



**ROEMHELD**  
HILMA ■ STARK

# The future starts now



## Zero point clamping system **SPEEDY connect**

P r o d u c t s | *f o r* | p r o d u c t i v i t y

reliable  
boosting  
compact  
powerful

- Industry 4.0-compatible
- Pneumatic double-action
- Very small dimensions
- High insertion force





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### SPEEDY connect

MP

- Standard - with zero point
- With equaliser
- Without centring

#### Order no.

9000 001	10
9000 002	10
9000 003	10

### Retractable nipple connect

MP

- With zero point
- With zero point - shortened
- With equaliser
- With equaliser - shortened
- Without centring
- Without centring - shortened

9000 100	14
9000 103	14
9000 101	14
9000 104	14
9000 102	14
9000 105	14

### Nipple fastening

- D
- E

809 120	16
809 128	16

### Programming aid

disc/disc for SPEEDY airtec and SPEEDY connect

9000 901	17
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### Accessories

Push-in fitting 0°

953 160	18
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Push-in fitting 90°

953 273	18
953 171	18
953 272	18

Key for nipple fastening E

804 962	18
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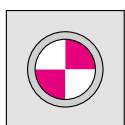
Sensor cable 1 m, 3 m

999 700 – 999 703	19
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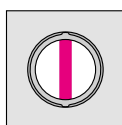
Bridge for unlocking

9000 900	19
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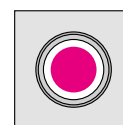
## Symbols



NP - with zero point



AG - with equaliser



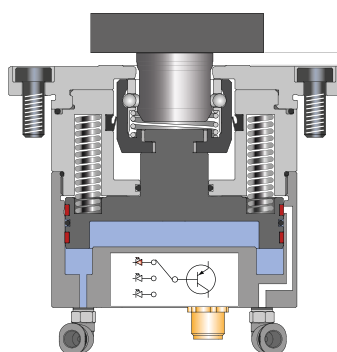
OZ - without centring



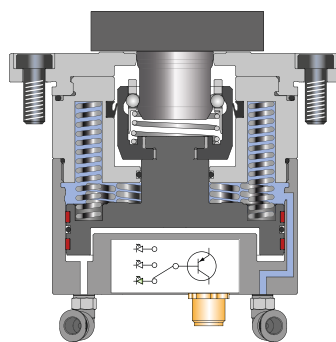
## Function description SPEEDY connect

SPEEDY connect is a pneumatically actuated zero point clamping system.

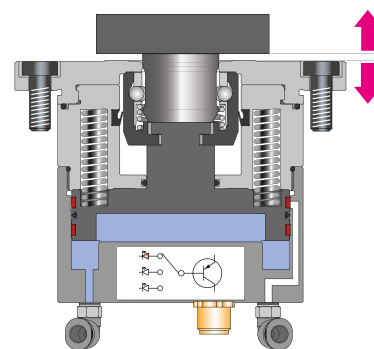
A piston is held in the clamped position using springs. The piston is of a double-action pneumatic design.



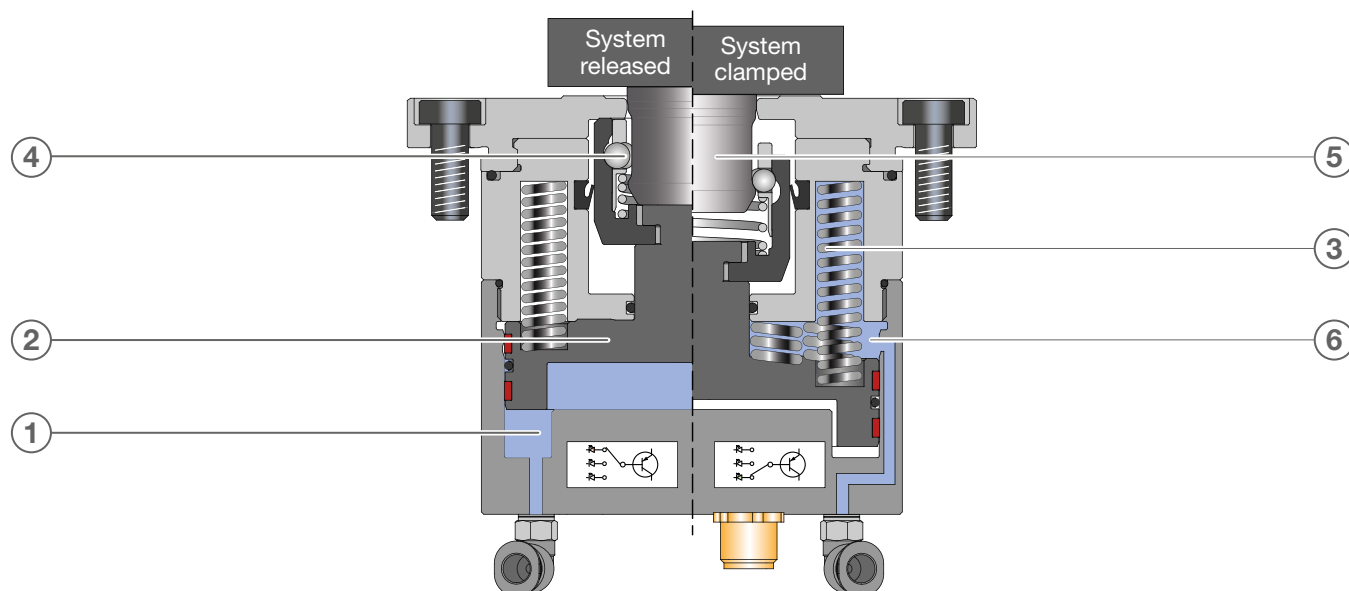
Reliable clamping from 4.5 mm



Pulled in with high force, clamped and positioned



Released with/without lifting



### Releasing:

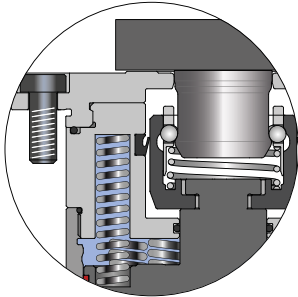
- The release pressure (1) is applied to the piston (2) and the piston moves up. The springs (3) are compressed.
- The balls (4) move to the parking position.
- The retractable nipple (5) is raised — "released" signal.

### Clamping:

- The release pressure (1) is relieved and drops to 0 bar.
- The spring pre-load is applied via the piston (2), the piston moves down.
- The balls (4) are pressed in by the clamping contour, enclose the retractable nipple (5) and pull it down so it is in contact — "clamped with retractable nipple" signal.
- If there is no retractable nipple in the retraction mechanism, the piston (2) moves to the stop — "clamped without retractable nipple" signal.
- The clamping pressure (6) can also be applied to the piston (2) to increase the insertion force.

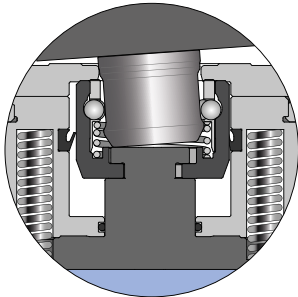
Tried and tested technology with a system –  
original down to the smallest detail

**Vorteile**  
die sich lohnen!



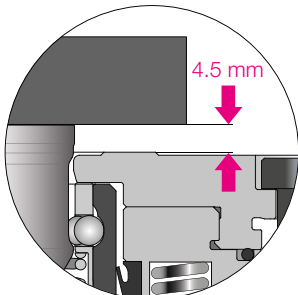
## Design

- Compact design with high clamping forces
- Double-action pneumatic system with clamping force boost
- Simple installation contour
- Easy to maintain – straightforward installation and cleaning
- Made of high-quality, stainless materials



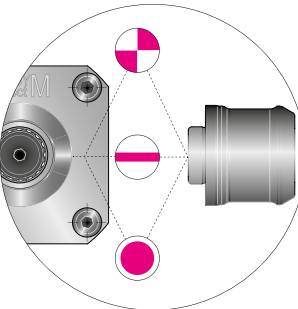
## Floating receptacle

- Clamping mechanism can move sideways (e.g. temperature variation)
- Angled insertion and removal possible
- Optimal for automatic applications



## Active insertion & optional lifting

- Active insertion force for optimal contact
- Maximum capture range with 4.5 mm travel
- Vibrations are damped and the quality of the workpieces therefore increased
- Straightforward robotic feed and removal
- Flexible handling with and without lifting 1.5 mm out of the fit



## Flexible equalising options

- Equalising possible via fast closing clamp or via retractable nipple
  - Tolerance range with retractable nipple AG  $\pm 0.05$  mm / OZ  $\pm 0.2$  mm
  - Tolerance range with fast closing clamp  $\pm 0.75$  mm
- Flexible feature for compensating for tolerances in material mix, thermal characteristics or large designs



## Fully integrated sensors

- Unambiguous acquisition of the clamping state
- Direct signalling on the rear via LEDs
- Digital outputs for straightforward further processing in the higher-level controller
- Greatest possible robustness and suitable for use in welding environments

## Characteristics

The SPEEDY connect series are fast closing clamps made of high-quality tool steel and a housing made of anodised, high-strength aluminium with very low space requirements due to compact external dimensions. The system is clamped mechanically using springs, the force is boosted pneumatically and the system also released pneumatically. The SPEEDY connect is self-locking due to the integrated spring assembly.

The integrated polling unit acquires and signals the clamping state via three signals ("clamped without nipple", "nipple clamped" or "released") on LEDs on the rear of the element, as well as digital signals for forwarding to a higher-level controller. The polling is designed so it is resilient to interference and is suitable for use in welding systems.



## Connections

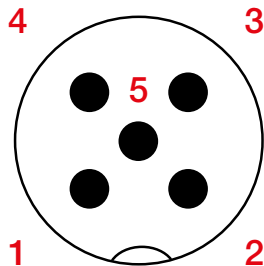
On the rear of the element there are the two pneumatic connections for releasing and boosting the clamping, as well as the electrical outputs and optical indication of the clamping state.



## Pin assignment

The integrated polling unit is to be supplied with a nominal voltage of +24 V DC. The related clamping state is indicated by an unambiguous signal ("clamped without nipple", "nipple

clamped" or "released"). The signal lines are designed as PNP outputs with a 10 k $\Omega$  pull-down resistor.



M12 connector, male, 5-pin,  
A-coding



Sensor cable with 0° alignment



Sensor cable with 90° alignment

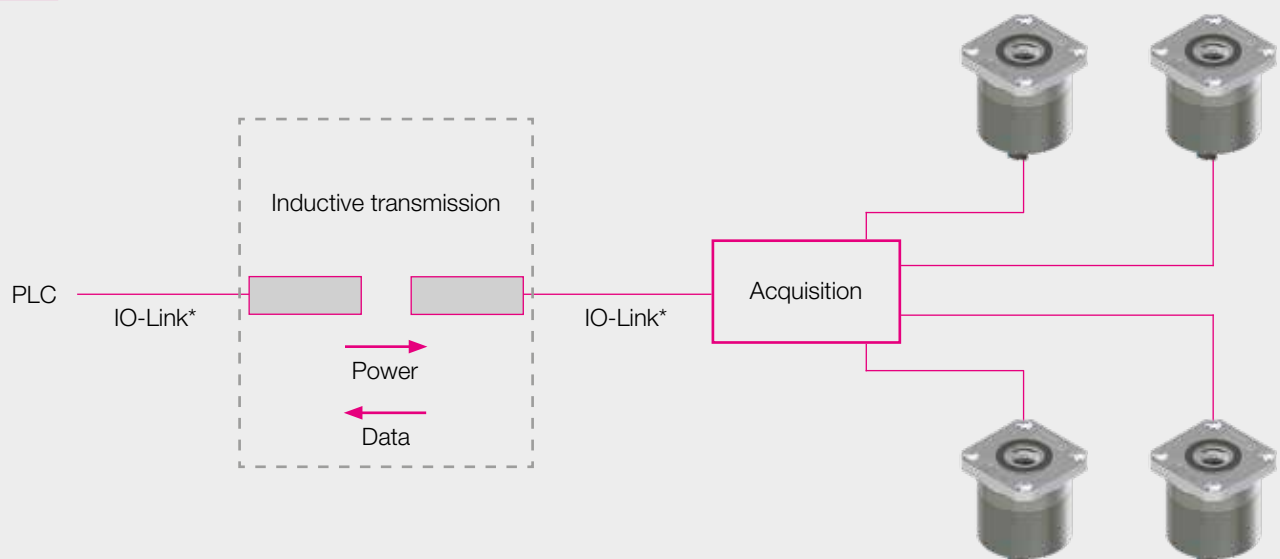
Assignment	Description	Signal type	Indication (rear)
Pin 1	+24 VDC	Supply	
Pin 2	Signal "clamped without nipple"	PNP	Yellow LED
Pin 3	GND	Supply	
Pin 4	Signal "nipple clamped"	PNP	Green LED
Pin 5	Signal "released"	PNP	Red LED
Screen	Not connected		

## Topology



### Possible application for the digital state acquisition

Acquisition and transmission of information from the machine table to the controller



\* Instead of IO-Link, a transmission can also be realised using digital signals.



## Specifications

## Transparency from the start

		SPEEDY connect MP NP	SPEEDY connect MP AG	SPEEDY connect MP OZ
Order number		9000 001	9000 002	9000 003
Design		With zero point	With equaliser	Without centring
Modular design		Yes		
Bearing surfaces		Yes		
Release check		Electrical		
Clamping check (with/without retractable nipple)		Electrical		
Maintenance interval	Cycles	2,000,000		
Active insertion force <sup>1</sup> without clamping pressure	[ N ]	1,200		
Active insertion force <sup>1</sup> at 5 bar / 20 bar	[ N ]	3,000 / 8,500		
Retention force <sup>2</sup>	[ N ]	10,000		
Min. release pressure	[ bar ]	5		
Max. operating pressure	[ bar ]	10 / 20**		
Lifting force at 5 bar	[ N ]	500		
Lifting distance*	[ mm ]	1.5		
Retraction distance total*		4.5		
Max. permissible lateral forces <sup>3</sup>	[ N ]	7,000	7000***	-
Volume of air for releasing/clamping	[cm <sup>3</sup> ]	64		
Operating temperature	[ °C ]	+10 to +60		
Min. permissible clamping time / release time	[ s ]	0.5		
Equalisation	[ mm ]	-	± 0.75	± 0.75
Radial pre-positioning <sup>4</sup>	[ mm ]	± 1		
Axial pre-positioning <sup>5</sup>	[ mm ]	- 3		
Max. loading angle	[°]	± 5		
Repeatability <sup>6</sup>	[ mm ]	< 0.05		
System accuracy <sup>7</sup>	[ mm ]	< 0.1		
Weight	[ kg ]	1.8		
Air connection		M5		
Sensor connection		M12 5-pin		
Voltage range	[V]	24 V (18 to 34 V)		

\* Other lifting and retraction distances possible on request \*\* with push-in fitting 953 273, 953 272 \*\*\* 90 degrees in equalisation direction

- <sup>1</sup> Insertion force: The insertion force refers to the load up to which the zero point is guaranteed. The retractable nipple is actively inserted 4.5 mm with this force.
- <sup>2</sup> Retention force: The retention force refers to the max. overload at which the nipple will continue to be retained, but the zero point has already been left.
- <sup>3</sup> Lateral force: The permissible force applies only to retractable nipples with zero point and retractable nipples with equaliser at 90° to the equalisation direction.
- <sup>4</sup> Radial pre-positioning: The loading device must have play on manual or automated handling.
- <sup>5</sup> Axial pre-positioning: The max. distance the retractable nipple is allowed to be from the piston base (stop before clamping) so that positive clamping can take place. Within this tolerance, the retractable nipple is inserted with the stated insertion force until it is in contact.
- <sup>6</sup> Repeatability: Repeatability generally refers to the accuracy with which the same pallet is positioned on changing on the same interface.
- <sup>7</sup> System accuracy: The system accuracy is the accuracy resulting from changing several pallets, e.g., on different machines.



## Titling tilting torque calculation example

### Profit from our expertise

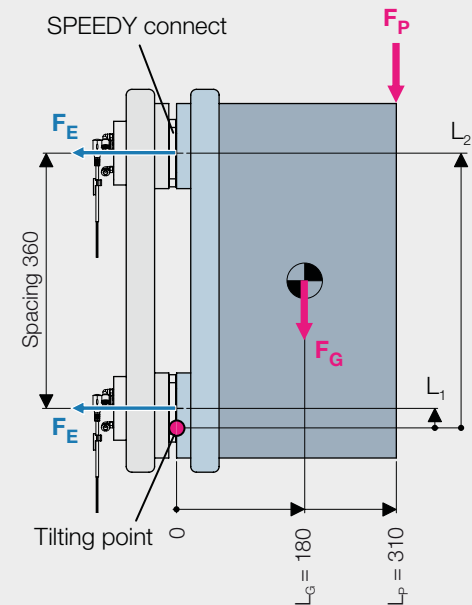
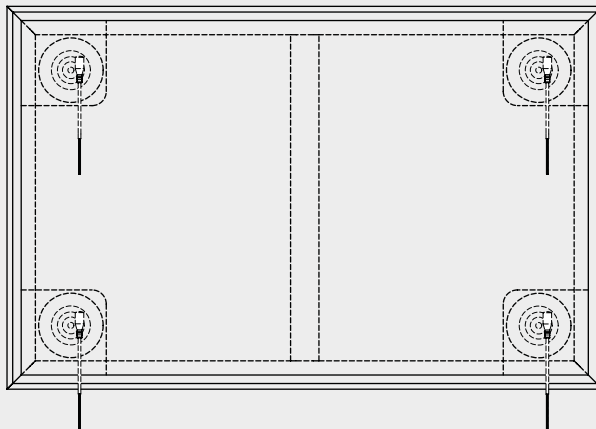
**i**

#### Calculation example, tilting torque (fictive figures):

4 SPEEDY connect M on a frame structure, fitted horizontally

#### Question:

Insertion moment  $M_E > 2 \times$  load moment  $M_L$ ? (safety factor 2)



$M_E$  : Moment from insertion force

$M_L$  : Moment from load

$F_P$  : Process force = 2000 N

$F_E$  : Insertion force = 3000 N (at 5 bar)

$F_G$  : Force due gravity, workpiece + pallet =  $300 \text{ kg} \times 9.81 \text{ m/s}^2 = 2943 \text{ N}$

Spacing =  $660 \times 360$

#### Solution:

Contact diameter = 55 mm

$L_1 = 55 \text{ mm} / 2 = 27.5 \text{ mm} = 0.0275 \text{ m}$

$L_2 = (55 \text{ mm} / 2 = 27.5 \text{ mm}) + 360 \text{ mm} = 0.3875 \text{ m}$

$M_E = 2 \times (F_E \times L_1 + F_E \times L_2) = 2 \times (3000 \text{ N} \times 0.0275 \text{ m} + 3000 \text{ N} \times 0.3875 \text{ m})$

$M_E = \mathbf{2490 \text{ Nm}}$

$M_L = M_G + M_P$

$M_L = (F_G \times L_G) + (F_P \times L_P) = (2943 \text{ N} \times 0.18 \text{ m}) + (2000 \text{ N} \times 0.31 \text{ m})$

$M_L = \mathbf{1149.7 \text{ Nm}}$

$M_E/M_L > 2?$

$M_E/M_L = 2490 \text{ Nm} / 1149.7 \text{ Nm}$

$M_E/M_L = \mathbf{2.17 > 2}$

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

**Attention:** acceleration forces due to handling operations are to be considered separately!

All variables are to be stated in SI units (metre, newton).

## SPEEDY connect MP

- Module
- Pneumatic
- Integrated polling

**Characteristics:**

Fast closing clamp made of high-quality tool steel and a housing made of anodised, high-strength aluminium with very low space requirements due to compact external dimensions.

Is clamped mechanically using springs, the force boosted pneumatically and the system released pneumatically.

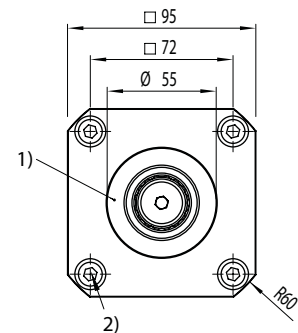
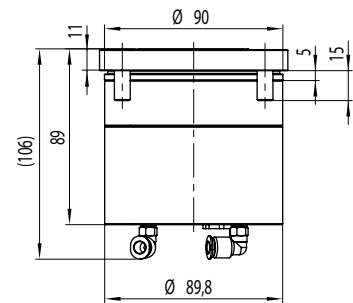
The integrated polling unit signals the clamping state via 24 V signals.

The fast closing clamp can be used in the designs with zero point, with equaliser and without centring.

**Application:**

For installation in systems for vehicle body-shell manufacture, assembly systems and for connecting machine elements. Suitable for usage in welding environments (welding-resistant).

It can also be used for all common machining tasks such as milling, grinding, eroding as well as on test stands and assembly devices. Ideal for automatic loading.



- 1) Hardened contact surface  
2) Fastening 4x M8 DIN6912

**Element with zero point**

Order no.	Retention force	Pressure max.	Release pressure min.	Weight	Data sheet
9000 001	10.000 N	20 bar*	5 bar	1.8 kg	D169

**Element with equaliser**

Order no.	Retention force	Pressure max.	Release pressure min.	Weight	Data sheet
9000 002	10.000 N	20 bar*	5 bar	1.8 kg	D169

Index pin included. See data sheet

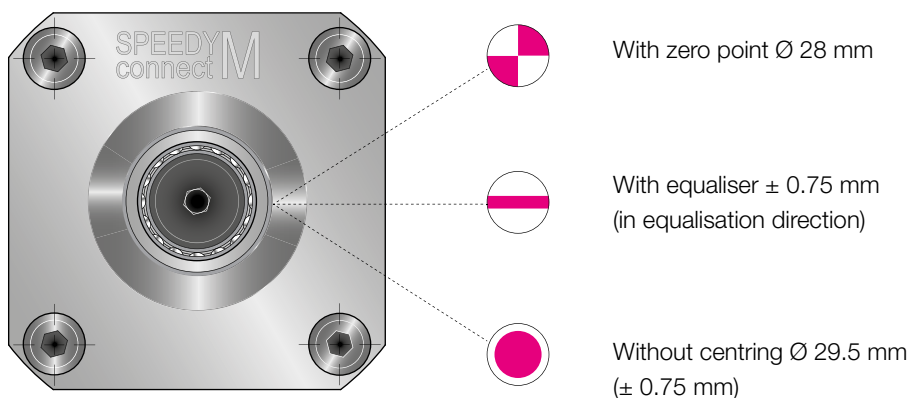
**Element without centring**

Order no.	Retention force	Pressure max.	Release pressure min.	Weight	Data sheet
9000 003	10.000 N	20 bar*	5 bar	1.8 kg	D169

Four M8x20 mm fastening screws included.

\* Max. 12 bar with push-in fitting 953 160 or 953 271 (included)  
Max. 20 bar with push-in fitting 953 272 or 953 273 (page 14)

## SPEEDY connect with equaliser

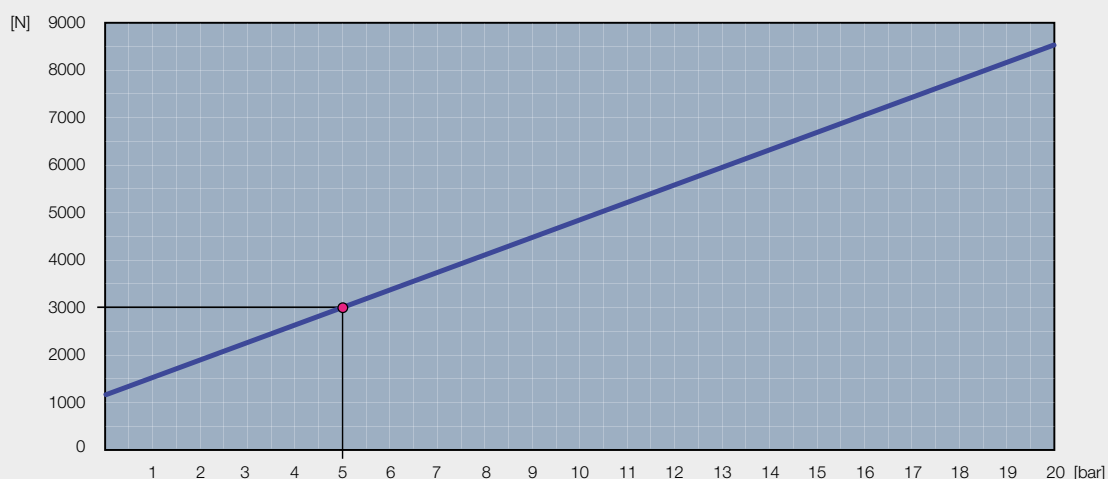


### i

#### Variable insertion force with SPEEDY connect

Depending on the clamping pressure, the clamping force is:

#### Clamping force / clamping pressure diagram



#### **Example calculation:**

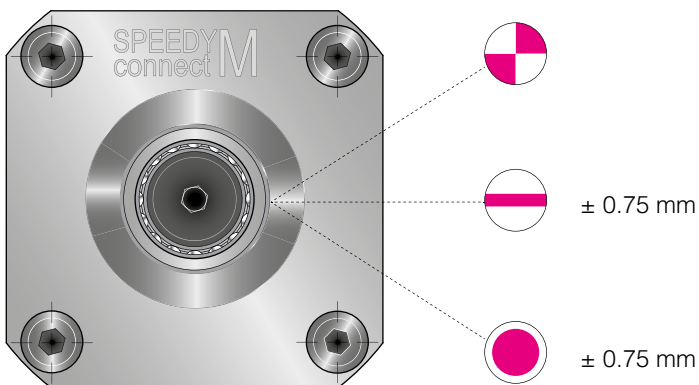
Pneumatic clamping pressure = 5 bar. According to the diagram there is an insertion force of 3000 N.

## Equalising options

Depending on requirements, there are numerous possible ways of equalising tolerances for different materials and different jig sizes. In principle, the equalising can be undertaken on the machine side or the jig side.

- Equalising via fast closing clamp  $\pm 0.75$  mm
- Equalising via retractable nipple AG  $\pm 0.05$  mm / OZ  $\pm 0.2$  mm

### Equalising via fast closing clamp

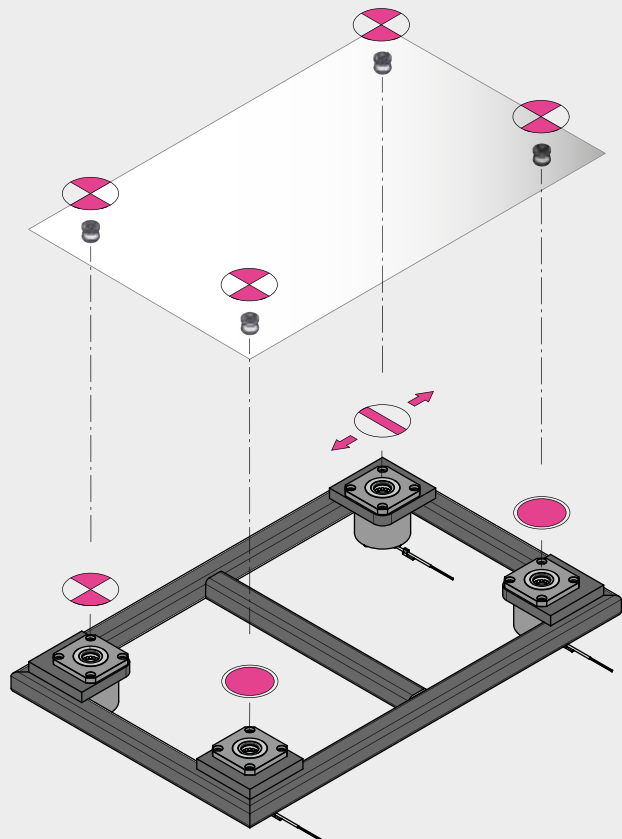


## i

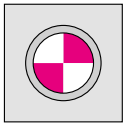
### Equalising via fast closing clamp

#### Application

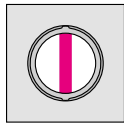
- Different materials between pallet and plate
- Pallets with same retractable nipples
- For large number of pallets and direct tool clamping
- Tolerance range  $\pm 0.75$  mm



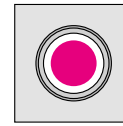
## Symbols



NP - with zero point

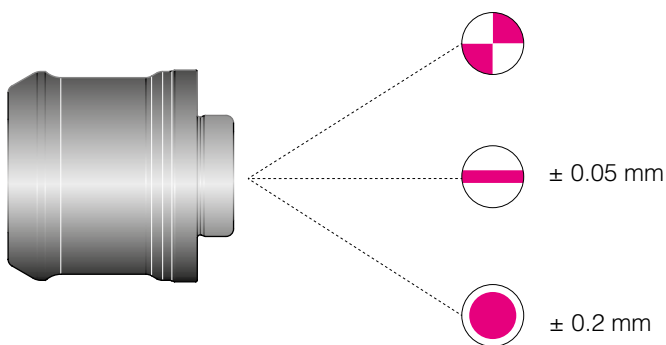


AG - with equaliser



OZ - without centring

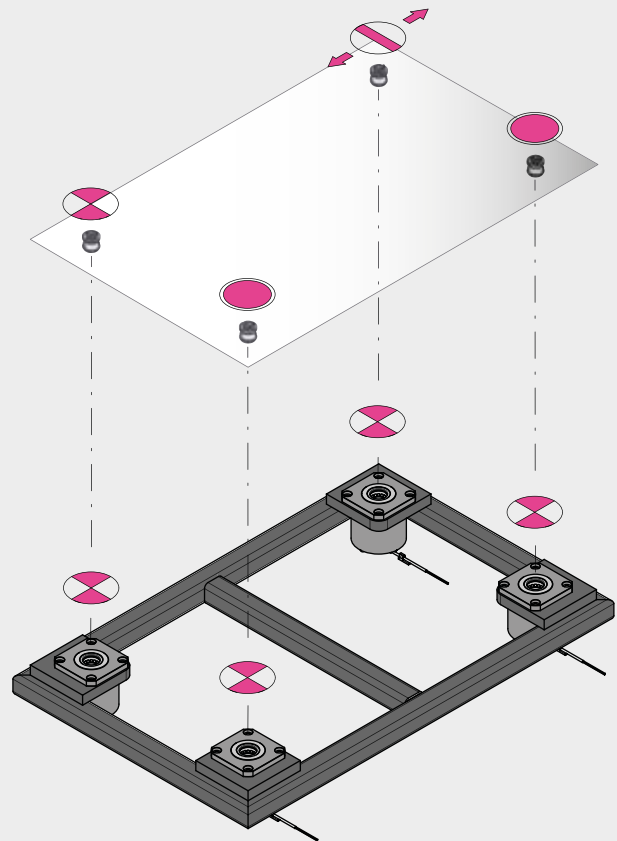
## Equalising via retractable nipple



### Equalising via retractable nipple

#### Application

- Different materials between pallet and plate
- Flexible with varying pallet sizes
- Tolerance range  
AG  $\pm 0.05$  mm / OZ  $\pm 0.2$  mm





## Retractable nipple connect M

### ● With zero point

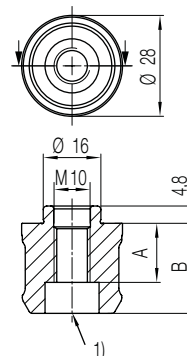


#### Characteristics:

Retractable nipple with zero point.

#### Application:

For positioning and clamping in machines and systems.



1) Counterbore for DIN912 M8

Order no.	Screw quality	Tightening torque		Dimensions		Weight	Data sheet
		M8	M10	A	B		
9000 100	min. 10.9	36 Nm	36 Nm	16.4 mm	25 mm	0.05 kg	D170
9000 103	min. 10.9	36 Nm	36 Nm	14.8 mm*	23.4 mm*	0.05 kg	D170

\* Retractable nipple shortened, without lifting

## Retractable nipple connect M

### ● With equaliser

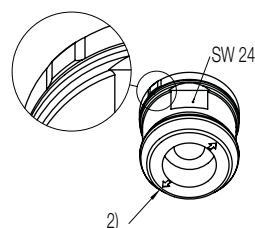
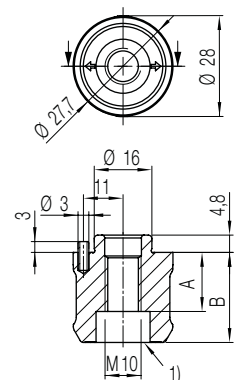


#### Characteristics:

Retractable nipple with equaliser in one axis (sword shape). An index pin Ø3 mm is fitted for correct positioning.

#### Application:

For positioning and clamping in machines and systems.



Order no.	Screw quality	Tightening torque		Dimensions		Weight	Data sheet
		M8	M10	A	B		
9000 101	min. 10.9	36 Nm	36 Nm	16.4 mm	25 mm	0.05 kg	D170
9000 104	min. 10.9	36 Nm	36 Nm	14.8 mm*	23.4 mm*	0.05 kg	D170

\* Retractable nipple shortened, without lifting  
Index pin included

1) Counterbore for DIN912 M8  
2) Equalisation direction marked

## Retractable nipple connect M

### ● Without centring

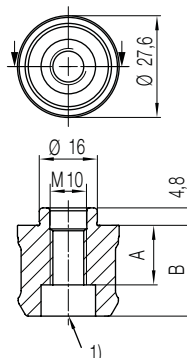


#### Characteristics:

Retractable nipple without centring.

#### Application:

For positioning and clamping in machines and systems.



1) Counterbore for DIN912 M8

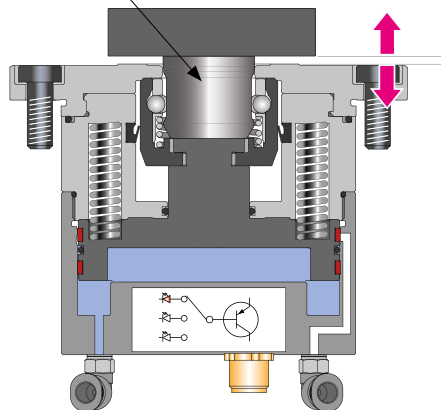
Order no.	Screw quality	Tightening torque		Dimensions		Weight	Data sheet
		M8	M10	A	B		
9000 102	min. 10.9	36 Nm	36 Nm	16.4 mm	25 mm	0.05 kg	D170
9000 105	min. 10.9	36 Nm	36 Nm	14.8 mm*	23.4 mm*	0.05 kg	D170

\* Retractable nipple shortened, without lifting

## Flexible handling with and without lifting from the fit

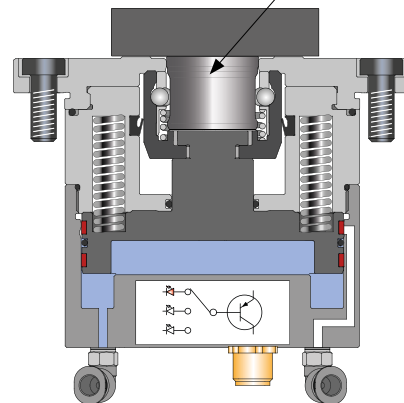
The release cycle of the SPEEDY connect series can take place with and without lifting from the fit. The release cycle with lifting (1) is achieved using "standard" retractable nipples. The release cycle without lifting (2) is undertaken using "shortened" retractable nipples.

Retractable nipple "standard"



(1) Released with lifting (1,5mm)

Retractable nipple "shortened"

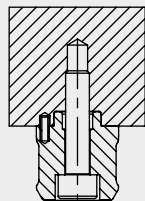


(2) Released without lifting

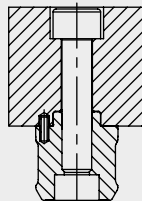


### Application example

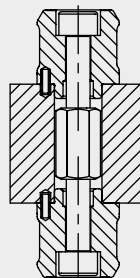
Variant A



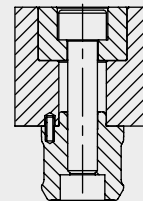
Variant B



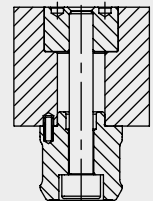
Variant C



Variant E



Variant E1



#### Variant A:

For applications in which nipple bores are not allowed on the surface (e.g. top of the pallet), or for direct workpiece clamping.

#### Variant B:

Straightforward nipple fastening from above.

#### Variant C:

Ideal fastening variant for clamping arrangements using which the workpiece is machined on both sides. Highest accuracy is ensured because the nipples are fastened in the same mounting bore.

#### Variant E, E1:

The precision bores for the nipples and all the necessary positioning bores on the pallet can be manufactured in one operation. As a consequence the positions have the highest accuracy in relation to each other.

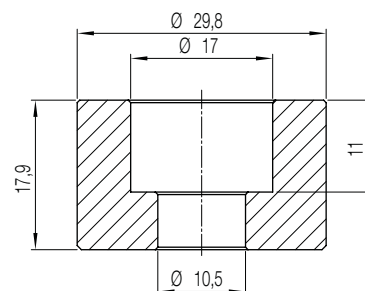
## Nipple fastening D


**Characteristics:**

Makes it possible to manufacture the nipple fastening with one clamping arrangement. In this way the highest accuracy is achieved.

**Application:**

Machine pallets, machine vices, chucks, jigs, direct workpiece clamping.



Order no.	For nipple	Tightening torque M10	Weight	Data sheet
809 120	ø 16 mm	36 Nm	0.05 kg	D170

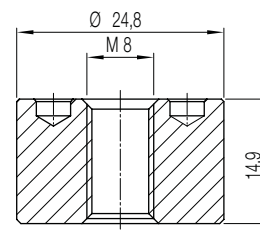
## Nipple fastening E


**Characteristics:**

Makes it possible to manufacture the nipple fastening with one clamping arrangement. In this way the highest accuracy is achieved.

**Application:**

Machine pallets, machine vices, chucks, jigs, direct workpiece clamping.  
Optional: key for installation order no. 804 962, for locking in the face bores.



Order no.	For nipple	Tightening torque M8	Weight	Data sheet
809 128	ø 16 mm	36 Nm	0.05 kg	D170

## Programming aid for SPEEDY airtec / connect

The programming aid is used to help on teaching-in a work cycle with a robot. The programming aid case contains three sets for the articles SPEEDY airtec and SPEEDY connect. One set consists of a 50 mm attachment for the retractable nipple

side and a 50 mm attachment for the closing clamp side. Both attachments together therefore produce a distance of 100 mm. After the successful determination of the co-ordinates, the 2x 50 mm can be corrected in the programming.



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



Programming aid for teaching-in a robot



### Programming aid in case with foam insert

- 3x nipple side (reversible attachment SPEEDY airtec / connect), labelled
- 3x element side with pre-assembled retractable nipple with zero point for SPEEDY connect
- 3x retractable nipple with zero point for SPEEDY airtec
- Various tools

Order no.	Description	Weight
9000 901	Programming aid SPEEDY airtec / connect	5 kg

## Accessories

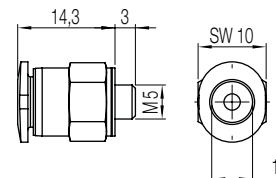
### Push-in fitting 0°


**Characteristics:**

Pneumatic M5 coupler in 0° design suitable for 9000 001.

**Application:**

For the connection and actuation of the SPEEDY connect.



Order no.	Description	Pressure max.	Weight
953 160	M5 Ø6 mm – straight / 0°	12 bar	4.5 g
953 273	M5 Ø6 mm – straight / 0°	20 bar	4.5 g

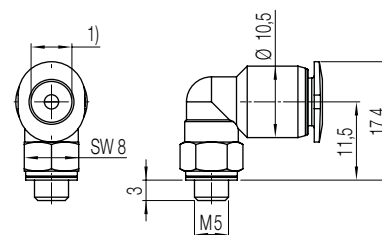
### Push-in fitting 90°


**Characteristics:**

Pneumatic M5 coupler in 90° design suitable for 9000 001.

**Application:**

For the connection and actuation of the SPEEDY connect.



Order no.	Description	Pressure max.	Weight
953 171	M5 Ø6 mm – angled / 90°	12 bar	5 g
953 272	M5 Ø6 mm – angled / 90°	20 bar	5 g

### Key for nipple fastening E


**Characteristics:**

Retractable nipple key SPEEDY connect.

**Application:**

Nipple fastening as per variant E.  
Installing and removing retractable nipples.

Order no.	Description	Weight
804 962	Retractable nipple key	0.08 kg



## Sensor cable 1 m, 3 m



### Characteristics:

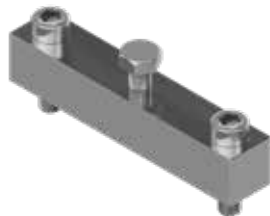
5-core sensor cable with M12 connector in straight or angled design with length of 1 or 3 metres.

### Application:

For the connection and evaluation of the integrated sensor unit.

Order no.	Description	Weight
999 700	5-core sensor cable, l = 1 m , M12 connector 0°, flying lead	0.05 kg
999 701	5-core sensor cable, l = 3 m , M12 connector 0°, flying lead	0.15 kg
999 702	5-core sensor cable, l = 1 m , M12 connector 90°, flying lead	0.05 kg
999 703	5-core sensor cable, l = 3 m , M12 connector 90°, flying lead	0.15 kg

## Bridge for unlocking

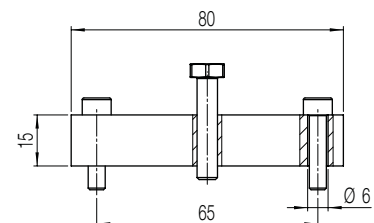


### Characteristics:

Bridge for mechanically unlocking the clamping element including fastening and jacking screws.

### Application:

Releasing the element during servicing if, e.g., there is no compressed air available.



Order no.	Description	Weight
9000 900	Bridge for mechanical unlocking With two M5x22 mm screws for fastening and one M6x30 mm screw for jacking	0.07 kg



**ROEMHELD**  
HILMA ■ STARK

## ... because zero point clamping has an origin!

### Experience

Since 1988, STARK has developed zero point clamping systems and is considered a pioneer in this sector.

In the first catalogue we described our product as follows:

"The retractable nipple is mounted directly on the clamping device or directly on the workpiece."

As early as during the launch, consideration was given to possibilities that to some extent were realised years later. The original clamping cylinder is still used in production today.

### Specialist

As a leading company in the field of zero point clamping technology, STARK has specialised uncompromisingly in zero point technology. By training specialists, STARK is safeguarding know-how for the future.

STARK combines all core components under one roof.

Continuous development and patents demonstrate the massive innovative power of the company.

Quality, precision, service and individual advice are elements of the corporate strategy.

### Partners

In production, STARK sees itself as a partner in various sectors and applications.

For the automotive or aerospace sector, machine tool manufacture as well as one-off and series manufacturing, STARK is available as a competent point of contact.

Individual advice on the usage of STARK components and custom solutions for production are our strengths.

### Group

ROEMHELD, HILMA, STARK – the three brands of the Römheld group are market leaders worldwide for productive solutions in industrial manufacturing, assembly, clamping and drive technology.

With our components, products and systems, we make your manufacturing more efficient and more flexible. The Römheld group is represented internationally with sales partners and joint ventures.

Your dealer



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