIN 7980, strain relief for sensor cable*

Magnetic Band MB500
System component for AP04S

Profile

- Easy adhesive mounting, self-assembly possible
- Pole length 5 mm
- System accuracy up to 50 µm



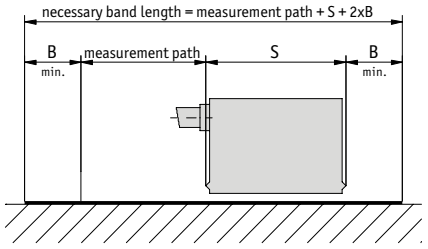
Mechanical data

Feature	Technical data	Additional information
Pole length	5 mm	
Measuring length	infinite	
Band width	10 mm	
	5 mm	
Thickness	1.4 mm	without cover strip
Accuracy class	50 µm or 100 µm	
Temperature coefficient	(11 ±1) x 10^{-6}/K	spring steel
	(16 ±1) x 10^{-6}/K	stainless steel
Operating temperature	-20 ... +70 °C	
Storage temperature	-40 ... +70 °C	
Humidity	100 % rh	condensation permitted
Mounting type	glued joint	pre-assembled double-sided adhesive strip
Cover strip material	stainless steel	

Order

The necessary band length is calculated as follows:
Measured path + sensor length "S" + (2 x lead-in and lead-out "B"). Sensor length "S" refer to the drawing of the employed sensor, lead-in and lead-out "B" = 10 mm.

Determination of band length (symbolic sensor representation)



Order table

Feature	Order data		Specifications	Additional information
Carrier strip	St	A	steel	
	VA		stainless steel	only with width 10 mm
Length	...	B	0.1 ... 90 m, in steps of 0.1 m	Order information, see "Determination of band length"
Cover strip	AM	C	with	stainless steel
	A0		without	

Order code

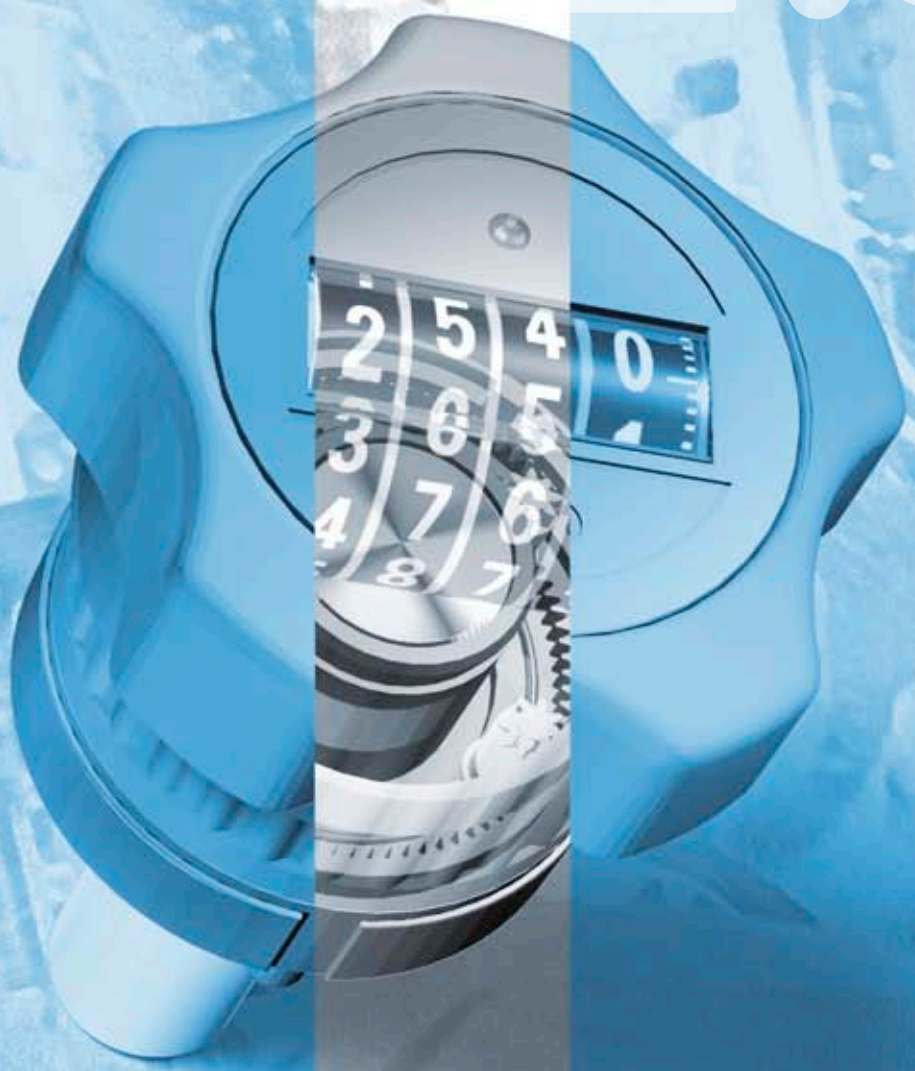
MB500 - 10 - 0.1 - [A] - [B] - TM - [C] - 10 - 0

Scope of delivery: MB500, User information

Accessories:

Profile rail PS	MagLine catalogue
Protective strip SB	MagLine catalogue
Cover rail PS1	MagLine catalogue

1.3



1.3 | Control knobs

Less is more – elegant double function in a flash

Since their introduction a few years ago, the SIKO mechanical control knobs (referred to as DK) with their integrated measurement system have successfully conquered many new fields of application. This is literally due to their "sensitive touch", as the control knobs are filigree, industrial standard adjusting knobs comprising a clever combination of miniature handwheel and mechanical digital position indicator.

With the control knobs, applications are possible in which multiple shaft or spindle rotations must be shown under restricted space conditions. The easy-to-handle control knobs already demonstrate their direct effect on the installed mechanical indicators with the most minimal movement, because all DKs have a full reduction gear in spite of their small dimensions. Only this gear technology enables the extremely fine-resolution tracking and precise absolute depiction of adjustment values directly at the measuring point.

Mounting is also extremely simple: Slip on, lock in place - ready.
Only a small drilled hole on the machine is necessary to accommodate the torque pin. The track-proven SIKO gear technology enables installation in any position.

The innovative concept of the DK range inspires mechanical engineering companies to create very compact, ergonomic and particularly inexpensive solutions. Users profit from the development experience in both areas of competence combined in this product group – handwheel technology and mechanical indicators.

The mechanical control knobs stand for economy, a wide application range and user-oriented product design.

Benefits

- Long service life due to consistent further development of technology and user-oriented choice of materials
- Excellent cost-benefit ratio
- Clear and precisely readable digital and analog value
- Modifiable displays owing to individual ratios
- Can be mounted in any position
- Cost-efficient retrofitting
- Easy slip-on hollow shaft mounting
- Special scales with analog knobs

1.3

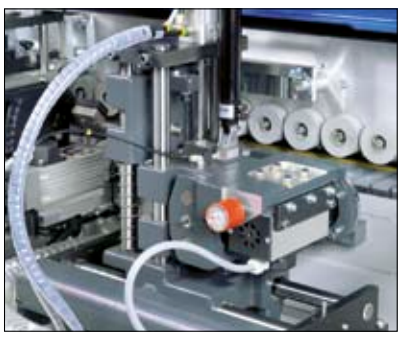
Setting values firmly under control – the DK01 is an example of a new ergonomic design for manual adjustment of adjustment shafts under particularly restricted space conditions. Value display meets the highest precision demands.

Applications

SIKO control knobs are versatile series-manufactured products which provide a number of additional displayed values in addition to the standard values.

Their suitability for industrial environments is demonstrated, for example, in process engineering applications, because these require a high level of precision during valve adjustment for numerous dosing applications. Many available actuators prove to be unsuitable as the necessary accuracy and reproducibility requirements cannot be met. The SIKO control knobs meet both criteria with ease and even visualize non-linear adjustment sequences.

1



Felder KG

2

Vögtlin Instruments AG

3

4

5

Gallus Druckmaschinen GmbH

[1] Correct posioting with one grip: DK03 for tool postioning on an edge banding machine. [2] Fine adjustment: Control knob for adjustment and monitoring opening of needle valves. [3] Use on dosing valves: DK01 with integrated position indicator enables reproducible valve settings without additional measuring devices. [4] The compact design of the SIKO control knobs: Ideal for cramped mounting areas. [5] DK03 with analog display for positioning print cylinders. Owing to the device's design with torque support, zero-point calibration of the display is maintained even when opened „headfirst".

Determining decimal points

The table opposite shows the decimal point principle of the digital indicators. For example, to obtain the reading “10.0”, the indicator must count “100” with the decimal place 1 after the first rotation. The decimal point is marked by a colored intermediate ring during series production.

Order figure	Indication	Display
for decimal place	e.g., 4-digit	
0	0000	0000
1	000.0	000|0
2	00.00	00|00
3	0.000	0|000

Background information

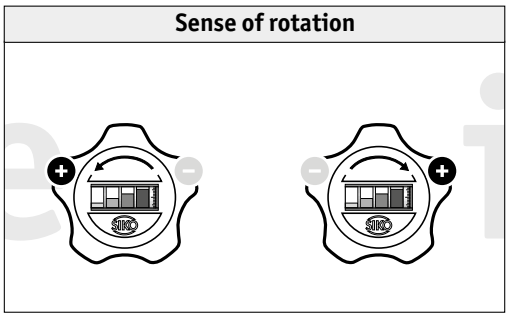
SIKO deals with the relationship between the spindle pitch and decimal point as follows: The spindle pitch serves as a reference. If this is 4 mm, the gear unit is designed so that 4.0 appears on the display after the first rotation.

Sense of rotation

The sense of rotation of the shaft influences the gear unit installed in the DK. Digital control knobs are available in two directions of rotations in relation to the corresponding machine shaft:

“i” stands for clockwise
“e” stands for counter-clockwise

Ascending values are shown on the display in accordance with the “i” and “e” ordering code.

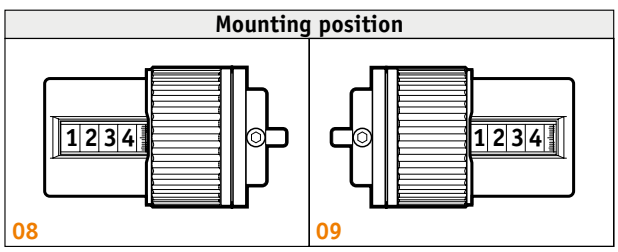


“+” shows the direction of rotation of the respective machine shaft. The ordering codes “e” and “i” specify in which direction of rotation the increasing values appear on the display.

Mounting position

Two factors determine the ordering codes of DK02*, DK05:
a) The orientation of the machine shaft
b) The line of vision to the window (decades)

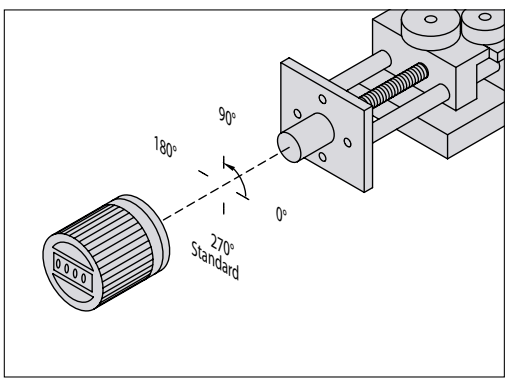
The position and orientation of the DK window and the visible decades are determined with a numeric code (e.g., 08, 09, etc.).



* Mounting example, DK02

Torque support

Several control knobs offer a choice of torque support positioning. These control knobs can therefore be mounted in a range of positions to suit the customer’s equipment.



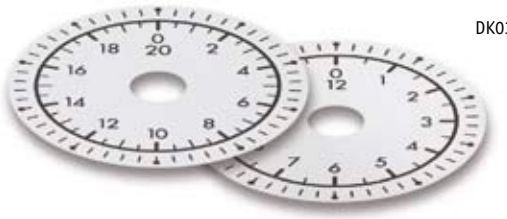
Scales for control knobs with analog display

Each scale must meet different requirements depending on the wide range of applications of analog control knobs. The basis for the displayed values is always the gear ratio. This defines the path which must be traversed after a specific number of rotations of the pointer (DK03) itself or the scale under the stationary pointer (DKA02).

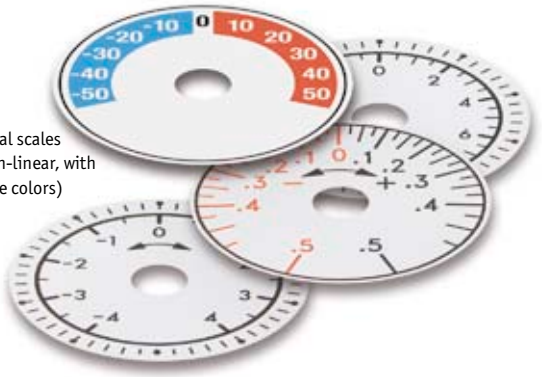
This why standard scales cannot do justice to all requirements. For these cases, SIKO supplies special scales which can be designed to suit customer requirements, for example for tracking adjustment in both directions, starting at zero and requiring a scale with ascending and descending values.

Non-linear scales are also possible, for example to display the opening degree of a valve.

Precise information in the form of diagrams or technical drawings are necessary for manufacturing such scales. Special requirements such as graduation, digits, company logos and color wishes can also be met.



DK03-normal scale

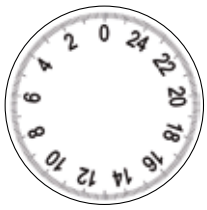


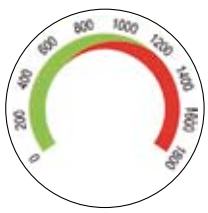
DK03 special scales (linear/non-linear, with one or more colors)

Free angle

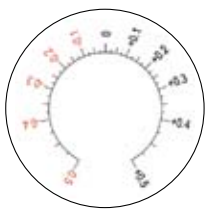
In some cases it can be necessary to provide a free angle,i.e. a zone on the scale which is not used for display purposes. This depends on your application and the ratios supplied by SIKO.

Free angles for the display of adjustment with a lower ratio are particularly used for the DKA02 control knob, which is only available with a fixed ratio of 26:1. Refer to the section on handwheels (page 70) for more information on this topic.

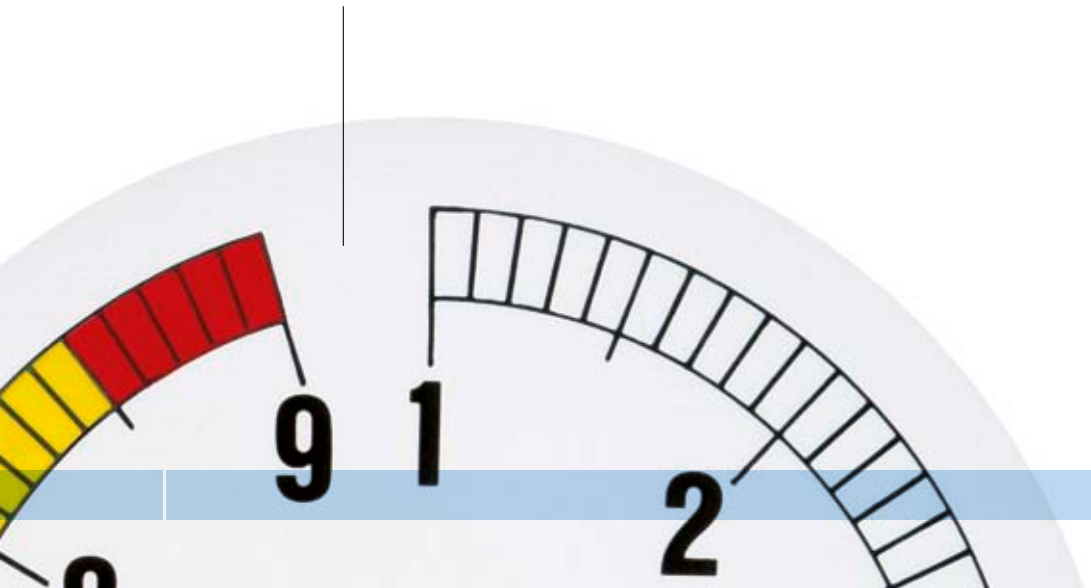




Normal scale (DKA02) and special customized scales: A sketch is normally sufficient in most cases. Refer to drawing aids (handwheels, accessories).



In some cases it can be necessary to provide a free angle,i.e., a zone on the scale which is not used for display purposes. This depends on your application and the ratios supplied by SIKO.



Ambient conditions	Examples of use	Benefits

Spindle settings
Direct action via axle or spindle. The principle of action corresponds to that of a compound table or of linear guides.



E.g., compound tables, planing or dowel drilling machines ...

- Direct display after x,y adjustment
- Easy mounting
- Precise positioning
- Flexible indication of values
- mm or inch


E.g., tooling in the lumber and metal industries ...

1.3

Process engineering
Visualization of valve settings, flow control ...



E.g., flow controllers for gases, liquids and granule, dosing pumps ...

- Variable mounting positions
- Visual representation of valve settings
- Exact reproducibility of set values (e.g. flow quantities)
- Non-linear special scales

E.g., gas mixer taps ...

Drive technology
Speed setting ...

E.g.,. miniature motors

- Ultra-fine speed setting
- Non-linear special scales

Control knobs

	DK01	DK02	DK03	DK04	DK05	DKA02	DKE01
							
							
							
							
							
							
							
Page	54	56	58	60	62	64	www.siko.de
Display type							
Analog			•			•	
Mechanical digital	•	•		•	•		
Electronic digital							•
Displays							
2 decades*				•			
3 decades*				•	•		
4 decades*	•	•					
5-digit LCD							•
Analog			•			•	
Hollow shaft							
Diameter (mm)	14	14	14	8	10	10	20
Control knob dimensions							
External diameter (mm)	36	36	36	23.5	40	40	80

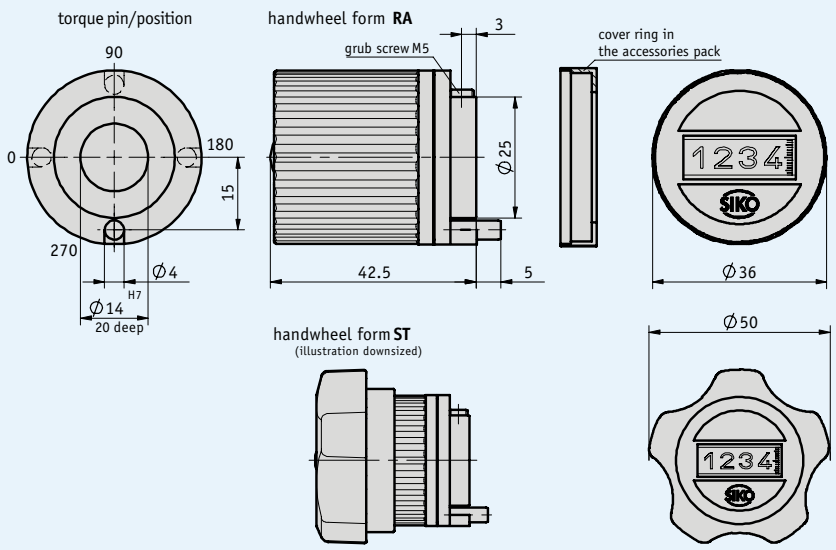
* Decade = digit ring with 10-division

1.3

Mechanical control knob DK01
Front view

Profile

- Control knob with integrated position indicator
- Shaft accommodation max. Ø 14 mm
- Counter with 4 decades and fine reading
- Various display values
- Star wheel as an option



Mechanical data

Feature	Technical data	Additional information
Counter	4 decades, fine reading	
Digit height	approx. 6 mm	
Ambient temperature	max. 80 °C	
Weight	0.06 kg	
Housing	plastic	
Window	plastic	optional mineral glass

Order

Order table

Feature	Order text			Additional information
Indication after 1st revolution	...	A	12/5, 15, 17/5, 20, 25, 30, 40, 50, 100	/5 = arithmetical value not displayed
			others on request	
Decimal place	0	B	0 = 0000	
	1		1 = 000.0	
	2		2 = 00.00	
	3		3 = 0.000	
Counting direction = ascending values	i	C	clockwise	
	e		counter-clockwise	
Hollow shaft/diameter (mm)	14	D	Ø 14 mm	
	...		RH8, RH10, RH12	Reducing bushes
			others on request	
Torque support/position	270	E	see the drawing	
	0		see the drawing	
	90		see the drawing	
	180		see the drawing	
Handwheel design	RA	F	knurled handle	
	ST		star wheel	
Handwheel color	FR	G	blazing red RAL 3000	
	S		black RAL 9005	
Sealing ring	0	H	without sealing ring	
	M		sealing ring provided with the accessories pack	

Order code

DK01 – [A] – [B] – [C] – [D] – [E] – [F] – [G] – K – [H]

Scope of delivery: *DK01*

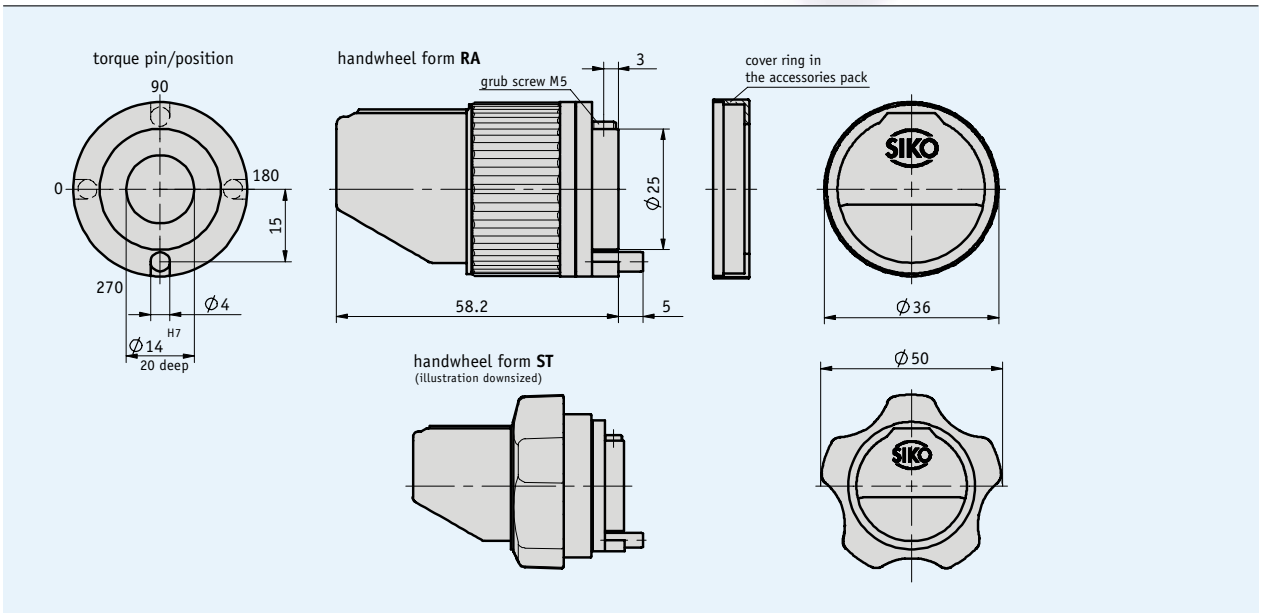
Accessories:
Reducing bushes *Page 110*

Additional information:
General information and areas of application *Page 48 cont.*

Mechanical control knob DK02
Side view

Profile

- Control knob with integrated position indicator
- Shaft accommodation: max. Ø 14 mm
- Counter with 4 decades and fine reading
- Various display values
- Star wheel as an option

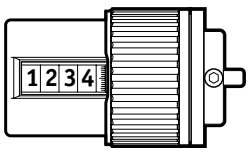
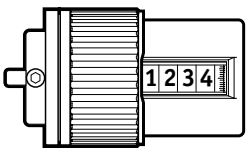


Mechanical data

Feature	Technical data	Additional information
Counter	4 decades, fine reading	
Digit height	approx. 6 mm	
Ambient temperature	max. 80 °C	
Weight	0.06 kg	
Housing	plastic	
Window	plastic	optional mineral glass

Order

Design

Mounting position	
	
08	09

Note: Characters highlighted in orange are order features

Order table

Feature	Order text		Additional information
Design	... A	08, 09	see the icons illustrating the mounting position
Indication after 1st revolution	... B	12/5, 15, 17/5, 20, 25, 30, 40, 50, 100	/5 = arithmetical value not displayed
		others on request	
Decimal place	0 C	0 = 0000	
	1	1 = 000.0	
	2	2 = 00.00	
	3	3 = 0.000	
Counting direction = ascending values	i D	clockwise	
	e	counter-clockwise	
Hollow shaft/diameter (mm)	14 E	Ø 14 mm	
	...	RH8, RH10, RH12	reducing bush
		others on request	
Torque support/position	270 F	see the drawing	
	0	see the drawing	
	90	see the drawing	
	180	see the drawing	
Handwheel design	RA G	knurled handle	
	ST	star wheel	
Sealing ring	0 H	without sealing ring	
	M	sealing ring provided with the accessories pack	

Order code

DK02 – [ ] A – [ ] B – [ ] C – [ ] D – [ ] E – [ ] F – [ ] G – FR – K – [ ] H

Scope of delivery: *DK02*

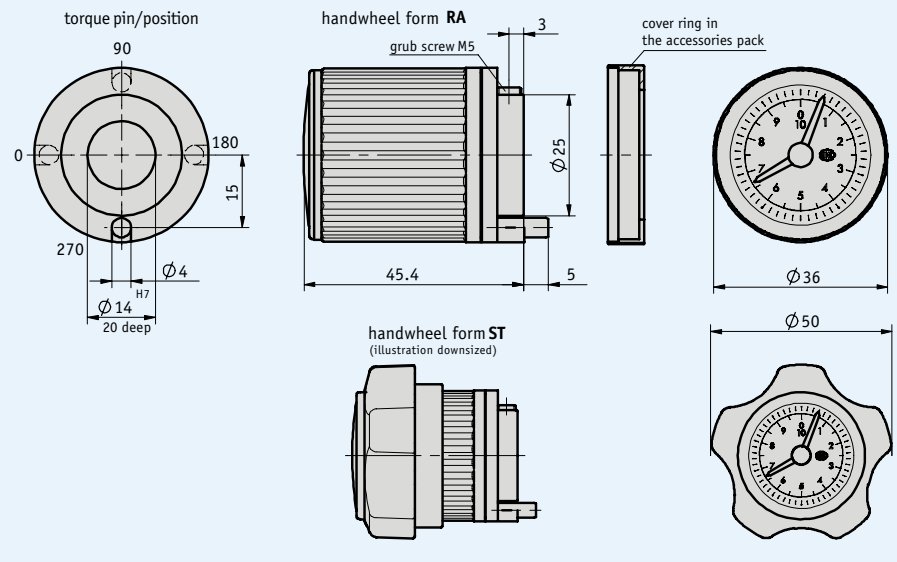
Accessories:
Reducing bushes *Page 110*

Additional information:
General information and areas of application *Page 48 cont.*

Mechanical control knob DK03
With analog scale

Profile

- Control knob with integrated position indicator
- Shaft accommodation: max. Ø 14 mm
- Front analog display
- Various gear ratios
- Special scales, also for non-linear settings
- Star wheel as an option



Mechanical data

Feature	Technical data	Additional information
Ambient temperature	max. 80 °C	
Weight	0.07 kg	
Housing	plastic	

Order

Order table

Feature	Order text			Additional information
Gear ratio	...	A	2, 3, 6, 10, 12, 15, 18, 20, 24, 30, 36, 48	others on request
Sense of rotation = ascending values	i	B	clockwise	
	e		counter-clockwise	
Pointer	1	C	red gear ratio	
	2		red gear ratio + black 1:1	
Scale	N..	D	normal scale	related to gear ratio
	VK..		special scale	custom-designed
Scale multi-colored	C1	E	1-color	
	C2		2-color	
	C3		3-color	
Hollow shaft/diameter (mm)	14	F	Ø 14 mm	
	...		RH8, RH10, RH12	reducing bush
			others on request	
Torque support/position	270	G	see the drawing	
	0		see the drawing	
	90		see the drawing	
	180		see the drawing	
Handwheel design	RA	H	knurled handle	
	ST		star wheel	
Handwheel color	FR	I	blazing red RAL 3000	
	S		black RAL 9005	
Sealing ring	0	K	without sealing ring	
	M		sealing ring provided with the accessories pack	

Order code

DK03 – [A] – [B] – [C] – [D] – [E] – [F] – [G] – [H] – [I] – [K]

Scope of delivery: *DK03*

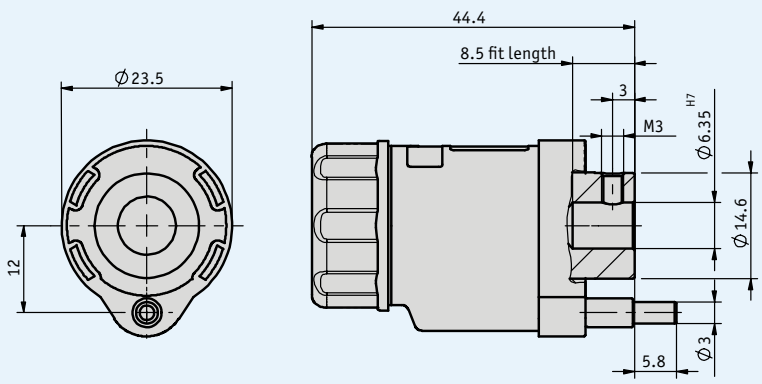
Accessories:
Reducing bushes *Page 110*

Additional information:
General information and areas of application *Page 48 cont.*

Mechanical control knob DK04
For fine adjustment

Profile

- Miniature rotary knob with digital display
- All mounting situations
- Shaft accomomodation max. Ø 6.35 mm
- Measuring range of max. 100 revolutions

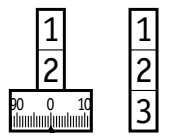
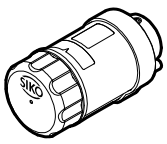
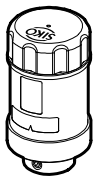


Mechanical data

Feature	Technical data	Additional information
Measuring range	up to 100 revolutions	
Ambient temperature	max. 80 °C	
Weight	approx. 20 g	
Housing	plastic	
Hollow shaft	stainless steel	

Order

Design

Display	Mounting position		Counting direction
 01F 010	 02	 04	

Note: Characters highlighted in orange are order features

Order

Order table

Feature	Order text			Additional information
Version	...	A	02, 04	see the icons illustration the mounting position
Indication after 1st revolution	01F	B	with fine scaling 0 ... 100	binary digital
	010		without fine scaling	three-digit digital
Decimal place	0	C	000	
	1		00.0	
	2		0.00	
Sense of rotation = ascending values	i	D	clockwise	
	e		counter-clockwise	
Hollow shaft/diameter	6.35	E	Ø 6.35 mm	
			others on request	

Order code

DK04 – [ ] – [ ] – [ ] – [ ] – [ ]
A B C D E

1.3

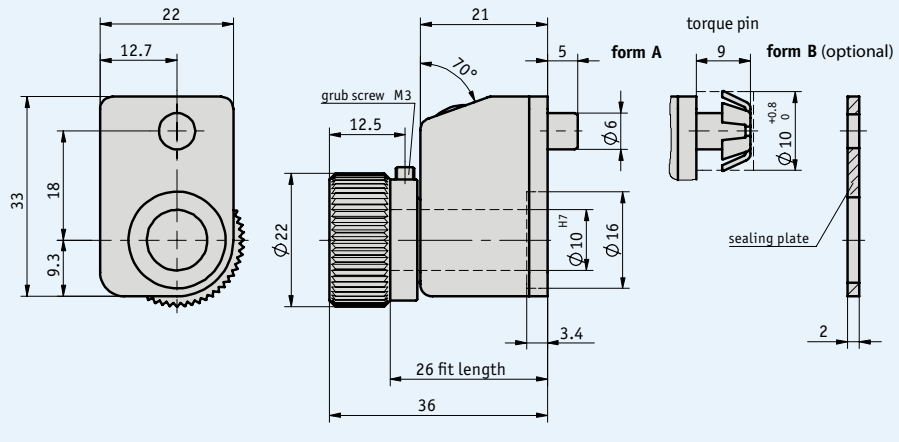
Scope of delivery: *DK04*

Additional information:
General information and areas of application *Page 48 cont.*

Mechanical control knob DK05
Miniaturized design with digital display

Profile

- Miniature control knob
- Shaft accommodation: max. Ø 10 mm
- Front display
- Counter with 3 decades
- Display can be designed for “mm” or “inch”
- Housing color: orange or black

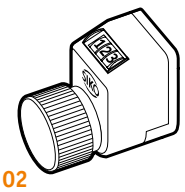
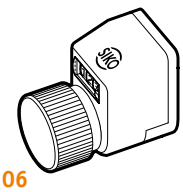
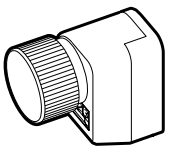


Mechanical data

Feature	Technical data	Additional information
Counter	3 decades	
Digit height	approx. 4 mm	
Ambient temperature	max. 80 °C	
Weight	approx. 0.02 kg	
Control knob shaft	Ø 10H7, plain bearing, anodized aluminum	
Housing	plastic, reinforced	

Order

Design

Display	Mounting position				Counting direction
1 2 3	 02	 04	 06	 07	

Note: Characters highlighted in orange are order features

Order table

Feature	Order text			Additional information
Design	...	A	02, 04, 06, 07	see the icons illustrating the mounting position
Display after 1st revolution	...	B	7/5, 10, 12/5, 15, 17/5, 20, 25, 30, 40, 50, 60, 80, 100	/5 = arithmetical value not displayed
			others on request	
Decimal place	0	C	0 = 000	
	1		1 = 00.0	
	2		2 = 0.00	
Counting direction = ascending values	i	D	clockwise	
	e		counter-clockwise	
Hollow shaft/diameter (mm)	10	E	Ø 10 mm	
	RH8		reducing bush Ø 8 mm	
	RH6		reducing bush Ø 6 mm	
			others on request	
Color	0	F	orange	
	S		black	

Order code

DK05 – [ ] – [ ] – [ ] – [ ] – [ ] – [ ] – [A]
A B C D E F

Scope of delivery: DK05

Accessories:
Reducing bushes *Page 110*

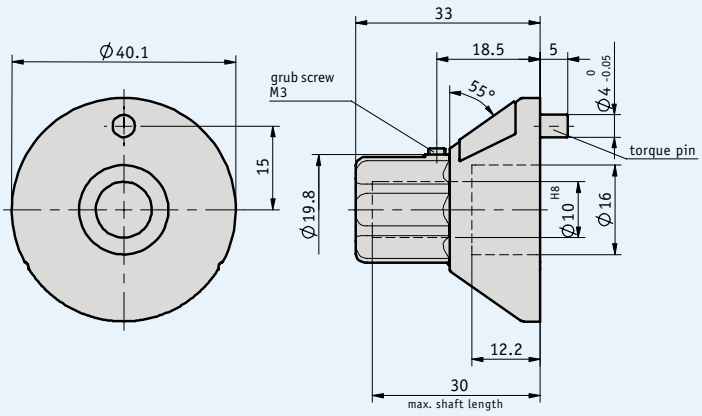
Additional information:
General information and areas of application *Page 48 cont.*

1.3

Mechanical control knob DKA02
Miniaturized design with analog display

Profile

- Miniature control knob with analog display
- Shaft accommodation: max. Ø 10 mm
- Use of normal scales or custom-designed displays
- Fine scaling as an option
- Free choice of mounting situation



Mechanical data

Feature	Technical data	Additional information
Gear ratio	i = 26	
Ambient temperature	max. 80 °C	
Weight	approx. 16 g	
Housing	plastic	

Order

Order table

Feature	Order text			Additional information
Bore/diameter	10	A	Ø 10 mm	
			others on request	
Sense of rotation = ascending values	i	B	clockwise	
	e		counter-clockwise	
Scale	N26	C	normal scale 1...26	
	VK		special scale	
Scale multi-colored	C1	D	1-color	
	C2		2-color	
	C3		3-color	
Fine scaling	F100	E	imprint 0...100	
	OF		not imprinted	

Order code

DKA02 - [ ] - [ ] - [ ] - [ ] - [ ]
A B C D E

1.3

Scope of delivery: *DKA02*

Additional information:
General information and areas of application *Page 48 cont.*

1.4

1.4 | Mechanical analog positionindicators and handwheels

Also stay in full control with multiple turns - digital absolute indicators embedded in the analog pointer scale.

Track-proven precision display and adjustment equipment for robust manual operation

While the handwheel is mainly used for manual adjustment of axial rotation, an integrated display permits reproducibility in addition to indication of rotation positions.

The range of possible applications is very wide – even in our electronic age. This is particularly true as the analog displays also work in the event of a power failure.

The "clocks" (indicators) are high-precision mechanical measuring devices, which are coupled to a motion work for direct, analog display of the adjustment values. The combination of analog pointer indication and digital counter alternatively ensures a high reading reliability for multiple rotations.

Individual solutions

A wide range of scales is available for actually reading off the value. Cutomization is possible depending on the respective ratio or to suit individual customer requirements. As for the spindle pitch, almost any standard ratio can be accommodated at the works.

In addition to integrated position indication, handwheels are basically designed for mounting on horizontal spindles. A combination of the standard display with a planetary gear and a torque pin also enables mounting on spindles with any spatial orientation. Only the correct mechanical connection between the handwheel and the shaft must be ensured.

Rugged outside, fine inside

Versions with non-corrosive, watertight or oil-filled display dials are also available for heavy-duty operation. The particularly robust analog SIKO measuring concept "handwheel plus indicator" is also very efficient in everyday, long-term use.

Benefits

- Precise display of measured value owing to a pointer shaft with double bearings
- Very good readability owing to large scales
- Robust handwheels made of metal or fiber-glass reinforced plastic
- Rugged measuring system with favorable mounting and operation features
- Ideal adaptation to customer requirements owing to various ratios and provision of customized special scales

1.4

Robust handwheels for precise spindle adjustment

Precision is based on the interaction of many sophisticated details. SIKO handwheels – mechanically high-tech solutions for long-term service.

Counterweight for steady gravimetric alignment of the indicator on horizontal shafts

Applications

There are many reasons why handwheels are undergoing a renaissance. The most important aspect is probably the human factor, as we have a well-developed, pronounced “analog eye”. For example with his trained vision, an offset printer can see from a distance whether a setting is correct or if it deviates from the standard.

SIKO handwheels with position indicators are already standard in a wide range of different industrial environments. With their precise, highly reliable function they are used on printing machines for regulating the contact pressure of rotary cylinders or in chemical or food cylinders – as here for example in a brewery – for controlling mixing ratios.

With their tangible ergonomics they also prove their robustness in tough production and trade environments. The solid functional design upgrades a number of standard applications, especially the equipment used in the metal, plastic and wood processing industries. In the chemical industry they are used for direct flow control.

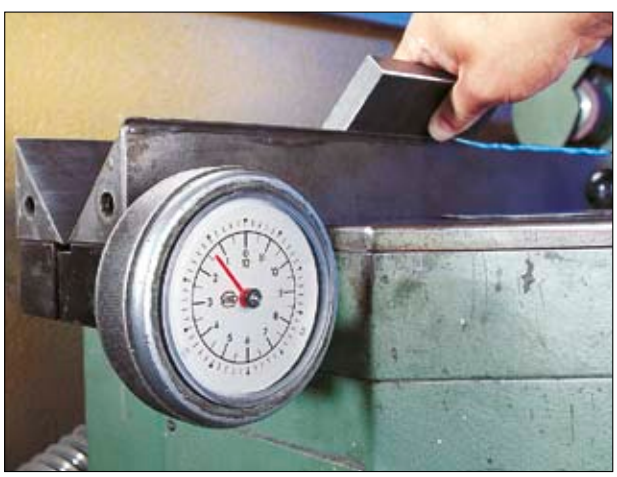
1

2

3

4

5

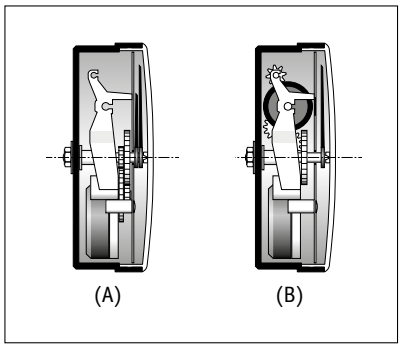


[1] Fine height adjustment of the saw blade of a circular saw. [2] Laminate coating system: Space monitoring during the coating process. [3] Tasty beer requires constantly controlled conditions: Control of mixing ratios in a brewery. [4] Control of roller pressure and ink mixing on small printing machines is still manual work. [5] A robust handwheel design is an important advantage in the metal processing industry.

Function

The functional principle of the SIKO position indicators is based on the physical force of gravity. The suspension design in the housings allows a double-mounted pointer shaft, which serves as a suspension shaft for a free-hanging weight.

The orientation of the scale, the gear unit with the required gear ratio and the pointer sleeve is based on the weight alignment. If the handwheel is turned, a gear wheel fixed in position on the pointer shaft ensures that the rotation is transmitted to the oscillating gear unit with a ratio of 1 : x. This direct connection between the handwheel and the bearing-mounted gear unit permits a display accuracy of 100 %.



Configuration of analog (A) and digital (B) position indicators. Small weights in this example ensure the vertical orientation of the indicator.

Zero setting function

When handwheels are used on horizontal spindles, this maintenance-free and reliable configuration permits simple referencing of the measured value.

Referencing (zero setting) is performed simply with a screwdriver from the front of the housing. Various covers are available for the use of SIKO handwheels without an indicator (e.g. as a simple crank). Ordering options are described under accessories.

1.4

Versions

SIKO supplies versions with non-corrosive, watertight or oil-filled dials for industrial applications (refer to table). An oil-filled version, for example, prevents misting of the glass caused by penetrating moisture, so that important data is always visible. Paraffin oil is also advantageous for all applications subject to strong vibration.

The properties of the dials can also be changed by using different glass types. Plastic glasses are light and break-resistant. The dials are equipped with Plexiglas as a standard; polyamide glasses ensure acetone resistance and hard mineral glass is a solution which is resistant to cleaning agents, solvents and corrosion.

N	• Dust-tight version, standard
P	• Filled with paraffin oil, absorbs vibration and impact • Non-misting dial
W	• Watertight, without filling

Background information

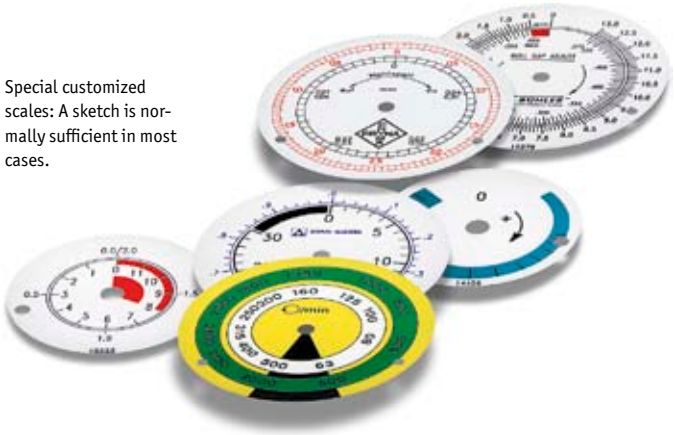
Due to the very different handwheel specifications, each scale or position indicator graduation must meet various requirements. The selected gear ratio is always used as a basis for the display values. This defines the distance which must be covered after a specific number of rotations.

Normal scales for position indicators

Normal scales

The type S position indicator can be equipped with two pointers, whereby one pointer is always moved with a gear ratio. With only one pointer and an assumed gear ratio of 20, a pointer moves across a scale range of 360° over 20 handwheel rotations, i.e., the entire adjustment path must be within only one rotation of this pointer. If a second pointer is selected, this runs 1:1 with the actual handwheel motion.

The position indicator type SZ is designed for larger measurement lengths. In this indicator the pointer of the display type S is replaced with a digital counter. Absolute display of more than one rotation of the pointer with a gear ratio is therefore possible. This combination has proven to be particularly advantageous in applications in which a large number of rotations and precise position information is required.



Special customized scales: A sketch is normally sufficient in most cases.

Special versions

Standard scales can naturally not do justice to all requirements. For this reason SIKO supplies special scales which can be designed to suit customer requirements, for example for tracking adjustment in both directions, starting at zero and requiring a scale with ascending and descending values. Precise information in the form of diagrams or technical drawings are necessary for manufacturing such scales. Special requirements such as graduation, digits, company logos and color wishes can also be met.

Calculation example* for type S:
Machine shaft, pitch p = 2
Measuring range 150 mm

Solution method:
Number of rotations “U” over the entire measuring range

$$\frac{150\ \text{mm}}{2} = 75\ \text{U}$$

If the ratio i = 75 is not available, select the next possible ratio (refer to the product pages “mechanical analog position indicators” from page 74, ordering table “ratios”). Assuming that the available standard ratio is 84 with a free angle, the calculation is this free angle: 84 rotations = 360°

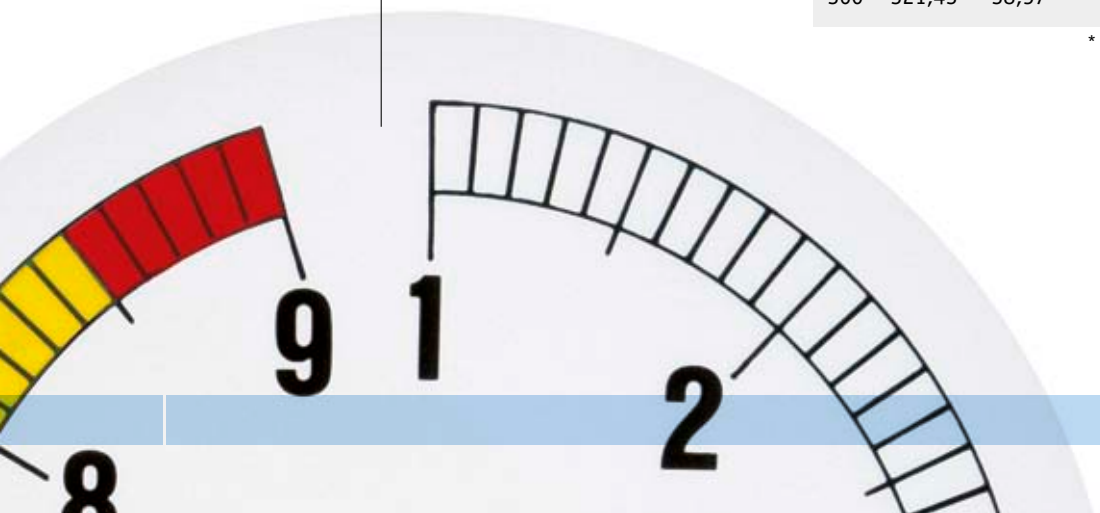
Pointer motion:

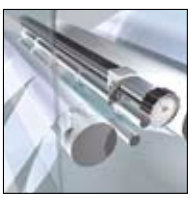
$$\frac{75\ \text{U} \times 360°}{84\ \text{U}} = 321{,}43°$$

Free angle:
360° – 321,43° = 38,57°

* Example not valid for SZ80/1

In several cases, it can be necessary to include a so-called free angle on the scale. This depends on your application and the ratios supplied by SIKO.



Ambient conditions	Examples of use	Benefits
 E.g., motor control	**Drive equipment** Setting and monitoring of speeds on variable speed gear units and disks. Setting of hydraulic units ...	■ Easy mounting ■ Precise speed setting ■ Indication of speed rpm ■ Normal and special scales, perfectly suited to the application
 E.g., flow setting	**Process engineering** Valve settings, pump capacity, stroke length adjustment on dosing pumps, setting of tablet presses ...	■ Easy mounting ■ Exact reproducibility of process settings ■ Mapping of non-linear adjustments ■ Normal and special scales, perfectly suited to the application
 E.g., rewind cutting machines (paper/foil industries)	**Printing and paper processing** Adjustment of ink application (inking rollers), setting of register and buckle plates, positioning of punching tools, stop adjustment ...	■ Easy mounting ■ Precise positioning and exact repositionability ■ Normal and special scales, perfectly suited to the application
 E.g., coating systems	**Roller positioning** For direct or angled rotational motion, for example on textile machines, laminating or coating systems ...	■ Versions for horizontal mounting ■ HKF design for all mounting positions (torque support, epicyclic gear) ■ Normal and special scales, perfectly suited to the application
 E.g., wood cutting	**Stop setting** Setting of stop depth, cutting width, angle or drill head for wood or sheet metal processing, tooling machines ...	■ Precise positioning ■ Exact angle indication ■ Robust metal handwheels for rough environmental conditions ■ Oil-filled versions for compensation of vibrations

Mechanical analog position indicators and handwheels

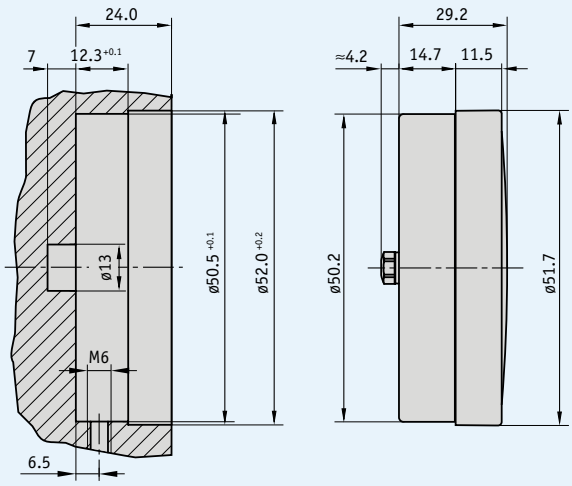
			S50/1	S70/1	S80/1	S120/1	SZ80/1
Page			74	76	78	80	82
Display							
analog			•	•	•	•	
analog-digital							•
Handwheel type, combinable with ...							
	Ø in mm	Form	Page				
Aluminum, integrated position indicator							
HR5	56		98				
Aluminum, separate position indicator							
HR	65 - 108		96	•		•		•
HST	75 - 110		92	•		•		•
HK/HKL	80 - 200		86	•		•	•	•
HS/HSL	80 - 200		89	•		•	•	•
Plastic, separate position indicator							
HG	63 - 98		94	•		•		•
KHB	87 - 200		84	•		•		•

1.4

Mechanical analog position indicator S50/1
For small SIKO handwheels

Profile

- Analog position indicator
- Data logging based on the gravity principle
- High stability thanks to doubly supported pointer shaft
- Very robust, glass-fiber enforced plastic housing
- Wide range of gear ratios
- Special scales, also for small numbers of pieces
- Dustproof, oil-filled or waterproof versions



Mechanical data

Feature	Technical data	Additional information
Housing	plastic, reinforced	
Weight versions N and W	0.1 kg	
Weight version P	0.1 kg	

Order

Order table

Feature	Order data		Technical data	Additional information
Version	N	A	dustproof	standard
	P		oil-filled	
	W		waterproof	
Gear ratio	...	B	1, 2, 3, 6, 10, 12, 15, 18, 20, 24, 30, 36, 48, 50, 60, 72, 84, 96, 100	
			others on request	
Sense of rotation = ascending values	i	C	clockwise	
	e		counter-clockwise	
Pointer	1	D	pointer with gear ratio	
	2		one pointer with gear ratio	and one pointer running 1:1
Cover glass	S	E	plastic	
	A		plastic, acetone-resistant	
Scale	N	F	normal scale	related to gear ratio
	VK		special scale	custom-designed, no VK with first article
Scale imprint	C1	G	one-color	
	C2		two-color	
	C3		three-color	

Order code

S50/1 - [A] - [B] - [C] - [D] - [E] - [F] - [G]

1.4

Scope of delivery: *S50/1*

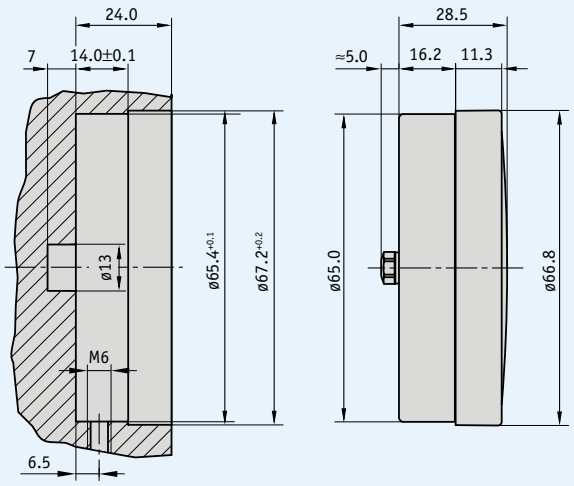
Accessories:
Drawing aid for scales *Page 111*

Additional information:
General information and areas of application *Page 68 cont.*

Mechanical analog position indicator S70/1
Individually usable for third-party handwheels

Profile

- Analog position indicator
- Data logging based on the gravity principle
- High stability thanks to doubly supported pointer shaft
- Very robust, glass-fiber enforced plastic housing
- Wide range of gear ratios
- Special scales, also for small numbers of pieces
- Dustproof, oil-filled or waterproof versions



1.4

Mechanical data

Feature	Technical data	Additional information
Housing	plastic, reinforced	
Weight of versions N and W	0.1 kg	
Weight of version P	0.2 kg	

Order

Order table

Feature	Order data		Technical data	Additional information
Version	N	A	dustproof	standard
	P		oil-filled	
	W		waterproof	
Gear ratio	...	B	1, 2, 3, 6, 10, 12, 15, 18, 20, 24, 30, 36, 48, 50, 60, 72, 84, 96, 100	
			others on request	
Sense of rotation = ascending values	i	C	clockwise	
	e		counter-clockwise	
Pointer	1	D	pointer with gear ratio	
	2		one pointer with gear ratio	and one pointer running 1:1
Scale	N	E	normal scale	related to gear ratio
	VK		special scale	custom-designed, no VK with first article
Scale imprint	C1	F	one-color	
	C2		two-color	
	C3		three-color	

Order code

S70/1 – [A] – [B] – [C] – [D] – [E] – [F]

Scope of delivery: *S70/1*

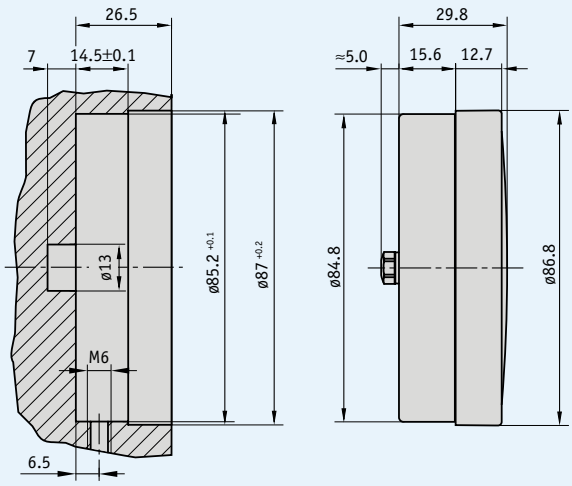
Accessories:
Drawing aid for scales *Page 111*

Additional information:
General information and areas of application *Page 68 cont.*

Mechanical analog position indicator S80/1
Compatible with many common handwheels

Profile

- Analog position indicator
- Data logging based on the gravity principle
- High stability thanks to doubly supported pointer shaft
- Very robust, glass-fiber reinforced plastic housing
- Wide range of gear ratios
- Special scales, also for small numbers of pieces
- Dustproof, oil-filled or waterproof versions



Mechanical data

Feature	Technical data	Additional information
Housing	plastic, reinforced	
Weight of versions N and W	0.1 kg	
Weight of version P	0.2 kg	

Order

Order table

Feature	Order data		Technical data	Additional information
Version	N	A	dustproof	standard
	P		oil-filled	
	W		waterproof	
Gear ratio	...	B	1, 2, 3, 6, 10, 12, 15, 18, 20, 24, 30, 36, 48, 50, 60, 72, 84, 96, 100	
			others on request	
Sense of rotation = ascending values	i	C	clockwise	
	e		counter-clockwise	
Pointer	1	D	pointer with gear ratio	
	2		one pointer with gear ratio	and one pointer running 1:1
Cover glass	S	E	plastic	
	A		plastic, acetone-resistant	
	M		mineral glass	
Zero setting	ON	F	without zero setting	
	MN		with zero setting	
Scale	N	G	normal scale	related to gear ratio
	VK		special scale	custom-designed, no VK with first article
Scale imprint	C1	H	one-color	
	C2		two-color	
	C3		three-color	

Order code

S80/1 - [ ] - [ ] - [ ] - [ ] - [ ] - [ ] - [ ] - [ ] - [ ]
A B C D E F G H

1.4

Scope of delivery: *S80/1*

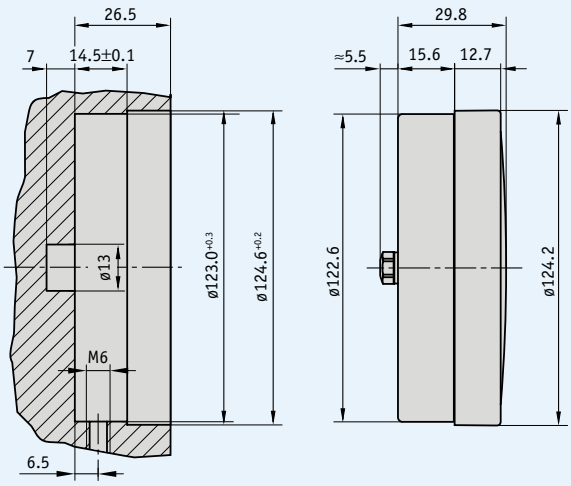
Accessories:
Drawing aid for scales *Page 111*

Additional information:
General information and areas of application *Page 68 cont.*

Mechanical analog position indicator S120/1
For particularly good readability

Profile

- Analog position indicator
- Data logging based on the gravity principle
- High stability thanks to doubly supported pointer shaft
- Very robust, glass-fiber reinforced plastic housing
- Wide range of gear ratios
- Special scales, also for small numbers of pieces
- Dustproof, oil-filled or waterproof versions



1.4

Mechanical data

Feature	Technical data	Additional information
Housing	plastic, reinforced	
Weight of versions N and W	0.2 kg	
Weight of version P	0.4 kg	

Order

Order table

Feature	Order data		Technical data	Additional information
Version	N	A	dustproof	standard
	P		oil-filled	
	W		waterproof	
Gear ratio	...	B	1, 2, 3, 6, 10, 12, 15, 18, 20, 24, 30, 36, 48, 50, 60, 72, 84, 96, 100, 120, 150, 200, 250, 300, 360, 500	
			others on request	
Sense of rotation = ascending values	i	C	clockwise	
	e		counter-clockwise	
Pointer	1	D	pointer with gear ratio	
	2		one pointer with gear ratio and one pointer running 1:1	
Zero setting	ON	E	without zero setting	
	MN		with zero setting	
Scale	N	F	normal scale	related to gear ratio
	VK		special scale	custom-designed, no VK with first article
Scale imprint	C1	G	one-color	
	C2		two-color	
	C3		three-color	

Order code

S120/1 – [A] – [B] – [C] – [D] – [E] – [F] – [G]

1.4

Scope of delivery: *S120/1*

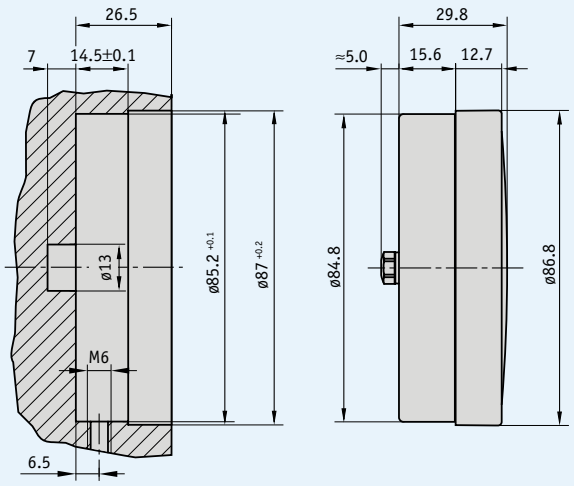
Accessories:
Drawing aid for scales *Page 111*

Additional information:
General information and areas of application *Page 68 cont.*

Mechanical analog position indicator SZ80/1
With additional digital counter

Profile

- Combined analog-digital position indicator
- Data logging based on the gravity principle
- High stability thanks to doubly supported pointer shaft
- Very robust, glass-fiber reinforced plastic housing
- Counter with 5 decades
- Special scales, also for small numbers of pieces
- Dustproof or oil-filled versions



Mechanical data

Feature	Technical data	Additional information
Housing	plastic, reinforced	
Weight of version N	0.2 kg	
Weight of version P	0.3 kg	

Order

Order table

Feature	Order data		Technical data	Additional information
Version	N	A	dustproof	standard
	P		oil-filled	
Indication after 1st revolution	...	B	2, 2/5, 3, 4, 5, 6, 8, 10, 15	e.g. 00010
			others on request	
Decimal places	0	C	0 = 00000	
	1		1 = 0000.0	
	2		2 = 000.00	
	3		3 = 00.000	
	4		4 = 0.0000	
Sense of rotation = ascending values	i	D	clockwise	
	e		counter-clockwise	
Pointer	1	E	pointer running 1:1	
	OZ		without pointer	
Cover glass	S	F	plastic	
	A		plastic, acetone-resistant	
Scale	N	G	normal scale	related to indication after 1st revolution
	VK		special scale	custom-designed, no VK with first article
Scale imprint	C1	H	one-color	
	C2		two-color	
	C3		three-color	

Order code

SZ80/1 - [ ] - [ ] - [ ] - [ ] - [ ] - [ ] - [ ] - [ ] - [ ]
A B C D E F G H

1.4

Scope of delivery: *SZ80/1*

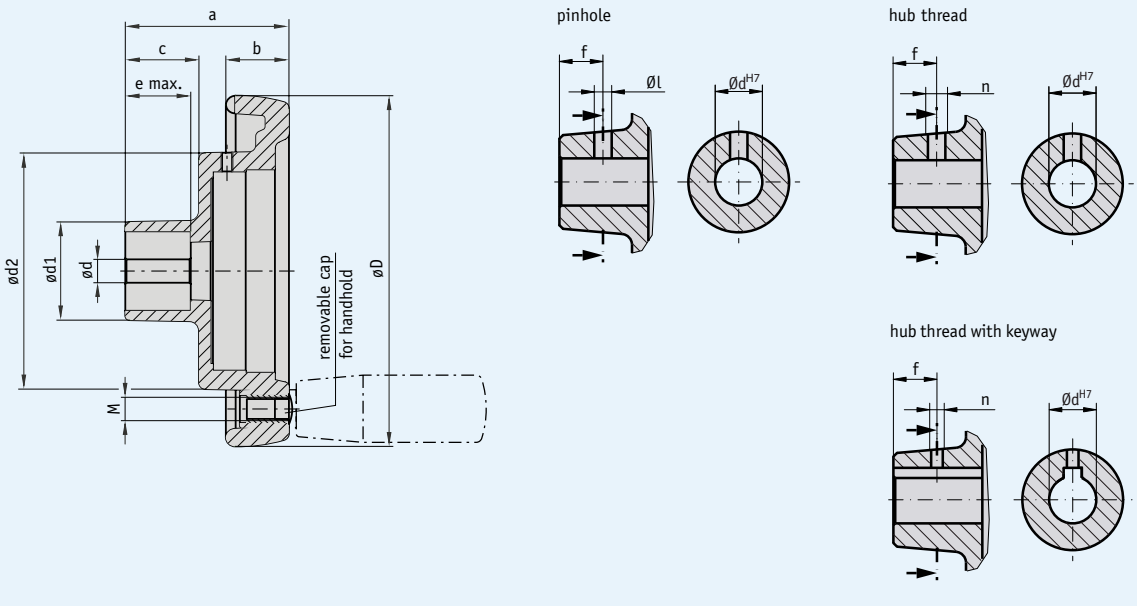
Accessories:
Drawing aid for scales *Page 111*

Additional information:
General information and areas of application *Page 68 cont.*

Handwheel KHB...
Made of fiber-glass reinforced plastic

Profile

- Robust and economic plastic handwheel
- Various sizes
- Hub made of zinc-coated steel for high stability and easy shaft mounting
- Various hub versions
- With thread for mounting a turning handle (see accessories)



Mechanical data

- **Dimensions**

type	ØD	Ødv	Ødx	Ød1	Ød2	a	b	c	e	GfG	suitable for	weight	material
KHB 9	87	5.8	16	32	63	54	17	21	20	M6	S50/1	0.16 kg	plastic, hub: zinc-coated steel
KHB 13	130	6.8	26	42	98.2	66	24	28.5	24	M8	S80/1; SZ80/1	0.35 kg	plastic, hub: zinc-coated steel
KHB 15	150	6.8	26	42	101	70	27	30.5	28	M10	S80/1; SZ80/1	0.43 kg	plastic, hub: zinc-coated steel
KHB 20	200	6.8	30	46	136	72	32	25	23	M10	S120/1	0.81 kg	plastic, hub: zinc-coated steel

dv = d predrilled; dx = d max.; with keyway; GfG = thread for handle

- **Special versions**

Handwheel type		KHB 9					KHB 13 / KHB 15						
Bore dH7		6 ... 8	9, 10	11, 12	13, 14	15, 16	7, 8	9, 10	11, 12	13 ... 17	18 ... 20	21 ... 24	25, 26
Groove width for keyway JS9			3	4				3	4	5	6		
Pinhole		3.8/8	3.8/8	3.8/8	4.8/8		3.8/12	3.8/12	3.8/12	4.8/12	4.8/12	4.8/12	
Hub thread	no keyway JS9	M4/8	M4/8	M4/8	M6/8		M4/12	M4/12	M4/12	M6/12	M6/12	M6/12	
	with keyway JS9		M3/8	M3/8				M3/12	M3/12	M4/12	M5/12		

Handwheel type		KHB 20						
Bore dH7		7, 8	9, 10	11, 12	13 ... 17	18 ... 22	23 ... 25	26 ... 30
Groove width for keyway JS9			3	4	5	6	8	
Pinhole		3.8/10	3.8/10	3.8/10	4.8/10	4.8/10	4.8/10	
Hub thread	without keyway JS9	M4/10	M4/10	M4/10	M6/10	M6/10	M6/10	
	with keyway JS9		M3/10	M3/10	M4/10	M5/10		

Note: Characters highlighted in orange are order features

Order

Order table

Feature	Order data		Technical data	Additional information
Handwheel	KHB...	A	9, 13, 15, 20	see "Dimensions"
Bore Ød	d vorg.	B	predrilled, see table above, value Ødv	
	...		6 ... 30 d max. in mm steps (H7)	see "Dimensions"
Keyway	OP	C	without keyway	
	JS9		light seat	according to DIN 6885 T1
Pinhole (only without keyway)	OS	D	without pinhole	
	...		diameter „Øl"/measure "f" (e.g. 3.8/12)	see table "Special versions", depending on handwheel type, only with hub thread "ONG"
			others on request	
Hub thread	ONG	E	without hub thread	
	...		thread "n"/measure "f" (e.g. M4/12)	see table "Special versions", depending on handwheel type, only with pinhole "OS"
			others on request	
Position indicator mounted (*)	PM	F	position indicator mounted	
	PS		separate position indicator	
Hub turned down	OAN	G	without turned-down hub	
			turned-down hub on request	only KHB9

* separate ordering of position indicator required! (see pages 74-82)

Order code

KHB... – [A] – [B] – [C] – [D] – [E] – [F] – [G]

Scope of delivery: *KHB...*

Accessories:

Handles *Page 102*
End plate *Page 103*

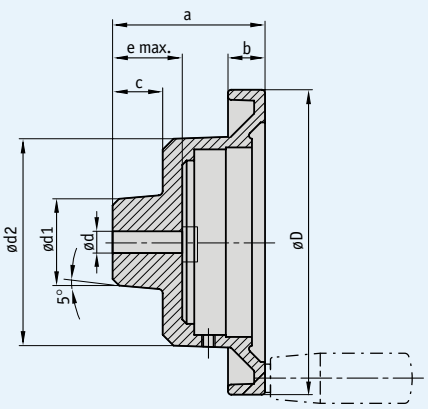
Additional information:

General information and areas of application *Page 68 cont.*

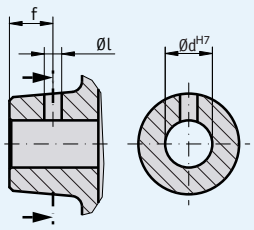
Handwheel HK.../HKL...
Aluminum handwheel in popular design

Profile

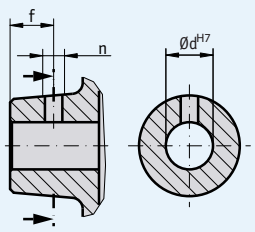
- Classical handwheel made of aluminum casting
- Various sizes
- Plastic-coated or bright-finished surface
- Various hub versions
- Turning handle as an option (see accessories)



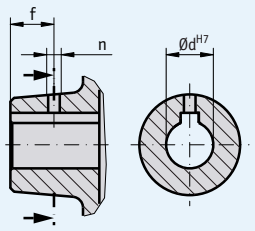
pinhole



hub thread



hub thread with keyway



1.4

Mechanical data

- **Dimensions**

type	ØD	Ødv	Ødx	Ød1	Ød2	a	b	c	e	GfG	suitable for	weight	material
HK 8	80	5.8	16	26	60	52	14	20	21	M6	S50/1	0.2 kg	aluminum
HK 12	120	6.8	25	40	95	64	15	23	30	M6	S80/1; SZ80/1	0.5 kg	aluminum
HK 14	140	6.8	25	40	95	70	17	23	30	M8	S80/1; SZ80/1	0.6 kg	aluminum
HK 16	160	7.8	25	40	95	70	20	23	28	M8	S80/1; SZ80/1	0.7 kg	aluminum
HK 20	200	7.8	30	45	95	75	22	25	32	M10	S80/1; SZ80/1	0.8 kg	aluminum
HKL 20	200	7.8	30	45	132	75	22	25	30	M10	S120/1	0.9 kg	aluminum

dv = d predrilled; dx = d max.; GfG = thread for handle

Special versions

Handwheel type		HK 8				
Bore dH7		6 ... 8	9, 10	11, 12	13 ... 16	
Groove width for keyway JS9			3	4	5	
Pinhole		3.8/12	3.8/12	3.8/12	4.8/12	
Hub thread	without keyway JS9	M4/12	M4/12	M4/12	M6/12	
	with keyway JS9		M3/12	M3/12		

Handwheel type		HK 12 / HK 14 / HK 16						
Bore dH7		7*), 8	9, 10	11, 12	13 ... 17	18 ... 21	22	23 ... 25
Groove width for keyway JS9			3	4	5	6	6	8
Pinhole		3.8/12	3.8/12	3.8/12	4.8/12	4.8/12	4.8/12	4.8/12
Hub thread	without keyway JS9	M4/12	M4/12	M4/12	M6/12	M6/12	M6/12	M6/12
	witth keyway JS9		M3/12	M3/12	M4/12	M5/12		

*) Bore Ø7H7 only for HK 12 / HK 14

Handwheel type		HK 20 / HKL 20							
Bore dH7		8	9, 10	11, 12	13 ... 17	18 ... 22	23 ... 25	26	27 ... 30
Groove width for keyway JS9			3	4	5	6	8	8	8**)
Pinhole		3.8/12	3.8/12	3.8/12	4.8/12	4.8/12	4.8/12	5.8/12	5.8/12
Hub thread	without keyway JS9	M4/12	M4/12	M4/12	M6/12	M6/12	M6/12	M8/12	M8/12
	with keyway JS9		M3/12	M3/12	M4/12	M5/12			

) not for HKL 20, additional special versions available on request. **Note: Characters highlighted in orange are order features.

Order

Order table

Feature	Order data		Technical data	Additional information
Handwheel type	HK...	A	8, 12, 14, 16, 20	see "Dimensions"
	HKL20			see "Dimensions"
Surface	B	B	unvarnished	
	C		plastic-coated, hammer finish paint, light-gray	
			others on request	
Handle bore	OG	C	without handle bore	
	...		M6, M8, M10 with handle bore or handle thread	see "Dimensions", value GfG
Bore Ød	d vorg.	D	predrilled, see table above, value Ødv	
	...		6 ... 30 d max. in mm steps (H7)	see "Dimensions"
Keyway	OP	E	without keyway	
	JS9		light seat	according to DIN 6885 T1
	P9		tight seat	according to DIN 6885 T1
Pinhole (only without keyway)	OS	F	without pinhole	
	...		diameter "Øl"/measure "f" (e.g. 3.8/12)	see table "Special versions", depending on handwheel type, only if hub thread "ONG"
			others on request	
Hub thread	ONG	G	without hub thread	
	...		thread "n"/measure "f" (e.g. M4/12)	see table "Special versions", depending on handwheel type, only if pinhole "OS"
			others on request	
Hub turned down	OAN	H	without turned-down hub	
			others on request	
Position indicator mounted (*)	PM	I	position indicator mounted	
	PS		separate position indicator	

* separate order of a position indicator required! (see pages 74-82)

Order code

HK...	–		–		–		–		–		–		–		–	
A		B		C		D		E		F		G		H		I

Scope of delivery: *HK.../HKL...*

Accessories:

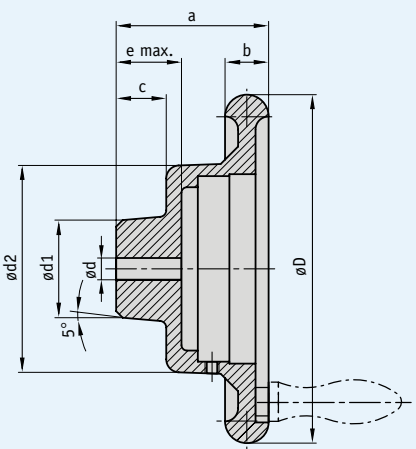
Handles *Page 102*
End plate *Page 103*

Additional information:

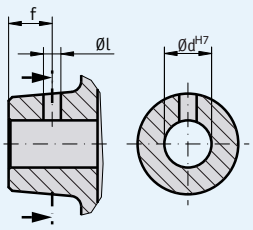
General information and areas of application *Page 68 cont.*

Profile

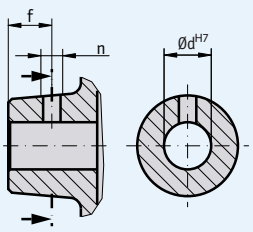
- Robust handwheel made of aluminum casting
- Rounded design with dirt corners minimized
- Various sizes
- Plastic-coated or bright-finished surface
- Various hub versions
- Turning handle as an option (see accessories)



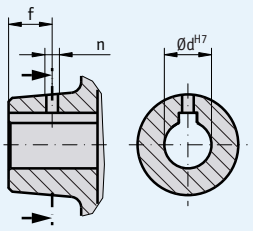
pinhole



hub thread



hub thread with keyway



Mechanical data

- **Dimensions**

type	ØD	Ødv	Ødx	Ød1	Ød2	a	b	c	e	GfG	suitable for	weight	material
HS 8	80	5.8	16	26	60	55	15	18	20	M6	S50/1	0.2 kg	aluminum
HS 12	125	6.8	25	40	95	70	16.5	23	30	M6	S80/1; SZ80/1	0.5 kg	aluminum
HS 14	140	6.8	20	32	95	70	18	23	29	M8	S80/1; SZ80/1	0.6 kg	aluminum
HS 16	160	7.8	30	45	95	70	20	23	30	M8	S80/1; SZ80/1	0.7 kg	aluminum
HS 18	180	7.8	30	45	95	75	22	28	34	M10	S80/1; SZ80/1	0.8 kg	aluminum
HSL 20	200	7.8	35	55	134	75	22	28	34	M10	S120/1	0.9 kg	aluminum

dv = d predrilled; dx = d max.; GfG = thread for handle

Special versions

Handwheel type		HS 8					
Bore dH7		6 ... 8	9, 10	11, 12	13, 14	15	16
Groove width for keyway JS9			3	4	5		
Pinhole		3.8/12	3.8/12	3.8/12	4.8/12	4.8/12	4.8/12
Hub thread	without keyway JS9	M4/12	M4/12	M4/12	M6/12	M6/12	M6/12
	with keyway JS9		M3/12	M3/12			

*) not for HS 8

Handwheel type		HS 12 / HS 14							
Bore dH7		7, 8	9, 10	11, 12	13 ... 17	18 ... 20	21**)	22**)	23 ... 25**)
Groove width for keyway JS9			3	4	5	6**)	6**)	6**)	
Pinhole		3.8/12	3.8/12	3.8/12	4.8/12	4.8/12	4.8/12**)	4.8/12**)	4.8/12**)
Hub thread	without keyway JS9	M4/12	M4/12	M4/12	M6/12	M6/12	M6/12**)	M6/12**)	M6/12**)
	with keyway JS9		M3/12	M3/12	M4/12	M5/12**)	M5/12**)		

**) not for HS14

Handwheel type		HS 16 / HS 18							
Bore dH7		8	9, 10	11, 12	13 ... 17	18 ... 22	23 ... 25	26, 27	28 ... 30
Groove width for keyway JS9			3	4	5	6	8	8	
Pinhole		3.8/12	3.8/12	3.8/12	4.8/12	4.8/12	4.8/12	5.8/12	5.8/12
Hub thread	without keyway JS9	M4/12	M4/12	M4/12	M6/12	M6/12	M6/12	M8/12	M8/12
	with keyway JS9		M3/12	M3/12	M4/12	M5/12			

Handwheel type		HSL 20								
Bore dH7		8	9, 10	11, 12	13 ... 17	18 ... 22	23 ... 25	26, 27	28 ... 30	31 ... 35
Groove width for keyway JS9			3	4	5	6	8	8	8	10
Pinhole		3.8/12	3.8/12	3.8/12	4.8/12	4.8/12	4.8/12	5.8/12	5.8/12	5.8/12
Hub thread	without keyway JS9	M4/12	M4/12	M4/12	M6/12	M6/12	M6/12	M8/12	M8/12	M8/12
	with keyway JS9		M3/12	M3/12	M4/12	M5/12	M6/12	M6/12	M6/12	

Order

Order table

Feature	Order data		Technical data	Additional information
Handwheel type	HS...	A	8, 12, 14, 16, 18	see “Dimensions“
	HSL...		20	
Surface	B	B	unvarnished	
	C		plastic-coated, hammer finish paint light-gray	
			others on request	
Handle bore	OG	C	without handle bore	
	...		M6 ... M10 with handle bore or handle thread	see “Dimensions“, value GfG
Bore Ød	d vorg.	D	predrilled	see “Dimensions“, value Ødv
	...		6 ... 35 d max. in mm steps (H7)	see “Dimensions“
Keyway	OP	E	without keyway	
	JS9		light seat	according to DIN 6885 T1
	P9		tight seat	according to DIN 6885 T1
Pinhole (only without keyway)	OS	F	without pinhole	
	...		diameter “Øl”/measure “f” (e.g., 3.8/12)	see table “Special versions”, depending on handwheel type, only if hub thread “ONG”
			others on request	
Hub thread	ONG	G	without hub thread	
	...		thread “n”/measure “f” (e.g., M4/12)	see table “Special versions”, depending on handwheel type, only if pinhole “OS”
			others on request	
Hub turned down	OAN	H	without turned-down hub	
			others on request	
Position indicator mounted (*)	PM	I	position indicator mounted	
	PS		separate position indicator	

* separate order of a position indicator required (see pages 74-82)

Order code

HS...	–		–		–		–		–		–		–	OK	–	
A		B		C		D		E		F		G		H		I

Scope of delivery: *HS.../HSL...*

Accessories:

Handles *Page 102*
End plate *Page 103*

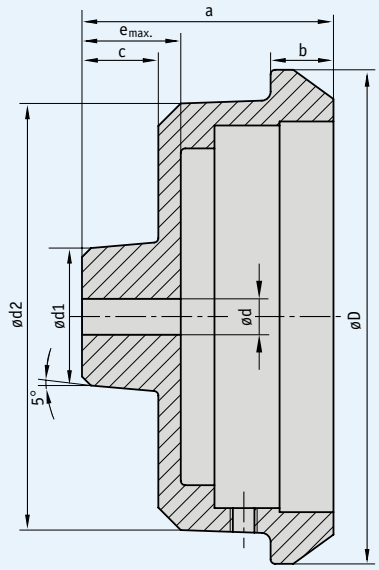
Additional information:

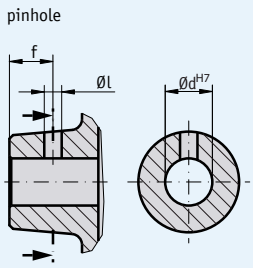
General information and areas of application *Page 68 cont.*

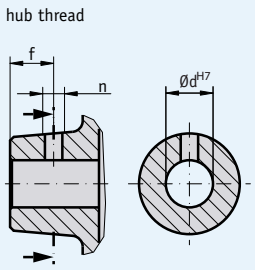
Handwheel HST...
Star wheel made of aluminum

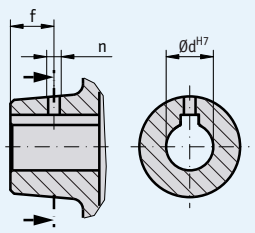
Profile

- Various sizes
- Plastic-coated or bright-finished surface
- Various hub versions









1.4

Mechanical data

Dimensions

type	ØD	Ødv	Ødx	Ød1	Ød2	a	b	c	e	suitable for	Weight	material
HST 7	78	5.8	20	32	60	50	20	15	20	S50/1	0.2 kg	aluminum
HST 8	75	5.8	12	20	60	43	10	10	13	S50/1	0.2 kg	aluminum
HST 11	110	6.8	16	30	95	56	14	17	22	S80/1; SZ80/1	0.5 kg	aluminum

dv = d predrilled; dx = d max.

Special versions

Handwheel type		HST 7					HST 11				
Bore dH7		6 ... 8	9, 10	11, 12	13 ... 16	17 ... 20	7, 8	9, 10	11, 12	13 ... 15	16
Groove width for keyway JS9			3	4	5			3	4	5	5
Pinhole		3.8/10	3.8/10	3.8/10	4.8/10	4.8/10	3.8/12	3.8/12	3.8/12	4.8/12	4.8/12
Hub thread	without keyway JS9	M4/10	M4/10	M4/10	M6/10	M6/10	M4/12	M4/12	M4/12	M6/12	M6/12
	with keyway JS9		M3/10	M3/10	M4/10			M3/12	M3/12	M4/12	

Additional special versions available on request.

Handwheel type	HST 8		
Bore dH7	6 ... 8	9, 10	11, 12
Groove width for keyway JS9		3	
Pinhole	3.8/6	3.8/6	3.8/6
Hub thread without keyway JS9	M4/6	M4/6	M4/6

Note: Characters highlighted in orange are order features.

Order

Order table

Feature	Order data		Technical data	Additional information
Handwheel type	HST...	A	7, 8, 11	see "Dimensions"
Surface	B	B	unvarnished	
	CS		plastic-coated, black RAL9005 half-matt	not with HST 7
			others on request	
Bore Ød	d vorg.	C	predrilled	see "Dimensions", value Ødv
	...		6 ... 20 d max. in mm steps (H7)	see "Dimensions" (smallest bore corresp. with predr.)
Keyway	OP	D	without keyway	
	JS9		light seat	according to DIN 6885 T1
	P9		tight seat	according to DIN 6885 T1
Pinhole (only without keyway)	OS	E	without pinhole	
	...		diameter "Øl"/measure "f" (e.g., 3.8/12)	see table "Special versions", depending on handwheel type, only if hub thread "ONG"
			others on request	
Hub thread	ONG	F	without hub thread	
	...		thread "n"/measure "f" (e.g., M4/12)	see table "Special versions", depending on handwheel type, only if pinhole "OS"
			others on request	
Hub turned down	OAN	G	without turned-down hub	
			others on request	
Position indicator mounted (*)	PM	H	position indicator mounted	
	PS		separate position indicator	

* separate order of a position indicator required (see pages 74-82)

Order code

HST...	–		–		–		–		–		–		–	
A		B		C		D		E		F		G		H

Scope of delivery: *HST...*

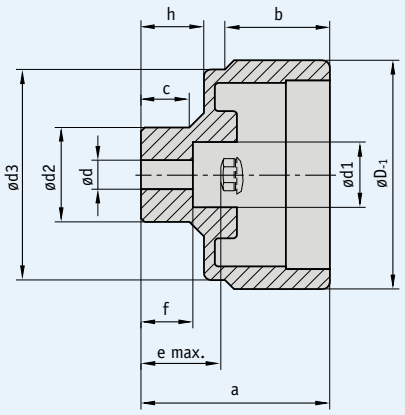
Accessories:
End plate *Page 103*

Additional information:
General information and areas of application *Page 68 cont.*

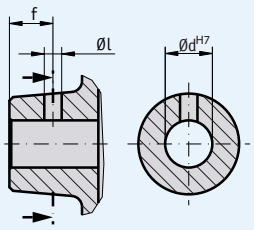
Handwheel HG...
Turning handle made of plastic

Profile

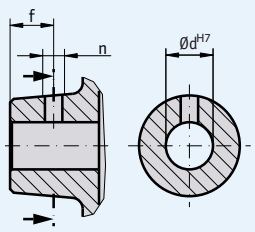
- Low-cost and compact turning handle made of glass-fiber reinforced plastic
- Various sizes
- Surface with rounded edges avoids accumulation of dirt
- Hub made of plastic or metal
- Various hub versions



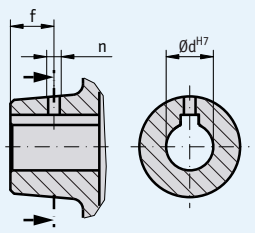
pinhole



hub thread



hub thread with keyway



1.4

Mechanical data

Dimensions

type	Hub	ØD	Ødv	Ødx	Ød1	Ød2	Ød3	a	b	c	e	f	h	suitable for	weight	material
HG 5	plastic	63		6 ... 12^{H9}	13	21	58	49	28.9	14.3	19.2	17.3	14.3	S50/1	0.1 kg	plastic
	metal	63	5.8	6 ... 16^{H7}	18	26	58	52	28.9	13.3	22.2	14.3	17.3	S50/1	0.1 kg	plastic
HG 10	plastic	98		6 ... 16^{H9}	16	30	93	56	31.5	18.7	22.8	20.7	18.7	S80/1; SZ80/1	0.2 kg	plastic
	metal	98	5.8	6 ... 16^{H7}	25.5	35	93	59	31.5	18.2	25.8	18	21.7	S80/1; SZ80/1	0.2 kg	plastic

dv = d predrilled

Special versions

Handwheel type		HG 5				HG 10			
Plastic hub		•	•	•		•	•	•	•
Metal hub		•	•	•	•	•	•	•	•
Bore dH7		6, 8	9, 10	12	14*)	6 ... 8	9, 10	11, 12	13 ... 16
Groove width for keyway JS9			3	4	5		3	4	5
Pinhole		3.8/10	3.8/10	3.8/10	4.8/10*)	3.8/10	3.8/10	3.8/10	4.8/10
Hub thread	without keyway JS9	M4/10	M4/10	M4/10*)	M6/10*)	M4/10	M4/10	M4/10	M6/10
	with keyway JS9	M3/10	M3/10	M3/10			M3/10	M3/10	M4/10

*) not possible with plastic hub, special versions available on request. **Note: Characters highlighted in orange are order features.**

Order

Order table

Feature	Order data		Technical data	Additional information
Handwheel type	HG...	A	5, 10	see “Dimensions“
Hub material	A	B	aluminum	
	K		plastic reinforced	
	VA		Nirosta	
Bore Ød	d vorg.	C	predrilled	see “Dimensions“, value Ødv
	...		6 ... 16 d max. in mm steps (H7)	see “Dimensions“
Keyway	OP	D	without keyway	
	JS9		light seat	according to DIN 6885 T1, only with hub material VA + A
	P9		tight seat	according to DIN 6885 T1, only with hub material VA + A
Pinhole (only without keyway)	OS	E	without pinhole	
	...		diameter “Øl”/measure “f” (e.g., 3.8/10)	see table “Special versions”, depending on handwheel type, only if hub thread “ONG”
			others on request	
Hub thread	ONG	F	without hub thread	
	...		thread “n”/measure “f” (e.g., M4/12)	see table “Special versions”, depending on handwheel type, only if pinhole “OS”, only with hub material VA + A
			others on request	
Hub turned down	OAN	G	without turned-down hub	
			others on request	
Position indicator mounted (*)	PM	H	position indicator mounted	
	PS		separate position indicator	

* separate order of a position indicator required (see pages 74-82)

Order code

HG... – [A] – [B] – [C] – [D] – [E] – [F] – [G] – [H]

Scope of delivery: *HG...*

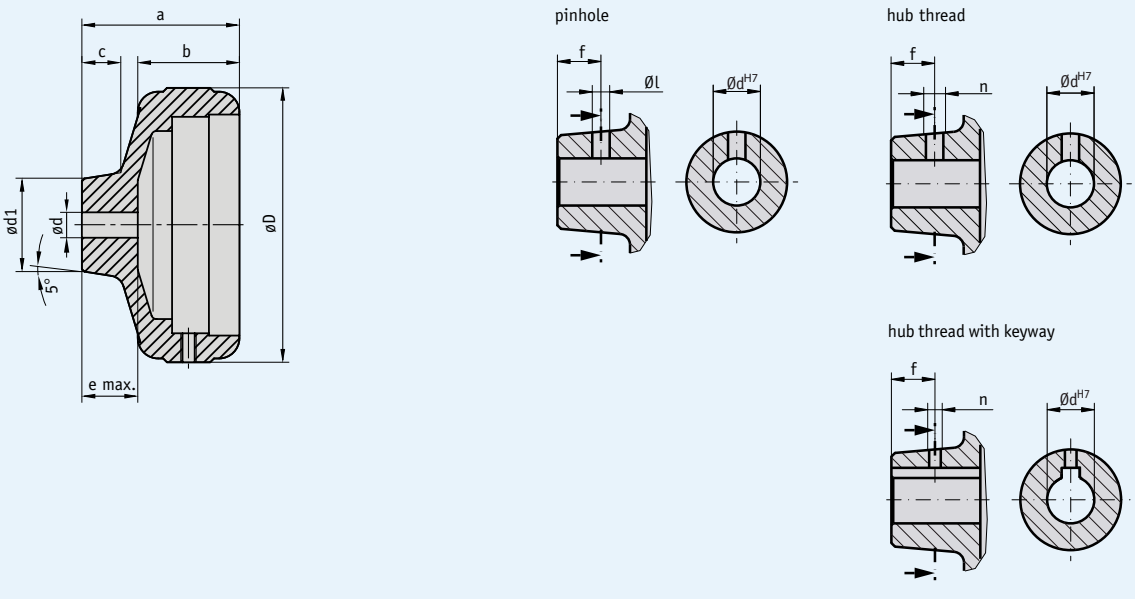
Accessories:
End plate *Page 103*

Additional information:
General information and areas of application *Page 68 cont.*

Handwheel HR...
Premium knurled aluminum handwheel

Profile

- Premium knurled aluminum handwheel
- Compact design
- Various sizes
- Surface plastic-coated, anodized or bright-finished
- Various hub versions



Mechanical data

Dimensions

type	ØD	Ødv	Ødx	Ød1	a	b	c	e	suitable for	weight	material
HR 6	65	5.8	20	30	50	35	15	20	S50/1	0.3 kg	aluminum
HR 11	108	6.8	20	36	62	40	15	22	S80/1; SZ80/1	0.5 kg	aluminum

dv = d predrilled; dx = d max.

Special versions

Handwheel type		HR 6					HR 11				
Bore dH7		6 ... 8	9, 10	11, 12	13 ... 16	17 ... 20	7, 8	9, 10	11, 12	13 ... 17	18 ... 20
Groove width for keyway JS9			3	4	5			3	4	5	6
Pinhole		3.8/10	3.8/10	3.8/10	4.8/10		3.8/10	3.8/10	3.8/10	4.8/10	4.8/10
Hub thread	without keyway JS9	M4/10	M4/10	M4/10	M6/10		M4/10	M4/10	M4/10	M6/10	M6/10
	with keyway JS9		M3/10	M3/10	M4/10			M3/10	M3/10	M4/10	

Additional special versions available on request. **Note: Characters highlighted in orange are order features.**

Order

Order table

Feature	Order data		Technical data	Additional information
Handwheel type	HR...	A	6, 11	see “Dimensions“
Surface	B	B	unvarnished	
	ES		black anodized	
	EF		natural anodized	
			others on request	
Bore Ød	d vorg.	C	predrilled	see “Dimensions“, value Ødv
	...		6 ... 16 d max. in mm steps (H7)	see “Dimensions“
Keyway	OP	D	without keyway	
	JS9		light seat	according to DIN 6885 T1
	P9		tight seat	according to DIN 6885 T1
Pinhole (only without keyway)	OS	E	without pinhole	
	...		diameter “Øl”/measure “f” (e.g., 3.8/10)	see table “Special versions”, depending on handwheel type, only if hub thread “ONG”
			others on request	
Hub thread	ONG	F	without hub thread	
	...		thread “n”/measure “f” (e.g., M4/10)	see table “Special versions”, depending on handwheel type, only if pinhole “OS”
			others on request	
Hub turned down	OAN	G	without turned-down hub	
			others on request	
Position indicator mounted (*)	PM	H	position indicator mounted	
	PS		separate position indicator	

* separate order of a position indicator required (see pages 74-82)

Order code

HR...	–		–		–		–		–		–		–	
A		B		C		D		E		F		G		H

Scope of delivery: HR...

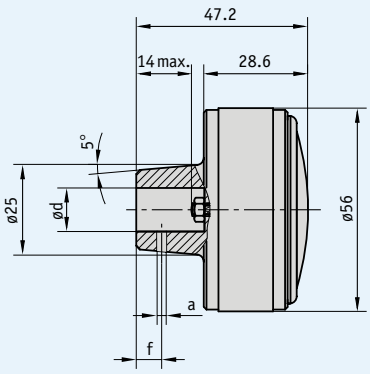
Accessories:
End plate *Page 103*

Additional information:
General information and areas of application *Page 68 cont.*

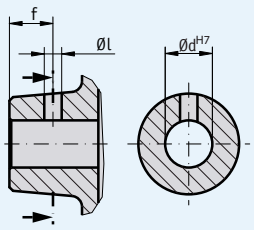
Handwheel HR5
Aluminum turning handle with integrated display

Profile

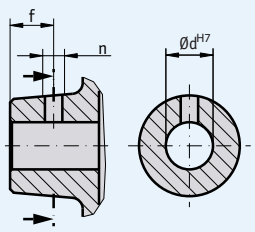
- Compact turning handle made of aluminum casting
- Integrated position indicator
- Analog display with various gear ratios and special scales
- Surface anodized or bright-finished
- Various hub versions



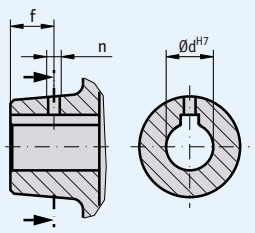
pinhole



hub thread



hub thread with keyway



1.4

Mechanical data

- **Dimensions**

type	ØD	Ødx	Weight	material
HR 5	8	12	0.1 kg	aluminum

dx = d max.

Order

Order table

Feature	Order data		Technical data	Additional information
Bore Ød	d	A	value Ød - Ødx	see “Dimensions“
	...		8 ... 12 d max. in mm steps (H7)	
Surface	B	B	unvarnished	
	ES		black anodized	
	EF		natural anodized	
Gear ratio	...	C	1, 2, 3, 6, 10, 12, 15, 18, 20, 24, 30, 36, 48, 50, 60, 72, 84, 96, 100	
Sense of rotation = ascending values	i	D	clockwise	
	e		counter-clockwise	
Pointer	1	E	pointer with gear ratio	
	2		1 pointer with gear ratio and 1 pointer running 1:1	
Pinhole	OS	F	without pinhole	
	2.5/7		diameter “Øl”/measure “f”	only if hub thread “ONG”
			others on request	
Hub thread	ONG	G	without hub thread	
	M6/8		thread “n” /measure “f”	only if pinhole “OS”
			others on request	
Scale	N	H	normal scale	related to gear pitch
	VK		special scale	custom-designed, no VK with first article
Scale imprint	C1	I	one-color	
	C2		two-color	
	C3		three-color	

Order code

HR5 – [A] – [B] – [C] – [D] – [E] – [F] – [G] – [H] – [I]

Scope of delivery: *HR5*

Additional information:
General information and areas of application *Page 68 cont.*

1.5

1.5 | Accessories

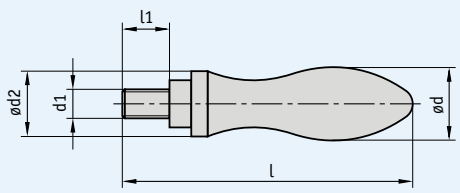
Profile

- Customized handling
- Easy to mount

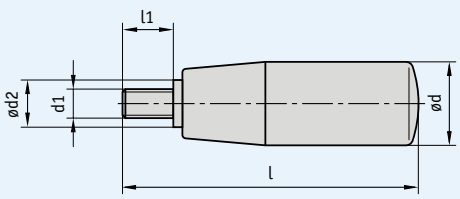
Fold-away handle

- Space-saving handle

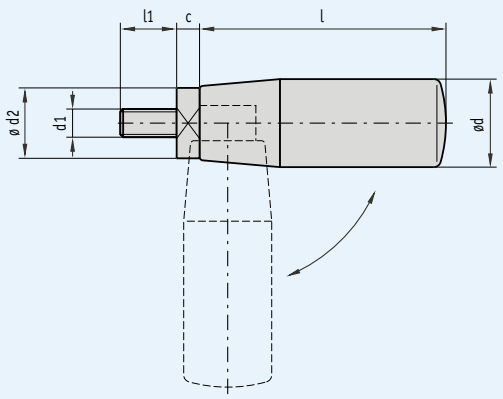
Ball handle



Cylindric handle



Fold-away handle



Order

Order table for ball handles

Type	Order text		d	d1	d2	l	l1
fixed	BGF	M6	16	M6	10	61	11
fixed	BGF	M8	20	M8	13	77	13
fixed	BGF	M10	25	M10	16	94	14
rotatable	BGD	M6	16	M6	14	66	11
rotatable	BGD	M8	20	M8	18	80	13
rotatable	BGD	M10	25	M10	21	97	14

Order code for ball handles

[ ] – [ ]
A B

Order table for cylindric handles

Type	Order text	d	d1	d2	l	l1
rotatable	M6	18	M6	10	55	12
rotatable	M8	23	M8	13	82	14
rotatable	M10	26	M10	13	99	16

Order code for cylindric handles

ZGD – [ ]
A

Order table for fold-away handles

Type	Order text	d	d1	d2	l	l1	c
rotatable	M8	25	M8	19	69	10	6
rotatable	M10	26	M10	26	82	17	7.5

Order code for fold-away handles

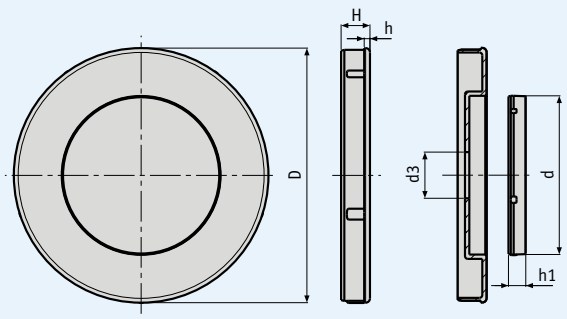
UG – [ ]
A

Scope of delivery: *Handle*

Profile

- Easy to mount
- Imprint on request

End plate



Order

1.5

Order table

Type	Order text	D	d	d3	H	h	h1
D50*	83641	51.8	34	10	8	2	6
D80*	83642	86.8	55	16	10	2	6

*imprint on request

Order code

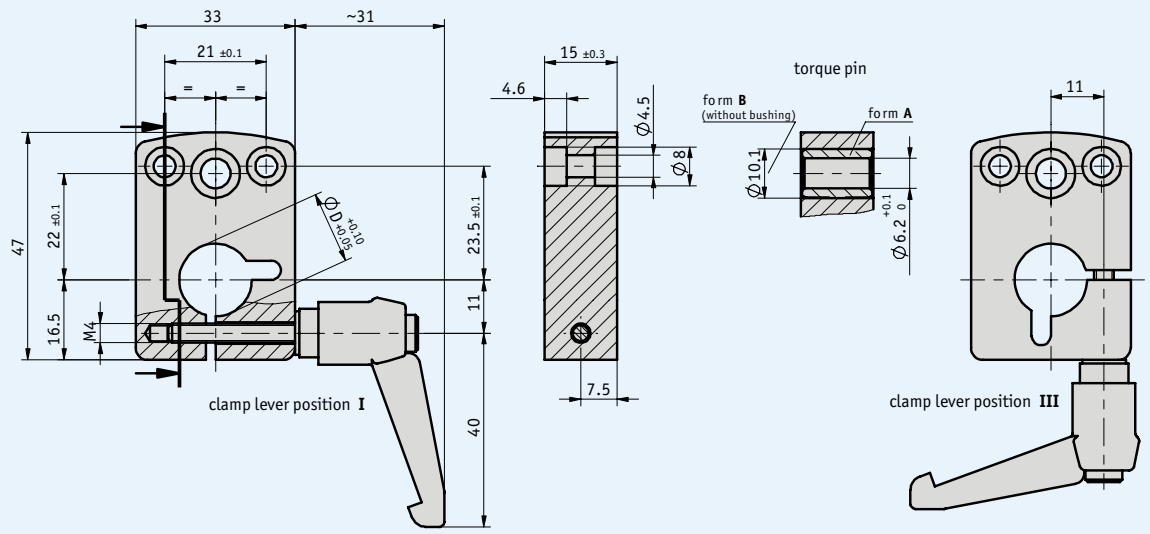
Scope of delivery: *End plate*

Clamping plate KP...
Accessories for DA04, DA09S

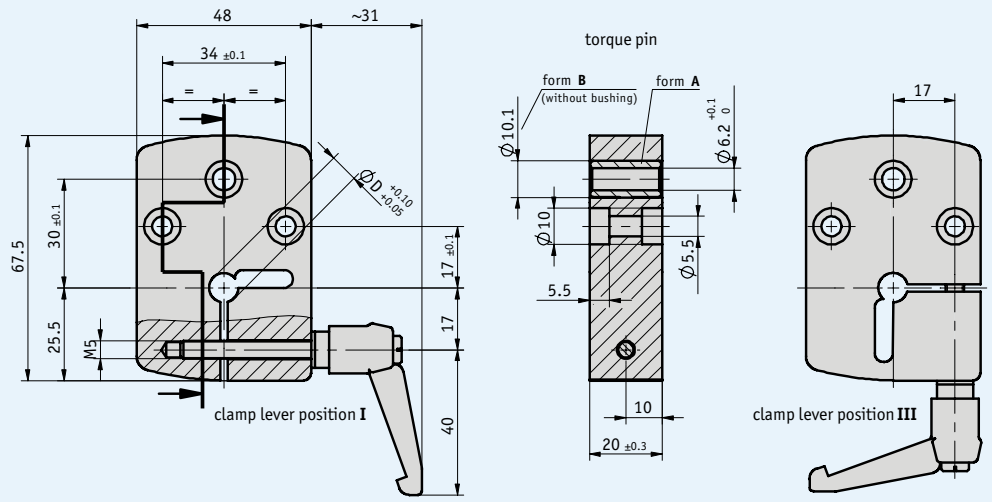
Profile

- KP04 for shaft diameters 8–15 mm
- KP09 for shaft diameters 8–20 mm
- Selectable clamp lever position
- Easy mounting and retrofitting

Clamping plate KP04



Clamping plate KP09



Mechanical data

Feature	Technical data	Additional information
Housing	aluminum, anodized	
Clamp lever	plastic, engaging	

Order

Feature	Order text		Specification	Additional information
Version	04	A		
	09			
Bore Ø	...	B	8, 10, 12, 14, 15	only with KP04
	...		8, 10, 12, 14, 15, 16, 18, 20	only with KP09
Clamp lever/position	I	C	mounting position I	
	III		mounting position III	
Torque support/form	A	D		
	B			
Clamp lever	with	E		
	without			

Order code

KP – [ ] – [ ] – [ ] – [ ] – [ ]
A B C D E

Scope of delivery: KP...

Mating connectors, bus terminator
Accessories for AP04

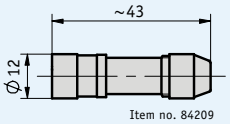
Profile

- Mating connectors, straight
- Bus terminator, straight

When screwed, the distance to the device will increase by approx. 3 mm.

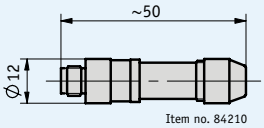
Mating connectors, straight

1



Item no. 84209

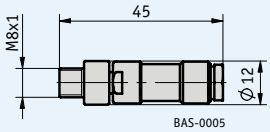
2



Item no. 84210

Bus terminator, straight

3



BAS-0005

1.5

Order

- **Order table**

	Fig.	PIN	Cable Ø	Order data
Mating connectors, straight				
M8 bush	1	4	3.5 ... 5	84209
M8 connector	2	4	3.5 ... 5	84210
Bus terminator, straight				
M8 connector	3	4		BAS-0005

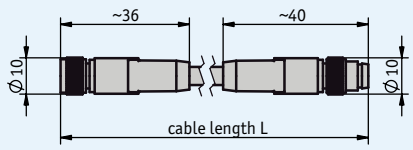
- **Order code**

Scope of delivery: *Connector as per order (see above)*

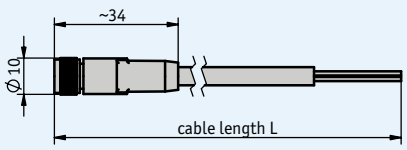
Profile

- Ready-to-use cable connection
- Cable lengths up to 10 m

Type of connection GE/GE



Type of connection GE



Mechanical data

Feature	Technical data	Additional information
Cable sheath	PUR	
Temperature range	-25 ... +80 °C	

Pin assignment

- **KV04S1**

Cable color	PIN
brown	1
white	2
blue	3
black	4

Order

- **Order table**

Feature	Order text		Specification	Additional information
Type of connection	GE	A	M8 bushing, flying leeds	only cable length 3.0, 5.0, 10.0 m
	GE/GE		M8 bushing, M8 connector	
Cable length	...	B	0.5, 1.0, 3.0, 5.0, 10.0 m	others on request

- **Order code**

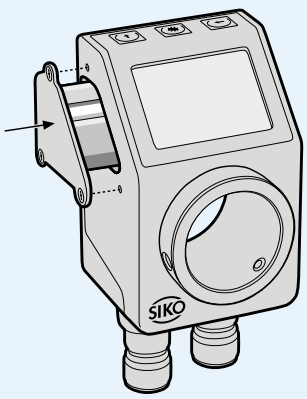
KV04S1 - [ ] - [ ]
A B

Scope of delivery: *KV04S1, User information*

Battery unit
Accessories for AP04

Profile

- Unit of battery and holder with contacts
- For easy und reliable replacement of the backup battery



1.5

Order

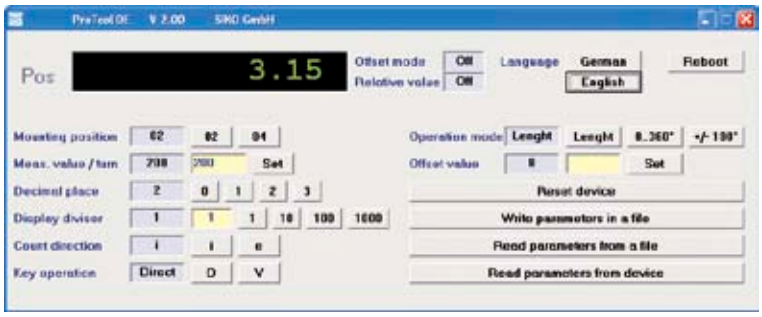
- **Order code**

84208

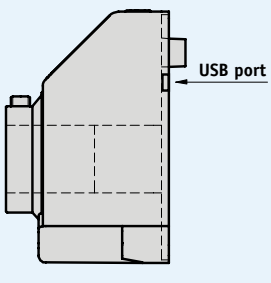
Scope of delivery: *Battery unit*

Profile

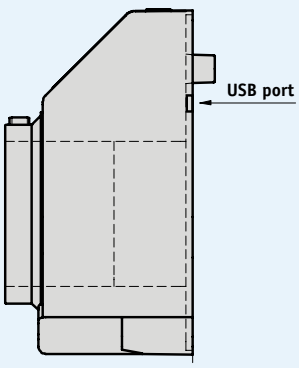
- Parameters can be freely programmed
- Toggle mode between angle and linear measurement
- With USB connection cable



DE04



DE10



Order

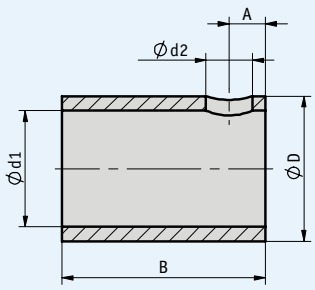
- **Order code**

ProTool DE

Scope of delivery: *Software on CD, USB programming cable, User information on CD*

Profile

- Easy and fast mounting
- Steel browned or stainless steel



Type	A*	B*	ØDf7*	Ød1H7	Ød2*
RH01	3.75	20	20	max. 18	5.5
RH02	4.0	30	30	max. 28	5.5
RH03	4.5	30	25	max. 22	5.5
RH04	2.8	17	14	max. 12	4.2
RH07	2.5	14	10	max. 8	3.2
RH08	3.0	20	14	max. 12	5.2
RH09	3.0	20	20	max. 18	2x3.6 (120°)

*Details in mm

Mechanical data

Type	RH01	RH02	RH03	RH04	RH07	RH08	RH09
Suitable for use with display	DA05/1, DA08, DA09S, DE10***	DA10* DA10R/1* DE10****	DA10** DA10R/1**	DA04 DE04	DA02 DK05	DK01 DK02 DK03	AP04
Ød1H7 steel browned	8, 10, 12, 14, 15, 16, 18	10, 12, 14, 16, 18, 20, 22, 24, 25, 26, 28	18, 20, 22	4, 5, 6, 8, 10, 12	6, 8	6, 8, 10, 12	
Ød1H7 stainless steel	VA8, VA9.525, VA10, VA12, VA12.7, VA14, VA15, VA15.875, VA16	VA12.7, VA20, VA24, VA25, VA25.4		VA8, VA9.525, VA10, VA12	VA8		VA8, VA9.525, VA10, VA12, VA12.7, VA14, VA15, VA15.875, VA16

*) only with hollow shaft WK, **) only with hollow shaft WL, ***) only with hollow shaft 20, ****) only with hollow shaft 30

Note: Characters highlighted in orange are order features.

Order

Order table

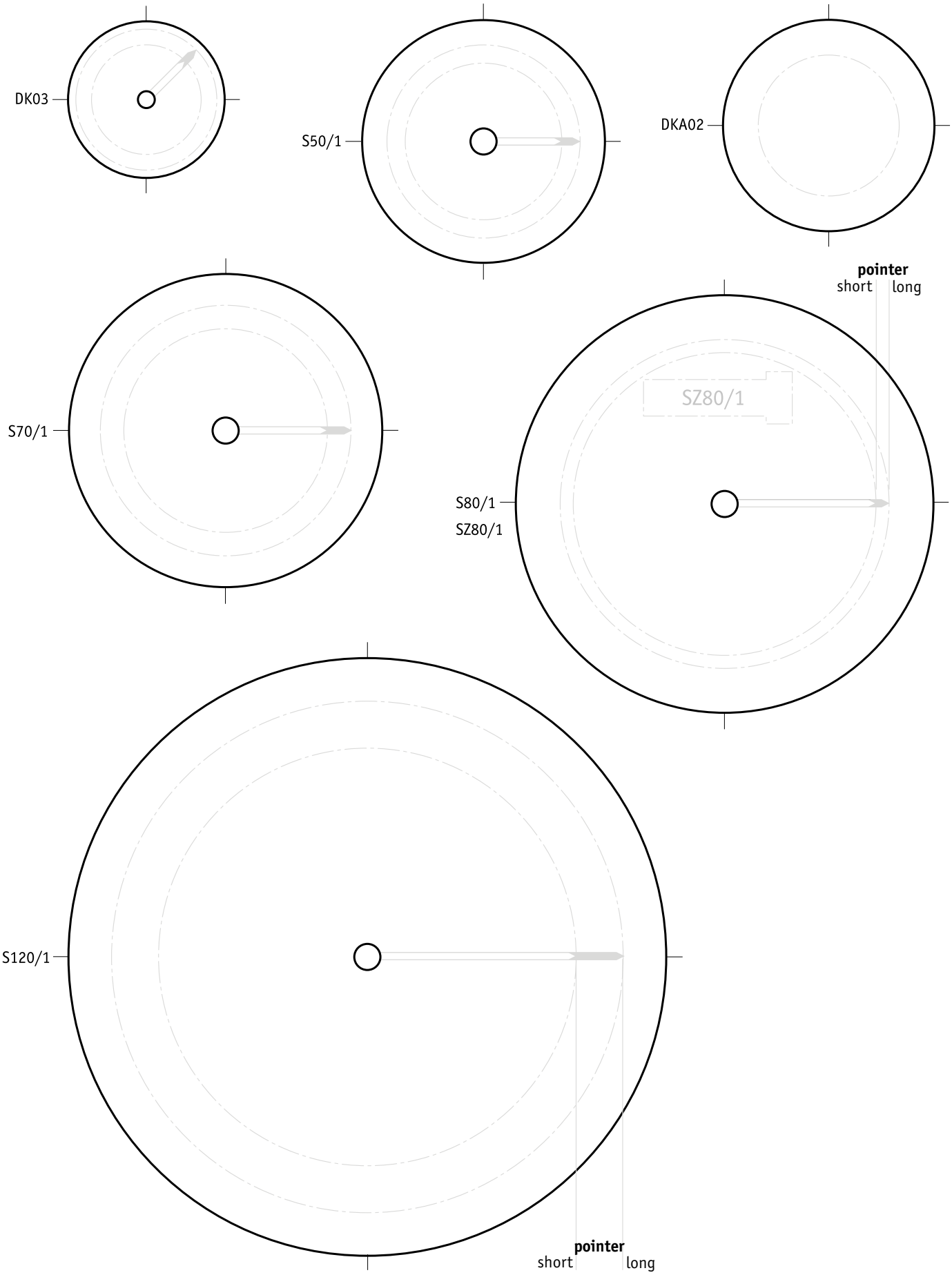
Feature	Order text		Specification	Additional information
Version	...	A	RH01, RH02, RH03, RH04, RH07, RH08, RH09	
Internal diameter $d1^{H7}$	...	B	see table above	

Order code

RH... – [ ]

A B

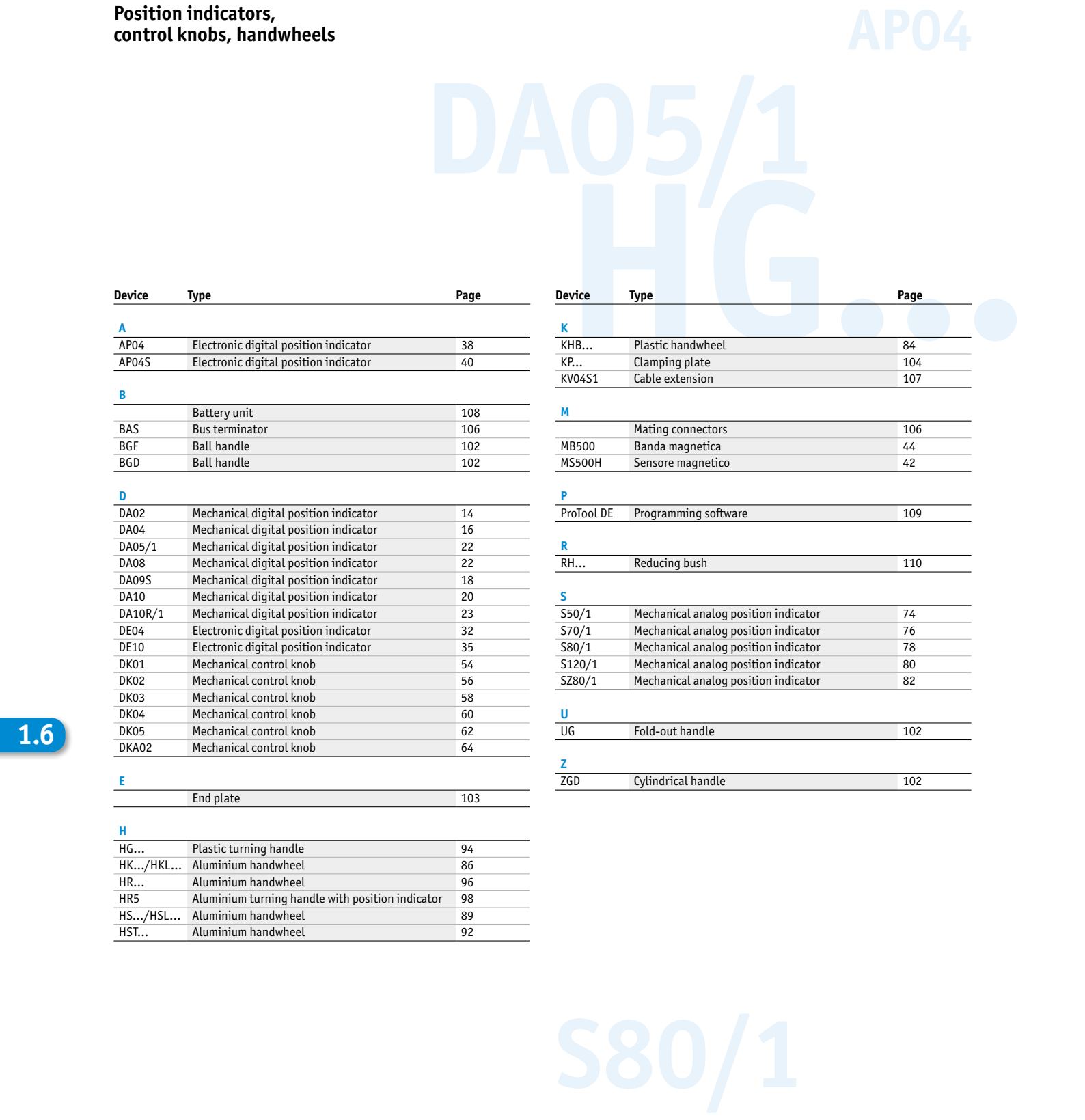
Scope of delivery: *Reducing bush, headless screw*



1.5

1.6

Position indicators, control knobs, handwheels



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