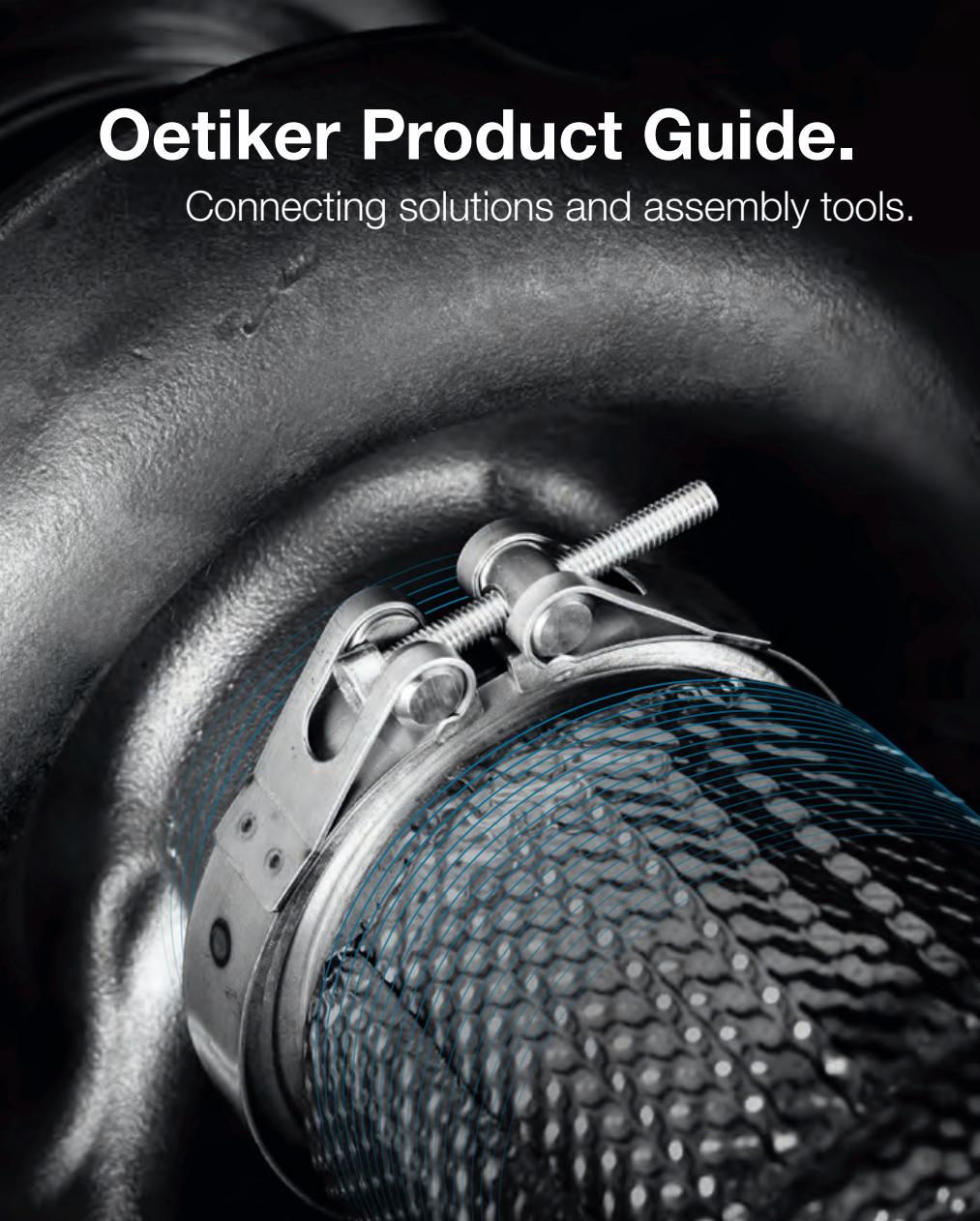


# Oetiker Product Guide.

Connecting solutions and assembly tools.



Connecting Technology

- 4 Our competencies
- 10 Typical connecting solutions: Automotive Industry
- 12 Typical connecting solutions: Industry & Trade

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<sup>16</sup> Ear Clamps

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<sup>58</sup> Low Profile Clamps

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<sup>78</sup> Screw Clamps and Universal Clamps

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<sup>96</sup> Multi Crimp Rings

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<sup>100</sup> Profile Clamps

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<sup>104</sup> Straps

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<sup>108</sup> Assembly Tools

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<sup>144</sup> Quick Connectors

Zurich, main station



Horgen,  
Oetiker Headquarters

# The optimum customer solution

## Connected. Integrated. Systematic.

When the coffee tastes delicious every morning, when your car steers with ease, when the harvest is collected reliably, and when everything goes according to plan in the operating room: be assured Oetiker connecting technology played a part in it.

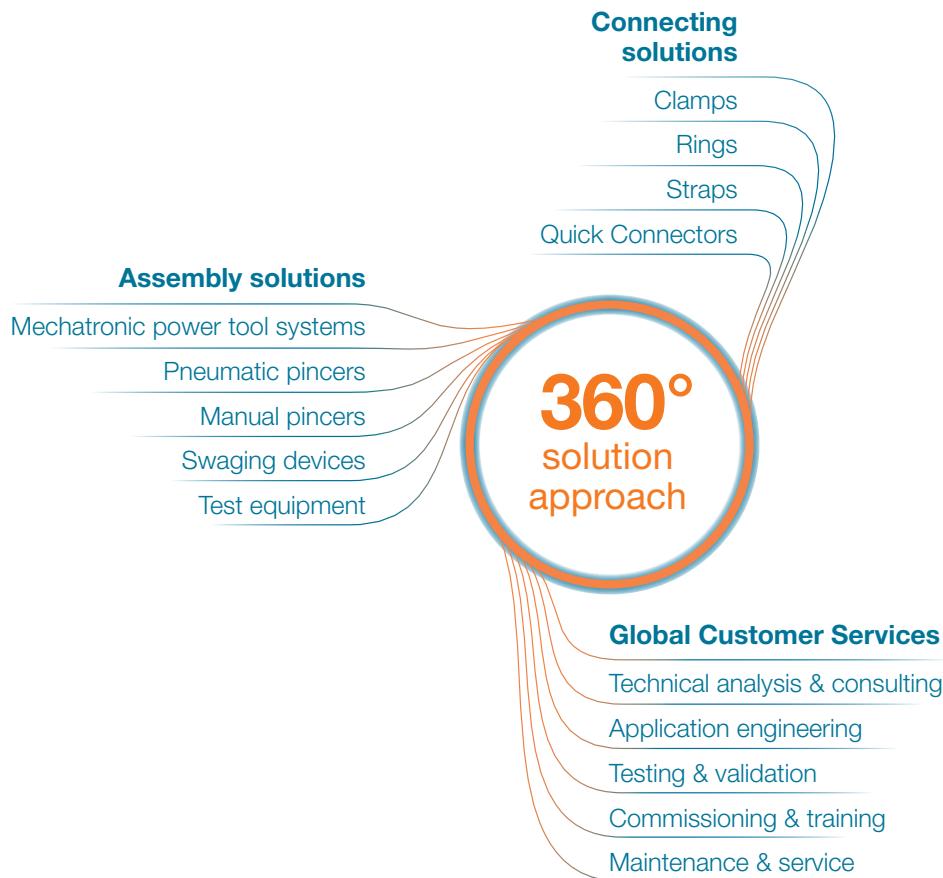
### Who invented it?

Hans Oetiker. In 1951, he invented the first ear clamp – a global innovation which is still an integral part of the Oetiker product range. But the ear clamp was only the beginning. Step by step, new product lines and services were added. Today, we continue to be fascinated by the sheer variety of optimum connecting and assembly solutions.

### Systematic customer solutions

Our connecting solutions are composed of thoroughly engineered products, complimented with an array of readily available assembly tools, and fortified with comprehensive support services.

We call it the “360° Solution Approach”. Receive technical consulting and support from our experts when selecting your optimum connecting solution and when carrying out application tests based on your components. Together, we’ll help you find out which closing tools and calibration instruments work perfectly for your project. And we take care of commissioning and maintenance for you on site.



Our “360° Solution Approach” shows results: Oetiker customers benefit from the all-inclusive range of connecting solutions, assembly tools, and – service and application engineering.

Your requirements are the starting point  
When customer requirements are demanding, the Oetiker experts are delighted. Our integrated “Solution Approach” makes it possible to find the optimum solution for you. We consult, analyze, and test for you until every detail is correct.

We never let up on finding your best connections  
Oetiker continuously develops and tests its products. We work on new solutions daily with our own Research and Development and Application centers in Europe, Asia, and the America's.

From the center of Europe to the whole world  
Oetiker is headquartered in Horgen on Lake Zurich in Switzerland. It is still a family-owned company, but has expanded to more than 30 offices, over 1,400 employees, a network of production and sales companies in Europe, North America and Asia, and it has Oetiker customers in over 70 countries. And it always meets the high Swiss quality standards.

Why the future is our present  
For Oetiker, being environmentally friendly means: using recyclable materials, avoiding chemical additives as much as possible, and carefully using resources.

Every new process and every new material is investigated well before it is introduced. Its meaning for employees and customers and also impacts on planning, production and sales, ecological compatibility and safety. Our production companies are certified according to ISO/TS 16949 and ISO 9001 standards and to the environment norm ISO 14001.

Quality products are the basis of our business. The Oetiker “Solution Approach” includes much more: we continually refine our expertise and support our customers throughout their production processes. We do this each and every day – a promise you can rely on.

#### Six stages to the optimum customer solution

1	2	3	4	5	6
<b>Analysis of customer parts and requirements</b>	<b>Selection of optimum connecting and assembly solution</b>	<b>Series of tests in accordance to requirements</b>	<b>Test results and recommendations</b>	<b>Validation and commissioning at the customer site</b>	<b>Reliable Assembly</b>

# Unique quality for your connections.

Connections that keep their promises

When it comes to our customers' requirements, we take care of every detail, just as with our own products, because we know your high quality connections must be reliable every time. During product development, material selection, processing, and the final quality control, we pay meticulous attention to every minuscule detail.

This is why Oetiker connecting solutions are sturdy and resilient – and leakages are a thing of the past. To ensure that each assembly keeps its promise, we also produce premium-quality closing tools. This guarantees our customers secure and verifiable assembly processes.

The highest quality from the ground up: The materials We exclusively manufacture our clamps and rings from selected high-quality materials to ensure our products surpass your requirements.

Comprehensive system



Oetiker



Others

Comprehensive system: The reliable customer solution  
To ensure that each connection holds to its promise in the long term, we produce our high-quality clamps and rings as well as our assembly tools in our own plant. This guarantees a secure and verifiable assembly result at all times.

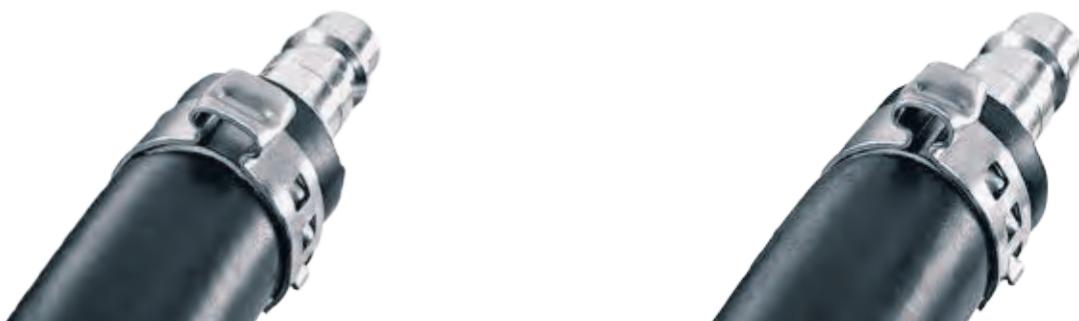
The quality is in the details: Burr free strip edges  
In order to protect clamped parts from damage and to prevent injuries during assembly, we use a unique procedure to manufacture burr-free strip edges at our own plant – this represents a technically important advantage compared with conventional strip edges, even though the difference from the edges of conventional strips is barely visible.

To ensure everything runs smoothly:  
Dimensions, identification and ordering  
Oetiker Clamps and Rings are manufactured to metric dimensions. For identification purposes, the nominal diameter is stamped on each product.

To determine the correct clamp diameter, push the hose onto the attaching material, (e.g. the nipple), and then measure the hose's outer diameter. Select a clamp whose average value of the diameter range is slightly greater than the hose's outer diameter.

Always quote the 8-digit item number when ordering.  
You'll find them on the catalog pages.

Tolerance compensation through clamp ear



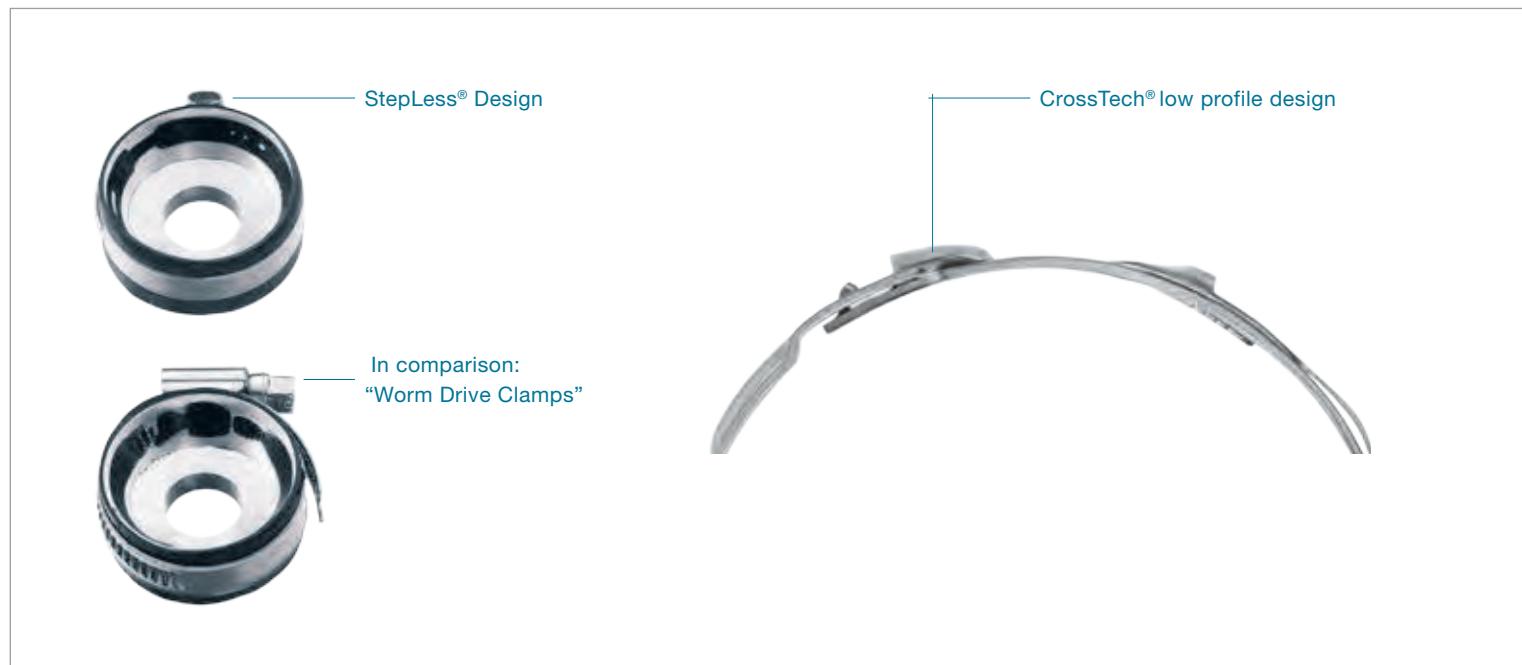
Intelligently made: Tolerance compensation  
As the result of production tolerances, no two components are identical. This does not represent a problem for our ear clamps, as the clamp ear can simply compensate for tolerances within a certain range.

## Effective and reliable: StepLess® design

This special design eliminates steps and/or overlaps on the inner circumference of the clamp. Because the tongue resides in a groove, the “tongue-in-groove” feature exerts pressure on the assembled parts over 360 degrees. This enables the clamp to apply a continuous radial force completely around the connection’s diameter.

## CrossTech®

The innovative CrossTech® feature is highly space-efficient and provides an ultra low profile design for a very low imbalance on rotating parts.



StepLess®

+ Uniform compression

+ Uniform surface pressure



CrossTech®

+ Ultra low profile design

+ Very low imbalance on rotating parts

**ToothLock®**

Interlocked with its teeth, the distinctive “ToothLock®” feature offers extremely high and permanent compression rates and outstanding expansion resistance – strong enough for the toughest connections.

It also supports shock and vibration resistance and helps the clamp to withstand thermal stress.

The ToothLock® is designed as a self-locking mechanism and increases the performance due to the low spring back rate. With its multiple tooth-locking positions, it compensates component tolerances.

ToothLock® Technology



ToothLock®

- + Multiple tooth-locking positions adjust to component tolerances
- + Very high and permanent compression
- + Low spring back maintains superior radial load performance
- + Highly pressure and expansion-resistant

The data in this catalog are based on many years experience. They are intended for reference, not as design specifications.

# Typical connecting solutions

## Automotive Industry



Product Groups

Cardan shafts/  
drive shafts

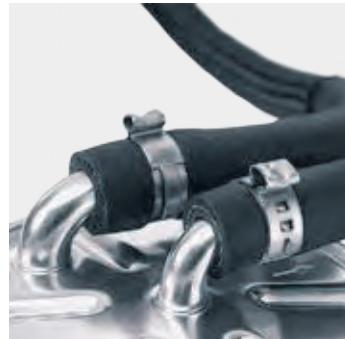
Airbag systems

ToothLock® Ear Clamp	293	p. 20		
StepLess® Ear Clamps – the next generation	123 & 193	p. 24		
StepLess® Ear Clamps	117 & 167	p. 32		
1-Ear Clamp with stud	103	p. 54		
1-Ear Clamp SV	153	p. 56		
1-Ear Clamp "Open End"	195	p. 19		
ToothLock® Low Profile Clamp	292	p. 60		
StepLess® Low Profile Clamp	168	p. 64		
StepLess® Low Profile Clamp	192	p. 72		
StepLess® Screw Clamp	178	p. 80		
Worm Drive Clamps	126 & 177	p. 90		
Multi Crimp Rings	150	p. 98		
Levi Heavy Duty V-Profile Clamps	280	p. 102		
Levi Heavy Duty Straps	283	p. 106		





## Cooling and heating water circuits      Steering systems



## Oil pipes      Fuel systems



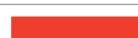
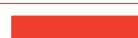
Exhaust systems      High pressure systems



# Typical connecting solutions

## Industry and Trade



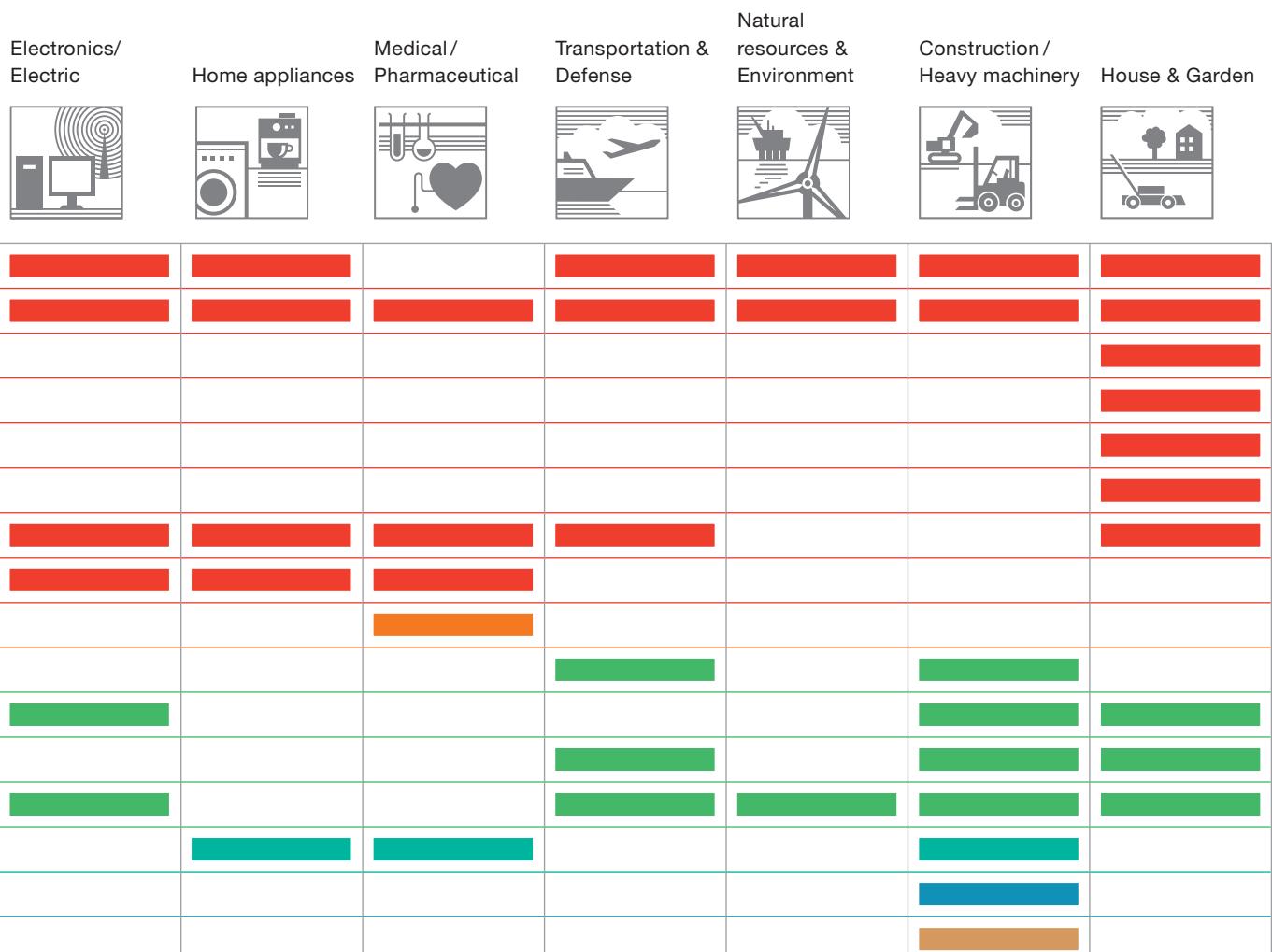
StepLess® Ear Clamps – the next generation	123 & 193	p. 24			
StepLess® Ear Clamps	117 & 167	p. 32			
StepLess® Ear Clamp PEX Series	167	p. 38			
1-Ear Clamps with mechanical interlock	105 & 155	p. 40			
Adjustable Clamps	109, 159	p. 44			
Adjustable Clamps	113 & 163	p. 47			
1-Ear Clamps	153 & 154	p. 50			
2-Ear Clamps	101 & 151	p. 51			
Clamp ER	194	p. 76			
StepLess® Screw Clamp	178	p. 80			
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Universal Clamp	174	p. 86			
Worm Drive Clamps	126 & 177	p. 90			
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Food & Beverage: Connection in coffee machine



Food & Beverage: Connection in vending machine



Home appliances: Water supply for washing machine



Medical: Connection in external heart pump



Electronics: Water cooling in computer

# Product families

p. 16

Ear Clamps



p. 58

Low Profile Clamps



p. 78

Screw Clamps and Universal Clamps



Fast and simple assembly

High, adaptable radial forces

Tolerance compensation

Visual closure check

Reusable: can be repeatedly opened and re-assembled\*

Low assembled height, minimum space requirement

Low imbalance on rotating parts

Tolerance compensation\*

Reusable

Large clamping range: can be set to several different nominal diameters\*

Fast and simple assembly

Compensate for diameter changes due to thermal expansion\*

\* depending on the product type

p. 96

Multi Crimp Rings

p. 100

Profile Clamps

p. 104

Straps



Constant, uniform, circumferential compression

Minimum space requirement, no imbalance on rotating parts

Flexible diameter reduction up to 6 mm\*

Aluminum model – lightweight

Lightweight and space efficient

Superior joint integrity

Quick and easy assembly

Engineered to suit customer requirements

Ultimate flexibility: many designs and configurations

Quick and easy assembly

Engineered to suit customer requirements

# Ear Clamps

p. 20

ToothLock® Ear Clamp  
293

p. 24

StepLess® Ear Clamps  
123 & 193 – next generation

p. 32

StepLess® Ear Clamps  
117 & 167



## ToothLock® Technology:

- + Very high and permanent compression rates
- + Superior radial load performance
- + Highly pressure and expansion resistant
- 360° StepLess®:**
  - + Powerful all-round seal
  - + Uniform compression
- Enlarged ear width (17 mm):
  - + Enhanced clearance for easy assembly
  - + Extended diameter range

## 360° StepLess®:

- + Uniform compression and uniform surface pressure
- Closed interlock:
  - + High radial loads
  - + Smooth outer contour
- Clamp ear:
  - + Compensates for component tolerances
  - + Adjustable surface pressure
- Dimple:
  - + Increased clamping force

## 360° StepLess®:

- + Uniform compression and uniform surface pressure
- Clamp ear:
  - + Compensates for component tolerances
  - + Adjustable surface pressure
- Dimple:
  - + Increased clamping force

Oetiker will be pleased to help you to find the correct choice for your application. Send sample parts and all relevant information for your specific application to Oetiker, and you will receive recommendations for product type, diameter, and method of assembly.

p. 40

1-Ear Clamps with mechanical interlock  
105 & 155



p. 44

Adjustable Clamps  
109, 159



p. 47

Adjustable Clamps  
113 & 163



#### Clamp ear:

- + Fast and simple assembly
- + Visible deformation provides evidence of proper closure

#### Dimple:

- + Increased clamping force

#### Choice of engagement positions:

- + Clamp can be adjusted to several nominal diameters

#### Clamp ear:

- + Fast and simple assembly
- + Visible deformation provides evidence of proper closure

#### Dimple:

- + Increased clamping force

#### Choice of engagement positions:

- + Clamp can be adjusted to several nominal diameters

#### Inner ring with radial guidance:

- + Effective and powerful all-round sealing

#### Clamp ear:

- + Compensates for component tolerances

- + Adjustable surface pressure

# Ear Clamps

p. 50

1-Ear Clamps  
153 & 154

p. 51

2-Ear Clamps  
101 & 151



Compact one-piece clamps:

- + Robust, secure connections
- + Miniature sizes
- With insert:
  - + Pre-shaped insert
  - + Effective and powerful all-round sealing

Clamp ear:

- + Compensates for component tolerances
- + Adjustable surface pressure

Dimple:

- + Increased clamping force

2-Ear version:

- + Extended clamping range
- Clamp ear:
  - + Fast and simple assembly
  - + Visible deformation of clamp ear provides evidence of proper closure

Oetiker will be pleased to help you to find the correct choice for your application. Send sample parts and all relevant information for your specific application to Oetiker, and you will receive recommendations for product type, diameter, and method of assembly.

p. 54

1-Ear Clamp with stud  
103

p. 56

1-Ear Clamp SV<sup>1</sup>  
153

1-Ear Clamp "Open End"  
(on request)  
195

**Secure:**

- + reliable fixation of airbag inflators within occupant safety systems

**Flexible:**

- + Easily adjustable clamp positioning

**Strong:**

- + High strength low alloy material with high retention properties
- + Good corrosion resistance

**Application:**

- Airbag inflators
- Sanitary pipes
- Compressed air lines
- etc.

**Radial assembly:**

- + Clamp can be opened to clear obstructions for axial or radial assembly

**Quick closure:**

- + Positive engagement of interlock ensures simple
- + Secure closure
- Scale resistant stainless steel:
- + Excellent strength and corrosion resistance at high temperatures

**Application:**

- Exhaust systems
- Heating systems
- etc.

**Open:**

- + Simple, radial assembly for ergonomic handling

**Flexible:**

- + Customer-specific modifications are possible

**Bridged ear:**

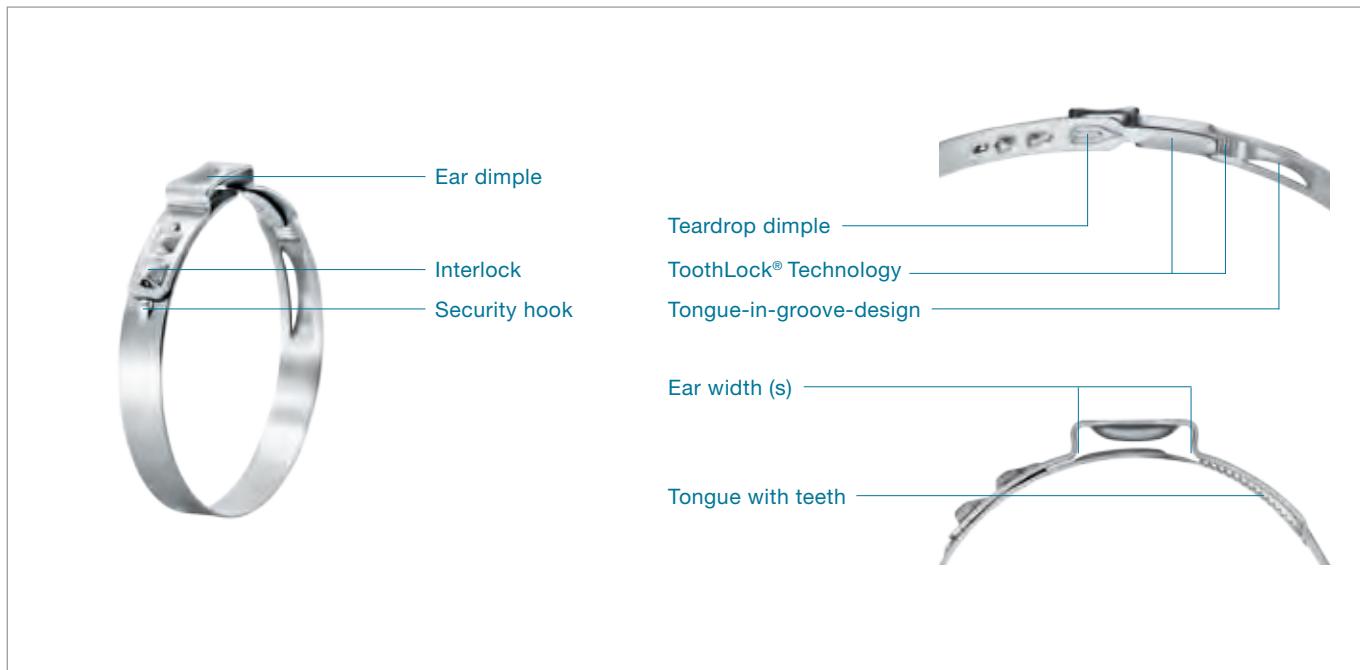
- + Good sealing and excellent retention properties

**Application:**

- Exhaust systems
- Airbags
- etc.

<sup>1</sup> SV = quick action

\* For detailed ordering information please contact your local Oetiker branch.



**ToothLock® Technology:** very high and permanent compression rates, superior radial load performance, highly pressure and expansion resistant

**360° StepLess®:** uniform compression, powerful all-round seal

**Enlarged ear width (17 mm):** enhanced clearance for easy assembly, extended diameter range

**Security hook:** prevents unintended opening during transport

**Closed interlock:** smooth outer contour supports injury-free installation

**Burr-free strip edges:** reduced risk of damage to parts being clamped

## ToothLock® Ear Clamp 293

### Target applications

Air Induction Systems

Other applications upon verification by Oetiker

### Material

Stainless Steel, Material no. 1.4301/UNS S30400

### Corrosion resistance according to DIN EN ISO 9227

≥ 1000 hours

### Series

Size range	width x thickness	ear width
40.0 – 120.5 mm	10.0 x 1.0 mm	17 mm

### Sizes

Diameter graduation 0.5 mm

Some sizes are only available if an appropriate minimum quantity is ordered.

### ToothLock®

Interlocked with its teeth, the distinctive "ToothLock®" feature offers extremely high and permanent compression rates and outstanding expansion resistance – strong enough for the toughest connections.

It also supports shock and vibration resistance and helps the clamp to withstand thermal stress.

The ToothLock® is designed as a self-locking mechanism and increases the performance due to the low spring back rate. With its multiple tooth-locking positions, it compensates component tolerances.

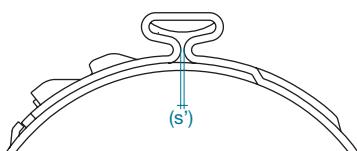
### Security hook

The security hook securely holds the clamp geometry together during transportation.

### Clamp ear (closing element)

Using tools designed by Oetiker, the clamp is closed by drawing together the lower radii of the "ear". The maximum diameter reduction is proportional to the open "ear" width (s). The theoretical maximum reduction in diameter is given by the formula:

$$\text{Max. diameter reduction} = \frac{\text{Ear width (s)}}{\pi} = \frac{17 \text{ mm}}{\pi} = 5.4 \text{ mm}$$



Note: the above sketch shows the appearance of a closed "ear" ( $s'$ ); it does not necessarily indicate an effective closed assembly.

#### Clamp Sizing

The following applies as a guideline: To determine the correct clamp diameter, push the hose onto the attaching material, (e.g. the nipple), and then measure the outer diameter of the hose. Select a clamp whose average value of the size range is slightly greater than the hose's outer diameter. To ensure full ToothLock® engagement and a sufficient closure of the clamp the nominal diameter has to be reduced by at least 2.2 mm (> 40% of the original ear width) and the correct closing force has to be applied during assembly.

#### Assembly

##### Assembly Recommendations

The clamp's ear should be closed at a uniform rate not exceeding the recommended maximum closing force. This will ensure clamp tension remains constant without overloading individual components of the assembly being joined, and of the clamps. Oetiker calls this installation method "force priority". Force priority ensures that tolerance compensating of the clamp remains functional for every installation. This insures the resulting radial force remains approximately the same for every assembly, independent of any component's dimensional fluctuation. If Oetiker's ELK electronically controlled pneumatic pincers are used in force priority mode, installations can be monitored to ensure repeatable installations are achieved at the proper force.

##### Assembly Instructions



For proper assembly, position the pincer jaws onto the "ear" of the clamp. Close the pincer jaws to compress the ear of the clamp. This reduces the diameter of the ToothLock® Ear Clamp. The tool can be removed once the pincer jaws open after the ear is clamped.

To ensure full ToothLock® engagement and a sufficient closure of the clamp, the nominal diameter has to be reduced by at least 2.2 mm (minimum diameter reduction) and the correct closing force has to be applied during assembly.

##### Closing force

As a matter of principle, the closing force selection is closely related to the desired compression or surface pressure of the

material to be assembled. The resistance against the clamp corresponds to the applied force, so that the defined closing force is significantly reduced if soft materials are compressed. The maximum closing force is displayed in the table below, it specifically refers to thermoplastics.

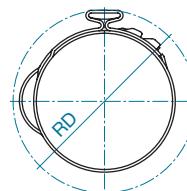
##### Block closure

Block closure is when the installation force fully closes the ear, resulting in both ear legs touching (vertical members between the ear dimple and clamp radius). When this occurs the installation force is absorbed by compressing the legs rather than transferring the installation forces to the parts being clamped. If installation forces are going to be measured, a block closure must be avoided.

##### Rotation diameter

The rotation diameter (RD) of an assembled clamp can be critical design information for applications which require a rotation within a limited open space. It changes, depending on the resulting ear gap. Maximum rotation diameter must be determined with application specific tests.

$$RD = \text{closed diameter} + 19.6 \text{ mm}$$



##### Important

- The ear height is a natural result of ear deformation. Do not influence the ear height, either by changing the ear gap or with built-in hold-down devices in installation tools.
- Single tool stroke closure only, do not apply secondary crimping force.

## Installation data

Material dimensions	Size range	Ear width	Maximum closing force
10 x 10 mm	40.0 – 120.5 mm	17 mm	7500 N*

\* For closing forces ≥ 7000 N, with the HO 7000 pneumatic pincer, an inlet pressure of > 6.6 bar is required.

This closing force is intended as a guide, which may vary depending on the type and tolerances of parts being clamped.  
To ensure optimum clamp selection, we recommend conducting functional tests with several assemblies.

## Order information 293

Item No.	Ref. No.	Ear width inside (mm)	Size range (mm)
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Band width 10 mm, thickness 1.0 mm (1010R)

29300011	040.0-1010R	17	34.6 – 40
29300013	040.5-1010R	17	35.1 – 40.5
29300015	041.0-1010R	17	35.6 – 41
29300017	041.5-1010R	17	36.1 – 41.5
29300019	042.0-1010R	17	36.6 – 42
29300021	042.5-1010R	17	37.1 – 42.5
29300023	043.0-1010R	17	37.6 – 43
29300025	043.5-1010R	17	38.1 – 43.5
29300027	044.0-1010R	17	38.6 – 44
29300029	044.5-1010R	17	39.1 – 44.5
29300031	045.0-1010R	17	39.6 – 45
29300033	045.5-1010R	17	40.1 – 45.5
29300035	046.0-1010R	17	40.6 – 46
29300037	046.5-1010R	17	41.1 – 46.5
29300039	047.0-1010R	17	41.6 – 47
29300041	047.5-1010R	17	42.1 – 47.5
29300043	048.0-1010R	17	42.6 – 48
29300045	048.5-1010R	17	43.1 – 48.5
29300047	049.0-1010R	17	43.6 – 49
29300049	049.5-1010R	17	44.1 – 49.5
29300051	050.0-1010R	17	44.6 – 50
29300053	050.5-1010R	17	45.1 – 50.5
29300055	051.0-1010R	17	45.6 – 51
29300057	051.5-1010R	17	46.1 – 51.5
29300059	052.0-1010R	17	46.6 – 52
29300061	052.5-1010R	17	47.1 – 52.5
29300063	053.0-1010R	17	47.6 – 53
29300065	053.5-1010R	17	48.1 – 53.5
29300067	054.0-1010R	17	48.6 – 54
29300069	054.5-1010R	17	49.1 – 54.5
29300071	055.0-1010R	17	49.6 – 55
29300073	055.5-1010R	17	50.1 – 55.5
29300002	056.0-1010R	17	50.6 – 56
29300076	056.5-1010R	17	51.1 – 56.5
29300078	057.0-1010R	17	51.6 – 57
29300080	057.5-1010R	17	52.1 – 57.5
29300082	058.0-1010R	17	52.6 – 58
29300084	058.5-1010R	17	53.1 – 58.5
29300086	059.0-1010R	17	53.6 – 59
29300088	059.5-1010R	17	54.1 – 59.5
29300090	060.0-1010R	17	54.6 – 60
29300092	060.5-1010R	17	55.1 – 60.5
29300094	061.0-1010R	17	55.6 – 61
29300096	061.5-1010R	17	56.1 – 61.5
29300098	062.0-1010R	17	56.6 – 62
29300100	062.5-1010R	17	57.1 – 62.5

Item No.	Ref. No.	Ear width inside (mm)	Size range (mm)
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29300102	063.0-1010R	17	57.6 – 63
29300104	063.5-1010R	17	58.1 – 63.5
29300106	064.0-1010R	17	58.6 – 64
29300108	064.5-1010R	17	59.1 – 64.5
29300110	065.0-1010R	17	59.6 – 65
29300112	065.5-1010R	17	60.1 – 65.5
29300114	066.0-1010R	17	60.6 – 66
29300116	066.5-1010R	17	61.1 – 66.5
29300118	067.0-1010R	17	61.6 – 67
29300120	067.5-1010R	17	62.1 – 67.5
29300000	068.0-1010R	17	62.6 – 68
29300123	068.5-1010R	17	63.1 – 68.5
29300125	069.0-1010R	17	63.6 – 69
29300003	069.5-1010R	17	64.1 – 69.5
29300001	070.0-1010R	17	64.6 – 70
29300004	070.5-1010R	17	65.1 – 70.5
29300009	071.0-1010R	17	65.6 – 71
29300010	071.5-1010R	17	66.1 – 71.5
29300132	072.0-1010R	17	66.6 – 72
29300005	072.5-1010R	17	67.1 – 72.5
29300006	073.0-1010R	17	67.6 – 73
29300136	073.5-1010R	17	68.1 – 73.5
29300138	074.0-1010R	17	68.6 – 74
29300140	074.5-1010R	17	69.1 – 74.5
29300142	075.0-1010R	17	69.6 – 75
29300144	075.5-1010R	17	70.1 – 75.5
29300146	076.0-1010R	17	70.6 – 76
29300148	076.5-1010R	17	71.1 – 76.5
29300150	077.0-1010R	17	71.6 – 77
29300008	077.5-1010R	17	72.1 – 77.5
29300007	078.0-1010R	17	72.6 – 78
29300154	078.5-1010R	17	73.1 – 78.5
29300156	079.0-1010R	17	73.6 – 79
29300158	079.5-1010R	17	74.1 – 79.5
29300160	080.0-1010R	17	74.6 – 80
29300162	080.5-1010R	17	75.1 – 80.5
29300164	081.0-1010R	17	75.6 – 81
29300166	081.5-1010R	17	76.1 – 81.5
29300168	082.0-1010R	17	76.6 – 82
29300170	082.5-1010R	17	77.1 – 82.5
29300172	083.0-1010R	17	77.6 – 83
29300174	083.5-1010R	17	78.1 – 83.5
29300176	084.0-1010R	17	78.6 – 84
29300178	084.5-1010R	17	79.1 – 84.5
29300180	085.0-1010R	17	79.6 – 85
29300182	085.5-1010R	17	80.1 – 85.5
29300184	086.0-1010R	17	80.6 – 86
29300186	086.5-1010R	17	81.1 – 86.5

The data in this catalog are based on many years experience. They are intended for reference, not as design specifications.

Item No.	Ref. No.	Ear width inside (mm)	Size range (mm)
29300188	087.0-1010R	17	81.6 – 87
29300190	087.5-1010R	17	82.1 – 87.5
29300192	088.0-1010R	17	82.6 – 88
29300194	088.5-1010R	17	83.1 – 88.5
29300196	089.0-1010R	17	83.6 – 89
29300198	089.5-1010R	17	84.1 – 89.5
29300200	090.0-1010R	17	84.6 – 90
29300202	090.5-1010R	17	85.1 – 90.5
29300204	091.0-1010R	17	85.6 – 91
29300206	091.5-1010R	17	86.1 – 91.5
29300208	092.0-1010R	17	86.6 – 92
29300210	092.5-1010R	17	87.1 – 92.5
29300212	093.0-1010R	17	87.6 – 93
29300214	093.5-1010R	17	88.1 – 93.5
29300216	094.0-1010R	17	88.6 – 94
29300218	094.5-1010R	17	89.1 – 94.5
29300220	095.0-1010R	17	89.6 – 95
29300222	095.5-1010R	17	90.1 – 95.5
29300224	096.0-1010R	17	90.6 – 96
29300226	096.5-1010R	17	91.1 – 96.5
29300228	097.0-1010R	17	91.6 – 97
29300230	097.5-1010R	17	92.1 – 97.5
29300232	098.0-1010R	17	92.6 – 98
29300234	098.5-1010R	17	93.1 – 98.5
29300236	099.0-1010R	17	93.6 – 99
29300238	099.5-1010R	17	94.1 – 99.5
29300240	100.0-1010R	17	94.6 – 100
29300242	100.5-1010R	17	95.1 – 100.5
29300244	101.0-1010R	17	95.6 – 101
29300246	101.5-1010R	17	96.1 – 101.5
29300248	102.0-1010R	17	96.6 – 102
29300250	102.5-1010R	17	97.1 – 102.5
29300252	103.0-1010R	17	97.6 – 103
29300254	103.5-1010R	17	98.1 – 103.5
29300256	104.0-1010R	17	98.6 – 104
29300258	104.5-1010R	17	99.1 – 104.5
29300260	105.0-1010R	17	99.6 – 105
29300262	105.5-1010R	17	100.1 – 105.5
29300264	106.0-1010R	17	100.6 – 106
29300266	106.5-1010R	17	101.1 – 106.5
29300268	107.0-1010R	17	101.6 – 107
29300270	107.5-1010R	17	102.1 – 107.5
29300272	108.0-1010R	17	102.6 – 108
29300274	108.5-1010R	17	103.1 – 108.5
29300276	109.0-1010R	17	103.6 – 109
29300278	109.5-1010R	17	104.1 – 109.5
29300280	110.0-1010R	17	104.6 – 110
29300282	110.5-1010R	17	105.1 – 110.5
29300284	111.0-1010R	17	105.6 – 111
29300286	111.5-1010R	17	106.1 – 111.5
29300288	112.0-1010R	17	106.6 – 112
29300290	112.5-1010R	17	107.1 – 112.5
29300292	113.0-1010R	17	107.6 – 113
29300294	113.5-1010R	17	108.1 – 113.5
29300296	114.0-1010R	17	108.6 – 114
29300298	114.5-1010R	17	109.1 – 114.5
29300300	115.0-1010R	17	109.6 – 115
29300302	115.5-1010R	17	110.1 – 115.5
29300304	116.0-1010R	17	110.6 – 116
29300306	116.5-1010R	17	111.1 – 116.5
29300308	117.0-1010R	17	111.6 – 117
29300310	117.5-1010R	17	112.1 – 117.5

Item No.	Ref. No.	Ear width inside (mm)	Size range (mm)
29300312	118.0-1010R	17	112.6 – 118
29300314	118.5-1010R	17	113.1 – 118.5
29300316	119.0-1010R	17	113.6 – 119
29300318	119.5-1010R	17	114.1 – 119.5
29300320	120.0-1010R	17	114.6 – 120
29300322	120.5-1010R	17	115.1 – 120.5

## Assembly Tools

## Manual

Clamping tool 293

Item No. 14100379

Torque wrench

Item No. 14100098



Clamping Tool with Torque Wrench

## Mechanical or Electronically controlled

HO 7000 ME w/o pincer head\*

Item No. 13900230

Pincer head HO-10.5-21.2 ME\*

Item No. 13900851

HO 7000 ELT w/o pincer head

Item No. 13900341

Pincer head HO-10.5-21.2 EL

Item No. 13900852

HO 10000 ELT w/o pincer head

Item No. 13900879

Pincer head HO-10.5-21.2 EL HO-10000

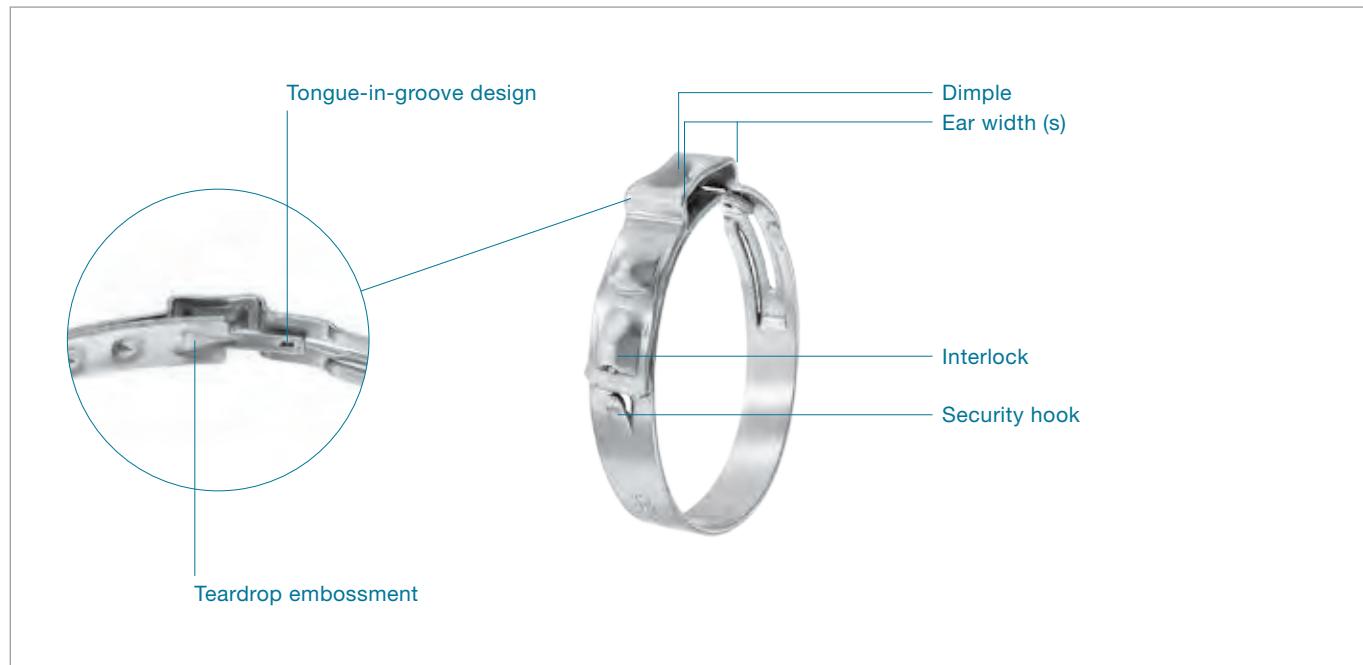
Item No. 13900854

Replacement Jaw Kit

Item No. 13900853



\* Application specific testing by Oetiker application engineering required



**360° StepLess®:** uniform compression and uniform surface pressure

Closed interlock: high radial loads, smooth outer contour

Clamp ear: compensates for component tolerances, adjustable surface pressure

Dimple and teardrop embossment: increased clamping force

Burr-free strip edges: reduced risk of damage to parts being clamped

Security hook: prevents unintended opening during transport

## StepLess® Ear Clamps – the next generation 123 & 193

### Material

123 High strength steel, Material no. 1.0934

Coating: zinc-plated, galfan optional

193 Stainless steel, Material no. 1.4301/UNS S30400

### Corrosion resistance according to DIN EN ISO 9227

123 Zinc-plated steel band ≥ 96 h

123 Galvanized steel band ≥ 144 h

193 ≥ 1000 h

### Standard Series

Size range	width x thickness	ear width
18.0 – 120.5 mm*	7 x 0.6 mm*	10.7 mm
30.0 – 120.5 mm*	7 x 0.6 mm*	13.0 mm
18.0 – 120.5 mm	7 x 0.8 mm	10.7 mm
30.0 – 120.5 mm	7 x 0.8 mm	13.0 mm

### Heavy Duty Series

Size range	width x thickness	ear width
24.5 – 120.5 mm	10 x 0.8 mm	10.7 mm
30.0 – 120.5 mm	10 x 0.8 mm	13.0 mm
24.5 – 120.5 mm**	10 x 1.0 mm	10.7 mm
30.0 – 120.5 mm	10 x 1.0 mm	13.0 mm

\* stainless steel available only

\*\* stainless steel material size range starts at 30.0 mm

### Sizes

Diameter graduation 0.5 mm

Some sizes are only available if an appropriate minimum quantity is ordered.

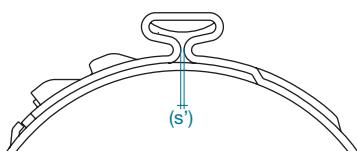
### Material dimension

The StepLess® ear clamps are available in standard widths and thicknesses. The band dimensions must be selected so that they take the required radial forces and the hose characteristics into account and secure the necessary sealing and/or retention properties for the corresponding environmental conditions.

### Clamp ear (closing element)

Using tools designed or endorsed by Oetiker, the clamp is closed by drawing together the lower radii of the “ear”. The maximum diameter reduction is proportionate to the open “ear” width (s). The theoretical maximum reduction in diameter is given by the formula:

$$\text{Max. diameter reduction} = \frac{\text{Ear width (s)}}{\pi}$$



Note: the above sketch shows the appearance of a closed "ear" ( $s'$ ); it does not necessarily indicate an effective closed assembly.

The following applies as a guideline: To determine the correct clamp diameter, push the hose onto the attaching material, (e.g. the nipple), and then measure the outer diameter of the hose. Select a clamp whose average value of the diameter range is slightly greater than the hose's outer diameter. The clamp is only sufficiently closed (minimal diameter reduction) if the original ear width is reduced by at least 40% (for an ear with a 10.7 mm width) or 50% (for an ear with a 13 mm width) and the correct closing force was applied during assembly.

#### Block closure

**Block closure** is when the assembly force fully closes the ear, resulting in both ear legs touching (vertical members between the ear dimple and clamp radius). When this occurs the assembly force is absorbed by compressing the legs rather than transferring the assembly forces to the parts being clamped. If assembly forces are going to be measured, a block closure must be avoided.

#### Security hook

The standard series will be delivered with security hook. Optionally the clamps can be ordered without security hook.

#### Assembly Recommendations

The clamp's ear should be closed at a uniform rate not exceeding the recommended maximum closing force. This will ensure clamp tension remains constant without overloading individual components of the assembly being joined, and of the clamps. Oetiker calls this assembly method "force priority". Force priority ensures that tolerance compensating features of the clamp remain functional for every assembly. This ensures the resulting radial force remain approximately the same for every assembly, independent of any component's dimensional fluctuation. Clamp installation monitoring and process data collection are available by incorporating the "Electronically Controlled Pneumatic Power Tool" Oetiker ELK in the assembly process.

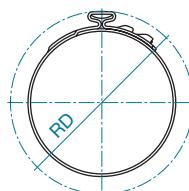
#### Closing force

As a matter of principle, the closing force selection is closely related to the desired compression or surface pressure of the material to be assembled. The resistance against the clamp corresponds to the applied force, so that the defined closing force is significantly reduced if soft materials are compressed.

The maximum closing forces are displayed in the table on the next page, depending on the material dimension. These specifically refer to thermoplastics or other less malleable materials with high Shore hardness.

#### Rotation diameter

The rotation diameter (RD) of an assembled clamp can be critical design information for applications which require a rotation within a limited open space. It changes, depending on the resulting ear gap. Clamping attempts yield the maximum rotation diameter of the respective component.



#### Important

- The ear height is a natural result of ear deformation. Do not influence the ear height, either by changing the ear gap or with built-in hold-down devices in assembly tools.
- Single tool stroke closure only, do not apply secondary crimping force.

## Assembly data

Material dimensions (mm) (mm)	Size dimensions (mm) (mm)	Ear width (mm)	Closing force max. (N)	Assembly tools force-monitored <sup>1</sup> :			
				Manual	Pneumatic	Cordless	Electronically controlled
<b>123</b>							
7 x 0.8	18.0 – 120.5	10.7	2400	HMK 01/S01	HO 3000 – 4000 ME	CP 10	HO 3000 – 4000 EL
7 x 0.8	30.0 – 120.5	13.0	2400	HMK 01/S01	HO 3000 – 4000 ME	CP 10	HO 3000 – 4000 EL
10 x 0.8	24.5 – 120.5	10.7	3400	Clamping tool and Torque wrench	HO 5000 ME	CP 10	HO 5000 EL
10 x 0.8	30.0 – 120.5	13.0	3400	Clamping tool and Torque wrench	HO 5000 ME	CP 10	HO 5000 EL
10 x 1.0	24.5 – 120.5	10.7	5000	Clamping tool and Torque wrench	HO 5000 – 7000 ME	CP 20	HO 5000 – 7000 EL
10 x 1.0	30.0 – 120.5	13.0	5000	Clamping tool and Torque wrench	HO 5000 – 7000 ME	CP 20	HO 5000 – 7000 EL
<b>193</b>							
7 x 0.6	18.0 – 120.5	10.7	2800	-	HO 3000 – 4000 ME	CP 10	HO 3000 – 4000 EL
7 x 0.6	30.0 – 120.5	13.0	2600	HMK 01	HO 3000 – 4000 ME	CP 10	HO 3000 – 4000 EL
7 x 0.8	18.0 – 120.5	10.7	4300	Clamping tool and Torque wrench	HO 5000 ME	CP 20	HO 5000 EL
7 x 0.8	30.0 – 120.5	13.0	4100	Clamping tool and Torque wrench	HO 5000 ME	CP 20	HO 5000 EL
10 x 0.8	24.5 – 120.5	10.7	5600	Clamping tool and Torque wrench	HO 7000 ME	CP 20	HO 7000 EL
10 x 0.8	30.0 – 120.5	13.0	5400	Clamping tool and Torque wrench	HO 7000 ME	CP 20	HO 7000 EL
10 x 1.0	30.0 – 120.5	10.7	8000 <sup>2</sup>	Clamping tool and Torque wrench	HO 7000 ME	CP 20	HO 7000 – 10000 EL
10 x 1.0	30.0 – 120.5	13.0	7700 <sup>2</sup>	Clamping tool and Torque wrench	HO 7000 ME	CP 20	HO 7000 – 10000 EL

For an alternative option, see our manual pincers on page 130

<sup>1</sup> Further information on page 108

<sup>2</sup> For closing forces ≥ 7000 N, with the HO 7000, an inlet pressure of > 5.5 bar is required.

#### Important note

These figures are intended as a guide, they may vary depending on the type and tolerances of parts being clamped. To ensure optimum clamp selection, we recommend making functional tests with several assemblies.

## Order information 123

Item No.	Ref. No.	Ear width inside (mm)	Size range (mm)	Item No.	Ref. No.	Ear width inside (mm)	Size range (mm)
High strength steel, coating: zinc-plated Band width 7 mm, thickness 0.8 mm (708)							
12300898 018.0-708 10.7 14.6 – 18							
12300899	018.5-708	10.7	15.1 – 18.5	12300682	046.5-708	10.7	43.1 – 46.5
12300900	019.0-708	10.7	15.6 – 19	12300683	047.0-708	10.7	43.6 – 47
12300901	019.5-708	10.7	16.1 – 19.5	12300684	047.5-708	10.7	44.1 – 47.5
12300902	020.0-708	10.7	16.6 – 20	12300685	048.0-708	10.7	44.6 – 48
12300903	020.5-708	10.7	17.1 – 20.5	12300686	048.5-708	10.7	45.1 – 48.5
12300841	021.0-708	10.7	17.6 – 21	12300687	049.0-708	10.7	45.6 – 49
12300904	021.5-708	10.7	18.1 – 21.5	12300688	049.5-708	10.7	46.1 – 49.5
12300905	022.0-708	10.7	18.6 – 22	12300689	050.0-708	10.7	46.6 – 50
12300842	022.5-708	10.7	19.1 – 22.5	12300690	050.5-708	10.7	47.1 – 50.5
12300906	023.0-708	10.7	19.6 – 23	12300691	051.0-708	10.7	47.6 – 51
12300907	023.5-708	10.7	20.1 – 23.5	12300632	051.5-708	10.7	48.1 – 51.5
12300908	024.0-708	10.7	20.6 – 24	12300692	052.0-708	10.7	48.6 – 52
12300909	024.5-708	10.7	21.1 – 24.5	12300693	052.5-708	10.7	49.1 – 52.5
12300589	025.0-708	10.7	21.6 – 25	12300694	053.0-708	10.7	49.6 – 53
12300642	025.5-708	10.7	22.1 – 25.5	12300695	053.5-708	10.7	50.1 – 53.5
12300643	026.0-708	10.7	22.6 – 26	12300696	054.0-708	10.7	50.6 – 54
12300644	026.5-708	10.7	23.1 – 26.5	12300697	054.5-708	10.7	51.1 – 54.5
12300645	027.0-708	10.7	23.6 – 27	12300698	055.0-708	10.7	51.6 – 55
12300646	027.5-708	10.7	24.1 – 27.5	12300699	055.5-708	10.7	52.1 – 55.5
12300647	028.0-708	10.7	24.6 – 28	12300700	056.0-708	10.7	52.6 – 56
12300648	028.5-708	10.7	25.1 – 28.5	12300701	056.5-708	10.7	53.1 – 56.5
12300649	029.0-708	10.7	25.6 – 29	12300702	057.0-708	10.7	53.6 – 57
12300650	029.5-708	10.7	26.1 – 29.5	12300703	057.5-708	10.7	54.1 – 57.5
12300590	030.0-708	10.7	26.6 – 30	12300704	058.0-708	10.7	54.6 – 58
12300651	030.5-708	10.7	27.1 – 30.5	12300705	058.5-708	10.7	55.1 – 58.5
12300652	031.0-708	10.7	27.6 – 31	12300706	059.0-708	10.7	55.6 – 59
12300653	031.5-708	10.7	28.1 – 31.5	12300707	059.5-708	10.7	56.1 – 59.5
12300654	032.0-708	10.7	28.6 – 32	12300591	060.0-708	10.7	56.6 – 60
12300655	032.5-708	10.7	29.1 – 32.5	12300708	060.5-708	10.7	57.1 – 60.5
12300627	033.0-708	10.7	29.6 – 33	12300709	061.0-708	10.7	57.6 – 61
12300656	033.5-708	10.7	30.1 – 33.5	12300710	061.5-708	10.7	58.1 – 61.5
12300657	034.0-708	10.7	30.6 – 34	12300711	062.0-708	10.7	58.6 – 62
12300658	034.5-708	10.7	31.1 – 34.5	12300712	062.5-708	10.7	59.1 – 62.5
12300659	035.0-708	10.7	31.6 – 35	12300713	063.0-708	10.7	59.6 – 63
12300660	035.5-708	10.7	32.1 – 35.5	12300714	063.5-708	10.7	60.1 – 63.5
12300661	036.0-708	10.7	32.6 – 36	12300715	064.0-708	10.7	60.6 – 64
12300662	036.5-708	10.7	33.1 – 36.5	12300716	064.5-708	10.7	61.1 – 64.5
12300663	037.0-708	10.7	33.6 – 37	12300717	065.0-708	10.7	61.6 – 65
12300664	037.5-708	10.7	34.1 – 37.5	12300718	065.5-708	10.7	62.1 – 65.5
12300665	038.0-708	10.7	34.6 – 38	12300719	066.0-708	10.7	62.6 – 66
12300666	038.5-708	10.7	35.1 – 38.5	12300720	066.5-708	10.7	63.1 – 66.5
12300641	039.0-708	10.7	35.6 – 39	12300721	067.0-708	10.7	63.6 – 67
12300668	039.5-708	10.7	36.1 – 39.5	12300722	067.5-708	10.7	64.1 – 67.5
12300669	040.0-708	10.7	36.6 – 40	12300723	068.0-708	10.7	64.6 – 68
12300670	040.5-708	10.7	37.1 – 40.5	12300724	068.5-708	10.7	65.1 – 68.5
12300671	041.0-708	10.7	37.6 – 41	12300725	069.0-708	10.7	65.6 – 69
12300672	041.5-708	10.7	38.1 – 41.5	12300726	069.5-708	10.7	66.1 – 69.5
12300673	042.0-708	10.7	38.6 – 42	12300727	070.0-708	10.7	66.6 – 70
12300674	042.5-708	10.7	39.1 – 42.5	12300728	070.5-708	10.7	67.1 – 70.5
12300675	043.0-708	10.7	39.6 – 43	12300729	071.0-708	10.7	67.6 – 71
12300676	043.5-708	10.7	40.1 – 43.5	12300730	071.5-708	10.7	68.1 – 71.5
12300677	044.0-708	10.7	40.6 – 44	12300731	072.0-708	10.7	68.6 – 72
12300678	044.5-708	10.7	41.1 – 44.5	12300732	072.5-708	10.7	69.1 – 72.5
12300679	045.0-708	10.7	41.6 – 45	12300733	073.0-708	10.7	69.6 – 73
12300680	045.5-708	10.7	42.1 – 45.5	12300734	073.5-708	10.7	70.1 – 73.5
12300681	046.0-708	10.7	42.6 – 46	12300735	074.0-708	10.7	70.6 – 74
				12300736	074.5-708	10.7	71.1 – 74.5

## Order information 123

Item No.	Ref. No.	Ear width inside (mm)	Size range (mm)
High strength steel, coating: zinc-plated Band width 7 mm, thickness 0.8 mm (708)			
12300737	075.0-708	10.7	71.6 – 75
12300738	075.5-708	10.7	72.1 – 75.5
12300739	076.0-708	10.7	72.6 – 76
12300740	076.5-708	10.7	73.1 – 76.5
12300741	077.0-708	10.7	73.6 – 77
12300742	077.5-708	10.7	74.1 – 77.5
12300743	078.0-708	10.7	74.6 – 78
12300744	078.5-708	10.7	75.1 – 78.5
12300745	079.0-708	10.7	75.6 – 79
12300746	079.5-708	10.7	76.1 – 79.5
12300747	080.0-708	10.7	76.6 – 80
12300748	080.5-708	10.7	77.1 – 80.5
12300749	081.0-708	10.7	77.6 – 81
12300750	081.5-708	10.7	78.1 – 81.5
12300751	082.0-708	10.7	78.6 – 82
12300752	082.5-708	10.7	79.1 – 82.5
12300753	083.0-708	10.7	79.6 – 83
12300754	083.5-708	10.7	80.1 – 83.5
12300755	084.0-708	10.7	80.6 – 84
12300756	084.5-708	10.7	81.1 – 84.5
12300757	085.0-708	10.7	81.6 – 85
12300758	085.5-708	10.7	82.1 – 85.5
12300759	086.0-708	10.7	82.6 – 86
12300760	086.5-708	10.7	83.1 – 86.5
12300761	087.0-708	10.7	83.6 – 87
12300762	087.5-708	10.7	84.1 – 87.5
12300763	088.0-708	10.7	84.6 – 88
12300764	088.5-708	10.7	85.1 – 88.5
12300765	089.0-708	10.7	85.6 – 89
12300766	089.5-708	10.7	86.1 – 89.5
12300767	090.0-708	10.7	86.6 – 90
12300768	090.5-708	10.7	87.1 – 90.5
12300769	091.0-708	10.7	87.6 – 91
12300770	091.5-708	10.7	88.1 – 91.5
12300771	092.0-708	10.7	88.6 – 92
12300772	092.5-708	10.7	89.1 – 92.5
12300773	093.0-708	10.7	89.6 – 93
12300774	093.5-708	10.7	90.1 – 93.5
12300775	094.0-708	10.7	90.6 – 94
12300776	094.5-708	10.7	91.1 – 94.5
12300777	095.0-708	10.7	91.6 – 95
12300778	095.5-708	10.7	92.1 – 95.5
12300779	096.0-708	10.7	92.6 – 96
12300780	096.5-708	10.7	93.1 – 96.5
12300781	097.0-708	10.7	93.6 – 97
12300782	097.5-708	10.7	94.1 – 97.5
12300783	098.0-708	10.7	94.6 – 98
12300784	098.5-708	10.7	95.1 – 98.5
12300785	099.0-708	10.7	95.6 – 99
12300786	099.5-708	10.7	96.1 – 99.5
12300787	100.0-708	10.7	96.6 – 100
12300788	100.5-708	10.7	97.1 – 100.5
12300789	101.0-708	10.7	97.6 – 101
12300790	101.5-708	10.7	98.1 – 101.5
12300791	102.0-708	10.7	98.6 – 102
12300792	102.5-708	10.7	99.1 – 102.5

Item No.	Ref. No.	Ear width inside (mm)	Size range (mm)
High strength steel, coating: zinc-plated Band width 7 mm, thickness 0.8 mm (708)			
12300793	103.0-708	10.7	99.6 – 103
12300794	103.5-708	10.7	100.1 – 103.5
12300795	104.0-708	10.7	100.6 – 104
12300796	104.5-708	10.7	101.1 – 104.5
12300797	105.0-708	10.7	101.6 – 105
12300798	105.5-708	10.7	102.1 – 105.5
12300799	106.0-708	10.7	102.6 – 106
12300800	106.5-708	10.7	103.1 – 106.5
12300801	107.0-708	10.7	103.6 – 107
12300802	107.5-708	10.7	104.1 – 107.5
12300803	108.0-708	10.7	104.6 – 108
12300804	108.5-708	10.7	105.1 – 108.5
12300805	109.0-708	10.7	105.6 – 109
12300806	109.5-708	10.7	106.1 – 109.5
12300807	110.0-708	10.7	106.6 – 110
12300808	110.5-708	10.7	107.1 – 110.5
12300809	111.0-708	10.7	107.6 – 111
12300810	111.5-708	10.7	108.1 – 111.5
12300811	112.0-708	10.7	108.6 – 112
12300812	112.5-708	10.7	109.1 – 112.5
12300813	113.0-708	10.7	109.6 – 113
12300814	113.5-708	10.7	110.1 – 113.5
12300815	114.0-708	10.7	110.6 – 114
12300816	114.5-708	10.7	111.1 – 114.5
12300817	115.0-708	10.7	111.6 – 115
12300818	115.5-708	10.7	112.1 – 115.5
12300819	116.0-708	10.7	112.6 – 116
12300820	116.5-708	10.7	113.1 – 116.5
12300821	117.0-708	10.7	113.6 – 117
12300822	117.5-708	10.7	114.1 – 117.5
12300823	118.0-708	10.7	114.6 – 118
12300824	118.5-708	10.7	115.1 – 118.5
12300825	119.0-708	10.7	115.6 – 119
12300826	119.5-708	10.7	116.1 – 119.5
12300827	120.0-708	10.7	116.6 – 120
12300592	120.5-708	10.7	117.1 – 120.5

Available on request  
(Diameter graduation 0.5 mm)

Item No.	Ref. No.	Ear width inside (mm)	Size range (mm)
Band width 7 mm, thickness 0.8 mm (708)			
On request		13	30.0 ... 120.5
Band width 10 mm, thickness 0.8 mm (1008)			
On request		10.7	24.5 ... 120.5
On request		13	30.0 ... 120.5
Band width 10 mm, thickness 1.0 mm (1010)			
On request		10.7	24.5 ... 120.5
On request		13	30.0 ... 120.5

## Order information 193

Item No.	Ref. No.	Ear width inside (mm)	Size range (mm)
Band width 7 mm, thickness 0.6 mm (706R)			
19300111	018.0-706R	10.7	14.6 – 18
19300838	018.5-706R	10.7	15.1 – 18.5
19300916	019.0-706R	10.7	15.6 – 19
19300917	019.5-706R	10.7	16.1 – 19.5
19300373	020.0-706R	10.7	16.6 – 20
19300776	020.5-706R	10.7	17.1 – 20.5
19300778	021.0-706R	10.7	17.6 – 21
19300918	021.5-706R	10.7	18.1 – 21.5
19300853	022.0-706R	10.7	18.6 – 22
19300105	022.5-706R	10.7	19.1 – 22.5
19300919	023.0-706R	10.7	19.6 – 23
19300823	023.5-706R	10.7	20.1 – 23.5
19300900	024.0-706R	10.7	20.6 – 24
19300765	024.5-706R	10.7	21.1 – 24.5
19300705	024.9-706R	10.7	21.5 – 24.9
19300116	025.0-706R	10.7	21.6 – 25
19300487	025.5-706R	10.7	22.1 – 25.5
19300488	026.0-706R	10.7	22.6 – 26
19300489	026.5-706R	10.7	23.1 – 26.5
19300368	027.0-706R	10.7	23.6 – 27
19300491	027.5-706R	10.7	24.1 – 27.5
19300492	028.0-706R	10.7	24.6 – 28
19300493	028.5-706R	10.7	25.1 – 28.5
19300494	029.0-706R	10.7	25.6 – 29
19300495	029.5-706R	10.7	26.1 – 29.5
19300354	030.0-706R	10.7	26.6 – 30
19300497	030.5-706R	10.7	27.1 – 30.5
19300498	031.0-706R	10.7	27.6 – 31
19300472	031.5-706R	10.7	28.1 – 31.5
19300500	032.0-706R	10.7	28.6 – 32
19300501	032.5-706R	10.7	29.1 – 32.5
19300502	033.0-706R	10.7	29.6 – 33
19300503	033.5-706R	10.7	30.1 – 33.5
19300504	034.0-706R	10.7	30.6 – 34
19300505	034.5-706R	10.7	31.1 – 34.5
19300506	035.0-706R	10.7	31.6 – 35
19300507	035.5-706R	10.7	32.1 – 35.5
19300508	036.0-706R	10.7	32.6 – 36
19300509	036.5-706R	10.7	33.1 – 36.5
19300510	037.0-706R	10.7	33.6 – 37
19300511	037.5-706R	10.7	34.1 – 37.5
19300512	038.0-706R	10.7	34.6 – 38
19300513	038.5-706R	10.7	35.1 – 38.5
19300514	039.0-706R	10.7	35.6 – 39
19300515	039.5-706R	10.7	36.1 – 39.5
19300348	040.0-706R	10.7	36.6 – 40
19300516	040.5-706R	10.7	37.1 – 40.5
19300517	041.0-706R	10.7	37.6 – 41
19300518	041.5-706R	10.7	38.1 – 41.5
19300519	042.0-706R	10.7	38.6 – 42
19300520	042.5-706R	10.7	39.1 – 42.5
19300349	043.0-706R	10.7	39.6 – 43
19300521	043.5-706R	10.7	40.1 – 43.5
19300522	044.0-706R	10.7	40.6 – 44
19300523	044.5-706R	10.7	41.1 – 44.5
19300524	045.0-706R	10.7	41.6 – 45
19300525	045.5-706R	10.7	42.1 – 45.5
19300526	046.0-706R	10.7	42.6 – 46

Item No.	Ref. No.	Ear width inside (mm)	Size range (mm)
Band width 7 mm, thickness 0.6 mm (706R)			
19300527	046.5-706R	10.7	43.1 – 46.5
19300528	047.0-706R	10.7	43.6 – 47
19300529	047.5-706R	10.7	44.1 – 47.5
19300530	048.0-706R	10.7	44.6 – 48
19300531	048.5-706R	10.7	45.1 – 48.5
19300532	049.0-706R	10.7	45.6 – 49
19300533	049.5-706R	10.7	46.1 – 49.5
19300534	050.0-706R	10.7	46.6 – 50
19300535	050.5-706R	10.7	47.1 – 50.5
19300536	051.0-706R	10.7	47.6 – 51
19300537	051.5-706R	10.7	48.1 – 51.5
19300538	052.0-706R	10.7	48.6 – 52
19300539	052.5-706R	10.7	49.1 – 52.5
19300540	053.0-706R	10.7	49.6 – 53
19300541	053.5-706R	10.7	50.1 – 53.5
19300542	054.0-706R	10.7	50.6 – 54
19300543	054.5-706R	10.7	51.1 – 54.5
19300544	055.0-706R	10.7	51.6 – 55
19300545	055.5-706R	10.7	52.1 – 55.5
19300546	056.0-706R	10.7	52.6 – 56
19300547	056.5-706R	10.7	53.1 – 56.5
19300548	057.0-706R	10.7	53.6 – 57
19300549	057.5-706R	10.7	54.1 – 57.5
19300550	058.0-706R	10.7	54.6 – 58
19300551	058.5-706R	10.7	55.1 – 58.5
19300552	059.0-706R	10.7	55.6 – 59
19300553	059.5-706R	10.7	56.1 – 59.5
19300114	060.0-706R	10.7	56.6 – 60
19300490	060.5-706R	10.7	57.1 – 60.5
19300496	061.0-706R	10.7	57.6 – 61
19300499	061.5-706R	10.7	58.1 – 61.5
19300554	062.0-706R	10.7	58.6 – 62
19300555	062.5-706R	10.7	59.1 – 62.5
19300556	063.0-706R	10.7	59.6 – 63
19300557	063.5-706R	10.7	60.1 – 63.5
19300558	064.0-706R	10.7	60.6 – 64
19300559	064.5-706R	10.7	61.1 – 64.5
19300560	065.0-706R	10.7	61.6 – 65
19300561	065.5-706R	10.7	62.1 – 65.5
19300562	066.0-706R	10.7	62.6 – 66
19300563	066.5-706R	10.7	63.1 – 66.5
19300564	067.0-706R	10.7	63.6 – 67
19300565	067.5-706R	10.7	64.1 – 67.5
19300476	068.0-706R	10.7	64.6 – 68
19300566	068.5-706R	10.7	65.1 – 68.5
19300567	069.0-706R	10.7	65.6 – 69
19300568	069.5-706R	10.7	66.1 – 69.5
19300569	070.0-706R	10.7	66.6 – 70
19300570	070.5-706R	10.7	67.1 – 70.5
19300571	071.0-706R	10.7	67.6 – 71
19300572	071.5-706R	10.7	68.1 – 71.5
19300573	072.0-706R	10.7	68.6 – 72
19300574	072.5-706R	10.7	69.1 – 72.5
19300575	073.0-706R	10.7	69.6 – 73
19300576	073.5-706R	10.7	70.1 – 73.5
19300577	074.0-706R	10.7	70.6 – 74
19300578	074.5-706R	10.7	71.1 – 74.5
19300579	075.0-706R	10.7	71.6 – 75

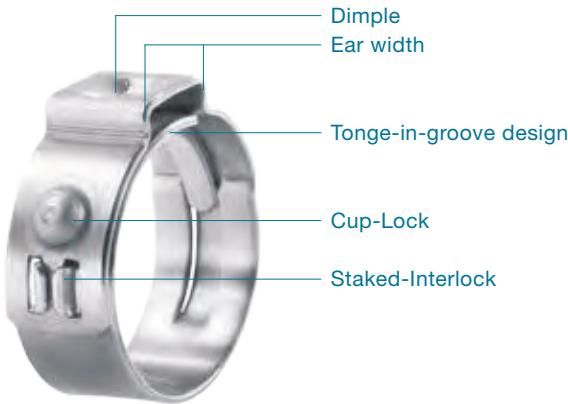
## Order information 193

Item No.	Ref. No.	Ear width inside (mm)	Size range (mm)
Band width 7 mm, thickness 0.6 mm (706R)			
19300580	075.5-706R	10.7	72.1 – 75.5
19300581	076.0-706R	10.7	72.6 – 76
19300582	076.5-706R	10.7	73.1 – 76.5
19300583	077.0-706R	10.7	73.6 – 77
19300584	077.5-706R	10.7	74.1 – 77.5
19300585	078.0-706R	10.7	74.6 – 78
19300586	078.5-706R	10.7	75.1 – 78.5
19300587	079.0-706R	10.7	75.6 – 79
19300588	079.5-706R	10.7	76.1 – 79.5
19300589	080.0-706R	10.7	76.6 – 80
19300590	080.5-706R	10.7	77.1 – 80.5
19300591	081.0-706R	10.7	77.6 – 81
19300592	081.5-706R	10.7	78.1 – 81.5
19300593	082.0-706R	10.7	78.6 – 82
19300594	082.5-706R	10.7	79.1 – 82.5
19300595	083.0-706R	10.7	79.6 – 83
19300596	083.5-706R	10.7	80.1 – 83.5
19300597	084.0-706R	10.7	80.6 – 84
19300598	084.5-706R	10.7	81.1 – 84.5
19300599	085.0-706R	10.7	81.6 – 85
19300600	085.5-706R	10.7	82.1 – 85.5
19300601	086.0-706R	10.7	82.6 – 86
19300602	086.5-706R	10.7	83.1 – 86.5
19300603	087.0-706R	10.7	83.6 – 87
19300604	087.5-706R	10.7	84.1 – 87.5
19300605	088.0-706R	10.7	84.6 – 88
19300606	088.5-706R	10.7	85.1 – 88.5
19300607	089.0-706R	10.7	85.6 – 89
19300608	089.5-706R	10.7	86.1 – 89.5
19300609	090.0-706R	10.7	86.6 – 90
19300610	090.5-706R	10.7	87.1 – 90.5
19300611	091.0-706R	10.7	87.6 – 91
19300612	091.5-706R	10.7	88.1 – 91.5
19300613	092.0-706R	10.7	88.6 – 92
19300614	092.5-706R	10.7	89.1 – 92.5
19300615	093.0-706R	10.7	89.6 – 93
19300616	093.5-706R	10.7	90.1 – 93.5
19300617	094.0-706R	10.7	90.6 – 94
19300618	094.5-706R	10.7	91.1 – 94.5
19300619	095.0-706R	10.7	91.6 – 95
19300620	095.5-706R	10.7	92.1 – 95.5
19300621	096.0-706R	10.7	92.6 – 96
19300622	096.5-706R	10.7	93.1 – 96.5
19300623	097.0-706R	10.7	93.6 – 97
19300624	097.5-706R	10.7	94.1 – 97.5
19300625	098.0-706R	10.7	94.6 – 98
19300626	098.5-706R	10.7	95.1 – 98.5
19300627	099.0-706R	10.7	95.6 – 99
19300628	099.5-706R	10.7	96.1 – 99.5
19300629	100.0-706R	10.7	96.6 – 100
19300630	100.5-706R	10.7	97.1 – 100.5
19300631	101.0-706R	10.7	97.6 – 101
19300632	101.5-706R	10.7	98.1 – 101.5
19300633	102.0-706R	10.7	98.6 – 102
19300634	102.5-706R	10.7	99.1 – 102.5
19300635	103.0-706R	10.7	99.6 – 103
19300636	103.5-706R	10.7	100.1 – 103.5
19300637	104.0-706R	10.7	100.6 – 104

Item No.	Ref. No.	Ear width inside (mm)	Size range (mm)
Band width 7 mm, thickness 0.6 mm (706R)			
19300638	104.5-706R	10.7	101.1 – 104.5
19300639	105.0-706R	10.7	101.6 – 105
19300640	105.5-706R	10.7	102.1 – 105.5
19300641	106.0-706R	10.7	102.6 – 106
19300642	106.5-706R	10.7	103.1 – 106.5
19300643	107.0-706R	10.7	103.6 – 107
19300644	107.5-706R	10.7	104.1 – 107.5
19300645	108.0-706R	10.7	104.6 – 108
19300646	108.5-706R	10.7	105.1 – 108.5
19300647	109.0-706R	10.7	105.6 – 109
19300648	109.5-706R	10.7	106.1 – 109.5
19300649	110.0-706R	10.7	106.6 – 110
19300650	110.5-706R	10.7	107.1 – 110.5
19300651	111.0-706R	10.7	107.6 – 111
19300652	111.5-706R	10.7	108.1 – 111.5
19300653	112.0-706R	10.7	108.6 – 112
19300654	112.5-706R	10.7	109.1 – 112.5
19300655	113.0-706R	10.7	109.6 – 113
19300656	113.5-706R	10.7	110.1 – 113.5
19300657	114.0-706R	10.7	110.6 – 114
19300658	114.5-706R	10.7	111.1 – 114.5
19300659	115.0-706R	10.7	111.6 – 115
19300660	115.5-706R	10.7	112.1 – 115.5
19300661	116.0-706R	10.7	112.6 – 116
19300662	116.5-706R	10.7	113.1 – 116.5
19300663	117.0-706R	10.7	113.6 – 117
19300664	117.5-706R	10.7	114.1 – 117.5
19300665	118.0-706R	10.7	114.6 – 118
19300666	118.5-706R	10.7	115.1 – 118.5
19300667	119.0-706R	10.7	115.6 – 119
19300668	119.5-706R	10.7	116.1 – 119.5
19300669	120.0-706R	10.7	116.6 – 120
19300115	120.5-706R	10.7	117.1 – 120.5
Available on request (Diameter graduation 0.5 mm)			
Item No.	Ref. No.	Ear width inside (mm)	Size range (mm)
Band width 7 mm, thickness 0.6 mm (706R)			
On request		13	30.0 ... 120.5
Band width 7 mm, thickness 0.8 mm (708R)			
On request		10.7	25.0 ... 120.5
On request		13	30.0 ... 120.5
Band width 10 mm, thickness 0.8 mm (1008R)			
On request		10.7	24.5 ... 120.5
On request		13	30.0 ... 120.5
Band width 10 mm, thickness 1.0 mm (1010R)			
On request		10.7	30.0 ... 120.5
On request		13	30.0 ... 120.5

The data in this catalog are based on many years experience. They are intended for reference, not as design specifications.

## StepLess® Ear Clamps with Cup-Lock 193



Cup-Lock: Efficient lock solution for small clamp diameters

### Material

193 Stainless steel, material no. 1.4301/UNS S30400

Corrosion resistance according to DIN EN ISO 9227

193 ≥ 1000 h

### Standard Series

Size range	width x thickness	ear width
19.0 – 31.0 mm	10.0 x 0.8 mm	8 mm

### Sizes

Diameter graduation 0.5 mm

Some sizes are only available if an appropriate minimum quantity is ordered. Customer specific sizes available on request.

### Cup and staked interlock

The two locks hold the clamp geometry together securely. As the cup lock absorbs the closing force with its full material cross section, these clamps are able to achieve even higher radial forces.

### Order information

For detailed order information, please contact your local Oetiker branch.

### Assembly data

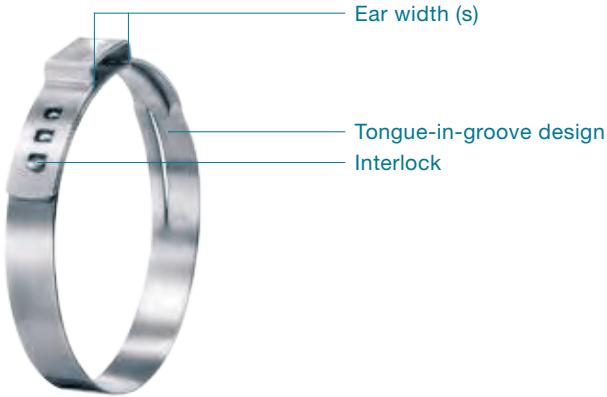
Material dimensions	Size (mm)	Closing force max. (N)	Assembly tools force-monitored <sup>1</sup> :			
			Manual	Pneumatic	Cordless	Electronically controlled
10 x 0.8	19.0 – 31.0	6600	Clamping tool and Torque wrench	HO 7000 ME	CP 20	HO 7000 EL

For an alternative option, see our manual pincers on page 130

<sup>1</sup> Further information on page 108

### Important note

These figures are intended as a guide, they may vary depending on the type and tolerances of parts being clamped. To ensure optimum clamp selection, we recommend making functional tests with several assemblies.



Narrow band: concentrates transmission of clamping force, less weight

360° StepLess®: uniform compression and uniform surface pressure

Clamp ear: compensates for component tolerances, adjustable surface pressure

Dimple: increases clamping force

Burr-free strip edges: reduced risk of damage to parts being clamped

## StepLess® Ear Clamps 117 & 167

### Material

117 Galvanized or zinc-plated steel band

167 Stainless Steel, Material no. 1.4301/UNS S30400

Optional alternative materials

Corrosion resistance according to DIN EN ISO 9227

117 Zinc-plated steel band ≥ 96 h

117 Galvanized steel band ≥ 144 h

167 ≥ 1000 h

### Series 117

Size range width x thickness

11.9 – 17.7 mm 7.0 x 0.6 mm

### Standard Series 167

Size range width x thickness

6.5 – 11.8 mm 5.0 x 0.5 mm

11.9 – 120.5 mm 7.0 x 0.6 mm

### Heavy Duty Series 167

Size range width x thickness

24.5 – 120.5 mm 10.0 x 0.8 mm

62.0 – 120.5 mm 10.0 x 1.0 mm

Some sizes are only available if an appropriate minimum quantity is ordered. Customer specific sizes available on request.

### Material thickness

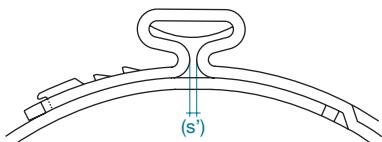
StepLess® Ear Clamps are produced in nominal widths and thicknesses. The selected material dimensions for a specific application are based on the stress required to obtain an adequate seal or load.

### Clamp ear (closing element)

Using tools designed or endorsed by Oetiker, the clamp is closed by drawing together the lower radii of the "ear". The maximum diameter reduction is proportionate to the open "ear" width (s).

The theoretical maximum reduction in diameter is given by the formula:

$$\text{Max. diameter reduction} = \frac{\text{Ear width (s)}}{\pi}$$



Note: the above sketch shows the appearance of a closed "ear" ( $s'$ ); it does not necessarily indicate an effective closed assembly.

The following applies as a guideline: To determine the correct clamp diameter, push the hose onto the attaching material, (e.g. the nipple), and then measure the outer diameter of the hose. Select a clamp whose average value of the diameter range is slightly greater than the hose's outer diameter. A clamp can only be considered adequately closed when the ear width ( $s$ ) has been reduced by at least 40%, and the correct closing force was used for assembly.

#### Block closure

Block closure is when the assembly force fully closes the ear, resulting in both ear legs touching (vertical members between the ear dimple and clamp radius). When this occurs the assembly force is absorbed by compressing the legs rather than transferring the assembly forces to the parts being clamped. If assembly forces are going to be measured, a block closure must be avoided.

#### Mechanical interlock

The interlock is a mechanical system for joining the clamp ends to permit closure. Some interlock designs can be opened for radial assembly prior to closure.

#### Assembly recommendations

The clamp's ear should be closed at a uniform rate not exceeding the recommended maximum closing force. This will ensure clamp tension remains constant without overloading individual components of the assembly being joined, and of the clamps. Oetiker calls this assembly method "force priority". Force priority ensures that tolerance compensating features of the clamp remain functional for every assembly. This ensures the resulting radial force remain approximately the same for every assembly, independent of any component's dimensional fluctuation. If Oetiker's ELK electronically controlled pneumatic pincers are used in force priority mode, assembly can be monitored to ensure repeatable installations are achieved at the proper force.

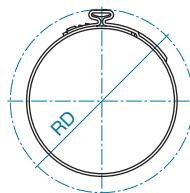
#### Closing force

As a matter of principle, the closing force selection is closely related to the desired compression or surface pressure of the material to be assembled. The resistance against the clamp corresponds to the applied force, so that the defined closing force is significantly reduced if soft materials are compressed.

The maximum closing forces are displayed in the table on the next page, depending on the material dimension. These specifically refer to thermoplastics or other less malleable materials with high Shore hardness.

#### Rotation diameter

The rotation diameter (RD) of an assembled clamp can be critical design information for applications that rotate in close proximity to adjacent components. Many factors can influence this final assembly diameter including compression, "ear" gap " $s$ " and material thickness. It is recommended that all variables be considered and evaluated prior to specifying a rotating diameter.



#### Important

- The ear height is a natural result of ear deformation. Do not influence the ear height, either by changing the ear gap or with built-in hold-down devices in assembly tools.
- Single tool stroke closure only, do not apply secondary crimping force.

## Assembly data

Material dimensions	Size (mm)	Closing force max. (N)	Assembly tools force-monitored <sup>1</sup> :	Manual	Pneumatic	Cordless	Electronically controlled
117							
7 x 0.6	11.9 – 17.8	1100	HMK 01/S01		HO 2000 – 4000 ME	CP 10	HO 2000 – 4000 EL
167							
5 x 0.5	6.5 – 11.8	1000	HMK 01/S01		HO 2000 – 4000 ME	CP 10	HO 2000 – 4000 EL
5 x 0.6	18.5 – 100.0	1700	HMK 01/S01		HO 2000 – 4000 ME	CP 10	HO 2000 – 4000 EL
7 x 0.6	11.9 – 17.5	2100	HMK 01/S01		HO 2000 – 4000 ME	CP 10	HO 2000 – 4000 EL
	17.8 – 120.5	2400	HMK 01/S01		HO 3000 – 4000 ME	CP 10	HO 3000 – 4000 EL
7 x 0.8	17.7 – 120.5	2800	-		HO 3000 – 4000 ME	CP 10	HO 3000 – 4000 EL
9 x 0.6	21.0 – 120.5	2800	-		HO 3000 – 4000 ME	CP 10	HO 3000 – 4000 EL
9 x 0.8	25.0 – 120.5	4100	Clamping tool and Torque wrench		HO 4000 – 7000 ME	CP 10	HO 4000 EL
10 x 0.6	21.0 – 120.5	2900	Clamping tool and Torque wrench		HO 4000 – 7000 ME	CP 10	HO 4000 – 7000 EL
10 x 0.8	24.5 – 120.5	5000	Clamping tool and Torque wrench		HO 5000 – 7000 ME	CP 20	HO 5000 – 7000 EL
10 x 1.0	60.0 – 120.5	7000 <sup>2</sup>	Clamping tool and Torque wrench		HO 7000 ME	CP 20	HO 7000 – 10000 EL
12 x 1.0	40.0 – 120.5	8500 <sup>2</sup>	Clamping tool and Torque wrench		HO 7000 ME	CP 20	HO 7000 – 10000 EL

For an alternative option, see our manual pincers on page 130

<sup>1</sup> Further information on page 108

<sup>2</sup> For closing forces ≥ 7000 N, with the HO 7000, an inlet pressure of > 5.5 bar is required.

#### Important note

These figures are intended as a guide, they may vary depending on the type and tolerances of parts being clamped. To ensure optimum clamp selection, we recommend making functional tests with several assemblies.

## Order information 117

Item No.	Ref. No.	Ear width inside (mm)	Size range (mm)
<b>Galvanized steel band</b>			
Band width 7 mm, thickness 0.6 mm (706)			
11701202	011.9-706	8	9.4 – 11.9
11701081	012.3-706	8	9.8 – 12.3
11701100	012.8-706	8	10.3 – 12.8
11701061	013.3-706	8	10.8 – 13.3
11701101	013.8-706	8	11.3 – 13.8
11701102	014.0-706	8	11.5 – 14
11701108	014.5-706	8	12 – 14.5
11701062	014.8-706	8	12.3 – 14.8
11701109	015.3-706	8	12.8 – 15.3
11701063	015.7-706	8	13.2 – 15.7
11701103	016.2-706	8	13.7 – 16.2
11701119	016.6-706	8	14.1 – 16.6
11701110	016.8-706	8	14.3 – 16.8
11701064	017.0-706	8	14.5 – 17
11701065	017.5-706	8	15 – 17.5

Item No.	Ref. No.	Ear width inside (mm)	Size range (mm)
<b>Zinc-plated steel band</b>			
Band width 7 mm, thickness 0.6 mm (706)			
11700583	011.9-706	8	9.4 – 11.9
11700584	012.3-706	8	9.8 – 12.3
11700585	012.8-706	8	10.3 – 12.8
11700586	013.3-706	8	10.8 – 13.3
11700587	013.8-706	8	11.3 – 13.8
11700588	014.0-706	8	11.5 – 14
11700568	014.5-706	8	12 – 14.5
11700589	014.8-706	8	12.3 – 14.8
11700569	015.3-706	8	12.8 – 15.3
11700570	015.7-706	8	13.2 – 15.7
11700571	016.2-706	8	13.7 – 16.2
11700572	016.6-706	8	14.1 – 16.6
11700590	016.8-706	8	14.3 – 16.8
11700591	017.0-706	8	14.5 – 17
11700573	017.5-706	8	15 – 17.5

## Order information 167

Item No.	Ref. No.	Ear width inside (mm)	Size range (mm)
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Band width 5 mm, thickness 0.5 mm (505R)

16702488	006.5-505R	4	5.3 – 6.5
16700001	007.0-505R	4	5.8 – 7
16700002	008.0-505R	4	6.8 – 8
16700003	008.7-505R	5.5	7 – 8.7
16702491	009.0-505R	5.5	7.3 – 9
16700004	009.5-505R	5.5	7.8 – 9.5
16700005	010.0-505R	5.5	8.3 – 10
16700006	010.5-505R	5.5	8.8 – 10.5
16702492	010.9-505R	5.5	9.2 – 10.9
16700007	011.3-505R	5.5	9.6 – 11.3
16700008	011.8-505R	5.5	10.1 – 11.8

Band width 7 mm, thickness 0.6 mm (706R)

16702951	011.9-706R	8	9.4 – 11.9
16700009	012.3-706R	8	9.8 – 12.3
16702493	012.8-706R	8	10.3 – 12.8
16700010	013.3-706R	8	10.8 – 13.3
16700011	013.8-706R	8	11.3 – 13.8
16700012	014.0-706R	8	11.5 – 14
16702864	014.2-706R	8	11.7 – 14.2
16700013	014.5-706R	8	12 – 14.5
16700014	014.8-706R	8	12.3 – 14.8
16700015	015.3-706R	8	12.8 – 15.3
16700016	015.7-706R	8	13.2 – 15.7
16702998	016.0-706R	8	13.5 – 16
16702494	016.2-706R	8	13.7 – 16.2
16702495	016.6-706R	8	14.1 – 16.6
16702496	016.8-706R	8	14.3 – 16.8
16700017	017.0-706R	8	14.5 – 17
16702497	017.5-706R	8	15 – 17.5
16700018	017.8-706R	10	14.6 – 17.8
16700019	018.0-706R	10	14.8 – 18
16700020	018.5-706R	10	15.3 – 18.5
16700110	019.2-706R	10	16 – 19.2
16702498	019.8-706R	10	16.6 – 19.8
16700024	021.0-706R	10	17.8 – 21
16700026	022.6-706R	10	19.4 – 22.6
16700028	023.5-706R	10	20.3 – 23.5
16700029	024.1-706R	10	20.9 – 24.1
16700031	025.6-706R	10	22.4 – 25.6
16700033	027.1-706R	10	23.9 – 27.1
16700035	028.6-706R	10	25.4 – 28.6
16702047	030.1-706R	10	26.9 – 30.1
16700039	030.8-706R	10	27.6 – 30.8
16700040	031.6-706R	10	28.4 – 31.6
16700042	033.1-706R	10	29.9 – 33.1
16700044	034.6-706R	10	31.4 – 34.6
16700046	036.1-706R	10	32.9 – 36.1
16700048	037.6-706R	10	34.4 – 37.6
16700050	038.1-706R	10	34.9 – 38.1
16700052	039.6-706R	10	36.4 – 39.6
16700053	041.0-706R	10	37.8 – 41

Item No.	Ref. No.	Ear width inside (mm)	Size range (mm)
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Band width 7 mm, thickness 0.6 mm (706R)

16700054	042.5-706R	10	39.3 – 42.5
16700055	044.0-706R	10	40.8 – 44
16700056	045.5-706R	10	42.3 – 45.5
16700057	047.0-706R	10	43.8 – 47
16700058	048.5-706R	10	45.3 – 48.5
16700059	050.0-706R	10	46.8 – 50
16700060	051.5-706R	10	48.3 – 51.5
16700061	053.0-706R	10	49.8 – 53
16700062	054.5-706R	10	51.3 – 54.5
16700063	056.0-706R	10	52.8 – 56
16700064	057.5-706R	10	54.3 – 57.5
16700065	059.0-706R	10	55.8 – 59
16700066	060.5-706R	10	57.3 – 60.5
16700067	062.0-706R	10	58.8 – 62
16700068	063.5-706R	10	60.3 – 63.5
16700069	065.0-706R	10	61.8 – 65
16700070	066.5-706R	10	63.3 – 66.5
16700071	068.0-706R	10	64.8 – 68
16700072	069.5-706R	10	66.3 – 69.5
16700073	071.0-706R	10	67.8 – 71
16700074	072.5-706R	10	69.3 – 72.5
16700075	074.0-706R	10	70.8 – 74
16700076	075.5-706R	10	72.3 – 75.5
16700077	077.0-706R	10	73.8 – 77
16700078	078.5-706R	10	75.3 – 78.5
16700079	080.0-706R	10	76.8 – 80
16700080	081.5-706R	10	78.3 – 81.5
16700081	083.0-706R	10	79.8 – 83
16700082	084.5-706R	10	81.3 – 84.5
16700083	086.0-706R	10	82.8 – 86
16700084	087.5-706R	10	84.3 – 87.5
16700085	089.0-706R	10	85.8 – 89
16700086	090.5-706R	10	87.3 – 90.5
16700087	092.0-706R	10	88.8 – 92
16700088	093.5-706R	10	90.3 – 93.5
16700089	095.0-706R	10	91.8 – 95
16700090	096.5-706R	10	93.3 – 96.5
16700091	098.0-706R	10	94.8 – 98
16700092	099.5-706R	10	96.3 – 99.5
16700093	101.0-706R	10	97.8 – 101
16700094	102.5-706R	10	99.3 – 102.5
16700095	104.0-706R	10	100.8 – 104
16700096	105.5-706R	10	102.3 – 105.5
16700097	107.0-706R	10	103.8 – 107
16700098	108.5-706R	10	105.3 – 108.5
16700099	110.0-706R	10	106.8 – 110
16700100	111.5-706R	10	108.3 – 111.5
16700101	113.0-706R	10	109.8 – 113
16700102	114.5-706R	10	111.3 – 114.5
16700103	116.0-706R	10	112.8 – 116
16700104	117.5-706R	10	114.3 – 117.5
16700105	119.0-706R	10	115.8 – 119
16700106	120.5-706R	10	117.3 – 120.5

## Order information 167

Item No.	Ref. No.	Ear width inside (mm)	Size range (mm)
Band width 9 mm, thickness 0.6 mm (906R)			
16706383	021.0-906R	10	17.8 – 21
16707693	022.6-906R	10	19.4 – 22.6
16707694	023.5-906R	10	20.3 – 23.5
16707695	024.1-906R	10	20.9 – 24.1
16707696	025.6-906R	10	22.4 – 25.6
16707533	027.1-906R	10	23.9 – 27.1
16707697	028.6-906R	10	25.4 – 28.6
16707698	030.1-906R	10	26.9 – 30.1
16707517	030.8-906R	10	27.6 – 30.8
16707488	031.6-906R	10	28.4 – 31.6
16703913	033.1-906R	10	29.9 – 33.1
16707641	034.6-906R	10	31.4 – 34.6
16704715	036.1-906R	10	32.9 – 36.1
16707494	037.6-906R	10	34.4 – 37.6
16707645	038.1-906R	10	34.9 – 38.1
16707306	039.6-906R	10	36.4 – 39.6
16707300	041.0-906R	10	37.8 – 41
16703914	042.5-906R	10	39.3 – 42.5
16707301	044.0-906R	10	40.8 – 44
16704719	045.5-906R	10	42.3 – 45.5
16707536	047.0-906R	10	43.8 – 47
16707479	048.5-906R	10	45.3 – 48.5
16707304	050.0-906R	10	46.8 – 50
16707480	051.5-906R	10	48.3 – 51.5
16707537	053.0-906R	10	49.8 – 53
16707477	054.5-906R	10	51.3 – 54.5
16707700	056.0-906R	10	52.8 – 56
16707701	057.5-906R	10	54.3 – 57.5
16707540	059.0-906R	10	55.8 – 59
16707372	060.5-906R	10	57.3 – 60.5
16707702	062.0-906R	10	58.5 – 62
16707703	063.5-906R	10	60.3 – 63.5
16707518	065.0-906R	10	61.8 – 65
16707542	066.5-906R	10	63.3 – 66.5
16707357	068.0-906R	10	64.8 – 68
16707688	069.5-906R	10	66.3 – 69.5
16707041	071.0-906R	10	67.8 – 71
16707704	072.5-906R	10	69.3 – 72.5
16707705	074.0-906R	10	70.8 – 74
16707404	075.5-906R	10	72.3 – 75.5
16703915	077.0-906R	10	73.8 – 77
16707366	078.5-906R	10	75.3 – 78.5
16707405	080.0-906R	10	76.8 – 80
16707543	081.5-906R	10	78.3 – 81.5
16707545	083.0-906R	10	79.8 – 83
16707706	084.5-906R	10	81.3 – 84.5
16707707	086.0-906R	10	82.8 – 86
16707708	087.5-906R	10	84.3 – 87.5
16707384	089.0-906R	10	85.8 – 89
16707710	090.5-906R	10	87.3 – 90.5
16707547	092.0-906R	10	88.8 – 92
16707325	093.5-906R	10	90.3 – 93.5
16703916	095.0-906R	10	91.8 – 95

Item No.	Ref. No.	Ear width inside (mm)	Size range (mm)
Band width 9 mm, thickness 0.6 mm (906R)			
16707548	096.5-906R	10	93.3 – 96.5
16707242	098.0-906R	10	94.8 – 98
16707711	099.5-906R	10	96.3 – 99.5
16707713	101.0-906R	10	97.8 – 101
16707714	102.5-906R	10	99.3 – 102.5
16707385	104.0-906R	10	100.8 – 104
16703918	105.5-906R	10	102.3 – 105.5
16707715	107.0-906R	10	103.8 – 107
16706709	108.5-906R	10	105.3 – 108.5
16707716	110.0-906R	10	106.8 – 110
16707717	111.5-906R	10	108.3 – 111.5
16707718	113.0-906R	10	109.8 – 113
16707719	114.5-906R	10	111.3 – 114.5
16707178	116.0-906R	10	112.8 – 116
16707179	117.5-906R	10	114.3 – 117.5
16707720	119.0-906R	10	115.8 – 119
16707276	120.5-906R	10	117.3 – 120.5

Available on request  
(Diameter graduation 0.5 mm)

Item No.	Ref. No.	Ear width inside (mm)	Size range (mm)
Band width 10 mm, thickness 0.8 (1008R)			
	On request	10	24.5 ... 120.5
Band width 10 mm, thickness 1.0 (1010R)			
	On request	10	62.0 ... 120.5

**360° StepLess® design**

Narrow band for concentrated compression  
Fast, simple and secure assembly  
Tamper-detectable design  
Requires only one assembly tool  
Conforms to ASTM F877/F2098

## StepLess® Ear Clamps PEX Series 167

PEX connecting solutions for markets compliant with Standard ASTM1 F877/F2098

**Material**

167 Stainless Steel, Material no. 1.4301/UNS S30400

**Corrosion resistance according to DIN EN ISO 9227**

167 ≥ 1000 h

**Standard PEX Series 167**

Diameter range	PEX tube	width x thickness
13.3 mm	3/8 inch	7 x 0.6 mm
17.5 mm	1/2 inch	7 x 0.8 mm
20.8 mm	5/8 inch	7 x 0.8 mm
23.3 mm	3/4 inch	9 x 0.8 mm
29.6 mm	1/1 inch	10 x 1.0 mm

**PEXGrip® Series 167**

Diameter range	PEX tube	width x thickness
17.5 mm	1/2 inch	7 x 0.8 mm
23.3 mm	3/4 inch	9 x 0.8 mm

**Field of application**

Oetiker StepLess® Ear Clamps 167 for PEX plumbing connections are suitable for ASTM F876 Polyethylene cross-linked PEX tubing with ASTM F1807/F2159 insert fittings. The clamp sizes are solely intended for PEX applications with corresponding inch sizes. The robust interlock design, specifically developed for PEX applications, provides high radial loads of the clamp.

The PEXGrip® Series 167 is preset to prevent the clamp from sliding. It grips the tube for easy assembly.



### International Standards

Oetiker Standard PEX Series 167 and PEXGrip® Series 167 comply with ASTM<sup>1</sup> F2098 stainless steel clamps for use with ASTM F1807 or F2159 insert fittings for PEX<sup>2</sup> tubing and are certified by NSF<sup>3</sup> to carry the cNSFus-PW mark:

<sup>1</sup> ASTM = American Society for Testing and Materials

<sup>2</sup> PEX = Polyethylene cross-linked

<sup>3</sup> NSF = National Sanitation Foundation

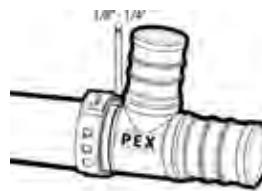
For additional information, please refer to ASTM International Standards Worldwide and the NSF Organization.

### Assembly instructions

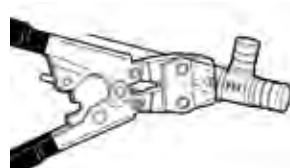
Clamps must be completely closed for the correct assembly of the Oetiker PEX clamp with PEX tubing. Oetiker's ratchet pincers for assembly of PEX clamps are F2098 compliant and will only release when the clamp is fully closed. For proper assembly, use the Oetiker recommended tool.

#### Warning:

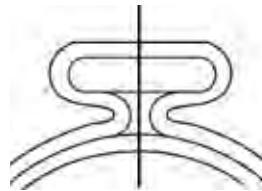
- In high chloride water conditions, use only plastic fittings
- Do not install in contact with concrete
- Use only ASTM F1807 or F2159 insert fittings with Oetiker F2098 clamps



The recommended distance (dimension) between the "Clamp" and "End of the Tube" is 1/8"-1/4".



Slip clamp over tubing and then close clamp ear with tool, tool will not release until clamp is fully closed.



Visually inspect clamp for correct closed ear form.

### Assembly data

PEX tube (inch <sup>4</sup> )	Material dimensions (mm)	Clamp size (mm)	Closing force max. (N)	Assembly tools not force-monitored, manual <sup>5</sup>	Assembly tools force-monitored <sup>5</sup> :
					Pneumatic      Cordless
3/8	7 x 0.6	13.3	2200	2-Handle Ratchet Pincer and 3-Handle Ratchet Pincer	HO 3000 ME      CP 10
1/2	7 x 0.8	17.5	3900	2-Handle Ratchet Pincer 3-Handle Ratchet Pincer	HO 5000 ME      CP 20
5/8	7 x 0.8	20.8	3900	2-Handle Ratchet Pincer and 3-Handle Ratchet Pincer	HO 5000 ME      CP 20
3/4	9 x 0.8	23.3	5000	2-Handle Ratchet Pincer and 3-Handle Ratchet Pincer	HO 5000 ME      CP 20
1	10 x 1.0	29.6	7000	2-Handle Ratchet Pincer and 3-Handle Ratchet Pincer	HO 5000 – 7000 ME      CP 20

<sup>4</sup> 1 inch = 25.4 mm

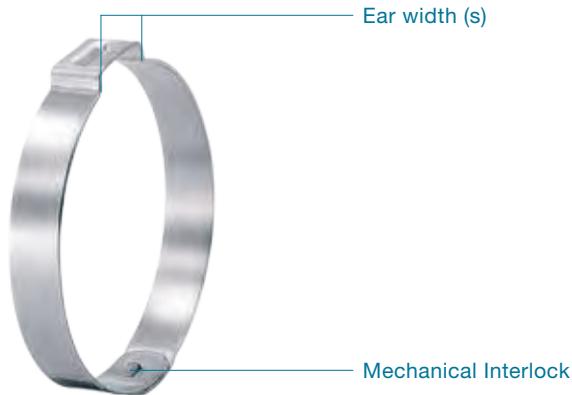
<sup>5</sup> Further information on page 130

#### Important note

The specifications of ASTM Standard F2098 must be met. When using force-monitored closing tools, the clamp must be verified as being correctly (completely) closed.

### Order information

Diameter Range	PEX tube	Band width x thickness	Standard PEX clamp item no.	PEXGrip® clamp item no.
13.3 mm	3/8 inch	7 x 0.6 mm	16703334	-
17.5 mm	1/2 inch	7 x 0.8 mm	16703335	16707872
20.8 mm	5/8 inch	7 x 0.8 mm	16705571	-
23.3 mm	3/4 inch	9 x 0.8 mm	16703336	16707955
29.6 mm	1 inch	10 x 1.0 mm	16704150	-



Clamp ear: **fast and simple assembly, visible deformation provides evidence of proper closure**

Dimple: **increases clamping force**

Burr-free strip edges: **reduced risk of damage to parts being clamped**

## 1-Ear Clamps with mechanical interlock 105 & 155

### Material

105 Galvanized or zinc-plated steel band

155 Stainless Steel, Material no. 1.4301/UNS S30400

### Corrosion resistance according to DIN EN ISO 9227

105 Zinc-plated steel band  $\geq 96$  h

105 Galvanized steel band  $\geq 144$  h

155  $\geq 1000$  h

### Series

Size range	width x thickness
------------	-------------------

10.5 – 116.0 mm	7.0 x 0.6/0.8 mm
-----------------	------------------

Some sizes are only available if an appropriate minimum quantity is ordered.

105 only available on request.

Using tools designed or endorsed by Oetiker, the clamp is closed by drawing together the lower radii of the "ear". The maximum diameter reduction is proportional to the open "ear" width. The theoretical maximum reduction in diameter is given by the formula:

$$\text{Max. diameter reduction} = \frac{\text{Ear width (s)}}{\pi}$$

To ensure perfect sealing, clamp ears must be correctly closed during assembly.

### Clamp diameter

The following applies as a guideline: To determine the correct clamp diameter, push the hose onto the attaching material, (e.g. the nipple), and then measure the outer diameter of the hose. Select a clamp whose average value of the diameter range is slightly greater than the hose's outer diameter.

### Mechanical interlock

The mechanical interlock is a mechanical connection which keeps the clamp securely closed. By using a mechanical interlock instead of spot-welding, corrosion around the closure elements is reduced.

**Assembly recommendations**

The clamp ear should be closed with a constant tool jaw force, this practice is referred to as "force priority closure". This assembly method ensures that a uniform and repeatable stress is applied to the application with a constant tensile force on the mechanical interlock.

Employing this methodology when closing 105 & 155 series clamps will compensate for any component tolerance variations, and ensure that the clamp applies a constant radial force to the application. Fluctuations in component tolerances are absorbed by variations in the "ear" gap (the space between the lower radii after assembly).

**Closing force**

It is important to realize that there is in a very close relationship between the desired compression of the material being clamped and the closing force selected. The table below gives maximum closing forces in relation to the size of the part being clamped.

**Important**

Single tool stroke closure only, do not apply secondary crimping force.

**Assembly data**

Size (mm)	Closing force max. (N)	Assembly tools force-monitored <sup>1</sup> :		
		Manual	Pneumatic	Cordless
10.5 – 17.0	1200	HMK 01/S01	HO 2000 ME	CP 10
18.5 – 116.0	2000	HMK 01/S01	HO 2000 ME	CP 10

For an alternative option, see our manual pincers on page 130

<sup>1</sup> Further information on page 108

**Important note**

These figures are intended as a guide, they may vary depending on the type and tolerances of parts being clamped. To ensure optimum clamp selection, we recommend making functional tests with several assemblies.

## Order information

Item No.	Ref. No.	Ear width inside (mm)	Size range (mm)
1-Ear Clamp with mechanical interlock, stainless Band width 7.0 mm, thickness 0.6 mm			
15500000	0105.0R	5	8.9 – 10.5
15500001	0113.0R	5	9.7 – 11.3
15500002	0123.0R	6	10.4 – 12.3
15500003	0133.0R	6	11.4 – 13.3
15500004	0135.0R	6.5	11.5 – 13.5
15500005	0138.0R	6	11.9 – 13.8
15500006	0140.0R	6.5	11.9 – 14
15500007	0145.0R	6	12.6 – 14.5
15500008	0157.0R	7	13.5 – 15.7
15500009	0170.0R	6	15.1 – 17
15500010	0185.0R	9	15.7 – 18.5
15500011	0198.0R	9	17 – 19.8
15500012	0210.0R	9	18.2 – 21
15500013	0226.0R	9	19.8 – 22.6
15500014	0241.0R	9	21.3 – 24.1
15500015	0256.0R	9	22.8 – 25.6
15500016	0271.0R	10	24 – 27.1
15500017	0286.0R	10	25.5 – 28.6
15500018	0301.0R	10	27 – 30.1
15500019	0316.0R	10	28.5 – 31.6
15500020	0331.0R	10	30 – 33.1
15500021	0346.0R	10	31.5 – 34.6
15500022	0361.0R	10	33 – 36.1
15500023	0376.0R	10	34.5 – 37.6
15500024	0381.0R	10	35 – 38.1
15500025	0396.0R	10	36.5 – 39.6

Item No.	Ref. No.	Ear width inside (mm)	Size range (mm)
1-Ear Clamp with mechanical interlock, stainless Band width 7.0 mm, thickness 0.6 mm			
15500026	0410.0R	10	37.9 – 41
15500027	0425.0R	10	39.4 – 42.5
15500028	0440.0R	10	40.9 – 44
15500029	0455.0R	10	42.4 – 45.5
15500030	0470.0R	10	43.9 – 47
15500031	0485.0R	10	45.4 – 48.5
15500032	0500.0R	10	46.9 – 50
15500033	0515.0R	10	48.4 – 51.5
15500034	0530.0R	10	49.9 – 53
15500035	0545.0R	10	51.4 – 54.5
15500036	0560.0R	10	52.9 – 56
15500037	0575.0R	10	54.4 – 57.5
15500038	0590.0R	10	55.9 – 59
15500039	0605.0R	10	57.4 – 60.5
15500040	0620.0R	10	58.9 – 62
15500041	0635.0R	10	60.4 – 63.5
15500042	0650.0R	10	61.9 – 65
15500043	0665.0R	10	63.4 – 66.5
15500044	0680.0R	10	64.9 – 68
15500045	0695.0R	10	66.4 – 69.5
15500046	0710.0R	10	67.9 – 71
15500047	0725.0R	10	69.4 – 72.5
15500048	0740.0R	10	70.9 – 74
15500049	0755.0R	10	72.4 – 75.5
15500050	0770.0R	10	73.9 – 77
15500051	0785.0R	10	75.4 – 78.5

## Order information

Item No.	Ref. No.	Ear width inside (mm)	Size range (mm)
1-Ear Clamp with mechanical interlock, stainless			
Band width 7.0 mm, thickness 0.6 mm			
15500052	0800.0R	10	76.9 – 80
15500053	0815.0R	10	78.4 – 81.5
15500054	0830.0R	10	79.9 – 83
15500055	0845.0R	10	81.4 – 84.5
15500056	0860.0R	10	82.9 – 86
15500057	0875.0R	10	84.4 – 87.5
15500058	0890.0R	10	85.9 – 89
15500059	0905.0R	10	87.4 – 90.5
15500060	0920.0R	10	88.9 – 92
15500061	0935.0R	10	90.4 – 93.5
15500062	0950.0R	10	91.9 – 95
15500063	0965.0R	10	93.4 – 96.5
15500064	0980.0R	10	94.9 – 98
15500065	0995.0R	10	96.4 – 99.5
15500066	1010.0R	10	97.9 – 101
15500067	1025.0R	10	99.4 – 102.5
15500101	1040.0R	10	100.9 – 104
15500068	1055.0R	10	102.4 – 105.5
15500102	1070.0R	10	103.9 – 107
15500103	1085.0R	10	105.4 – 108.5
15500104	1100.0R	10	106.9 – 110
15500105	1115.0R	10	108.4 – 111.5
15500106	1130.0R	10	109.9 – 113
15500107	1145.0R	10	111.4 – 114.5
15500069	1160.0R	10	112.9 – 116

109

159



Choice of engagement positions: clamp can be adjusted to several nominal diameters

Clamp ear: simple and fast assembly, visible deformation provides evidence of proper closure

Burr-free strip edges: reduced risk of damage to parts being clamped

Connecting technology: ideal for soft materials

## Adjustable Clamps 109, 159

### Material

109 Zinc-plated steel band

159 Stainless Steel, Material no. 1.4301/UNS S30400

### Corrosion resistance according to DIN EN ISO 9227

109 ≥ 96 h

159 ≥ 1000 h

### Adjustable Clamp 109

Size range	width x thickness
29.5 – 122.0 mm	7.0 x 0.8 mm
29.5 – 122.0 mm	9.0 x 0.8 mm

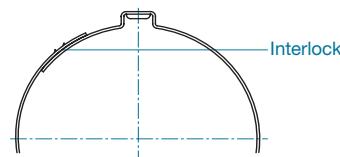
### Adjustable Clamp 159

Size range	width x thickness
25.0 – 50.0 mm	7.0 x 0.8 mm*
40.0 – 110.0 mm	7.0 x 0.8 mm*

\* Diameter range covered by a single clamp

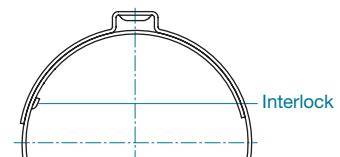
Some sizes are only available if an appropriate minimum quantity is ordered.

### 159 – Adjustable clamp:



Version with interlock outside may make assembly easier

### 109/159 – Adjustable clamps:



Version with interlock inside

### Clamp ear (closing element)

Using tools designed by Oetiker, the clamp is closed by drawing together the lower radii of the “ear”. The maximum diameter reduction is proportional to the open “ear” width (s). The theoretical maximum reduction in diameter is given by the formula:

$$\text{Max. diameter reduction} = \frac{\text{Ear width (s)}}{\pi}$$

### Multi-position interlock

The interlock consists of one or two load-retaining hooks that withstand tensile loading during closure and a lock tab designed to hold the hooks in their windows prior to closure. With both designs the interlock can be engaged in several positions within the published range. This feature allows a single part to cover a range of diameters.

### Assembly Recommendations

#### 109 & 159 – Adjustable Clamps

109 Adjustable Clamps are supplied pre-shaped and engaged at mid-diameter. 159 clamps are supplied flat. The clamp must be shaped prior to assembly. Each incremental step of the interlock reduces the diameter before closure by approximately 1.6 mm. The following assembly steps demonstrate how best to achieve an effective geometry.

The clamp ear of both variants should be closed with constant tool jaw force, this practice is referred to as “force priority closure”. This assembly method ensures that a uniform and repeatable stress is applied to the application with a constant tensile force on the mechanical interlock.

### Closing force

The closing force must be chosen to give the required material compression or surface pressure and should be qualified by dimensional evaluation and experiment. The resistance against the clamp equals the applied force, so the closing force is greatly reduced when compressing a soft material. The table below gives the maximum applied closing force for clamp and material dimensions.

### Important

Single tool stroke closure only, do not apply secondary crimping force.

### Assembly data

Material dimensions (mm)	Size (mm)	Closing force max. (N)	Assembly tools force-monitored <sup>1</sup> :		
			Manual	Pneumatic	Cordless
<b>109</b>					
7 x 0.8	29.5 – 122.0	1400	HMK 01/S01	HO 2000 ME	CP 10
9 x 0.8	29.5 – 122.0	1800	HMK 01/S01	HO 2000 ME	CP 10
<b>159</b>					
7 x 0.8	25.0 – 50.0	2400	HMK 01/S01	HO 3000 ME	CP 10
7 x 0.8	40.0 – 110.0	2400	HMK 01/S01	HO 3000 ME	CP 10

For an alternative option, see our manual pincers on page 130

<sup>1</sup> Further information on page 108

### Important note

These figures are intended as a guide, they may vary depending on the type and tolerances of parts being clamped. To ensure optimum clamp selection, we recommend making functional tests with several assemblies.

## Assembly instructions

159 – Version with interlock outside



**Step 1**  
Pre-shape clamp.



**Step 2**  
Determine the clamp length.



**Step 3**  
Cut off the remaining material.  
To avoid possible injury deburr  
cut edges with a file.



**Step 4**  
Place the clamp over object.  
Engage interlocking hooks in  
tightest window position.  
Firmly crimp the ear with  
Oetiker pincers.

159 – Version with interlock inside



**Step 1**  
Pre-shape clamp.



**Step 2**  
Determine the clamp length.  
Make sure the end of the  
clamp passes the "ear", as  
shown.



**Step 3**  
Cut off the remaining material.  
To avoid possible injury deburr  
cut edges with a file.



**Step 4**  
Place the clamp over object.  
Engage interlocking hooks in  
tightest window position.  
Firmly crimp the ear with  
Oetiker pincers.

## Order information

Item No.	Ref. size*	Diameter range (mm)	Diameter range (inch)
109			

Band width 7 mm, thickness 0.8 mm, Ear width 10 mm

10900012	29.5	24.5 – 29.5
10900016	34.2	29.5 – 36.0
10900018	42.3	36.0 – 45.5
10900020	55.1	45.5 – 61.5
10900022	74.3	61.5 – 85.5
10900014	106.1	85.5 – 122.0

Band width 9 mm, thickness 0.8 mm, Ear width 10 mm

10900013	29.5	24.5 – 29.5
10900017	34.2	29.5 – 36.0
10900019	42.3	36.0 – 45.5
10900021	55.1	45.5 – 61.5
10900023	74.3	61.5 – 85.5
10900015	106.1	85.5 – 122.0

\* Ref. size = Condition as supplied:  
Formed and engaged at the mid-diameter.

Item No.	Ref. size*	Diameter range (mm)	Diameter range (inch)
159			

Band width 7 mm, thickness 0.8 mm, Ear width 8.5 mm

Version with interlock outside			
15900002		25.0 – 50.0	
15900004		40.0 – 110.0	
Version with interlock inside			
15900005		25.0 – 50.0	
15900007		40.0 – 110.0	

\* Ref. size = Condition as supplied:  
Formed and engaged at the mid-diameter.

## 113 &amp; 163



Choice of engagement positions: **clamp can be adjusted to several nominal diameters**

Inner ring with radial guidance: **effective and powerful all-round sealing**

Clamp ear: **simple and fast assembly, visible deformation provides evidence of proper closure**

Burr-free strip edges: **reduced risk of damage to parts being clamped**

Connecting technology: **ideal for soft materials**

## Adjustable Clamps 113 & 163

### Material

113 Zinc-plated high-strength Steel, Material no. 1.0934

163 Stainless Steel, Material no. 1.4301/UNS S30400

### Corrosion resistance according to DIN EN ISO 9227

113 ≥ 96 h

163 ≥ 1000 h

### Series

Size range	width x thickness
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30.0 – 116.0 mm	7.0 x 0.6 mm
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72.0 – 132.0 mm	9.0 x 0.6 mm
-----------------	--------------

Some sizes are only available if an appropriate minimum quantity is ordered.

## Clamp ear (closing element)

Using tools designed by Oetiker, the clamp is closed by drawing together the lower radii of the "ear". The maximum diameter reduction is proportional to the open "ear" width (s).

The theoretical maximum reduction in diameter is given by the formula:

$$\text{Max. diameter reduction} = \frac{\text{Ear width (s)}}{\pi}$$

## Multi-position interlock

The interlock consists of one or two load-retaining hooks that withstand tensile loading during closure and a lock tab designed to hold the hooks in their windows prior to closure. With both designs the interlock can be engaged in several positions within the published range. This feature allows a single part to cover a range of diameters.

## Radial guiding (self-aligning design)

A tab formed on the inner portion of the clamp locates in a slot in the outer band surface. During assembly and closure, the tab slides in the slot and so avoids any step around the inner circumference of the clamp.

## Assembly Recommendations

## 163 – Adjustable Clamps with radial guiding

The clamp can be assembled axially on the application prior to assembly or alternatively, radially around the assembled components. For either method, it is important that the hooks and lock tab are engaged in windows giving the smallest possible diameter, so that the maximum clearance between the assembled components and the inside diameter of the clamp before closure is no greater than 1.5 mm. Each incremental step of the interlock reduces the diameter before closure by 1.6 mm on the "3-step" series, and by 1.05 mm on the "6-step" design.

## Closing force

The closing force must be chosen to give the required material compression or surface pressure and should be qualified by dimensional evaluation and experiment. The resistance against the clamp equals the applied force, so the closing force is greatly reduced when compressing a soft material. The table below gives the maximum applied closing force for clamp and material dimensions.

## Important

Single tool stroke closure only, do not apply secondary crimping force.

## Assembly data

Material dimensions	Size (mm) (mm)	Closing force max. (N)	Assembly tools force-monitored <sup>1</sup> :			
			Manual	Pneumatic	Cordless	Electronically controlled
<b>113</b>						
7 x 0.6	30.0 – 116.0	1400	HMK 01/S01	HO 2000 ME	CP 10	HO 2000 EL
9 x 0.6	72.0 – 132.0	2200	HMK 01/S01	HO 2000 ME	CP 10	HO 2000 EL
<b>163</b>						
7 x 0.6	30.0 – 50.0	1800	HMK 01/S01	HO 2000 – 3000 ME	CP 10	HO 2000 – 3000 EL
7 x 0.6	56.0 – 116.0	2400	HMK 01/S01	HO 3000 ME	CP 10	HO 3000 EL
9 x 0.6	72.0 – 132.0	2800	-	HO 3000 ME	CP 10	HO 3000 EL

For an alternative option, see our manual pincers on page 130

<sup>1</sup> Further information on page 108

## Important note

These figures are intended as a guide, they may vary depending on the type and tolerances of parts being clamped. To ensure optimum clamp selection, we recommend making functional tests with several assemblies.

## Order information

Item No.	Ref. size*	Diameter range (mm)	Diameter range (inch)
113			

3 adjustment positions

Band width 7 mm, thickness 0.6 mm, Ear width 10 mm

11300020	30	23.6 – 30.0	0.929 – 1.181
11300000	32	25.6 – 32.0	1.008 – 1.260
11300001	35	28.6 – 35.0	1.126 – 1.378
11300002	37	30.6 – 37.0	1.205 – 1.457
11300003	40	33.6 – 40.0	1.323 – 1.575
11300004	45	38.6 – 45.0	1.520 – 1.772
11300021	50	43.6 – 50.0	1.717 – 1.969

6 adjustment positions

Band width 7 mm, thickness 0.6 mm, Ear width 10 mm

11300028	56	47.5 – 56.0	1.870 – 2.205
11300017	62	53.5 – 62.0	2.106 – 2.441
11300029	68	59.5 – 68.0	2.343 – 2.677
11300018	74	65.5 – 74.0	2.579 – 2.913
11300005	80	71.5 – 80.0	2.815 – 3.150
11300006	86	77.5 – 86.0	3.051 – 3.386
11300007	92	83.5 – 92.0	3.287 – 3.622
11300008	94	85.5 – 94.0	3.366 – 3.701
11300009	98	89.5 – 98.0	3.524 – 3.858
11300010	104	95.5 – 104.0	3.760 – 4.094
11300030	107	98.5 – 107.0	3.878 – 4.213
11300011	110	101.5 – 110.0	3.996 – 4.331
11300019	116	107.5 – 116.0	4.232 – 4.567

4 adjustment positions

Band width 9 mm, thickness 0.6 mm, Ear width 10 mm

11300022	72	64.0 – 72.0	2.520 – 2.835
11300023	78	70.0 – 78.0	2.756 – 3.071
11300024	84	76.0 – 84.0	2.992 – 3.307
11300012	90	82.0 – 90.0	3.228 – 3.543
11300013	96	88.0 – 96.0	3.465 – 3.780
11300014	102	94.0 – 102.0	3.701 – 4.016
11300015	108	100.0 – 108.0	3.937 – 4.252
11300016	114	106.0 – 114.0	4.173 – 4.488
11300025	120	112.0 – 120.0	4.409 – 4.724
11300026	126	118.0 – 126.0	4.645 – 4.961
11300027	132	124.0 – 132.0	4.882 – 5.197

\* Ref. size = Condition as supplied:

Formed and engaged at the mid-diameter.

Item No.	Ref. size*	Diameter range (mm)	Diameter range (inch)
163			

3 adjustment positions

Band width 7 mm, thickness 0.6 mm, Ear width 10 mm

16300022	30	23.6 – 30.0	0.929 – 1.181
16300179	32	25.6 – 32.0	1.008 – 1.260
16300023	35	28.6 – 35.0	1.126 – 1.378
16300251	37	30.6 – 37.0	1.205 – 1.457
16300024	40	33.6 – 40.0	1.323 – 1.575
16300025	45	38.6 – 45.0	1.520 – 1.772
16300026	50	43.6 – 50.0	1.717 – 1.969

6 adjustment positions

Band width 7 mm, thickness 0.6 mm, Ear width 10 mm

16300027	56	47.5 – 56.0	1.870 – 2.205
16300028	62	53.5 – 62.0	2.106 – 2.441
16300029	68	59.5 – 68.0	2.343 – 2.677
16300030	74	65.5 – 74.0	2.579 – 2.913
16300031	80	71.5 – 80.0	2.815 – 3.150
16300032	86	77.5 – 86.0	3.051 – 3.386
16300033	92	83.5 – 92.0	3.287 – 3.622
16300051	94	85.5 – 94.0	3.366 – 3.701
16300034	98	89.5 – 98.0	3.524 – 3.858
16300035	104	95.5 – 104.0	3.760 – 4.094
16300250	107	98.5 – 107.0	3.878 – 4.213
16300036	110	101.5 – 110.0	3.996 – 4.331
16300037	116	107.5 – 116.0	4.232 – 4.567

4 adjustment positions

Band width 9 mm, thickness 0.6 mm, Ear width 10 mm

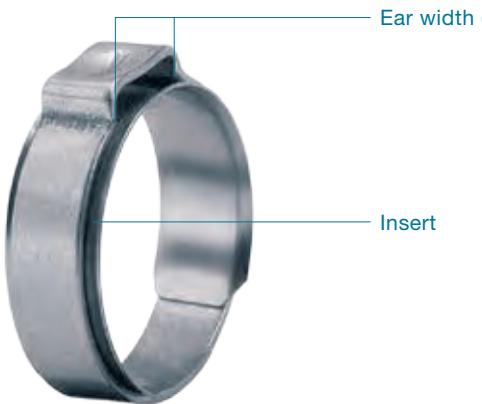
16300038	72	64.0 – 72.0	2.520 – 2.835
16300039	78	70.0 – 78.0	2.756 – 3.071
16300040	84	76.0 – 84.0	2.992 – 3.307
16300041	90	82.0 – 90.0	3.228 – 3.543
16300042	96	88.0 – 96.0	3.465 – 3.780
16300043	102	94.0 – 102.0	3.701 – 4.016
16300044	108	100.0 – 108.0	3.937 – 4.252
16300046	114	106.0 – 114.0	4.173 – 4.488
16300045	120	112.0 – 120.0	4.409 – 4.724
16300053	126	118.0 – 126.0	4.645 – 4.961
16300129	132	124.0 – 132.0	4.882 – 5.197

\* Ref. size = Condition as supplied:

Formed and engaged at the mid-diameter.

153

154



Compact one-piece clamp: **for robust, secure connections, miniature sizes**

**Clamp ear:** **fast and simple assembly, visible deformation provides evidence of proper closure**

**Deburred edges:** **reduced risk of damage to parts being clamped**

**154 with pre-shaped insert:** **effective and powerful all-round seal**

## 1-Ear Clamps 153 & 154

### Material

153 **Stainless Steel, Material no. 1.4307/UNS S30403**

154 **Clamp: Stainless Steel, Material no. 1.4307/ UNS S30403**

**Insert:** **Stainless Steel, Material no. 1.4310/UNS S30100**

### Corrosion resistance according to DIN EN ISO 9227

153  $\geq 800$  h

154  $\geq 800$  h

### Size range

153 3.3 – 30.7 mm

154 2.9 – 30.0 mm

Some sizes are only available if an appropriate minimum quantity is ordered.

### Process

The manufacturing process for Oetiker 1-Ear and 2-Ear Clamps commences with the spiral roll-forming and welding of raw material into lengths of tube, a technique developed to obtain a robust, continuous welded ring.

### Oetiker 1-Ear Clamps with insert

This type of clamp combines the geometry and properties of the 1-Ear Clamp with an insert made of stainless steel.

These clamps are ideal for demanding applications involving soft or hard rubbers and plastics. The thin-walled insert ring (up to 0.3 mm thick), with an oval protrusion that locates in the ear space, bridges the ear gap and ensures almost uniform compression around the whole circumference of a clamp.

### Edge condition

Burrs generated during the shearing and forming processes are entirely eliminated in a barrel-finishing operation.

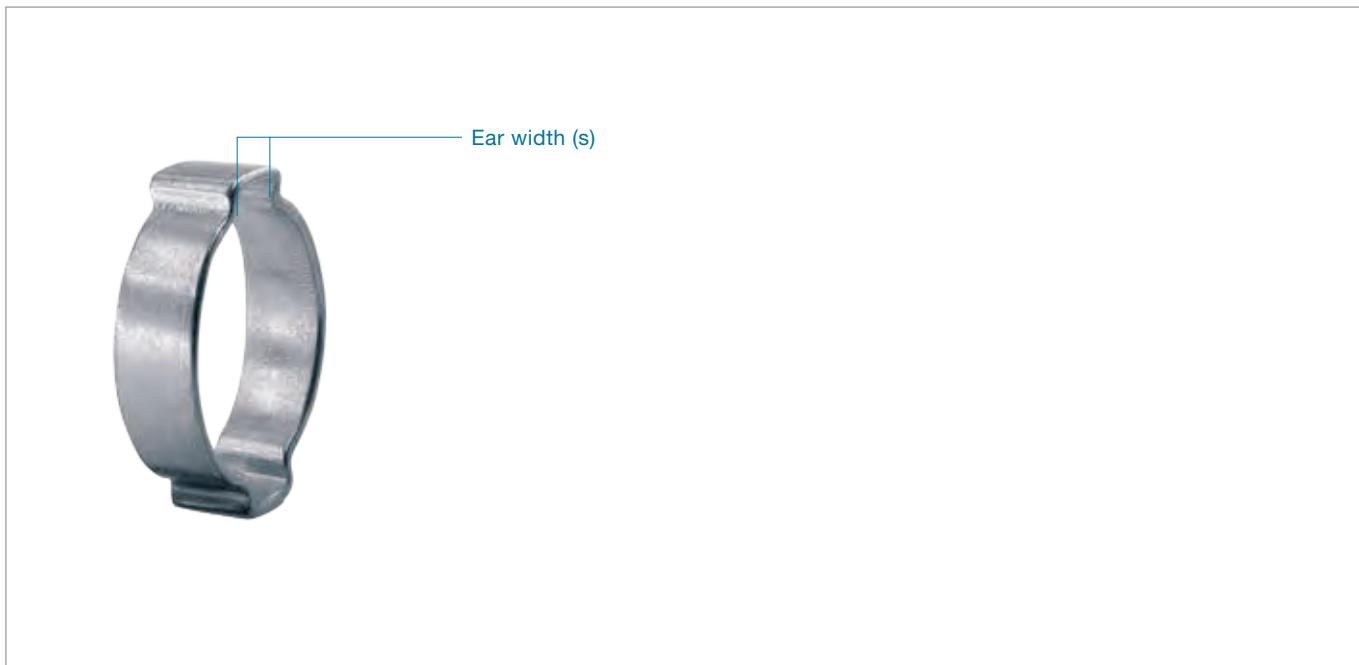
### Clamp ear (closing element)

Using tools designed or endorsed by Oetiker, the clamp is closed by drawing together the lower radii of the "ear". The maximum diameter reduction is proportional to the open "ear" width. The maximum reduction in diameter is given by the formula:

$$\text{Max. diameter reduction} = \frac{\text{Ear width (s)}}{\pi}$$

### Important

Single tool stroke closure only, do not apply secondary crimping force.



2-Ear version: **extended clamping range**

Compact one-piece clamp: **for robust, secure connections**

Clamp ear: **fast and simple assembly, visible deformation provides evidence of proper closure**

Deburred edges: **reduced risk of damage to parts being clamped**

## 2-Ear Clamps 101 & 151

### Material

101 Zinc-plated steel, Material no. 1.0338/SAE 1008/1010

151 Stainless Steel, Material no. 1.4307/UNS S30403

### Corrosion resistance according to DIN EN ISO 9227

101 ≥ 96 h

151 ≥ 800 h

### Size range

4.1 – 46.0 mm

Some sizes are only available if an appropriate minimum quantity is ordered.

### Oetiker 2-Ear Clamps

The ears of these clamps do not have a dimple and nearly double the clamping range, compared to the 1-Ear Clamp. 2 ears provide a degree of elasticity to accommodate changes in size of the parts being joined, such as that which may be caused by thermal expansion or vibration.

Assembly techniques are similar to those for 1-Ear Clamps, but the force applied when closing the second ear may react against

the opposing closed ear and make a second crimping operation necessary. For perfect sealing, the ears must be adequately closed during assembly.

### Assembly recommendations

The ears of these clamps should be closed with the recommended, uniform force (known as force priority). This method will result in a constant, reproducible stress within the clamp material, without overloading either the clamp or the parts being assembled. The nominal diameter of the clamp should always be chosen so that, when assembled with the correct clamping force, the ears are almost closed. Complete process monitoring and 100% process documentation are available using the "Electronically Controlled Pneumatic Power Tool" Oetiker ELK.

### Closing force

The following table shows the maximum applied closing force for different material dimensions.

### Important

Single tool stroke closure only, do not apply secondary crimping force.

## Assembly data

Size (mm)	Closing force max. (N) galvanized stainless	Assembly tools force-monitored <sup>1</sup> :			
		Manual	Pneumatic	Cordless	Electronically controlled
<b>153</b>					
3.3 – 11.0	-	1400	HMK 01/S01	HO 2000 ME	CP 10
11.3 – 20.7	-	2300	HMK 01/S01	HO 3000 ME	CP 10
21.0 – 30.7	-	2800	-	HO 3000 ME	CP 10
<b>154</b>					
3.3 – 11.8	-	1500	HMK 01/S01	HO 2000 ME	CP 10
12.0 – 20.7	-	2500	HMK 01	HO 3000 ME	CP 10
21.0 – 30.7	-	3600	Clamping tool and Torque wrench	HO 4000 ME	CP 10
<b>101 &amp; 151</b>					
4.1 – 20.0	2200	2500	HMK 01/S01	HO 3000 ME	CP 10
22.0 – 46.0	3400	3600	Clamping tool and Torque wrench	HO 3000 ME	CP 10
					HO 4000 EL

For an alternative option, see our manual pincers on page 130

<sup>1</sup> Further information on page 108

## Important note

These figures are intended as a guide, they may vary depending on the type and tolerances of parts being clamped. To ensure optimum clamp selection, we recommend making functional tests with several assemblies.

## Order information

Item No.	Ref. No.	Ear width inside (mm)	Size range (mm)
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## 1-Ear Clamp, stainless

15300000	03.3R	1.4	2.9 – 3.3
15300001	03.5R	1.4	3 – 3.5
15300002	04.1R	2.5	3.3 – 4.1
15300054	04.6R	3	3.8 – 4.6
15300003	05.1R	3.2	4.1 – 5.1
15300055	05.6R	3.2	4.6 – 5.6
15300004	06.1R	3.2	5.1 – 6.1
15300005	06.6R	3.2	5.6 – 6.6
15300006	07.0R	3	6.1 – 7
15300007	07.5R	3.5	6.5 – 7.5
15300008	08.0R	4	6.8 – 8
15300009	08.3R	4	7.1 – 8.3
15300010	08.7R	4	7.5 – 8.7
15300011	09.0R	5	7.5 – 9
15300012	09.5R	5	8.1 – 9.5
15300013	10.0R	5	8.5 – 10
15300014	10.5R	5	9.1 – 10.5
15300015	11.0R	5.5	9.3 – 11
15300016	11.3R	5.5	9.6 – 11.3
15300017	11.8R	5.5	10.1 – 11.8
15300018	12.0R	6.5	10.1 – 12
15300019	12.3R	6.5	10.3 – 12.3
15300020	12.8R	6.5	10.8 – 12.8

Item No.	Ref. No.	Ear width inside (mm)	Size range (mm)
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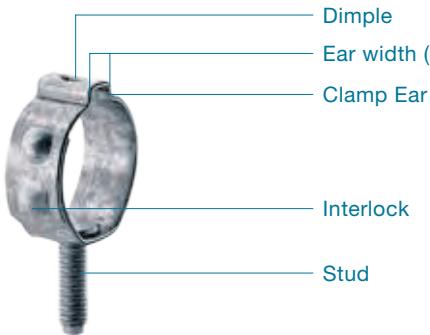
## 1-Ear Clamp, stainless

15300021	13.3R	6.5	11.3 – 13.3
15300022	13.8R	6.5	11.8 – 13.8
15300023	14.0R	6.5	12 – 14
15300024	14.5R	6.5	12.5 – 14.5
15300025	15.0R	6.5	13 – 15
15300026	15.5R	6.5	13.5 – 15.5
15300027	16.0R	7	13.8 – 16
15300028	16.5R	8	14 – 16.5
15300029	16.8R	7	14.6 – 16.8
15300030	17.5R	7	15.3 – 17.5
15300031	18.5R	7	16.3 – 18.5
15300032	19.5R	7.5	17.2 – 19.5
15300033	20.0R	7.5	17.7 – 20
15300034	20.7R	9	17.9 – 20.7
15300035	21.0R	7.5	18.7 – 21
15300036	21.8R	7.5	19.5 – 21.8
15300037	22.5R	8.5	19.9 – 22.5
15300038	23.5R	8.5	21 – 23.5
15300040	24.5R	9	21.7 – 24.5
15300041	25.5R	9	22.7 – 25.5
15300043	26.3R	8.5	23.6 – 26.3
15300044	27.0R	9.5	24.1 – 27
15300045	30.7R	11	27.2 – 30.7

## Order information

Item No.	Ref. No.	Ear width inside (mm)	Size range (mm)
<b>1-Ear Clamp with insert, stainless</b>			
15400010	03.3RER	1.4	2.5 – 2.9
15400011	03.5RER	1.4	2.7 – 3.1
15400012	04.1RER	2.5	2.9 – 3.7
15400063	04.6RER	3	3.4 – 4.2
15400013	05.1RER	3.2	3.7 – 4.7
15400064	05.6RER	3.2	4.2 – 5.2
15400014	06.1RER	3.2	4.7 – 5.7
15400015	06.6RER	3.2	5.2 – 6.2
15400016	07.0RER	3	5.6 – 6.5
15400017	07.5RER	3.5	5.9 – 7
15400018	08.0RER	4	6.3 – 7.5
15400019	08.3RER	4	6.6 – 7.8
15400020	08.7RER	4	7 – 8.2
15400021	09.0RER	5	7 – 8.5
15400022	09.5RER	5	7.5 – 9
15400023	10.0RER	5	8 – 9.5
15400024	10.5RER	5	8.5 – 10
15400025	11.0RER	5.5	8.8 – 10.5
15400026	11.3RER	5.5	9.1 – 10.8
15400027	11.8RER	5.5	9.6 – 11.3
15400028	12.0RER	6.5	9.5 – 11.5
15400029	12.3RER	6.5	9.8 – 11.8
15400030	12.8RER	6.5	10.3 – 12.3
15400031	13.3RER	6.5	10.6 – 12.6
15400032	13.8RER	6.5	11.1 – 13.1
15400033	14.0RER	6.5	11.3 – 13.3
15400034	14.5RER	6.5	11.8 – 13.8
15400035	15.0RER	6.5	12.3 – 14.3
15400036	15.5RER	6.5	12.8 – 14.8
15400037	16.0RER	7	13.1 – 15.3
15400038	16.5RER	8	13.2 – 15.8
15400039	16.8RER	7	13.9 – 16.1
15400040	17.5RER	7	14.6 – 16.8
15400041	18.5RER	7	15.6 – 17.8
15400042	19.5RER	7.5	16.5 – 18.8
15400043	20.0RER	7.5	17.1 – 19.3
15400044	20.7RER	9	17.1 – 20
15400045	21.0RER	7.5	18 – 20.3
15400046	21.8RER	7.5	18.8 – 21.1
15400065	22.5RER	8.5	19.2 – 21.8
15400048	23.5RER	8.5	20.2 – 22.8
15400049	24.5RER	9	21 – 23.8
15400050	25.5RER	9	22 – 24.8
15400051	26.3RER	8.5	23 – 25.6
15400052	27.0RER	9.5	23.3 – 26.3
15400053	30.7RER	11	26.5 – 30

Item No.	Ref. No.	Size range (mm)
<b>2-Ear Clamp, zinc-plated</b>		
10100000	0041	3.1 – 4.1
10100001	0045	3.5 – 4.5
10100002	0305	3.4 – 5
10100004	0507	5 – 7
10100008	0709	7 – 9
10100011	0811	8 – 11
10100016	1113	11 – 13
10100019	1315	12.5 – 15
10100022	1517	14 – 17
10100024	1518	15 – 18
10100097	1619	16 – 19
10100027	1720	16 – 20
10100029	1922	18 – 22
10100030	2023	19 – 23
10100032	2225	21 – 25
10100034	2327	22.5 – 27
10100035	2528	24 – 28
10100037	2731	26.3 – 31
10100041	3134	29.3 – 34
10100043	3437	32 – 37
10100045	3740	35 – 40
10100047	4043	37.6 – 43
10100049	4346	40.6 – 46
<b>2-Ear Clamp, stainless</b>		
15100000	0041R	3.1 – 4.1
15100001	0045R	3.5 – 4.5
15100002	0305R	3.4 – 5
15100003	0507R	5 – 7
15100004	0709R	7 – 9
15100023	0811R	8 – 11
15100006	1113R	11 – 13
15100007	1315R	12.5 – 15
15100008	1517R	14 – 17
15100009	1518R	15 – 18
15100010	1720R	16.2 – 20
15100011	1922R	18.1 – 22
15100012	2023R	19.1 – 23
15100013	2225R	21.1 – 25
15100014	2327R	22.5 – 27
15100015	2528R	24 – 28
15100016	2731R	26.3 – 31
15100018	3134R	29.3 – 34
15100019	3437R	32 – 37
15100020	3740R	35 – 40
15100021	4043R	37.6 – 43
15100022	4346R	40.6 – 46



**Secure:** reliable fixation of airbag inflators within occupant safety systems

**Cost effective:** allows a versatile alternative to attaching inflators, eliminating the need for custom brackets

**Space saving:** ear position of 180 or 45 degree offers easy assembly

**Flexible:** easily adjustable clamp positioning

**Made to measure:** various diameters available with M5 or M6 studs for standard size inflators

**Strong:** high strength low alloy material with high retention properties + good corrosion resistance

**Reliable assembly:** quick and easy assembly with process monitoring equipment

## 1-Ear Clamp with stud 103

For Occupant Safety Systems

### Material

103 Galvanized steel band

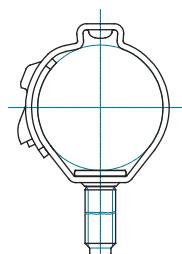
Corrosion resistance according to DIN EN ISO 9227

103 ≥ 72 h

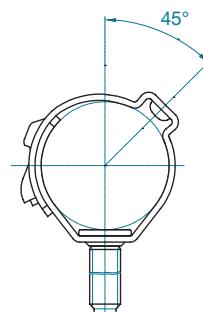
Size range	width x thickness	stud size
20.6 – 50.0 mm	10.0 x 1.0 mm	M5 and M6
20.6 – 50.0 mm	14.0 x 1.0 mm	M5 and M6

### Ear Positioning Options\*

1-Ear Clamp with stud,  
180° ear



1-Ear Clamp with stud,  
45° ear



\* For detailed ordering information please contact your local Oetiker branch

**Material**

The band of Oetiker 1-Ear Clamps with Stud are made from Galvan material. The studs are made from zinc-plated material.

**Band edge condition**

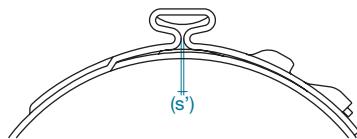
Stringent controls are maintained at the Oetiker strip process, conditioning the slit material and forming a machined or rolled edge radius. This process reduces the potential for damage caused by sharp or square edges, when the clamp compresses adjacent material.

**Clamp ear (closing element)**

Using tools designed or endorsed by Oetiker, the clamp is closed by drawing together the lower radii of the "ear". The maximum diameter reduction is proportionate to the open "ear" width (s).

The theoretical maximum reduction in diameter is given by the formula:

$$\text{Max. diameter reduction} = \frac{\text{Ear width (s)}}{\pi}$$



Note: the above sketch shows the appearance of a closed "ear" (s'); it does not necessarily indicate an effective closed assembly.

**Mechanical interlock**

The interlock is a mechanically jointed design for securing the clamp in the round condition.

**Ear design**

The integrated dimple in the ear effectively increases the clamping force and provides a spring effect when the diameter of the application contracts or expands due to thermal or mechanical influences.

**Stud torque**

The stud torque has to be adjusted individually.

**Assembly recommendations**

The clamp "ear" is deformed with a constant tool jaw force; this practice is referred to as "force priority closure". The assembly method assures that a uniform and repeatable stress is applied to the application in addition to a consistent tensile force on the clamp interlock. Employing this methodology when closing the 103 series clamp will compensate for any component tolerance variations, assuring that the clamp applies a constant radial force on the application. Fluctuations in component tolerances are absorbed by the changing "ear" gap (s'). Clamp assembly monitoring equipment and process data collection is available by incorporating the "Electronically Controlled Pneumatic Power Tool" Oetiker ELK within the assembly process.

**Order information**

For detailed order information, please contact your local Oetiker branch.

**Important**

Single tool stroke closure only, do not apply secondary crimping force.

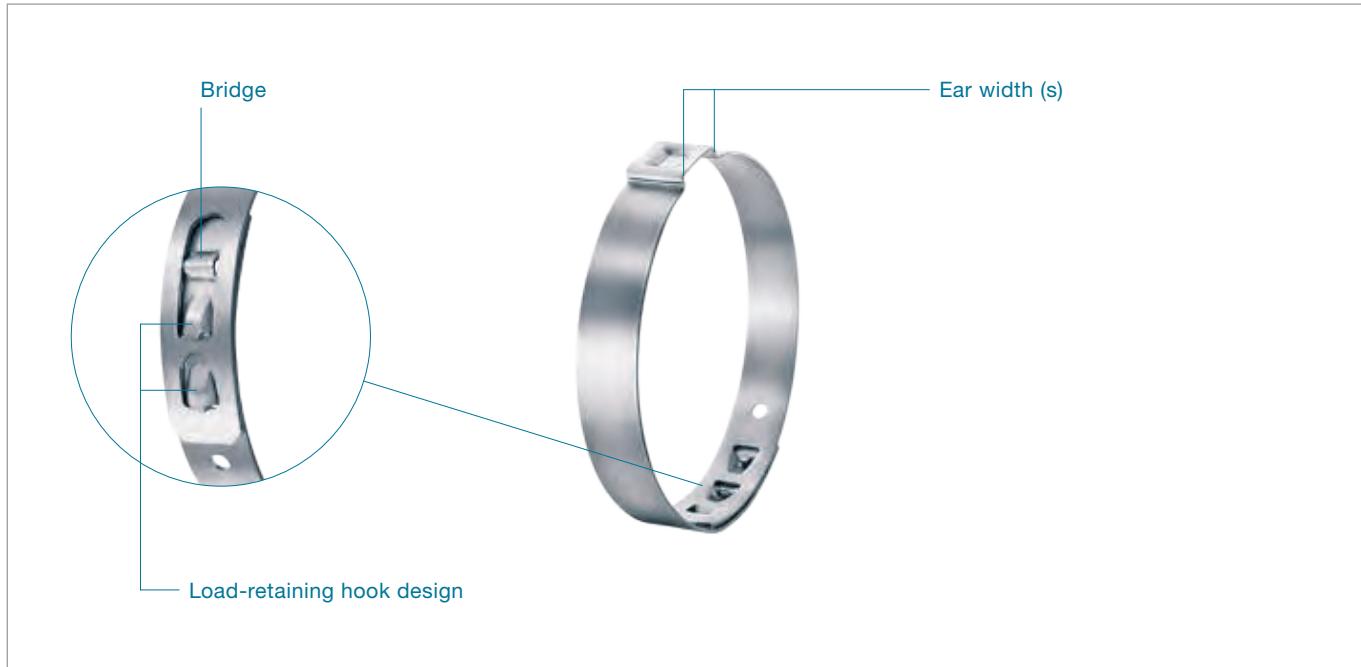
**Assembly data**

Material dimensions (mm)	Size (mm)	Stud	Closing force max. (N)		Recommended pneumatic pincer <sup>1</sup>	Recommended pincer heads	
			DX51D <sup>2</sup>	HX380LAD <sup>2, 3</sup>		EL	ME
10 x 1.0	20.6 – 50.0	M6	3450	4600	HO 5000 EL/ME	13900772	13900773
10 x 1.0	20.6 – 50.0	M5	3850	5000	HO 5000 EL/ME	13900772	13900773
14 x 1.0	20.6 – 50.0	M6	6000	7000	HO 7000 EL/ME	13900772	13900773
14 x 1.0	20.6 – 50.0	M5	6400	7400	HO 7000 EL/ME	13900772	13900773

<sup>1</sup> Further information on page 110

<sup>2</sup> Base steel material

<sup>3</sup> HX > 21.2 mm



Radial assembly: [open the clamp for axial and radial assembly with freedom of movement](#)

Quick closure: [simple, secure mounting, thanks to the form-fitting closure design](#)

Bridge: [to correctly mount the clamp](#)

Scale resistant stainless steel: [excellent strength and corrosion resistance at high temperatures](#)

Flexible: [available closed or prorounded.](#)

## 1-Ear Clamp SV 153

### Material

153 SV 18 SR<sup>TM</sup>, high oxidation resistance

### Corrosion resistance according to DIN EN ISO 9227

153 SV ≥ 400 h

Size range	width x thickness	ear width
40.0 – 150.0 mm	12.0 x 0.8 mm	13 mm

### Sizes

Diameter graduation 0.5 mm

Some sizes are only available if an appropriate minimum quantity is ordered.

### Material

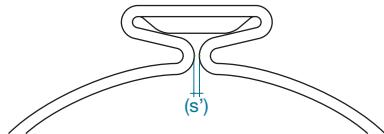
Oetiker 1-Ear Clamps SV are manufactured from stainless steel (18 SR<sup>TM</sup>), offering excellent heat resistance. The selected material is a good combination of toughness and durability, which represent the basic prerequisites for the assembly process of clamps.

### Clamp ear (closing element)

Using tools designed or endorsed by Oetiker, the clamp is closed by drawing together the lower radii of the “ear”. The maximum diameter reduction is proportionate to the open “ear” width (s).

The theoretical maximum reduction in diameter is given by the formula:

$$\text{Max. diameter reduction} = \frac{\text{Ear width (s)}}{\pi}$$



The representation makes no claim to full closure of the clamp ear(s), but only serves as a sketched visualization of a closed clamp.

The following applies as a guideline: To determine the correct clamp diameter, push the hose onto the attaching material, (e.g. the nipple) and then measure the outer diameter of the hose. The value of the outer diameter must be slightly above the average value of the diameter range of the clamp to be selected.

The clamp is only then sufficiently closed when the original ear width (s) is reduced by at least 50% and it has been ensured that the correctly defined closing force was used during assembly. Further details regarding the closing force, the functioning of the tolerance compensation, and constantly guaranteed roundness are described in the Section “Assembly Recommendations”.

### Bridge

In line with the error avoidance principle, the bridge prevents the clamp from being incorrectly mounted.

### Load-retaining hook design

The closure is a mechanical connecting element and serves to hold the clamp geometry together securely. The closure is designed so that the clamp can be opened before the device is closed for the purpose of radial assembly.

### Assembly Recommendations

The “clamp ear” should be closed with a recommended and uniform closing force – force priority. This ensures that the tension loading of the strip material remains permissible and consistently traceable, without overloading individual components, parts to be ligated, and clamps. The force priority assembly allows the tolerance compensation to remain functional during every closure and each radial force to remain approximately the same, based on the resulting size(s) of the ear gap, which changes depending on the component tolerances. Clamp installation monitoring and process data collection are available by incorporating the “Electronically Controlled Pneumatic Power Tool” Oetiker ELK in the assembly process.

### Closing force

As a matter of principle, the closing force selection is closely related to the desired retaining characteristics of the material to be assembled. In specific applications, it sometimes leads to a generous undercutting of the defined closing forces.

### Function

The 1-Ear Clamp SV is only suitable for applications with the required sealing function

### Order information

For detailed order information, please contact your local Oetiker branch.

### Important

Single tool stroke closure only, do not apply secondary crimping force.

### Assembly data

Material dimensions	Size (mm) (mm)	Closing force max. (N)	Assembly tools force-monitored <sup>1</sup> :	Manual	Pneumatic	Cordless	Electronically controlled
12 x 0.8	40.0 – 150.0	5000	Clamping tool and Torque wrench		HO 5000 ME	CP 20	HO 5000 EL

<sup>1</sup> Further information on page 108

### Important note

These figures are intended as a guide, they may vary depending on the type and tolerances of parts being clamped. To ensure optimum clamp selection, we recommend making functional tests with several assemblies.

# Low Profile Clamps

p. 60

ToothLock® Low Profile Clamp  
292

p. 64 / 68

StepLess® Low Profile Clamps with/  
without tolerance compensation  
168



## ToothLock® technology:

- + Very high and permanent compression
- + Superior radial load performance
- + Highly pressure and expansion resistant

## CrossTech®:

- + Ultra low profile design
- + Very low imbalance on rotating parts

## StepLess®:

- + Uniform compression
- + Powerful all-round seal
- + Withstands thermal stress, shock- and vibration-resistant

## Reusability:

- + Can be repeatedly opened and re-assembled

## Low assembled height:

- + Minimum space requirement
- + Minimal imbalance on rotating parts

## 360° StepLess®:

- + Uniform 360° compression and uniform surface pressure

## Tolerance compensation:

- + Provides a degree of compensation for component tolerances

Oetiker will be pleased to help you to find the correct choice for your application. Send sample parts and all relevant information for your specific application to Oetiker, and you will receive recommendations for product type, diameter, and method of assembly.

p.72

StepLess® Low Profile Clamp  
192

p. 76

Clamp ER  
194



Tolerance compensation elements:

- + Allow for variations in component tolerances and temperature variations

360° StepLess®:

- + Uniform 360° compression and uniform surface pressure

Novel tensioning hook design:

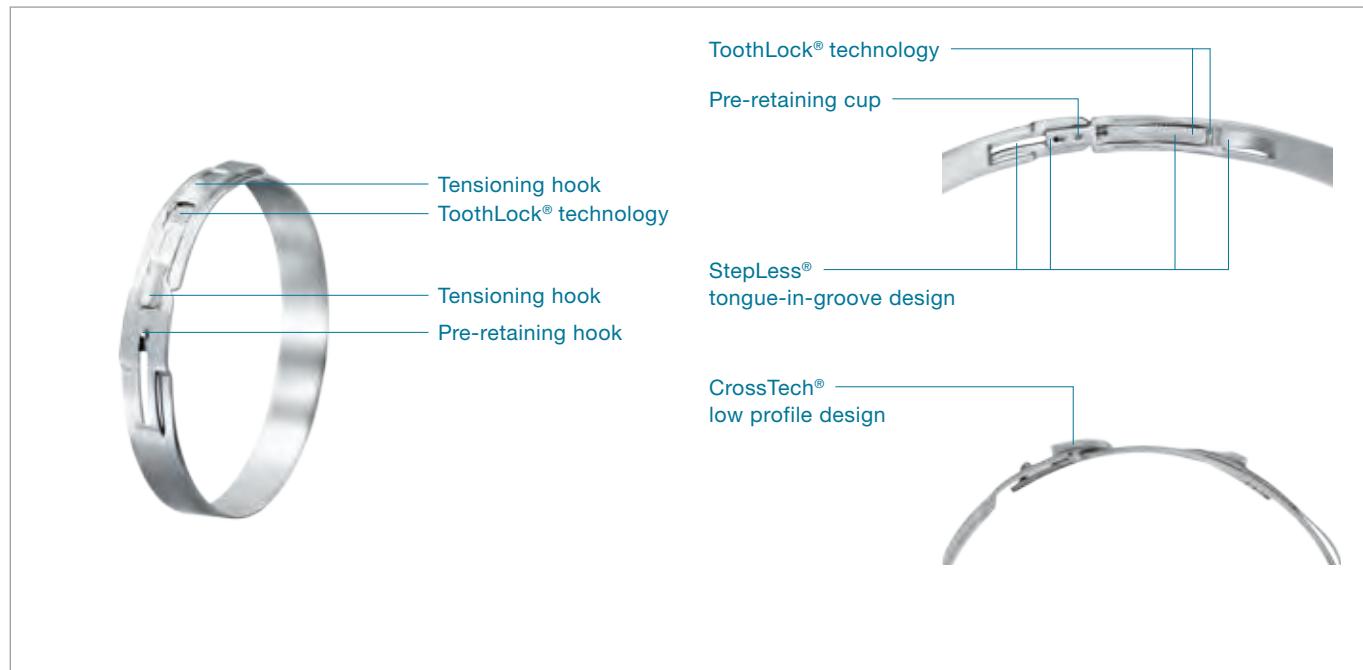
- + Fast and simple assembly
- + High radial forces

Compact:

- + Lightweight
- + Miniature sizes

Solid closure:

- + Fast and simple assembly
- + Safe connections for low pressure applications



**ToothLock® technology:** very high and permanent compression, superior radial load performance, highly pressure and expansion resistant

**CrossTech®:** ultra low profile design, very low imbalance on rotating parts

**StepLess®:** uniform compression, powerful all-round seal, withstands thermal stress, shock- and vibration-resistant

**Burr-free strip edges:** reduced risk of damage to parts being clamped

**Pre-retaining cup:** visual clamp closure verification

**Assembly-friendly and reliable:** extended diameter range, time-saving and process reliable assembly

## ToothLock® Low Profile Clamp 292

### Target applications

Drive shafts (CVJ boots made from TPE)

Other applications upon verification by Oetiker

### Material

Stainless Steel, Material no. 1.4301/UNS S30400

### Corrosion resistance according to DIN EN ISO 9227

≥ 1000 hours

### Size range

57.5 – 118.0 mm

width x thickness

10.0 x 1.0 mm

### Sizes

Diameter graduation 0.5 mm

Some sizes are only available if an appropriate minimum quantity is ordered.

### ToothLock®

Interlocked with its teeth, the distinctive ToothLock® feature offers extremely high and permanent compression rates and outstanding expansion resistance – strong enough for the toughest connections. It also resists shock and vibration and helps the clamp to

withstand thermal stress. The ToothLock® is designed as a self-locking mechanism that provides superior performance. With its multiple tooth-locking positions, it compensates for component tolerances.

### CrossTech®

The innovative CrossTech® feature is highly space-efficient and provides an ultra low profile design for a very low imbalance on rotating parts.

### Tensioning Hooks

The tensioning hooks are the features used to close the ToothLock® Low Profile Clamp. An Oetiker assembly tool engages both tensioning hooks, and reduces the clamp diameter until the predefined closing force is reached.

### Clamp Selection

ToothLock® Low Profile Clamp sizes are determined using the largest and smallest diameter in the working range. Ideally the compressed diameter of the parts being damped should be in the middle of the working range.

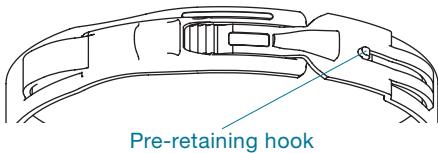
## Assembly

Closing position – visual clamp closure indicators

As supplied

The pre-retaining hook is engaged in the supplied condition.

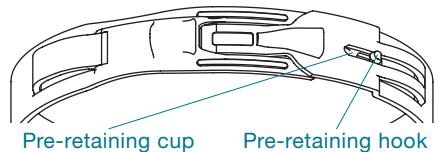
Teeth are visible.



Pre-retaining hook

Maximum diameter in working range

The pre-retaining cup becomes visible and the teeth are no longer visible.

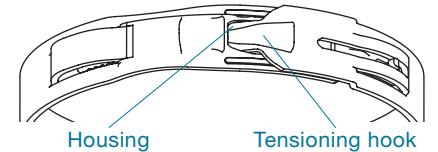


Pre-retaining cup

Pre-retaining hook

Minimum diameter in working range and nominal diameter

The tensioning hook is almost in contact with the housing.



Housing

Tensioning hook

Working range

The working range of the ToothLock® Low Profile Clamp is only functional between the minimum and the maximum diameter amounting to a 2.5 mm diameter range. The as supplied diameter is 4.2 mm larger than the minimum diameter, thus offering a large overall diameter range.

## Assembly Recommendations

This clamp can be installed using a manual clamping tool with torque wrench or with the Electronically Controlled Pneumatic Pincer – ELK 02 – for high volume installations as well as for process reliable installations. By using the ELK 02 complete process monitoring is available, including 100% data recording.

## Assembly Instructions

### Pincer jaws (cutaway)



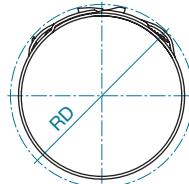
Tensioning hooks

To close a clamp, the pincer jaws must be engaged with both tensioning hooks. By operating either the ELK 02 or closing the manual pincer, the simultaneous movement of the two tensioning hooks reduces the diameter of the ToothLock® Low Profile Clamp.

## Rotation diameter

The rotation diameter (RD) of an assembled clamp can be a critical design parameter for applications that rotate in close proximity to adjacent components.

$$RD = \text{closed inside diameter} + 8.7 \text{ mm}$$



## Installation data

Material dimension	Size range	Maximum closing force	Installation tools force-monitored	
			Manual	Electronically controlled
10 x 1.0 mm	57.5 – 120.5 mm	3900 N	Clamping tool and torque wrench	HO EL 5000

## Important note

The closing force is intended as a guide, which may vary depending on the type and tolerances of parts being clamped. To ensure optimum clamp selection, we recommend conducting functional tests with several assemblies.

## Order information 292

Item No.	Ref. No.	As supplied-Ø (mm)	Working range (mm) Min.-Ø* Max.-Ø	Item No.	Ref. No.	As supplied-Ø (mm)	Working range (mm) Min.-Ø* Max.-Ø
29200000	057.5-1010R	61.7	57.5 – 60	29200092	080.5-1010R	84.7	80.5 – 83
29200002	058.0-1010R	62.2	58 – 60.5	29200094	081.0-1010R	85.2	81 – 83.5
29200004	058.5-1010R	62.7	58.5 – 61	29200096	081.5-1010R	85.7	81.5 – 84
29200006	059.0-1010R	63.2	59 – 61.5	29200098	082.0-1010R	86.2	82 – 84.5
29200008	059.5-1010R	63.7	59.5 – 62	29200100	082.5-1010R	86.7	82.5 – 85
29200010	060.0-1010R	64.2	60 – 62.5	29200102	083.0-1010R	87.2	83 – 85.5
29200012	060.5-1010R	64.7	60.5 – 63	29200104	083.5-1010R	87.7	83.5 – 86
29200014	061.0-1010R	65.2	61 – 63.5	29200106	084.0-1010R	88.2	84 – 86.5
29200016	061.5-1010R	65.7	61.5 – 64	29200108	084.5-1010R	88.7	84.5 – 87
29200018	062.0-1010R	66.2	62 – 64.5	29200110	085.0-1010R	89.2	85 – 87.5
29200020	062.5-1010R	66.7	62.5 – 65	29200112	085.5-1010R	89.7	85.5 – 88
29200022	063.0-1010R	67.2	63 – 65.5	29200114	086.0-1010R	90.2	86 – 88.5
29200024	063.5-1010R	67.7	63.5 – 66	29200116	086.5-1010R	90.7	86.5 – 89
29200026	064.0-1010R	68.2	64 – 66.5	29200118	087.0-1010R	91.2	87 – 89.5
29200028	064.5-1010R	68.7	64.5 – 67	29200120	087.5-1010R	91.7	87.5 – 90
29200030	065.0-1010R	69.2	65 – 67.5	29200122	088.0-1010R	92.2	88 – 90.5
29200032	065.5-1010R	69.7	65.5 – 68	29200124	088.5-1010R	92.7	88.5 – 91
29200034	066.0-1010R	70.2	66 – 68.5	29200126	089.0-1010R	93.2	89 – 91.5
29200036	066.5-1010R	70.7	66.5 – 69	29200128	089.5-1010R	93.7	89.5 – 92
29200038	067.0-1010R	71.2	67 – 69.5	29200130	090.0-1010R	94.2	90 – 92.5
29200040	067.5-1010R	71.7	67.5 – 70	29200132	090.5-1010R	94.7	90.5 – 93
29200042	068.0-1010R	72.2	68 – 70.5	29200134	091.0-1010R	95.2	91 – 93.5
29200044	068.5-1010R	72.7	68.5 – 71	29200136	091.5-1010R	95.7	91.5 – 94
29200046	069.0-1010R	73.2	69 – 71.5	29200138	092.0-1010R	96.2	92 – 94.5
29200048	069.5-1010R	73.7	69.5 – 72	29200140	092.5-1010R	96.7	92.5 – 95
29200050	070.0-1010R	74.2	70 – 72.5	29200142	093.0-1010R	97.2	93 – 95.5
29200052	070.5-1010R	74.7	70.5 – 73	29200144	093.5-1010R	97.7	93.5 – 96
29200054	071.0-1010R	75.2	71 – 73.5	29200146	094.0-1010R	98.2	94 – 96.5
29200056	071.5-1010R	75.7	71.5 – 74	29200148	094.5-1010R	98.7	94.5 – 97
29200058	072.0-1010R	76.2	72 – 74.5	29200150	095.0-1010R	99.2	95 – 97.5
29200060	072.5-1010R	76.7	72.5 – 75	29200152	095.5-1010R	99.7	95.5 – 98
29200062	073.0-1010R	77.2	73 – 75.5	29200154	096.0-1010R	100.2	96 – 98.5
29200064	073.5-1010R	77.7	73.5 – 76	29200156	096.5-1010R	100.7	96.5 – 99
29200066	074.0-1010R	78.2	74 – 76.5	29200158	097.0-1010R	101.2	97 – 99.5
29200068	074.5-1010R	78.7	74.5 – 77	29200160	097.5-1010R	101.7	97.5 – 100
29200070	075.0-1010R	79.2	75 – 77.5	29200162	098.0-1010R	102.2	98 – 100.5
29200072	075.5-1010R	79.7	75.5 – 78	29200164	098.5-1010R	102.7	98.5 – 101
29200074	076.0-1010R	80.2	76 – 78.5	29200166	099.0-1010R	103.2	99 – 101.5
29200076	076.5-1010R	80.7	76.5 – 79	29200168	099.5-1010R	103.7	99.5 – 102
29200078	077.0-1010R	81.2	77 – 79.5	29200170	100.0-1010R	104.2	100 – 102.5
29200080	077.5-1010R	81.7	77.5 – 80	29200172	100.5-1010R	104.7	100.5 – 103
29200082	078.0-1010R	82.2	78 – 80.5	29200174	101.0-1010R	105.2	101 – 103.5
29200084	078.5-1010R	82.7	78.5 – 81	29200176	101.5-1010R	105.7	101.5 – 104
29200086	079.0-1010R	83.2	79 – 81.5	29200178	102.0-1010R	106.2	102 – 104.5
29200088	079.5-1010R	83.7	79.5 – 82	29200180	102.5-1010R	106.7	102.5 – 105
29200090	080.0-1010R	84.2	80 – 82.5	29200182	103.0-1010R	107.2	103 – 105.5

The data in this catalog are based on many years experience. They are intended for reference, not as design specifications.

Item No.	Ref. No.	As supplied- Ø (mm)	Working range (mm) Min.-Ø* Max.-Ø
29200184	103.5-1010R	107.7	103.5 – 106
29200186	104.0-1010R	108.2	104 – 106.5
29200188	104.5-1010R	108.7	104.5 – 107
29200190	105.0-1010R	109.2	105 – 107.5
29200192	105.5-1010R	109.7	105.5 – 108
29200194	106.0-1010R	110.2	106 – 108.5
29200196	106.5-1010R	110.7	106.5 – 109
29200198	107.0-1010R	111.2	107 – 109.5
29200200	107.5-1010R	111.7	107.5 – 110
29200202	108.0-1010R	112.2	108 – 110.5
29200204	108.5-1010R	112.7	108.5 – 111
29200206	109.0-1010R	113.2	109 – 111.5
29200208	109.5-1010R	113.7	109.5 – 112
29200210	110.0-1010R	114.2	110 – 112.5
29200212	110.5-1010R	114.7	110.5 – 113
29200214	111.0-1010R	115.2	111 – 113.5
29200216	111.5-1010R	115.7	111.5 – 114
29200218	112.0-1010R	116.2	112 – 114.5
29200220	112.5-1010R	116.7	112.5 – 115
29200222	113.0-1010R	117.2	113 – 115.5
29200224	113.5-1010R	117.7	113.5 – 116
29200226	114.0-1010R	118.2	114 – 116.5
29200228	114.5-1010R	118.7	114.5 – 117
29200230	115.0-1010R	119.2	115 – 117.5
29200232	115.5-1010R	119.7	115.5 – 118
29200234	116.0-1010R	120.2	116 – 118.5
29200236	116.5-1010R	120.7	116.5 – 119
29200238	117.0-1010R	121.2	117 – 119.5
29200240	117.5-1010R	121.7	117.5 – 120
29200242	118.0-1010R	122.2	118 – 120.5

## Assembly Tools

## Manual

Clamping tool 292

Item No. 14100378

Torque wrench

Item No. 14100098



## Force-monitored: Electronically controlled

HO 5000 ELT w/o pincer head

Item No. 13900339

HO 5000 EL w/o pincer head

Item No. 13900234

Pincer head HO-10.5-32.3-77° EL

Item No. 13900847

Replacement-jaw kit

Item No. 13900848

Calibration set

Item No. 13900942



\* Min.-Ø = Nominal-Ø diameter marked on clamp



**Reusability:** can be repeatedly opened and re-assembled

**360° StepLess®:** uniform 360° compression and constant surface pressure

**Low assembled height:** minimum space requirement, low imbalance on rotating parts

**Load retaining hooks:** visual indication that clamp is correctly assembled

**Burr-free strip edges:** reduced risk of damage to parts being clamped

## StepLess® Low Profile Clamp 168

### Material

168 Stainless steel, Material no. 1.4301 or UNS S30400

Alternative materials available on request.

### Corrosion resistance according to DIN EN ISO 9227

168 ≥ 1000 h

### Series

Nominal diameter	width x thickness
10.5 – 19.0 mm	9.0 x 0.5 mm
19.5 – 110.0 mm	7.0 x 0.6 mm
25.0 – 110.0 mm	9.0 x 0.6 mm
60.0 – 120.5 mm	10.0 x 0.6 mm

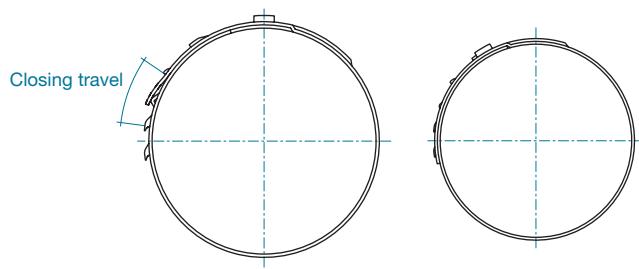
Some sizes are only available if an appropriate minimum quantity is ordered.

StepLess® Low Profile Clamps are produced in several nominal widths and thicknesses. The dimensions of the material used for the standard range are determined taking into account the required radial force, the nature of the application and the need to maintain sealing and/or retaining properties under the specified conditions and environmental exposure. When selecting the clamp diameter, the dimensions of the mating components on which the clamp is to be assembled must be accurately established to enable effective clamping performance. The durometer hardness of the soft material and the desired compression are important factors when calculating the appropriate clamp diameter.

### Tensioning hook and tunnel

With the use of an Oetiker assembly tool, the clamp is reduced in diameter until the interlock position is achieved. The diameter reduction of the clamp is proportional to the closing travel. The theoretical maximum reduction in diameter is given by the formula:

$$\text{Max. diameter reduction} = \frac{\text{Closing travel}}{\pi}$$



#### Assembly Recommendations

Using a hand tool, or a pneumatic tool specifically designed for high volume production, locate the jaw tips in the tensioning hook and tunnel.

Activating the pneumatic tool, or closing the hand tool, simultaneously draws the two features together, reducing the inside diameter of the clamp. To maintain this reduced diameter, the apertures are depressed over the load retaining hooks and the applied load exerted by the tool is released, so that the hooks engage in the appropriate apertures.

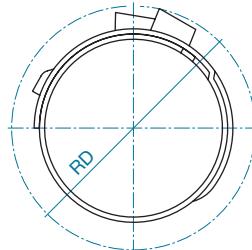
The StepLess® Low Profile Clamp provides a constant, accurate, inside diameter after assembly, but, unlike StepLess® Ear Clamps 167, will not compensate for variations in component tolerance or accommodate the effects of thermal expansion.

The sealing pressure beneath the clamp is dependent on the compression factor established when determining the appropriate clamp diameter and the resistance to thermal "set" of the soft material.

Complete process monitoring, including 100% documentation is available using the Electronically controlled pneumatic power tool Oetiker ELK (see chapter Assembly Tools).

#### Rotation diameter

The rotation diameter (RD) of an assembled clamp can be critical design information for applications that rotate in close proximity to adjacent components. The following list gives rotation diameters for various band sizes and product designs:



RD for 905RWV = inside diameter +7.2 mm

RD for 706R = inside diameter +6.0 mm

RD for 906R = inside diameter +6.0 mm

RD for 1006R = inside diameter +6.3 mm

#### Reuseability

Oetiker StepLess® Low Profile Clamps are reusable. They can be repeatedly opened and re-assembled – for example in the automotive industry at maintenance and service intervals. They can be assembled both axially and radially.

#### Note on ordering

In contrast to ear clamps, StepLess® Low Profile Clamps are identified with the nominal closed diameter, e.g. 195 for a closed and assembled diameter of 19.5 mm.

Material dimensions	Manual pincer*	Recommended pneumatic pincer**
9 x 0.5 mm	14100030	HO 3000
7 x 0.6 mm	14100030	HO 3000
9 x 0.6 mm	14100030	HO 3000
10 x 0.6 mm	14100030	HO 3000

\* 14100030 Manual pincer for StepLess® Low Profile Clamps 7 mm, 9 mm and 10 mm wide

\*\* With appropriate pincer head

## Order information

Item No.	Ref. No.	Ø upon delivery (mm)	Ø nominal, closed (mm)
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Band width 9 mm, thickness 0.5 mm (905RWV)

16800561	0105-905RWV	13.3	10.5
16800562	0110-905RWV	13.8	11
16800563	0115-905RWV	14.3	11.5
16800564	0120-905RWV	14.8	12
16800565	0125-905RWV	15.3	12.5
16800566	0130-905RWV	15.8	13
16800567	0135-905RWV	16.3	13.5
16800568	0140-905RWV	16.8	14
16800569	0145-905RWV	17.3	14.5
16800570	0150-905RWV	17.8	15
16800571	0155-905RWV	18.3	15.5
16800572	0160-905RWV	18.8	16
16800573	0165-905RWV	19.3	16.5
16800574	0170-905RWV	19.8	17
16802321	0175-905RWV	20.3	17.5
16800575	0180-905RWV	20.8	18
16803070	0185-905RWV	21.3	18.5
16800576	0190-905RWV	21.8	19

Band width 7 mm, thickness 0.6 mm (706R)

16800278	0600-706R	64.4	60
16800279	0605-706R	64.9	60.5
16800281	0610-706R	65.4	61
16800282	0615-706R	65.9	61.5
16800283	0620-706R	66.4	62
16800284	0625-706R	66.9	62.5
16800285	0630-706R	67.4	63
16800286	0635-706R	67.9	63.5
16800287	0640-706R	68.4	64
16800288	0645-706R	68.9	64.5
16800289	0650-706R	69.4	65
16800290	0655-706R	69.9	65.5
16800291	0660-706R	70.4	66
16800292	0665-706R	70.9	66.5
16800293	0670-706R	71.4	67
16800294	0675-706R	71.9	67.5
16800295	0680-706R	72.4	68
16800296	0685-706R	72.9	68.5
16800297	0690-706R	73.4	69
16800298	0695-706R	73.9	69.5
16800299	0700-706R	74.4	70
16800300	0705-706R	74.9	70.5
16800301	0710-706R	75.4	71
16800302	0715-706R	75.9	71.5
16800303	0720-706R	76.4	72
16800304	0725-706R	76.9	72.5
16800305	0730-706R	77.4	73
16800306	0735-706R	77.9	73.5
16800307	0740-706R	78.4	74
16800308	0745-706R	78.9	74.5
16800309	0750-706R	79.4	75
16800310	0755-706R	79.9	75.5
16800311	0760-706R	80.4	76

Item No.	Ref. No.	Ø upon delivery (mm)	Ø nominal, closed (mm)
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Band width 7 mm, thickness 0.6 mm (706R)

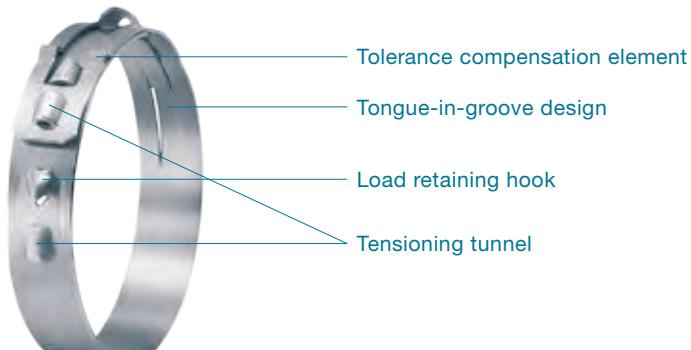
16800312	0765-706R	80.9	76.5
16800313	0770-706R	81.4	77
16800314	0775-706R	81.9	77.5
16800315	0780-706R	82.4	78
16800316	0785-706R	82.9	78.5
16800317	0790-706R	83.4	79
16800318	0795-706R	83.9	79.5
16800319	0800-706R	84.4	80
16800320	0805-706R	84.9	80.5
16800321	0810-706R	85.4	81
16800322	0815-706R	85.9	81.5
16800323	0820-706R	86.4	82
16800324	0825-706R	86.9	82.5
16800325	0830-706R	87.4	83
16800326	0835-706R	87.9	83.5
16800327	0840-706R	88.4	84
16800328	0845-706R	88.9	84.5
16800329	0850-706R	89.4	85
16800330	0855-706R	89.9	85.5
16800331	0860-706R	90.4	86
16800332	0865-706R	90.9	86.5
16800333	0870-706R	91.4	87
16800334	0875-706R	91.9	87.5
16800335	0880-706R	92.4	88
16800336	0885-706R	92.9	88.5
16800337	0890-706R	93.4	89
16800338	0895-706R	93.9	89.5
16800339	0900-706R	94.4	90
16800340	0905-706R	94.9	90.5
16800341	0910-706R	95.4	91
16800342	0915-706R	95.9	91.5
16800343	0920-706R	96.4	92
16800344	0925-706R	96.9	92.5
16800345	0930-706R	97.4	93
16800346	0935-706R	97.9	93.5
16800347	0940-706R	98.4	94
16800348	0945-706R	98.9	94.5
16800349	0950-706R	99.4	95
16800350	0955-706R	99.9	95.5
16800351	0960-706R	100.4	96
16800352	0965-706R	100.9	96.5
16800353	0970-706R	101.4	97
16800354	0975-706R	101.9	97.5
16800355	0980-706R	102.4	98
16800356	0985-706R	102.9	98.5
16800357	0990-706R	103.4	99
16800358	0995-706R	103.9	99.5
16800359	1000-706R	104.4	100
16800360	1005-706R	104.9	100.5
16800361	1010-706R	105.4	101
16800362	1015-706R	105.9	101.5
16800363	1020-706R	106.4	102
16800364	1025-706R	106.9	102.5
16800365	1030-706R	107.4	103

## Order information

Item No.	Ref. No.	Ø upon delivery (mm)	Ø nominal, closed (mm)
Band width 7 mm, thickness 0.6 mm (706R)			
16800366	1035-706R	107.9	103.5
16800367	1040-706R	108.4	104
16800368	1045-706R	108.9	104.5
16800369	1050-706R	109.4	105
16800370	1055-706R	109.9	105.5
16800371	1060-706R	110.4	106
16800372	1065-706R	110.9	106.5
16800373	1070-706R	111.4	107
16800374	1075-706R	111.9	107.5
16800375	1080-706R	112.4	108
16800376	1085-706R	112.9	108.5
16800377	1090-706R	113.4	109
16800378	1095-706R	113.9	109.5
16800379	1100-706R	114.4	110

Available on request (Diameter graduation 0.5 mm)

Item No.	Ref. No.	Size range (mm)
Band width 7 mm, thickness 0.6 mm (706R)		
On request		19.5 ... 59.5
Band width 9 mm, thickness 0.6 mm (906R)		
On request		25.0 ... 110.0
Band width 10 mm, thickness 0.6 mm (1006R)		
On request		60.0 ... 120.5



Tolerance compensation: provides a degree of compensation for component tolerances

Reusability: can be repeatedly opened and re-assembled

360° StepLess®: uniform 360° compression and constant surface pressure

Low assembled height: minimum space requirement, low imbalance on rotating parts

Burr-free strip edges: reduced risk of damage to parts being clamped

## StepLess® Low Profile Clamp with tolerance compensation 168

### Material

168 Stainless steel, Material no. 1.4301/UNS S30400

Alternative materials on request.

### Corrosion resistance according to DIN EN ISO 9227

168 ≥ 1000 h

### Series

Nominal diameter	width x thickness
19.5 – 110.0 mm	9.0 x 0.6 mm

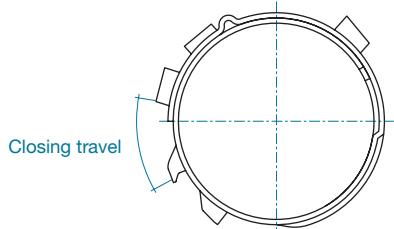
Some sizes are only available if an appropriate minimum quantity is ordered. StepLess® Low Profile Clamps with tolerance compensation are available in one standard band dimension.

When selecting the clamp diameter, the dimensions of mating components on which the clamp is to be assembled must be accurately established to enable effective clamping. The durometer hardness of the soft material and desired compression are important factors when determining the appropriate clamp diameter.

### Tensioning tunnels

By using an Oetiker closing tool and applying it at the tensioning tunnels, the clamp is reduced in diameter until the load-retaining hook is located within the tunnel and engages with the leading edge. The diameter reduction of the clamp is proportional to the closing travel, but slightly influenced by elongation of the tolerance-compensation element under high loads. The theoretical maximum reduction in diameter is given by the formula:

$$\text{Max. diameter reduction} = \frac{\text{Closing travel}}{\pi}$$



#### Tolerance compensation

The tolerance-compensating elements come into effect when the nominal diameter of the closed clamp cannot be achieved due to adjacent components being at the upper levels of the tolerance range. When parts being clamped have high durometer hardness values, the compensating element can be fully elongated providing the closed position is still achievable.

For optimum performance, a clamp diameter should be selected based on the theoretical lower tolerance limits of the components. Then, when the larger dimensional assembly is encountered, the tolerance compensation element is elongated to absorb the increased diameter and allow the load-retaining hook to engage in the tensioning tunnel. The application configuration, the physical properties of the materials being sealed and the required retention, are all critical factors when determining the overall functionality of the connection

#### Assembly Recommendations

These clamps can be closed manually using a specially developed hand tool, or a pneumatic pincer when large quantities are to be assembled. To close the clamp, the tips of the pincer jaws must be inserted in the tensioning tunnel at the end of the overlap and in the tunnel next to the load-retaining hook. Operation of the closing tool reduces the diameter of the clamp to the position at which engagement of the closing hook occurs.

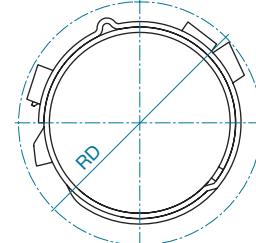
The design of StepLess® Low Profile Clamps with tolerance compensation is such that the inner contour of the tensioning tunnel on the end of the overlap, automatically engages with the load retaining hook when the correct position is achieved. In contrast to StepLess® low-profile clamps without tolerance compensation, they have the ability to accommodate minor variations in component tolerances during assembly and absorb diameter changes due to thermal expansion and contraction within the range of the compensating element.

As with other types of clamp, the sealing pressure beneath a clamp is a factor of the diameters and materials of the components under compression. The sealing properties of these clamps depends significantly on the opposing forces generated in the soft material of parts being secured, and the pre-loading of the tolerance-compensation element.

Complete process monitoring, including 100% documentation is available using the Electronically controlled pneumatic pincer ELK.

#### Rotation diameter

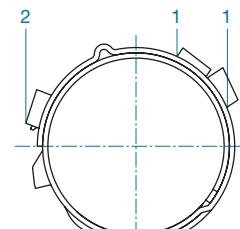
The StepLess® Low Profile Clamp with tolerance compensation has a low radial height, and was specifically developed for applications where space is restricted, while taking into account the need to accommodate the tolerances of parts being connected.



RD for 906RT8 = inside diameter +7.4 mm

#### Reusability

Oetiker StepLess® Low Profile Clamps with tolerance compensation are reusable to a limited extent. They can be repeatedly opened and re-assembled – for example in the automotive industry at maintenance and service intervals. They can be assembled both axially and radially. To open a clamp, the pincer must be fitted to the two tunnels (1) and squeezed. The applied force has the effect of slightly reducing the diameter of the clamp, enabling the hook to disengage from the tensioning tunnel (2) on the overlapping end.



#### Note on ordering

In contrast to ear clamps, StepLess® Low Profile Clamps are identified with the nominal closed diameter, e.g. 195 for a closed and assembled diameter of 19.5 mm.

Material dimensions	Manual pincer*	Recommended pneumatic pincer**
9 x 0.6 mm	14100109	HO 3000

\* 14100109 Manual pincer for StepLess® Low Profile Clamps with tolerance compensation

\*\* With appropriate pincer head

## Order information

Item No.	Ref. No.	Ø upon delivery (mm)	Ø nominal, closed (mm)
Band width 9 mm, thickness 0.6 mm (906RT8)			
16802113	0195-906RT8	22	19.5
16802114	0200-906RT8	22.5	20
16802115	0205-906RT8	23	20.5
16802116	0210-906RT8	23.5	21
16802117	0215-906RT8	24	21.5
16802118	0220-906RT8	24.5	22
16802119	0225-906RT8	25	22.5
16802120	0230-906RT8	25.5	23
16802121	0235-906RT8	26	23.5
16802122	0240-906RT8	26.5	24
16802123	0245-906RT8	27	24.5
16802124	0250-906RT8	27.5	25
16802125	0255-906RT8	28	25.5
16802126	0260-906RT8	28.5	26
16802127	0265-906RT8	29	26.5
16802128	0270-906RT8	29.5	27
16802129	0275-906RT8	30	27.5
16802130	0280-906RT8	30.5	28
16802131	0285-906RT8	31	28.5
16802132	0290-906RT8	31.5	29
16802133	0295-906RT8	32	29.5
16802134	0300-906RT8	32.5	30
16802135	0305-906RT8	33	30.5
16802136	0310-906RT8	33.5	31
16802137	0315-906RT8	34	31.5
16802138	0320-906RT8	34.5	32
16802139	0325-906RT8	35	32.5
16802140	0330-906RT8	35.5	33
16802141	0335-906RT8	36	33.5
16802142	0340-906RT8	36.5	34
16802143	0345-906RT8	37	34.5
16802144	0350-906RT8	37.5	35
16802145	0355-906RT8	38	35.5
16802146	0360-906RT8	38.5	36
16802147	0365-906RT8	39	36.5
16802148	0370-906RT8	39.5	37
16802149	0375-906RT8	40	37.5
16802150	0380-906RT8	40.5	38
16802151	0385-906RT8	41	38.5
16802152	0390-906RT8	41.5	39
16802153	0395-906RT8	42	39.5
16802154	0400-906RT8	42.5	40
16802155	0405-906RT8	43	40.5
16802156	0410-906RT8	43.5	41
16802157	0415-906RT8	44	41.5
16802158	0420-906RT8	44.5	42
16802159	0425-906RT8	45	42.5
16802160	0430-906RT8	45.5	43
16802161	0435-906RT8	46	43.5
16802162	0440-906RT8	46.5	44
16802163	0445-906RT8	47	44.5
16802164	0450-906RT8	47.5	45
16802165	0455-906RT8	48	45.5
16802166	0460-906RT8	48.5	46
16802167	0465-906RT8	49	46.5
16802168	0470-906RT8	49.5	47
16802169	0475-906RT8	50	47.5

Item No.	Ref. No.	Ø upon delivery (mm)	Ø nominal, closed (mm)
Band width 9 mm, thickness 0.6 mm (906RT8)			
16802170	0480-906RT8	50.5	48
16802171	0485-906RT8	51	48.5
16802172	0490-906RT8	51.5	49
16802173	0495-906RT8	52	49.5
16802174	0500-906RT8	52.5	50
16802175	0505-906RT8	53	50.5
16802176	0510-906RT8	53.5	51
16802177	0515-906RT8	54	51.5
16802178	0520-906RT8	54.5	52
16802179	0525-906RT8	55	52.5
16802180	0530-906RT8	55.5	53
16802181	0535-906RT8	56	53.5
16802182	0540-906RT8	56.5	54
16802183	0545-906RT8	57	54.5
16802184	0550-906RT8	57.5	55
16802185	0555-906RT8	58	55.5
16802186	0560-906RT8	58.5	56
16802187	0565-906RT8	59	56.5
16802188	0570-906RT8	59.5	57
16802189	0575-906RT8	60	57.5
16802190	0580-906RT8	60.5	58
16802191	0585-906RT8	61	58.5
16802192	0590-906RT8	61.5	59
16801880	0595-906RT8	62	59.5
16802193	0600-906RT8	62.5	60
16802194	0605-906RT8	63	60.5
16802195	0610-906RT8	63.5	61
16802196	0615-906RT8	64	61.5
16802197	0620-906RT8	64.5	62
16802198	0625-906RT8	65	62.5
16802199	0630-906RT8	65.5	63
16802200	0635-906RT8	66	63.5
16802201	0640-906RT8	66.5	64
16802202	0645-906RT8	67	64.5
16801881	0650-906RT8	67.5	65
16802203	0655-906RT8	68	65.5
16802204	0660-906RT8	68.5	66
16802205	0665-906RT8	69	66.5
16802206	0670-906RT8	69.5	67
16802207	0675-906RT8	70	67.5
16802208	0680-906RT8	70.5	68
16802209	0685-906RT8	71	68.5
16802210	0690-906RT8	71.5	69
16802211	0695-906RT8	72	69.5
16802212	0700-906RT8	72.5	70
16802213	0705-906RT8	73	70.5
16802214	0710-906RT8	73.5	71
16802215	0715-906RT8	74	71.5
16802216	0720-906RT8	74.5	72
16802217	0725-906RT8	75	72.5
16802218	0730-906RT8	75.5	73
16802219	0735-906RT8	76	73.5
16802220	0740-906RT8	76.5	74
16802221	0745-906RT8	77	74.5
16802222	0750-906RT8	77.5	75
16802223	0755-906RT8	78	75.5
16802224	0760-906RT8	78.5	76

The data in this catalog are based on many years experience. They are intended for reference, not as design specifications.

## Order information

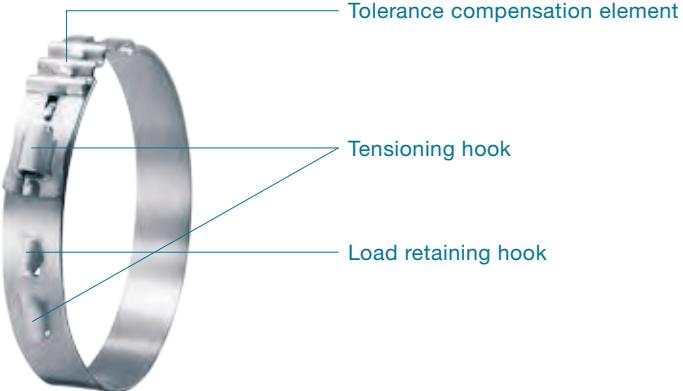
Item No.	Ref. No.	Ø upon delivery (mm)	Ø nominal, closed (mm)
Band width 9 mm, thickness 0.6 mm (906RT8)			
16802225	0765-906RT8	79	76.5
16802226	0770-906RT8	79.5	77
16802227	0775-906RT8	80	77.5
16802228	0780-906RT8	80.5	78
16802229	0785-906RT8	81	78.5
16802230	0790-906RT8	81.5	79
16802231	0795-906RT8	82	79.5
16802232	0800-906RT8	82.5	80
16802233	0805-906RT8	83	80.5
16802234	0810-906RT8	83.5	81
16802235	0815-906RT8	84	81.5
16802236	0820-906RT8	84.5	82
16802237	0825-906RT8	85	82.5
16802238	0830-906RT8	85.5	83
16802239	0835-906RT8	86	83.5
16802240	0840-906RT8	86.5	84
16802241	0845-906RT8	87	84.5
16802242	0850-906RT8	87.5	85
16802243	0855-906RT8	88	85.5
16802244	0860-906RT8	88.5	86
16802112	0865-906RT8	89	86.5
16802245	0870-906RT8	89.5	87
16802246	0875-906RT8	90	87.5
16802247	0880-906RT8	90.5	88
16802248	0885-906RT8	91	88.5
16802249	0890-906RT8	91.5	89
16802250	0895-906RT8	92	89.5
16802251	0900-906RT8	92.5	90
16802252	0905-906RT8	93	90.5
16802253	0910-906RT8	93.5	91
16802254	0915-906RT8	94	91.5
16802255	0920-906RT8	94.5	92
16802256	0925-906RT8	95	92.5
16802257	0930-906RT8	95.5	93
16802258	0935-906RT8	96	93.5
16802259	0940-906RT8	96.5	94
16802260	0945-906RT8	97	94.5
16802261	0950-906RT8	97.5	95
16802262	0955-906RT8	98	95.5
16802263	0960-906RT8	98.5	96
16802264	0965-906RT8	99	96.5
16802265	0970-906RT8	99.5	97
16802266	0975-906RT8	100	97.5
16802267	0980-906RT8	100.5	98
16802268	0985-906RT8	101	98.5
16802269	0990-906RT8	101.5	99
16802270	0995-906RT8	102	99.5
16802271	1000-906RT8	102.5	100
16802412	1005-906RT8	103	100.5
16802404	1010-906RT8	103.5	101
16802418	1015-906RT8	104	101.5
16802419	1020-906RT8	104.5	102
16803030	1025-906RT8	105	102.5
16803031	1030-906RT8	105.5	103
16803032	1035-906RT8	106	103.5
16803033	1040-906RT8	106.5	104
16803034	1045-906RT8	107	104.5

Item No.	Ref. No.	Ø upon delivery (mm)	Ø nominal, closed (mm)
Band width 9 mm, thickness 0.6 mm (906RT8)			
16803035	1050-906RT8	107.5	105
16803036	1055-906RT8	108	105.5
16803037	1060-906RT8	108.5	106
16803038	1065-906RT8	109	106.5
16802617	1070-906RT8	109.5	107
16803039	1075-906RT8	110	107.5
16803040	1080-906RT8	110.5	108
16803041	1085-906RT8	111	108.5
16803042	1090-906RT8	111.5	109
16803043	1095-906RT8	112	109.5
16803044	1100-906RT8	112.5	110

192 with tolerance compensation element, 1-wave



192 with tolerance compensation element, 3-waves



Tolerance compensation elements: allow for variations in component tolerances and temperature variations

360° StepLess®: uniform 360° compression and constant surface pressure

Low assembled height: minimum space requirement, low imbalance on rotating parts

Novel tensioning hook design: fast and simple assembly, high radial force

Burr-free strip edges: reduced risk of damage to parts being clamped

## StepLess® Low Profile Clamp 192

### Material

192 Stainless Steel, Material no. 1.4301/UNS S30400

### Corrosion resistance according to DIN EN ISO 9227

192 ≥ 1000 h

### Series

Nominal diameter	width x thickness	tol. element
19.5 – 60.0 mm	10.0 x 0.8 mm	1-wave
40.0 – 120.5 mm	10.0 x 0.8 mm	3-waves

Available in 0.5 mm diameter graduations on request.

Specific diameters can only be supplied when an appropriate minimum quantity is ordered.

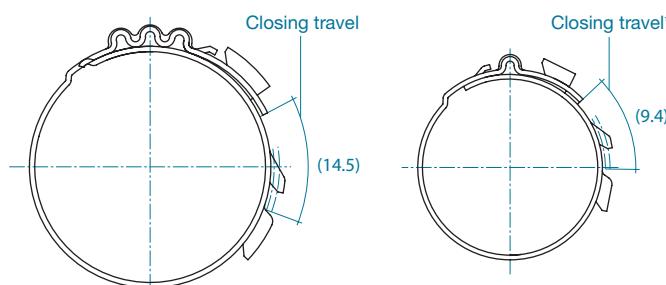
Oetiker StepLess® Low Profile Clamps 192 are produced with 1-wave and 3-wave tolerance compensation elements. The dimensions of the material used within the standard range are determined taking into account the required radial force, the nature of the application and the need to maintain sealing and/or retaining properties under the specified conditions and environmental exposure. When selecting the clamp diameter, the dimensions of the mating components on which the clamp is to be assembled must be accurately established to enable effective clamping performance. The durometer hardness of the soft material and desired compression are significant factors when calculating the appropriate clamp diameter.

### Tensioning hooks

The tensioning hooks are the features used to close the StepLess® Low Profile Clamp 192. An Oetiker closing tool engages in both tensioning features, and tool movement reduces the clamp diameter until the internal cavity of the tensioning hook on the overlapping band fully engages in the load-retaining hook.

The diameter reduction of the clamp is substantially proportional to the closing travel, but subject to slight variations, depending on the degree to which tolerance compensation is required and the required radial force. The theoretical maximum reduction in diameter is given by the formula:

$$\text{Max. diameter reduction} = \frac{\text{Closing travel}}{\pi}$$



\* Optionally available with enlarged as-supplied diameter (greater closing travel)

#### Tolerance compensation

The tolerance compensation waves are activated when the compressed diameter of the application is greater than the nominal diameter of the clamp. When the resistance against the clamp exceeds the strength of the formed convolutes, elongation occurs to enable successful engagement of the tensioning and retaining hooks.

The flexible effect of the convolutes has the potential to accommodate diameter changes due to the effects of temperature changes and vibration.

As a rule, the nominal diameter of an Oetiker StepLess® Low Profile Clamp 192 should be selected to enable the optimum hose or seal compression at the minimum assembly diameter. In the event of a maximum assembly installation, the convolutes must be capable of elongating to absorb the diameter increase while maintaining the ability to achieve the interlock engagement, taking into account the maximum permitted pincer force and the amount of elongation the convolutes can withstand.

The capability of the tolerance-compensation element, the properties and dimensional tolerance of the materials being joined all directly affect the overall functionality of the connection.

#### Assembly Recommendations

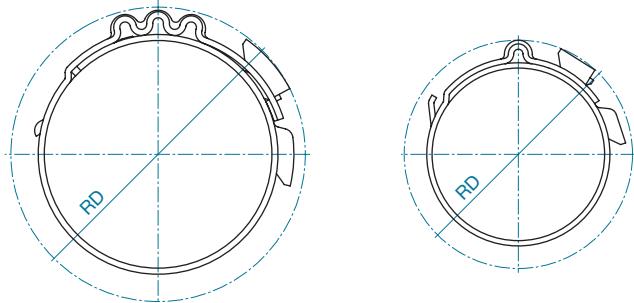
These clamps can be assembled using manual pincers especially developed for this clamp design or, alternatively, pneumatic pincers for high volume installation. To close a clamp, the pincer jaws must be engaged within both tensioning hooks. By operating the pneumatic tool or closing the manual pincer, the simultaneous movement of the two tensioning hooks reduces the diameter of the StepLess® Low Profile Clamp 192 until the effective closed diameter is achieved. The geometry of the StepLess® Low Profile Clamp 192 is such that, on reaching this position, the internal contour of the tensioning hook on the overlapping end of the clamp engages automatically in the load retaining hook.

The surface pressure generated depends on the selection criteria, especially the diameter and materials of the parts being clamped. Sealing performance is derived mainly from the restoring force of the compressed elastic material combined with tension from the tolerance-compensation elements.

Complete process monitoring, including 100% documentation is available using the Electronically controlled pneumatic pincer ELK.

#### Rotation diameter

The rotation diameter (RD) of an assembled clamp can be critical design information for applications that rotate in close proximity to adjacent components.



Accurate Information regarding rotation diameter can be provided on request.

#### Note on ordering

In contrast to ear clamps, StepLess® Low Profile Clamps are identified with the nominal closed diameter, e.g. 195 for a closed and assembled diameter of 19.5 mm.

Material dimensions	Manual pincer*	Recommended pneumatic pincer**
10.0 x 0.8 mm	14100134	HO 5000 EL / HO 7000 EL

\* 14100134 Manual pincer for StepLess® Low Profile Clamps 192.

\*\* With appropriate pincer head and closing force setting.

Please provide us with appropriate sample parts and comprehensive information about the application.

## Order information

Item No.	Ø upon delivery (mm)	Ø nominal, closed (mm) *	Item No.	Ø upon delivery (mm)	Ø nominal, closed (mm) *	Item No.	Ø upon delivery (mm)	Ø nominal, closed (mm) *
Tolerance compensation element 1-wave Band width 10 mm, thickness 0.8 mm			Tolerance compensation element 1-wave Band width 10 mm, thickness 0.8 mm			Tolerance compensation element 3-waves Band width 10 mm, thickness 0.8 mm		
19200686	22.5	19.5	19200400	47	44	19200454	44.5	40
19200684	23	20	19200401	47.5	44.5	19200455	45	40.5
19200685	23.5	20.5	19200402	48	45	19200350	45.5	41
19200688	24	21	19200403	48.5	45.5	19200352	46	41.5
19200733	24.5	21.5	19200404	49	46	19200456	46.5	42
19200734	25	22	19200405	49.5	46.5	19200457	47	42.5
19200244	25.5	22.5	19200406	50	47	19200458	47.5	43
19200245	26	23	19200407	50.5	47.5	19200459	48	43.5
19200255	26.5	23.5	19200408	51	48	19200460	48.5	44
19200263	27	24	19200409	51.5	48.5	19200461	49	44.5
19200368	27.5	24.5	19200410	52	49	19200462	49.5	45
19200369	28	25	19200411	52.5	49.5	19200463	50	45.5
19200370	28.5	25.5	19200412	53	50	19200464	50.5	46
19200371	29	26	19200413	53.5	50.5	19200465	51	46.5
19200372	29.5	26.5	19200414	54	51	19200466	51.5	47
19200253	30	27	19200415	54.5	51.5	19200467	52	47.5
19200322	30.5	27.5	19200416	55	52	19200468	52.5	48
19200373	31	28	19200417	55.5	52.5	19200469	53	48.5
19200374	31.5	28.5	19200418	56	53	19200470	53.5	49
19200268	32	29	19200419	56.5	53.5	19200471	54	49.5
19200375	32.5	29.5	19200420	57	54	19200472	54.5	50
19200376	33	30	19200421	57.5	54.5	19200473	55	50.5
19200377	33.5	30.5	19200422	58	55	19200474	55.5	51
19200378	34	31	19200423	58.5	55.5	19200339	56	51.5
19200379	34.5	31.5	19200424	59	56	19200340	56.5	52
19200380	35	32	19200425	59.5	56.5	19200475	57	52.5
19200381	35.5	32.5	19200426	60	57	19200476	57.5	53
19200333	36	33	19200427	60.5	57.5	19200477	58	53.5
19200335	36.5	33.5	19200428	61	58	19200478	58.5	54
19200382	37	34	19200429	61.5	58.5	19200479	59	54.5
19200383	37.5	34.5	19200430	62	59	19200480	59.5	55
19200332	38	35	19200431	62.5	59.5	19200481	60	55.5
19200384	38.5	35.5	19200432	63	60	19200482	60.5	56
19200385	39	36				19200483	61	56.5
19200386	39.5	36.5				19200484	61.5	57
19200358	40	37				19200485	62	57.5
19200387	40.5	37.5				19200486	62.5	58
19200388	41	38				19200487	63	58.5
19200389	41.5	38.5				19200488	63.5	59
19200390	42	39				19200489	64	59.5
19200391	42.5	39.5				19200490	64.5	60
19200392	43	40				19200491	65	60.5
19200393	43.5	40.5				19200492	65.5	61
19200394	44	41				19200493	66	61.5
19200395	44.5	41.5				19200494	66.5	62
19200396	45	42				19200495	67	62.5
19200397	45.5	42.5				19200496	67.5	63
19200398	46	43				19200341	68	63.5
19200399	46.5	43.5				19200342	68.5	64

## Order information

Item No.	Ø upon delivery (mm)	Ø nominal, closed (mm) *
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Tolerance compensation element 3-waves  
Band width 10 mm, thickness 0.8 mm

19200497	69	64.5
19200498	69.5	65
19200499	70	65.5
19200500	70.5	66
19200501	71	66.5
19200502	71.5	67
19200503	72	67.5
19200504	72.5	68
19200505	73	68.5
19200506	73.5	69
19200507	74	69.5
19200508	74.5	70
19200509	75	70.5
19200510	75.5	71
19200511	76	71.5
19200512	76.5	72
19200513	77	72.5
19200514	77.5	73
19200515	78	73.5
19200516	78.5	74
19200517	79	74.5
19200518	79.5	75
19200519	80	75.5
19200520	80.5	76
19200521	81	76.5
19200522	81.5	77
19200523	82	77.5
19200524	82.5	78
19200525	83	78.5
19200526	83.5	79
19200527	84	79.5
19200528	84.5	80
19200529	85	80.5
19200530	85.5	81
19200531	86	81.5
19200532	86.5	82
19200533	87	82.5
19200534	87.5	83
19200535	88	83.5
19200536	88.5	84
19200537	89	84.5
19200538	89.5	85
19200539	90	85.5
19200540	90.5	86
19200541	91	86.5
19200542	91.5	87
19200543	92	87.5
19200544	92.5	88
19200545	93	88.5

Item No.	Ø upon delivery (mm)	Ø nominal, closed (mm) *
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Tolerance compensation element 3-waves  
Band width 10 mm, thickness 0.8 mm

19200546	93.5	89
19200547	94	89.5
19200548	94.5	90
19200362	95	90.5
19200549	95.5	91
19200550	96	91.5
19200551	96.5	92
19200552	97	92.5
19200553	97.5	93
19200554	98	93.5
19200555	98.5	94
19200556	99	94.5
19200557	99.5	95
19200558	100	95.5
19200559	100.5	96
19200560	101	96.5
19200561	101.5	97
19200562	102	97.5
19200563	102.5	98
19200564	103	98.5
19200565	103.5	99
19200566	104	99.5
19200567	104.5	100
19200568	105	100.5
19200569	105.5	101
19200570	106	101.5
19200571	106.5	102
19200572	107	102.5
19200573	107.5	103
19200343	108	103.5
19200348	108.5	104
19200574	109	104.5
19200575	109.5	105
19200576	110	105.5
19200577	110.5	106
19200578	111	106.5
19200579	111.5	107
19200580	112	107.5
19200581	112.5	108
19200582	113	108.5
19200583	113.5	109
19200584	114	109.5
19200585	114.5	110
19200586	115	110.5
19200587	115.5	111
19200588	116	111.5
19200589	116.5	112
19200590	117	112.5
19200591	117.5	113

Item No.	Ø upon delivery (mm)	Ø nominal, closed (mm) *
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Tolerance compensation element 3-waves  
Band width 10 mm, thickness 0.8 mm

19200592	118	113.5
19200593	118.5	114
19200594	119	114.5
19200595	119.5	115
19200596	120	115.5
19200597	120.5	116
19200598	121	116.5
19200599	121.5	117
19200600	122	117.5
19200601	122.5	118
19200602	123	118.5
19200603	123.5	119
19200604	124	119.5
19200605	124.5	120
19200606	125	120.5

\* Without affecting the tolerance-compensation element (free state).



Load retaining hook/window

**Compact:** **lightweight, miniature sizes**

**Low assembled height:** **minimum space requirement**

**Solid closure:** **fast and simple assembly, safe connection for low pressure applications**

**Burr-free strip edges:** **reduced risk of damage to parts being clamped**

## Clamp ER 194

### Material

194 Stainless Steel, Material no. 1.4310/UNS S30100

### Corrosion resistance according to DIN EN ISO 9227

194 ≥ 800 h

### Series

Size range	width x thickness
4.8 – ca. 25 mm	6.5 x 0.25 mm

Some sizes are only available if an appropriate minimum quantity is ordered.

Oetiker ER Clamps are made from a single, standard strip dimension. The clamp diameter must be determined very accurately to ensure correct operation in service – the required radial force, the nature of the hose and the necessary sealing and retaining properties are all extremely important.

Particular attention must be paid to the compressibility and wall-thickness of the material being joined. For assistance, please contact Oetiker.

### Load retaining hook

Closure is achieved when the load retaining hook engages in the load retaining window. Both hook and window have been specially developed for this type of clamp. The reduction in diameter of the Clamp ER is proportional to the closing travel, which is approx. 4 mm. The maximum diameter reduction is thus given by the following formula:

$$\text{Max. diameter reduction} = \frac{\text{Closing travel}}{\pi}$$

The very thin material, from which these clamps are made, only 0.25 mm, means that after assembly there is only a very small step where the two ends of the clamp overlap. The effect of this is that the ER Clamps exert almost uniform compression, or surface pressure, on clamped parts.

The result is effective clamping of compressible materials for all manner of applications. The sealing characteristics of Clamps ER depend on the resilience provided by the compressed elastic material of the parts joined.

#### Assembly Recommendations

Clamps ER can be closed using a specially-developed manual pincer, or, for large quantities, using a pneumatic pincer. To install a clamp, the diameter is reduced by jaws, which completely surround it, until the load retaining hook engages in the load retaining window in the overlapping end. No specific orientation within the tool is required prior to closure.

#### Note on ordering

Oetiker Clamps ER are identified with the nominal closed diameter, e.g. 6 for a closed diameter of 6 mm.

For detailed order information, please contact your local Oetiker branch.

# Screw Clamps and Universal Clamps

p. 80

StepLess® Screw Clamp  
178



p. 82

Worm Drive Clamp  
180



p. 84

Worm Drive Clamp Mini  
180



Choice of engagement positions:

- + Clamp can be adjusted to several different nominal diameters

360° StepLess®:

- + Uniform compression and uniform surface pressure

Self-tensioning:

- + Compensates for thermal cycle diameter changes

Toggle lock with intermediate position:

- + Fast and simple assembly
- + High tightening torque

Visual overload protection:

- + Protection against excessive tightening

Compact design:

- + Minimal space requirement
- + Miniature sizes

Embossed band strip:

- + Reduced risk of damage to the part being clamped

Oetiker will be pleased to help you to find the correct choice for your application. Send sample parts and all relevant information for your specific application to Oetiker, and you will receive recommendations for product type, diameter, and method of assembly.

p. 86

Universal Clamp  
174

p. 90

Worm Drive Clamps  
126 & 177

p. 94

Worm Drive Clamps North America  
conform to SAE<sup>2</sup> J1508 Typ "F"  
126 & 177



Perforated band strip:

- + Universally applicable
- + Various diameters and widths
- Ratchet lock:
  - + Assembly and removal without tools
- Screw lock:
  - + Simple assembly
  - + High holding force

Durable band design:

- + Enhanced surface pressure
- + Optimized band exceeds DIN<sup>1</sup> 3017 standard
- Reliable:
  - + No damage to hose
  - + Optimum sealing
- Worker-friendly:
  - + One size fits various diameters
  - + Fast and easy service with common tool

Clamp design:

- + Perforated clamp band
- + Large clamping range
- + High holding forces
- Short housing saddle:
  - + Uniform force distribution and good sealing

<sup>1</sup> DIN = Deutsches Institut für Normung  
(German Institute for Standardization)

<sup>2</sup> SAE = Society of Automotive Engineers  
(only for the North American market)



Choice of engagement positions: clamp can be adjusted to several different nominal diameters

Narrow Band: concentrated transmission of clamping force, complies with SAE J1508 Type SSPC

360° StepLess®: uniform 360° compression and constant surface pressure

Burr-free strip edges: reduced risk of damage to the part being clamped

Self-tensioning: compensates for thermal cycle diameter changes

## StepLess® Screw Clamp 178

### Material

178 Band, spacer, retaining elements (D-nut):

Stainless Steel, Material no. 1.4301/UNS S30400

Screw: Stainless Steel, Material no. 1.4319/UNS S30200

Spring: 17-7PH (aerospace quality)

### Series

Size range	width x thickness
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18.0 – 255.0 mm	9.0 x 0.6 mm
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Some sizes are only available if an appropriate minimum quantity is ordered.

Oetiker StepLess® Screw Clamps are available in two versions:  
Oetiker StepLess® Screw Clamps and Self-Tensioning StepLess®  
Screw Clamps.

### Material thickness

Oetiker StepLess® Screw Clamps and Self-Tensioning StepLess®  
Screw Clamps are made from strip material 9 mm wide and  
0.6 mm thick. The dimensions of the strip ensure optimum sealing  
with EPDM rubber and silicone hoses, while taking into account  
the necessary radial force, the compressibility of the hose, the  
sealing/retaining properties and the environmental conditions.

### Interlock

The closure is a mechanical interlock whose function is to provide  
secure retention of the round clamp geometry. The interlock  
can be opened to permit radial assembly of the clamp, and at  
the same time provides a simple way of relocating the interlock  
features to obtain alternative diameters prior to tightening.

Positions for diameter changes

Sizes 24–42 mm

- 3 different positions

- diameter change for each step 1.6 mm

Sizes 45–55 mm

- 3 different positions

- diameter change for each step 2.1 mm

Sizes 60–255 mm

- 5 different positions

- diameter change for each step 2.0 mm

Screw: M4 x 0.7

Screw head: combination of hexagon head with cross-socket

#### Assembly Recommendations

1. Turn screw anti-clockwise until it stops at the "D" nut.
2. For radial assembly or change of diameter, unlatch the inter-lock.
3. Position the open clamp around the hose. Locate the tongue in the groove and position the apertures of the mechanical interlock over the mating features. Engage the interlock at the smallest possible diameter.
4. Tighten the screw to the required torque. Do not exceed the maximum permissible tightening torque.
5. A gap of > 3 mm should exist between the D-nuts. This ensures that there is sufficient movement for the clamp to reduce in diameter when the spring of the self-tensioning clamp expands during contraction of the hose. If the gap between the D-nuts is less than the recommended 3 mm, proceed to step 6. (Only applicable to Self-Tensioning Spring Screw Clamps).
6. Turn the screw anti-clockwise to loosen the Self-Tensioning Screw Clamp.
7. Relocate the interlock in the next smaller diameter position.
8. Tighten the screw to the required torque. Do not exceed the maximum permissible tightening torque.

Maximum average, static torque guide:

Spring without color identification (sizes 24.0–31.0 mm):

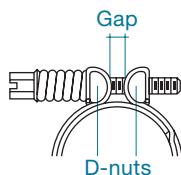
90–100 Ncm Max (8–9 inch pound-force max.)

Green spring (sizes 32.0 mm and larger):

135–200 Ncm Max (12–18 inch pound-force max.)

The values indicated above are based on maximum clamp torque capacity and common hose materials. Low durometer hardness hoses may require alternative or lower torque values and should be verified by means of product compatibility investigations.

For StepLess® Screw Clamps the minimum gap between D-nuts should be > 3mm.



Tolerance compensation with StepLess® Screw Clamps

Oetiker StepLess® Screw Clamps and Self-Tensioning StepLess® Screw Clamps should be tightened to the optimum torque as specified in the guide. This torque takes into account the required degree of compression, the necessary radial force, and the maximum torque resistance of the screw and clamp band. By using a defined and constant torque at assembly, compensation for component tolerances will always be available and the radial force will remain approximately the same.

The spring on Oetiker Self-Tensioning StepLess® Screw Clamp serves as a compensation element to accommodate changes in diameter resulting from thermal expansion and contraction or vibration. This feature gives Screw Clamps optimum sealing performance even in applications where there are strong thermal influences.

#### Order information

Item No.*	Ref. No.*	Item No.**	Ref. No.**	Size range (mm)
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Band width 9 mm, thickness 0.6 mm

17800120	024-9	17800170	024S9	18 – 24
17800122	028-9	17800172	028S9	22 – 28
17800124	032-9	17800174	032S9	26 – 32
17800125	036-9	17800175	036S9	30 – 36
17800126	040-9	17800176	040S9	34 – 40
17800127	045-9	17800177	045S9	37.5 – 45
17800128	050-9	17800178	050S9	42.5 – 50
17800129	055-9	17800179	055S9	47.5 – 55
17800130	060-9	17800180	060S9	49 – 60
17800131	065-9	17800181	065S9	54 – 65
17800132	070-9	17800182	070S9	59 – 70
17800133	075-9	17800183	075S9	64 – 75
17800134	080-9	17800184	080S9	69 – 80
17800135	085-9	17800185	085S9	74 – 85
17800136	090-9	17800186	090S9	79 – 90
17800137	095-9	17800187	095S9	84 – 95
17800138	100-9	17800188	100S9	89 – 100
17800139	105-9	17800189	105S9	94 – 105
17800140	110-9	17800190	110S9	99 – 110

\* StepLess® Screw Clamps

\*\* Self-Tensioning Screw Clamps

For Self-Tensioning StepLess® Screw Clamps, the minimum diameter of the clamping range is 1 mm larger than that given in the above table.

Alternative diameters on request.



Toggle lock with intermediate position: **fast and simple assembly, high tightening torque**

Visual overload protection: **protects against excessive tightening**

Hexagon socket screw SW5: **fast and safe assembly**

Alternative with wing screw: **tool integrated in the clamp**

## Worm Drive Clamp 180

### Material

180 W4 Band and fastener: Stainless Steel,

Material no. 1.4301/UNS S30400

Screw: Stainless Steel, Material no. 1.4305/UNS S30300

### Series

Size range	width x thickness
30.0 – 500.0 mm	12.2 x 0.9 mm

Special sizes up to 1000 mm diameter available on request.

Some sizes are only available if an appropriate minimum quantity is ordered.

### Screw Clamp design

#### Flap lock

After opening the body, the band can be formed by hand to approximately the clamping diameter. The flap can then be closed, and the clamp tightened by turning the screw. As a result, the screw only has to be turned for the last part of the clamping operation.

#### Intermediate stop

The flap is secured by an intermediate stop. Even when loosely assembled, clamps cannot open on their own accord.

#### Visual overload protection

The housing incorporates a web which distorts visibly above a tightening torque of 4–5 Nm (35–44 in-lbs). This visual feature indicates that a Worm Drive Clamp is optimally tightened and still has an adequate factor of safety to the maximum tightening torque.

### Worm Drive Clamps with wing screw

The Worm Drive Clamp with wing screw can be assembled entirely without tools. The integral, torsionally-stiff wing provides optimum grip. The dimensions correspond to the standard design with the exception of the wing screw.

### Oetiker Universal Clamp Band

The universal tension band is available in 8 or 12 mm band width, each on rolls with lengths of 10, 20, or 30 m, with a suitable lock for band widths of 8 or 12 mm.



Stainless steel universal tension band and lock.

### Assembly Recommendations

For safe tightening of screw clamps without wing screws, we recommend use of a 5A/F hexagon wrench. The maximum static tightening torque is 6 Nm (53 in-lb).

### Installing an Universal Worm Drive Clamp

Measure the circumference to be clamped and cut off the band to that length. Pass the end of the band, from above, through the slit in the closing element, and fold it back at least 40 mm below the band. Pass the second end of the band through the slit in the perforated part of the closing element and fold it back at least 40 mm. Lay the band around the part to be clamped, push the band end with perforation below the flap lock and close.



Tighten the clamp with a 5 A/F hexagon wrench. This system may not be entirely suitable for soft and flexible components.

### Order information

Item No.	Clamping range D (mm)
Screw Clamp	
Band width 12 mm, thickness 0.9 mm	
18000206	30 – 60
18000025	50 – 80
18000026	80 – 110
18000027	110 – 140
18000028	140 – 170
18000029	170 – 200
18000030	200 – 230
18000031	230 – 260
18000032	260 – 290
18000033	290 – 320
18000034	320 – 350

Item No.	Clamping range D (mm)
Universal Clamp Band	
Band width 8 mm, thickness 0.5 mm	
18000211	Closing element for stainless steel
18000213	Universal clamp band, roll 10 m
18000214	Universal clamp band, roll 20 m
18000215	Universal clamp band, roll 30 m
Band width 12 mm, thickness 0.5 mm	
18000211	Closing element for stainless steel
18000216	Universal clamp band, roll 10 m
18000217	Universal clamp band, roll 20 m
18000218	Universal clamp band, roll 30 m

### Screw Clamp with wing screw

18000207	30 – 60
18000136	50 – 80
18000137	80 – 110
18000135	110 – 140
18000168	140 – 170
18000143	170 – 200
18000169	200 – 230
18000174	230 – 260
18000175	260 – 290
18000176	290 – 320
18000177	320 – 350

Worm Drive Clamps are available for a clamping range from 30 mm up to 1000 mm. Up to diameter 200 mm, Worm Drive Clamps are delivered pre-shaped, above diameter 200 mm they are supplied flat. Customer-specific sizes are available on request.

180 Mini with wing screw



180 Mini



Housing with screw

Compact design: Minimal space requirement, miniature sizes

Cylindrical screw head: fast, simple and safe assembly

Embossed band strip: reduced risk of damage to the part being clamped

Alternative with wing screw: tool integrated in the clamp

## Worm Drive Clamp Mini 180

### Material type R 180

W2 Band: Rust-resistant chromium steel,

Material no. 1.4016/UNS S43000

Screw and housing: Steel, zinc-plated, blue chromate finish

### Material type Mini R+S 180

W4 Band and fastener: Stainless Steel,

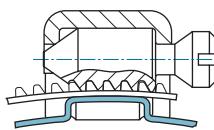
Material no. 1.4301/UNS S30400

Screw: Stainless Steel,

Material no. 1.4305/UNS S30300

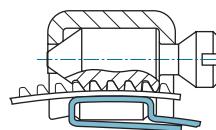
### Clamp Design

Oetiker Mini R+S Worm Drive Clamps



Mini R+S

Sizes 1–7 band overlapping



Mini R+S

Above size 8, band reverse-bent

### Series

Size range	width x thickness
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7.0 – 19.0 mm	5.0 x 0.4 mm	Type R <sup>1</sup>
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7.0 – 219.0 mm	5.0 x 0.4 mm	Type R+S <sup>2</sup>
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Some sizes are only available if an appropriate minimum quantity is ordered.

<sup>1</sup> Mini R = stainless

<sup>2</sup> Mini R+S = stainless and acid-proof

## Oetiker Mini R Worm Drive Clamps



Open state



Round state

## Assembly Recommendations

For safe tightening of screw clamps without wing screws, we recommend to use a suitable standard screwdriver.

## Maximum static tightening torques:

Mini R 70 Ncm (6 in-lb)

Mini R+S/wing screw 120 Ncm (10 in-lb)

## Order information

Item No.	Type	Clamping range D (mm)
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Worm Drive Clamp Mini R<sup>1</sup>

Band width 5 mm, thickness 0.4 mm

18000000	MINI R 1	6 – 11
18000001	MINI R 1.5	7 – 15
18000002	MINI R 2	11 – 19
18000248	MINI R 1 GZ	6 – 11
18000249	MINI R 2 GZ	9 – 19
18000252	MINI 1 S	6 – 11
18000254	MINI 2 S	11 – 19
18000255	MINI 1 GS	6 – 11
18000256	MINI 2 GS	9 – 19

S = open state with hexagon-head screw

GS = round state with hexagon-head screw

R 1, R 1.5, R 2 = open state with cylindrical screw head

R 1 GZ / R 2 GZ = round state with cylindrical screw head

## Worm Drive Clamps with cylindrical screw head Mini R+S

Band width 5 mm, thickness 0.4 mm

18000003	MINI R+S 1	7 – 11
18000004	MINI R+S 2	11 – 19
18000005	MINI R+S 3	18 – 29
18000006	MINI R+S 4	28 – 39
18000007	MINI R+S 5	38 – 49
18000008	MINI R+S 6	48 – 59
18000009	MINI R+S 7	58 – 69
18000010	MINI R+S 8	68 – 79
18000011	MINI R+S 9	78 – 89
18000012	MINI R+S 10	88 – 99
18000013	MINI R+S 11	98 – 109
18000014	MINI R+S 12	108 – 119
18000015	MINI R+S 13	118 – 129
18000016	MINI R+S 14	128 – 139
18000017	MINI R+S 15	138 – 149
18000018	MINI R+S 16	148 – 159
18000019	MINI R+S 17	158 – 169
18000020	MINI R+S 18	168 – 179
18000021	MINI R+S 19	178 – 189
18000022	MINI R+S 20	188 – 199
18000023	MINI R+S 21	198 – 209
18000024	MINI R+S 22	208 – 219

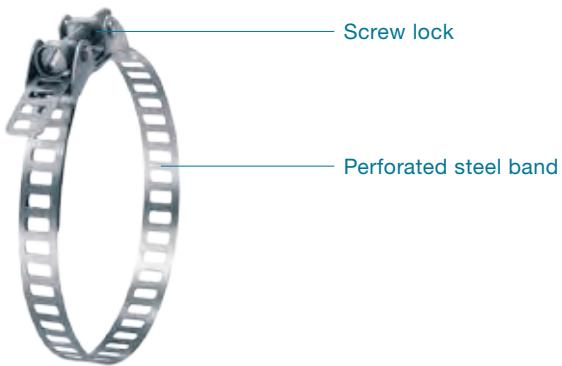
Worm Drive Clamps with wing screw Mini R+S<sup>2</sup>

Band width 5 mm, thickness 0.4 mm

18000183	MINI R+S F 1	7 – 11
18000184	MINI R+S F 2	11 – 19
18000185	MINI R+S F 3	18 – 29
18000186	MINI R+S F 4	28 – 39
18000187	MINI R+S F 5	38 – 49
18000188	MINI R+S F 6	48 – 59
18000189	MINI R+S F 7	58 – 69
18000190	MINI R+S F 8	68 – 79
18000191	MINI R+S F 9	78 – 89
18000192	MINI R+S F 10	88 – 99
18000193	MINI R+S F 11	98 – 109
18000194	MINI R+S F 12	108 – 119
18000195	MINI R+S F 13	118 – 129
18000196	MINI R+S F 14	128 – 139
18000197	MINI R+S F 15	138 – 149
18000198	MINI R+S F 16	148 – 159
18000199	MINI R+S F 17	158 – 169
18000200	MINI R+S F 18	168 – 179
18000201	MINI R+S F 19	178 – 189
18000202	MINI R+S F 20	188 – 199
18000203	MINI R+S F 21	198 – 209
18000204	MINI R+S F 22	208 – 219

<sup>1</sup> Mini R = stainless

<sup>2</sup> Mini R+S = stainless and acid-proof



Perforated band: universally applicable for various diameters and widths

Ratchet lock: assembly and removal without tools

Screw lock: simple assembly, high holding force

Various supply options: kit format, bulk or to customer specification

## Universal Clamp 174

### Material

174 All parts are stainless steel, Material no. 1.4301/ UNS S30400

Optional alternative materials

### Series

Size range	width x thickness
≥ 35.0 mm	10.0 x 0.5 mm
≥ 80.0 mm	18.0 x 0.8 mm*
≥ 150.0 mm	30.0 x 0.7 mm**

\* For use with 18 mm screw lock

\*\* For use with 30 mm screw lock



Screw lock 18 mm



Ratchet lock



Perforated steel band

## Clamp Design

### Concept

Individual closure mechanism (screw or ratchet lock) combined with perforated steel band – clamps can be round or have an irregular form. Available as kits, in bulk or to customer's specification. Special versions are available with integral tolerance compensation and non-perforated band.

Universal clamps are available in standard widths and thicknesses. The band dimensions should be chosen to give the necessary radial force (clamping force) to ensure the required retention properties under the anticipated ambient conditions.

### Assembly Recommendations

For assembly of the Screw Lock, we recommend to use a suitable flat blade screwdriver, or a socket wrench.

### Static tightening torque

Screw lock for band width 10 mm: max. 3 Nm

Screw lock for band width 18 mm: max. 10 Nm

Screw lock for band width 30 mm: max. 20 Nm

## Assembly instructions

Screw lock type



Determine the clamp length, e.g. wrap around object to be clamped and add approx. 50 mm.



Cut off band to required length. To avoid possible injury remove sharp edges with a file and trim corners at an angle.



Insert approximately 30 mm of band material through the top of the retaining slot and fold backwards underneath the remaining strip.



Position clamp over object. Insert free end of the band over the hooks and under the screw, protruding past the body of the screw lock. Engage the hooks in the perforations at the tightest possible position.



Tighten the clamp with a screwdriver or hexagon wrench.

Ratchet lock type



Determine the clamp length, e.g. wrap around object to be clamped and add approx. 50 mm.



Cut off band to required length. To avoid possible injury remove sharp edges with a file and trim corners at an angle.



Insert approximately 30 mm of band material through the top of the retaining slot and fold backwards underneath the remaining strip.



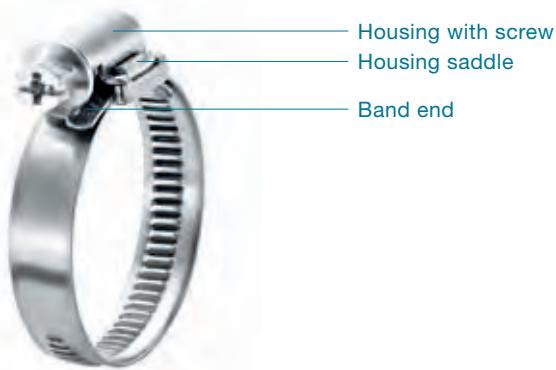
Place lever in open position, pre-form the end of the band to match the curvature of lock. Pass free end under tongue and through slot, so that the end extends beyond the lock body.



Position clamp over object. With minimal force, press free end of band steel down and ratchet the lever back and forth until tight. Firmly lock the lever down in the final retained position. "Securing dimple" prevents unintentional opening.

## Order information

Item No.	Ref. No.	Size range (mm)	Item No.	Ref. No.	Band length (m)			
<b>Screw lock</b>								
<b>Compatible with band width 10 mm</b>								
17400003	540R/10-	40 – 100	17400067	501R/10	10			
17400002	540R/10+	100 – ...	17400081	501R/20	20			
<b>Compatible with band width 18 mm</b>								
17400005	540R/18-	80 – 150	17400077	518R/10	10			
17400004	540R/18+	150 – ...	17400079	518R/20	20			
<b>Compatible with band width 30 mm</b>								
17400006	540R/30+	150 – ...	<b>Perforated steel band</b>					
<b>Ratchet lock</b>								
<b>Compatible with band width 10 mm</b>								
17400063	504R/60-	35 – 60	17400101	530R/10	10			
17400064	504R/60+	60 – ...	17401421	530R/20	20			
<b>Steel band</b>								
<b>Width 30 mm, material thickness 0.7 mm</b>								



**Durable:** Enhanced surface pressure thanks to curled, burr-free edges

(optimized band exceeds DIN 3017 standard)

**Reliable:** No damage to hose thanks to curled strip with burr-free edges, optimum sealing

**Worker-friendly:** One size fits various diameters, fast and easy service with common screw driver or torque wrench

## Worm Drive Clamps 126 & 177

### High band quality. Made by Oetiker.

#### Material 126

W1 All parts coated steel

W2 Band and housing: stainless steel

Material No. 1.4016 / UNS S43000

Hexagon-head screw: steel, zinc-plated

#### Material 177

W3 All parts stainless steel

Material No. 1.4016 / UNS S43000

W4 All parts stainless steel

Material No. 1.4301 / UNS S30400

Please ask for availability.

#### Standard Series

Diameter range	Width x Thickness
8.0 – 32.0 mm	9 x 0.6 mm
25.0 – 160.0 mm	9 x 0.7 mm
25.0 – 390.0 mm	12 x 0.8 mm

#### Clamp design

Oetiker Worm Drive Clamps are technically advanced, multi-range hose clamps, which cover a very wide range of clamping diameters. Hoses of differing diameters can be securely connected with a single size.

Manufactured by cold-forming, the bands of these worm drive clamps have a slightly curved form. The depth of the thread impressions reduces to each side – the thread impressions have their full depth in the middle.

Worm drive clamps in material qualities W1 and W2 have a 7 A/F hexagon head screw with cross recess (Phillips). Clamps in material qualities W3 and W4 have a hexagon-head screw with a standard screwdriver slot.

#### Recommended installation

For professional installation, we recommend using a flexible screwdriver. This tool ensures safe installation even in hard-to reach locations. For series installation requiring high process reliability, electronically monitored controlled-torque screwdrivers should be used.

Static tightening torque:

Clamping range	B = 9	B = 12
8 – 20	2 +0.5 Nm	
16 – 160	3 +0.5 Nm	
25 – 390		5 +0.5 Nm

Static test torque:

Clamping range	B = 9	B = 12
8 – 20	max. 2.6 Nm	
16 – 160	max. 4.0 Nm	
25 – 390		max. 6.5 Nm

B = band width

## Order information

Item No.	Ref. No.	Size range (mm)	Item No.	Ref. No.	Size range (mm)
Worm Drive Clamps W2			Worm Drive Clamps W2		
Band width 9 mm, thickness 0.6 mm			Band width 12 mm, thickness 0.8 mm		
12600451	09/008016 W2	8 – 16	12600352	12/025040 W2	25 – 40
12600452	09/012020 W2	12 – 20	12600339	12/030045 W2	30 – 45
12600453	09/016025 W2	16 – 25	12600330	12/032050 W2	32 – 50
12600454	09/020032 W2	20 – 32	12600450	12/035055 W2	35 – 55

Worm Drive Clamps W2		
Band width 9 mm, thickness 0.7 mm		
12600429	09/025040 W2	25 – 40
12600430	09/030045 W2	30 – 45
12600431	09/032050 W2	32 – 50
12600432	09/040060 W2	40 – 60
12600433	09/050070 W2	50 – 70
12600434	09/060080 W2	60 – 80
12600435	09/070090 W2	70 – 90
12600467	09/080100 W2	80 – 100
12600468	09/090110 W2	90 – 110
12600469	09/100120 W2	100 – 120
12600470	09/110130 W2	110 – 130
12600471	09/120140 W2	120 – 140
12600472	09/130150 W2	130 – 150
12600473	09/140160 W2	140 – 160
12600354	12/045065 W2	45 – 65
12600341	12/050070 W2	50 – 70
12600444	12/055075 W2	55 – 75
12600342	12/060080 W2	60 – 80
12600343	12/070090 W2	70 – 90
12600355	12/075095 W2	75 – 95
12600338	12/080100 W2	80 – 100
12600344	12/090110 W2	90 – 110
12600345	12/100120 W2	100 – 120
12600346	12/110130 W2	110 – 130
12600347	12/120140 W2	120 – 140
12600348	12/130150 W2	130 – 150
12600349	12/140160 W2	140 – 160
12600350	12/150170 W2	150 – 170
12600351	12/160180 W2	160 – 180
12600353	12/170190 W2	170 – 190
12600395	12/180200 W2	180 – 200

Other diameter ranges on request.

Item No.	Ref. No.	Size range (mm)
Worm Drive Clamps W2		
Band width 12 mm, thickness 0.8 mm		
12600352	12/025040 W2	25 – 40
12600339	12/030045 W2	30 – 45
12600330	12/032050 W2	32 – 50
12600450	12/035055 W2	35 – 55
12600340	12/040060 W2	40 – 60
12600354	12/045065 W2	45 – 65
12600341	12/050070 W2	50 – 70
12600444	12/055075 W2	55 – 75
12600342	12/060080 W2	60 – 80
12600343	12/070090 W2	70 – 90
12600355	12/075095 W2	75 – 95
12600338	12/080100 W2	80 – 100
12600344	12/090110 W2	90 – 110
12600345	12/100120 W2	100 – 120
12600346	12/110130 W2	110 – 130
12600347	12/120140 W2	120 – 140
12600348	12/130150 W2	130 – 150
12600349	12/140160 W2	140 – 160
12600350	12/150170 W2	150 – 170
12600351	12/160180 W2	160 – 180
12600353	12/170190 W2	170 – 190
12600395	12/180200 W2	180 – 200
12600401	12/190210 W2	190 – 210
12600396	12/200220 W2	200 – 220
12600397	12/210230 W2	210 – 230
12600400	12/220240 W2	220 – 240
12600417	12/230250 W2	230 – 250
12600398	12/240260 W2	240 – 260
12600418	12/250270 W2	250 – 270
12600460	12/260280 W2	260 – 280
12600419	12/270290 W2	270 – 290
12600443	12/280300 W2	280 – 300
12600426	12/290310 W2	290 – 310
12600399	12/300320 W2	300 – 320
12600420	12/350370 W2	350 – 370
12600421	12/370390 W2	370 – 390

Other diameter ranges on request.

## Order information

Item No.	Ref. No.	Size range (mm)
<b>Worm Drive Clamps W3</b>		
Band width 9 mm, thickness 0.6 mm		
17700510	09/008016 W3	8 – 16
17700511	09/012020 W3	12 – 20
17700514	09/016025 W3	16 – 25
17700515	09/020032 W3	20 – 32

17700462	09/025040 W3	25 – 40
17700463	09/030045 W3	30 – 45
17700464	09/032050 W3	32 – 50
17700465	09/035055 W3	35 – 55
17700466	09/040060 W3	40 – 60
17700467	09/050070 W3	50 – 70
17700468	09/060080 W3	60 – 80
17700469	09/070090 W3	70 – 90
17700470	09/080100 W3	80 – 100
17700471	09/090110 W3	90 – 110
17700472	09/100120 W3	100 – 120
17700473	09/110130 W3	110 – 130
17700474	09/120140 W3	120 – 140
17700475	09/130150 W3	130 – 150
17700476	09/140160 W3	140 – 160

Other diameter ranges on request.

Item No.	Ref. No.	Size range (mm)
<b>Worm Drive Clamps W3</b>		
Band width 12 mm, thickness 0.8 mm		
17700528	12/025040 W3	25 – 40
17700529	12/030045 W3	30 – 45
17700530	12/032050 W3	32 – 50
17700531	12/035055 W3	35 – 55
17700532	12/040060 W3	40 – 60
17700533	12/045065 W3	45 – 65
17700534	12/050070 W3	50 – 70
17700535	12/055075 W3	55 – 75
17700536	12/060080 W3	60 – 80
17700546	12/070090 W3	70 – 90
17700547	12/075095 W3	75 – 95
17700548	12/080100 W3	80 – 100
17700549	12/090110 W3	90 – 110
17700550	12/100120 W3	100 – 120
17700551	12/110130 W3	110 – 130
17700552	12/120140 W3	120 – 140
17700553	12/130150 W3	130 – 150
17700554	12/140160 W3	140 – 160
17700555	12/150170 W3	150 – 170
17700614	12/160180 W3	160 – 180
17700615	12/170190 W3	170 – 190
17700616	12/180200 W3	180 – 200
17700617	12/190210 W3	190 – 210
17700618	12/200220 W3	200 – 220
17700619	12/210230 W3	210 – 230
17700620	12/220240 W3	220 – 240
17700621	12/230250 W3	230 – 250
17700622	12/240260 W3	240 – 260
17700623	12/250270 W3	250 – 270
17700624	12/260280 W3	260 – 280
17700625	12/270290 W3	270 – 290
17700626	12/280300 W3	280 – 300
17700627	12/290310 W3	290 – 310
17700628	12/300320 W3	300 – 320
17700629	12/350370 W3	350 – 370
17700630	12/370390 W3	370 – 390

Other diameter ranges on request.

## Order information

Item No.	Ref. No.	Size range (mm)
Worm Drive Clamps W4		
Band width 9 mm, thickness 0.6 mm		
17700512	09/008016 W4	8 – 16
17700513	09/012020 W4	12 – 20
17700516	09/016025 W4	16 – 25
17700517	09/020032 W4	20 – 32

17700517	09/020032 W4	20 - 32
<b>Worm Drive Clamps W4</b>		
Band width 9 mm, thickness 0.7 mm		
17700477	09/025040 W4	25 - 40
17700478	09/030045 W4	30 - 45
17700479	09/032050 W4	32 - 50
17700480	09/035055 W4	35 - 55
17700481	09/040060 W4	40 - 60
17700482	09/050070 W4	50 - 70
17700483	09/060080 W4	60 - 80
17700484	09/070090 W4	70 - 90
17700485	09/080100 W4	80 - 100
17700486	09/090110 W4	90 - 110
17700487	09/100120 W4	100 - 120
17700488	09/110130 W4	110 - 130
17700489	09/120140 W4	120 - 140
17700490	09/130150 W4	130 - 150
17700491	09/140160 W4	140 - 160

Other diameter ranges on request.

Item No.	Ref. No.	Size range (mm)
<b>Worm Drive Clamps W4</b>		
Band width 12 mm, thickness 0.8 mm		
17700537	12/025040 W4	25 – 40
17700538	12/030045 W4	30 – 45
17700539	12/032050 W4	32 – 50
17700540	12/035055 W4	35 – 55
17700541	12/040060 W4	40 – 60
17700542	12/045065 W4	45 – 65
17700543	12/050070 W4	50 – 70
17700544	12/055075 W4	55 – 75
17700545	12/060080 W4	60 – 80
17700556	12/070090 W4	70 – 90
17700557	12/075095 W4	75 – 95
17700558	12/080100 W4	80 – 100
17700559	12/090110 W4	90 – 110
17700560	12/100120 W4	100 – 120
17700561	12/110130 W4	110 – 130
17700562	12/120140 W4	120 – 140
17700563	12/130150 W4	130 – 150
17700564	12/140160 W4	140 – 160
17700565	12/150170 W4	150 – 170
17700648	12/160180 W4	160 – 180
17700649	12/170190 W4	170 – 190
17700650	12/180200 W4	180 – 200
17700651	12/190210 W4	190 – 210
17700652	12/200220 W4	200 – 220
17700653	12/210230 W4	210 – 230
17700654	12/220240 W4	220 – 240
17700655	12/230250 W4	230 – 250
17700656	12/240260 W4	240 – 260
17700657	12/250270 W4	250 – 270
17700658	12/260280 W4	260 – 280
17700659	12/270290 W4	270 – 290
17700660	12/280300 W4	280 – 300
17700661	12/290310 W4	290 – 310
17700662	12/300320 W4	300 – 320
17700663	12/350370 W4	350 – 370
17700664	12/370390 W4	370 – 390

Other diameter ranges on request.

North America: 126

North America: 177



Housing with screw  
Housing saddle

Conforms to SAE J1508 Type "F" (North America): Perforated band, large clamping range

Short housing saddling: even radial load

Robust housing connection: high radial loads

High quality materials: good corrosion resistance

## Worm Drive Clamps North America conform to SAE<sup>1</sup> J1508 Type "F" 126 & 177

### Material 126

Band and housing are stainless steel materials UNS 201/301, respectively

Hex-head screw is carbon steel, zinc-plated

### Material 177

Band and housing are stainless steel materials UNS 201/301, respectively

Hex-head screw is stainless steel, UNS 410

### Series

Diameter range	width x thickness
----------------	-------------------

3/8 – 7.0 in	1/2 x 0.025 in
--------------	----------------

10 – 178 mm	12.7 x 0.63 mm
-------------	----------------

Other material qualities and diameter ranges on request.

Oetiker Worm Drive Clamps are suitable for numerous applications, for example for agricultural and forestry machinery, on ship and marine applications, in maintenance, repair and operations industries, etc. As a result of the generous clamping range, the same size of clamp can be used for several joint diameters.

A choice of materials to suit the application makes them a practical solution for the low and medium pressure ranges. Oetiker Worm-Drive Clamps comply fully with the requirements of SAE J1508 for Type "F" clamps.

### Recommended assembly

For professional assembly, we recommend use of a flexible screwdriver. This tool ensures safe assembly even in hard-to-reach locations.

In series production where there are high process reliability requirements, use of an electronically-monitored Oetiker torque screwdriver should be considered.

<sup>1</sup> SAE = Society of Automotive Engineers

Item No.		Assembly tool
14100316		Flexible screwdriver 5/16"
<b>Recommended assembly torque</b>		
Product Group		Torque (in-lb/Nm)
126		max. 30/max. 3.4
177		max. 35/max. 4.0
<b>Minimum ultimate torque</b>		
Product Group		Torque (in-lb/Nm)
126		min. 60/min. 6.9
177		min. 60/min. 6.9

**Order information**

Item No.	SAE Size No.	Diameter range (in)	Diameter range (mm)	Item No.	SAE Size No.	Diameter range (in)	Diameter range (mm)
<b>Worm Drive Clamps 126</b>							
Band width 1/2 in (12.7 mm), thickness 0.025 in (0.63 mm)							
12600359	6	3/8 – 7/8	9 – 22	17700338	6	3/8 – 7/8	9 – 22
12600374	8	7/16 – 1	11 – 25	17700339	8	7/16 – 1	11 – 25
12600375	10	1/2 – 1 1/16	13 – 27	17700340	10	1/2 – 1 1/16	13 – 27
12600376	12	9/16 – 1 1/4	14 – 32	17700341	12	9/16 – 1 1/4	14 – 32
12600377	16	11/16 – 1 1/2	17 – 38	17700342	16	11/16 – 1 1/2	17 – 38
12600378	20	3/4 – 1 3/4	19 – 44	17700343	20	3/4 – 1 3/4	19 – 44
12600379	24	1 – 2	25 – 51	17700344	24	1 – 2	25 – 51
12600380	28	1 1/4 – 2 1/4	32 – 57	17700345	28	1 1/4 – 2 1/4	32 – 57
12600381	32	1 1/2 – 2 1/2	38 – 63	17700346	32	1 1/2 – 2 1/2	38 – 63
12600382	36	1 13/16 – 2 3/4	46 – 70	17700347	36	1 13/16 – 2 3/4	46 – 70
12600383	40	2 – 3	52 – 76	17700348	40	2 – 3	52 – 76
12600384	44	2 1/4 – 3 1/4	57 – 82	17700349	44	2 1/4 – 3 1/4	57 – 82
12600385	48	2 1/2 – 3 1/2	65 – 89	17700350	48	2 1/2 – 3 1/2	65 – 89
12600386	52	2 3/4 – 3 3/4	70 – 95	17700351	52	2 3/4 – 3 3/4	70 – 95
12600387	56	3 – 4	78 – 101	17700352	56	3 – 4	78 – 101
12600388	60	3 1/4 – 4 1/4	83 – 108	17700353	60	3 1/4 – 4 1/4	83 – 108
12600389	64	2 1/2 – 4 1/2	64 – 114	17700354	64	2 1/2 – 4 1/2	64 – 114
12600390	72	3 – 5	76 – 127	17700355	72	3 – 5	76 – 127
12600391	80	3 1/2 – 5 1/2	89 – 140	17700356	80	3 1/2 – 5 1/2	89 – 140
12600392	88	4 – 6	102 – 152	17700357	88	4 – 6	102 – 152
12600393	96	4 1/2 – 6 1/2	114 – 165	17700358	96	4 1/2 – 6 1/2	114 – 165
12600394	104	5 – 7	127 – 178	17700359	104	5 – 7	127 – 178

# Multi Crimp Rings

p. 98

MCR AL – Puzzle lock design  
Aluminum  
150



Full material cross-section over  
360°:

+ Constant pressure applied uni-  
formly around the circumference

Low assembled height:

+ Minimum space requirement

+ No imbalance on rotating parts

Nominal diameter up to 120 mm:

+ Suitable for universal application,  
in particular for thermoplastic  
components

Aluminum version:

+ Reduced weight

Oetiker will be pleased to help you to find the correct choice for your application. Send sample parts and all relevant information for your specific application to Oetiker, and you will receive recommendations for product type, diameter, and method of assembly.

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MCR R – spirally welded

Stainless steel

150



Full material cross-section over  
360°:

+ Constant pressure applied uniformly around the circumference

Low assembled height:

+ Minimum space requirement

+ No imbalance on rotating parts

Nominal diameter up to 50 mm:

+ Especially suitable for cooling and heating water circuits, and for airbag systems



Full material cross-section over 360°: constant pressure applied uniformly around the circumference

Flexible diameter reduction: high, adjustable surface pressure, very easy to install

Low assembled height: minimum space requirement, no imbalance on rotating parts

Specially formed strip edges: reduced risk of damage to parts being clamped

Aluminum version\*: reduced weight

## Multi Crimp Rings MCR 150

MCR with Puzzle lock design

Material

Aluminum, Material EN AW-5754

Corrosion resistance according to DIN EN ISO 9227

$150 \geq 400h$

Size range

24.5 – 120.0 mm

Material dimensions

7.0 x 1.5 mm

10.0 x 1.5 mm

Diameter reduction\*

$\varnothing 24.5 - \varnothing 26.5$  mm: max. up to  $\varnothing 21.9$  mm

$\varnothing 27.0 - \varnothing 40.0$  mm: max. 5 mm

$\varnothing 40.5 - \varnothing 120.0$  mm: max. 6 mm

Puzzle design (interlock)

The interlock is a mechanical connection employing very precise mating elements. Its design creates a positive mechanical connection. It ensures secure connection of the ring ends within the permissible load range.

Field of application

The MCR with a puzzle lock is universally applicable due to its large diameter area, but is especially suitable for thermoplastics.

\* The diameter reduction is dependent on the nominal diameter of the MCR.

MCR spirally welded

#### Material

Stainless steel, Material no. 1.4307/UNS S30403

Corrosion resistance according to DIN EN ISO 9227

150 ≥ 800h

#### Size range

5.0 – 50.0 mm

#### Material dimensions

On request

#### Diameter reduction\*

Ø 5.0 – Ø 19.0 mm: application-specific

Ø 19.5 – Ø 30.0 mm: max. 20%

Ø 30.5 – Ø 50.0 mm: max. 6 mm

Individual diameters and product variants are only available in appropriate minimum quantities.

\* The diameter reduction is dependent on the nominal diameter of the MCR.

#### Material dimensions

Oetiker Multi Crimp Rings are available in a range of dimensions and materials. The band dimensions should be chosen to take into account the required radial force, the nature of the hose, to ensure the necessary sealing and/or retention properties under the relevant ambient conditions, and any mechanical loads on the MCR.

#### Diameter reduction

The maximum possible diameter reduction is dependent on the MCR's nominal diameter. The MCR's nominal diameter should be kept as small as possible in relation to the diameter of the parts being clamped in order to shorten shrinking times, simplify positioning, and reduce the material load on the MCR.

Oetiker will be pleased to help you to find the correct choice for your specific application.

A change in the material structure and the band sizes must necessarily take place during assembly. Bear in mind that the smaller the corresponding MCR diameter is, the more drastic these changes will be. The reason for this is the material quantity in relation to the diameter.

The required degree of compression, or the surface pressure exerted on the part being clamped by an MCR depends on the radial force which, in turn, determines the retention and sealing properties.

Each surface pressure must be determined according to the specific application. If the Oetiker shrinking tools specially developed for this purpose are used, an approximately 360° surface pressure of the parts being clamped is achieved without any overlap due to the inner surfaces of the MCR.

#### Recommendations for installing MCRs

Oetiker Multi Crimp Rings should be closed using the swaging tools developed for them. The Oetiker Swaging Tool ELS 01 offers many advantages for industrial use, for example, opening of the fixture for optimum accessibility and automatic locking, through to the electronic verification of process parameters for force-priority closure. Alternatively, conventional multi segment hydraulic and pneumatic swaging tools are commercially available. For small lots in the diameter range 5.0 – 25.0 mm, Oetiker provides the Cordless Crimp Pincer CC 01.

#### Field of application

The spirally welded MCR is especially suitable for cooling and heating water circuits as well as for airbag systems.

#### Tolerance compensation

Tolerance compensation when installing Oetiker Multi Crimp Rings depends entirely on the function sequence of the assembly tool. Fundamentally, with diameter-priority assembly of Oetiker Multi Crimp Rings, tolerance compensation is impossible, because the MCR is simply closed to a specified diameter. This means that the tolerances of components exert their full effect on the degree of compression or the surface pressure applied to the part being clamped. With this type of assembly, everything else is subjugated to achieving a defined diameter.

Thus, tolerance compensating assembly of an MCR can only be achieved with force-priority regulation. Or, to put it a different way, the basic principle here is not pressing to a given diameter, but achieving an empirically determined closing force, and so the surface pressure associated with it.

With the innovative closure concept of the "Oetiker ELS 01", high process reliability combined with the force-priority, verified assembly of Oetiker Multi Crimp Rings is assured. Gauges for checking the closing force are also available.

#### Order information

For detailed order information, please contact your local Oetiker branch.

# Profile Clamps

p. 102

Levi Heavy Duty V-Profile Clamps  
280



Lightweight and space efficient

Superior joint integrity

Quick and easy assembly

Engineered to suit customer  
requirements

Application:  
Turbo connections  
DP filters  
Charge air systems  
Exhaust systems

Oetiker will be pleased to help you to find the correct choice for your application. Send sample parts and all relevant information for your specific application to Oetiker, and you will receive recommendations for product type, diameter, and method of assembly.

#### 1-Ear V-Profile Clamp\*

(on request)

190



#### V-Profile:

- + Secure and quickly assembled connections

#### Clamp ear:

- + Compact, robust fastening
- + Tolerance compensation

#### Flexible:

- + Customer-specific versions for form and function

#### Application:

Exhaust systems

Filter units

Suction and compressed air hose  
(heat shields)

etc.

\* For detailed ordering information please contact your local Oetiker branch.



Compact design: **lightweight and space efficient**

High strength: **superior joint integrity**

Assembly-friendly: **quick and easy assembly**

360° positioning: **provides easy access to components in compact environments**

Engineered solutions: **to suit customer requirements**

## Levi Heavy Duty V-Profile Clamps 280

### Material

W4 Band: 1.4404

Threaded trunnion: 1.4305

Slotted trunnion: 1.4305

Profile segments: 1.4509

ISO 4762 – M8x70 fully threaded: A4-80, Fe/Zn5C1

### Other materials on request

Corrosion resistance according to ISO 9227

W4 ≥ 200 hours

### Size range

50.0 – 500.0 mm (Larger sizes on request)

### Band widths

15.0 mm / 20.0 mm / 25.0 mm / 30.0 mm / 35.0 mm

### Band thickness

1.0 mm / 1.5 mm / 2.0 mm / 2.5 mm

### V-profile material thickness

1.0 mm / 1.5 mm

For clamp inside diameters 50.0 – 100.0 mm

1.5 mm / 2.0 mm

For clamp inside diameters 100.0 – 300.0 mm

2.0 mm / 2.5 mm / 3.0 mm

For clamp inside diameters > 300.0 mm

### Recommended installation torque

M 6 = 7 Nm

M 8 = 15 Nm

M10 = 25 Nm

M12 = 30 Nm

### Recommended tightening speed

250 – 350 rpm

Levi Heavy Duty V-Profile Clamps are used to pull together and connect two circular flanges. They are designed and manufactured from both standard and non-standard components to create a range of final products configured to meet specific application requirements.

The Levi Heavy Duty V-Profile Clamps are very robust and can operate reliably and safely under conditions of stress, vibration, corrosion and temperature variation.

#### Hardware

Our standard Levi Heavy Duty V-Profile Clamps feature a hexagon socket bolt, threaded up the neck, a threaded trunnion and a quick lock type trunnion for a quick and reliable assembly.

To reduce friction all stainless bolts are coated.

A range of trunnions is also available to suit numerous application requirements such as rotation limitations, prevailing torque etc.

#### Profiles

We manufacture a number of different segment profiles to suit different applications. The internal profile diameter can be chosen in millimeter increments. It is recommended that the application and any specific requirements be discussed in detail with Oetiker first. In this way, we can ensure that maximum and minimum diameter tooling is available, and that the optimum clamp is selected to ensure fit and provide a secure joint.

Pressed profiles between Ø 50.0 – Ø 150.0 mm

Rolled profiles from Ø 150.0 – Ø 500.0 mm

#### Standard V-profile types

Standard angle 40°



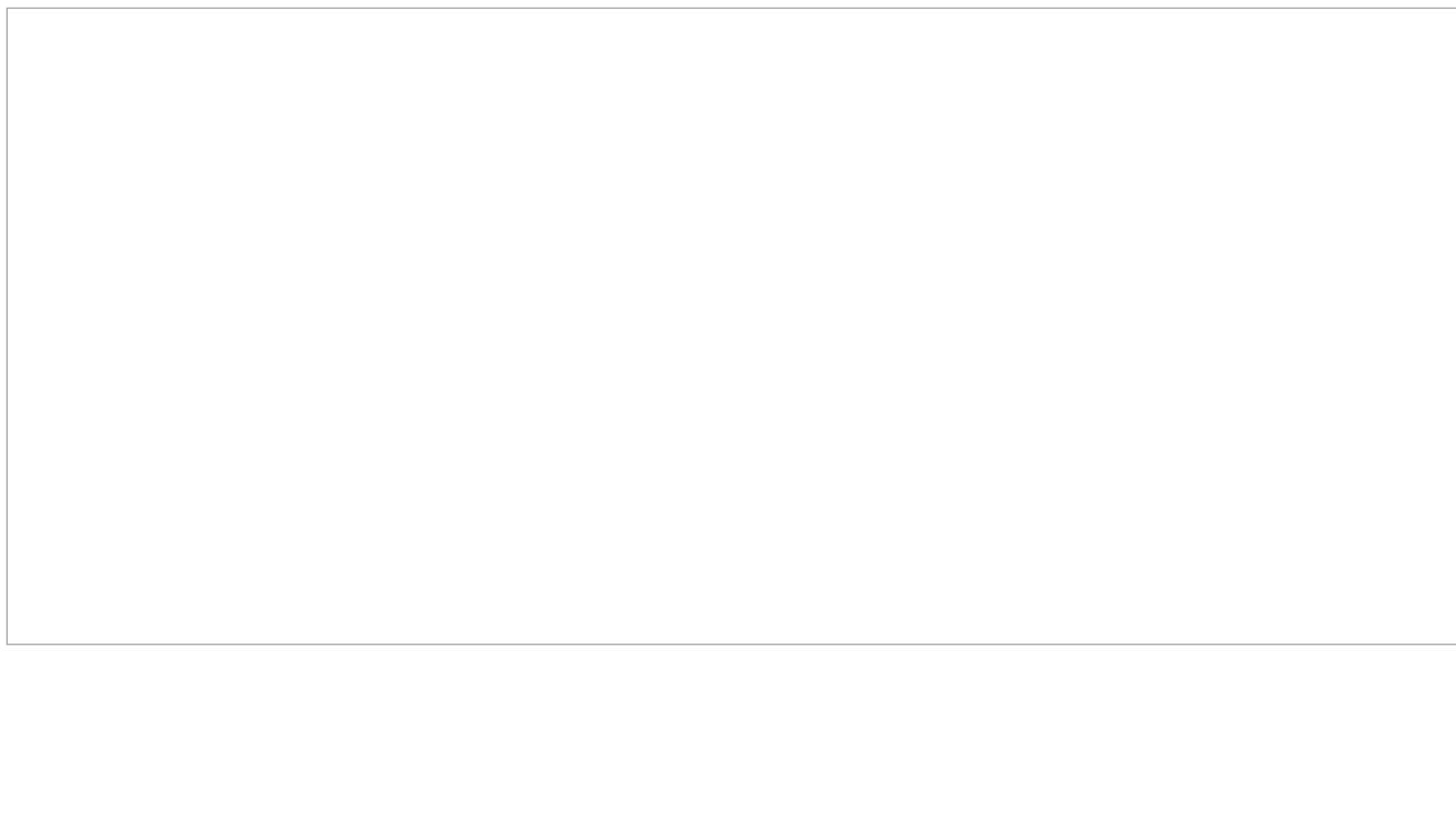
#### Flange design

Flanges can be machined or formed to meet the specific dimensions for every application. Prior to finalizing your flange design it is recommended that the application and any specific requirements be discussed in detail with us first.

Please contact our engineering department for support.

For a guideline of flange design and dimensions we refer to the DIN standard 3016-3.

## Straps



Oetiker will be pleased to help you to find the correct choice for your application. Send sample parts and all relevant information for your specific application to Oetiker, and you will receive recommendations for product type, diameter, and method of assembly.

p. 106

**Levi Heavy Duty Straps**  
283



Ultimate flexibility: many designs  
and configurations

Quick and easy assembly

Engineered to suit customer  
requirements

Application:  
**Fuel tanks**  
**Compressed air vessels**  
**Particle filters**  
**EGR coolers**  
**Mufflers**  
**Exhaust systems**  
**Filter casings**  
**Water tanks**



Engineered solutions: to suit customer requirements

Ultimate flexibility: many designs and configuration regarding strap end connector styles + material selection + length/thickness + and surface finishing

Assembly-friendly: quick and easy assembly + lightweight

## Levi Heavy Duty Straps 283

### Band material

[Carbon steel](#)

[Stainless steel](#)

### Surface treatment

[Untreated](#)

[Zinc coated](#)

[Aluzinc](#)

[Galvanized](#)

[Anti-corrosion primers](#)

[Powder coated](#)

### Hardware

[Loops](#)

[Bolts and trunnions](#)

[T-Bolts](#)

[Quick locks](#)

[Weld nuts/bolts](#)

[Riveting](#)

### Length

[30.00 – 3000.00 mm](#)

### Band widths

[15 – 110 mm](#)

### Band thickness

[0.7 – 3.0 mm](#)

### Fasteners

[M6 / M8, M8 / M10, M10 / M12](#)

### Engineered tank straps

With the support of our engineering team we are able to supply cost-effective and robust tank strap solutions. We can offer everything from changes in existing products to completely new strap solutions. We manufacture our tank straps in different materials. The straps can be surface treated or coated according to the customer specifications. In addition standard hardware and thermoplastic liners are also available in a large range.

### Tank strap assemblies

We are able to offer a large variety of standardized fasteners and rubber/plastic in-liners for the straps. Thanks to large volumes and our lean and cost-effective process we are able to supply you with robust and validated strap assemblies at highly competitive prices.

### Variants

The Levi heavy duty straps and clamps can be offered in different variants like flat or pre-formed bands, with C-shaped liners in rubber and thermoplastic materials or pre-assemblies of covers/hardware. We can manufacture different lengths that can fit a cylindrical or customized installation.

Please use our strap design configurator to find our standard range that fits your application. (<http://strapguide.oetiker.com>)

# Assembly Tools

## Assembly of Ear Clamps and Low Profile Clamps

p. 110

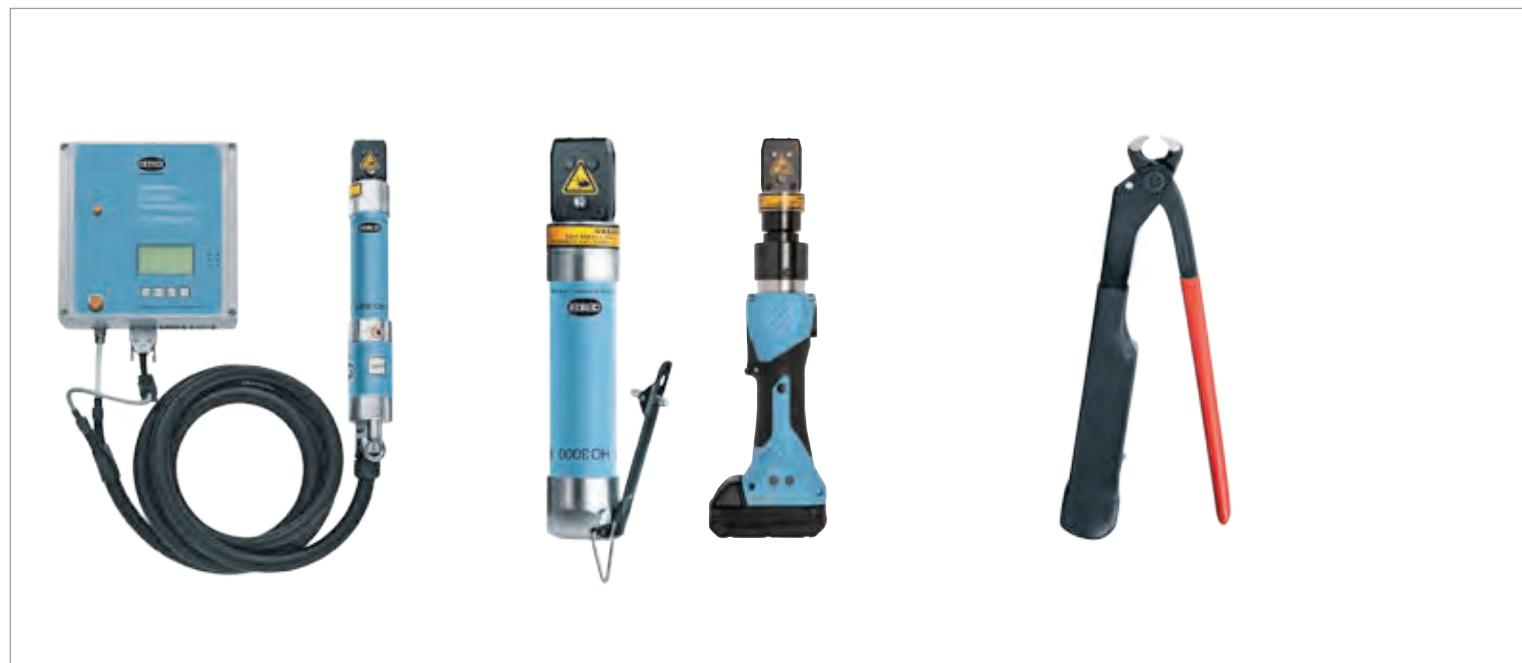
p. 126

p. 130

Electronically controlled pneumatic  
Pincer

Pneumatic and Cordless Pincers

Hand installation pincers



Reliable process with electronic monitoring of all specified parameters – 100% documentation

High process reliability

Manual closure of clamps

Complete integration into automated systems

Efficient, uniform assembly

Communication via PLC\* and PC

Cordless version for flexible use

Optimal usability with the aid of function keys and large display

\* PLC = Programmable Logic Controller

Oetiker will be pleased to help you to find the correct choice for your application. Send sample parts and all relevant information for your specific application to Oetiker, and you will receive recommendations for product type, diameter, and method of assembly.

#### Assembly of Multi Crimp Rings

p. 132



p. 134

#### Swaging tools



#### Calibration of closing forces

p. 140

#### Test Equipment



Efficient, cordless assembly of small Multi Crimp Rings

Lightweight, ergonomic design for easy handling

#### Assembly of Multi Crimp Rings

Separable or vertical opening for optimum component access

Intermeshing swaging segments guarantee 360° degree compression of MCR

Fast and simple exchange of swaging jaws

Calibration of closing force of assembly tools

Ensures uniform, reproducible process quality



Control Unit



With Type EL – pincer with standard trigger (EL = electronic version)



or with Type ELT – pincer with extended trigger (ELT = electronic version with extended trigger)

**Highly efficient, verified assembly**

Process reliability, electronic monitoring of parameters – 100% documentation

Multiple closure prevention

Optimal usability thanks to function keys and large display

Force or stroke-priority closure

Complete integration into automated systems (via USB-, extended mixed signal- and RS232 port)

## Electronically Controlled Pneumatic Pincer Oetiker ELK 02

This high quality, complete pincer system ensures the uniform and reliable assembly of Oetiker clamps and consists of the control unit and the pincer.

For optimal adaption to any requirement a wide range of pincer body sizes and pincer heads is available. The control unit can be selected with plug types for different regions.

Oetiker will be pleased to help you to find the correct choice for your application.

Data log acquisition from an Oetiker ELK 02 is available in the integrated "Measurement"-mask, when connected to a PC.

Standard hose/cable length of the Trigger unit is 3 m. Alternative hose/cable lengths, also as angled versions, on request.

The ELK 02 control unit and the software can be operated in different languages. The technical description is included on a CD.

**Selection example**

For a closing force of approx. 3000 N and using an HO 3000 EL, the available inlet pressure must be at least 6 bar. The closing force itself must be set to the required data by changing parameters in the ELK 02 control unit. This can be done using a PC. The closure can be triggered off manually or by programming a sequence into the ELK02 or by an external control signal. A closing force tester, for example Test Equipment CAL 01, is used to determine and set the correct closing force.

To maintain consistent pincer force, sufficient compressed air pressure and volume must be provided.

## Technical data ELK 02 control unit

<b>Power supply:</b>	85–265 V / 47–63 Hz
<b>Power requirement:</b>	30 Va (Fuse 10 A)
<b>Compressed air supply:</b>	4–10 bar
<b>External dimensions:</b>	200 x 230 x 70 mm
<b>Weight:</b>	3.7 kg

## Delivery scope ELK 02 control unit

Control unit item no.	13600289
PC Software ELK 02	
CD with operating instructions	
Compressed air connection set (incl. filter/water separator)	
Connection cable for all interfaces	
Main cable with country-specific plug	

## Selection of control unit

Plug type	Schuko plug (plug type F, 3-pole)	CH (plug type J, 3-pole)	UK (plug type G, 3-pole)	USA (plug type B, 3-pole)	South America (plug 3-pole)	AUS (plug type I, 3-pole)	Japan (plug type B, 3-pole)
Norm conformity	CEE 7/4	SEV 1011	BS 1363	NEMA 5-15	NBR 14136	AS 3112	NEMA 5-15
Item No.	13600348	13600349	13600350	13600351	13600352	13600353	13600354

For control unit ELK 02, order pincer and pincer head in accordance with the requirements of the Oetiker clamp type to be assembled: see following pages.

## Selection of complete pincer systems

The complete pincer system consists of pincer head and pincer.

1) First select the pincer head in accordance with the requirement.

2) Then select the pincer type (EL or ELT) in the corresponding columns below. The item numbers for the complete pincer include the pincer and the desired pincer head.

## Pincer heads

Jaw width (mm)	5.5	7.5	7.5	10.2	10.2	10.5	10.5	14.5	14.5
Open gap (mm)	8.6	11.6	13.2	13.2	16.2	13.7	16.6	16.6	16.6
For ear width* (mm)	</= 7	8	10	10	13	10	13	13	13
Item No.	13900156	13900152	13900148	13900119	13900140	13900112	13900097	13900544	13900774

\* measured inside

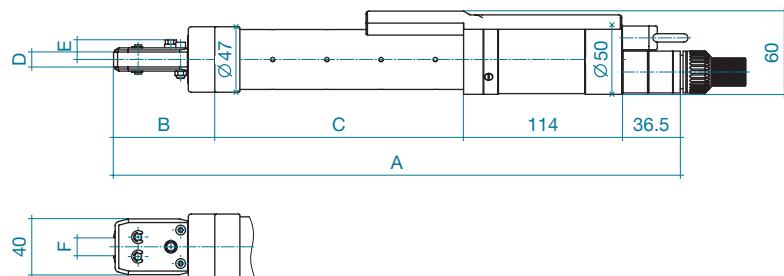
Type HO X000 EL – Pincer with standard trigger										EL without pincer head
HO 2000 EL										
Pincer complete	13900187	13900188	<b>13900189</b>	<b>13900191</b>	-	-	-	-	-	13900231
Replacement-jaw kit	13900166	13900167	13900168	13900163	-	-	-	-	-	
HO 3000 EL										
Pincer complete	-	13900192	<b>13900193</b>	<b>13900195</b>	13900196	-	-	-	-	13900232
Replacement-jaw kit	-	13900167	13900168	13900163	13900170	-	-	-	-	
HO 4000 EL										
Pincer complete	-	-	-	13900199	13900200	-	-	-	-	13900233
Replacement-jaw kit	-	-	-	13900163	13900170	-	-	-	-	
HO 5000 EL										
Pincer complete	-	-	-	-	-	<b>13900201</b>	13900202	-	-	13900234
Replacement-jaw kit	-	-	-	-	-	13900164	13900165	-	-	
HO 7000 EL										
Pincer complete	-	-	-	-	-	<b>13900203</b>	13900204	13900547	-	13900235
Replacement-jaw kit	-	-	-	-	-	13900164	13900165	13900545	-	

Type HO X000 ELT – Pincer with extended trigger										ELT without pincer head
HO 2000 ELT										
Pincer complete	13900529	13900530	<b>13900496</b>	<b>13900532</b>	-	-	-	-	-	13900333
Replacement-jaw kit	13900166	13900167	13900168	13900163	-	-	-	-	-	
HO 3000 ELT										
Pincer complete	-	13900533	<b>13900534</b>	<b>13900373</b>	13900536	-	-	-	-	13900335
Replacement-jaw kit	-	13900167	13900168	13900163	13900170	-	-	-	-	
HO 4000 ELT										
Pincer complete	-	-	-	13900539	13900540	-	-	-	-	13900337
Replacement-jaw kit	-	-	-	13900163	13900170	-	-	-	-	
HO 5000 ELT										
Pincer complete	-	-	-	-	-	<b>13900525</b>	13900526	-	-	13900339
Replacement-jaw kit	-	-	-	-	-	13900164	13900165	-	-	
HO 7000 ELT										
Pincer complete	-	-	-	-	-	<b>13900382</b>	13900541	13900723	-	13900341
Replacement-jaw kit	-	-	-	-	-	13900164	13900165	13900545	-	
HO 10000 ELT										
Pincer complete	-	-	-	-	-	-	-	-	-	13900805
Replacement-jaw kit	-	-	-	-	-	-	-	-	-	13900545

Item numbers in **bold type** belong to the recommended basic equipment. Replacement jaw kit = left and right pincer jaws complete with all necessary parts. The jaw width must be at least 0.5 mm wider than the band used for the clamps to be assembled. The opening gap should be wide enough for the largest ear.

## Technical data

HO 2000 EL/ELT, HO 3000 EL/ELT, HO 4000 EL/ELT



## Pincer heads

Jaw width (mm)	5.5	7.5	7.5	10.2	10.2	10.2
For ear width* (mm)	</= 7	8	10	8	10	13
Item No.	13900156	13900152	13900148	13900144	13900119	13900140

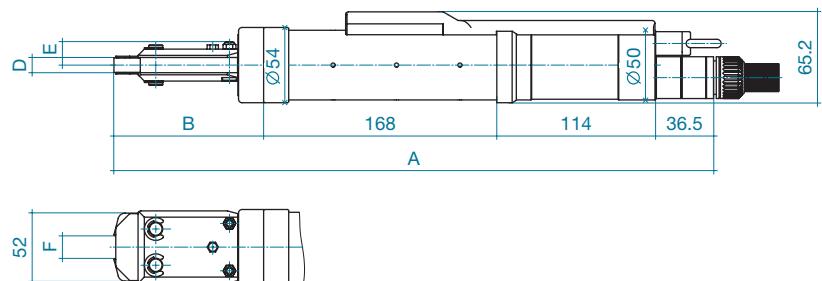
## Type of pincer

HO 2000 EL/ELT	A (mm)	325.0	324.0	324.0	324.0	324.0	-
	B (mm)	74.0	73.0	73.0	73.0	73.0	-
	C (mm)	101.0	101.0	101.0	101.0	101.0	-
	D (mm)	5.5	7.5	7.5	10.2	10.2	-
	E (mm)	12.3	13.3	13.3	14.9	14.9	-
	F (mm)	8.6	11.6	13.2	11.6	13.2	-
HO 3000 EL/ELT	A (mm)	-	363.0	363.0	363.0	363.0	368.0
	B (mm)	-	73.0	73.0	73.0	73.0	78.0
	C (mm)	-	140.0	140.0	140.0	140.0	140.0
	D (mm)	-	7.5	7.5	10.2	10.2	10.2
	E (mm)	-	13.3	13.3	14.9	14.9	14.9
	F (mm)	-	11.6	13.2	11.6	13.2	16.2
HO 4000 EL/ELT	A (mm)	-	-	402.0	402.0	402.0	407.0
	B (mm)	-	-	73.0	73.0	73.0	78.0
	C (mm)	-	-	179.0	179.0	179.0	179.0
	D (mm)	-	-	7.5	10.2	10.2	10.2
	E (mm)	-	-	13.3	14.9	14.9	14.9
	F (mm)	-	-	13.2	11.6	13.2	16.2

\* measured inside

## Technical data

## HO 5000 EL/ELT



## Pincer heads

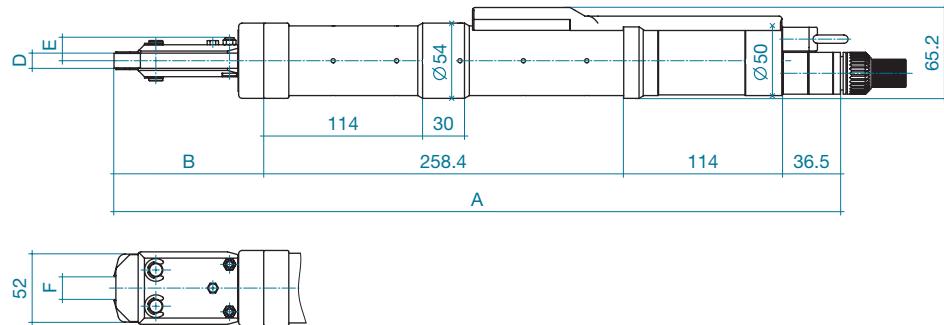
Jaw width D (mm)	10.5	10.5	14.5
For ear width* (mm)	10	13	13
Item No.	13900112	13900097	13900544

\* measured inside

## Type of pincer

HO 5000 EL/ELT	A (mm)	420.5	425.5	425.5
	B (mm)	102.0	107.0	107.0
	E (mm)	16.6	16.6	18.6
	F (mm)	13.7	16.6	16.6

## HO 7000 EL/ELT



## Pincer heads

Jaw width D (mm)	10.5	10.5	14.5
For ear width* (mm)	10	13	13
Item No.	13900112	13900097	13900544

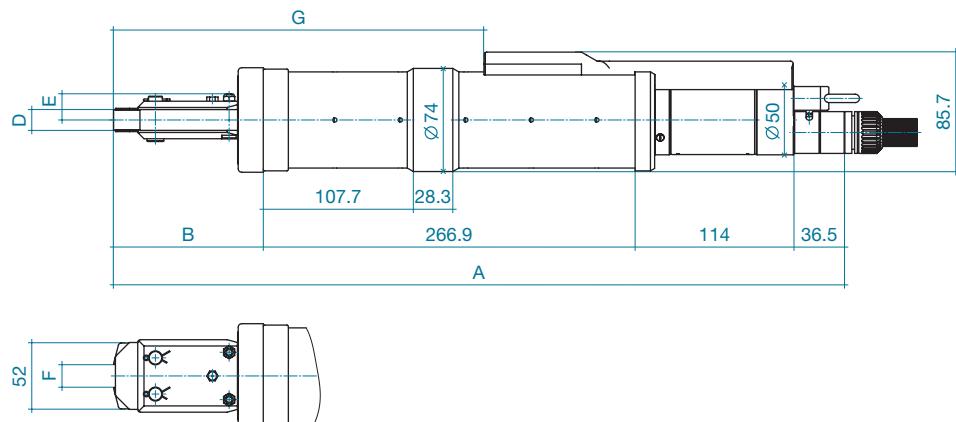
\* measured inside

## Type of pincer

HO 7000 EL/ELT	A (mm)	511.0	516.0	516.0
	B (mm)	102.0	107.0	107.0
	E (mm)	16.6	16.6	18.6
	F (mm)	13.7	16.6	16.6

## Technical data

HO 10000 ELT



## Pincer heads

Jaw width D (mm)	14.5
For ear width* (mm)	13
Item No.	13900774

\* measured inside

## Type of pincer

HO 10000 ELT	A (mm)	525.0
	B (mm)	107.4
	E (mm)	18.6
	F (mm)	16.6

Compressed air connection: internal thread G 1/4



Pincer ME

Pincer with pistol grip

Pistol grip retrofit kit

#### Pincer ME

**Highly process reliable and efficient assembly**

**Full range of pincer heads, for compatibility to all standard clamps**

**Adaptation of different pincer head designs according to application**

**Option: Pistol grip (for HO 2000–4000 ME)**

**Lightweight and ergonomic design for one-handed operation**

## Pneumatic Pincers Oetiker ME

This high-quality, complete pincer system ensures the uniform assembly of Oetiker clamps. The selection of the correct pincer body and head is determined by the type of Oetiker clamp to be assembled, the optimum closing force and the air supply pressure that is available.

To obtain the optimum closing force, please refer to the technical information for the product being assembled and take into account the availability of special pincer heads.

#### Selection example

For a closing force of approx. 3000 N and using an HO 3000 ME, the available inlet pressure must be at least 6 bar. The closing force must be set to the data given. To change the closing force, the inlet pressure must be adjusted. A closing force tester, for example Test Equipment CAL 01, is used to determine and set the correct closing force.

For ergonomic operation we provide a pistol grip for HO 2000/3000/4000 ME. It is a lightweight accessory that can be assembled easily by our Powertool Service Center. The pistol grip is available as a retrofit kit or in combination with a new pincer.

To maintain consistent pincer force, sufficient compressed air pressure and volume must be provided.

Delivery scope pneumatic pincer Oetiker ME

Oetiker ME with pincer head

Compressed air connection set (incl. filter/water separator)

Operating instruction

### Selection of complete pincer systems

The complete pincer system consists of pincer head and pincer.

1) First select the pincer head in accordance with the requirement.

2) Then select the pincer type in the corresponding columns below. The item number for the complete pincer and complete pincer with pistol grip include the selected pincer head.

#### Pincer heads

Jaw width (mm)	5.5	7.5	7.5	10.2	10.2	10.5	10.5	14.5
Open gap (mm)	8.6	11.6	13.2	13.2	16.2	13.7	16.6	16.6
For ear width* (mm)	<= 7	8	10	10	13	10	13	13
Item No.	13900158	13900154	13900150	13900138	13900142	13900113	13900114	13900543

Type of pincer	ME without pincer head							
HO 2000 ME								
Pincer complete	13900173	13900174	<b>13900176</b>	<b>13900182</b>	-	-	-	13900226
Pincer complete with pistol grip	13900930	13900931	13900932	13900934	-	-	-	13901301
Replacement-jaw kit	13900166	13900167	13900168	<b>13900163</b>	-	-	-	-
HO 3000 ME								
Pincer complete	-	13900175	<b>13900177</b>	<b>13900183</b>	13900185	-	-	13900227
Pincer complete with pistol grip	-	13900935	13900936	13900938	13900939	-	-	13901302
Replacement-jaw kit	-	13900167	13900168	13900163	13900170	-	-	-
HO 4000 ME								
Pincer complete	-	-	-	<b>13900184</b>	13900186	-	-	13900228
Pincer complete with pistol grip	-	-	-	13900940	13900941	-	-	13901303
Replacement-jaw kit	-	-	-	13900163	13900170	-	-	-
HO 5000 ME								
Pincer complete	-	-	-	-	-	<b>13900161</b>	13900162	-
Replacement-jaw kit	-	-	-	-	-	13900164	13900165	-
HO 7000 ME								
Pincer complete	-	-	-	-	-	<b>13900171</b>	13900172	13900546
Replacement-jaw kit	-	-	-	-	-	13900164	13900165	13900545
Pistol grip retrofit kit	-	-	-	-	-	-	-	13901300

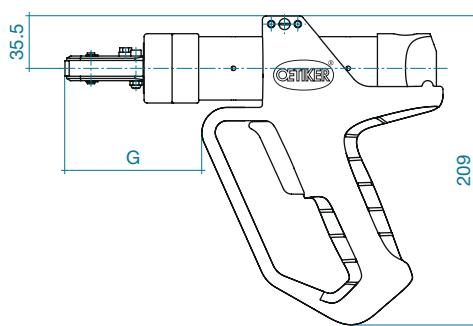
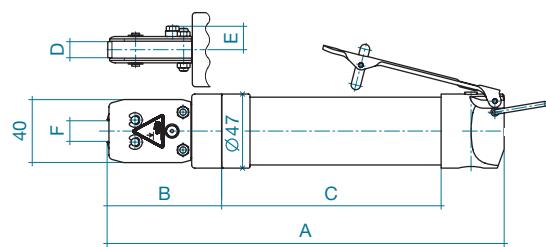
\* measured inside

Item numbers in **bold type** belong to the recommended basic equipment. Replacement jaw kit = left and right pincer jaws complete with all necessary parts. The jaw width must be at least 0.5 mm wider than the band used for the clamps to be assembled. The opening gap should be wide enough for the largest ear.

## Technical data

HO 2000 ME, HO 3000 ME, HO 4000 ME

Pincer complete with pistol grip



## Pincer heads

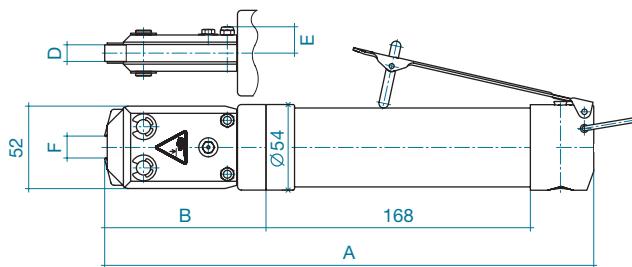
Jaw width D (mm)	5.5	7.5	7.5	10.2	10.2
For ear width* (mm)	</= 7	8	10	10	13
Item No.	13900158	13900154	13900150	13900138	13900142

## Type of pincer

HO 2000 ME	A (mm)	214.0	213.0	213.0	213.0	-
	B (mm)	74.0	73.0	73.0	73.0	-
	C (mm)	101.0	101.0	101.0	101.0	-
	D (mm)	5.5	7.5	7.5	10.2	-
	E (mm)	12.3	13.3	13.3	14.9	-
	F (mm)	8.6	11.6	13.2	13.2	-
Pistol Grip for HO 2000 ME	G (mm)	55.0	54.0	54.0	54.0	-
HO 3000 ME	A (mm)	-	252.0	252.0	252.0	257.0
	B (mm)	-	73.0	73.0	73.0	78.0
	C (mm)	-	140.0	140.0	140.0	140.0
	D (mm)	-	7.5	7.5	10.2	10.2
	E (mm)	-	13.3	13.3	14.9	14.9
	F (mm)	-	11.6	13.2	13.2	16.2
Pistol Grip for HO 3000 ME	G (mm)	-	93.0	93.0	93.0	98.0
HO 4000 ME	A (mm)	-	-	291.0	291.0	296.0
	B (mm)	-	-	73.0	73.0	78.0
	C (mm)	-	-	179.0	179.0	179.0
	D (mm)	-	-	7.5	10.2	10.2
	E (mm)	-	-	13.3	14.9	14.9
	F (mm)	-	-	13.2	13.2	16.2
Pistol Grip for HO 4000 ME	G (mm)	-	-	-	132.0	137.0

\* measured inside

## HO 5000 ME



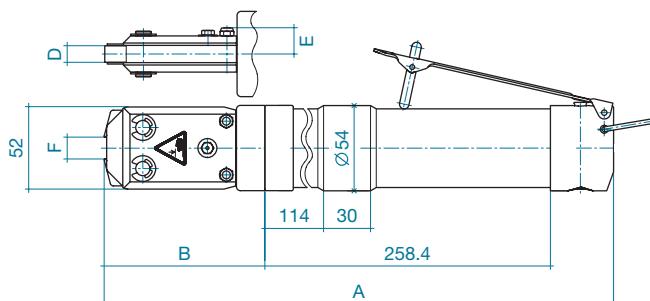
## Pincer heads

Jaw width D (mm)	10.5	10.5	14.5
For ear width* (mm)	10	13	13
Item No.	13900113	13900114	13900543

## Type of pincer

HO 5000 ME A (mm)	309.0	314.0	314.0
B (mm)	102.0	107.0	107.0
E (mm)	16.6	16.6	18.6
F (mm)	13.7	16.6	16.6

## HO 7000 ME



## Pincer heads

Jaw width D (mm)	10.5	10.5	14.5
For ear width* (mm)	10	13	13
Item No.	13900113	13900114	13900543

## Type of pincer

HO 7000 ME A (mm)	400.0	405.0	405.0
B (mm)	102.0	107.0	107.0
E (mm)	16.6	16.6	18.6
F (mm)	13.7	16.6	16.6

\* measured inside

Compressed air connection: internal thread G 1/4

# Special Pincer Heads for Oetiker ME/EL

## – Assembly of Oetiker Ear Clamps 1/2

Pincer head with extended holders

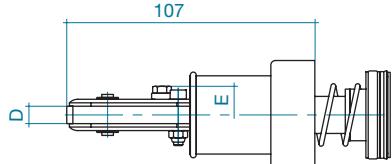
Different extensions allow to reach areas where access is restricted.

Compatible with pincer types HO 2000 to HO 4000.

Selection of pincer heads

The jaw width must be at least 0.5 mm wider than the band used for the clamps to be assembled. The opening gap should be wide enough for the largest ear.

Extension 34.5 mm



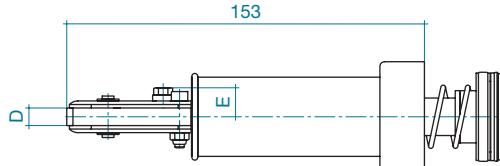
### Pincer heads

Jaw width D (mm)	5.5	7.5	10.2
Open gap (mm)	8.6	13.2	13.2
Height E (mm)	11.0	12.0	14.0
For ear width** (mm)	</=7	10	10

### Type of pincer

HO ME	Pincer head complete	13900272	13900274	13900276
	Replacement-jaw kit	13900166	13900168	13900163
HO EL*	Pincer head complete	13900271	13900273	13900275
	Replacement-jaw kit	13900166	13900168	13900163
	Check gauge***	13600016	13600016	13600016

Extension 80 mm



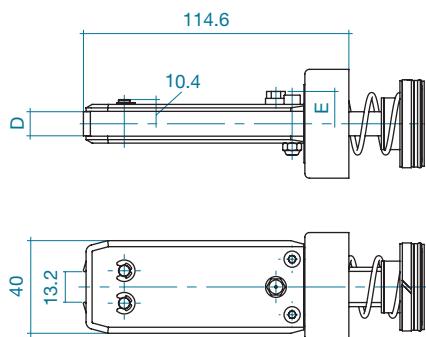
### Pincer heads

Jaw width D (mm)	5.5	7.5	10.2
Open gap (mm)	8.6	13.2	13.2
Height E (mm)	11.0	12.0	14.0
For ear width** (mm)	</=7	10	10

### Type of pincer

HO ME	Pincer head complete	13900278	13900280	13900282
	Replacement-jaw kit	13900166	13900168	13900163
HO EL*	Pincer head complete	13900277	13900279	13900281
	Replacement-jaw kit	13900166	13900168	13900163
	Check gauge***	13600016	13600016	13600016

Extension 42 mm, narrow



### Pincer heads

Jaw width (mm)	7.5	10.2
Open gap (mm)	13.2	13.2
Height E (mm)	12.7	14.0
For ear width** (mm)	10	10

### Type of pincer

HO ME	Pincer head complete	13900821	13900801
	Replacement-jaw kit	13900168	13900163
HO EL*	Pincer head complete	13900820	13900802
	Replacement-jaw kit	13900168	13900163

\* also for ELT type

\*\* Measured inside

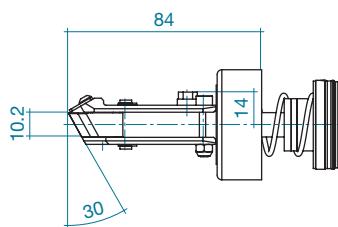
\*\*\* already included in CAL 01

### Pincer heads with angled jaws

**Specially for installing ear clamps where access is restricted.**

Suitable for ear clamps with 7 and 9 mm band widths. Compatible with pincer types HO 2000 to HO 4000.

Jaws angled at 30°



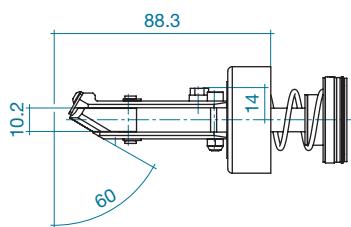
### Pincer heads 30°

Jaw width (mm)	10.2
Open gap (mm)	13.2
For ear width** (mm)	10

### Type of pincer

HO ME	Pincer head complete	13900706
HO EL*	Pincer head complete	13900707
	Replacement-jaw kit	13900708
	Calibration set	13900871

Jaws angled at 60°



### Pincer heads 60°

Jaw width (mm)	10.2
Open gap (mm)	13.2
For ear width** (mm)	10

### Type of pincer

HO ME	Pincer head complete	13900694
HO EL*	Pincer head complete	13900697
	Replacement-jaw kit	13900695
	Calibration set	13900872

\* also for ELT

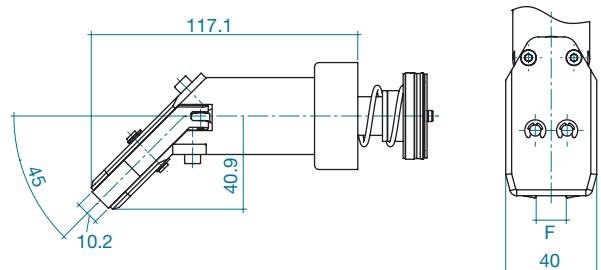
\*\* Measured inside

# Special Pincer Heads for Oetiker ME/EL

## - Assembly of Oetiker Ear Clamps 2/2

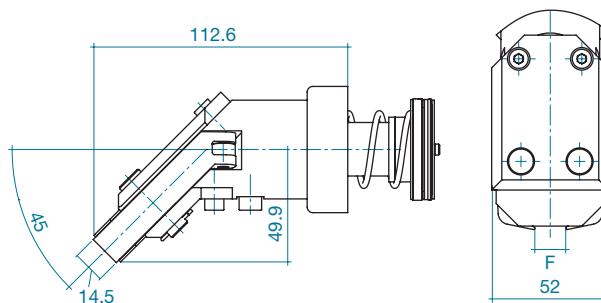
Jaws angled at 45°

Compatible with pincer types HO 2000 to 4000.



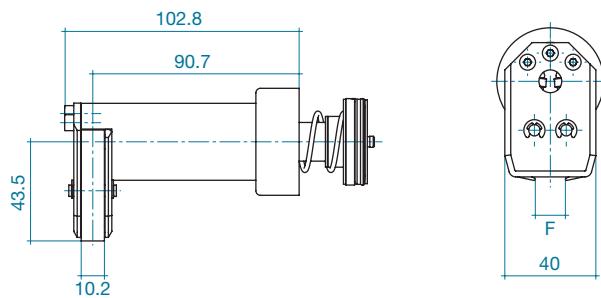
Jaws angled at 45°

Compatible with pincer types HO 5000 and 7000.



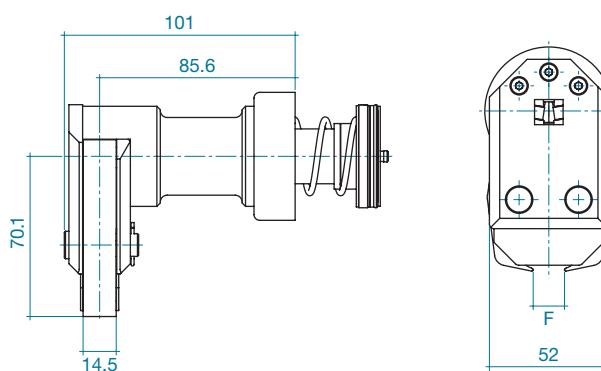
Jaws angled at 90°

Compatible with pincer types HO 2000 to 4000.



Jaws angled at 90°

Compatible with pincer types HO 5000 and 7000.



Pincer heads 45°

Jaw width (mm)	10.2	10.2
Open gap F (mm)	13.2	16.2
For ear width** (mm)	10	13

Type of pincer

HO ME	Pincer head complete	13901271	13900775
	Replacement-jaw kit	13900777	13900777
HO EL*	Pincer head complete	13900776	
	Replacement-jaw kit	13900777	

Pincer heads 45°

Jaw width (mm)	14.5	14.5
Open gap F (mm)	13.7	16.6
For ear width** (mm)	10	13

Type of pincer

HO ME	Pincer head complete	13900784	13900782
	Replacement-jaw kit	13900785	13900785
HO EL*	Pincer head complete	13900783	
	Replacement-jaw kit	13900785	

Pincer heads 90°

Jaw width (mm)	10.2	10.2
Open gap F (mm)	13.2	16.2
For ear width** (mm)	10	13

Type of pincer

HO ME	Pincer head complete	13900781	13900778
	Replacement-jaw kit	13900780	13900780
HO EL*	Pincer head complete	13900779	
	Replacement-jaw kit	13900780	

Pincer heads 90°

Jaw width (mm)	14.5	14.5
Open gap F (mm)	13.7	16.6
For ear width** (mm)	10	13

Type of pincer

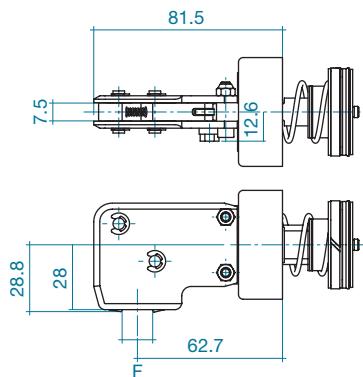
HO ME	Pincer head complete	13900788	13900786
	Replacement-jaw kit	13900789	13900789
HO EL*	Pincer head complete	13900787	
	Replacement-jaw kit	13900789	

\* also for ELT

\*\* Measured inside

90° lengthwise

Compatible with pincer types HO 2000 to 4000.



Pincer Head for 1-Ear Clamp with stud

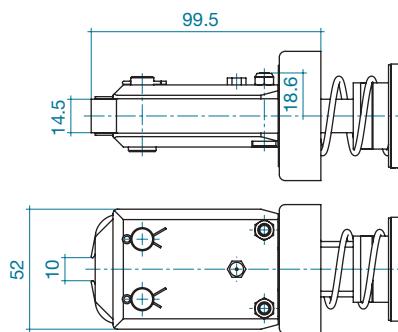
Pincer head for assembly of 1-Ear Clamp with stud, band width 14 mm. Compatible with pincer types HO 5000 and 7000.

## Pincer heads 90° lengthwise

Jaw width (mm)	7.5	7.5
Open gap F (mm)	13.2	16.2
For ear width** (mm)	10	13

## Type of pincer

HO ME	Pincer head complete	13901280	13901282
HO EL*	Pincer head complete	13901281	13901283
	Replacement-jaw kit	13901284	13901284



Pincer Head for ToothLock® Ear Clamp

Pincer head for assembly of ToothLock® Ear Clamp.

Compatible with pincer type HO 7000.

## Pincer heads

Jaw width (mm)	14.5
Open gap (mm)	10.0
For ear width** (mm)	≤ 5.5

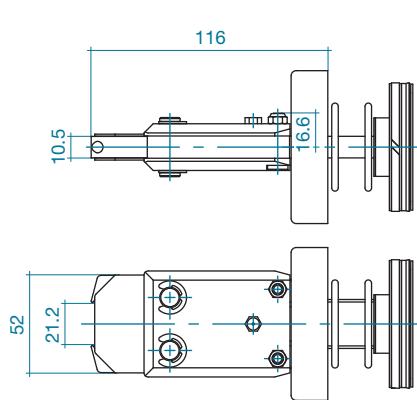
## Type of pincer

HO ME	Pincer head complete	13900773	
HO EL*	Pincer head complete	13900772	
	Replacement-jaw kit	13900771	
	Calibration set	13600058	

Pincer Head for ToothLock® Ear Clamp

Pincer head for assembly of ToothLock® Ear Clamp.

Compatible with pincer type HO 10000.

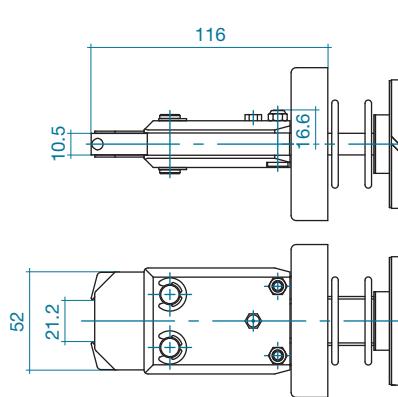


## Pincer heads

Jaw width (mm)	10.5
Open gap (mm)	21.2
For ear width** (mm)	17

## Type of pincer

HO ME	Pincer head complete	13900851	
HO EL*	Pincer head complete	13900852	
	Replacement-jaw kit	13900853	



## Pincer heads

Jaw width (mm)	10.5
Open gap (mm)	21.2
For ear width** (mm)	17

## Type of pincer

HO EL*	Pincer head complete	13900854	
	Replacement-jaw kit	13900853	

\* also for ELT

\*\* Measured inside

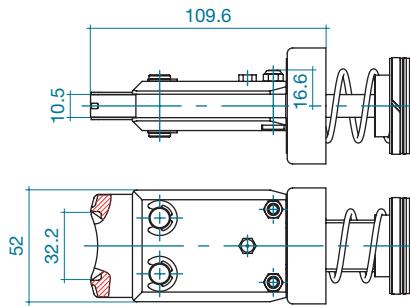
# Special Pincer Heads for Oetiker ME/EL

## – Assembly of Oetiker StepLess® Low Profile Clamps

All Oetiker StepLess® Low Profile Clamps have unique head requirements and are specific to the product group designation and type.

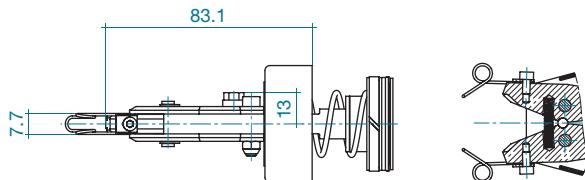
When using Oetiker ME pneumatic pincers, it is essential to use a throttle valve for adjusting the closing speed.

Pincer head for installing ToothLock® Low Profile Clamp – 292  
Compatible with pincer type HO 5000 and HO 7000.



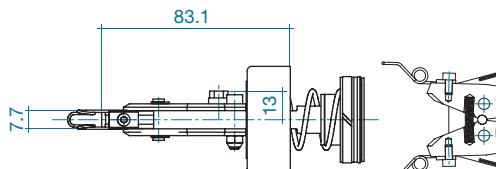
Pincer heads for installing reusable StepLess® Low Profile Clamps – 168 (RWV)

The hold-down springs fitted to both jaws make closure easier and improve handling. Compatible with pincer types HO 2000 to 4000.



Pincer heads for installing StepLess® Low Profile Clamps – 168

The optional hold-down springs improve handling, especially for production-line applications. Can be used for standard clamps from 50 mm (or approx. 19.5 mm for special types). Can be used for clamps 7, 9 mm and 10 mm wide. Compatible with pincer types HO 3000 and 4000.



Pincer heads	
Jaw width (mm)	10.5

Type of Pincer		
HO EL*	Pincer head complete	13900847
	Replacement-jaw kit	13900848
	Calibration set	13900942

Pincer heads	
Jaw width (mm)	7.7

Pincer types		
HO ME	Pincer head complete	13900668
	Replacement-jaw kit	13900673
	Spring accessory	13900677
	Calibration adaptor	13900862
	Throttle valve	13900636
	Throttle valve with adaptor for NPT 1	13900637
HO EL*	Pincer head complete	13900667
	Replacement-jaw kit	13900673
	Spring accessory	13900677
	Calibration adaptor	13900862

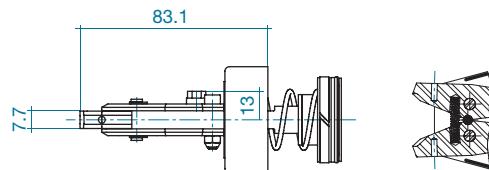
Pincer heads	
Standard	Special**
Jaw width (mm)	7.7

Pincer types		
HO ME	Pincer head complete	13900664
	Replacement-jaw kit	13900673
	Spring accessory	13900675
	Calibration adaptor	13900862
	Throttle valve	13900636
	Throttle valve with adaptor for NPT 1	13900637
HO EL*	Pincer head complete	13900663
	Replacement-jaw kit	13900673
	Spring accessory	13900675
	Calibration adaptor	13900862

\* also for ELT

\*\* Low-profile clamp with single closure hook – only for 7 mm band width. Especially suitable for small low-profile clamps

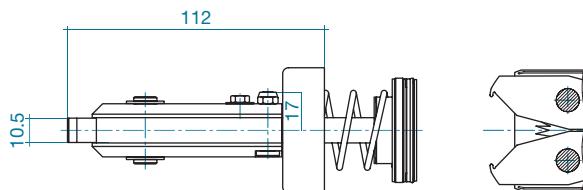
Pincer heads for installing StepLess® Low Profile Clamps with tolerance compensation – 168  
Compatible with pincer types HO 3000 and 4000.



Pincer heads	RT 8
Jaw width (mm)	7.7

Pincer types		
HO ME	Pincer head complete	13900670
	Replacement-jaw kit	13900673
	Calibration adaptor	13900862
HO EL*	Pincer head complete	13900669
	Replacement-jaw kit	13900673
	Calibration adaptor	13900862

Pincer head for installing StepLess® Low Profile Clamp 192  
Compatible with pincer types HO 5000 EL and 7000 EL.

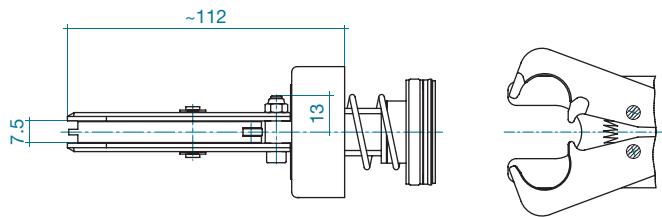


StepLess® Low Profile Clamp  
192 with tolerance compensation  
element 1/3 waves

Pincer heads	element 1/3 waves
Jaw width (mm)	10.5

Pincer types		
HO EL*	Pincer head complete	13900555
	Replacement-jaw kit	13900556
	Calibration adaptor EL	13900495

Pincer head for installing Clamps ER – 194  
Compatible with pincer types HO 2000 to 4000 ME.



Pincer heads	7.5
Jaw width (mm)	

Pincer types	
HO ME	On request

\* also for ELT



Efficient: quick, repeatable installation with exceptional accuracy

Convenient: cordless installation tool for ear clamps

Ergonomic and light: for easy, user-friendly handling

Process reliable: Monitoring and data collection of process parameters

Safeguarded settings: simple, tamper-proof closing force settings

LED display: indicates closing force quality, battery charge and service status

Extended maintenance intervals: to suit volume production applications

## Cordless Clamp Pincer Oetiker CP 10, -20

Cordless CP 10 and CP 20 pincers are ideal alternatives to pneumatic tools where installation flexibility is of paramount importance. The tools guarantee a quick and effortless installation of Oetiker ear clamp models with high accuracy and excellent maneuverability in tight spaces.

The PC software included in the scope of supply enables easy, precise and tamper-proof adjustment of the closing force as well as the documentation and analysis of historical process data saved in the tool.

As an alternative to cordless battery operation, the CP pincers can also be used with an corded AC adapter.

The automatic ram retraction ensures the tool jaws return to their initial position after reaching the pre-set closing force. Furthermore, the tool has an emergency stop function which immediately stops jaw closure upon release of the trigger switch.

The 360° rotatable pincer head allows excellent maneuverability.

### Oetiker CP 10, -20 scope of supply

- Cordless Clamp Pincers with 2 batteries (pincer head included depending on system chosen)
- PC software (for adjusting closing force, tool testing and retrieval of historical data)
- Technical manual (multilingual)
- Country-specific charger
- Carrying case

## Technical Data\*

## CP 10

**Closing force range:** 800 N – 4500 N\*\***External dimensions:** 395 x 81 x 124 mm**Weight:** 2500 g\*\*\***Closing time:** 2 seconds

## CP 20

**Closing force range:** 3500 N – 10000 N\*\***External dimensions:** 425 x 81 x 124 mm**Weight:** 3100 g\*\*\***Closing time:** 3 – 4 seconds

## Accessories and Spare Parts for CP 10, -20

Li-Ion battery	18V 2.0Ah	Item no.: 14002340
Li-Ion battery	18V 3.0Ah	Item no.: 14002343
Li-Ion battery	18V 4.0Ah	Item no.: 14002346
Battery charger	CLi 18V OEM-EU-230V/50Hz	Item no.: 14002339
Battery charger	CLi 18V OEM-US-120V/60Hz	Item no.: 14002342
Battery charger	CLi 18V OEM-AUS/NZ-230V	Item no.: 14002345
Plug Adapter	UK-CH T23	Item no.: 06001709
AC adapter	230V/50Hz-18V EU	Item no.: 14002341
AC adapter	120V/60Hz-18V US	Item no.: 14002344
AC adapter	230V/50Hz-18V AUS/ NZL	Item no.: 14002347

\* Approximate information

\*\* Adjustable closing force range, depending upon pincer head used. Closing force can be determined by:

- CAL 01
- SKM 01 and SKM 02

\*\*\* incl. 1 x 2 Ah battery and standard pincer head

## Selection of complete pincer systems

A complete pincer system is made up of pincer head and pincer.

1) First, choose the pincer head according to requirement.

2) Then choose the pincer type in the corresponding columns below it. The item numbers for the pincer types include the complete scope of supply including the desired pincer head.

Pincer heads	CP 10	CP 10	CP 10	CP 20	CP 20	CP 20
Jaw width	7.5 mm	10.2 mm	10.2 mm	10.5 mm	10.5 mm	14.5 mm
Opening gap	13.2 mm	13.2 mm	16.2 mm	13.7 mm	16.6 mm	16.6 mm
For ear width*	10 mm	10 mm	13 mm	10 mm	13 mm	13 mm
Item no.	13900683	13900659	13900725	13900662	13900660	13900711

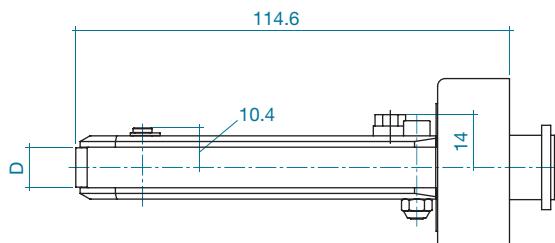
Selection of pincer types							CP sets without pincer head**
CP 10 (AUS)	13900967	13900959	13900963	–	–	–	13901311
Jaw replacement kit	13900168	13900163	13900170	–	–	–	–
CP 10 (EU)	13900965	13900957	13900961	–	–	–	13901309
Jaw replacement kit	13900168	13900163	13900170	–	–	–	–
CP 10 (UK)	13900968	13900960	13900964	–	–	–	13901312
Jaw replacement kit	13900168	13900163	13900170	–	–	–	–
CP 10 (US)	13900966	13900958	13900962	–	–	–	13901310
Jaw replacement kit	13900168	13900163	13900170	–	–	–	–
CP 20 (AUS)	–	–	–	13900971	13900975	13900979	13901315
Jaw replacement kit	–	–	–	13900164	13900165	13900545	–
CP 20 (EU)	–	–	–	13900969	13900973	13900977	13901313
Jaw replacement kit	–	–	–	13900164	13900165	13900545	–
CP 20 (UK)	–	–	–	13900972	13900976	13900980	13901316
Jaw replacement kit	–	–	–	13900164	13900165	13900545	–
CP 20 (US)	–	–	–	13900970	13900974	13900978	13901314
Jaw replacement kit	–	–	–	13900164	13900165	13900545	–

\* measured on the inside

\*\* to suit regional power plug

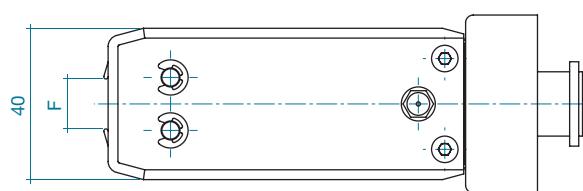
# Special Pincer Heads for CP 10

Pincer heads long, narrow

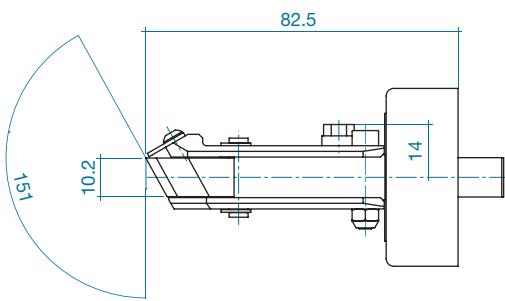


Pincer heads

Jaw width D:	10.2 mm	7.5 mm
Opening gap F:	13.2 mm	13.2 mm
For ear width*:	10 mm	10 mm
Item no.	13900800	13900822
Jaw replacement kit	13900163	13900168



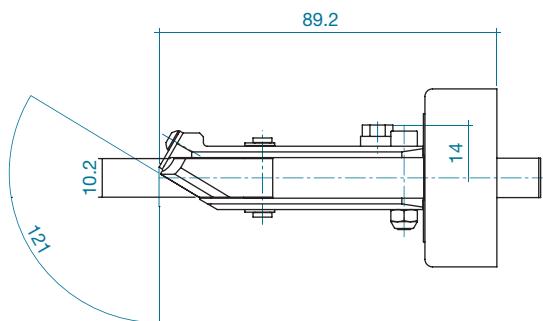
30° pincer heads



Pincer heads

Jaw width:	10.2 mm
Opening gap:	13.2 mm
For ear width*:	10 mm
Item no.	13900724
Jaw replacement kit	13900708
Calibration set	13900722

60° pincer heads



Pincer heads

Jaw width:	10.2 mm
Opening gap:	13.2 mm
For ear width*:	10 mm
Item no.	13900690
Jaw replacement kit	13900695
Calibration set	13900696

\* measured on the inside

# Hand installation pincers



Tool type

Item No.

For Ear Clamps

Compound action standard jaw pincers

14100386



For Ear Clamps

Compound action side jaw pincers

14100387



For Ear Clamps

Single action standard jaw pincers\*

14100396

Pincers with narrow jaws for limited space

14100037



For Ear Clamps

Manual pincer with force monitoring  
with straight jaws Oetiker HMK 01

On request

Manual pincer with force monitoring  
with side jaws Oetiker HMK S01  
for limited space (image not shown)

On request



For correct assembly and uniform closure.

A vibration signal indicates when the preset force is reached.

For 167 PEX (ASTM<sup>1</sup> F 877/2098)

2-Handle Ratchet Pincer

14100069

3-Handle Ratchet Pincer (image not shown)

14100280

Single handed assembly

Lightweight design for ease of handling. When using Ratchet Pincers, tool will not release until the clamp is completely closed. Meets the specifications of ASTM Standard F2098.

For Ear Clamps – Heavy Duty

Pincer system\*\*, consists of

Clamping tool for standard clamps	14100382
Clamping tool 192	14100377
Clamping tool 292	14100378
Clamping tool 293	14100379
Torque wrench	14100098

<sup>1</sup> ASTM = American Society for Testing and Materials

\* Available in select markets only

\*\* Clamping tool and torque wrench must be ordered separately



Tool type	Item No.
-----------	----------

For StepLess® Low Profile Clamps 192

Clamp pincers with special jaw form

14100134



For StepLess® Low Profile Clamps

Pincers with return spring

5 mm wide 14100031

7/10 mm wide 14100030

With tolerance compensation 14100109



For Clamps ER

Pincers with return spring

On request



For Screw Clamps/Worm Drive Clamps

Torque wrench with digital display 1.0–5.0 Nm

14100304

Socket set bit for slotted-head screws

14100306



Torque wrench with digital display 3.2–16 Nm

14100307

Socket set bit for hexagon-head screws (SW 7)

14100308



Compound action ratchet pincers

Available for Multi Crimp Rings diameters

On request

5.0 – 11.0 mm

Compound action heavy duty pincers

Available for Multi Crimp Rings diameters

On request

5.0 – 11.0 mm

Compound action heavy duty pincers

Available for Multi Crimp Rings diameters

On request

10.0 – 17.0 mm



Convenient: **cordless assembly of small Multi Crimp Rings**

Ergonomic and light: **for easy, user-friendly handling**

Process reliable: **Monitoring and data collection of process parameters.**

Effective: **quick, precise swaging of Multi Crimp Rings in low volumes**

LED display: **indicates closing force quality, battery charge and service status**

Extended maintenance intervals: **to suit volume production applications**

## Cordless Crimp Pincer Oetiker CC 20

This cordless Crimp Pincer has been developed especially for the industry and trade sector so that Oetiker Multi Crimp Rings can be assembled economically in low volume production runs or in the field.

Multi Crimp Rings in the 5-25mm diameter range can be quickly and easily swaged using this tool.

Application specific sizes and crimping pincer jaw item numbers are defined by Oetiker Application Engineering or Power Tool Service Centers.

The PC software included in the scope of supply enables easy, precise and tamper-resistant adjustment of the process settings as well as the documentation and analysis of historical process data saved in the tool.

As an alternative to cordless battery operation, the CC pincers can also be used with a corded AC adapter.

The automatic ram retraction ensures the tool jaws return to their initial position after reaching the pre-set closing parameters. Furthermore, the tool has an emergency stop function which immediately stops jaw closure upon release of the trigger switch.

The 360° rotatable pincer head allows excellent maneuverability.

**Technical Data\* CC 20****External dimensions:** approx. 476 × 81 × 124 mm**Weight:** approx. 3300 g\*\*\***Closing time:** 4–6 seconds**Oetiker CC 20 scope of supply****CC 20 cordless Crimp Pincer with 2 batteries****PC software** (for adjusting the closing force, tool testing and retrieval of historical data)**Technical manual (multilingual)****Country-specific charger****Carrying case****Accessories and Spare Parts for CC 20**

Li-Ion battery	18V 2.0 Ah	Item No.: 14002340
Li-Ion battery	18V 3.0 Ah	Item No.: 14002343
Li-Ion battery	18V 4.0 Ah	Item No.: 14002346
Battery charger	CLi 18V OEM-EU-230V / 50Hz	Item No.: 14002339
Battery charger	CLi 18V OEM-EU-120V / 60Hz	Item No.: 14002342
Battery charger	CLi 18V OEM-AUS / NZ-230V	Item No.: 14002345
Plug Adapter	UK-CH T23	Item No.: 06001709
AC adapter	230V / 50Hz-18V EU	Item No.: 14002341
AC adapter	120V / 60Hz-18V US	Item No.: 14002344
AC adapter	230V / 50Hz-18V AUS / NZL	Item No.: 14002347

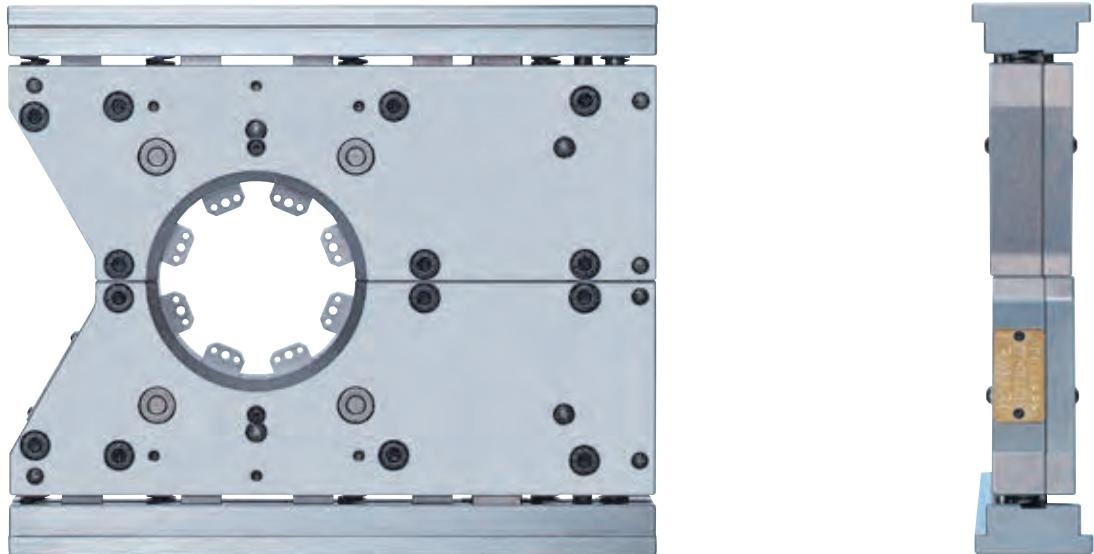
**Size-specific pincer heads on request to 25 mm  
Multi Crimp Rings.****CC 20 Sets without pincer head\*\***

CC 20 (EU)	Item No.: 13901008
CC 20 (AUS)	Item No.: 13901010
CC 20 (US)	Item No.: 13901009
CC 20 (UK)	Item No.: 13901011

\* Approximate information

\*\* to suit regional power plug

\*\*\* incl. 1 × 2 Ah battery and standard pincer head



Cost effective tool solution

Small size allows flexibility

Two separate halves for optimum component access

Interlocking swaging segments guarantee 360° compression of MCR

Interchangeable swaging jaws enhance quick-change features

Optional arrangement enables 2 rings to be assembled  $\geq 45$  mm apart

## Two-Piece Swaging Tool Oetiker Compact and Compact XL

For Multi Crimp Rings

Oetiker Multi Crimp Rings should be assembled using the swaging tools developed for them. This ensures correct assembly and the best possible product performance. The vertical-opening, Two-Piece Swaging Tool for Oetiker Multi Crimp Rings with its compact dimensions allows for the separation of the tool halves for optimum accessibility and automatic latching of the tool.

Powered by an external force – for example a hydraulic press – the jaws interact to reduce the MCR diameter. Because the jaw segments overlap, optimum compression of the ring is achieved.

Tool type	Item No.
Swaging Tool COMPACT	13400538
Swaging Tool COMPACT XL	13401306

## Technical data

## External dimensions

Compact: 316 x 268 x 58 mm

Compact XL: 385 x 330 x 58 mm

## Weight

Compact: 22 kg (48 lbs)

Compact XL: 35 kg (77 lbs)

## MCR size range

Compact: Ring dimensions Ø 16 mm to Ø 60 mm

Compact XL: Ring dimensions Ø 16 mm to Ø 109 mm outside diameter with 8 replaceable swaging jaws

## Ring width

7, 8, 9, 10 mm

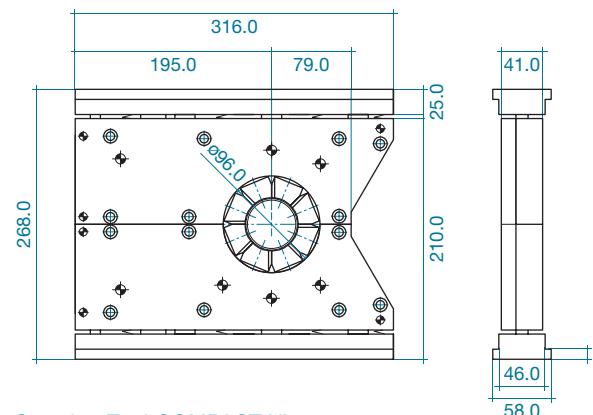
## Press stroke

Segment stroke Ø 8 mm

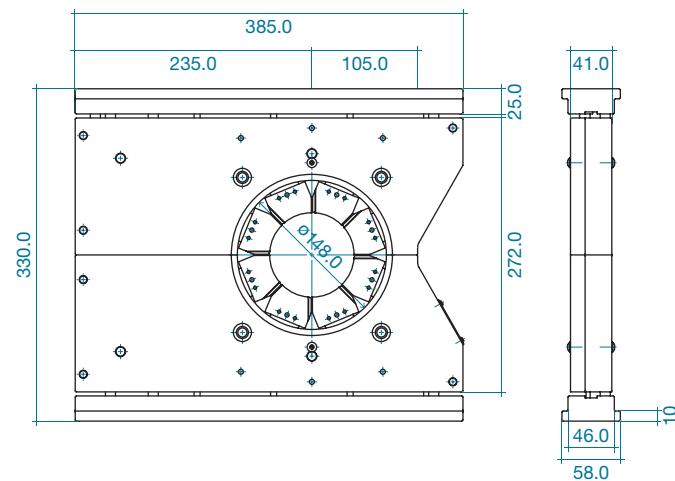
## Minimal requirements for press (to be provided by customer)

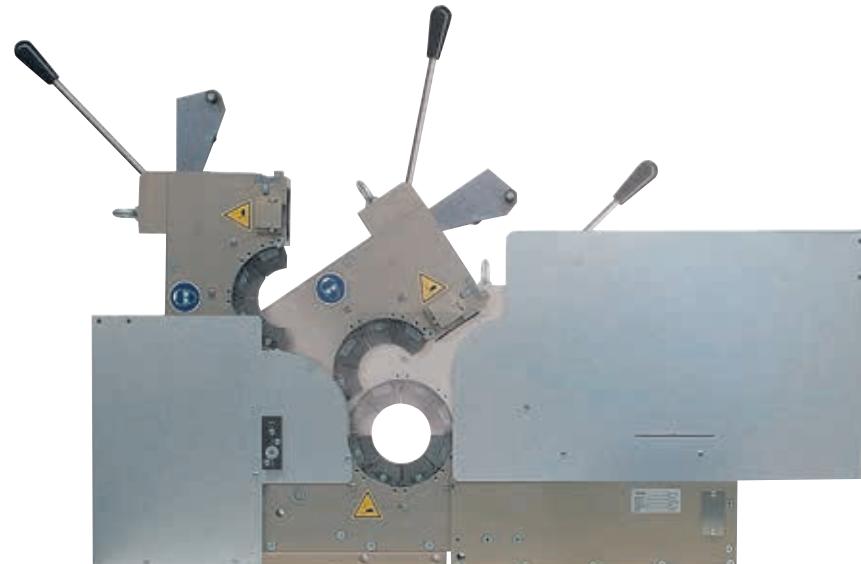
Press force: min. 5000 kg

## Swaging Tool COMPACT



## Swaging Tool COMPACT XL





Single hinge for optimum accessibility

Automatic locking when tool is activated

Minimal width for parallel operation, enabling multiple single-axis assembly

Intermeshing swaging segments guarantee 360° compression of Multi Crimp Rings

Interchangeable swaging jaws enhance quick-change features

## Hydraulic Swaging Tool Oetiker Flex

For Multi Crimp Rings

### Technical data

#### External dimensions

Complete system including mobile bench:

1550 x 1450 x 700 mm (l x h x w)

Swaging press: 1270 x 660 x 80 mm (l x h x w)

#### Weight

Including mobile bench and hydraulic unit: ca. 220 kg

#### MCR size range

Ring dimensions 16 mm to 120 mm outside diameter with 8  
replaceable swaging jaws

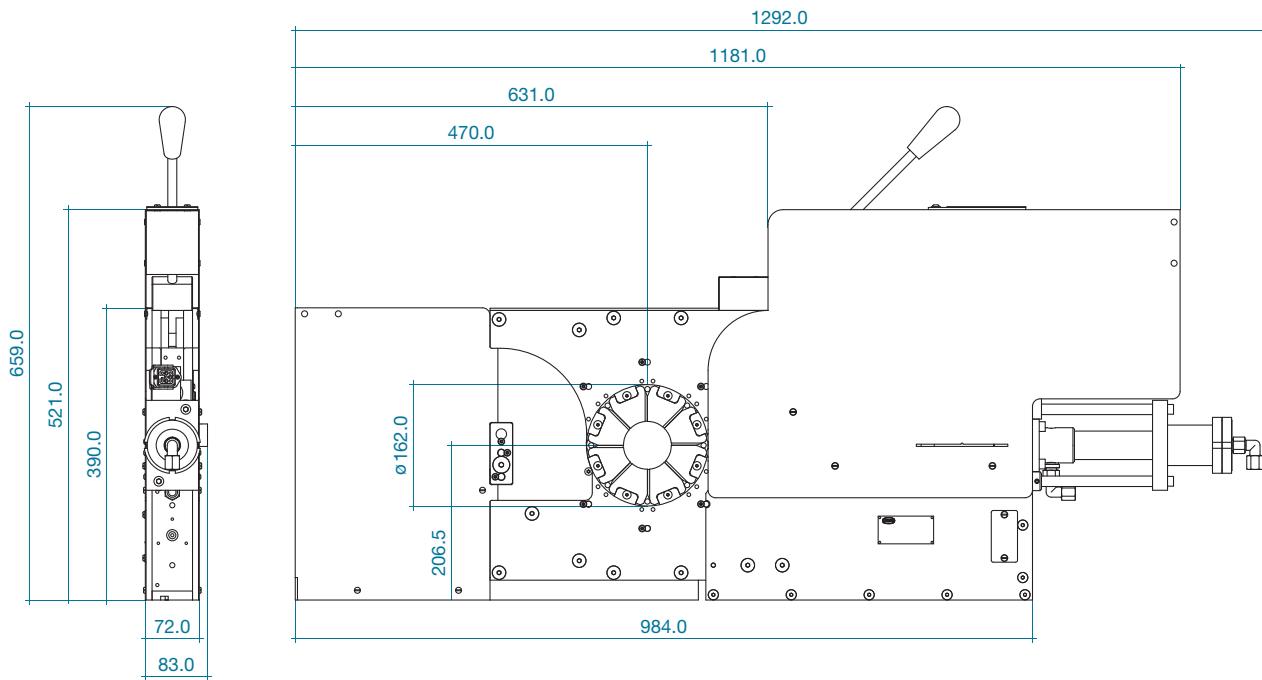
Ring dimensions 121 mm to 132 mm outside diameter with  
special slides and jaws

#### Press stroke

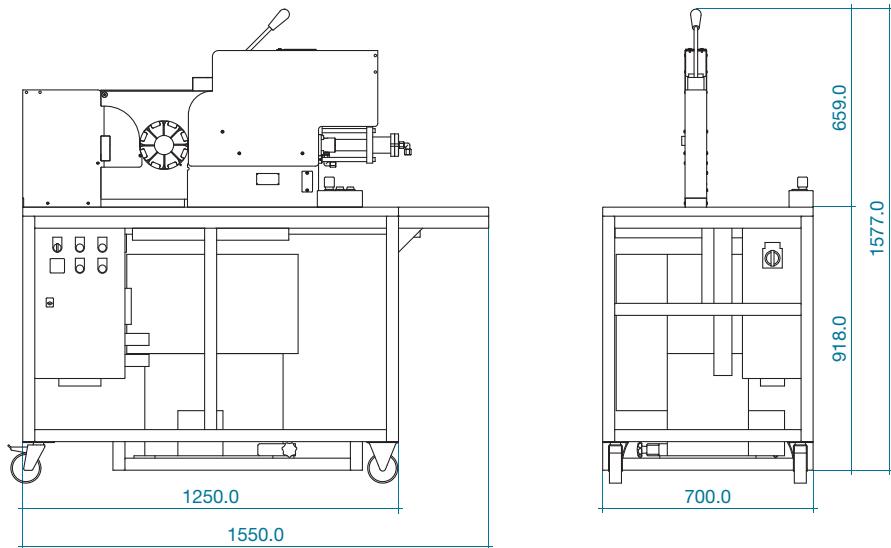
Segment stroke 8 mm

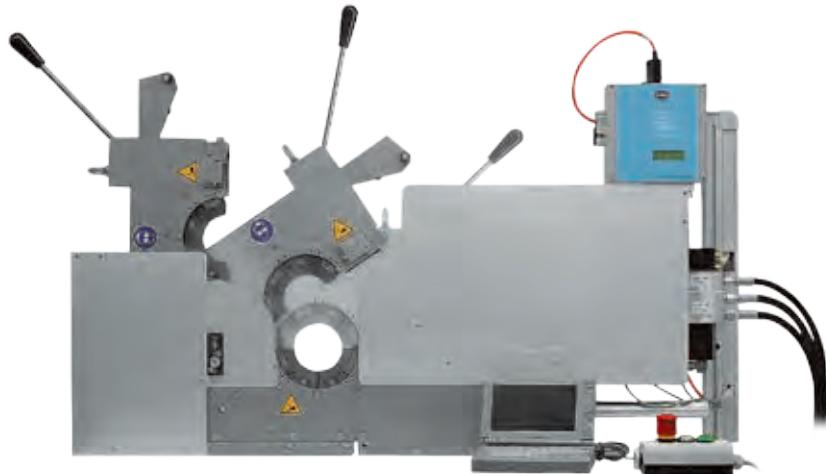
Oetiker Multi Crimp Rings (MCR) should be assembled using the swaging tools developed for them. This ensures correct assembly and the best possible product performance.

The hydraulic swaging tool Oetiker Flex has many advantages for industrial applications: For example, the tool can be opened for unrestricted accessibility with automatic latching and a very compact width. Powered by the integrated hydraulic drive, the jaws interact to reduce the MCR diameter. Because the jaw segments overlap, optimum compression of the ring is achieved.



Tool type	Item No.
Swaging tool Flex	13401010





Process reliable assembly with electronic monitoring of parameters

Tool hinged for optimum accessibility

Simultaneous closure of multiple MCRs supported

Intermeshing swaging segments guarantee 360° compression of Multi Crimp Rings

Interchangeable swaging jaws enhance quick-change features

## Electronically Controlled Hydraulic Swaging Tool Oetiker ELS 01

For Multi Crimp Rings

### Technical Data

#### External dimensions

Complete system including mobile bench:

1550 x 1800 x 700 mm (l x h x w)

Swaging press: 1270 x 660 x 80 mm (l x h x w)

#### Weight

Including mobile bench and hydraulic unit: ca. 240 kg

#### MCR size range

Ring dimensions 16 mm to 120 mm outside diameter with 8 replaceable swaging jaws

Ring dimensions 121 mm to 132 mm outside diameter with special slides and jaws

#### Press stroke

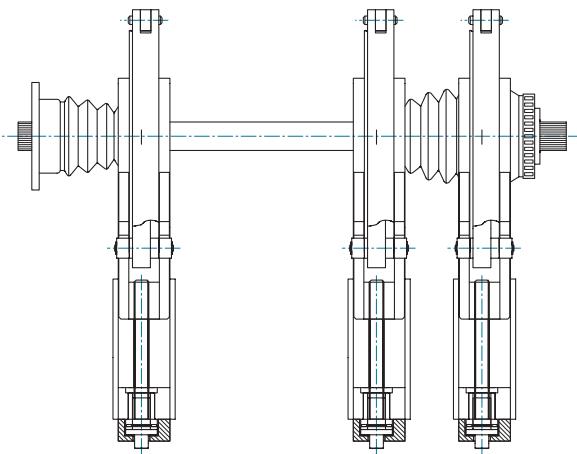
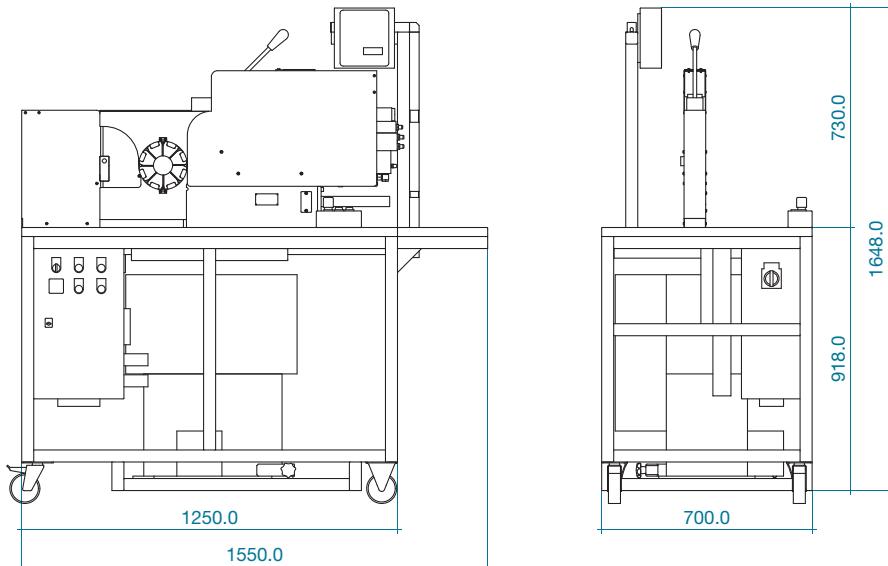
Segment stroke 8 mm

Oetiker Multi Crimp Rings should be assembled using the swaging tools developed for them. This ensures correct assembly and the best possible product performance.

The electronically controlled Swaging Tool Oetiker ELS 01 is an innovative closing concept providing reliable assembly with electronic monitoring of all specified parameters. This tool offers many advantages for automotive and industrial applications, e.g. integration in automated processes, convenient programming using a PC, optimum component accessibility, automatic locking of the tool mechanism and low width. Powered by the integrated hydraulic drive, the jaws interact to reduce the MCR diameter.

Because the jaw segments overlap, optimum compression of the ring is achieved. Swaging can be carried out with either force or diameter priority. When using the force-priority method, the assembly of Oetiker Multi Crimp Rings can compensate for variations in component tolerances. In addition, 100% documentation of closures is available by using the optional "Clamp Process Monitoring" software.

The thrust force of the hydraulic cylinder is set by changing the parameters at the ELS 01 control unit. This is accomplished by means of a PC, programming the specifications of a sequence of consecutive assemblies, or, optionally, using an external control signal. Specially adapted Test and Calibrating Equipment, based on the Calibrator CAL 01, is employed to calibrate the thrust force.



Example of an arrangement of swaging tools.  
Rings can be closed simultaneously.

Tool type	Item No.
Swaging tool ELS 01	
With 3 x 400V/50–60Hz mains voltage	13401011
For other voltages	on request
CPM Clamp Process Monitoring Software	13600121
Calibrating Equipment for ELS 01	on request
Calibration gauges	on request



Ensures uniform, reproducible process quality

Provides an interface for data exchange with any Oetiker electronically controlled assembly tool

AC or DC operation

Convenient carrying case

## Test Equipment Oetiker CAL 01

Closing forces for Oetiker Clamps

All types of Oetiker Ear Clamps and Low Profile Clamps that can be closed using a pneumatic pincer should be closed with a recommended, uniform force. This results in a constant, reproducible tensile stress in the clamp material within the permissible limits and without overloading the individual elements of the assembly.

The "Test Equipment CAL 01" is used to adjust and verify the applied closing force. To determine the recommended closing force for a specific product, please refer to the respective clamp data.

### Important

To comply with applicable local standards for test equipment, the CAL 01 should be calibrated at least once a year by an authorized institution. Please contact Oetiker regarding this service.

## Technical Data Oetiker Test Equipment Cal 01

Operating voltage: 100–200 V / 47–63 Hz

Current consumption: 400 mA

External dimensions: 190 x 110 x 60 mm

Weight: 0.8 kg (CAL 01), 3.4 kg (complete case)

## Delivery scope Oetiker Test equipment CAL 01

Calibrator CAL 01 with technical description and operating instructions

Coded load cell (SKS 01), assembled with 10 mm wide interchangeable pressure jaws (SKB 10)

7 mm wide pressure jaws (SKB 07)

Check gauge

Power transformer compatible with local supply

Data cables for communication with PC, PLC and ELK / ELS

Lithium block battery (BAT 01)

## Oetiker Test Equipment CAL 01 versions

## Item No.

German	13600068
French	13600075
Dutch	13600076
Italian	13600077
Spanish	13600078
Swedish	13600079
English (UK)	13600080
English (USA)	13600081
English (Australia)	13600082
English (China)	13600155

## Optional accessories and spare parts

## Item No.

Mains-plug charger for block battery 9V 230V/50Hz, EURO plug	06001158
Block battery 9V	06001157
Lithium block battery 9V (BAT 01)	06001165
Mains unit 100...230V, EURO (STN 01)	06001159
Mains unit 100...230V, UK (STN 02)	06001166
Mains unit 100...230V, USA (STN 03)	06001167
Mains unit 100...230V, Australia (STN 04)	06001168
Pressure jaws SKB05 (jaw width 5 mm)	13600060
Pressure jaws SKB05** (jaw width 5 mm)	13600294
Pressure jaws SKB07 (jaw width 7 mm)	13600059
Pressure jaws SKB10 (jaw width 10 mm)	13600058
Guard* for HO 2000 to 4000 (SVG01)	13600070
Guard* for HO 5000 and 7000 (SVG02)	13600071

\* The guards SVG01/02 surround the pincer head, and at the same time hold the SKS 01 in position so that the danger zone is protected. These guards should be used when the CAL 01 is used to carry out automatic Cmk checks

\*\* for opening gap < 7.5 mm and closing force up to 2 kN.



Mechanical alternative for closing force calibration

Ensures uniform and reproducible process quality

Force is determined from a conversion table

Covers the entire standard range of closing forces

Provides electronic data exchange in combination with a suitable digital gauge

## Test Equipment Oetiker CAL 02

Mechanical alternative to Test Equipment CAL 01. High accuracy – especially suitable for mechanical tools.

Versions	Item No.
With MarCator 1087 digital gauge <sup>1</sup>	13600243
With MarCator 1081 digital gauge <sup>2</sup>	13600244
Without dial gauge	13600245

Delivery scope

Digital gauge (electronic data exchange, depends on version)

Closing force sensor (SKS 02), fitted with closing force lugs

10 mm wide (SKB 10)

Operating instructions

Transport case

Adhesive Loctite 243

Socket wrench SW 2.5

Socket wrench SW 3

<sup>1</sup> with electronic data exchange

<sup>2</sup> without electronic data exchange



Economical alternative for closing force calibration

Force indicated by a pointer on a scale

Ensures uniform and reproducible process quality

Three models available to suit closing force range

Developed for ear clamp assembly tools

Robust plastic carrying case

## Test Equipment Oetiker SKM 00, -01, -02

Closing Force Gauges SKM 01/02 offer economical solutions for verifying the closing forces in small series and service applications. Suitable for calibrating assembly tools for ear clamps.

Types of Oetiker Closing Force Gauges	Item No.
Oetiker SKM 00	13900833
Oetiker SKM 01	13900631
Oetiker SKM 02	13900632

### Delivery scope

Oetiker SKM 00, -01, -02

Closing Force Gauge

Operating instructions

### Technical data SKM 00, -01

Dimensions: ca. 100 x 19.5 x 44 mm

Weight: ca. 230 g

Closing force range SKM 00: 600 N–2000 N

Closing force range SKM 01: 1200 N–3400 N

Graduation: 200 N

### Technical data SKM 02

Dimensions: ca. 100 x 19.5 x 44 mm

Weight: ca. 240 g

Closing force range: 3500 N–7500 N

Graduation: 500 N

# Quick Connectors

[p. 146](#)

Quick Connector  
thread-optimized range



Tool-free assembly

Highly space-efficient

Simple, robust modular design

Oetiker will be pleased to help you to find the correct choice for your application... Our standard includes the thread-optimized and the length-optimized series. Variants for adaptation to customer-specific conditions are possible.

p. 146

Quick Connector  
length-optimized range



Quick Connector  
thread-optimized rangeQuick Connector  
length-optimized range

**Quick, tool-free push-in connection**

**Space-saving compact one-piece design with maximum flow**

**Flexible and easy to integrate: thread- and length optimized range**

**Heat-resistant, robust, tamper-proof**

## Quick Connectors 200

### Material

**Body:** Material No. 1.0737/UNS G12144

**Protection against corrosion on request**

**Circlip:** Material No 1.4310/UNS S30100

**O-Ring:** According to requirements

### Use

Oetiker Quick Connectors (QC) are an innovative connecting solution for pressure lines carrying media. They enable significant savings in assembly time, space required, and assembly costs to be made.

Thanks to tool-free assembly, Oetiker QC are an optimal solution for many applications and are particularly suitable as a connecting element for oil and / or coolant lines to turbochargers, transmissions, and radiators.

### Process monitoring

Process monitoring is carried out mechanically. With appropriate modification of the plug or tube, visual process monitoring is also possible.

### Temperature range

The temperature range is dependent on the material of the O-ring. This is determined according to the requirements.

## Functionality



To make the connection, push the grooved tube/adaptor into the Quick Connector until it engages. We recommend verifying correct insertion of each pipe by means of manual pull testing. Locking of the pipe/insertion nipple in the QC takes place by means of the groove in the pipe, the groove system in the QC and the circlip – an especially space-saving solution allowing the smallest of QC diameters.

## Performance

## Operating pressure

The permissible operating pressure is directly dependent on the O-ring selected, the temperature, and the quality of the male component. It must always be determined in relation to the application.

DN8–DN18	< 40 bar
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## Pull-out load on QC tube

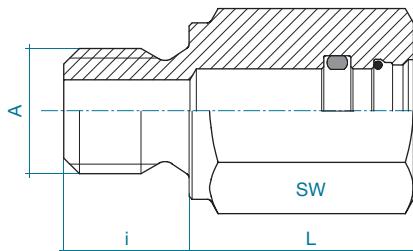
## DN

8	> 1800 N
10	> 2000 N
12	> 2200 N
15	> 2400 N
18	> 2600 N

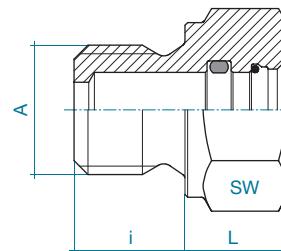


To disconnect, push the disconnection sleeve/pincer into the Quick Connector to the stop, hold it in this position, and pull out the tube/adaptor.

## thread-optimized range



## length-optimized range



DN	A	i	L	SW
8	M12 x 1.5	12.0	21.5	17.0
10	M14 x 1.5	12.0	22.0	19.0
12	M16 x 1.5	12.0	23.0	22.0
15	M18 x 1.5	12.0	24.0	24.0
18	M22 x 1.5	14.0	27.0	27.0

DN	A	i	L	SW
8	M14 x 1.5	12.0	11.0	19.0
10	M16 x 1.5	12.0	12.0	22.0
12	M18 x 1.5	12.0	13.0	24.0
15	M22 x 1.5	14.0	13.0	27.0
18	M27 x 2.0	16.0	14.0	32.0

Lengths in mm

Lengths in mm

Printed in Germany on FSC certified paper



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