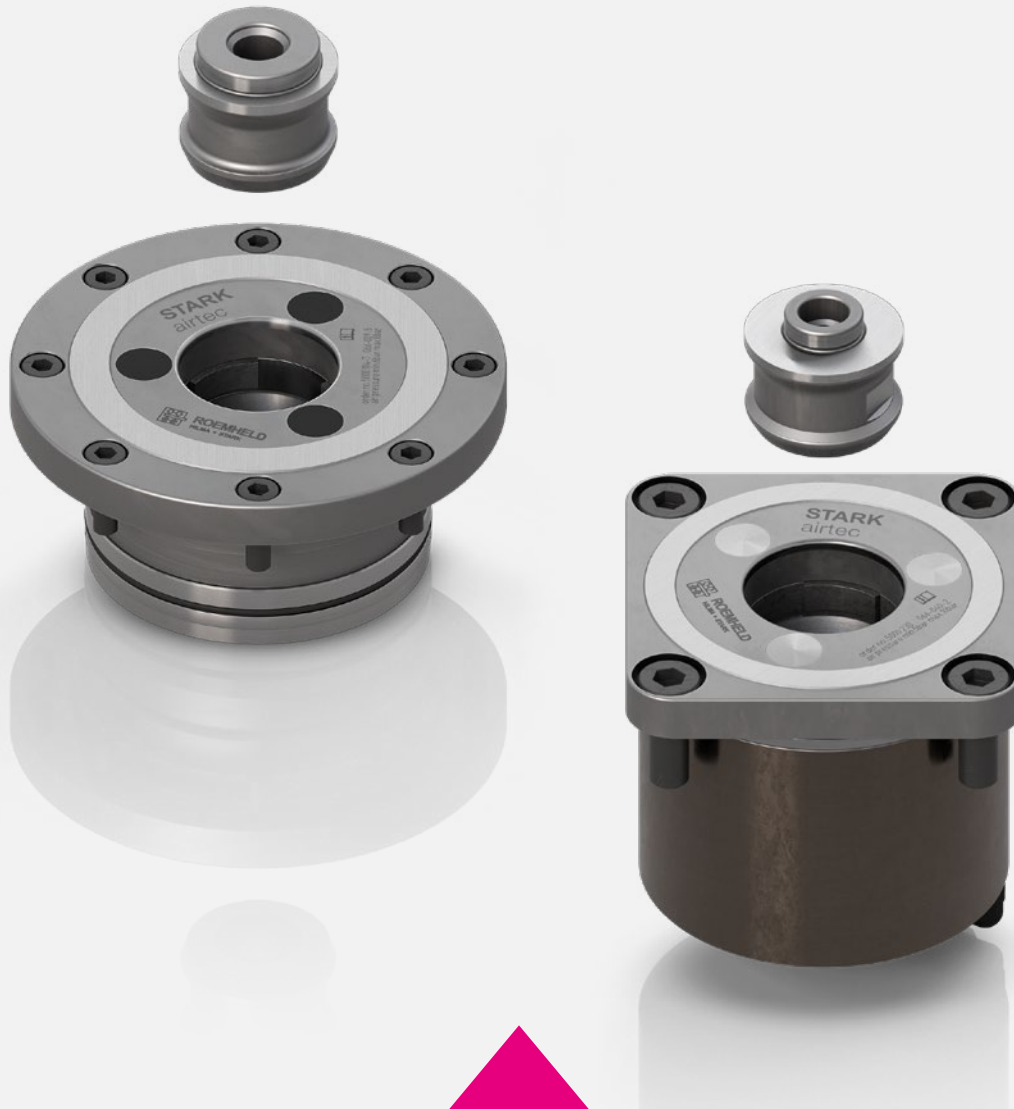




ROEMHELD
HILMA ■ STARK



STARK.airtec

Zero point clamping system
Single acting, pneumatic



**POWERFUL
INNOVATIVE
PROFICIENT
INDIVIDUAL
RELIABLE**

The high-tech company STARK Spannsysteme, founded in 1977, is regarded as a pioneer in the development and manufacture of zero point clamping systems, being the first company on the market to specialise exclusively in this technology for decades.

High quality and precision distinguish what is possibly the broadest product range available on the market in the field of highly productive workpiece clamping.

Production is more efficient and flexible with STARK components, products and systems.

**FOCUS ON
INDUSTRIES
& MARKETS.**



AUTOMOTIVE



AVIATION



MACHINE AND
TOOL CONSTRUCTION



MEDICINE

Every customer has specific requirements. Our established and extensive industry expertise allows us to offer you the best solutions, services and products for sustainable and efficient use in your market.

- Low maintenance:** intervals up to 2 million cycles
- Process reliability:** Industry 4.0 ready
- Powerful:** circulating clamping segments
- Precise:** cylindrical fit
- Fast:** clamping/release time 0.2 sec



STARK Spannsysteme

- More productivity through:
- maximum flexibility in production
 - maximum process reliability
 - reduced manufacturing costs thanks to set-up time optimisation

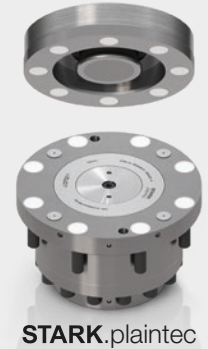
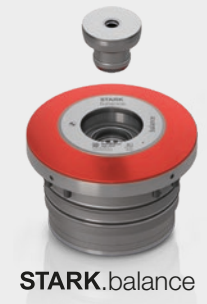


Table of contents STARK.airtec

INFORMATION

Function	6
USP – Tried and tested technology with system	7
Properties and application areas	8
Connection variants	10
Pin assignment	11
Topology	11
Technical data	12
Tilting moment calculation example	13

ELEMENTS

Mechanical engineering	14
STARK.airtec D100, flush-mounted	14
STARK.airtec D100, module	14
STARK.airtec D100, Tornado	15
STARK.airtec D100, integrated query	15
STARK.airtec G080, flush-mounted	16
STARK.airtec G080, module	16
STARK.airtec G080, integrated query	17
Application example – mechanical engineering	17

Plant engineering

STARK.airtec GX080, integrated query	18
STARK.airtec GX080, set	18
Application engineering – automation	19

Special versions

STARK.airtec D155, special	20
STARK.airtec D100, special	20
STARK.airtec D100, set surface-mounted elements	21

RETRACTABLE NIPPLE

Equaliser via retractable nipple	22
Combination possibility & tolerance range	23
Floating function	23

Retractable nipple – standard

Retractable nipple STARK.airtec - NP	24
Retractable nipple STARK.airtec - AG	24
Retractable nipple STARK.airtec - OZ	25

Retractable nipple – plant engineering

Retractable nipple STARK.airtec X-series - NP	26
Retractable nipple STARK.airtec X-series - AG	26
Retractable nipple STARK.airtec X-series - OZ	26

Retractable nipple – floating function

Retractable nipple STARK.airtec floating function - NP	27
Retractable nipple STARK.airtec floating function - AG	27
Retractable nipple STARK.airtec floating function - OZ	27

Nipple fastening

Nipple fastening D	28
Nipple fastening E	28
Key for nipple fastening	29

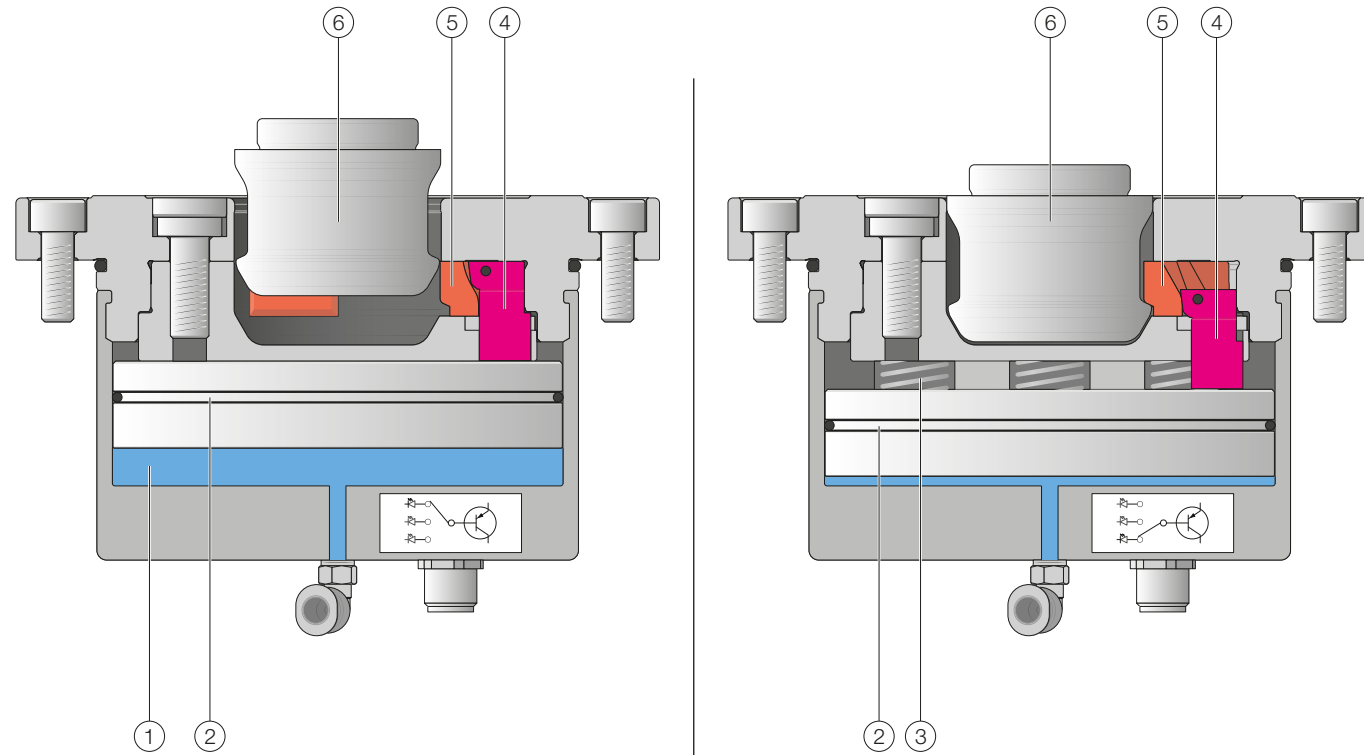
ACCESSORIES

Surface-mounted housing	30
Bridge for unlocking STARK.airtec/connect	30
Push-in fittings	31
Screw covers	31
Sensor cables	32
Y-cable & pin assignment	32
Programming aid STARK.airtec/connect	33
List of order numbers	34

► Note NEW order numbers – see information on page 34

Function

The STARK.airtec is a pneumatically operated zero point clamping system. The piston is held in the clamping position by springs – this piston has a single acting pneumatic design.



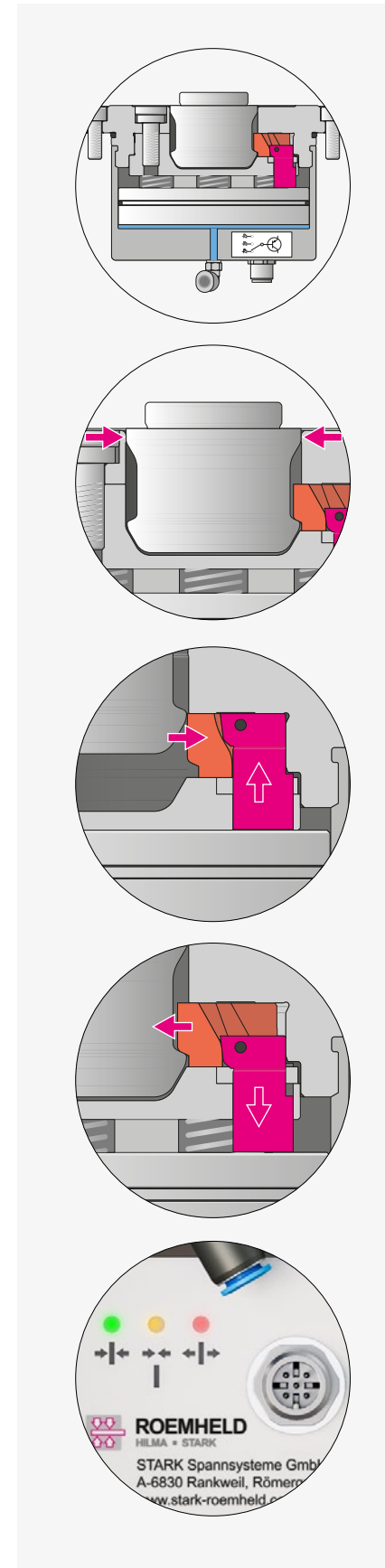
Release pneumatically:

- Pneumatic pressure ② is applied to the piston ① which moves upwards.
- The clamping fingers ④ are moved upwards by the piston ② and pull the segments ⑤ outwards.
- The retractable nipple ⑥ is released.

Clamp mechanically:

- The pneumatics are released. The pneumatic pressure drops to 0 bar.
- The spring pre-tensioning force ③ is initiated via the piston ② which moves down.
- The clamping fingers ④ are pulled down by the piston ② and push the clamping segments ⑤ inwards.
- The retractable nipple ⑤ is pulled down by the clamping surface on the clamping segments ⑥ and clamps on the support surface.

Tried and tested technology with system – original down to the smallest detail



DESIGN

- Compact design (flush-mounted version, screw-in version or module)
- High retention force, enormous force density
- Low-maintenance, designed for high load changes (> 2 million in endurance test)
- Made of high-quality tool steel and chrome steel
- Activation by clean air, releasable from 5 bar
- Can be operated without an additional maintenance unit
- Environmentally friendly and clean operation (no oil)
- Particularly suitable in oil-free environments, e.g. in the food, aviation or medical technology industries.

CYLINDRICAL FIT

- Due to the cylindrical fit, high lateral forces during machining can be absorbed by the STARK.airtec fast closing clamp
- Ideal pre-centring for Römheld coupling elements without coupling travel

FORCED CONTROL

- The segments are mechanically operated
- Powerful and safe clamping is guaranteed at all times
- 2 million clamping cycles tested in endurance tests, full functional readiness even under extreme conditions.
- Functions reliably in any installation position
- Very fast clamping and release time – 0.2 sec

SEGMENTS

- Due to the optimal circumferential force closure of the clamping segments, the retractable nipple is held securely with positive locking in the STARK.airtec fast closing clamp.

FULLY INTEGRATED SENSORS

- Unambiguous recording of the clamping status
- Direct rear signalling via LEDs
- Digital outputs for simple further processing in the higher-level control system
- High level of robustness and usability in welding environments

Properties and application areas

Compact outer dimensions, mechanically clamped, pneumatically released

The products of the STARK.airtec series are fast closing clamps made of high-quality tool steel and optionally housings made of hard anodised aluminium with very small space requirements due to compact external dimensions. The system is mechanically tensioned with springs and pneumatically released. Circumferential clamping segments ensure that the retractable nipple is held optimally, securely and with positive locking all around in the fast closing clamp.

Many versions, integrated querying unit

Within the product family, a large number of design versions are available, which can be optimally used depending on the respective application area. In addition to the simple versions with a flush-mounted and modular design, the STARK.airtec series also includes fast closing clamps that have an integrated querying unit. In addition, the clamping status of the element can easily be recorded and signalled by means of three signals ("clamped without nipple", "nipple clamped" or "released"). The module supports every application by means of LEDs directly on the back of the element as well as digitally for forwarding to a higher-level control system. The query is designed to be fail-safe and suitable for use in welding systems.

Optimised for use on machine tools

The products of the STARK.airtec family are optimised as zero-point clamping elements of the category "mechanical engineering" for use on machine tools and guarantee the highest repeat accuracy and process reliability. These products enable all common machining operations such as milling, grinding, eroding as well as the use on test benches and assembly devices. With the integrated "blow-out" cleaning function, the products can also be ideally used with automated loading.

Robot-supported loading and unloading

The product family has been extended with special versions designed for installation in systems for vehicle body shell construction, assembly systems and for connecting machine elements. Here, the focus is on robot-supported loading and unloading or the dynamic composition of devices in open space.

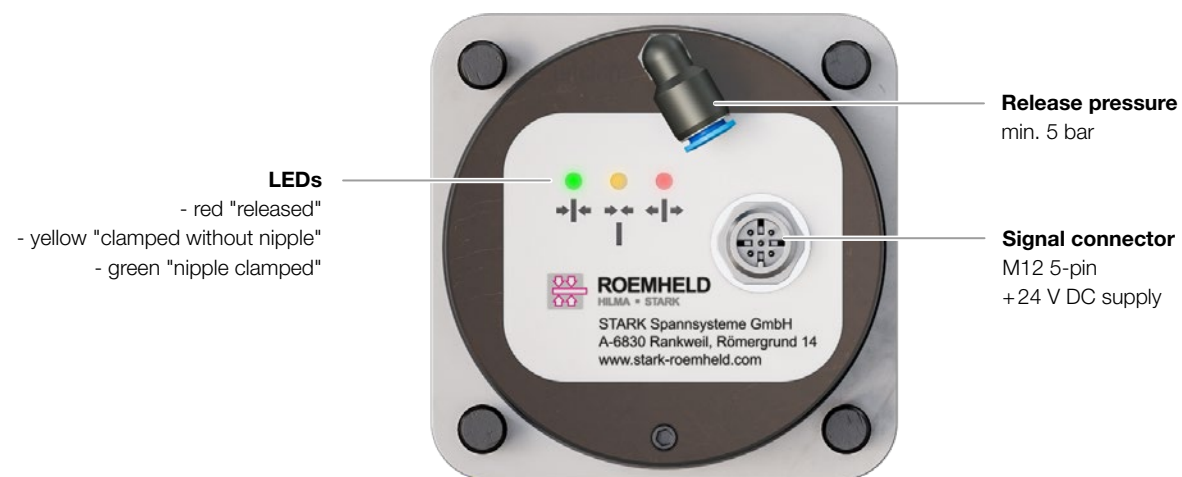
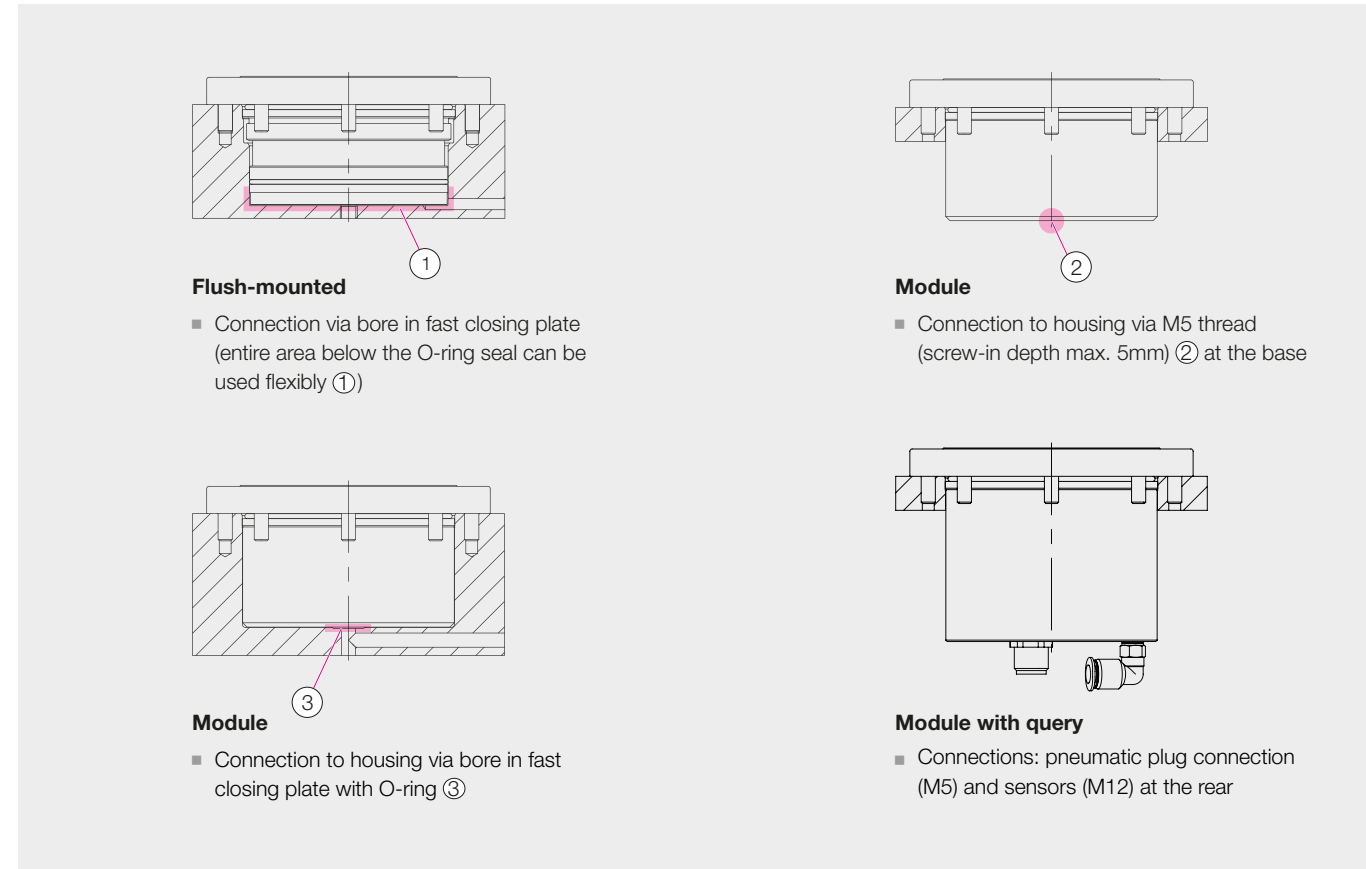
Additional functions using various retractable nipples

A wide range of retractable nipples is available to match the fast closing clamps that can provide additional functions (e.g. unique equalisation of ± 1.5 mm) or can be screwed into the device in a simple form depending on the application.

	DISC FORMS	INSTALLATION FORMS	RETRACTABLE NIPPLE FORMS
Mechanical engineering	 Round disc	 Flush-mounted	 Standard
	 Cut disc	 Module	 Different collar lengths
	 Disc with island	 Module with query	 Equaliser via flange
	 Special discs		
Plant engineering	 Cut disc	 Module with query	 Standard

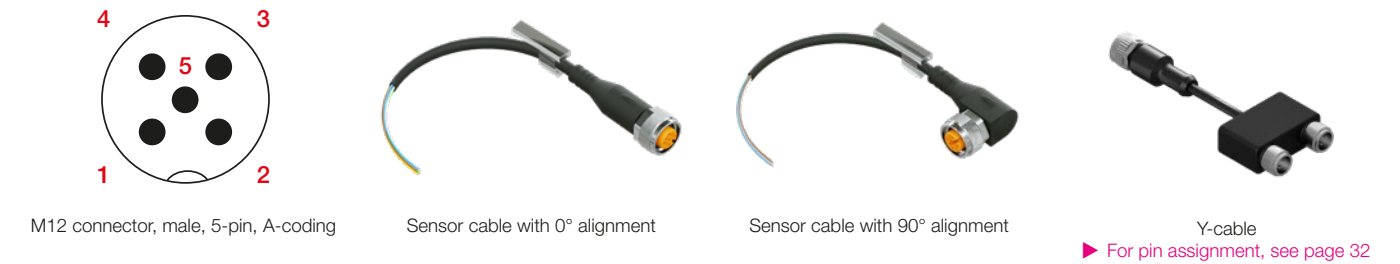
Connection variants

The pneumatic connection for release is located on the back of the element. In the "Module with query" version, the electrical outputs and the visual display of the clamping status are also located there. Further connection options and details can be found in the respective data sheet.



Pin assignment

The integrated querying unit must be supplied with a nominal voltage of +24V DC. The respective clamping status is indicated by a distinct signal ("clamped without nipple", "nipple clamped" or "released"). The signal lines are designed as PNP outputs with a 10 kΩ pull-down resistor.



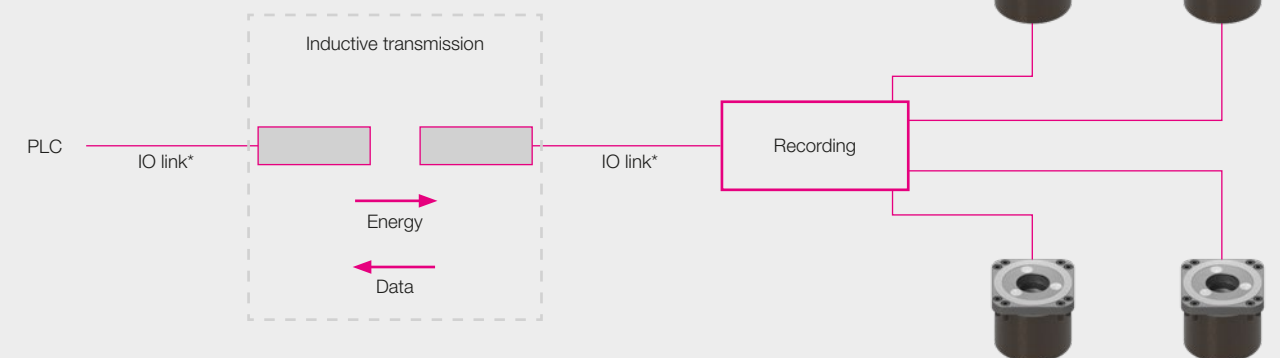
Assignment	Description	Signal type	Display (rear)
Pin 1	+24 V DC	Supply	
Pin 2	Signal "clamped without nipple"	PNP	LED yellow
Pin 3	GND	Supply	
Pin 4	Signal "nipple clamped"	PNP	LED green
Pin 5	Signal "released"	PNP	LED red
Shield	Not applied		

Topology

INFO

Possible application of digital status recording

Recording and transmission of information from the zero point clamping system in the machine or system to the controller



* instead of an IO link, transmission with digital signals can also be implemented.

Technical data

		STARK.airtec D100 / G080	STARK.airtec GX080	STARK.airtec D155
Maintenance interval (max. number of clamping cycles)	Cycles	2,000,000		700,000
Clamping force ¹	[N]	20,000		
Retention force ²	[N]	55,000		
Min. release pressure	[bar]	5		6
Max. operating pressure	[bar]	10		
Max. permitted lateral forces ³	[N]	7,000		
Tilting moment	[Nm]	500		
Air volume (release/clamp)	[cm ³]	19		46
Min. permitted clamping time / release time	[s]	0.2		
Radial pre-positioning ⁴	[mm]	±2		
Axial pre-positioning	[mm]	on support		
Repeat accuracy ⁵	[mm]	<0.005	<0.05	<0.005
System accuracy ⁶	[mm]	<0.01	<0.1	<0.01

- ¹ Clamping force: This clamping force is the load up to which the zero point of the retractable nipple is guaranteed. The specified clamping force must not be exceeded.
- ² Retention force: This is the maximum overload at which the retractable nipple is still held but the zero point has already been left.
- ³ Lateral force: The permitted force only applies to retractable nipples with zero point and retractable nipples with a 90° equalisation to the equaliser direction.
- ⁴ Radial pre-positioning: The loading device must be compliant for automated loading.
- ⁵ Repeat accuracy: This usually indicates the accuracy that refers to the change of the same pallet position-oriented on the same interface.
- ⁶ System accuracy: This refers to the accuracy resulting from changing several pallets, e.g. on different machines.

Tilting moment calculation example

INFO

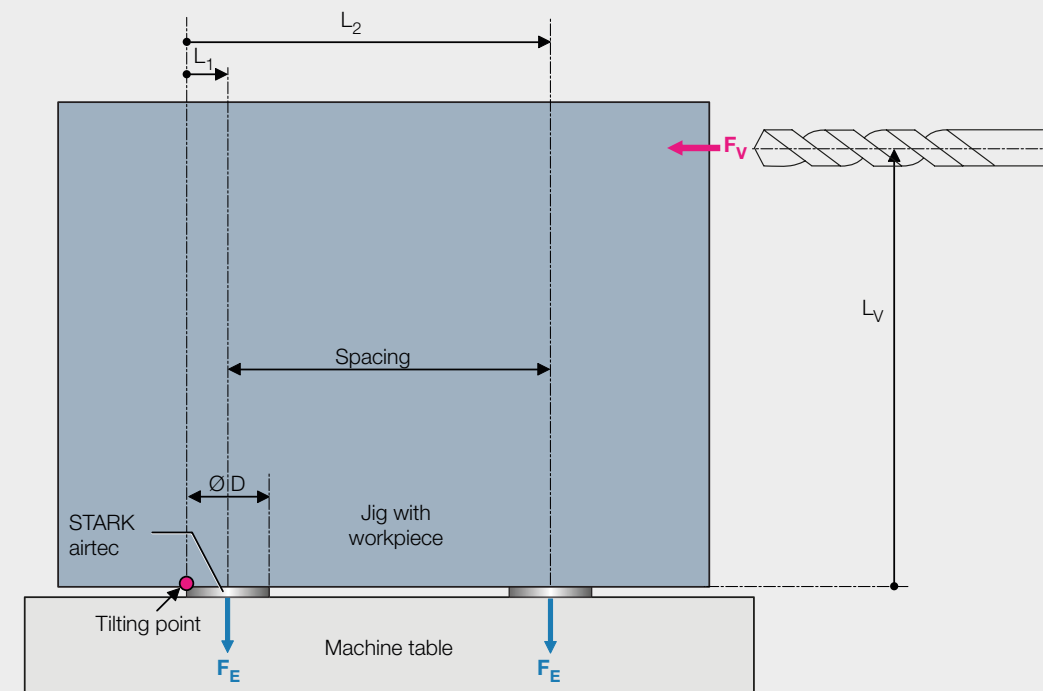
Tilting moment calculation example

Example:

Fast closing clamp plate 4 STARK.airtec with spacing 200 x 200 and max. feed force of 10 kN with distance of 300 mm.

Question:

Due to the predominance of roughing work, the system is to be checked for a double safety factor. Are the number of fast closing clamps and the spacing selected adequate?



Solution:

$$M_E > 2 \times M_V ?$$

$$M_V = F_V \times L_V = 10,000 \text{ N} \times 0.3 \text{ m}$$

$$M_V = \mathbf{3,000 \text{ Nm}}$$

$$M_E = 2 \times (F_E \times L_1) + 2 \times (F_E \times L_2)$$

$$M_E = 2 \times F_E \times (L_1 + L_2)$$

$$L_1 = \text{Ø D} / 2$$

$$L_2 = \text{Ø D} / 2 + \text{Spacing}$$

$$L_1 + L_2 = \text{Ø D} + \text{Spacing}$$

$$L_1 + L_2 = 0.076 \text{ m} + 0.20 \text{ m} = 0.276 \text{ m}$$

$$M_E = 2 \times F_E \times (L_1 + L_2) = 2 \times 20,000 \text{ N} \times 0.276 \text{ m}$$

$$M_E = \mathbf{11,040 \text{ Nm}}$$

$$M_E / M_V > 2 ?$$

$$M_E / M_V = 11,040 \text{ Nm} / 3,000 \text{ N}$$

$$M_E / M_V = \mathbf{3.68 > 2}$$

With this design there is a safety factor of around two.

(Enter all variables in SI units (metres, newtons))

M_V : Moment from feed force

M_E : Moment from retention force

F_V : Feed force (10,000 N)

F_E : Retention force (20,000 N)

Spacing = 200 mm = 0.20 m

Ø D (bearing ring) : 76 mm = 0.076 m

L_V : 300 mm = 0.30 m

MECHANICAL ENGINEERING

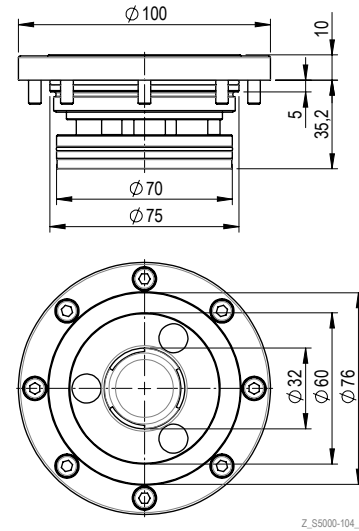
STARK.airtec D100, flush-mounted



Fast closing clamp made of high-quality tool steel. System is pneumatically single acting (clamping by spring force).

Design as flush-mounted module \varnothing 100 mm with support ring.

- Retention force: 55,000 N
- Clamping force: 20,000 N
- Repeat accuracy: < 0.005 mm
- Pressure: min. 5 bar, max. 10 bar
- Weight: 1.15 kg
- Installation according to data sheet D074
- Operating Manual WM-020-168-xx-xx



- Cylinder screw with hex. socket M5 x 14 mm S931-003, enclosed separately

Z_S5000-104_01

Order number	Article designation	Operating temperature	Material
S5000-104	SE A1 P 200 D100 ST NP	+10 to +80 °C	Tool steel, NBR
S5000-104-4	SE A1 P 200 D100 ST NP ET	+10 to +150 °C	Tool steel, FKM
S5000-104-5	SE A1 P 200 D100 ST NP NI	+10 to +80 °C	Stainless steel, NBR

► Note NEW order numbers – see information on page 34

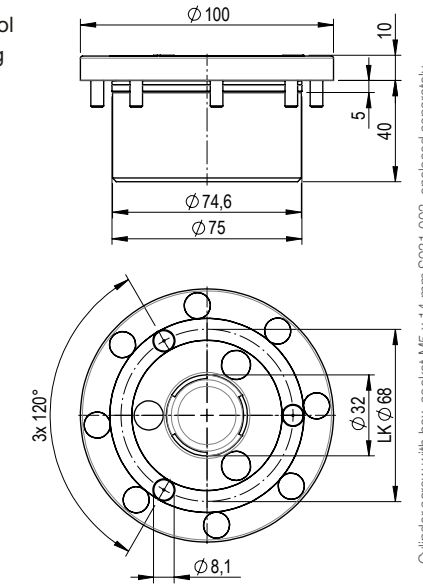
STARK.airtec D100, Tornado



Fast closing clamp made of high-quality tool steel. System is pneumatically single acting (clamping by spring force).

Modular design \varnothing 100 mm with blow-out via 3 support islands (\varnothing 8.1 mm)

- Retention force: 55,000 N
- Clamping force: 20,000 N
- Repeat accuracy: < 0.005 mm
- Pressure: min. 5 bar, max. 10 bar
- Weight: 1.2 kg
- Installation according to data sheet D088
- Operating Manual WM-020-168-xx-xx



- Cylinder screw with hex. socket M5 x 14 mm S931-003, enclosed separately

- Screw cover M5 S955-146-01, enclosed separately

- O-ring \varnothing 8.0 x 2.0 mm S933-066, enclosed separately

- For connection options, see page 10

Z_S5000-101-3_00

Order number	Article designation	Operating temperature	Material
S5000-101-3	SM A1 P 200 D100 TO NP ET	+10 to +80 °C	Tool steel, NBR
S5000-101-8	SM A1 P 200 D100 TO NP ET	+10 to +150 °C	Tool steel, FKM
S5000-101-17	SM A1 P 200 D100 TO NP NI	+10 to +80 °C	Stainless steel, NBR

► Note NEW order numbers - see information on page 34

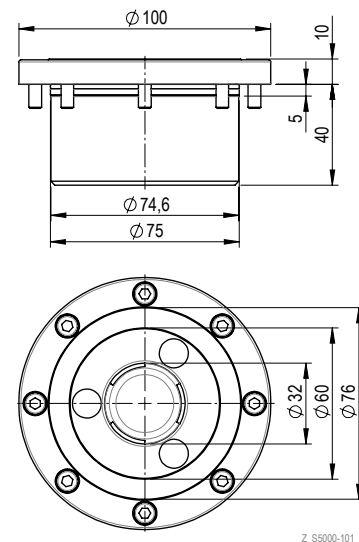
STARK.airtec D100, module



Fast closing clamp made of high-quality tool steel. System is pneumatically single acting (clamping by spring force).

Modular design \varnothing 100 mm with support ring.

- Retention force: 55,000 N
- Clamping force: 20,000 N
- Repeat accuracy: < 0.005 mm
- Pressure: min. 5 bar, max. 10 bar
- Weight: 1.1 kg
- Installation according to data sheet D088
- Operating Manual WM-020-168-xx-xx



- Cylinder screw with hex. socket M5 x 14 mm S931-003, enclosed separately

- O-ring \varnothing 8.0 x 2.0 mm S933-066, enclosed separately

- For connection options, see page 10

Z_S5000-101_00

Order number	Article designation	Operating temperature	Material
S5000-101	SM A1 P 200 D100 ST NP	+10 to +80 °C	Tool steel, NBR
S5000-101-16	SM A1 P 200 D100 ST NP ET	+10 to +150 °C	Tool steel, FKM
S5000-101-2	SM A1 P 200 D100 ST NP NI	+10 to +80 °C	Stainless steel, NBR

► Note NEW order numbers - see information on page 34

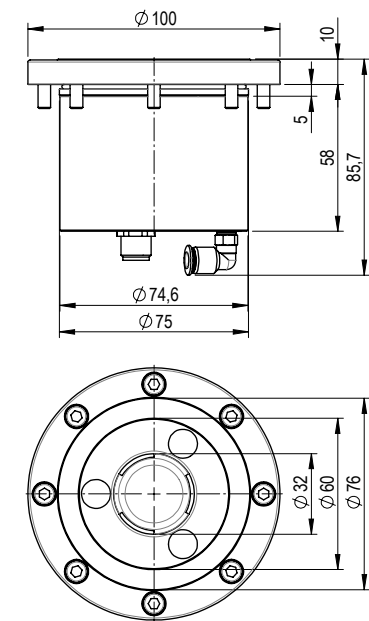
STARK.airtec D100, integrated query



Fast closing clamp made of high quality tool steel or hard anodised aluminium. System is pneumatically single acting (clamping by spring force).

Modular design \varnothing 100 mm with support ring. Integrated electrical query of the clamping status M12 connector, 5-pin, 24 V DC.

- Retention force: 55,000 N
- Clamping force: 20,000 N
- Repeat accuracy: < 0.005 mm
- Pressure: min. 5 bar, max. 10 bar
- Weight: 1.45 kg
- Installation according to data sheet D088
- Operating Manual WM-020-168-xx-xx



- Cylinder screw with hex. socket M5 x 14 mm S931-003, enclosed separately

- For connection options, see page 10

Z_S5000-110_00

Order number	Article designation	Operating temperature	Material
S5000-110	SM A1 P 200 D100 ST NP EA	+10 to +80 °C	Tool steel, aluminium, NBR
S5000-110-1	SM A1 P 200 D100 ST NP EA NI	+10 to +80 °C	Stainless steel, NBR

► Note NEW order numbers - see information on page 34

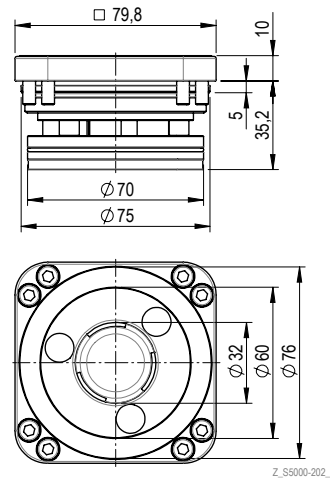
STARK.airtec G080, flush-mounted



Fast closing clamp made of high-quality tool steel. System is pneumatically single acting (clamping by spring force).

Design as flush-mounted module 80x80 mm with support ring.

- Retention force: 55,000 N
- Clamping force: 20,000 N
- Repeat accuracy: < 0.005 mm
- Pressure: min. 5 bar, max. 10 bar
- Weight: 1.0 kg
- Installation according to data sheet D107
- Operating Manual WM-020-168-xx-xx



- Cylinder screw with hex. socket M5 x 14 mm S931-003, enclosed separately

Order number	Article designation	Operating temperature	Material
S5000-202	SE A1 P 200 G080 ST NP	+10 to +80 °C	Tool steel, NBR
S5000-202-1	SE A1 P 200 G080 ST NP ET	+10 to +150 °C	Tool steel, FKM
S5000-202-2	SE A1 P 200 G080 ST NP NI	+10 to +80 °C	Stainless steel, NBR

► Note NEW order numbers - see information on page 34

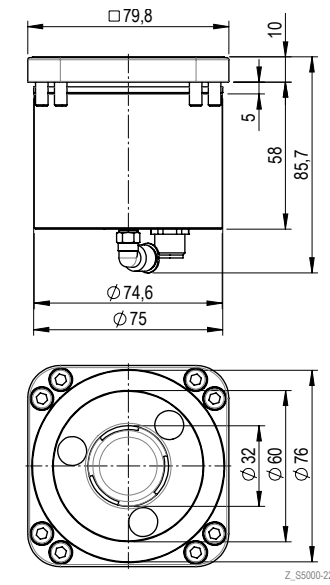
STARK.airtec G080, integrated query



Fast closing clamp made of high quality tool steel or hard anodised aluminium. System is pneumatically single acting (clamping by spring force).

Modular design 80x80 mm with support ring. Integrated electrical query of the clamping status M12 connector, 5-pin, 24 V DC.

- Retention force: 55,000 N
- Clamping force: 20,000 N
- Repeat accuracy: < 0.005 mm
- Pressure: min. 5 bar, max. 10 bar
- Weight: 1.35 kg
- Installation according to data sheet D172
- Operating Manual WM-020-168-xx-xx



- Cylinder screw with hex. socket M5 x 14 mm S931-003, enclosed separately
- For connection options, see page 10

Order number	Article designation	Operating temperature	Material
S5000-220	SM A1 P 200 G080 ST NP EA	+10 to +80 °C	Tool steel, aluminium, NBR
S5000-220-1	SM A1 P 200 G080 ST NP EA NI	+10 to +80 °C	Stainless steel, NBR

► Note NEW order numbers - see information on page 34

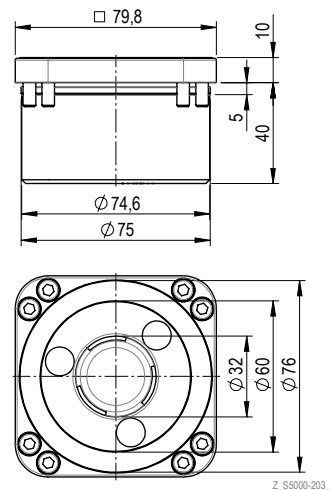
STARK.airtec G080, module



Fast closing clamp made of high-quality tool steel. System is pneumatically single acting (clamping by spring force).

Modular design 80x80 mm with support ring.

- Retention force: 55,000 N
- Clamping force: 20,000 N
- Repeat accuracy: < 0.005 mm
- Pressure: min. 5 bar, max. 10 bar
- Weight: 1.1 kg
- Installation according to data sheet D108
- Operating Manual WM-020-168-xx-xx



- Cylinder screw with hex. socket M5 x 14 mm S931-003, enclosed separately
- O-ring $\varnothing 8.0 \times 2.0$ mm S933-066, enclosed separately
- For connection options, see page 10

Order number	Article designation	Operating temperature	Material
S5000-203	SM A1 P 200 G080 ST NP	+10 to +80 °C	Tool steel, NBR
S5000-203-2	SM A1 P 200 G080 ST NP ET	+10 to +150 °C	Tool steel, FKM
S5000-203-3	SM A1 P 200 G080 ST NP NI	+10 to +80 °C	Stainless steel, NBR

► Note NEW order numbers - see information on page 34

Application example - mechanical engineering

Typical application for milling machines

- Zero-point clamping system 4 elements STARK.airtec (S5000-104)
- Multiple coupling for media transfer to the device pallet
- Pallet indexing
- 1x pneumatic line for opening the STARK.airtec elements
- 5x pneumatic lines for clamping device (clamping and monitoring)

System options

- Couplings for pneumatic, hydraulic and vacuum transfer
- Blow-out via STARK.airtec element
- Equipment check
- Centre distances from 80 mm possible



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ELEMENTS - PLANT ENGINEERING

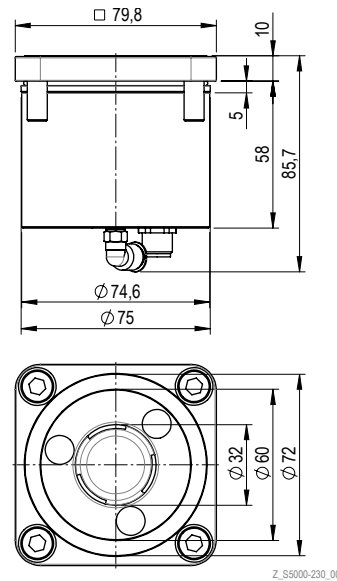
STARK.airtec GX080, integrated query



Fast closing clamp made of high quality tool steel or hard anodised aluminium. System is pneumatically single acting (clamping by spring force).

Modular design 80x80 mm with support ring. Integrated electrical query of the clamping status M12 connector, 5-pin, 24 V DC.

- Retention force: 55,000 N
- Clamping force: 20,000 N
- Repeat accuracy: < 0.05 mm
- Pressure: min. 5 bar, max. 10 bar
- Weight: 1.35 kg
- Installation according to data sheet D171
- Operating Manual WM-020-168-xx-xx



- Cylinder screw with hex. socket M8 x 20 mm S931-978-03, enclosed separately
- For connection options, see page 10

Order number	Article designation	Operating temperature	Material
S5000-230	SM A1 P 200 GX080 ST NP EA	+10 to +80 °C	Tool steel, aluminium, NBR
S5000-230-1	SM A1 P 200 GX080 ST NP EA NI	+10 to +80 °C	Stainless steel, aluminium, NBR

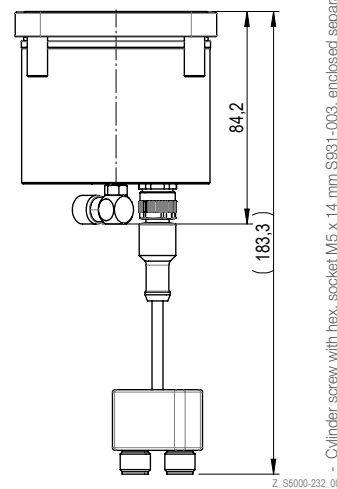
► Note NEW order numbers – see information on page 34

STARK.airtec GX080, set



Pre-mounted assembly with Y-cable for connection to standard sensor cable.

- 1x STARK.airtec GS080 (Art. No. S5000-230)
- 1x angle connection, pivoted M5/AD 6 (Art. No. S953-419)
- 1x Y-cable 113 mm, M12 socket 5-pin. on 2x M12 connector 4-pin. (Art. No. S958-153)
- Weight: 1.4 kg
- Installation according to data sheet D171
- Operating Manual WM-020-168-xx-xx

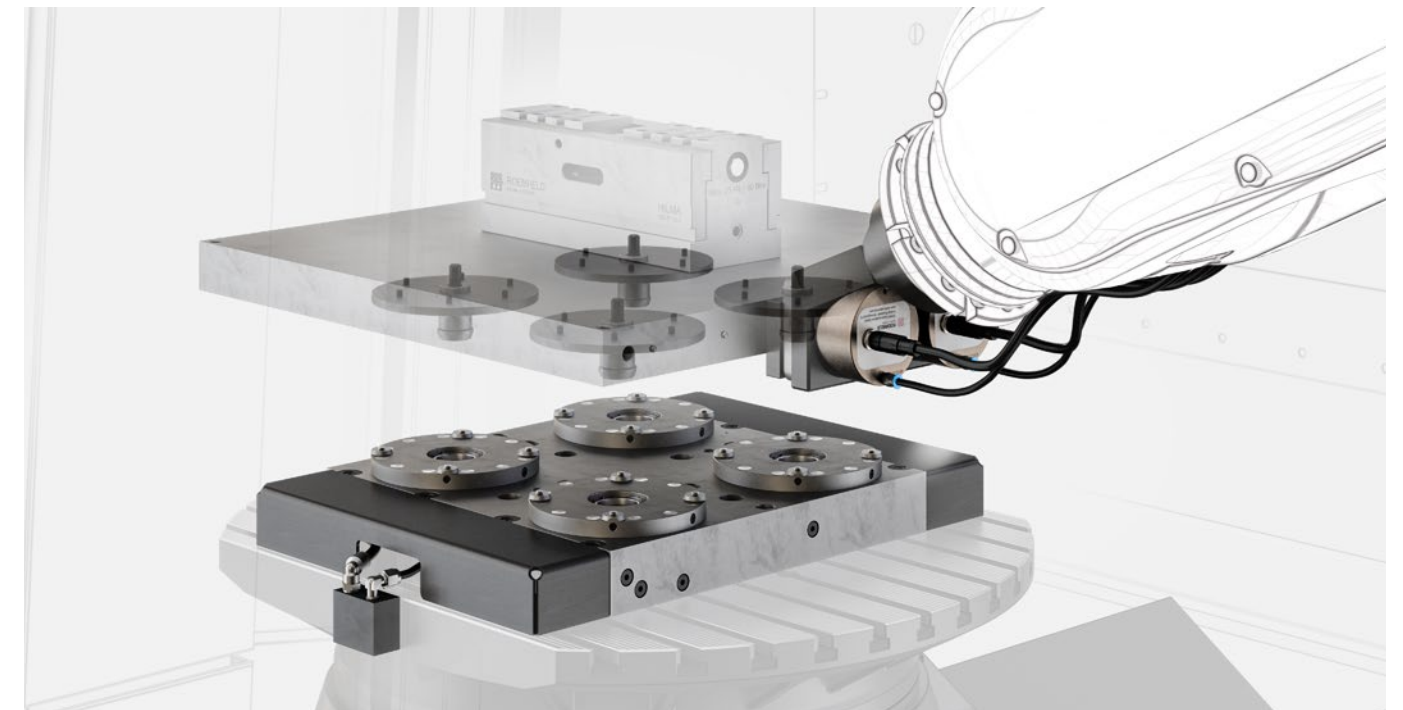


- Cylinder screw with hex. socket M5 x 14 mm S931-003, enclosed separately
- Y-cable 113 mm, M12 socket 5-pin on 2x M12 connector 4-pin S958-153, enclosed separately
- For connection options, see page 10
- For missing dimensions, see S5000-230

Order number	Article designation
S5000-232	SM A1 P 200 GX080 ST NP EA Set

► Note NEW order numbers – see information on page 34

Application engineering - automation



Application for milling machines – durable & easy to service

- Coupling unit with zero-point clamping system (device pallet - handling system)
- 2 elements STARK.airtec with integrated query (S5000-230)
- Fast closing plate with 4 elements STARK.classic.2 NG
- Connections for handling system
 - > 1x pneumatic connection
 - > 1x signal line with M12 plug connection
- Process reliability
 - > Release control
 - > Clamp control

System options

- Presence control
- Pallet detection (RFID)
- Blow-out via STARK.airtec element



SPECIAL VERSIONS

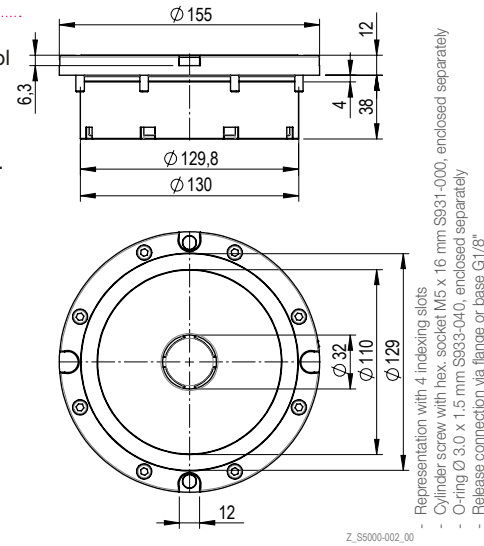
STARK.airtec D155, special



Fast closing clamp made of high-quality tool steel. System is pneumatically single acting (clamping by spring force).

Modular design ø 155 mm with support ring.

- Retention force: 55,000 N
- Clamping force: 20,000 N
- Repeat accuracy: < 0.005 mm
- Pressure: min. 6 bar, max. 10 bar
- Weight: 4.8 kg
- Installation according to data sheet D062
- Operating Manual WM-020-168-xx-xx



Order number	Article designation	Disc form	Operating temperature	Material
S5000-001	SM A1 P 200 D155 SO NP	without indexing slots	+ 10 to +80 °C	Tool steel, NBR
S5000-002	SM A1 P 200 D155 SO NP IN	with 4 indexing slots	+ 10 to +80 °C	Tool steel, NBR
S04342	SM A1 P 200 D155 SO NP IN NI	with 4 indexing slots	+ 10 to +80 °C	Stainless steel, NBR

► Note NEW order numbers - see information on page 34

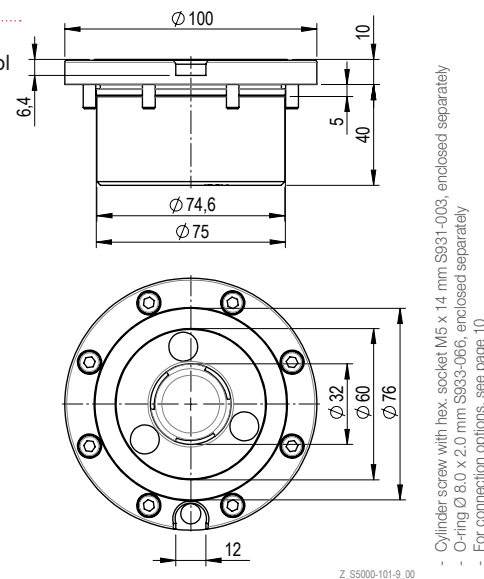
STARK.airtec D100, special



Fast closing clamp made of high-quality tool steel. System is pneumatically single acting (clamping by spring force).

Modular design and flush-mounted module design ø 100 mm with support ring and indexing slot (12 mm).

- Retention force: 55,000 N
- Clamping force: 20,000 N
- Repeat accuracy: < 0.005 mm
- Pressure: min. 5 bar, max. 10 bar
- Weight: 1.2 kg
- Operating Manual WM-020-168-xx-xx



Order number	Article designation	Version	Installation according to data sheet	Material
S5000-101-9	SM A1 P 200 D100 SO NP IN NI	Modular design	D088	Stainless steel, NBR
S5000-104-3	SE A1 P 200 D100 SO NP IN NI	Flush-mounted module	D074	Stainless steel, NBR

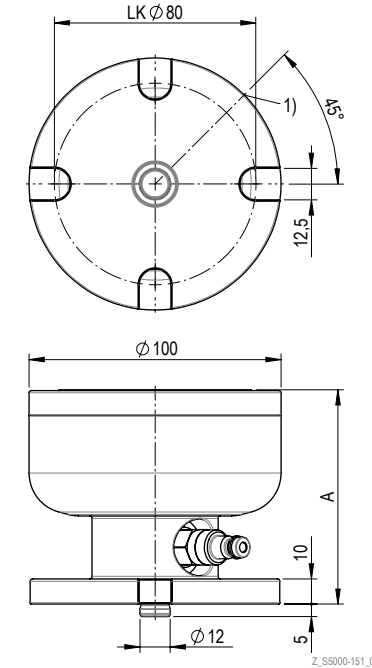
► Note NEW order numbers - see information on page 34

STARK.airtec D100, set surface-mounted element



Surface-mounted element ø 100 mm incl. STARK.airtec S5000-104. Lower side, centred pin ø 12. 4x fastening for M12 screws in grid 40 mm. Lateral pneumatic coupling for release.

- Retention force: 55,000 N
- Clamping force: 20,000 N
- Repeat accuracy: < 0.005 mm
- Pressure: min. 5 bar, max. 10 bar
- Operating Manual WM-020-168-xx-xx



Order number	Article designation	Height (A)	Weight
S5000-151	Surface-mounted element STARK.airtec D100	85 mm	3.4 kg
S5000-152	Surface-mounted element STARK.airtec D100	135 mm	4.2 kg

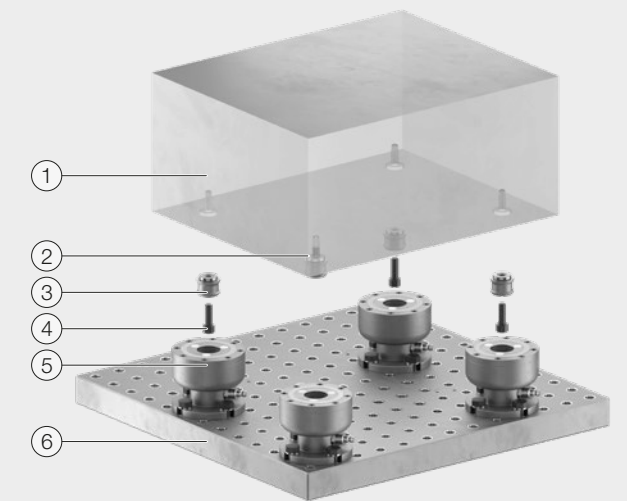
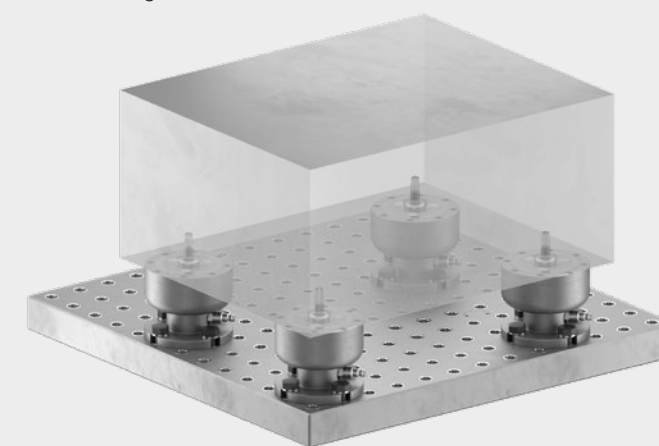
► Note NEW order numbers - see information on page 34

INFO

Functionality of STARK.airtec surface-mounted element

Do you want to gain height?

All STARK zero-point clamping systems are also available as surface-mounted elements. In addition, you have the option of adapting the retractable nipple to ensure that nothing "gets in the way" when machining.



- 1 Workpiece
- 2 Retractable nipple mounted
- 3 Retractable nipple
- 4 Screws
- 5 STARK.airtec surface-mounted element
- 6 Hole grid pallet

RETRACTABLE NIPPLE

A zero-point clamping system consists of a fast closing clamp into which a retractable nipple is clamped. Three different retractable nipples are combined to equalise manufacturing tolerances and the necessary "mobility for thermal expansion" on a pallet "temperature variation of a workpiece":

- Retractable nipple with zero point (NP)
- Retractable nipple with equaliser (AG)
- Retractable nipple without centring (OZ)

Equaliser via retractable nipple

Depending on the requirements of the retractable nipples, there are many ways to equalise tolerances in different materials and device sizes.



Retractable nipple with zero point (NP)



Retractable nipple with equaliser (AG) equalisation of theoretical centre in equaliser direction¹



Retractable nipple without centring (OZ) equaliser of theoretical centre in all directions¹

¹ See table: Combination possibility & tolerance range

Combination possibility & tolerance range

Element	Retractable nipple – standard			Retractable nipple – X series			Floating nipple		
	NP	AG	OZ	NP	AG	OZ	NP	AG	OZ
STARK.airtec D100, flush-mounted									
STARK.airtec D100, module									
STARK.airtec D100, Tornado									
STARK.airtec D100, integrated query	✓	±0.05mm	±0.25mm	✓	✓	✓	✓	±1.5mm	±1.5mm
STARK.airtec G080, flush-mounted									
STARK.airtec G080, module									
STARK.airtec GX080, integrated query									
STARK.airtec GX080, set	✓			✓	±0.15mm	±0.25mm	✓	±1.5mm	±1.5mm
STARK.airtec D155, special							✗	✗	✗
STARK.airtec D100, special	✓	±0.05mm	±0.25mm	✓	✓	✓	✓	±1.5mm	±1.5mm

- ✓ Recommended combination
- ✓ Possible combination
- ✗ Not recommended, consultation required

Values correspond to the radial tolerance for the position of element and retractable nipple including expected temperature variation

INFO Equaliser via retractable nipple

Field of application

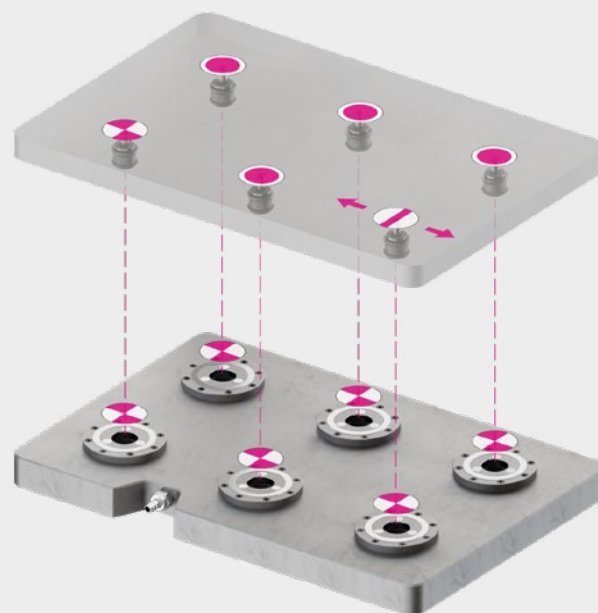
- Different materials between pallet and plate
- Flexible for different pallet sizes
- Manufacturing tolerances for cost-effective production

Application example - equalisation principle

- Fast closing plate with 6 elements
 - > 6x STARK.airtec D100, flush-mounted (S5000-104)
- Device pallet with 6 retractable nipples
 - > 1x retractable nipple STARK.airtec NP (S5000-012)
 - > 1x retractable nipple STARK.airtec AG (S5000-013) tolerance range ± 0.05mm¹
 - > 4x retractable nipple STARK.airtec OZ (S5000-014) tolerance range ± 0.25mm¹

Symbols – equaliser function

- with zero point (NP)
- with equaliser (AG)
- without centring (OZ)



INFO Advantages & benefits Retractable nipple STARK.airtec floating function

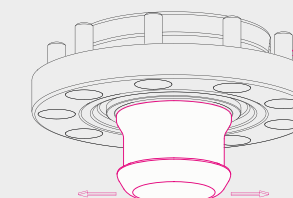
- **Low production costs**
For large centre distances, the advantage of a large equaliser can lead to much cheaper manufacture and thus significant cost savings. There are no processing steps and therefore the throughput time for the production of fast closing plates and pallets is reduced.
- **Thermal expansion**
Temperature changes, e.g. night 17 °C / day 32 °C, require special precautions to prevent redundant dimensioning (e.g. in the case of aluminium, this change in temperature modifies a centre distance from 1000 mm to 1000.36 mm).
- **Manufacturing tolerances**
Due to the large equaliser, it is sufficient to prepare the position of the elements and retractable nipples with generous tolerances. The entire system is always zero point accurate.

You determine the zero point.

Zero point and axis alignment are retained and are always known. In total, up to ± 1.5 mm can be equalised.

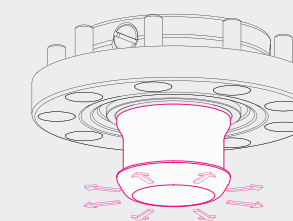
Retractable nipple with equaliser

Floating range of ± 1.5 mm in the direction of the arrow



Retractable nipple without centring

Floating range of ± 1.5 mm in the direction of the arrow (radial in all directions)



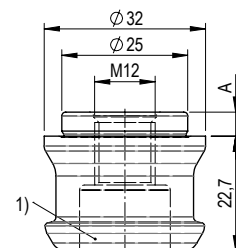
RETRACTABLE NIPPLE - STANDARD

Retractable nipple STARK.airtec - NP



Retractable nipple suitable for all fast closing clamps of the STARK.airtec family.

- Retractable nipple with zero point
- Weight: 0.1 kg
- Installation according to data sheet D029
- Operating Manual WM-020-168-xx-xx



1) Countersink for M10 screw
- Plastic cover M10 S999-361 optional
Z_S5000-012_00

Order number	Article designation	Collar length (A)	Material
S5000-012	EB A1 NP 250 12 048	4.8mm	Tool steel
S5000-012-1	EB A1 NP 250 12 048 NI	4.8mm	Stainless steel
S5000-009	EB A1 NP 250 12 148	14.8mm	Tool steel
S5000-009-1	EB A1 NP 250 12 148 NI	14.8mm	Stainless steel

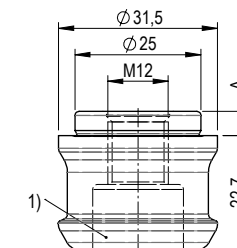
► Note NEW order numbers – see information on page 34

Retractable nipple STARK.airtec - OZ



Retractable nipple suitable for all fast closing clamps of the STARK.airtec family.

- Retractable nipple without centring
- Weight: 0.1 kg
- Installation according to data sheet D029
- Operating Manual WM-020-168-xx-xx



1) Countersink for M10 screw
- Plastic cover M10 S999-361 optional
Z_S5000-014_00

Order number	Article designation	Collar length (A)	Material
S5000-014	EB A1 OZ 250 12 048	4.8mm	Tool steel
S5000-014-1	EB A1 OZ 250 12 048 NI	4.8mm	Stainless steel
S5000-011	EB A1 OZ 250 12 148	14.8mm	Tool steel
S5000-011-1	EB A1 OZ 250 12 148 NI	14.8mm	Stainless steel

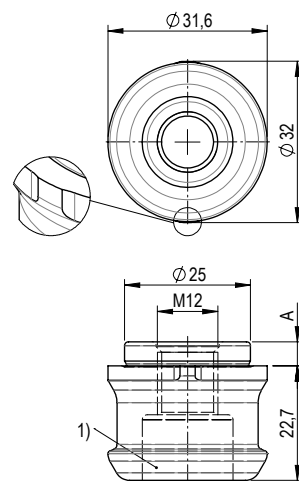
► Note NEW order numbers – see information on page 34

Retractable nipple STARK.airtec - AG



Retractable nipple suitable for all fast closing clamps of the STARK.airtec family.

- Retractable nipple with equaliser in one axis (sword form)
- Weight: 0.1 kg
- Installation according to data sheet D029
- Operating Manual WM-020-168-xx-xx



1) Countersink for M10 screw
- Plastic cover M10 S999-361 optional
Z_S5000-013_00

Order number	Article designation	Collar length (A)	Material
S5000-013	EB A1 AG 250 12 048	4.8mm	Tool steel
S5000-013-1	EB A1 AG 250 12 048 NI	4.8mm	Stainless steel
S5000-010	EB A1 AG 250 12 148	14.8mm	Tool steel
S5000-010-1	EB A1 AG 250 12 148 NI	14.8mm	Stainless steel

► Note NEW order numbers – see information on page 34

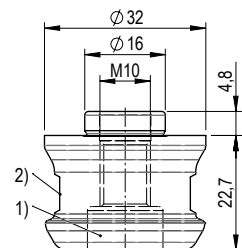
RETRACTABLE NIPPLE - PLANT ENGINEERING

Retractable nipple STARK.airtec X-series - NP



Retractable nipples preferably for fast closing clamps of type STARK.airtec GX080.

- Retractable nipple with zero point
- Reduced repeat accuracy
- Weight: 0.1 kg
- Installation according to data sheet D170
- Operating Manual WM-020-168-xx-xx



1) Countersink for M8 screw
2) Width across flats SW 26
Z_S5000-030_00

Order number	Article designation	Material
S5000-030	EB A1 NP 160 10 048 RG	Tool steel

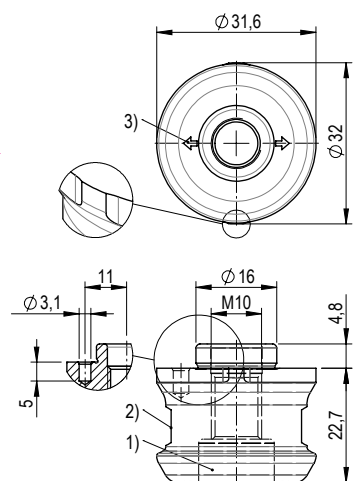
► Note NEW order numbers – see information on page 34

Retractable nipple STARK.airtec X-series - AG



Retractable nipples preferably for fast closing clamps of type STARK.airtec GX080.

- Retractable nipple with equaliser in one axis (sword form) with indexing pin
- Reduced repeat accuracy
- Weight: 0.1 kg
- Installation according to data sheet D170
- Operating Manual WM-020-168-xx-xx



1) Countersink for M10 screw
2) Width across flats SW 26
3) Equalisation direction labelled
- Clamping pin Ø 3.0 x 8 mm S936-333, enclosed separately
Z_S5000-031_00

Order number	Article designation	Material
S5000-031	EB A1 AG 160 10 048 RG	Tool steel

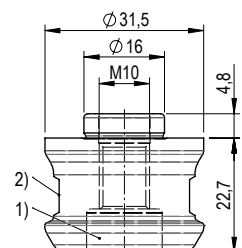
► Note NEW order numbers - see information on page 34

Retractable nipple STARK.airtec X-series - OZ



Retractable nipples preferably for fast closing clamps of type STARK.airtec GX080.

- Retractable nipple without centring
- Reduced repeat accuracy
- Weight: 0.1 kg
- Installation according to data sheet D170
- Operating Manual WM-020-168-xx-xx



1) Countersink for M10 screw
2) Width across flats SW 26
Z_S5000-032_00

Order number	Article designation	Material
S5000-032	EB A1 OZ 160 10 048 RG	Tool steel

► Note NEW order numbers - see information on page 34

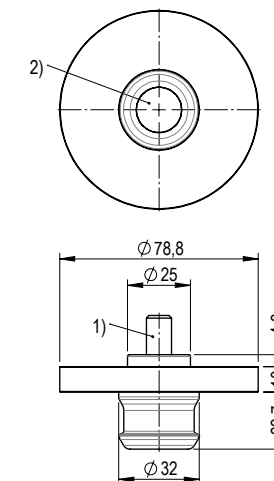
FLOATING NIPPLE

Retractable nipple STARK.airtec floating function - NP



Retractable nipple suitable for fast closing clamps of the STARK.airtec family.

- Retractable nipple with zero point, no floating range
- Weight: 0.2 kg
- Installation according to data sheet D029
- Operating Manual WM-020-168-xx-xx



1) Cylinder screw with hex. socket M10 x 40 mm S331-028, enclosed separately
2) Plastic cover M10 S989-361, enclosed separately
Z_S5000-021_00

Order number	Article designation	Material
S5000-021	EF A1 NP 250 10 048 FL	Tool steel

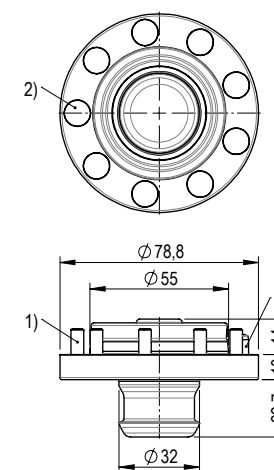
► Note NEW order numbers - see information on page 34

Retractable nipple STARK.airtec floating function - AG



Retractable nipple suitable for fast closing clamps of the STARK.airtec family.

- Retractable nipple with equaliser in one axis (sword form), floating range of ± 1.5 mm
- Weight: 0.2 kg
- Installation according to data sheet D102
- Operating Manual WM-020-168-xx-xx



1) Cylinder screw with hex. socket M5 x 14 mm S331-003, enclosed separately
2) Screw cover M5 S055-146-01, enclosed separately
3) Cylinder pin Ø 6.0 x 14 mm S836-070, enclosed separately
Z_S5000-022_00

Order number	Article designation	Material
S5000-022	EF A1 AG 250 10 048 FL	Tool steel, NBR

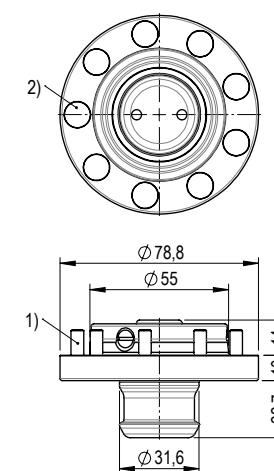
► Note NEW order numbers – see information on page 34

Retractable nipple STARK.airtec floating function - OZ



Retractable nipple suitable for fast closing clamps of the STARK.airtec family.

- Retractable nipple without centring, floating range of ± 1.5 mm
- Weight: 0.2 kg
- Installation according to data sheet D102
- Operating Manual WM-020-168-xx-xx



1) Cylinder screw with hex. socket M5 x 14 mm S331-003, enclosed separately
2) Screw cover M5 S055-146-01, enclosed separately
Z_S5000-023_00

Order number	Article designation	Material
S5000-023	EF A1 OZ 250 10 048 FL	Tool steel, NBR

► Note NEW order numbers – see information on page 34

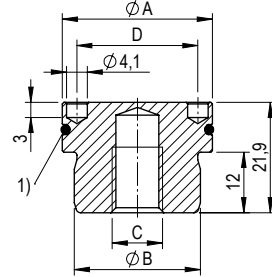
NIPPLE FASTENING

Nipple fastening D



Counterpart for mounting the retractable nipple according to the version "D".

- Allows to make the nipple fastening with one clamping.
- Mounting key or face wrench recommended for counterholding
- Operating Manual WM-020-168-xx-xx



1) S804-253 O-ring Ø 17.17 x 1.78 mm S933-271
S804-267 O-ring Ø 26.7 x 1.76 mm S933-163
Z_S804-267_01

Order number	Article designation	Ø A	Ø B	C (thread)	D	Installation according to data sheet	Weight
S804-253	NB 20 22 16 12 M08 NI D	19.8mm	16mm	M8	14 mm	D170	0.05 kg
S804-267	NB 30 22 25 12 M10 NI D	29.8mm	25 mm	M10	24 mm	D029	0.05 kg

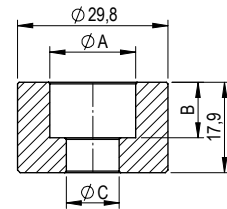
► Note NEW order numbers – see information on page 34

Nipple fastening E



Counterpart for mounting the retractable nipple according to the version "E".

- Allows to make the nipple fastening with one clamping.
- Operating Manual WM-020-168-xx-xx



Z_S809-120_00

Order number	Article designation	Ø A	Ø	Ø C	Fastening bore	Installation according to data sheet	Weight
S809-120	NB 30 18 00 00 F10 NI E	17 mm	11 mm	10.5 mm	M10	D170	0.05 kg
S804-266-01	NB 30 18 00 00 F12 NI E	18.5 mm	12.5 mm	12.5 mm	M12	D029	0.05 kg

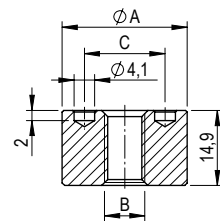
► Note NEW order numbers – see information on page 34

Nipple fastening E.1



Counterpart for mounting the retractable nipple according to the version "E.1".

- Allows to make the nipple fastening with one clamping. Mounting key or face wrench recommended for counterholding.
- Operating Manual WM-020-168-xx-xx



Z_S804-266_00

Order number	Article designation	Ø A	B (thread)	C	Installation according to data sheet	Weight
S809-128	NB 25 15 00 00 M08 NI E1	24.8mm	M8	16 mm	D170	0.05 kg
S804-266	NB 30 15 00 00 M10 NI E1	29.8mm	M10	24 mm	D029	0.05 kg

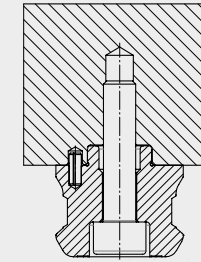
► Note NEW order numbers - see information on page 34

INFO

Application example

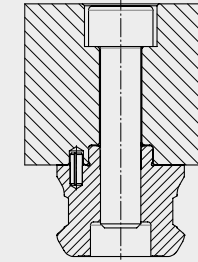
Version A

For applications where nipple bores are not permitted on the surface (e.g. pallet top) or for direct clamping of workpieces.



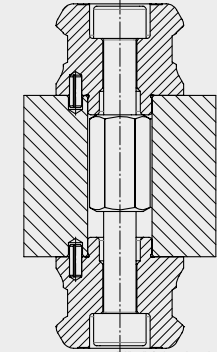
Version B

Simple nipple fastening from above.



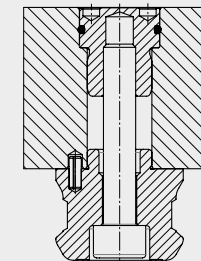
Version C

Ideal fastening version for clamping in laterally inverted manufacturing. Highest level of accuracy is guaranteed because the nipples are fastened in the same locating bore.



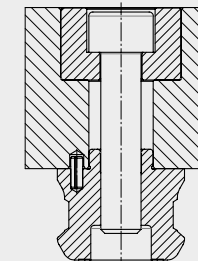
Version D

For applications where nipple bores are not permitted on the surface (e.g. pallet top) or for direct clamping of workpieces.

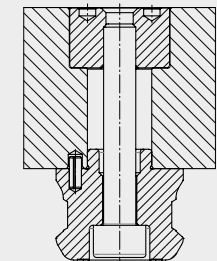


Version E

The fitting bores for the nipples and all necessary positioning holes on the pallet can be produced in one operation. This results in the highest level of accuracy of the positions to each other.



Version E.1

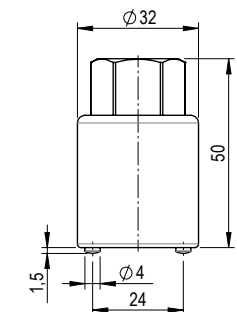


Key for nipple fastening D & E.1



For mounting and dismantling the retractable nipple according to version "D & E.1".

- Wrench size SW22
- Tightening torque see installation data sheets of retractable nipples.



Z_S804-254_00

Order number	Article designation	Dimensions	Weight
S804-254	Key for nipple fastening M10	ø32 mm / 50 mm	0.16 kg

► Note NEW order numbers - see information on page 34

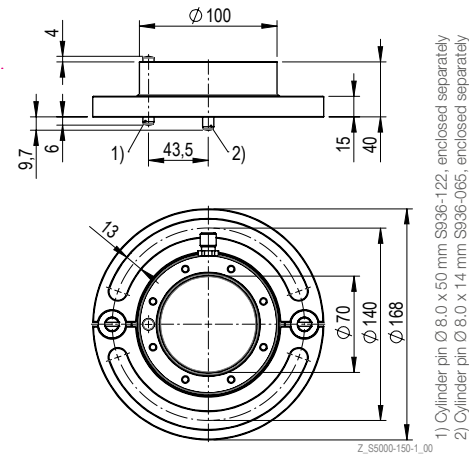
ACCESSORIES

Surface-mounted housing STARK.airtec D100



Surface-mounted housing made of nitrided steel for assembly on machine table. Suitable for fast closing clamp of type STARK.airtec D100

- Two-part design
- For installation, see Operating Manual WM-020-168-xx-xx



Order number	Article designation	Weight
S5000-150-1	Surface-mounted housing STARK.airtec D100	1.6 kg

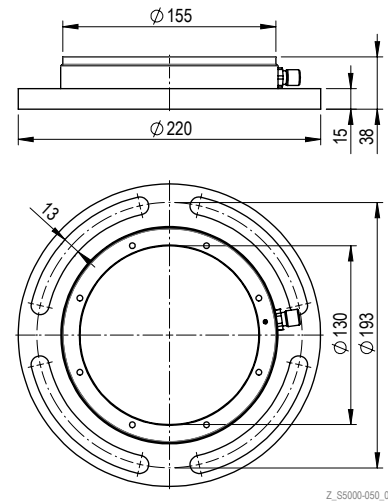
► Note NEW order numbers – see information on page 34

Surface-mounted housing STARK.airtec D155, special



Surface-mounted housing made of nitrided steel for assembly on machine table. Suitable for fast closing clamp of type STARK.airtec D155

- One-part design
- For installation, see Operating Manual WM-020-168-xx-xx



Order number	Article designation	Weight
S5000-050	Surface-mounted housing STARK.airtec D155	2.2 kg

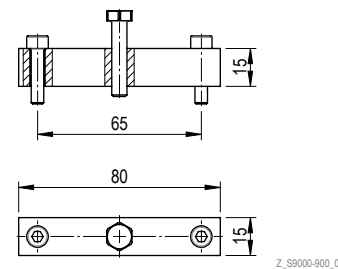
► Note NEW order numbers - see information on page 34

Bridge for unlocking STARK.airtec/connect



Bridge for the mechanical unlocking (in case of service – see operating manual) of the fast closing clamps STARK.connect and STARK.airtec with integrated querying.

- 1x bridge 80mm x 15 x 15 mm
- 2x M5 x 22 mm fixing screw
- 1x M6 x 30 mm screw for lifting off



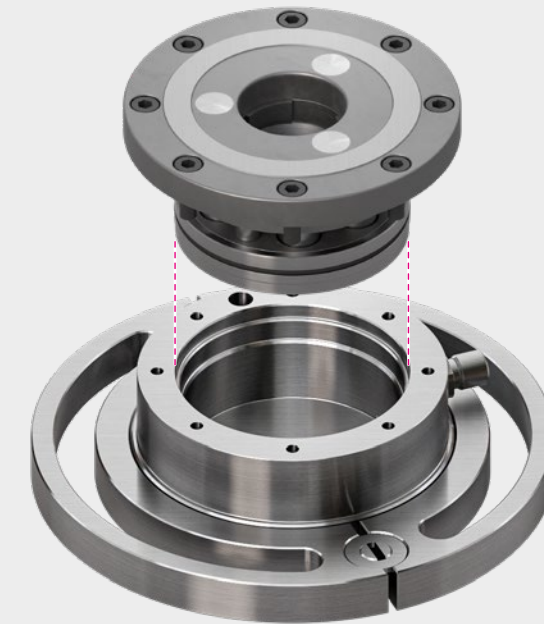
Order number	Article designation	Weight
S9000-900	Bridge for unlocking STARK.airtec/connect	0.07 kg

► Note NEW order numbers - see information on page 34

INFO

Surface-mounted housing practical example

STARK.airtec S5000-104 surface-mounted housing with clamping ring and pneumatic connection.



Push-in fittings



Pneumatic M5 push-in fitting suitable for the STARK.connect and STARK.airtec fast closing clamps.

- In straight or angled design for 12 bar, 16 bar or 20 bar maximum pressure

Order number	Article designation	Design	Weight
S953-160	Push-in fitting QSM-M5-6	M5 Ø 6 mm – straight / 0° – max. 12 bar	0.005 kg
S953-273	Push-in fitting NPQH-D-M5-Q6-P10	M5 Ø 6 mm – straight / 0° – max. 20 bar	0.013 kg
S953-171	L-push-in fitting QSML-M5-6	M5 Ø 6 mm – angled / 90° – max. 12 bar	0.005 kg
S953-272	L-push-in fitting NPQH-L-M5-Q6-P10	M5 Ø 6 mm – angled / 90° – max. 20 bar	0.013 kg
S953-419	Angle connection, pivoted M5-AD6	M5 Ø 6 mm – angled / 90° – max. 16 bar	0.020 kg

► Note NEW order numbers - see information on page 34

Screw cover



Screw cover suitable for retractable nipples or fast closing clamps of the STARK.airtec family.

Order number	Article designation	Field of application	Design	Weight
S999-361	Screw cover for M10	Retractable nipple – standard	M10 Ø 18 mm x 4.6 mm	0.001 kg
S055-146-01	Screw cover for M5	Fast closing clamp	M5 Ø 10.3 mm x 3 mm	0.001 kg
S055-146-02	Screw cover for M6	Fast closing clamp	M6 Ø 11.5 mm x 3 mm	0.001 kg

► Note NEW order numbers - see information on page 34

Sensor cable



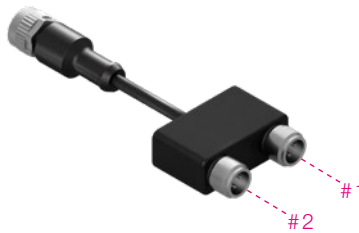
5-pin M12 sensor cable suitable for fast closing clamps STARK.connect and STARK.airtec

- M12 connector in straight or angled design, second side with open end in 2 m or 5 m length

Order number	Article designation	Design	Weight
S999-700	Sensor cable M12 2m open end 0°	5-pin sensor cable, l = 2m, M12 connector 0°, open end	0.05 kg
S999-701	Sensor cable M12 5m open end 0°	5-pin sensor cable, l = 5m, M12 connector 0°, open end	0.15 kg
S999-702	Sensor cable M12 2m open end 90°	5-pin sensor cable, l = 2m, M12 connector 90°, open end	0.05 kg
S999-703	Sensor cable M12 5m open end 90°	5-pin sensor cable, l = 5m, M12 connector 90°, open end	0.15 kg

► Note NEW order numbers – see information on page 34

Y-cable & pin assignment

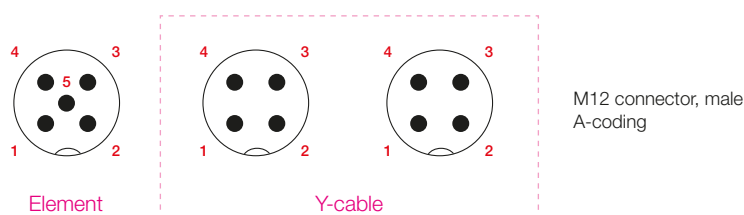


For connecting and evaluating the integrated sensor unit.

- For use with 4-pin sensor-cable with M12 connector

Order number	Article designation	Design	Weight
S958-153	Y-cable	Cable 113 mm, M12 socket 5-pin to 2x M12 connector 4-pin	0.03 kg

► Note NEW order numbers – see information on page 34



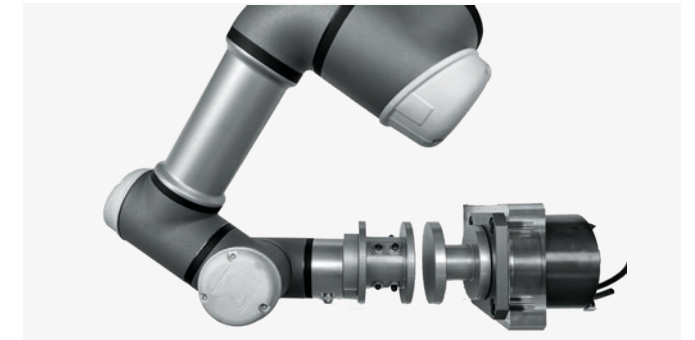
Assignment	Assignment #1	Assignment #2	Description	Signal type	Display (rear)
Pin 1	Pin 1	Not assigned	24 V DC	Supply	
Pin 2	Not assigned	Pin 2	Signal "clamped without nipple"	PNP	LED yellow
Pin 3	Pin 3	Pin 3	GND	Supply	
Pin 4	Pin 4	Not assigned	Signal "nipple clamped"	PNP	LED green
Pin 5	Not assigned	Pin 4	Signal "released"	PNP	LED red
Shield	Not applied	Not applied	Not applied		

Programming aid STARK.airtec/connect

The programming aid serves to support the teach-in of a work cycle with a robot. The programming aid case contains three sets for the STARK.airtec and STARK.connect. One set consists of a 50 mm attachment for the side of the retractable nipple and a 50 mm attachment for the side of the fast closing clamp. Both attachments together thus result in a distance of 100 mm. After successful determination of the coordinates, the 2x 50 mm can be corrected again in the programming.



One set consists of a 50 mm attachment for the side of the retractable nipple and a 50 mm attachment for the side of the fast closing clamp



Programming aid for teaching in a robot



Programming aid for fast closing clamps locks STARK.connect and STARK.airtec

- Case with foam insert and associated tools
- 3x nipple side (turning attachment STARK.airtec / STARK.connect)
- 3x element side with pre-assembled STARK.connect nipple with zero point
- 3x nipple for STARK.airtec with zero point

Order number	Article designation	Weight
S9000-901	Programming aid STARK.airtec/connect	5 kg

► Note NEW order numbers - see information on page 34

List of order numbers STARK.airtec

► Note NEW order numbers

S04342	20	S999-701	32	S5000-022	27	S5000-110-1	15
S055-146-01	31	S999-702	32	S5000-023	27	S5000-150-1	30
S055-146-02	31	S999-703	32	S5000-030	26	S5000-151	21
S804-253	28	S5000-001	20	S5000-031	26	S5000-152	21
S804-254	29	S5000-002	20	S5000-032	26	S5000-202	16
S804-266	28	S5000-009	24	S5000-050	30	S5000-202-1	16
S804-266-01	28	S5000-009-1	24	S5000-101	14	S5000-202-2	16
S804-267	28	S5000-010	24	S5000-101-16	14	S5000-203	16
S809-120	28	S5000-010-1	24	S5000-101-17	15	S5000-203-2	16
S809-128	28	S5000-011	25	S5000-101-2	14	S5000-203-3	16
S953-160	31	S5000-011-1	25	S5000-101-3	15	S5000-220	17
S953-171	31	S5000-012	24	S5000-101-8	15	S5000-220-1	17
S953-272	31	S5000-012-1	24	S5000-101-9	20	S5000-230	18
S953-273	31	S5000-013	24	S5000-104	14	S5000-230-1	18
S953-419	31	S5000-013-1	24	S5000-104-3	20	S5000-232	18
S958-153	32	S5000-014	25	S5000-104-4	14	S9000-900	30
S999-361	31	S5000-014-1	25	S5000-104-5	14	S9000-901	33
S999-700	32	S5000-021	27	S5000-110	15		

INFO NEW order numbers

In the course of a system modification within the ROEMHELD Group, the order numbers for STARK Spannsysteme have been adapted and standardised.

- NEW: all order numbers start with **S**
- NEW: hyphen - instead of blank space

S5000-104
instead of
5000 104

Examples

NEW order number	OLD order number	Modifications
S04342	S04342	No modification
S5000-104	5000 104	S as prefix, hyphen - instead of blank space

A COMPANY OF THE
ROEMHELD GROUP

STARK
Spannsysteme

The ROEMHELD Group consists of 5 companies at locations in Germany and Austria, each with different products and orientations. With numerous subsidiaries, sales partners and service companies on all continents and in more than 50 countries, rapid and intensive customer support is provided in the mechanical engineering, medical technology, automotive, aviation and agricultural industries.

As part of the ROEMHELD Group, STARK benefits from the security and experience of a family-run traditional company as well as from the worldwide sales and service network. At the same time, this background provides the independence to pursue dynamic and innovative goals for new market-driven developments and customer-specific solutions with which STARK maintains its leading technological position.



ROEMHELD
HILMA ■ STARK

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