

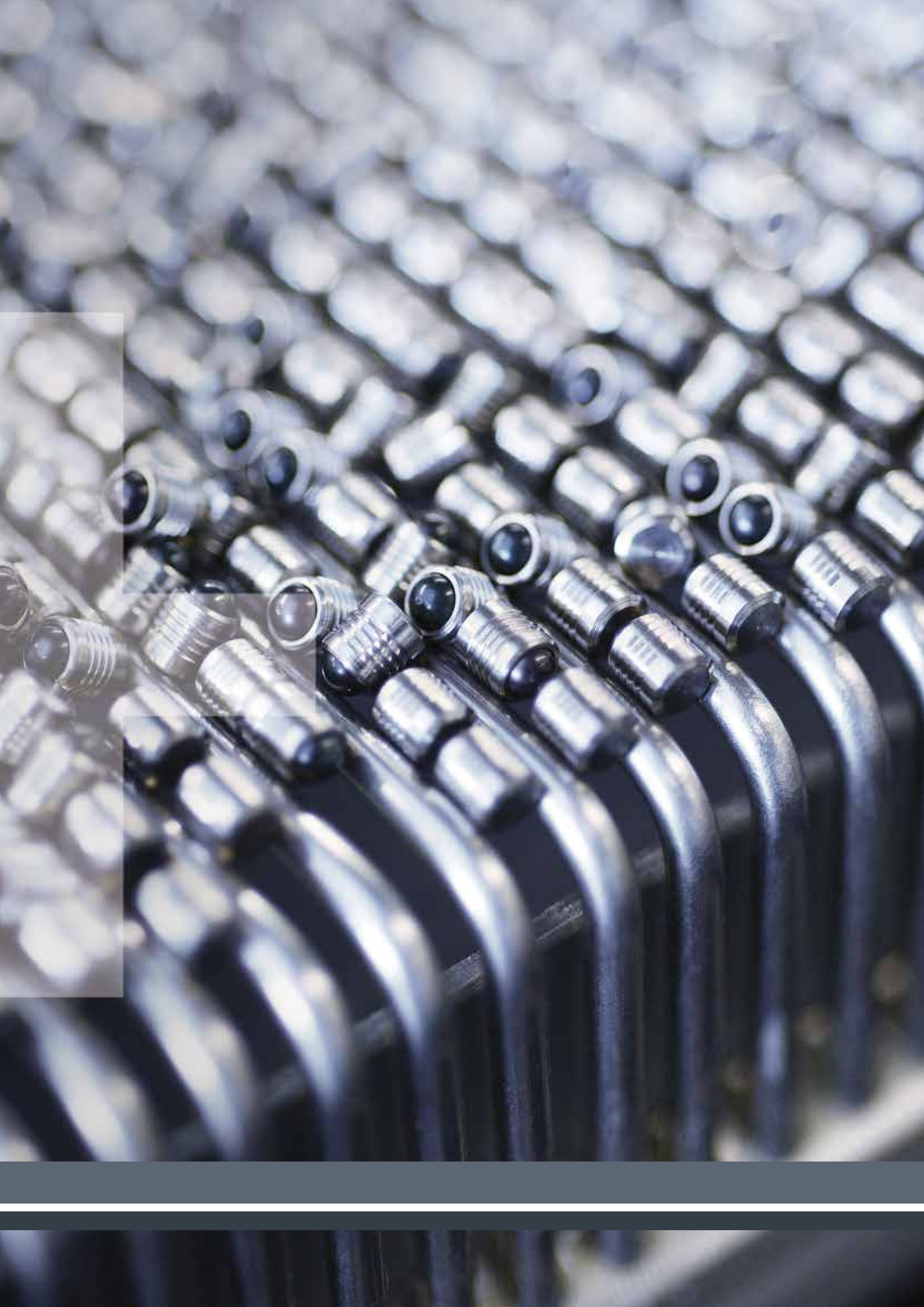
# SFC-KOENIG

Leader in  
Sealing & Flow Control  
Technology



┆ KOENIG EXPANDER®    KOENIG CHECK VALVE®    KOENIG RESTRICTOR®    ┆







# The World's Leading Sealing & Flow Control Technology

With over 3 billion parts installed and failure rates less than 1 part per million, SFC KOENIG® is recognized around the world for reliable, safe and effective sealing and flow control. With our unique expanding seal technology our parts reduce contamination, withstand high pressures and provide leak-free performance for long life cycles.

SFC KOENIG is the original inventor of the one piece, metal-to-metal sealing solution, the KOENIG EXPANDER®, and all SFC KOENIG components are recognized for best-in-class performance in even the most critical applications.

With over 80 years of experience, SFC KOENIG is ready to deliver a solution designed for your application and can integrate our products into your production and workflow processes. Our expert engineers are ready to design a custom part to meet your specific requirements, and we offer a wide variety of standard sizes, designs and configurations for our full line of easy-to-install components.

## SFC KOENIG

Leader in  
Sealing & Flow Control  
Technology



## Proven Precision & Reliability

SFC KOENIG components are proven effective in a diverse array of applications, and are the ideal solution wherever safe and secure sealing and flow control is needed. We maintain a variety of manufacturing and industry-specific certifications, and our engineers are ready to assist with a customized solution that meets your exact specifications and requirements. With over 3 billion parts installed, SFC KOENIG components are proven effective and are ready to meet your toughest sealing and flow control challenge.



### FLUID POWER

SFC KOENIG parts are ideal for hydraulics, manifolds, mobile power units, valves, pumping and other fluid power systems. We deliver reliable, leak-free sealing and flow control, with tamper-proof designs that provide long life cycles and withstand the harshest environments.



### TRANSPORTATION

Leading automotive and vehicle system manufacturers rely on SFC KOENIG solutions for optimized safety and reliability. We maintain IATF 16949 certification and our parts are proven reliable for the operational extremes and high-vibration levels found in engines, transmissions, turbo chargers, braking, fueling and transportation .



### MEDICAL

Offering the highest levels of safety, security and dependability, SFC KOENIG components meet the strict requirements of medical, surgical, optical and dental applications. From life-saving equipment to environmental controls, our best-in-class performance is relied on in even the most mission-critical applications.





### **OFFSHORE & MARITIME**

The corrosive, harsh conditions found in maritime and offshore applications are reliably handled by SFC KOENIG components. Our sealing and flow control solutions have been used a diverse array of applications, including shipping, natural gas compressors, pumps, fluid density probes and more.



### **AEROSPACE**

The aviation and aerospace industries rely on SFC KOENIG components for lightweight, high-pressure performance. From flight controls to jet engines, our parts provide safe and effective sealing and flow control in extreme environmental conditions.

# Unrivaled Sealing & Flow Control Solutions

## KOENIG EXPANDER®

The KOENIG EXPANDER® is the original one-piece, metal-to-metal sealing solution. With over 3 billion parts installed and a failure rate less than 1 PPM (part per million), these no-leak sealing plugs permanently resist pressures up to 500 bar and are proven effective – even for the sealing of angled channels and deep holes. The KOENIG EXPANDER® offers easy installation for a variety of applications and configurations, and is the industry's leading technology for the sealing of drilled holes.

## KOENIG CHECK VALVE®

With its self-contained, ball-style design and stainless steel construction, the KOENIG CHECK VALVE® provides precise flow control and minimal leakage, leveraging proven SFC KOENIG expander sleeve technology and flow control expertise to provide a highly-accurate solution. Available in a variety of sizes, cracking pressures, and in forward-flow and reverse-flow designs, the KOENIG CHECK VALVE® is effective for fast and dependable flow control.

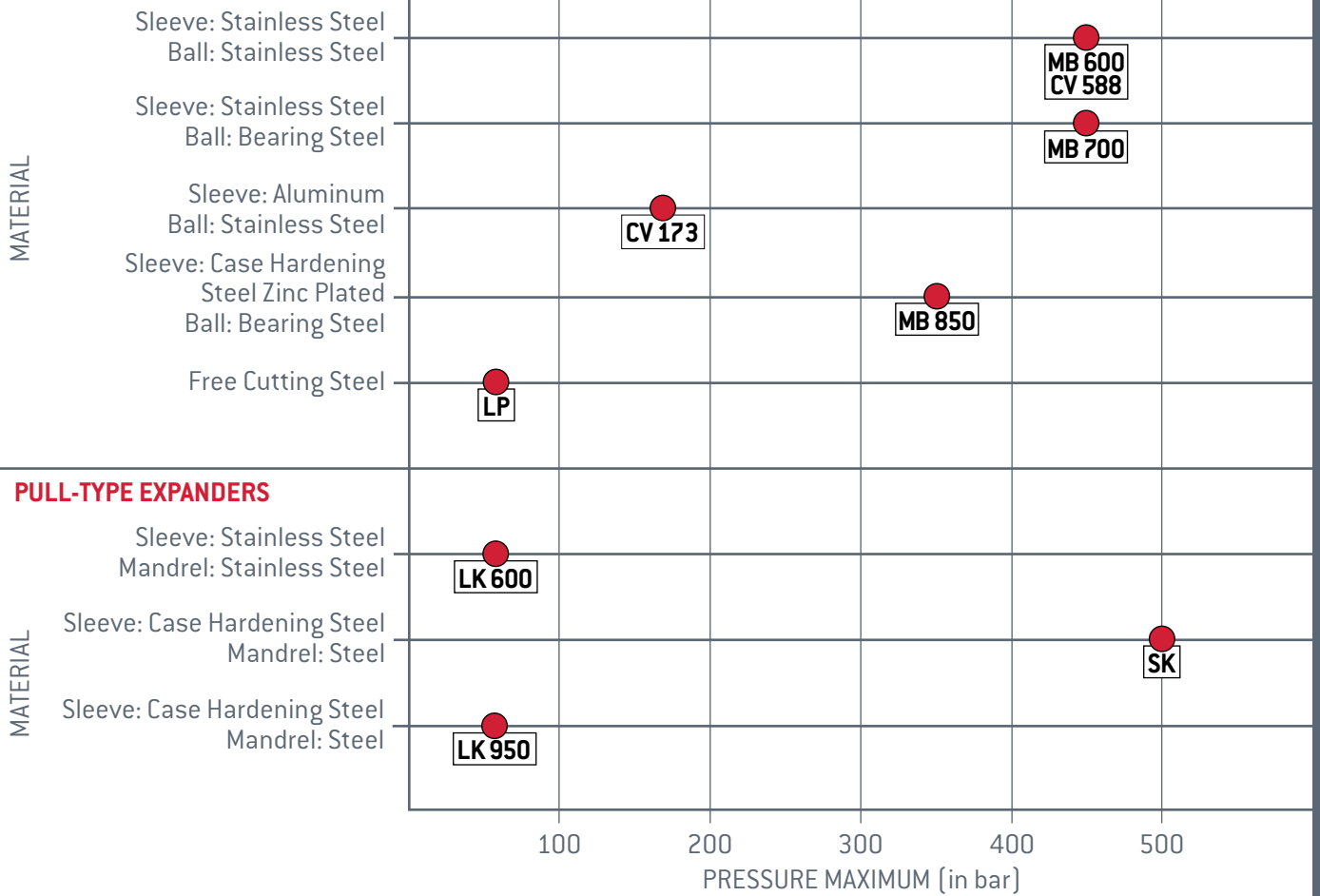
## KOENIG RESTRICTOR®

Designed for accurate flow control in even the most precise applications, the KOENIG RESTRICTOR® is ideal for deep-hole installations and wherever dependable, no leak fluid restriction is needed. The KOENIG RESTRICTOR® is available in a variety of orifice sizes customized for your flow rate, and is offered with or without an integrated screen, providing a reliable, one-piece flow control solution.



## MATERIAL / PRESSURE


### PUSH-TYPE EXPANDERS



## FLOW RATE / PRESSURE

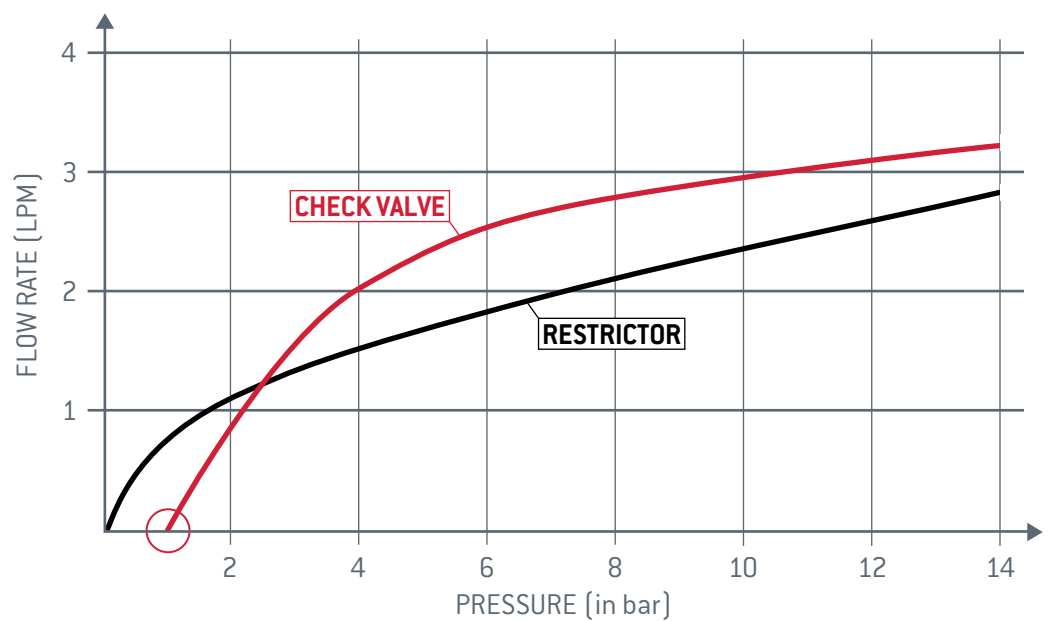
### FUNCTIONS

#### CHECK VALVE

- Opening Pressure: Allow the flow from e.g. 1 bar in flow direction 
- Control fluid pressure in circuits
- Backflow prevention

#### RESTRICTOR

- Flow Limiter: Control the amount of fluid being supplied
- Orifice diameters customized to your flow requirements



# Content

## **PUSH-TYPE EXPANDERS / PAGES 8–27**

KOENIG EXPANDER® plugs effectively seal drilled holes. These parts feature a serrated sleeve which expands as the ball is inserted, enlarging the part to the needed size and sealing the hole. For installation, push-style expanders require a hole drilled with a counter bore.



### **SERIES MB / CV / Pages 8–27**

- Sealing plugs for operating pressures up to 450 bar / 6500 psi
- Wide range of sizes from Ø 3 – 22mm
- Corrosion-resistant versions available
- Fast, easy installation

## **LOW-PRESSURE EXPANDERS / PAGES 38–41**

Based on a press fit and anchoring concept, low-pressure style expanders use a conical press-in sleeve. During installation, the press-in sleeve adapts to the bore and the outer serration bites into the bore wall.

### **SERIES LP / Pages 38–41**

- Sealing plugs for operating pressures up to 60 bar / 850 psi
- Short installation dimensions
- Mechanical sealing using press fit
- Quick installation



## **PULL-TYPE EXPANDERS / PAGES 28–37**

Pull-style expanders use an integrated mandrel to insert the expander plug into a drilled hole. This type of KOENIG EXPANDER® does not require the hole to be counter-bored, and is often used for angled channels or installations with difficult orientations. They are ideal for installations with space or weight constraints.

### **SERIES SK / Pages 28–33**

- Sealing plugs for operating pressures up to 500 bar / 7200 psi
- Short installation length
- Liberal manufacturing tolerance 0 / + 0.12mm
- Extended mandrel for deeper setting

### **SERIES LK / Pages 34–37**

- Sealing plugs for operating pressures up to 60 bar / 850 psi
- Short installation dimensions
- Liberal manufacturing tolerance 0 / + 0.12mm
- Comprehensive product range for Ø 4 – 20 mm





### **FLOW CONTROL / PAGES 42–53**

The KOENIG RESTRICTOR® is designed to restrict flow in fluid systems and is available in a variety of orifice sizes. The KOENIG CHECK VALVE® controls the flow of fluids and is available in a variety of cracking pressures.

### **CHECK VALVES / Pages 42–49**

- Forward-flow and reverse-flow types available
- Pressure rated up to 300 bar / 4350 psi
- Standard units available in various cracking pressures
- Stainless steel design is standard
- Available in a range of standard size diameters and flow rates



### **SERIES RE - RESTRICTORS / Pages 50–53**

- Can be used with fluids or gases
- Stainless steel design is standard
- Orifices can be calculated to achieve desired flow rates
- Expansion style easily installs into drilled holes and is tamper resistant

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### **SPECIAL ORDERS / PAGE 55**

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### **SETTING TOOL EQUIPMENT / PAGES 56–65**

SFC KOENIG® offers a variety of setting tools and equipment to assist in the installation of our parts.

- EXPRESS 3000 - Hydropneumatic Table Presses
- EXPRESS 5000 - Hydropneumatic Table Presses
- EXTTOOLS 030, 040-1, 040-2 and 050
- EXTTOOLS B-010
- KW-008 - Hand Lever Tool with Equipment Ø 4 – 6 mm

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### **SYSTEMS AND AUTOMATION SOLUTIONS / PAGE 67**

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### **TECHNICAL INFORMATION / PAGES 68–93**

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### **QUALITY ASSURANCE / PAGE 94**



**Full Line of Sealing & Flow Control Technologies**

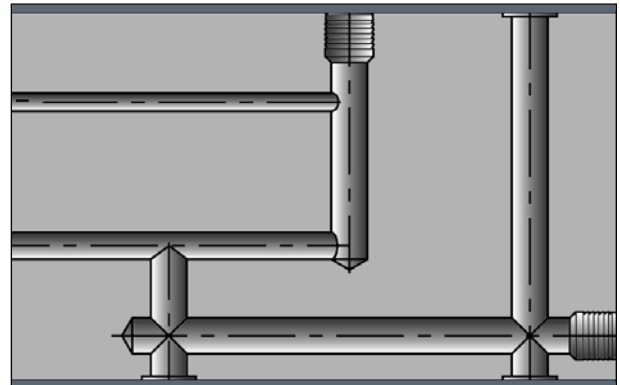
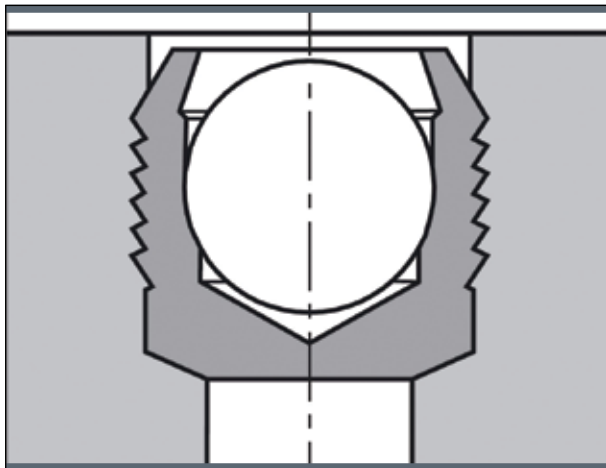


# KOENIG EXPANDER®

## Series MB / CV

Sealing Plugs for Operating Pressures up to 450 bar / 6500 psi

- Operating pressures up to 450 bar / 6500 psi
- Comprehensive range of products for  $\varnothing$  3 – 22 mm, also available in inch version
- Corrosion-resistant version
- Available in aluminum
- Standard drilling manufacturing tolerance 0 / + 0.10 mm
- Swift and easy installation
- Purely mechanical sealing through anchorage system



Please inquire with our sales or applications engineers about requirements for special materials or configurations not shown in the catalog.

### RECOMMENDED SETTING EQUIPMENT FOR SERIES MB AND CV

**EXPRESS 3000**

Hydropneumatic Table Press

See page 58 for more information

**EXPRESS 5000**

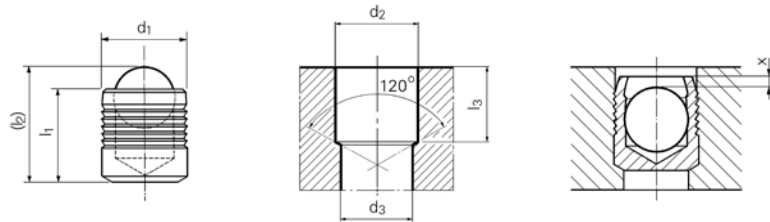
Hydropneumatic Table Press

See page 58 for more information



# KOENIG EXPANDER® SEALING PLUGS Series MB 600

Sleeve Clear Passivated per MIL-S-5002, Aerospace Quality



3D DATA: [www.sfckoenig.com](http://www.sfckoenig.com)

Part Number	d <sub>1</sub>	l <sub>1</sub>	(l <sub>2</sub> ) ~ Ref.	d <sub>2</sub> +0.1 0	d <sub>3</sub> max	l <sub>3</sub> min.	x ±0.2	Packaging Unit	Weight in gram/pcs.
MB 600-030	3.0	3.6	4.6	3.0	2.2	3.4	0.4	100 / 1000	0.17
MB 600-040	4.0	4.0	5.1	4.0	3.3	3.8	0.2	100 / 1000	0.34
MB 600-050	5.0	5.5	7.1	5.0	4.3	5.3	0.4	100 / 1000	0.68
MB 600-060	6.0	6.5	8.6	6.0	5.3	6.3	0.4	100 / 500	1.18
MB 600-070	7.0	7.5	10.1	7.0	6.4	7.3	0.4	100 / 250	1.91
MB 600-080	8.0	8.5	11.6	8.0	7.4	8.3	0.3	50 / 250	2.86
MB 600-090	9.0	10.0	13.5	9.0	8.4	9.8	0.4	50 / 250	4.02
MB 600-100	10.0	11.0	15.1	10.0	9.4	10.8	0.4	50 / 250	5.50
MB 600-120	12.0	13.0	17.8	12.0	10.6	12.8	0.4	25 / 100	9.37
MB 600-140	14.0	15.0	20.5	14.0	12.7	14.5	0.4	25 / 100	14.81

Dimensions in millimeters

## PRESSURE PERFORMANCE

Series MB 600 mm	Base Material of the Installation							
	①	②	③	⑤	⑥	⑦	⑧	
	ETG-100 / 44SMn28 AISI 1144	C15Pb / 1.0403 ~ SAE 1015 (10L15)	EN 1563: GJS-600-3 ASTM A536: 80-60-03	EN 1561: GJL-250 ASTM A48: NO.35	AlCu4Mg1 / EN AW-2024-T3 AA: 2024 T4/T6*	AlMgSiPb / EN AW-6012-T6 AA: 6012-T6	G-AISI7Mg / EN-AC-42100 ASTM/UNS: A356	
Ø 3 – 10	1400 bar / 20300 psi <b>450 bar / 6500 psi</b>					1200 bar / 17400 psi <b>380 bar / 5500 psi</b>		
Ø 12 – 14	1000 bar / 14500 psi <b>350 bar / 5100 psi</b>					900 bar / 13000 psi <b>280 bar / 4100 psi</b>		

Proof Pressure Test - ©

Max. Allowable Working Pressure = Nominal Pressure

\*SFC KOENIG's North American Engineering Department utilizes 2024-T4/T6 as a test base material.



### Material:

Sleeve: Stainless Steel 1.4305

Ball: Stainless Steel 1.4301

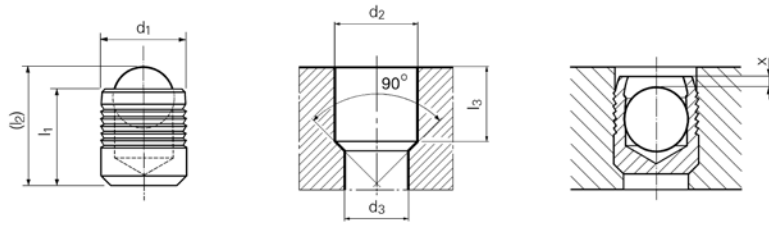
### Important:

See installation instructions on pages 76–77

Installation requirements on page 71

# KOENIG EXPANDER® SEALING PLUGS Series MB 600 Inch

Sleeve Clear Passivated per MIL-S-5002, Aerospace Quality



Toleranzen / Tolérances  $d_2$ : MB 600-093A =  $+0.002$   
 MB 600-125A bis/à MB 600-281A =  $+0.004$

3D DATA: [www.sfckoenig.com](http://www.sfckoenig.com)

Part Number	$d_1$	$l_1$	$(l_2)$ ~ Ref.	$d_2$	$d_3$ max	$l_3$ min.	$x$ 0 -0.012	Packaging Unit	Weight in gram/pcs.
MB600-093A	0.093	0.100	0.120	0.0937	0.062	0.095	0.012	100 / 1000	0.07
MB600-125A	0.124	0.138	0.172	0.1250	0.093	0.125	0.012	100 / 1000	0.17
MB600-156A	0.156	0.150	0.196	0.1562	0.125	0.130	0.012	100 / 1000	0.31
MB600-187A	0.187	0.193	0.259	0.1875	0.156	0.152	0.012	100 / 500	0.53
MB600-218A	0.218	0.225	0.301	0.2187	0.187	0.187	0.012	100 / 500	0.86
MB600-250A	0.249	0.260	0.352	0.2500	0.218	0.212	0.012	100 / 500	1.26
MB600-281A	0.281	0.285	0.380	0.2812	0.250	0.250	0.012	100 / 500	1.87

Dimensions in inches

## PRESSURE PERFORMANCE

Series MB 600 Inch	Base Material of the Installation						
	①	②	③	⑤	⑥	⑦	⑧
	ETG-100 / 44SMn28 AISI 1144	C15Pb / 1.0403 ~ SAE 1015 {10L15}	EN 1563: GJS-600-3 ASTM A536: 80-60-03	EN 1561: GJL-250 ASTM A48: NO.35	AlCu4Mg1 / EN AW-2024-T3 AA: 2024 T4/T6*	AlMgSiPb / EN AW-6012-T6 AA: 6012-T6	G-AlSi7Mg / EN-AC-42100 ASTM/UNS: A356
Ø 0.093 – 0.281	1400 bar / 20300 psi 450 bar / 6500 psi					1200 bar / 17400 psi 380 bar / 5500 psi	

Proof Pressure Test - ©

Max. Allowable Working Pressure = Nominal Pressure

\*SFC KOENIG's North American Engineering Department utilizes 2024-T4/T6 as a test base material.

### Material:

Sleeve: Stainless Steel 1.4305

Ball: Stainless Steel 1.4301 (1.4034 MB 600-093)

### Important:

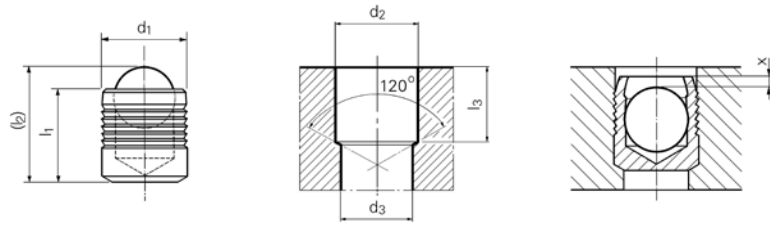
See installation instructions on pages 76–77

Installation requirements on page 71





# KOENIG EXPANDER® SEALING PLUGS Series MB 700



3D DATA: [www.sfckoenig.com](http://www.sfckoenig.com)

Part Number	d <sub>1</sub>	l <sub>1</sub>	(l <sub>2</sub> ) ~ Ref.	d <sub>2</sub> +0.1 0	d <sub>3</sub> max	l <sub>3</sub> min.	x ±0.2	Packaging Unit	Weight in gram/pcs.
MB 700-030	3.0	3.6	4.6	3.0	2.2	3.4	0.4	100 / 1000	0.17
MB 700-040	4.0	4.0	5.2	4.0	3.3	3.8	0.2	100 / 2000	0.34
MB 700-050	5.0	5.5	7.0	5.0	4.3	5.3	0.4	100 / 2000	0.68
MB 700-060	6.0	6.5	8.6	6.0	5.3	6.3	0.4	100 / 2000	1.17
MB 700-070	7.0	7.5	10.1	7.0	6.4	7.3	0.4	100 / 1000	1.90
MB 700-080	8.0	8.5	11.6	8.0	7.4	8.3	0.3	50 / 1000	2.84
MB 700-090	9.0	10.0	13.5	9.0	8.4	9.8	0.4	50 / 500	4.00
MB 700-100	10.0	11.0	15.1	10.0	9.4	10.8	0.4	50 / 500	5.47
MB 700-120	12.0	13.0	17.8	12.0	10.6	12.8	0.4	50 / 250	9.31
MB 700-140	14.0	15.0	20.4	14.0	12.7	14.5	0.4	50 / 250	14.72
MB 700-160	16.0	17.0	23.4	16.0	14.7	16.5	0.6	25 / 100	22.00
MB 700-180	18.0	19.0	26.3	18.0	16.7	18.5	0.6	25 / 100	31.34
MB 700-200	20.0	22.0	30.0	20.0	18.7	21.5	0.8	25 / 100	44.24
MB 700-220	22.0	25.0	34.0	22.0	20.7	24.5	0.8	25 / 50	58.61

Dimensions in millimeters

## PRESSURE PERFORMANCE

Series MB 700 mm	Base Material of the Installation							
	①	②	③	⑤	⑥	⑦	⑧	
	ETG-100 / 44SMn28 AISI 1144	C15Pb / 1.0403 ~ SAE 1015 (10L15)	EN 1563: GJS-600-3 ASTM A536: 80-60-03	EN 1561: GJL-250 ASTM A48: NO.35	AlCu4Mg1 / EN AW-2024-T3 AA: 2024 T4/T6*	AlMgSiPb / EN AW-6012-T6 AA: 6012-T6	G-AISI7Mg / EN-AC-42100 ASTM/UNS: A356	
Ø 3 – 10	1400 bar / 20300 psi <b>450 bar / 6500 psi</b>					1200 bar / 17400 psi <b>380 bar / 5500 psi</b>		
Ø 12 – 22	1150 bar / 16700 psi <b>350 bar / 5100 psi</b>					900 bar / 13000 psi <b>280 bar / 4100 psi</b>		

Proof Pressure Test - ©

Max. Allowable Working Pressure = Nominal Pressure

\*SFC KOENIG's North American Engineering Department utilizes 2024-T4/T6 as a test base material.

### Material:

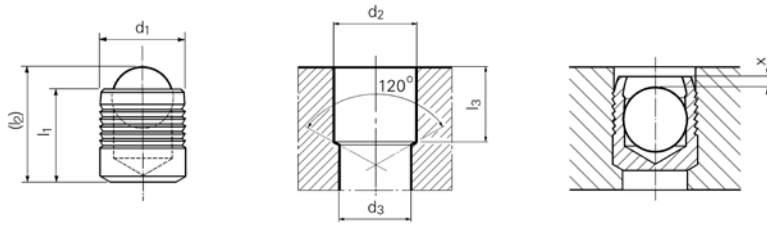
Sleeve: Stainless Steel DIN 1.4305  
Ball: Bearing Steel, Heat Treated

### Important:

See installation instructions on pages 76–77  
Installation requirements on page 71



# KOENIG EXPANDER® SEALING PLUGS Series MB 850



3D DATA: [www.sfckoenig.com](http://www.sfckoenig.com)

Part Number	d <sub>1</sub>	l <sub>1</sub>	(l <sub>2</sub> ) ~ Ref.	d <sub>2</sub> +0.1 0	d <sub>3</sub> max	l <sub>3</sub> min.	x ±0.2	Packaging Unit	Weight in gram/pcs.
MB 850-030	3.0	3.6	4.6	3.0	2.2	3.4	0.4	100 / 1000	0.17
MB 850-040	4.0	4.0	5.2	4.0	3.3	3.8	0.2	100 / 2000	0.34
MB 850-050	5.0	5.5	7.1	5.0	4.3	5.3	0.4	100 / 2000	0.68
MB 850-060	6.0	6.5	8.6	6.0	5.3	6.3	0.4	100 / 2000	1.17
MB 850-070	7.0	7.5	10.1	7.0	6.4	7.3	0.4	100 / 1000	1.91
MB 850-080	8.0	8.5	11.6	8.0	7.4	8.3	0.3	50 / 1000	2.84
MB 850-090	9.0	10.0	13.6	9.0	8.4	9.8	0.4	50 / 500	4.00
MB 850-100	10.0	11.0	15.1	10.0	9.4	10.8	0.4	50 / 500	5.47
MB 850-120	12.0	13.0	17.9	12.0	10.6	12.8	0.4	50 / 250	9.31
MB 850-140	14.0	15.0	20.6	14.0	12.7	14.5	0.4	50 / 250	14.72
MB 850-160	16.0	17.0	23.4	16.0	14.7	16.5	0.6	25 / 100	22.00
MB 850-180	18.0	19.0	26.4	18.0	16.7	18.5	0.6	25 / 100	31.34
MB 850-200	20.0	22.0	30.1	20.0	18.7	21.5	0.8	25 / 100	44.24
MB 850-220	22.0	25.0	34.0	22.0	20.7	24.5	0.8	25 / 50	58.61

Dimensions in millimeters

## PRESSURE PERFORMANCE

Series MB 850 mm	Base Material of the Installation							
	①	②	③	⑤	⑥	⑦	⑧	
	ETG-100 / 44SMn28 AISI 1144	C15Pb / 1.0403 ~ SAE 1015 [10L15]	EN 1563: GJS-600-3 ASTM A536: 80-60-03	EN 1561: GJL-250 ASTM A48: NO.35	AlCu4Mg1 / EN AW-2024-T3 AA: 2024 T4/T6*	AlMgSiPb / EN AW-6012-T6 AA: 6012-T6	G-AISI7Mg / EN-AC-42100 ASTM/UNS: A356	
Ø 3 – 10	1100 bar / 16000 psi <b>350 bar / 5100 psi</b>					1000 bar / 14500 psi <b>320 bar / 4600 psi</b>		
Ø 12 – 22	900 bar / 13000 psi <b>280 bar / 4100 psi</b>					800 bar / 11600 psi <b>250 bar / 3600 psi</b>		

Proof Pressure Test - ©

Max. Allowable Working Pressure = Nominal Pressure

\*SFC KOENIG's North American Engineering Department utilizes 2024-T4/T6 as a test base material.

### Material:

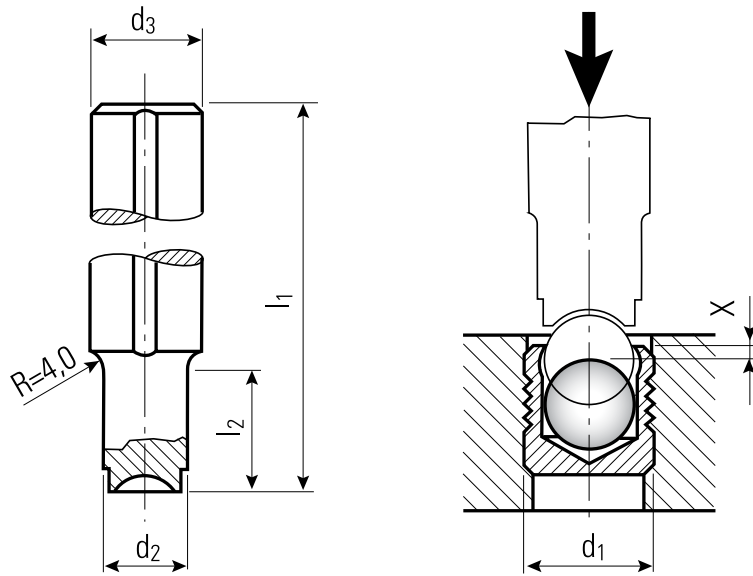
Sleeve: Case Hardening Steel Zinc Plated, Thick Coat Passivated, CR (VI)-Free  
Ball: Bearing Steel, Heat Treated

### Important:

See installation instructions on pages 76–77  
Installation requirements on page 71



# KOENIG EXPANDER® SETTING TOOLS Series MB



3D DATA: [www.sfckoenig.com](http://www.sfckoenig.com)

Part Number	d <sub>1</sub> Expander	d <sub>3</sub> -h9	l <sub>1</sub>	d <sub>2</sub>	l <sub>2</sub>	x ±0.2	Weight in gram/pcs.
MB 030	3.0	10	100	2.8	10	0.4	55
MB 040	4.0	10	100	3.8	10	0.2	55
MB 050	5.0	10	100	4.8	12	0.4	55
MB 060	6.0	10	100	5.8	15	0.4	55
MB 070	7.0	10	100	6.8	18	0.4	55
MB 080	8.0	10	100	7.8	20	0.3	55
MB 090	9.0	14	100	8.8	22	0.4	120
MB 100	10.0	14	100	9.8	25	0.4	120
MB 120	12.0	14	150	11.7	30	0.4	180
MB 140	14.0	20	150	13.7	35	0.4	350
MB 160	16.0	20	150	15.7	40	0.6	350
MB 180	18.0	20	150	17.7	45	0.6	350
MB 200	20.0	25	150	19.7	50	0.8	550
MB 220	22.0	25	150	21.7	55	0.8	550

Dimensions in millimeters

North American customers please refer to page 22

## Material:

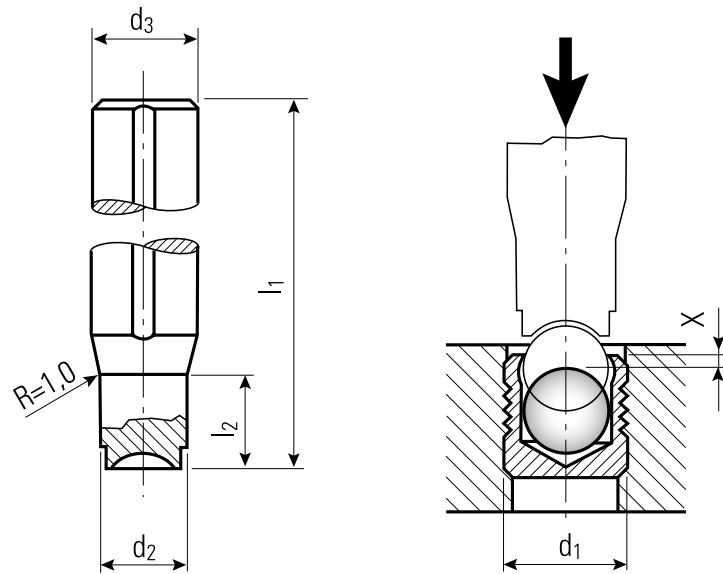
Tool Steel, Heat Treated, Hardness Approx. HRC 50

## RECOMMENDED SETTING EQUIPMENT FOR SERIES MB

EXPRESS 3000	Hydropneumatic Table Press	See page 58 for more information
EXPRESS 5000	Hydropneumatic Table Press	See page 58 for more information



# KOENIG EXPANDER® SETTING TOOLS Series MB Inch



3D DATA: [www.sfckoenig.com](http://www.sfckoenig.com)

Part Number	d <sub>1</sub> Expander	d <sub>3</sub> -h9	l <sub>1</sub>	d <sub>2</sub>	l <sub>2</sub>	x 0 -0.012	Weight in gram/pcs.
MB 093A	0.093	0.394	3.94	0.082	0.137	0.012	55
MB 125A	0.125	0.394	3.94	0.117	0.137	0.012	55
MB 156A	0.156	0.394	3.94	0.148	0.137	0.012	55
MB 187A	0.187	0.394	3.94	0.180	0.137	0.012	55
MB 218A	0.218	0.394	3.94	0.211	0.400	0.012	55
MB 250A	0.250	0.394	3.94	0.242	0.400	0.012	55
MB 281A	0.281	0.394	3.94	0.273	0.400	0.012	55

Dimensions in inches

North American customers please refer to page 24

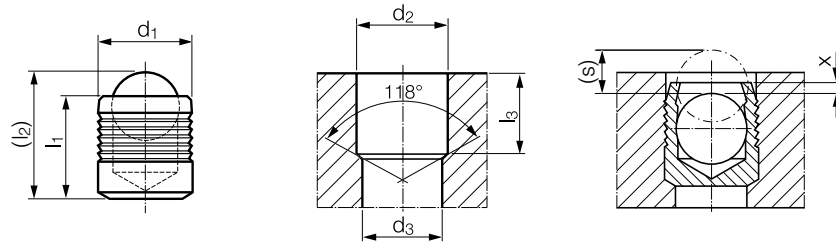
## Material:

Tool Steel, Heat Treated, Hardness Approx. HRC 50

## RECOMMENDED SETTING EQUIPMENT FOR SERIES MB

<b>EXPRESS 3000</b>	Hydropneumatic Table Press	See page 58 for more information
<b>EXPRESS 5000</b>	Hydropneumatic Table Press	See page 58 for more information

# KOENIG EXPANDER® SEALING PLUGS Series CV 173



3D DATA: [www.sfckoenig.com](http://www.sfckoenig.com)

Part Number	d <sub>1</sub>	l <sub>1</sub>	(l <sub>2</sub> ) ~ Ref.	d <sub>2</sub> +0.1 0	d <sub>3</sub> max	l <sub>3</sub> min.	x ±0.1	(s) ~ Ref.	Packaging Unit	Weight in gram/pcs.
CV 173-030	3.0	3.18	4.1	3.0	2.3	2.9	0.2	1.0	100 / 1000	0.09
CV 173-040	4.0	4.00	5.2	4.0	3.3	3.8	0.2	1.4	100 / 1000	0.20
CV 173-050	5.0	5.50	7.0	5.0	4.3	5.3	0.2	1.9	100 / 1000	0.44
CV 173-060	6.0	6.50	8.6	6.0	5.3	6.3	0.2	2.3	100 / 1000	0.78
CV 173-070	7.0	7.50	10.1	7.0	6.2	7.3	0.2	2.8	100 / 1000	1.28
CV 173-080	8.0	8.50	11.7	8.0	7.2	8.3	0.2	3.4	100 / 1000	1.96
CV 173-090	9.0	10.00	13.7	9.0	8.2	9.8	0.2	3.7	100 / 1000	2.88
CV 173-100	10.0	11.00	15.2	10.0	9.2	10.8	0.2	4.2	100 / 500	4.01
CV 173-120	12.0	13.00	18.0	12.0	11.0	12.8	0.2	5.1	50 / 250	7.06

Dimensions in millimeters

Not all items in stock – MOQ and production lead times may apply

## PRESSURE PERFORMANCE

Series CV 173 mm	Base Material of the Installation				
	① ETG-100 / 44SMn28 AISI 1144	③ EN 1563: GJS-600-3 ASTM A536: 80-60-03	④ EN 1563: GJS-450-10 ASTM A536: 65-45-12	⑥ AlCu4Mg1 / EN AW-2024-T3 AA: 2024 T4/T6*	⑧ G-AISI7Mg / EN-AC-42100 ASTM/UNS: A356
Ø 3 – 10				650 bar / 9400 psi <b>210 bar / 3000 psi</b>	
Ø 12				300 bar / 4300 psi <b>100 bar / 1500 psi</b>	

Proof Pressure Test - ⑥

Max. Allowable Working Pressure = Nominal Pressure

\*SFC KOENIG's North American Engineering Department utilizes 2024-T4/T6 as a test base material.

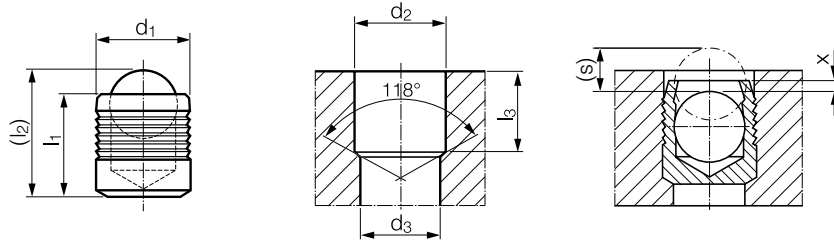


### Material:

Sleeve: Aluminum 2024-T4, QQ-A 225/6

Ball: Stainless Steel, AISI 302/304, Wax Film Lubrication (Diameter Dependant)

# KOENIG EXPANDER® SEALING PLUGS Series CV 173 Inch



3D DATA: [www.sfckoenig.com](http://www.sfckoenig.com)

Part Number	$d_1$	$l_1$	$(l_2)$ ~ Ref.	$d_2$ +0.004 0	$d_3$ max.	$l_3$ min.	$x$ $\pm 0.004$	$(s)$ ~ Ref.	Packaging Unit	Weight in gram/pcs.
CV 173-156	0.156	0.158	0.21	0.1562	0.130	0.149	0.008	0.053	100 / 1000	0.19
CV 173-187	0.187	0.217	0.27	0.1875	0.160	0.208	0.010	0.066	100 / 1000	0.37
CV 173-218	0.218	0.217	0.28	0.2187	0.190	0.208	0.010	0.078	100 / 1000	0.55
CV 173-250	0.250	0.256	0.34	0.2500	0.220	0.247	0.010	0.094	100 / 1000	0.87
CV 173-281	0.281	0.296	0.40	0.2812	0.250	0.287	0.010	0.110	100 / 1000	1.60
CV 173-312	0.312	0.335	0.46	0.3125	0.281	0.326	0.010	0.129	100 / 1000	1.93
CV 173-343	0.343	0.394	0.52	0.3437	0.312	0.385	0.010	0.140	100 / 500	2.58
CV 173-375	0.375	0.394	0.54	0.3750	0.343	0.385	0.010	0.153	100 / 500	3.25
CV 173-406	0.406	0.434	0.59	0.4062	0.375	0.425	0.010	0.162	100 / 500	4.20
CV 173-437	0.437	0.512	0.68	0.4375	0.406	0.503	0.010	0.166	50 / 250	5.70

Dimensions in inches

Not all items in stock – MOQ and production lead times may apply

## PRESSURE PERFORMANCE

Series CV 173 Inch	Base Material of the Installation				
	①	③	④	⑥	⑧
	ETG-100 / 44SMn28 AISI 1144	EN 1563: GJS-600-3 ASTM A536: 80-60-03	EN 1563: GJS-450-10 ASTM A536: 65-45-12	AlCu4Mg1 / EN AW-2024-T3 AA: 2024 T4/T6*	G-AISI7Mg / EN-AC-42100 ASTM/UNS: A356
Ø 0.156 – 0.437				650 bar / 9400 psi 210 bar / 3000 psi	

Proof Pressure Test - ©

Max. Allowable Working Pressure = Nominal Pressure

\*SFC KOENIG's North American Engineering Department utilizes 2024-T4/T6 as a test base material.

### Material:

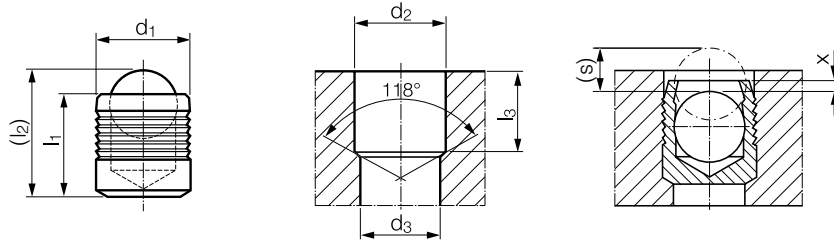
Sleeve: Aluminum 2024-T4, QQ-A 225/6

Ball: Stainless Steel, AISI 302/304, Wax Film Lubrication (Diameter Dependant)





# KOENIG EXPANDER® SEALING PLUGS Series CV 173 Inch Short



3D DATA: [www.sfckoenig.com](http://www.sfckoenig.com)

Part Number	d <sub>1</sub>	l <sub>1</sub>	(l <sub>2</sub> ) ~ Ref.	d <sub>2</sub> +0.004 0	d <sub>3</sub> max.	l <sub>3</sub> min.	x ±0.004	(s) ~ Ref.	Packaging Unit	Weight in gram/pcs.
CV 173-125S	0.125	0.125	0.16	0.1250	0.100	0.113	0.007	0.042	100 / 1000	0.10
CV 173-156S	0.156	0.125	0.17	0.1562	0.130	0.113	0.000	0.040	100 / 1000	0.15
CV 173-187S	0.187	0.187	0.24	0.1875	0.160	0.170	0.010	0.066	100 / 1000	0.33
CV 173-218S	0.218	0.187	0.25	0.2187	0.190	0.170	0.000	0.063	100 / 1000	0.46
CV 173-250S	0.250	0.225	0.30	0.2500	0.220	0.196	0.000	0.083	100 / 1000	0.76
CV 173-281S	0.281	0.255	0.35	0.2812	0.250	0.233	0.000	0.091	100 / 1000	1.08
CV 173-312S	0.312	0.280	0.39	0.3125	0.281	0.255	0.000	0.107	100 / 1000	1.52
CV 173-343S	0.343	0.307	0.43	0.3437	0.312	0.275	0.000	0.118	100 / 500	2.01
CV 173-406S	0.406	0.365	0.52	0.4062	0.375	0.308	-0.010	0.143	100 / 500	3.59

Dimensions in inches

Not all items in stock – MOQ and production lead times may apply

## PRESSURE PERFORMANCE

Series CV 173 Inch Short	Base Material of the Installation				
	①	③	④	⑥	⑧
	ETG-100 / 44SMn28 AISI 1144	EN 1563: GJS-600-3 ASTM A536: 80-60-03	EN 1563: GJS-450-10 ASTM A536: 65-45-12	AlCu4Mg1 / EN AW-2024-T3 AA: 2024 T4/T6*	G-AISI7Mg / EN-AC-42100 ASTM/UNS: A356
Ø 0.125 – 0.406				400 bar / 5800 psi 150 bar / 2100 psi	

Proof Pressure Test - ⑥

Max. Allowable Working Pressure = Nominal Pressure

\*SFC KOENIG's North American Engineering Department utilizes 2024-T4/T6 as a test base material.

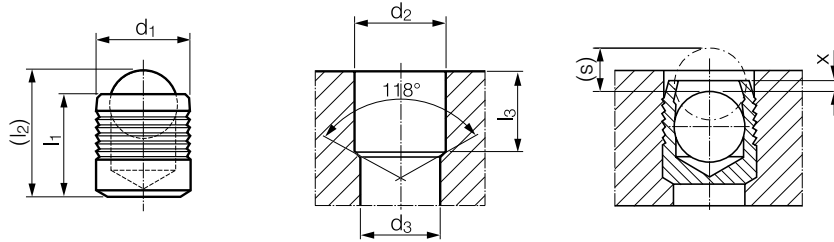


### Material:

Sleeve: Aluminum 2024-T4, QQ-A 225/6

Ball: Stainless Steel, AISI 302/304, Wax Film Lubrication (Diameter Dependant)

# KOENIG EXPANDER® SEALING PLUGS Series CV 588



3D DATA: [www.sfckoenig.com](http://www.sfckoenig.com)

Part Number	d <sub>1</sub>	l <sub>1</sub>	(l <sub>2</sub> ) ~ Ref.	d <sub>2</sub> +0.1 0	d <sub>3</sub> max	l <sub>3</sub> min.	x ±0.1	(s) ~ Ref.	Packaging Unit	Weight in gram/pcs.
CV 588-040	4.0	4.00	5.2	4.0	3.3	3.8	0.2	1.4	100 / 1000	0.36
CV 588-050	5.0	5.50	7.0	5.0	4.3	5.3	0.2	1.9	100 / 1000	0.76
CV 588-060	6.0	6.50	8.6	6.0	5.3	6.3	0.2	2.3	100 / 1000	1.28
CV 588-070	7.0	7.50	10.1	7.0	6.2	7.3	0.2	2.8	100 / 1000	2.00
CV 588-080	8.0	8.50	11.7	8.0	7.2	8.3	0.2	3.4	100 / 1000	2.96
CV 588-090	9.0	10.00	13.7	9.0	8.2	9.8	0.2	3.7	100 / 1000	4.31
CV 588-100	10.0	11.00	15.2	10.0	9.2	10.8	0.2	4.2	100 / 500	5.88

Dimensions in millimeters

Not all items in stock – MOQ and production lead times may apply

## PRESSURE PERFORMANCE

Series CV 588 mm	Base Material of the Installation				
	① ETG-100 / 44SMn28 AISI 1144	③ EN 1563: GJS-600-3 ASTM A536: 80-60-03	④ EN 1563: GJS-450-10 ASTM A536: 65-45-12	⑥ AlCu4Mg1 / EN AW-2024-T3 AA: 2024 T4/T6*	⑧ G-AISI7Mg / EN-AC-42100 ASTM/UNS: A356
Ø 4 – 9	1000 bar / 14500 psi 350 bar / 5000 psi				
Ø 10	860 bar / 12500 psi 280 bar / 4000 psi				

Proof Pressure Test - ⑧

Max. Allowable Working Pressure = Nominal Pressure

\*SFC KOENIG's North American Engineering Department utilizes 2024-T4/T6 as a test base material.

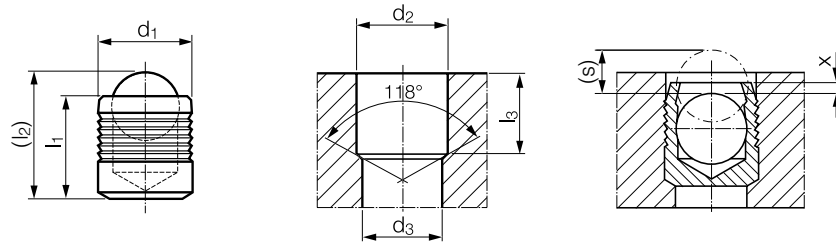
### Material:

Sleeve: Stainless Steel [316] ASTM A580, Passivate, QQ-P-35C

Ball: Stainless Steel, AISI 316, Wax Film Lubrication (Diameter Dependant)



# KOENIG EXPANDER® SEALING PLUGS Series CV 588 Inch



3D DATA: [www.sfckoenig.com](http://www.sfckoenig.com)

Part Number	d <sub>1</sub>	l <sub>1</sub>	(l <sub>2</sub> ) ~ Ref.	d <sub>2</sub> +0.004 0	d <sub>3</sub> max.	l <sub>3</sub> min.	x ±0.004	(s) ~ Ref.	Packaging Unit	Weight in gram/pcs.
CV 588-156	0.156	0.158	0.21	0.1562	0.130	0.149	0.008	0.053	500 / 1000	0.35
CV 588-187	0.187	0.217	0.27	0.1875	0.160	0.208	0.010	0.066	100 / 1000	0.71
CV 588-218	0.218	0.217	0.28	0.2187	0.190	0.208	0.010	0.078	100 / 1000	0.94
CV 588-250	0.250	0.256	0.34	0.2500	0.220	0.247	0.010	0.094	100 / 1000	1.42
CV 588-281	0.281	0.296	0.40	0.2812	0.250	0.287	0.010	0.110	100 / 1000	2.92
CV 588-312	0.312	0.335	0.46	0.3125	0.281	0.326	0.010	0.129	100 / 1000	3.88
CV 588-343	0.343	0.394	0.52	0.3437	0.312	0.385	0.010	0.140	100 / 500	4.11
CV 588-375	0.375	0.394	0.54	0.3750	0.343	0.385	0.010	0.153	100 / 500	4.86

Dimensions in inches

Not all items in stock – MOQ and production lead times may apply

## PRESSURE PERFORMANCE

Series CV 588 Inch	Base Material of the Installation				
	①	③	④	⑥	⑧
	ETG-100 / 44SMn28 AISI 1144	EN 1563: GJS-600-3 ASTM A536: 80-60-03	EN 1563: GJS-450-10 ASTM A536: 65-45-12	AlCu4Mg1 / EN AW-2024-T3 AA: 2024 T4/T6*	G-AISI7Mg / EN-AC-42100 ASTM/UNS: A356
Ø 0.156 – 0.375	1000 bar / 14500 psi 350 bar / 5000 psi				

Proof Pressure Test - ⑥

Max. Allowable Working Pressure = Nominal Pressure

\*SFC KOENIG's North American Engineering Department utilizes 2024-T4/T6 as a test base material.

### Material:

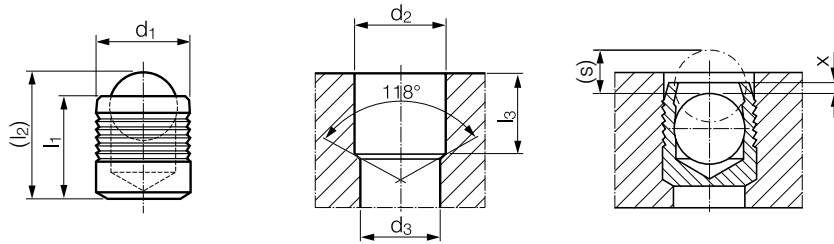
Sleeve: Stainless Steel (316) ASTM A580, Passivate, QQ-P-35C

Ball: Stainless Steel, AISI 316, Wax Film Lubrication (Diameter Dependant)





# KOENIG EXPANDER® SEALING PLUGS Series CV 588 Inch Short



3D DATA: [www.sfckoenig.com](http://www.sfckoenig.com)

Part Number	$d_1$	$l_1$	$(l_2)$ ~ Ref.	$d_2$ +0.004 0	$d_3$ max.	$l_3$ min.	$x$ $\pm 0.004$	$(s)$ ~ Ref.	Packaging Unit	Weight in gram/pcs.
CV 588-125S	0.125	0.125	0.16	0.1250	0.100	0.113	0.007	0.042	100 / 1000	0.18
CV 588-156S	0.156	0.125	0.17	0.1562	0.130	0.113	0.000	0.040	100 / 1000	0.29
CV 588-187S	0.187	0.187	0.24	0.1875	0.160	0.170	0.010	0.066	100 / 1000	0.60
CV 588-218S	0.218	0.187	0.25	0.2187	0.190	0.170	0.000	0.063	100 / 1000	0.81
CV 588-250S	0.250	0.225	0.30	0.2500	0.220	0.196	0.000	0.083	100 / 1000	1.20
CV 588-281S	0.281	0.255	0.35	0.2812	0.250	0.233	0.000	0.091	100 / 1000	1.77

Dimensions in inches

Not all items in stock – MOQ and production lead times may apply

## PRESSURE PERFORMANCE

Series CV 588 Inch Short	Base Material of the Installation				
	①	③	④	⑥	⑧
	ETG-100 / 44SMn28 AISI 1144	EN 1563: GJS-600-3 ASTM A536: 80-60-03	EN 1563: GJS-450-10 ASTM A536: 65-45-12	AlCu4Mg1 / EN AW-2024-T3 AA: 2024 T4/T6*	G-AISI7Mg / EN-AC-42100 ASTM/UNS: A356
Ø 0.125 – 0.281	560 bar / 8100 psi 250 bar / 3600 psi				

Proof Pressure Test - ②

Max. Allowable Working Pressure = Nominal Pressure

\*SFC KOENIG's North American Engineering Department utilizes 2024-T4/T6 as a test base material.

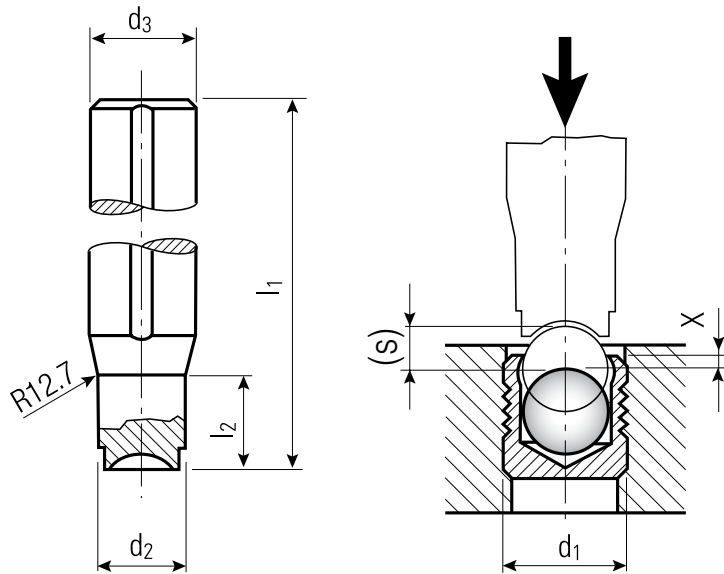
### Material:

Sleeve: Stainless Steel, AISI 316, ASTM A580, Passivate, QQ-P-35C

Ball: Stainless Steel, AISI 316, Wax Film Lubrication (Diameter Dependant)



# KOENIG EXPANDER® SETTING TOOLS Series CV



3D DATA: [www.sfckoenig.com](http://www.sfckoenig.com)

Part Number	d <sub>1</sub> Expander	d <sub>3</sub> ±0.12	l <sub>1</sub>	d <sub>2</sub>	l <sub>2</sub>	x ±0.10	(s) ~ Ref.	Weight in gram/pcs.
HT-MBM-030	MB/CV XXX-030	9.53	127	2.8	7.6	0.2	1.0	62
HT-MBM-040	MB/CV XXX-040	9.53	127	3.8	7.6	0.2	1.4	63
HT-MBM-050	MB/CV XXX-050	9.53	127	4.8	12.7	0.2	1.9	62
HT-MBM-060	MB/CV XXX-060	9.53	127	5.8	15.2	0.2	2.3	63
HT-MBM-070	MB/CV XXX-070	9.53	127	6.8	20.3	0.2	2.8	63
HT-MBM-080	MB/CV XXX-080	9.53	127	7.8	33.0	0.2	3.4	63
HT-MBM-090	MB/CV XXX-090	12.70	127	8.8	38.1	0.2	3.7	102
HT-MBM-100	MB/CV XXX-100	12.70	127	9.8	38.1	0.2	4.2	107
HT-MBM-120	MB/CV XXX-120	12.70	127	11.7	38.1	0.2	5.1	118
HT-MBM-140	MB/CV XXX-140	15.88	127	13.7	45.7	0.2	5.9	174
HT-MBM-160	MB/CV XXX-160	15.88	127	15.7	45.7	0.2	6.4	192
HT-MBM-180	MB/CV XXX-180	19.05	127	17.7	45.7	0.2	7.2	264
HT-MBM-200	MB/CV XXX-200	22.23	127	19.7	45.7	0.2	8.4	347
HT-MBM-220	MB/CV XXX-220	25.40	127	21.7	45.7	0.2	9.5	442

Dimensions in millimeters

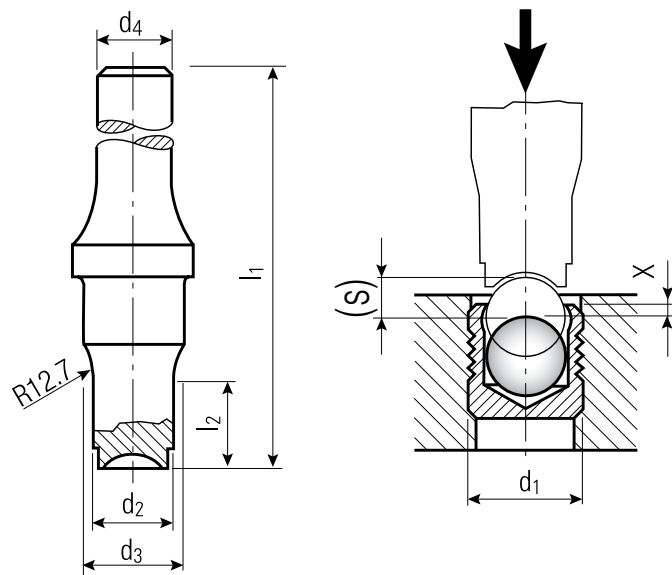
## Material:

Tool Steel, Heat Treated, Hardness Approx. HRC 50

## RECOMMENDED SETTING EQUIPMENT FOR SERIES CV

EXPRESS 3000	Hydropneumatic Table Press	See page 58 for more information
EXPRESS 5000	Hydropneumatic Table Press	See page 58 for more information

# KOENIG EXPANDER® SETTING TOOLS Series CV Air Hammer



3D DATA: [www.sfckoenig.com](http://www.sfckoenig.com)

Part Number	d <sub>1</sub> Expander	d <sub>3</sub> ±0.12	d <sub>4</sub> (AH only)	l <sub>1</sub>	d <sub>2</sub>	l <sub>2</sub>	x ±0.10	(s) ~ Ref.	Weight in gram/pcs.
AH-MBM-030	MB/CV XXX-030	12.7	10.2	101.6	2.8	7.6	0.2	1.0	83
AH-MBM-040	MB/CV XXX-040	12.7	10.2	101.6	3.8	7.6	0.2	1.4	84
AH-MBM-050	MB/CV XXX-050	12.7	10.2	101.6	4.8	12.7	0.2	1.9	81
AH-MBM-060	MB/CV XXX-060	12.7	10.2	101.6	5.8	15.2	0.2	2.3	81
AH-MBM-070	MB/CV XXX-070	12.7	10.2	101.6	6.8	20.3	0.2	2.8	79
AH-MBM-080	MB/CV XXX-080	12.7	10.2	101.6	7.8	33.0	0.2	3.4	74
AH-MBM-090	MB/CV XXX-090	12.7	10.2	101.6	8.8	33.0	0.2	3.7	78
AH-MBM-100	MB/CV XXX-100	12.7	10.2	101.6	9.8	38.1	0.2	4.2	80
AH-MBM-120	MB/CV XXX-120	12.7	10.2	101.6	11.7	38.1	0.2	5.1	91
AH-MBM-140	MB/CV XXX-140	12.7	10.2	101.6	13.7	-	0.2	5.9	98
AH-MBM-160	MB/CV XXX-160	12.7	10.2	101.6	15.7	-	0.2	6.4	101
AH-MBM-180	MB/CV XXX-180	12.7	10.2	101.6	17.7	-	0.2	7.2	105
AH-MBM-200	MB/CV XXX-200	12.7	10.2	101.6	19.7	-	0.2	8.4	110
AH-MBM-220	MB/CV XXX-220	12.7	10.2	101.6	21.7	-	0.2	9.5	116

Dimensions in millimeters

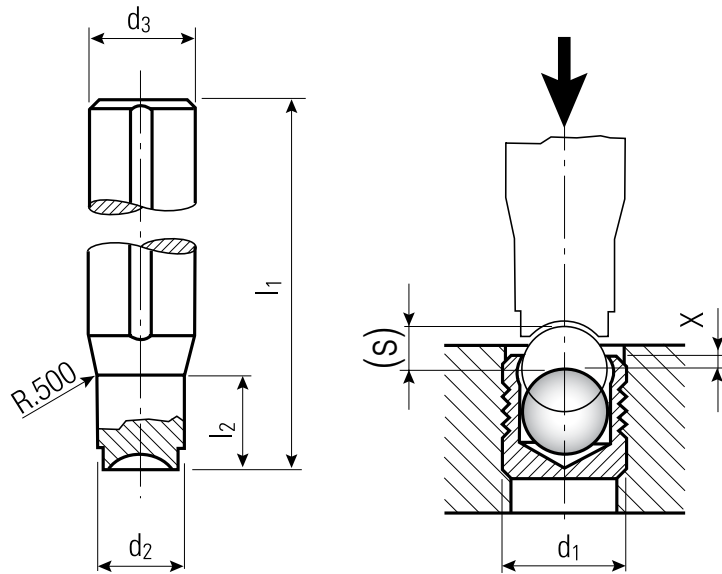
## Material:

Tool Steel, Heat Treated, Hardness Approx. HRC 50

## RECOMMENDED SETTING EQUIPMENT FOR SERIES CV

EXPRESS 3000	Hydropneumatic Table Press	See page 58 for more information
EXPRESS 5000	Hydropneumatic Table Press	See page 58 for more information

# KOENIG EXPANDER® SETTING TOOLS Series CV



3D DATA: [www.sfckoenig.com](http://www.sfckoenig.com)

Part Number	d <sub>1</sub> Expander	d <sub>3</sub> ±0.005	l <sub>1</sub>	d <sub>2</sub>	l <sub>2</sub>	x ±0.004	(s) ~ Ref.	Weight in gram/pcs.
HT-CVI-156	CV XXX-156	0.375	5.0	0.142	0.3	0.008	0.053	63
HT-CVI-187	CV XXX-187	0.375	5.0	0.173	0.4	0.010	0.066	63
HT-CVI-218	CV XXX-218	0.375	5.0	0.204	0.5	0.010	0.063	63
HT-CVI-250	CV XXX-250	0.375	5.0	0.236	0.6	0.010	0.083	63
HT-CVI-281	CV XXX-281	0.375	5.0	0.267	0.8	0.010	0.110	63
HT-CVI-312	CV XXX-312	0.375	5.0	0.298	1.3	0.010	0.107	62
HT-CVI-343	CV XXX-343	0.500	5.0	0.329	1.5	0.010	0.140	100
HT-CVI-375	CV XXX-375	0.500	5.0	0.361	1.5	0.010	0.153	104
HT-CVI-406	CV XXX-406	0.500	5.0	0.392	1.5	0.010	0.162	108
HT-CVI-437	CV XXX-437	0.500	5.0	0.423	1.5	0.010	0.166	112

Dimensions in inches

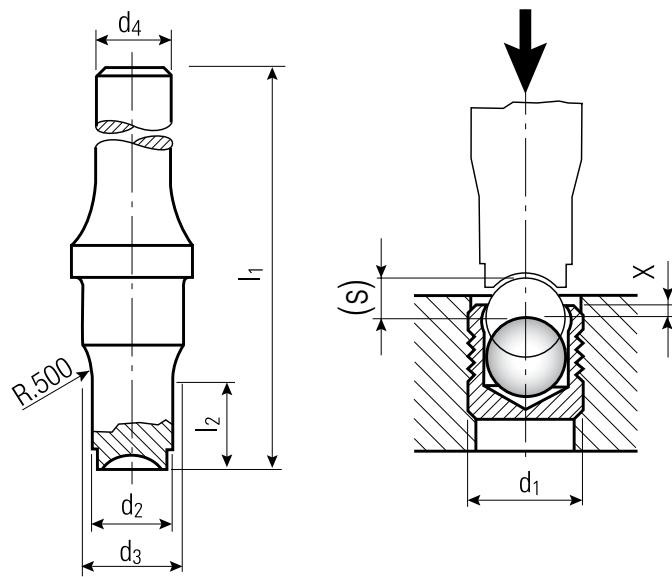
## Material:

Tool Steel, Heat Treated, Hardness Approx. HRC 50

## RECOMMENDED SETTING EQUIPMENT FOR SERIES CV

EXPRESS 3000	Hydropneumatic Table Press	See page 58 for more information
EXPRESS 5000	Hydropneumatic Table Press	See page 58 for more information

# KOENIG EXPANDER® SETTING TOOLS Series CV Air Hammer



## 3D DATA: [www.sfckoenig.com](http://www.sfckoenig.com)

Part Number	d <sub>1</sub> Expander	d <sub>3</sub> ±0.005	d <sub>4</sub>	l <sub>1</sub>	d <sub>2</sub>	l <sub>2</sub>	x ±0.004	(s) ~ Ref.	Weight in gram/pcs.
AH-CVI-156	CV XXX-156	0.5	0.401	4.0	0.142	0.3	0.008	0.053	84
AH-CVI-187	CV XXX-187	0.5	0.401	4.0	0.173	0.4	0.010	0.066	83
AH-CVI-218	CV XXX-218	0.5	0.401	4.0	0.204	0.5	0.010	0.063	82
AH-CVI-250	CV XXX-250	0.5	0.401	4.0	0.236	0.6	0.010	0.083	81
AH-CVI-281	CV XXX-281	0.5	0.401	4.0	0.267	0.8	0.010	0.110	79
AH-CVI-343	CV XXX-343	0.5	0.401	4.0	0.329	1.3	0.010	0.140	73
AH-CVI-375	CV XXX-375	0.5	0.401	4.0	0.361	1.5	0.010	0.153	77
AH-CVI-406	CV XXX-406	0.5	0.401	4.0	0.392	1.5	0.010	0.162	81
AH-CVI-437	CV XXX-437	0.5	0.401	4.0	0.423	1.5	0.010	0.166	86

Dimensions in inches

### Material:

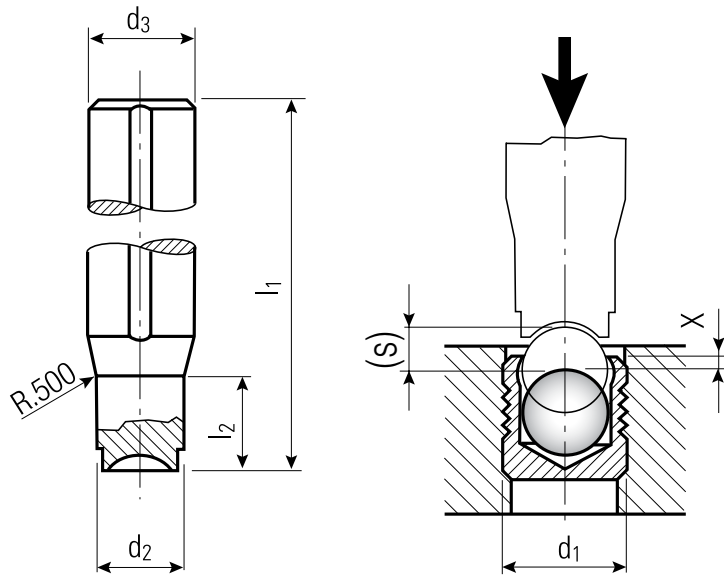
Tool Steel, Heat Treated, Hardness Approx. HRC 50

## RECOMMENDED SETTING EQUIPMENT FOR SERIES CV

EXPRESS 3000	Hydropneumatic Table Press	See page 58 for more information
EXPRESS 5000	Hydropneumatic Table Press	See page 58 for more information



# KOENIG EXPANDER® SETTING TOOLS Series CV Short



## 3D DATA: [www.sfckoenig.com](http://www.sfckoenig.com)

Part Number	d <sub>1</sub> Expander	d <sub>3</sub> ±0.005	l <sub>1</sub>	d <sub>2</sub>	l <sub>2</sub>	x ±0.004	(s) ~ Ref.	Weight in gram/pcs.
HT-CVI-125	CV XXX-125S	0.375	5.0	0.111	0.3	0.007	0.042	62
HT-CVI-156-S	CV XXX-156S	0.375	5.0	0.142	0.3	0.000	0.040	63
HT-CVI-187	CV XXX-187S	0.375	5.0	0.173	0.4	0.010	0.066	63
HT-CVI-218	CV XXX-218S	0.375	5.0	0.204	0.5	0.010	0.063	63
HT-CVI-250	CV XXX-250S	0.375	5.0	0.236	0.6	0.010	0.083	63
HT-CVI-281-S	CV XXX-281S	0.375	5.0	0.267	0.8	0.000	0.091	63
HT-CVI-312	CV XXX-312S	0.375	5.0	0.298	1.3	0.010	0.107	62
HT-CVI-343	CV XXX-343S	0.500	5.0	0.329	1.5	0.010	0.118	100
HT-CVI-406	CV XXX-406S	0.500	5.0	0.392	1.5	0.010	0.143	108

Dimensions in inches

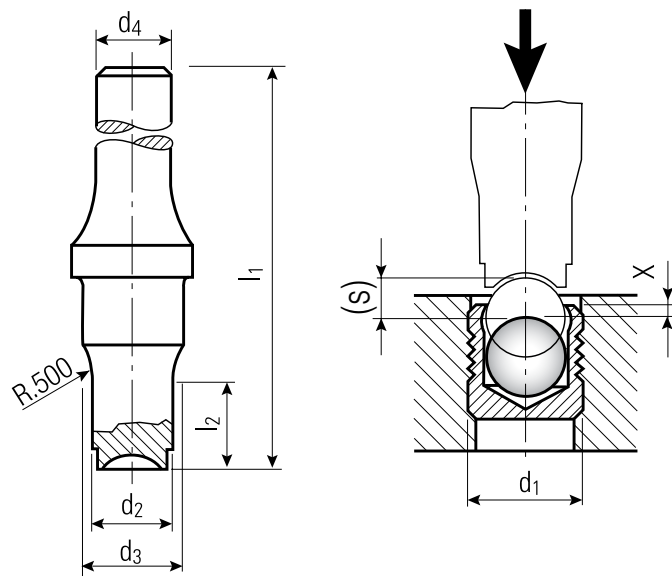
### Material:

Tool Steel, Heat Treated, Hardness Approx. HRC 50

## RECOMMENDED SETTING EQUIPMENT FOR SERIES CV

<b>EXPRESS 3000</b>	Hydropneumatic Table Press	See page 58 for more information
<b>EXPRESS 5000</b>	Hydropneumatic Table Press	See page 58 for more information

# KOENIG EXPANDER® SETTING TOOLS Series CV Short Air Hammer



3D DATA: [www.sfckoenig.com](http://www.sfckoenig.com)

Part Number	d <sub>1</sub> Expander	d <sub>3</sub> ±0.005	d <sub>4</sub>	l <sub>1</sub>	d <sub>2</sub>	l <sub>2</sub>	x ±0.004	(s) ~ Ref.	Weight in gram/pcs.
AH-CVI-125	CV XXX-125S	0.5	0.401	4.0	0.111	0.3	0.007	0.042	83
AH-CVI-156-S	CV XXX-156S	0.5	0.401	4.0	0.142	0.3	0.000	0.040	84
AH-CVI-187	CV XXX-187S	0.5	0.401	4.0	0.173	0.4	0.010	0.066	83
AH-CVI-218	CV XXX-218S	0.5	0.401	4.0	0.204	0.5	0.010	0.063	82
AH-CVI-250	CV XXX-250S	0.5	0.401	4.0	0.236	0.6	0.010	0.083	81
AH-CVI-281-S	CV XXX-281S	0.5	0.401	4.0	0.267	0.8	0.000	0.091	79
AH-CVI-312	CV XXX-312S	0.5	0.401	4.0	0.298	1.3	0.010	0.107	73
AH-CVI-343	CV XXX-343S	0.5	0.401	4.0	0.329	1.3	0.010	0.118	76
AH-CVI-406	CV XXX-406S	0.5	0.401	4.0	0.329	1.5	0.010	0.143	81

Dimensions in inches

## Material:

Tool Steel, Heat Treated, Hardness Approx. HRC 50

## RECOMMENDED SETTING EQUIPMENT FOR SERIES CV

EXPRESS 3000	Hydropneumatic Table Press	See page 58 for more information
EXPRESS 5000	Hydropneumatic Table Press	See page 58 for more information



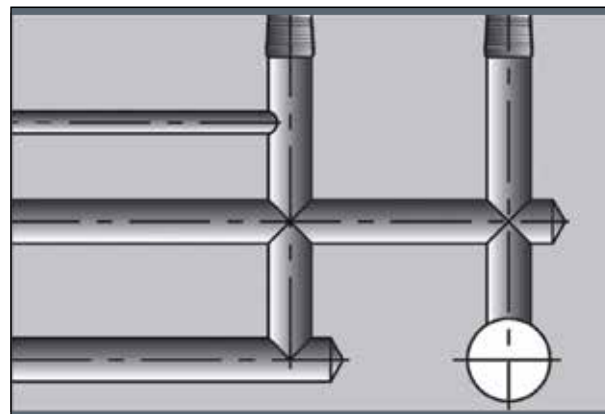
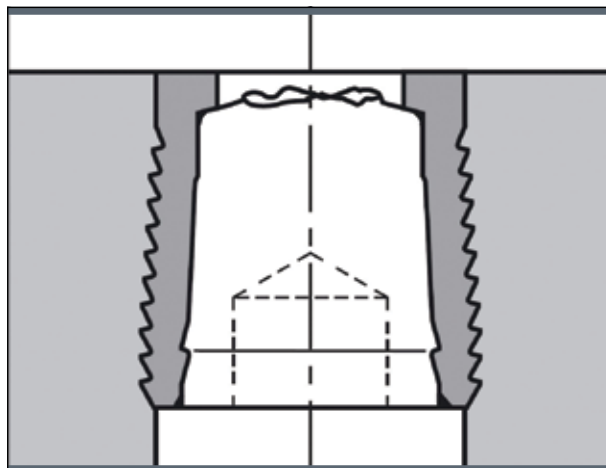
**Full Line of Sealing & Flow Control Technologies**

# KOENIG EXPANDER®

## Series SK

Sealing Plugs for Operating Pressures up to 500 bar / 7200 psi

- Operating pressures up to 500 bar / 7200 psi
- Short installation length
- Liberal manufacturing tolerance 0 / + 0.12 mm
- Direct installation into hydraulic bores
- Purely mechanical sealing through anchorage system
- Swift installation using convenient processing tools



Please inquire with our sales or applications engineers about requirements for special materials or configurations not shown in the catalog.

### RECOMMENDED SETTING EQUIPMENT FOR SERIES SK

<b>KW-008</b>	Hand Lever Tool with Equipment $\varnothing 4 - 6$ mm
<b>EXTOOL-030</b>	Hydraulic/Pneumatic Tool
<b>EXTOOL-040-1</b>	Hydraulic/Pneumatic Tool
<b>EXTOOL-040-2</b>	Hydraulic/Pneumatic Tool
<b>EXTOOL-B-010</b>	Hydraulic/Pneumatic Tool

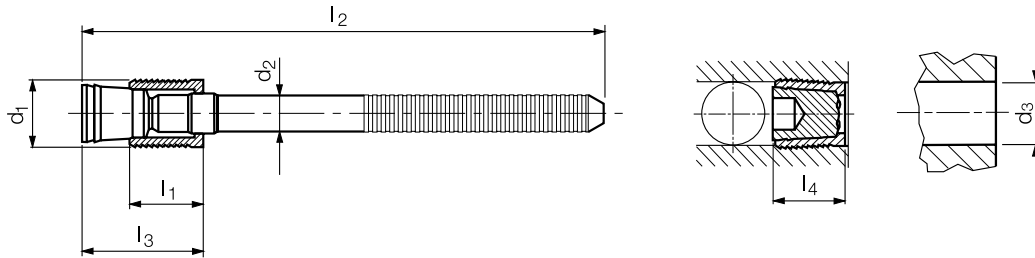
See page 64 for more information  
See page 59 for more information  
See page 60 for more information  
See page 61 for more information  
See page 63 for more information





# KOENIG EXPANDER® SEALING PLUGS Series SK 550

One Piece Construction, Ideal for Automated High Production Requirements



3D DATA: [www.sfckoenig.com](http://www.sfckoenig.com)

Part Number	d <sub>1</sub>	l <sub>1</sub>	d <sub>2</sub>	l <sub>2</sub>	l <sub>3</sub> max.	l <sub>4</sub> max.	d <sub>3</sub> +0.12 0	Packaging Unit	Weight in gram/pcs.
SK550-040	4.0	4.5	2.50	39	9.0	6.5	4.0	100 / 1000	1.71
SK550-050	5.0	5.5	3.00	41	10.0	7.5	5.0	100 / 1000	2.68
SK550-060	6.0	6.5	3.40	43	12.0	8.0	6.0	100 / 500	3.61
SK550-070	7.0	7.5	4.10	38	14.0	9.0	7.0	100 / 500	4.98
SK550-080	8.0	8.5	4.20	40	15.0	10.5	8.0	100 / 500	6.33
SK550-090	9.0	9.5	4.50	43	17.0	11.0	9.0	100 / 250	8.23
SK550-100	10.0	10.5	4.75	45	19.0	12.5	10.0	100 / 250	10.57
SK550-120	12.0	12.5	5.70	50	24.0	16.5	12.0	50 / 250	16.77

Dimensions in millimeters

## PRESSURE PERFORMANCE

Series SK 550 mm	Base Material of the Installation							
	①	②	③	⑤	⑥	⑦	⑧	
	ETG-100 / 44SMn28 AISI 1144	C15Pb / 1.0403 ~ SAE 1015 {10L15}	EN 1563: GJS-600-3 ASTM A536: 80-60-03	EN 1561: GJL-250 ASTM A48: NO.35	AlCu4Mg1 / EN AW-2024-T3 AA: 2024 T4/T6*	AlMgSiPb / EN AW-6012-T6 AA: 6012-T6	G-AlSi7Mg / EN-AC-42100 ASTM/UNS: A356	
Ø 4 – 10	1600 bar / 23200 psi 500 bar / 7200 psi					1400 bar / 20300 psi 450 bar / 6500 psi		
Ø 12	1600 bar / 23200 psi 400 bar / 5800 psi							

Proof Pressure Test - ©

Max. Allowable Working Pressure = Nominal Pressure



### Material:

Sleeve: Case Hardening Steel, Gun Metal-Finish  
Mandrel: Heat Treatable Steel, Special Oil Film Lubrication

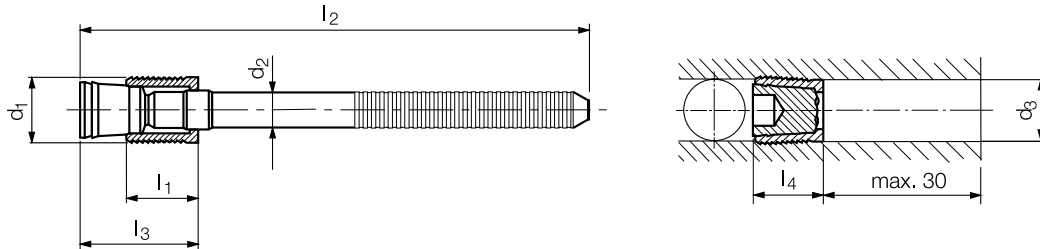
### Important:

See installation instructions on page 78  
Installation requirements on page 71



# KOENIG EXPANDER® SEALING PLUGS Series SK 552 Long Mandrel

One Piece Construction, Ideal for Automated High Production Requirements  
Special Type: With Mandrel 30mm Longer than Standard



## 3D DATA: [www.sfckoenig.com](http://www.sfckoenig.com)

Part Number	d <sub>1</sub>	l <sub>1</sub>	d <sub>2</sub>	l <sub>2</sub>	l <sub>3</sub> max.	l <sub>4</sub> max.	d <sub>3</sub> +0.12 0	Packaging Unit	Weight in gram/pcs.
SK552-040	4.0	4.5	2.5	69	9.0	6.5	4.0	100 / 1000	2.87
SK552-050	5.0	5.5	3.0	71	10.0	7.5	5.0	100 / 500	4.32
SK552-060	6.0	6.5	3.4	73	12.0	8.0	6.0	100 / 500	5.65
SK552-070	7.0	7.5	4.1	68	14.0	9.0	7.0	100 / 250	8.01
SK552-080	8.0	8.5	4.2	70	15.0	10.5	8.0	100 / 250	9.60
SK552-090	9.0	9.5	4.5	73	17.0	11.0	9.0	50 / 100	11.97
SK552-100	10.0	10.5	4.8	75	19.0	12.5	10.0	50 / 100	14.73

Dimensions in millimeters

## PRESSURE PERFORMANCE

Series SK 552 mm	Base Material of the Installation						
	①	②	③	⑤	⑥	⑦	⑧
	ETG-100 / 44SMn28 AISI 1144	C15Pb / 1.0403 ~ SAE 1015 (10L15)	EN 1563: GJS-600-3 ASTM A536: 80-60-03	EN 1561: GJL-250 ASTM A48: NO.35	AlCu4Mg1 / EN AW-2024-T3 AA: 2024 T4/T6*	AlMgSiPb / EN AW-6012-T6 AA: 6012-T6	G-AISI7Mg / EN-AC-42100 ASTM/UNS: A356
Ø 4 – 10	1600 bar / 23200 psi 500 bar / 7200 psi					1400 bar / 20300 psi 450 bar / 6500 psi	

Proof Pressure Test - ©

Max. Allowable Working Pressure = Nominal Pressure

### Material:

Sleeve: Case Hardening Steel, Gun Metal-Finish  
Mandrel: Heat Treatable Steel, Special Oil Film Lubrication

### Important:

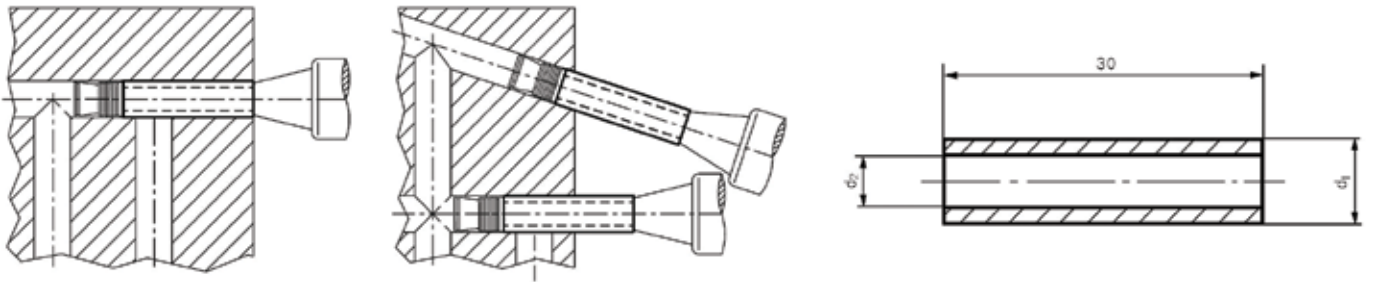
See installation instructions on page 78  
Installation requirements on page 71



# KOENIG EXPANDER® SPACERS Series SK Setting Tools SK552

For Setting KOENIG EXPANDER® SK with Mandrel 30mm Longer than Standard

Typical Applications



3D DATA: [www.sfckoenig.com](http://www.sfckoenig.com)

Part Number	$d_1$	$d_2$	Serie SK	Weight in gram/pcs.
4X30-SK	4.0	2.7	SK 552-040	2
5X30-SK	5.0	3.2	SK 552-050	3
6X30-SK	6.0	3.7	SK 552-060	5
7X30-SK	7.0	4.6	SK 552-070	6
8X30-SK	8.0	4.8	SK 552-080	8
9X30-SK	9.0	5.2	SK 552-090	11
10X30-SK	10.0	5.6	SK 552-100	13

Dimensions in millimeters

## Material:

Case Hardening Steel, Case Hardened

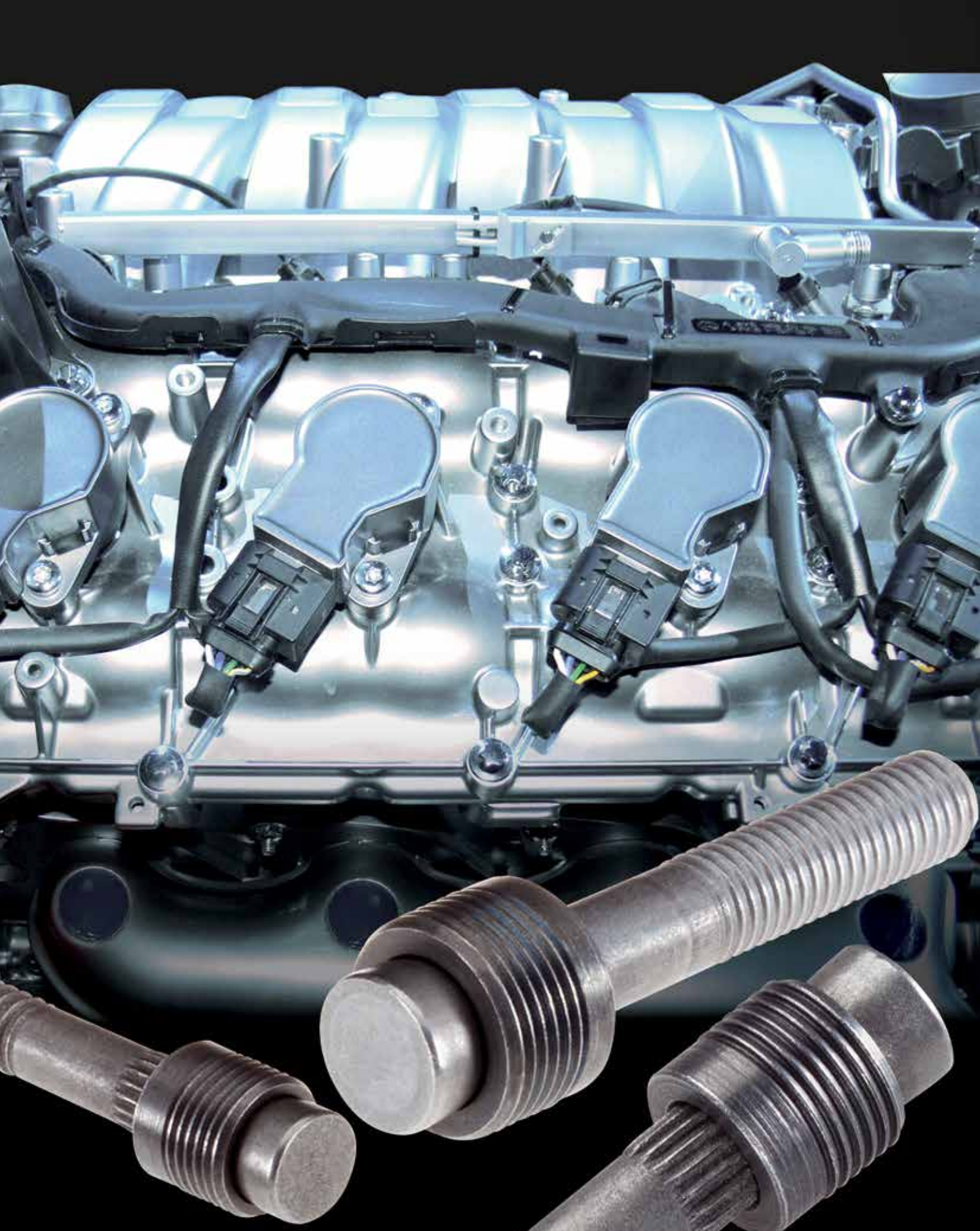
## RECOMMENDED SETTING EQUIPMENT FOR SERIES SK

KW-008	Hand Lever Tool with Equipment $\emptyset$ 4 – 6 mm	See page 64 for more information
EXTOOL-030	Hydraulic/Pneumatic Tool	See page 59 for more information
EXTOOL-040-1	Hydraulic/Pneumatic Tool	See page 60 for more information
EXTOOL-040-2	Hydraulic/Pneumatic Tool	See page 61 for more information
EXTOOL-B-010	Hydraulic/Pneumatic Tool	See page 63 for more information









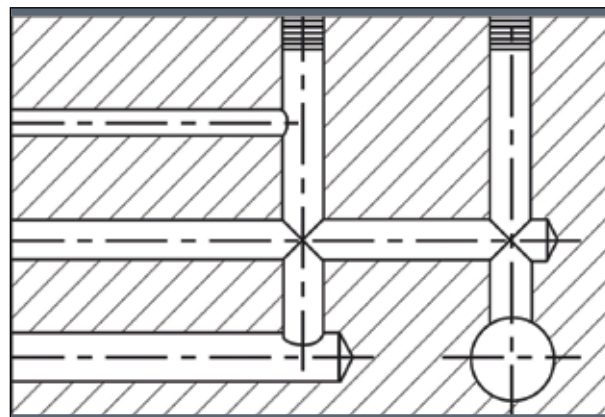
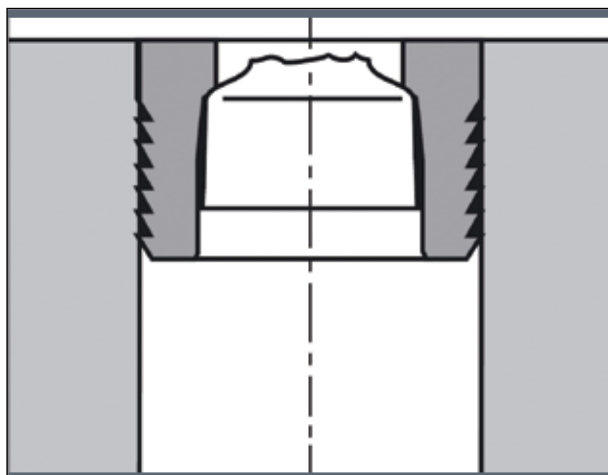
Full Line of Sealing & Flow Control Technologies

# KOENIG EXPANDER®

## Series LK

Sealing Plugs for Operating Pressures up to 60 bar / 850 psi

- Operating pressures up to 60 bar / 850 psi
- Short installation dimensions
- Liberal manufacturing tolerance 0 / + 0.12 mm
- Direct installation into hydraulic bore
- Purely mechanical sealing through anchorage system
- Installation using convenient processing tools
- Comprehensive product range for  $\varnothing$  4 – 20mm



Please inquire with our sales or applications engineers about requirements for special materials or configurations not shown in the catalog.

### RECOMMENDED SETTING EQUIPMENT FOR SERIES LK

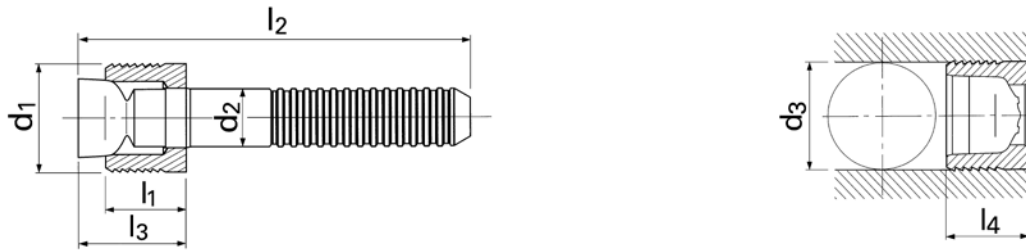
<b>KW-008</b>	Hand Lever Tool with Equipment $\varnothing$ 4 – 6 mm
<b>EXTOOL-030</b>	Hydraulic/Pneumatic Tool
<b>EXTOOL-040-1</b>	Hydraulic/Pneumatic Tool
<b>EXTOOL-040-2</b>	Hydraulic/Pneumatic Tool
<b>EXTOOL-050</b>	Hydraulic/Pneumatic Tool
<b>EXTOOL-B-010</b>	Hydraulic/Pneumatic Tool

See page 64 for more information  
See page 59 for more information  
See page 60 for more information  
See page 61 for more information  
See page 62 for more information  
See page 63 for more information





# KOENIG EXPANDER® SEALING PLUGS Series LK 600



## 3D DATA: [www.sfckoenig.com](http://www.sfckoenig.com)

Part Number	d <sub>1</sub>	l <sub>1</sub>	d <sub>2</sub>	l <sub>2</sub>	d <sub>3</sub> +0.12 0	l <sub>3</sub> max.	l <sub>4</sub> max.	Packaging Unit	Weight in gram/pcs.
LK 600-040	4.0	3.7	2.2	33	4.0	5.8	4.0	100 / 1000	1.19
LK 600-050	5.0	4.5	2.5	36	5.0	7.1	4.8	100 / 1000	1.81
LK 600-060	6.0	5.0	3.2	36	6.0	7.9	5.5	100 / 1000	2.95
LK 600-070	7.0	5.5	3.8	32	7.0	8.8	5.8	100 / 500	3.70
LK 600-080	8.0	6.5	4.3	34	8.0	10.5	7.0	100 / 500	5.26
LK 600-100	10.0	7.0	4.9	34	10.0	11.0	7.5	100 / 500	7.65

Dimensions in millimeters

## PRESSURE PERFORMANCE

Series LK 600 mm	Base Material of the Installation						
	①	②	③	⑤	⑥	⑦	⑧
	ETG-100 / 44SMn28 AISI 1144	C15Pb / 1.0403 ~ SAE 1015 (10L15)	EN 1563: GJS-600-3 ASTM A536: 80-60-03	EN 1561: GJL-250 ASTM A48: NO.35	AlCu4Mg1 / EN AW-2024-T3 AA: 2024 T4/T6*	AlMgSiPb / EN AW-6012-T6 AA: 6012-T6	G-AlSi7Mg / EN-AC-42100 ASTM/UNS: A356
Ø 4 – 10	180 bar / 2600 psi 60 bar / 850 psi						

Proof Pressure Test - ©

Max. Allowable Working Pressure = Nominal Pressure

### Material:

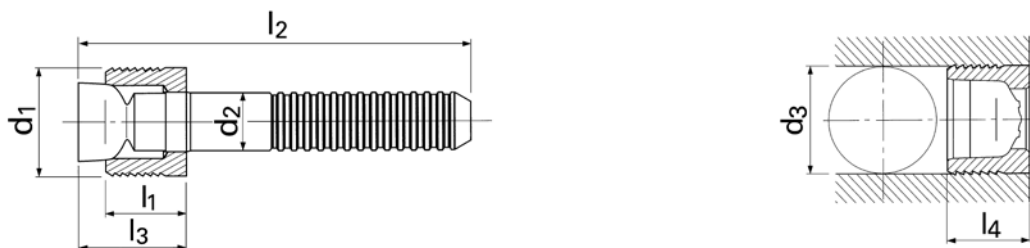
Sleeve: Stainless Steel, Special Oil Film Lubrication  
Mandrel: Stainless Steel, Special Oil Film Lubrication

### Important:

See installation instructions on page 79  
Installation requirements on page 71



# KOENIG EXPANDER® SEALING PLUGS Series LK 950



## 3D DATA: [www.sfckoenig.com](http://www.sfckoenig.com)

Part Number	d <sub>1</sub>	l <sub>1</sub>	d <sub>2</sub>	l <sub>2</sub>	d <sub>3</sub> *	l <sub>3</sub> max.	l <sub>4</sub> max.	Packaging Unit	Weight in gram/pcs.
LK 950-040	4.0	3.7	2.2	36	4.0	5.5	4.0	100 / 1000	1.26
LK 950-050	5.0	4.5	3.0	36	5.0	6.9	4.8	100 / 1000	2.28
LK 950-060	6.0	5.0	3.4	36	6.0	7.4	5.3	100 / 1000	3.12
LK 950-070	7.0	5.5	4.2	34	7.0	8.0	5.8	100 / 500	4.70
LK 950-080	8.0	6.5	4.3	34	8.0	9.8	6.8	100 / 500	5.32
LK 950-090	9.0	6.5	4.7	34	9.0	9.8	6.8	100 / 500	6.53
LK 950-100	10.0	6.5	5.1	36	10.0	9.8	6.8	100 / 500	8.23
LK 950-120	12.0	7.5	5.9	36	12.0	11.7	7.8	100 / 500	12.21
LK 950-140	14.0	8.0	5.9	36	14.0	12.2	9.0	100 / 250	13.98
LK 950-160	16.0	10.5	5.9	42	16.0	16.0	11.5	100 / 250	21.17
LK 950-180	18.0	11.0	6.60	50.0	18.0	17.7	13.0	100 / 200	29.99
LK 950-200	20.0	11.0	6.60	50.0	20.0	17.7	13.0	50 / 125	34.55

Dimensions in millimeters

\*In base materials with high hardness or hardened materials:

< 280HB the bore tolerance should be 0 / +0.12

≥ 280HB the bore tolerance should be +0.05 / +0.15

## PRESSURE PERFORMANCE

Series LK 950 mm	Base Material of the Installation						
	①	②	③	⑤	⑥	⑦	⑧
	ETG-100 / 44SMn28 AISI 1144	C15Pb / 1.0403 ~ SAE 1015 (10L15)	EN 1563: GJS-600-3 ASTM A536: 80-60-03	EN 1561: GJL-250 ASTM A48: NO.35	AlCu4Mg1 / EN AW-2024-T3 AA: 2024 T4/T6*	AlMgSiPb / EN AW-6012-T6 AA: 6012-T6	G-AlSi7Mg / EN-AC-42100 ASTM/UNS: A356
Ø 4 – 20	180 bar / 2600 psi 60 bar / 850 psi						

Proof Pressure Test - ©

Max. Allowable Working Pressure = Nominal Pressure

### Material:

Sleeve: Case Hardening Steel, Soft Annealed Gun Finish  
Mandrel: Steel, Special Oil Film Lubrication

### Important:

See installation instructions on page 79  
Installation requirements on page 71





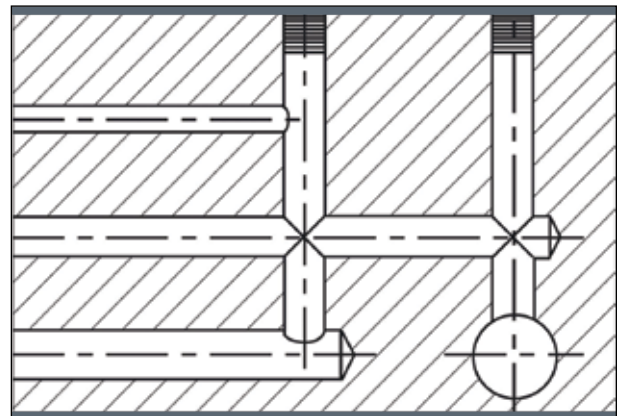
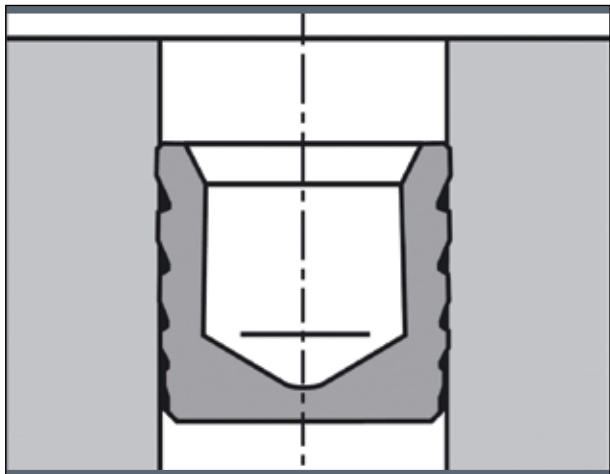
Full Line of Sealing & Flow Control Technologies

# KOENIG EXPANDER®

## Series LP

Sealing Plugs for Operating Pressures up to 60 bar / 850 psi

- Operating pressures up to 60 bar / 850 psi
- Short installation dimensions
- Mechanical sealing using press fit
- Quick installation



Please inquire with our sales or applications engineers about requirements for special materials or configurations not shown in the catalog.

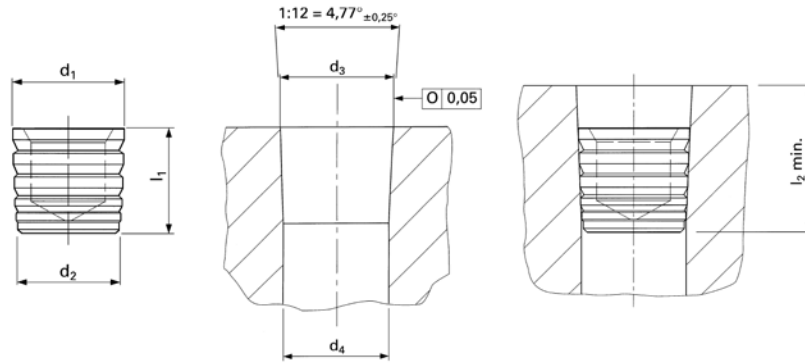
### RECOMMENDED SETTING EQUIPMENT FOR SERIES LP

<b>EXPRESS 3000</b>	Hydropneumatic Table Press	See page 58 for more information
<b>EXPRESS 5000</b>	Hydropneumatic Table Press	See page 58 for more information





# KOENIG EXPANDER® SEALING PLUGS Series LP 900



3D DATA: [www.sfckoenig.com](http://www.sfckoenig.com)

Part Number	d <sub>1</sub> Expander	d <sub>2</sub>	l <sub>1</sub>	d <sub>3</sub> min.	d <sub>4</sub> +0.1 -0.3	l <sub>2</sub> min.	Packaging Unit	Weight in gram/pcs.
LP 900-040	4.40	3.7	5.0	4.55	4.0	7.0	1000 / 10000	0.35
LP 900-050	5.40	4.7	6.0	5.55	5.0	8.0	1000 / 5000	0.63
LP 900-060	6.40	5.7	6.0	6.55	6.0	8.5	500 / 2500	0.89
LP 900-070	7.40	6.7	6.0	7.55	7.0	8.5	500 / 2500	1.20
LP 900-080	8.45	7.7	7.0	8.60	8.0	9.5	250 / 2000	1.76
LP 900-090	9.60	9.0	7.5	9.75	9.0	10.0	100 / 1000	2.30
LP 900-100	10.65	10.0	8.5	10.80	10.0	11.0	100 / 1000	3.20
LP 900-120	12.75	12.0	9.5	12.90	12.0	12.0	50 / 500	5.03

Dimensions in millimeters

Not all items in stock – MOQ and production lead times may apply

Please inquire with our sales team for larger LP 900 models

## PRESSURE PERFORMANCE

Series LP 900 mm	Base Material of the Installation						
	①	②	③	⑤	⑥	⑦	⑧
	ETG-100 / 44SMn28 AISI 1144	C15Pb / 1.0403 ~ SAE 1015 (10L15)	EN 1563: GJS-600-3 ASTM A536: 80-60-03	EN 1561: GJL-250 ASTM A48: NO.35	AlCu4Mg1 / EN AW-2024-T3 AA: 2024 T4/T6*	AlMgSiPb / EN AW-6012-T6 AA: 6012-T6	G-AlSi7Mg / EN-AC-42100 ASTM/UNS: A356
Ø 4 – 12	180 bar / 2600 psi 60 bar / 850 psi						

Proof Pressure Test - ©

Max. Allowable Working Pressure = Nominal Pressure

### Material:

Free Cutting Steel  
Nitrocarburized, Lubricated

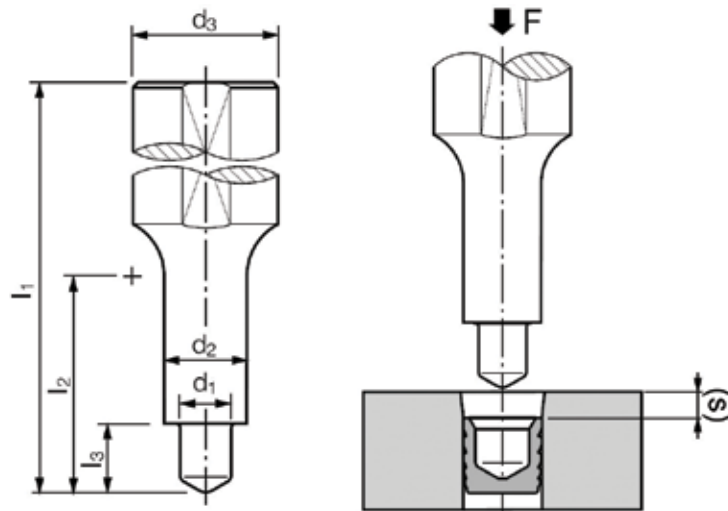
### Important:

See installation instructions on page 80  
Installation requirements on page 71





# KOENIG EXPANDER® SETTING TOOLS Series LP



3D DATA: [www.sfckoenig.com](http://www.sfckoenig.com)

Part Number	d <sub>1</sub> Expander	d <sub>1</sub>	d <sub>2</sub>	d <sub>3</sub> -h9	l <sub>1</sub>	l <sub>2</sub>	l <sub>3</sub>	(s) ~ Ref.	Weight in gram/pcs.
LP 040	4.40	2.5	3.7	10.0	100	10	3.80	1.0	0.33
LP 050	5.40	3.1	4.7	10.0	100	15	4.76	1.3	0.61
LP 060	6.40	3.8	5.7	10.0	100	15	4.79	1.3	0.86
LP 070	7.40	4.6	6.7	10.0	100	15	4.74	1.5	1.17
LP 080	8.45	5.3	7.7	10.0	100	20	5.77	1.8	1.71
LP 090	9.60	6.5	8.7	14.0	100	20	6.23	1.8	2.24
LP 100	10.65	7.4	9.7	14.0	100	25	6.96	2.0	3.13
LP 120	12.75	9.1	11.7	14.0	100	25	7.94	2.0	4.93

Dimensions in millimeters

## Material:

Tool Steel, Heat Treated, Hardness Approx. HRC 50

## RECOMMENDED SETTING EQUIPMENT FOR SERIES LP

<b>EXPRESS 3000</b>	Hydropneumatic Table Press	See page 58 for more information
<b>EXPRESS 5000</b>	Hydropneumatic Table Press	See page 58 for more information



Full Line of Sealing & Flow Control Technologies

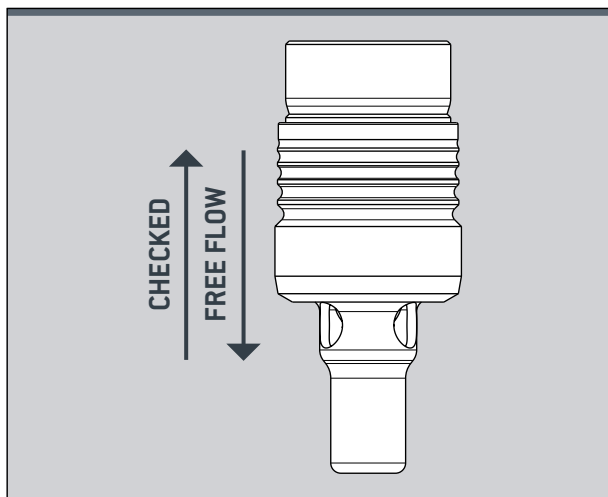
# KOENIG CHECK VALVE®

## Check Valves – Series BF and BR

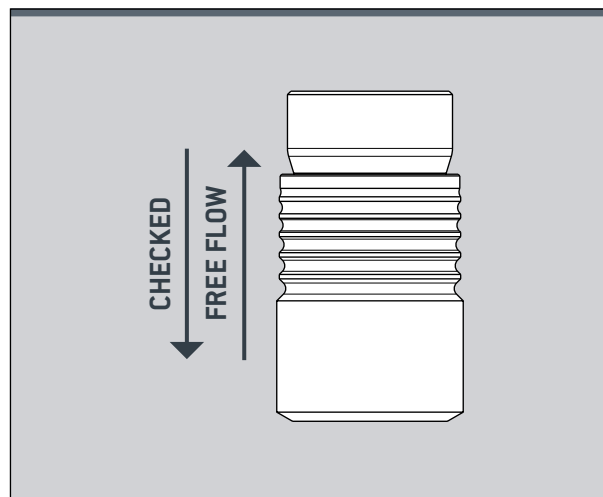
Max. Working Pressure Differential: 280 bar / 4060 psi in Checked Direction

- Design based on the expansion principal
- Modular concept: Forward Flow (BF) / Reverse Flow (BR)
- Maximum working pressure differential: 280 bar / 4060 psi in checked direction
- Available in standard sizes, with different opening pressures and screens
- Specific customer solutions on request

CHECK VALVE FORWARD FLOW (BF)



CHECK VALVE REVERSE FLOW (BR)



Please inquire with our sales or applications engineers about requirements for special materials or configurations not shown in the catalog.

### RECOMMENDED SETTING EQUIPMENT FOR SERIES BF AND BR

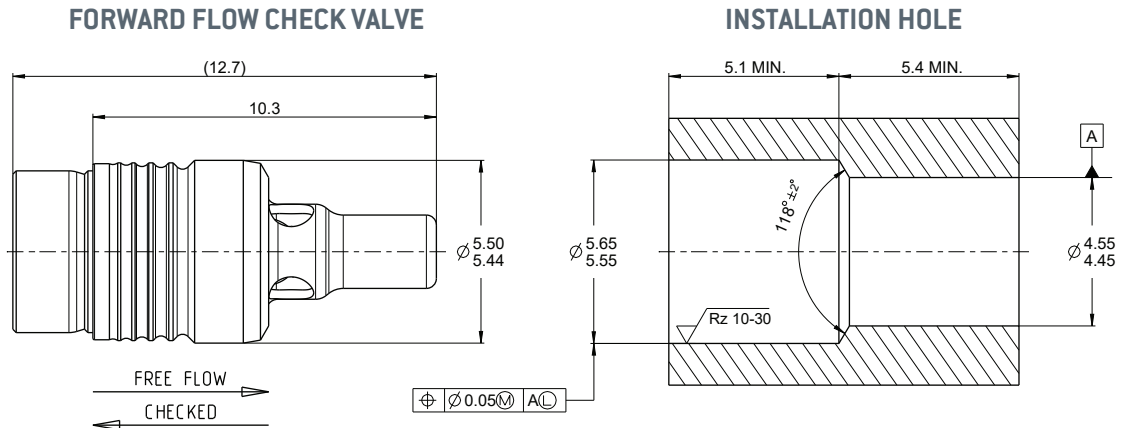
EXPRESS 3000

Hydropneumatic Table Press

See page 58 for more information

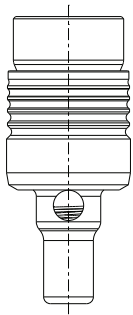


# KOENIG CHECK VALVE® Series BF 5.5mm Forward

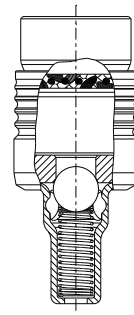


Dimensions in mm

## CHECK VALVE FORWARD FLOW - UNSCREENED



Part Number	Cracking Pressure (bar)
BFAA055U000	0.00 (no spring)
BFAA055U014	0.14 (± 0.05)
BFAA055U025	0.25 (± 0.10)
BFAA055U040	0.40 (± 0.30)
BFAA055U050	0.50 (± 0.30)
BFAA055U100	1.00 (± 0.30)
BFAA055U200	2.00 (± 0.30)

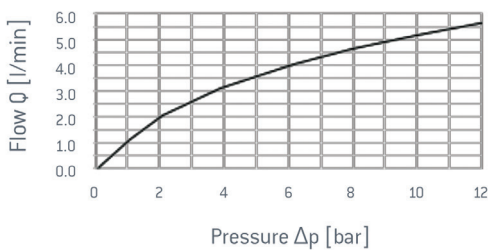


## CHECK VALVE FORWARD FLOW - SCREENED

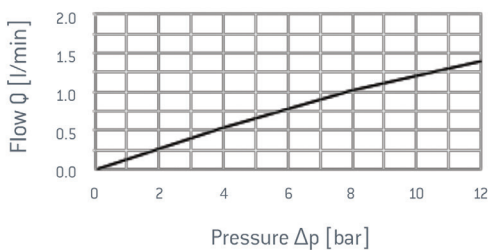
Part Number	Cracking Pressure (bar)
BFAA055S000	0.00 (no spring)
BFAA055S014	0.14 (± 0.05)
BFAA055S025	0.25 (± 0.10)
BFAA055S040	0.40 (± 0.30)
BFAA055S050	0.50 (± 0.30)
BFAA055S100	1.00 (± 0.30)
BFAA055S200	2.00 (± 0.30)

3D DATA: [www.sfckoenig.com](http://www.sfckoenig.com)

**CHECK VALVE FLOW CURVE - UNSCREENED**  
BFAA055U014; T=50°C; Hydraulic Oil HLP46



**CHECK VALVE FLOW CURVE - SCREENED**  
BFAA055S014; T=50°C; Hydraulic Oil HLP46



## PERFORMANCE

Max. Installation Force	6200 N
Max. Working Pressure in Check Direction	280 bar
Max. Working Pressure in Flow Direction	40 bar
Max. Leakage on Air	20 sccm/min. @ 1.72 bar
Max. Leakage on Hydraulic Fluid (HLP46)	1 drop / min.
Cycle Test on Hydraulic Fluid (HLP46)	1 Mio. Cycles, 5 Hz, 6 bar, 50°C
Screen Size	125 Microns Absolute
Material of Test Body	EN-GJS-600-3

## MATERIALS

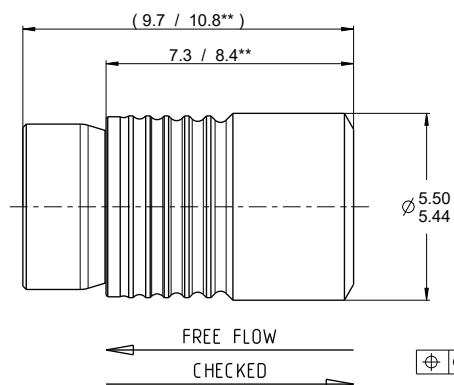
Sleeve	1.4305 / AISI 303
Pin	1.4021 / AISI 420A
Cage	1.4305 / AISI 303
Spring	1.4310 / AISI 301
Ball	1.3541 / AISI 420C
Screen	1.4401 / AISI 316L

## SETTING TOOL

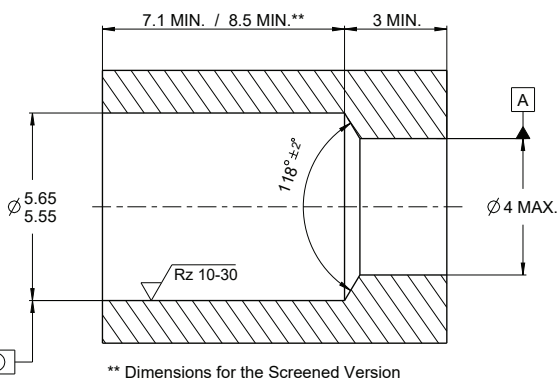
Check Valve Forward Flow – Unscreened	ST – 055 – 0335
Check Valve Forward Flow – Screened	ST – 055 – 0280

# KOENIG CHECK VALVE® Series BR 5.5mm Reverse

## REVERSE FLOW CHECK VALVE

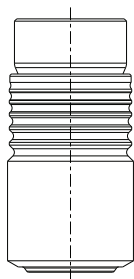


## INSTALLATION HOLE



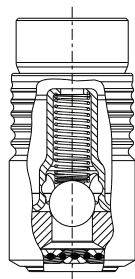
Dimensions in mm

### CHECK VALVE REVERSE FLOW - UNSCREENED



Part Number	Cracking Pressure (bar)
BRAA055U000	0.00 (no spring)
BRAA055U014	0.14 (± 0.05)
BRAA055U025	0.25 (± 0.10)
BRAA055U040	0.40 (± 0.30)
BRAA055U050	0.50 (± 0.30)
BRAA055U100	1.00 (± 0.30)
BRAA055U200	2.00 (± 0.30)

### CHECK VALVE REVERSE FLOW - SCREENED

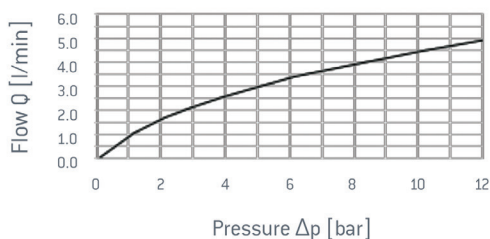


Part Number	Cracking Pressure (bar)
BRAA055S000	0.00 (no spring)
BRAA055S014	0.14 (± 0.05)
BRAA055S025	0.25 (± 0.10)
BRAA055S040	0.40 (± 0.30)
BRAA055S050	0.50 (± 0.30)
BRAA055S100	1.00 (± 0.30)
BRAA055S200	2.00 (± 0.30)

3D DATA: [www.sfckoenig.com](http://www.sfckoenig.com)

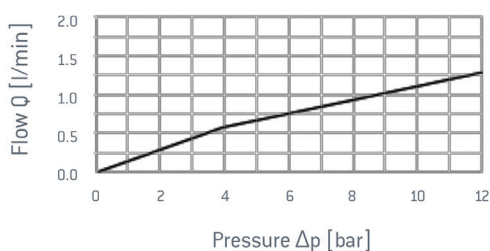
### CHECK VALVE FLOW CURVE - UNSCREENED

BRAA055U014; T=50°C; Hydraulic Oil HLP46



### CHECK VALVE FLOW CURVE - SCREENED

BRAA055S014; T=50°C; Hydraulic Oil HLP46



### PERFORMANCE

Max. Installation Force	6200 N
Max. Working Pressure in Check Direction	280 bar
Max. Working Pressure in Flow Direction	40 bar
Max. Leakage on Air	20 sccm/min. @ 1.72 bar
Max. Leakage on Hydraulic Fluid (HLP46)	1 drop / min.
Cycle Test on Hydraulic Fluid (HLP46)	1 Mio. Cycles, 5 Hz, 6 bar, 50°C
Screen Size	125 Microns Absolute
Material of Test Body	EN-GJS-600-3

### MATERIALS

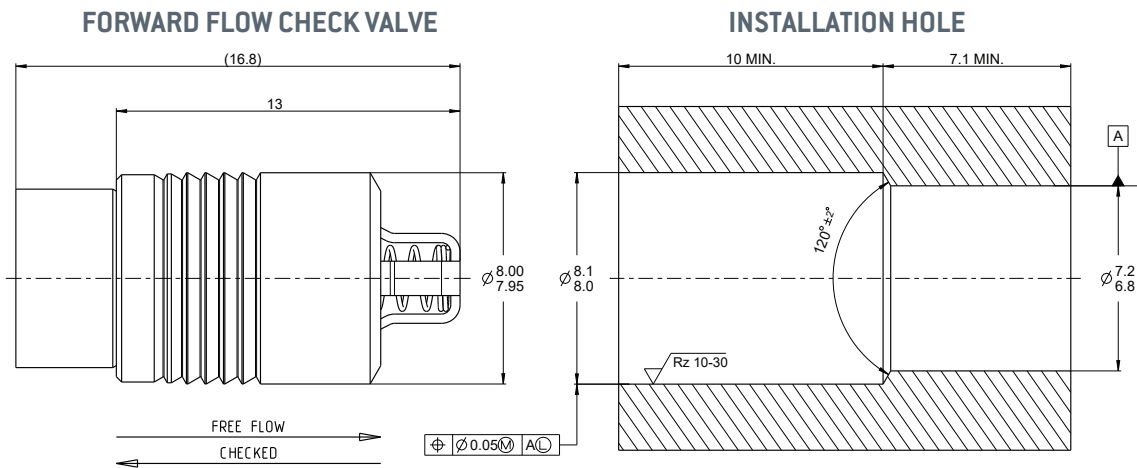
Sleeve	1.4305 / AISI 303
Pin	1.4021 / AISI 420A
Cage	1.4305 / AISI 303
Spring	1.4310 / AISI 301
Ball	1.3541 / AISI 420C
Screen	1.4401 / AISI 316L

### SETTING TOOL

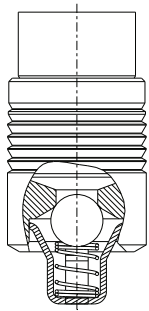
Check Valve Forward Flow – Unscreened	ST – 055 – 0335
Check Valve Forward Flow – Screened	ST – 055 – 0335



# KOENIG CHECK VALVE® Series BF 8.0mm Forward



Dimensions in mm

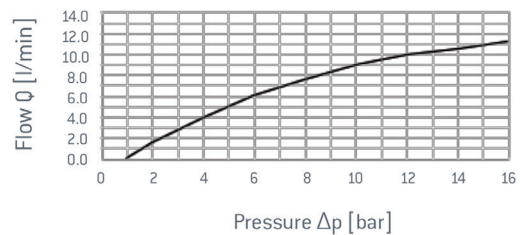


## CHECK VALVE FORWARD FLOW - UNSCREENED

Part Number	Cracking Pressure [bar]
BF660080024000	0.00 (no spring)
BF660080024014	0.14 (± 0.05)
BF660080024040	0.40 (± 0.30)
BF660080024100	1.00 (± 0.30)

## CHECK VALVE FLOW CURVE - UNSCREENED

BF660080024100; T=50°C; Hydraulic Oil HLP46



3D DATA: [www.sfckoenig.com](http://www.sfckoenig.com)

## PERFORMANCE

Max. Installation Force	8000 N
Max. Working Pressure in Check Direction	280 bar
Max. Working Pressure in Flow Direction	40 bar
Max. Leakage on Air	20 sccm/min. @ 1.72 bar
Max. Leakage on Hydraulic Fluid (HLP46)	1 drop / min.
Cycle Test on Hydraulic Fluid (HLP46)	1 Mio. Cycles, 5 Hz, 6 bar, 50°C
Material of Test Body	EN-GJS-600-3

## MATERIALS

Sleeve	1.4305 / AISI 303
Pin	1.4542 / AISI 630
Cage	1.4310 / AISI 301
Spring	1.4310 / AISI 301
Ball	1.3541 / AISI 420C

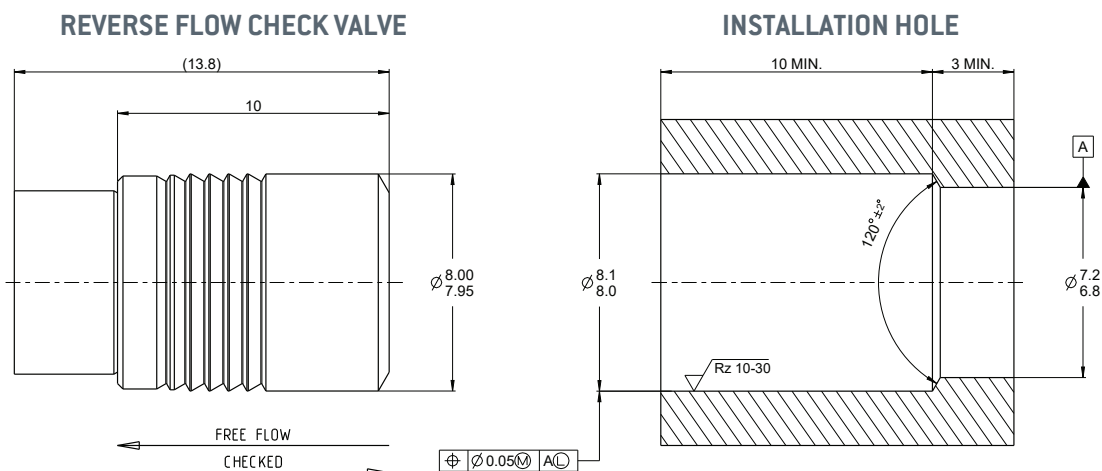
## SETTING TOOL

Check Valve Forward Flow – Unscreened	ST – 080 – 0380
---------------------------------------	-----------------

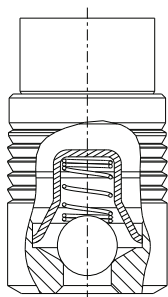




# KOENIG CHECK VALVE® Series BR 8.0mm Reverse



Dimensions in mm

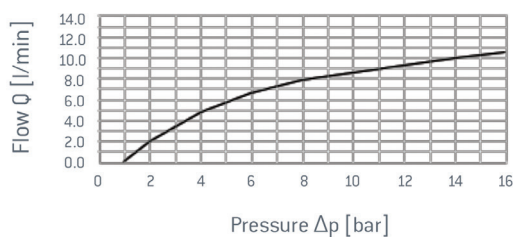


## CHECK VALVE REVERSE FLOW - UNSCREENED

Part Number	Cracking Pressure (bar)
BR660080024000	0.00 (no spring)
BR660080024014	0.14 (± 0.05)
BR660080024040	0.40 (± 0.30)
BR660080024100	1.00 (± 0.30)

## CHECK VALVE FLOW CURVE - UNSCREENED

BR660080024100; T=50°C; Hydraulic Oil HLP46



3D DATA: [www.sfckoenig.com](http://www.sfckoenig.com)

## PERFORMANCE

Max. Installation Force	8000 N
Max. Working Pressure in Check Direction	280 bar
Max. Working Pressure in Flow Direction	40 bar
Max. Leakage on Air	20 sccm/min. @ 1.72 bar
Max. Leakage on Hydraulic Fluid (HLP46)	1 drop / min.
Cycle Test on Hydraulic Fluid (HLP46)	1 Mio. Cycles, 5 Hz, 6 bar, 50°C
Material of Test Body	EN-GJS-600-3

## MATERIALS

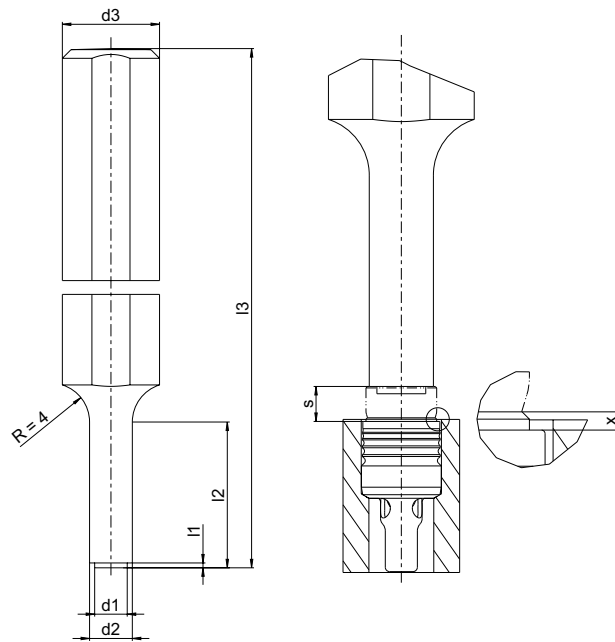
Sleeve	1.4305 / AISI 303
Pin	1.4542 / AISI 630
Cage	1.4310 / AISI 301
Spring	1.4310 / AISI 301
Ball	1.3541 / AISI 420C

## SETTING TOOL

Check Valve Reverse Flow – Unscreened	ST – 080 – 0380
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# KOENIG CHECK VALVE® SETTING TOOL Series BF and BR



3D DATA: [www.sfckoenig.com](http://www.sfckoenig.com)

Part Number	Part Name	$d_1^{±0.05}$	$d_2^{±0.05}$	$d_3 \text{ h9}$	$l_1$	$l_2$	$l_3$	$x$	(s)
ST – 055 – 0280	Setting Tool 5.5	2.80	4.40	10.0	$0.5^{+0.05}$	15	100	$0^{+0.25}$	2.4
ST – 055 – 0335	Setting Tool 5.5	3.35	4.40	10.0	$0.5^{+0.05}$	15	100	$0^{+0.25}$	2.4
ST – 080 – 0380	Setting Tool 8.0	3.80	6.20	10.0	$2.4^{±0.10}$	20	100	$0^{±0.15}$	4.0

Dimensions in millimeters

## RECOMMENDED SETTING EQUIPMENT FOR SERIES BF AND BR

EXPRESS 3000

Hydropneumatic Table Press

See page 58 for more information





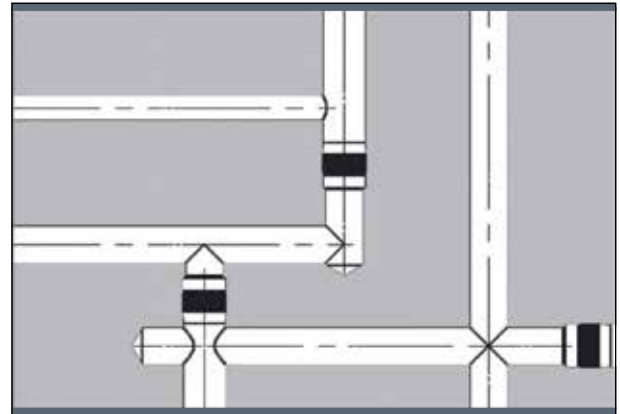
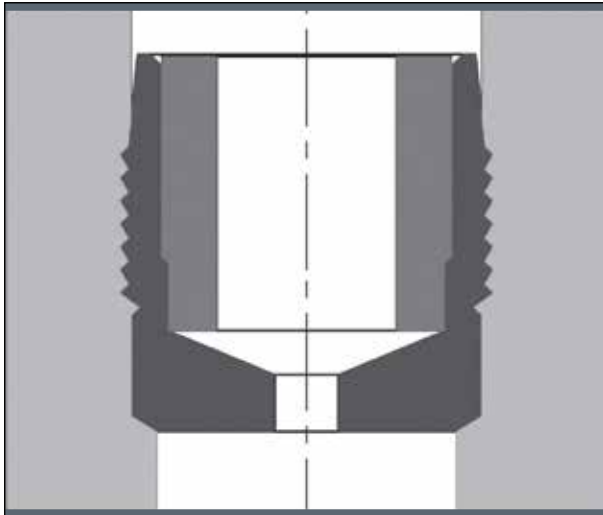


Full Line of Sealing & Flow Control Technologies

# KOENIG RESTRICTOR®

## Orifices – Series RE

- Expansion style restrictors
- Can be used with fluids or gases
- Standard restrictors in 300 series stainless steel
- Orifices can be calculated to achieve desired flow rates
- Expansion style easily installs into drilled holes and is tamper resistant



Please inquire with our sales or applications engineers about requirements for special materials or configurations not shown in the catalog.

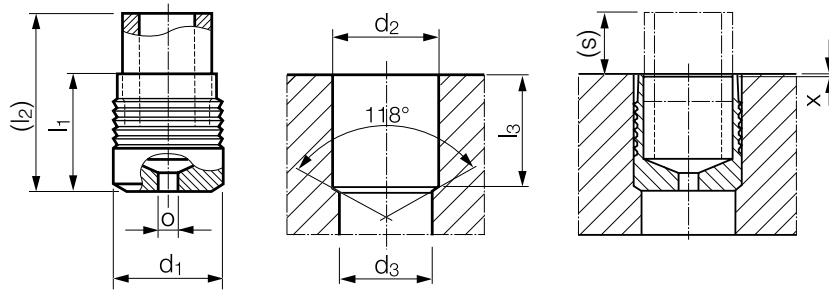
### RECOMMENDED SETTING EQUIPMENT FOR SERIES RE

<b>EXPRESS 3000</b>	Hydropneumatic Table Press	See page 58 for more information
<b>EXPRESS 5000</b>	Hydropneumatic Table Press	See page 58 for more information





# KOENIG RESTRICTOR® ORIFICE RESTRICTORS Series RE



3D DATA: [www.sfckoenig.com](http://www.sfckoenig.com)

Part Number	$d_1$	$l_1$	$(l_2)$ ~ Ref.	$\phi$ $\pm 0.025$ Orifice Diameter	$d_2$ $+0.10$ $0$	$l_3$ min.	$d_3$ max.	$s$ ~ Ref.	$x$ $\pm 0.3$	Packaging Unit
RE-040-XXX	4.0	4.0	6.0	0.40 - 1.27	4.0	3.9	3.3	2.0	0.0	100 / 1000
RE-050-XXX	5.0	5.5	8.2	0.40 - 1.91	5.0	5.4	4.3	2.7	0.0	100 / 1000
RE-060-XXX	6.0	6.5	9.9	0.40 - 2.54	6.0	6.4	5.3	3.4	0.0	100 / 1000
RE-070-XXX	7.0	7.5	11.6	0.40 - 3.30	7.0	7.4	6.2	4.1	0.0	100 / 1000
RE-080-XXX	8.0	8.5	13.3	0.40 - 3.81	8.0	8.4	7.2	4.8	0.0	100 / 1000
RE-090-XXX	9.0	10.0	15.5	0.40 - 4.32	9.0	9.9	8.2	5.5	0.0	100 / 1000
RE-100-XXX	10.0	11.0	17.1	0.40 - 4.95	10.0	10.9	9.2	6.1	0.0	50 / 250

Dimensions in millimeters

The weight depending on the orifice diameter

To calculate orifice diameter/length please refer to page 90

Not all items in stock – MOQ and production lead times may apply

## PRESSURE PERFORMANCE

Series RE mm	Base Material of the Installation			
	① ETG-100 / 44SMn28 AISI 1144	④ EN 1563: GJS-450-10 ASTM A536: 65-45-12	⑥ AlCu4Mg1 / EN AW-2024-T3 AA: 2024 T4/T6	⑧ G-AlSi7Mg / EN-AC-42100 ASTM/UNS: A356
Ø 4	120 bar / 1740 psi			100 bar / 1450 psi
Ø 5	180 bar / 2610 psi			150 bar / 2175 psi
Ø 6	210 bar / 3045 psi			150 bar / 2175 psi
Ø 7-8	210 bar / 3045 psi			180 bar / 2610 psi
Ø 9-10	Please Contact Us for Details			

Max. Allowable Working Pressure = Nominal Pressure

\*SFC KOENIG's North American Engineering Department utilizes 2024-T4/T6 as a test base material.



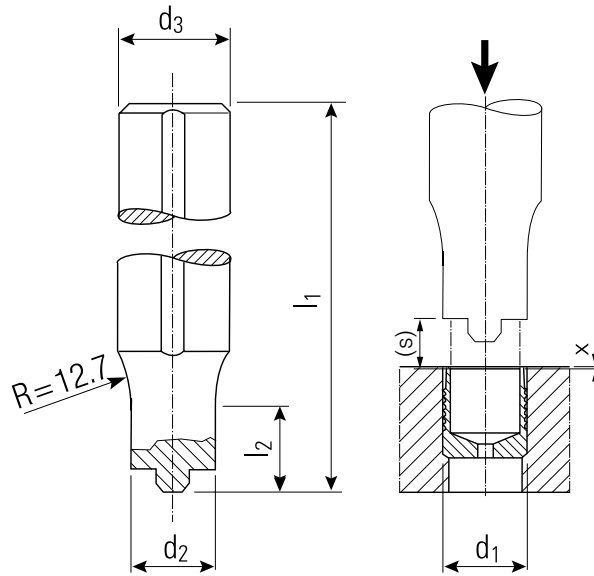
### Material:

Stainless Steel AISI 303/304

### Part Number Key:

XXX is orifice diameter in hundredths of a millimeter, for example 127 for 1.27mm, with the decimal always in the same location

# KOENIG RESTRICTOR® SETTING TOOLS Series RE



3D DATA: [www.sfckoenig.com](http://www.sfckoenig.com)

Part Number	d <sub>1</sub> Series RE	d <sub>3</sub> ±0.20	l <sub>1</sub>	d <sub>2</sub>	l <sub>2</sub>	(s) ~ Ref.	x ±0.30	Weight in gram/pcs.
HT-REM-040	RE-040-XXX	9.53	127	3.61	7.62	2.0	0.0	70
HT-REM-050	RE-050-XXX	9.53	127	4.78	12.70	2.7	0.0	70
HT-REM-060	RE-060-XXX	9.53	127	5.79	15.24	3.4	0.0	70
HT-REM-070	RE-070-XXX	9.53	127	6.78	20.32	4.1	0.0	70
HT-REM-080	RE-080-XXX	9.53	127	7.57	33.02	4.8	0.0	70
HT-REM-090	RE-090-XXX	12.70	127	8.36	38.10	5.5	0.0	70
HT-REM-100	RE-100-XXX	12.70	127	9.78	38.10	6.1	0.0	70

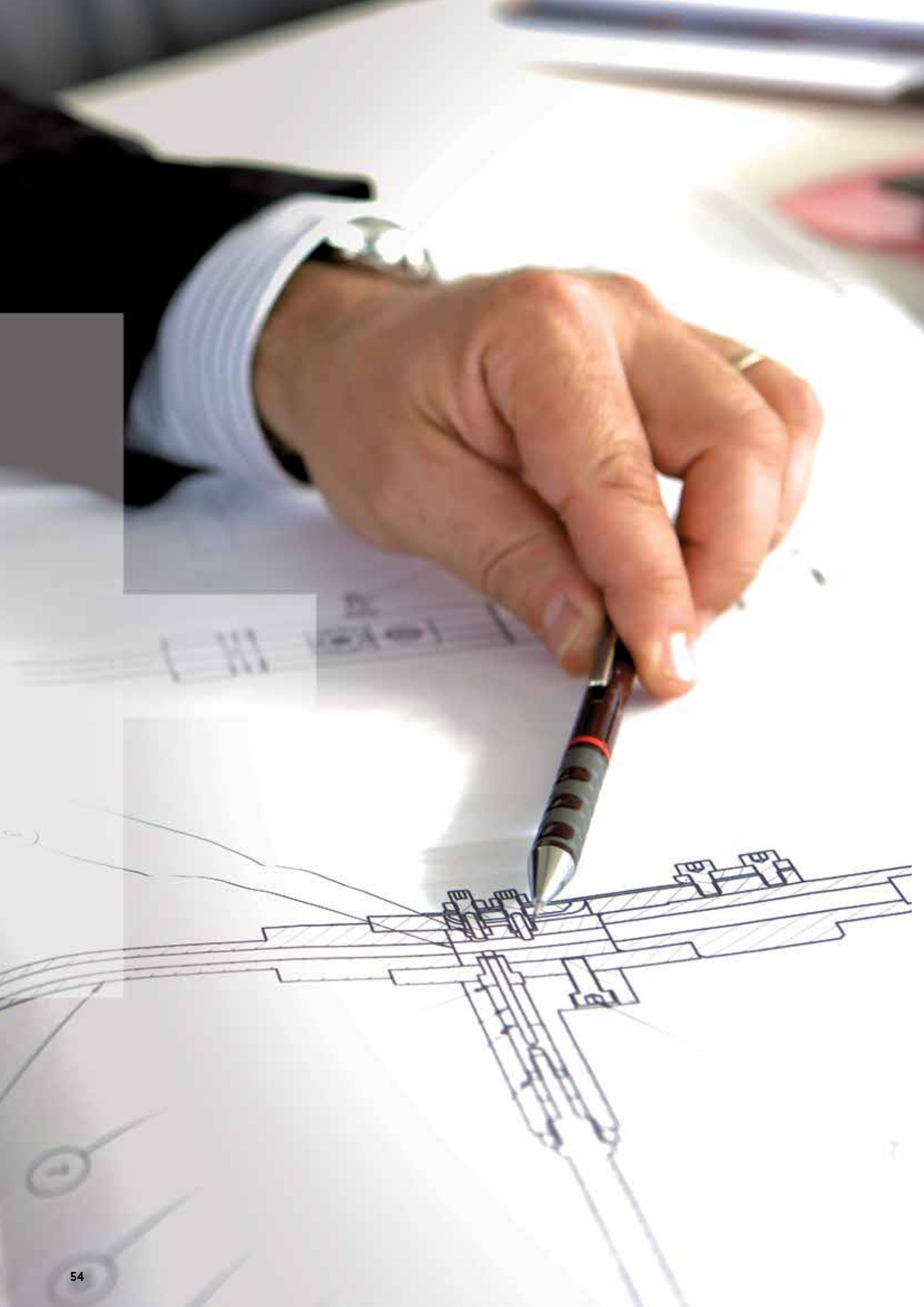
Dimensions in millimeters

## Material:

Tool Steel, Heat Treated, Hardness Approx. HRC 50

## RECOMMENDED SETTING EQUIPMENT FOR SERIES RE

EXPRESS 3000	Hydropneumatic Table Press	See page 58 for more information
EXPRESS 5000	Hydropneumatic Table Press	See page 58 for more information



## Special Orders

In addition to our standard product line, SFC KOENIG can provide customized parts and unique solutions specially designed for your installation.

Our in-house engineering staff is available to assist you with your needs. With decades of expertise in sealing we meet even the most unique requirements, producing parts that are tailored to your exact application. Our team includes some of the industry's most experienced engineers and manufacturing personnel, and we deliver the solutions others cannot.

From material to size to operation, we are able to customize our components to meet unique installations. With over 3 billion parts delivered to customers around the world, we are experts in sealing and flow control, and are ready to apply that knowledge to your order.

SFC KOENIG maintains failure rates less than 1 part per million, delivering reliable solutions with unmatched consistency. Our engineering expertise, quality controls and efficient manufacturing operations are designed to produce the highest quality parts for each customer's requirements.

SFC KOENIG brings more than 80 years of success to the design processes. From the initial design consultation to testing, production and process integration, we are ready to work with you to solve your unique sealing and flow control challenge.







**Full Line of Sealing & Flow Control Technologies**



# SETTING TOOL EQUIPMENT

## Setting Equipment for All Series

---

- Express 3000 / Hydropneumatic Table Press
- Express 5000 / Hydropneumatic Table Press
- EXT00L 030, 040-1, 040-2 and 050 / Hydraulic / Pneumatic Tool with Mandrel Collection Device
- EXT00L B-050 / Battery Tool with Mandrel Collection Device
- KW-008 - Hand Lever Tool with Equipment  $\varnothing$  4 – 6 mm



# SETTING TOOLS EXPRESS 3000/5000

## Hydropneumatic Table Press for Series MB / CV / LP / BF / BR / RE with Force and Distance Control

Hydropneumatic setting tool for the installation of KOENIG EXPANDER®. Quick tool change avoids long changeover times. The required working stroke is preprogrammed and can be retrieved by the Expander type to be processed (max. 64 memory locations). In addition, the working stroke is referenced for each individual Expander, which guarantees high process stability and quality. The press is force and distance controlled; an RS232 or USB interface can be used to trace corresponding data on the customer's computer for later processing. The required software is included in the scope of delivery.

**EXPRESS 3000** – For the installation of KOENIG EXPANDER Series MB, CV and LP from Ø 3 - 10mm (.093" - .375" inch), KOENIG CHECK VALVE BF and BR 5.5 and 8mm, and KOENIG RESTRICTOR Series RE from Ø 4 - 10mm.

**EXPRESS 5000** – For the installation of KOENIG EXPANDER Series MB and CV Ø 12 - 22mm (.406" - .437" inch) and Series LP for Ø 12mm.

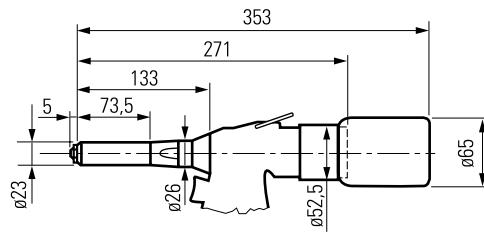
SETTING TOOL DATA			
EXPRESS 3000		EXPRESS 5000	
<b>Height</b>	approx. 1360 mm	<b>Height</b>	approx. 1470 mm
<b>Width</b>	approx. 340 mm (max. 530 mm)	<b>Width</b>	approx. 400 mm (max. 580 mm)
<b>Depth</b>	approx. 495 mm	<b>Depth</b>	approx. 535 mm
<b>Table (width x depth)</b>	220 x 160 mm	<b>Table (width x depth)</b>	300 x 190 mm
<b>Weight</b>	approx. 140 kg	<b>Weight</b>	approx. 190 kg
<b>Compressive force</b>	30 kN (max force 29.5 kN at 6 bar)	<b>Compressive force</b>	50 kN (max force 52.5 kN at 6 bar)
<b>Working stroke</b>	10 mm (within the cylinder ram)	<b>Working stroke</b>	15 mm (within the cylinder ram)
<b>Working speed</b>	40 mm/sec (max. possible at 6 bar)	<b>Working speed</b>	30 mm/sec (max. possible at 6 bar)



SETTING TOOL DATA	
EXPRESS 3000 and EXPRESS 5000	
<b>Working area (height)</b>	250 mm (working height between table top and cylinder, without setting tool)
<b>Working area (depth)</b>	200 mm (center-line spacing between cylinder and C frame)
<b>Cylinder ram</b>	60 mm
<b>Operating voltage</b>	230 V/110 V, automatic switchover to corresponding power supply
<b>Operation</b>	VISUAL POINT terminal with QVGA graphic display
<b>Force / distance control</b>	Sensor adjusted with SIT reference sensor
<b>Software</b>	WINSCOPE Software for connecting to a PC

# SETTING TOOL EXT00L-030

Hydropneumatic Tool for Series LK / SK with Mandrel Collection Device



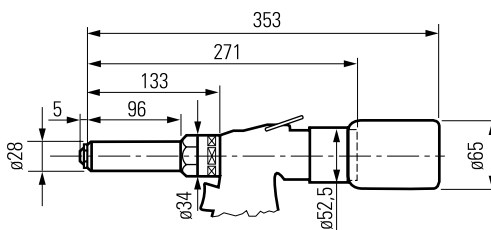
## TECHNICAL DATA

Type	EXT00L-030
Series	LK / SK
Order number	300160392
Weight	2.5 kg
Pull force at 7 bar	19 kN
Working stroke	25 mm
Air supply pressure (min. - max.)	5-7 bar
Air consumption at 5-6 bar	3.5 l
Noise level	< 75 dB(A)
Cycle time	2.0 s
Nosepiece (not included) LK600-040	300161993
Nosepiece (not included) Expander LK and SK Ø 4.0	300161899
Nosepiece (not included) Expander LK and SK Ø 5.0	300161901
Nosepiece (not included) Expander LK and SK Ø 6.0	300161902
Jaws Expander LK and SK Ø 4.0 - 6.0	300161883
Jaws case Expander LK and SK Ø 4.0 - 6.0	300161882
Jaws pusher Expander LK and SK Ø 4.0 - 6.0	300161884

Without nosepiece

# SETTING TOOL EXT00L-040-1

Hydropneumatic Tool for Series LK / SK with Mandrel Collection Device



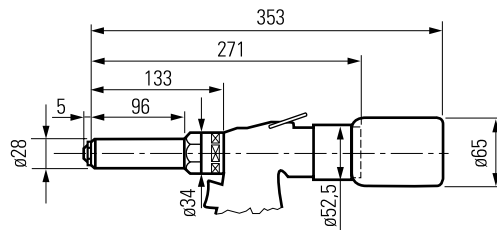
## TECHNICAL DATA

Type	EXT00L-040-1
Series	LK / SK
Order number	300160393
Weight	2.7 kg
Pull force at 7 bar	24 kN
Working stroke	18 mm
Air supply pressure (min. - max.)	5-7 bar
Air consumption at 5-6 bar	3.5 l
Noise level	< 75 dB(A)
Cycle time	2.0 s
Nosepiece (not included) Expander LK and SK Ø 7.0	300161911
Nosepiece (not included) Expander LK and SK Ø 8.0	300161912
Nosepiece (not included) Expander LK and SK Ø 9.0	300161913
Nosepiece (not included) Expander LK and SK Ø 10.0	300161914
Jaws Expander LK and SK Ø 7.0 - 10.0	300161903
Jaws case Expander LK and SK Ø 7.0 - 10.0	300161900
Jaws pusher Expander LK and SK Ø 7.0 - 10.0	300161905

Without nosepiece

# SETTING TOOL EXT00L-040-2

Hydropneumatic Tool for Series LK / SK with Mandrel Collection Device



## TECHNICAL DATA

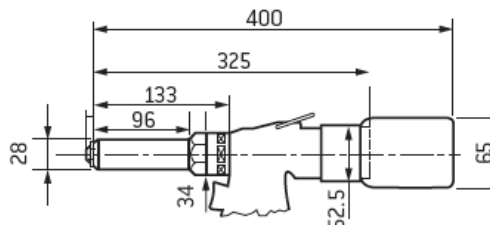
Type	EXT00L-040-2
Series	LK / SK
Order number	300160394
Weight	2.7 kg
Pull force at 7 bar	24 kN
Working stroke	18 mm
Air supply pressure (min. - max.)	5-7 bar
Air consumption at 5-6 bar	3.5 l
Noise level	< 75 dB(A)
Cycle time	2.0 s
Nosepiece (not included) Expander LK and SK Ø 12.0	300161931
Nosepiece (not included) Expander LK and SK Ø 14.0	300161932
Nosepiece (not included) Expander LK and SK Ø 16.0	300161933
Jaws Expander LK and SK Ø 12.0 - 16.0	300161930
Jaws case Expander LK and SK Ø 12.0 - 16.0	300161900
Jaws pusher Expander LK and SK Ø 12.0 - 16.0	300161905

Without nosepiece



# SETTING TOOL EXT00L-050

Hydropneumatic Tool for Series LK with Mandrel Collection Device



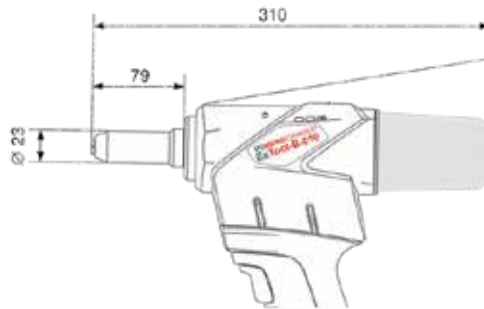
## TECHNICAL DATA

Type	EXT00L-050
Series	LK
Order number	300179728
Weight	3.4 kg
Pull force at 7 bar	34 kN
Working stroke	13 mm
Air supply pressure (min. - max.)	5-7 bar
Air consumption at 5-6 bar	3.5 l
Noise level	< 75 dB(A)
Cycle time	2.0 s
Nosepiece (not included) Expander LK Ø 18.0	300179935
Nosepiece (not included) Expander LK Ø 20.0	300179938
Jaws Expander LK Ø 18.0 - 20.0	300179934
Jaws case Expander LK Ø 18.0 - 20.0	300179921
Jaws pusher Expander LK Ø 18.0 - 20.0	300179922

Without nosepiece

# SETTING TOOL EXT00L-B-010

Battery Tool for Series LK / SK with Mandrel Collection Device



## TOOL EQUIPMENT

Type	EXT00L-B-010
Series	LK / SK
Order number	300179894
Weight	1.65 kg (without battery)
Pull force	24 kN
Working stroke	30 mm
Weight battery	0.35 kg
Noise level	78.8 dB
Nominal voltage	20 V
Capacity	Li-Ion 2.0 Ah

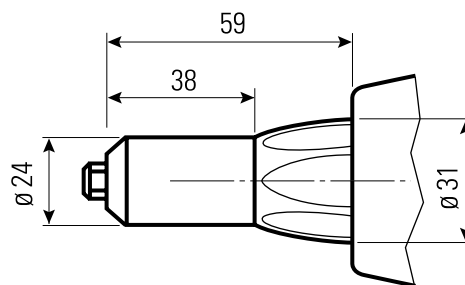
Without nosepieces and equipment kit

Type	Equipment Kit	Nosepieces
Series	LK / SK	LK / SK
<b>Equipment Ø 4.0 - 6.0 (nosepiece not included)</b>	300179925	
Nosepiece Expander LK and SK Ø 4.0		300161899
Nosepiece Expander LK and SK Ø 5.0		300161901
Nosepiece Expander LK and SK Ø 6.0		300161902
<b>Equipment Ø 7.0 - 10.0 (nosepiece not included)</b>	300179926	
Nosepiece Expander LK and SK Ø 7.0		300161911
Nosepiece Expander LK and SK Ø 8.0		300161912
Nosepiece Expander LK and SK Ø 9.0		300161913
Nosepiece Expander LK and SK Ø 10.0		300161914
<b>Equipment Ø 12.0 - 16.0 (nosepiece not included)</b>	300179927 (LK only)	
Nosepiece Expander LK Ø 12.0		300161931 (LK only)
Nosepiece Expander LK Ø 14.0		300161932 (LK only)
Nosepiece Expander LK Ø 16.0		300161933 (LK only)

Nosepieces and Equipment Kit are required and must be purchased separately.

# SETTING TOOL KW-008

Mechanical Hand Lever Tool for Series SK / LK



## TECHNICAL DATA

Type	KW-008	KW-008
Series	SK	LK
Order number	300159301	300159301
Weight	1.95 kg	1.95 kg
Length	515 mm	515 mm
Nosepiece Expander $\varnothing$ 3.0	-	-
Nosepiece Expander $\varnothing$ 4.0	DPM400-C10	DPM400-B10
Nosepiece Expander $\varnothing$ 5.0	DPM400-D10	DPM400-D10
Nosepiece Expander $\varnothing$ 6.0	DPM400-E10	DPM400-E10
Jaws $\varnothing$ 3.0 - 6.0	PRG 540-46E	PRG 540-46E

Hand lever tool with equipment for SK and LK  $\varnothing$  3 - 6mm







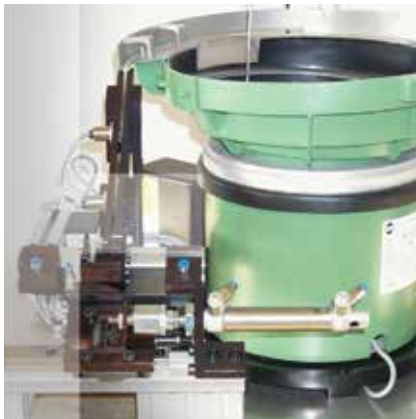


## Systems and Automation Solutions

At SFC KOENIG, a complete sealing and flow control solution means the right products are combined with the right assembly and installation processes. By helping customers integrate our parts into their operations we are able to improve efficiency, improve consistency and lower total costs. Our team is ready to work with you to develop a complete automation solution designed for your needs.



We support customers throughout the entire process – from planning, design and product selection, through to development and implementation. SFC KOENIG automation equipment, such as presses and hydraulic tools, combined with our process integration services, allows us to deliver a customized total solution for your operation.



In conjunction with our automation partners, SFC KOENIG offers single-head workstations as well as fully-automated assembly equipment. The direction, type and number of assembly heads can all be customized and integrated into your production line. Built-in processing diagnostics control the assembly process for improved product quality.

SFC KOENIG automation solutions help to ensure that products are placed accurately and consistently, eliminating errors and potential risks. Our customized solutions are developed for efficiency and help you reduce assembly time and lower costs. Our high quality assembly systems:



- are efficient and reliable
- automatically feed sealing and flow control products
- easily integrate into assembly lines
- strictly control the installation process
- offer process flexibility
- improve product quality
- feature a modular design of the placing head
- are capable of high process speeds
- feature PLC control and monitoring
- increase throughput
- utilize a robust design



## CHAPTER CONTENTS

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**Full Line of Sealing & Flow Control Technologies**

# TECHNICAL INFORMATION

## Information About CV Series Available Upon Request

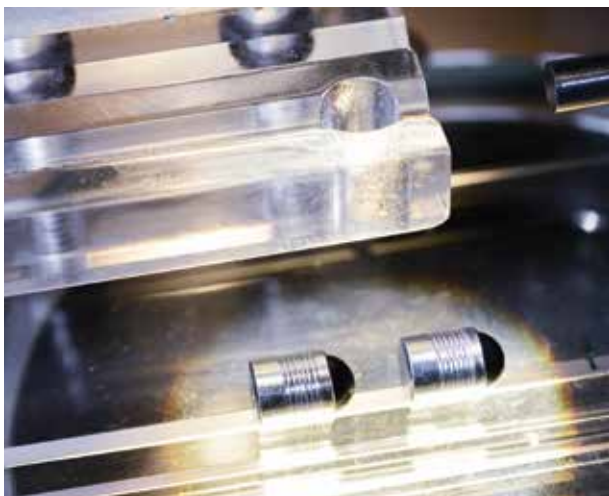
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**KOENIG EXPANDER®**

**KOENIG CHECK VALVE®**

**KOENIG RESTRICTOR®**

Our technical information section contains reference details related to performance, installation and materials. SFC KOENIG engineers are available to assist you at any time, and can advise on questions and concerns about your individual application. We also offer special orders for customized solutions to meet your individual needs.

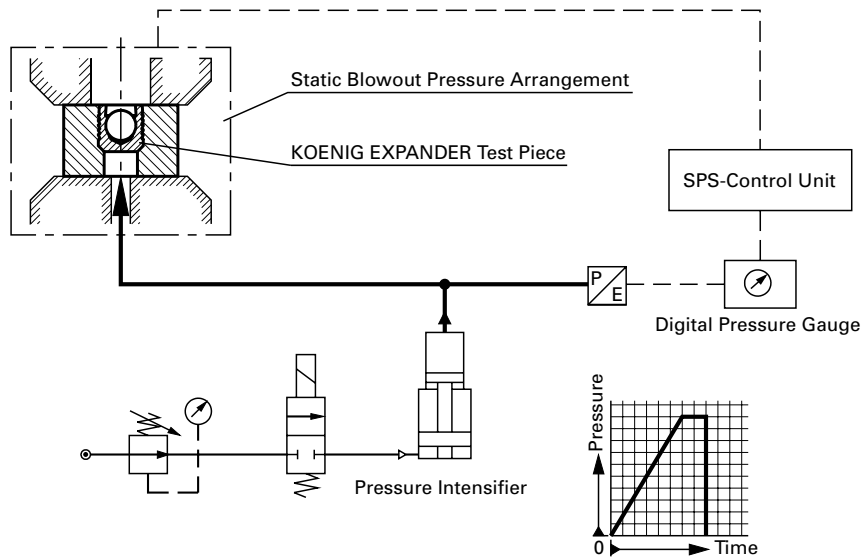


# KOENIG EXPANDER® TEST PRESSURE

## TEST PRESSURE<sup>Ⓐ</sup>

The KOENIG EXPANDER® is statically loaded up to burst pressure. This test is performed at SFC KOENIG for functional testing during the production process.

Samples from each production batch are subjected to this functional test.

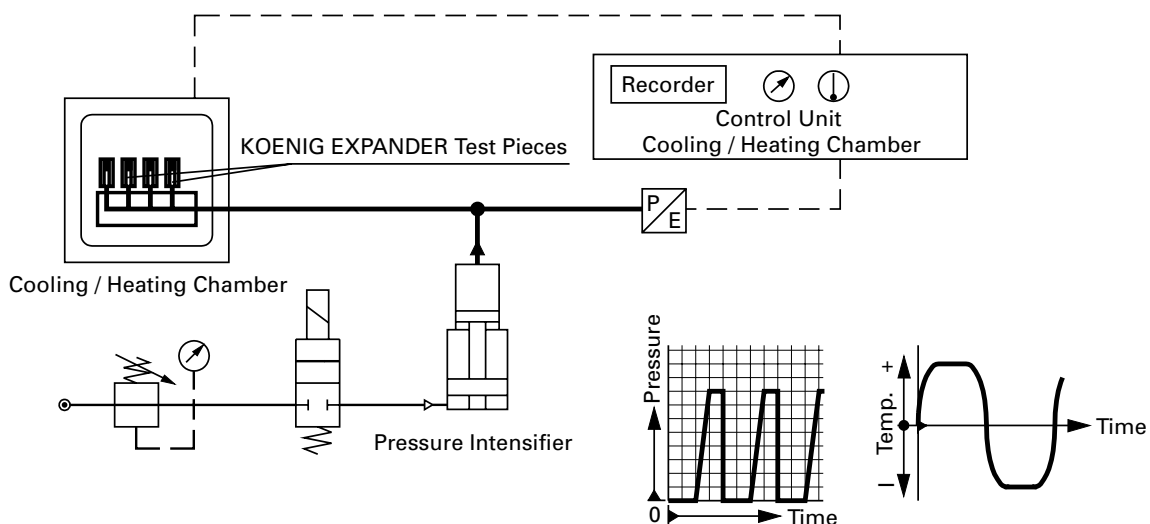


## TEST PRESSURE, TEST<sup>Ⓑ</sup>

The KOENIG EXPANDER® is subjected to a pressure cycling test under varying environmental conditions. The test determines the levels of pressure that can be absorbed by the part by applying intermittent pressure loads and temperature fluctuations to confirm the sealing plug is not squeezed out.

### CONDITIONS

- Temperature: 2 hrs at +100° C (Series LK/LP at 150° C) / 2 hrs at – 40° C temperature cycle 30 – 45 min.
- Pressure: Intermittent, 2 min 0 bar, 3 min test pressure
- Duration: 168 hrs (long-term test)
- Bore: Tolerance, roundness and roughness in accordance with standard sheets, plain surface, edge and wall distance according to standard sheet





# BASE MATERIALS / INSTALLATION REQUIREMENTS

Operating pressures listed can be achieved for the following base materials:

Base Material of the Installation		Tensile Strength Rm [N/mm <sup>2</sup> ]	Elongation A5 [%]	Yield Strength Rp0.2 [N/mm <sup>2</sup> ]	Hardness HB
①	High Strength Steel ETG-100 / 44SMn28 AISI 1144	960 - 1000	6	min. 865	320 avg.
②	Case Hardened Steel C15Pb / 1.0403 AISI 10L15	430 - 730	10	min. 280	200 avg.
③	Ductile Cast Iron EN 1563: GJS-600-3 ASTM A536: 80-60-03	min. 600	3	min. 370	200 - 290
④	Ductile Cast Iron (Dura-Bar®) EN 1563: GJS-450-10 ASTM A536: 65-45-12	450 avg.	12	310 avg.	131 - 217
⑤	Gray Cast Iron EN 1561: GJL-250 ASTM A48: NO.35	350 avg.	0.3	165 - 228	160 - 250
⑥	Aluminum-Alloy AlCu4Mg1 / EN AW-2024-T3 AA: 2024 T4/T6*	min. 450	8	min. 310	120 avg.
⑦	Aluminum-Alloy AlMgSiPb / EN AW-6012-T6 AA: 6012-T6	min. 310	8	min. 260	105 avg.
⑧	Cast Aluminum-Alloy G-AISI7Mg / EN-AC-42100 ASTM/UNS: A356	min. 230	2	min. 190	min. 75

\*SFC KOENIG's North American Engineering Department utilizes 2024-T4/T6 as a test base material.

- Equally high working pressures can also be achieved with base materials with similar mechanical properties. However, compliance must be met for the appropriate installation conditions.
- Applications in cast aluminum, magnesium alloys, nonferrous metals and plastics require special consideration and can be developed upon request.
- Applications in base materials with high hardness and hardened materials, require special consideration and can be developed upon request.
- **Applications in surface coated materials (zinc plated, anodized ...) require special consideration and can be developed upon request.**
- For factors affecting pressure performance please see:
  - Anchoring Principle
  - Surface Finish: Requirements
  - Design Guidelines

## SAFETY MARGIN

The safety margin includes uncontrollable factors. Dynamic loads at nominal pressure, with 10<sup>6</sup> load cycles and a frequency of 3 – 4 Hz have shown that the subsequently measured bursting pressures, are reduced according to Test Ⓐ by 20 % as well as Test Ⓑ.

# PRESSURE PERFORMANCE

## Series MB / CV

Series MB 600 mm	Base Material of the Installation							
	①	②	③	⑤	⑥	⑦	⑧	
	ETG-100 / 44SMn28 AISI 1144	C15Pb / 1.0403 ~ SAE 1015 [10L15]	EN 1563: GJS-600-3 ASTM A536: 80-60-03	EN 1561: GJL-250 ASTM A48: NO.35	AlCu4Mg1 / EN AW-2024-T3 AA: 2024 T4/T6*	AlMgSiPb / EN AW-6012-T6 AA: 6012-T6	G-AISI7Mg / EN-AC-42100 ASTM/UNS: A356	
Ø 3 – 10	1400 bar / 20300 psi				450 bar / 6500 psi		1200 bar / 17400 psi	380 bar / 5500 psi
Ø 12 – 14	1000 bar / 14500 psi				350 bar / 5100 psi		900 bar / 13000 psi	280 bar / 4100 psi
Hole Tolerance	0 / +0.1 mm							
Hole Roughness	R <sub>z</sub> 10 – 30 µm				Anchorage in Base Metal			

Series MB 600 Inch	Base Material of the Installation							
	①	②	③	⑤	⑥	⑦	⑧	
	ETG-100 / 44SMn28 AISI 1144	C15Pb / 1.0403 ~ SAE 1015 [10L15]	EN 1563: GJS-600-3 ASTM A536: 80-60-03	EN 1561: GJL-250 ASTM A48: NO.35	AlCu4Mg1 / EN AW-2024-T3 AA: 2024 T4/T6*	AlMgSiPb / EN AW-6012-T6 AA: 6012-T6	G-AISI7Mg / EN-AC-42100 ASTM/UNS: A356	
Ø 0.093 – 0.281	1400 bar / 20300 psi				450 bar / 6500 psi		1200 bar / 17400 psi	380 bar / 5500 psi
Hole Tolerance	Ø 0.093 0 / +0.002 Inch from Ø 0.125 0 / +0.004 Inch							
Hole Roughness	R <sub>z</sub> 10 – 30 µm				Anchorage in Base Metal			

Series MB 700 mm	Base Material of the Installation							
	①	②	③	⑤	⑥	⑦	⑧	
	ETG-100 / 44SMn28 AISI 1144	C15Pb / 1.0403 ~ SAE 1015 [10L15]	EN 1563: GJS-600-3 ASTM A536: 80-60-03	EN 1561: GJL-250 ASTM A48: NO.35	AlCu4Mg1 / EN AW-2024-T3 AA: 2024 T4/T6*	AlMgSiPb / EN AW-6012-T6 AA: 6012-T6	G-AISI7Mg / EN-AC-42100 ASTM/UNS: A356	
Ø 3 – 10	1400 bar / 20300 psi				450 bar / 6500 psi		1200 bar / 17400 psi	380 bar / 5500 psi
Ø 12 – 22	1150 bar / 16700 psi				350 bar / 5100 psi		900 bar / 13000 psi	280 bar / 4100 psi
Hole Tolerance	0 / +0.1 mm							
Hole Roughness	R <sub>z</sub> 10 – 30 µm				Anchorage in Base Metal			

Series MB 850 mm	Base Material of the Installation							
	①	②	③	⑤	⑥	⑦	⑧	
	ETG-100 / 44SMn28 AISI 1144	C15Pb / 1.0403 ~ SAE 1015 [10L15]	EN 1563: GJS-600-3 ASTM A536: 80-60-03	EN 1561: GJL-250 ASTM A48: NO.35	AlCu4Mg1 / EN AW-2024-T3 AA: 2024 T4/T6*	AlMgSiPb / EN AW-6012-T6 AA: 6012-T6	G-AISI7Mg / EN-AC-42100 ASTM/UNS: A356	
Ø 3 – 10	1100 bar / 16000 psi				350 bar / 5100 psi		1000 bar / 14500 psi	320 bar / 4600 psi
Ø 12 – 22	900 bar / 13000 psi				280 bar / 4100 psi		800 bar / 11600 psi	250 bar / 3600 psi
Hole Tolerance	0 / +0.1 mm							
Hole Roughness	R <sub>z</sub> 10 – 30 µm				R <sub>z</sub> 10 – 30 µm	Anchorage in Base Metal		

Series CV 173 mm	Base Material of the Installation				
	①	③	④	⑥	⑧
	ETG-100 / 44SMn28 AISI 1144	EN 1563: GJS-600-3 ASTM A536: 80-60-03	EN 1563: GJS-450-10 ASTM A536: 65-45-12	AlCu4Mg1 / EN AW-2024-T3 AA: 2024 T4/T6*	G-AISI7Mg / EN-AC-42100 ASTM/UNS: A356
Ø 3 – 10				650 bar / 9400 psi 210 bar / 3000 psi	
Ø 12				300 bar / 4300 psi 100 bar / 1500 psi	
Hole Tolerance	0 / +0.1 mm				
Hole Roughness	R <sub>z</sub> 10 – 30 µm			Anchorage in Base Material	

Series CV 588 mm	Base Material of the Installation				
	①	③	④	⑥	⑧
	ETG-100 / 44SMn28 AISI 1144	EN 1563: GJS-600-3 ASTM A536: 80-60-03	EN 1563: GJS-450-10 ASTM A536: 65-45-12	AlCu4Mg1 / EN AW-2024-T3 AA: 2024 T4/T6*	G-AISI7Mg / EN-AC-42100 ASTM/UNS: A356
Ø 4 – 9	1000 bar / 14500 psi		350 bar / 5000 psi		
Ø 10	860 bar / 12500 psi		280 bar / 4000 psi		
Hole Tolerance	0 / +0.1 mm				
Hole Roughness	R <sub>z</sub> 10 – 30 µm			Anchorage in Base Material	

Proof Pressure Test® Max. Allowable Working Pressure = Nominal Pressure \*SFC KOENIG's North American Engineering Department utilizes 2024-T4/T6 as a test base material. See Anchorage Principles related to the base materials on page 74.

# PRESSURE PERFORMANCE

## Series SK / LP / LK / RE

Series SK mm	Base Material of the Installation							
	①	②	③	⑤	⑥	⑦	⑧	
	ETG-100 / 44SMn28 AISI 1144	C15Pb / 1.0403 ~ SAE 1015 [10L15]	EN 1563: GJS-600-3 ASTM A536: 80-60-03	EN 1561: GJL-250 ASTM A48: NO.35	AlCu4Mg1 / EN AW-2024-T3 AA: 2024 T4/T6*	AlMgSiPb / EN AW-6012-T6 AA: 6012-T6	G-AISI7Mg / EN-AC-42100 ASTM/UNS: A356	
Ø 4 – 10	1600 bar / 23200 psi				500 bar / 7200 psi		1400 bar / 20300 psi	450 bar / 6500 psi
Ø 12	1600 bar / 23200 psi				400 bar / 5800 psi			
Hole Tolerance	0 / +0.12 mm							
Hole Roughness	R <sub>z</sub> 10 – 30 µm				Anchorage in Base Metal			

If SK plugs are used to keep channels separated, allowable working pressure on the insertion side is reduced by 50%.

Series LP mm	Base Material of the Installation							
	①	②	③	⑤	⑥	⑦	⑧	
	ETG-100 / 44SMn28 AISI 1144	C15Pb / 1.0403 ~ SAE 1015 [10L15]	EN 1563: GJS-600-3 ASTM A536: 80-60-03	EN 1561: GJL-250 ASTM A48: NO.35	AlCu4Mg1 / EN AW-2024-T3 AA: 2024 T4/T6*	AlMgSiPb / EN AW-6012-T6 AA: 6012-T6	G-AISI7Mg / EN-AC-42100 ASTM/UNS: A356	
Ø 4 – 12	180 bar / 2600 psi				60 bar / 850 psi			
Hole Tolerance	According to Data Sheet							
Hole Roughness	R <sub>z</sub> 10 – 30 µm				Anchorage in Base Metal			

① ② ③ ⑤ ⑥ Temperature range for proof pressure testⓈ: – 40 °C to + 150 °C ⑦ ⑧ Temperature range for proof pressure testⓈ: – 40 °C to + 100 °C

Series LK 600 mm	Base Material of the Installation							
	①	②	③	⑤	⑥	⑦	⑧	
	ETG-100 / 44SMn28 AISI 1144	C15Pb / 1.0403 ~ SAE 1015 [10L15]	EN 1563: GJS-600-3 ASTM A536: 80-60-03	EN 1561: GJL-250 ASTM A48: NO.35	AlCu4Mg1 / EN AW-2024-T3 AA: 2024 T4/T6*	AlMgSiPb / EN AW-6012-T6 AA: 6012-T6	G-AISI7Mg / EN-AC-42100 ASTM/UNS: A356	
Ø 4 – 10	180 bar / 2600 psi				60 bar / 850 psi			
Hole Tolerance	0 / +0.12 mm							
Hole Roughness	R <sub>z</sub> 10 – 30 µm				Anchorage in Base Metal			

① ② ③ ⑤ Temperature range for proof pressure testⓈ: – 40 °C to + 150 °C ⑥ ⑦ ⑧ Temperature range for proof pressure testⓈ: – 40 °C to + 100 °C

Series LK 950 mm	Base Material of the Installation							
	①	②	③	⑤	⑥	⑦	⑧	
	ETG-100 / 44SMn28 AISI 1144	C15Pb / 1.0403 ~ SAE 1015 [10L15]	EN 1563: GJS-600-3 ASTM A536: 80-60-03	EN 1561: GJL-250 ASTM A48: NO.35	AlCu4Mg1 / EN AW-2024-T3 AA: 2024 T4/T6*	AlMgSiPb / EN AW-6012-T6 AA: 6012-T6	G-AISI7Mg / EN-AC-42100 ASTM/UNS: A356	
Ø 4 – 20	180 bar / 2600 psi				60 bar / 850 psi			
Hole Tolerance	+0.05 / +0.15	0 / +0.12 mm						
Hole Roughness	R <sub>z</sub> 10 – 30 µm				R <sub>z</sub> 10 – 30 µm		Anchorage in Base Metal	

① ② ③ ⑤ Temperature range for proof pressure testⓈ: – 40 °C to + 150 °C ⑥ ⑦ ⑧ Temperature range for proof pressure testⓈ: – 40 °C to + 100 °C

KOENIG EXPANDER® sealing plugs series LK are not suitable for pressure load applied on the insertion side of the plug. For special release contact SFC KOENIG.

Series RE mm	Base Material of the Installation			
	①	④	⑥	⑧
	ETG-100 / 44SMn28 AISI 1144	EN 1563: GJS-450-10 ASTM A536: 65-45-12	AlCu4Mg1 / EN AW-2024-T3 AA: 2024 T4/T6*	G-AISI7Mg / EN-AC-42100 ASTM/UNS: A356
Ø 4	120 bar / 1740 psi		100 bar / 1450 psi	
Ø 5	180 bar / 2610 psi		150 bar / 2175 psi	
Ø 6	210 bar / 3045 psi		150 bar / 2175 psi	
Ø 7–8	210 bar / 3045 psi		180 bar / 2610 psi	
Ø 9–10	Please Contact Us for Details			

Proof Pressure TestⓈ Max. Allowable Working Pressure = Nominal Pressure \*SFC KOENIG's North American Engineering Department utilizes 2024-T4/T6 as a test base material.

**Base Material Harder than Expander:** To achieve the allowable working pressure, anchorage to the bore roughness of the base material is required. Roughness R<sub>z</sub> = 10 – 30 µm.

**Base Material Softer than Expander:** Anchorage to the bore of the base material occurs automatically due to the serrations on the sleeve of the KOENIG EXPANDER®.

**Transition Zone:** To achieve the allowable working pressure, anchorage to the bore roughness of the base material is required. Roughness R<sub>z</sub> = 10 to 30 µm.

See Anchorage Principles related to the base materials on page 74.

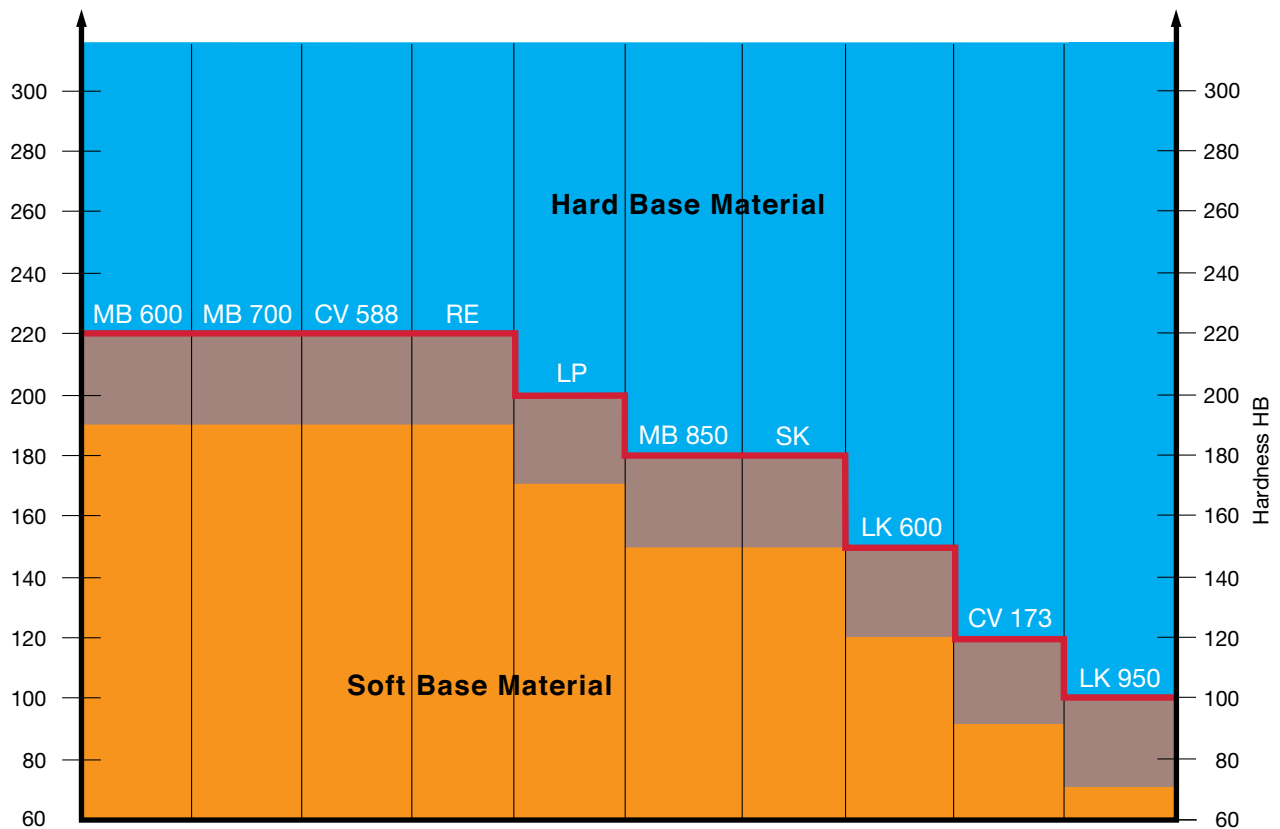
# ANCHORAGE PRINCIPLE

The required bore roughness is directly related to the hardness and the mechanical characteristics of the base material. Depending on the combination of sealing plug and base material, anchorage takes place either by the groove profile of the expander sleeve biting into the base material or on anchorage to the surface roughness of the bore.

**Note:**  
When selecting a KOENIG EXPANDER® the bore roughness must always be adjusted according to the hardness of the base material.

Anchorage between sleeve and base material is achieved when the sleeve is a minimum of HB = 30 greater than the base material. If the hardness difference is less, hole roughness of 10 to 30 µm is needed to achieve indicated working pressures.

## Anchorage Principle Related to the Base Material



## KOENIG EXPANDER®

**Base Material Harder than Expander:** To achieve the allowable working pressure, anchorage to the bore roughness of the base material is required.  
**Roughness  $R_z = 10 - 30 \mu\text{m}$ .**

**Transition Zone:** To achieve the allowable working pressure, anchorage to the bore roughness of the base material is required.  
**Roughness  $R_z = 10 \text{ to } 30 \mu\text{m}$ .**

**Base Material Softer than Expander:** Anchorage to the bore of the base material occurs automatically due to the serrations on the sleeve of the KOENIG EXPANDER®.



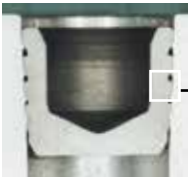
# ANCHORAGE PRINCIPLE



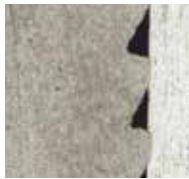
Anchorage due to plug sleeve serrations  
**KOENIG EXPANDER® Series SK**  
 In aluminum-alloy HB = 90



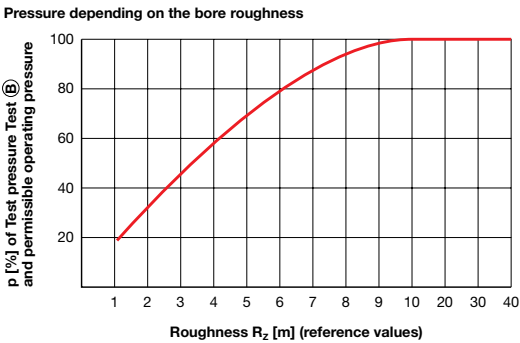
Anchorage due to plug sleeve serrations  
**KOENIG EXPANDER® Series MB 850**  
 In aluminum-alloy HB = 90



Anchorage due to plug sleeve serrations  
**KOENIG EXPANDER® Series LP**  
 In aluminum-alloy HB = 90

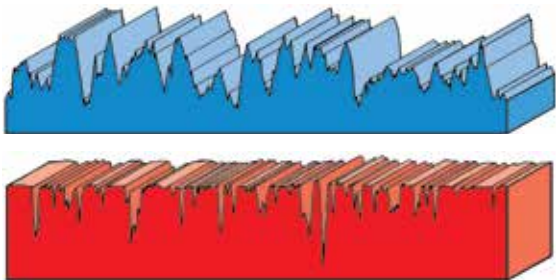


Sufficient anchorage due to plug sleeve serrations  
**KOENIG EXPANDER® Series LK 950**  
 In aluminum-alloy HB = 90



## BORE ROUGHNESS REQUIREMENTS

When installing KOENIG EXPANDER® plugs in hard base material positive anchoring is not possible. To attain suitable working pressures and anchorage, it is necessary to have a bore roughness of  $R_z = 10\text{--}30 \mu\text{m}$ . At a roughness greater than  $R_z = 30 \mu\text{m}$  leakage might occur.



## ROUGHNESS PROFILE

### Required Roughness Profile

The ideal bore roughness for anchorage is attained by drilling with a twist drill or a core drill.

### Undesirable Roughness Profile

By reaming, a one-sided, smooth roughness profile is created. This is not desirable.

# INSTALLATION INSTRUCTIONS FOR SERIES MB

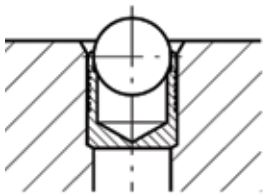


Fig. 1

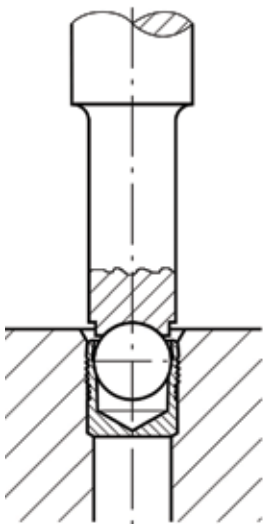


Fig. 2

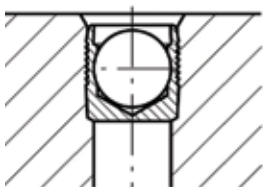


Fig. 3

## DRILLED HOLE

- The drilled hole must be within the tolerances shown on the preceding dimensional sheets.
- The counterbored hole ( $d_2$ ) must be properly sized for the through hole ( $d_3$ ) according to the dimensional sheets.
- Holes must be round within 0.05 mm.
- With hard materials the bore roughness should be from  $R_z = 10-30 \mu\text{m}$  for best results.
- Longitudinal rifles and spiral grooves should be avoided. These influence the sealing effectiveness.
- The bore must be free of oil, grease and chips.

## SETTING PROCEDURE

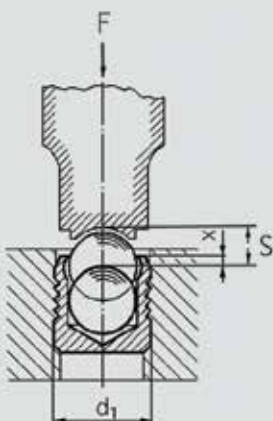
- With the ball facing out the KOENIG EXPANDER® is inserted in the counterbored hole. The top sleeve should not be above the surface of the base material (Fig. 1).
- With only a slight or no counterbore, the base of the sleeve must be adequately supported during installation.
- The ball can now be pressed in until the top of the ball is below the edge of the sleeve (Fig. 2 and 3). Corresponding approximate values for stroke S as well as the dimensions X are from the table below.

## Note:

- Use the proper size setting tool for the KOENIG EXPANDER® according to the data sheet.
- Spray cleaning with air drying is the only way to clean/degrease plugs before installation. Do not dip and vacuum dry the plugs.

## PRESS

Small quantities or single parts can be installed with a hammer and a setting tool. Installation can also be done with an arbor press. It is preferred to limit stroke travel when using a press because insertion force is difficult to control. KOENIG EXPANDER® plugs are also ideal for automated installation because they are problem free.



## INSTALLATION CHART

		Series MB 600 / MB 700 / MB 850													
d1 [mm]		3	4	5	6	7	8	9	10	12	14	16	18	20	22
S [mm]	Stroke (approx. values)	1.2	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.5	6.35	7.0	8.0	9.0	10.0
X [mm]	Position of Top of Ball Relative to Top of Sleeve ±0.2	0.4	0.2	0.4	0.4	0.4	0.3	0.4	0.4	0.4	0.4	0.6	0.6	0.8	0.8

		Series MB 600 Inch-Version						
d1 [inch]		.093	.125	.156	.187	.218	.250	.281
S [in]	Stroke (approx. values)	.031	.047	.059	.079	.094	.109	.118
X [in]	Position of Top of Ball Relative to Top of Sleeve	Flush to .012 Below the Sleeve						

# INSTALLATION INSTRUCTIONS FOR SERIES MB

## PLUG REMOVAL

With KOENIG EXPANDER® MB Series removal of the plug is possible. The plug can be drilled out with a carbide tipped drill or with a high speed steel drill.

Plug Removal Drill Bit Recommendation		
MB 600-030 to 140	Ball HB ~250	High Speed Steel Drill
MB 600-093 A	Ball HRC ~55	Carbide Tipped Drill
MB 600-125 A to 281 A	Ball HB ~250	High Speed Steel Drill
MB 700-030 to 220	Ball HRC ~45	Carbide Tipped Drill
MB 850-030 to 220	Ball HRC ~45	Carbide Tipped Drill

## PROCEDURE:

- For KOENIG EXPANDER® smaller than 6mm or .250 inches in diameter:  
Drill out, in one process, to the **next larger diameter** according to the data sheet.
- For KOENIG EXPANDER® models larger than 6mm or .250 inches in diameter:  
Drill out in several steps with last step to the **next larger diameter** according to the data sheet.
- Clear chips, remnants of the sleeve, and oil and grease from the bore.
- Inspect bore to confirm that it meets all requirements.
- Install a new KOENIG EXPANDER®.

## Note:

After plug removal always use the next larger size plug.

# INSTALLATION INSTRUCTIONS FOR SERIES SK

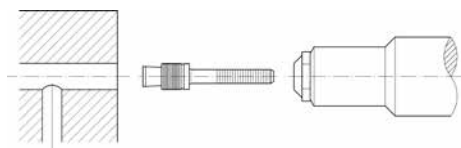


Fig. 1

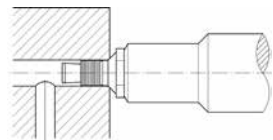


Fig. 2

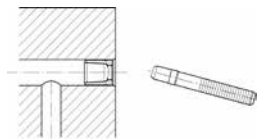


Fig. 3

## DRILLED HOLE

- The drilled hole must be within the tolerances shown on the preceding data sheets.
- Holes must be round within 0.05 mm.
- With hard materials the bore roughness should be from  $R_z = 10\text{--}30\ \mu\text{m}$  for best results.
- Longitudinal rifles and spiral grooves should be avoided. These influence the sealing effectiveness.
- The bore must be free of oil, grease and chips.

## SETTING PROCEDURE

- Insert the plug in the tool, making sure that the sleeve is against the nosepiece (Fig. 1).
- After inserting the plug into the hole (ensuring the tool is flush to the work surface) activate the tool to expand the plug. The mandrel will break apart when the proper tension has been reached (Fig. 2 and 3).

## Note:

- The assembly of KOENIG EXPANDER® plugs should only be done in a **clean working area**.
- The sleeve and mandrel of the **plug should not be cleaned, lubricated or have sealant (compound) applied**.

## TOOLS

For trouble free installation of KOENIG EXPANDER® plugs use the tools and appropriate components according to the data sheet.

## PLUG REMOVAL

With KOENIG EXPANDER® SK Series plug removal is possible.

## PROCEDURE:

- Drive the mandrel from the sleeve with a punch.
- Drill out the sleeve and remove the mandrel.
- Bore the hole to the **next larger Expander diameter** per the data sheet.
- Clear chips, remnants of the sleeve, and oil and grease from the bore.
- Inspect bore to confirm that it meets all requirements.
- Install a new KOENIG EXPANDER®.

## Note:

After plug removal always install the next larger size plug.

# INSTALLATION INSTRUCTIONS FOR SERIES LK

## DRILLED HOLE

1. The drilled hole must be within the tolerance shown on the dimensional sheets.  
In base materials with high hardness or hardened materials:
  - < 280HB the bore tolerance should be 0 / + 0.12
  - $\geq$  280HB the bore tolerance should be +0.05 / + 0.15
2. Holes must be round within 0.05 mm.
3. With hard materials the bore roughness should be from  $R_z = 10\text{--}30\ \mu\text{m}$  for best results.
4. Longitudinal rifles and spiral grooves should be avoided. These influence the sealing effectiveness.
5. The bore must be free of oil, grease and chips.

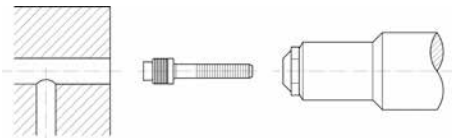


Fig. 1

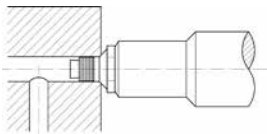


Fig. 2

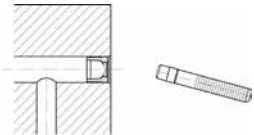


Fig. 3

## SETTING PROCEDURE

- Insert the plug in the tool, ensuring that the sleeve is against the nosepiece (Fig. 1).
- After inserting the plug into the hole activate the tool to expand the plug.
- The mandrel will break apart when the proper tension has been reached (Fig. 2 and 3).

## Note:

- The assembly of KOENIG EXPANDER® plugs should only be done in a **clean working area**.
- The sleeve and mandrel of **the plug should not be cleaned, lubricated or have sealant (compound) applied**.

## TOOLS

For trouble free installation of KOENIG EXPANDER® plugs use the tools and appropriate components according to the data sheet.

## PLUG REMOVAL

With KOENIG EXPANDER® plugs LK Series plug removal is possible.

## PROCEDURE:

- Drive the mandrel from the sleeve with a punch.
- Drill out the sleeve and remove the mandrel.
- Bore the hole to the **next larger Expander diameter** per the data sheet.
- Clear chips, remnants of the sleeve and oil and grease from the bore.
- Inspect bore to confirm that it meets all requirements.
- Install a new KOENIG EXPANDER®.

## Note:

After plug removal always install the next larger size plug.



# INSTALLATION INSTRUCTIONS FOR SERIES LP

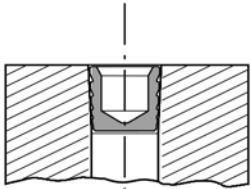


Fig. 1

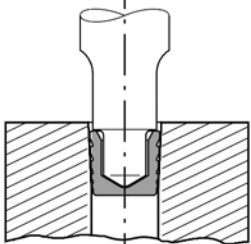


Fig. 2

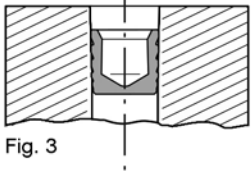


Fig. 3

## DRILLED HOLE

- The drilled hole must be within the tolerances shown on the dimensional sheets.
- A 1:12 cone rate must be maintained as per the specification sheet.
- Holes must be round within 0.05 mm.
- With hard materials the bore roughness should be from  $R_z = 10-30 \mu\text{m}$  for best results.
- Longitudinal rifles and spiral grooves should be avoided. These influence the sealing effectiveness.
- The bore must be free of oil, grease and chips.

## SETTING PROCEDURE

- With the setting hole facing out, the LP-plug is inserted in the cone bore. The top sleeve should not be above the surface of the base material (Fig. 1).
- The LP-plug can now be pressed in with the setting tool. Corresponding approximate values for stroke S are from the table below (Fig. 2).
- Installed LP-plug (Fig. 3).

### Note:

- Use the proper size setting tool for the KOENIG EXPANDER® according to the data sheet.
- A higher setting force might occur if the LP plugs are washed before installation.

## PRESS

- It is preferred to limit travel when using a press because insertion force is difficult to control.
- Recommended setting speed is 5 mm/sec.
- The KOENIG EXPANDER® ensures an optimum orientation, it works perfectly with automatic processing.

## PLUG REMOVAL

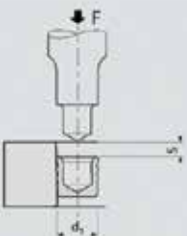
With KOENIG EXPANDER® LP Series plug removal is possible. The plug can be drilled out with a high speed steel drill.

### PROCEDURE:

- Drill out, in one process, to the next larger diameter, nominal diameter d4 according to the data sheet.
- Drill the taper hole with a reamer up to diameter d3 according to the data sheet.
- Clear chips, remnants of the sleeve, and oil and grease from the bore.
- Install a new KOENIG EXPANDER®.

### Note:

After plug removal always install the next larger size plug.

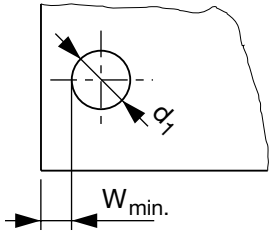


## INSTALLATION CHART

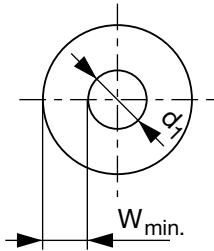
Series LP 900								
Diameter	4	5	6	7	8	9	10	12
Stroke S [mm] +/- 0,25	1.0	1.3	1.3	1.5	1.8	1.8	2.0	2.0

In steel, gray cast nodulized cast iron, aluminum wrought alloy, aluminum-cast material

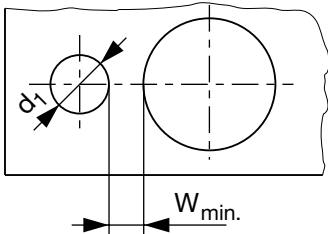
Distance to External Wall



Distance to Exterior Wall



Wall Thickness Between Bores



### WALL THICKNESS / DISTANCE FROM EDGE

As the radial expansion of the KOENIG EXPANDER® sleeve occurs, the base material in which it will be anchored plastically deforms. The resultant strength, as well as the hydraulic pressure and temperature service conditions depending on the expander type and characteristics of the base material, require minimum wall thickness, or distance from edge.

The guideline values for minimum wall thickness and distance from edge ( $W_{min.}$ ) express these influencing factors. At these minimum values, only slight deformation on the exterior profile of the base material of less than 20  $\mu\text{m}$  is likely. This does not affect the function of the KOENIG EXPANDER®. Below the guideline values ( $W_{min.}$ ) the possibility of overloading the base material exists, which can adversely influence the function of the KOENIG EXPANDER®. In such cases tests must be conducted.

#### Guideline values $W_{min.}$ for wall thickness and distance from edge

KOENIG EXPANDER® diameters Series MB / SK and LP

$$d_1 \geq 4 \text{ mm: } W_{min.} = f_{min.} \times d_1$$

$$d_1 < 4 \text{ mm: } W_{min.} = f_{min.} \times d_1 + 0.5 \text{ mm}$$

KOENIG EXPANDER® diameters Series LK / RE

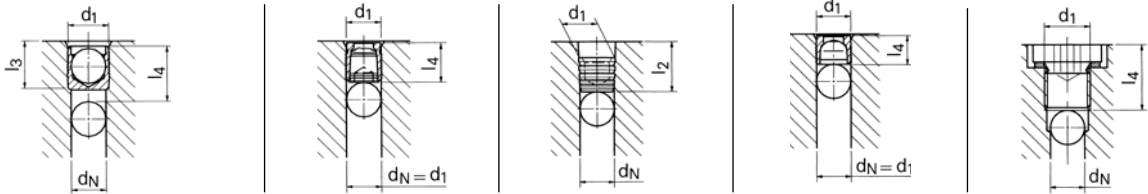
$$d_1 \geq 5 \text{ mm: } W_{min.} = f_{min.} \times d_1$$

$$d_1 = 4 \text{ mm: } W_{min.} = f_{min.} \times d_1 + 0.5 \text{ mm}$$

		①	②	③	⑤	⑥	⑦	⑧
Base Material	Description	ETG100	C15Pb	EN-GJS-600-3	EN-GJL-250	AlCu4Mg1	AlMgSiPb	G-AlSi7Mg
	Avg. Tensile Strength $R_m$ [N/mm <sup>2</sup> ]	1000	560	650	300	480	340	260
	Minimum Elongation A5 [%]	6	10	3	0.3	8	8	2
	Avg. Ultimate Strength $R_p$ 0.2 [N/mm <sup>2</sup> ]	900	300	425	200	380	290	220
KOENIG EXPANDER® Series		Factor $f_{min.}$						
MB 600		0.6	0.8	0.8	1.0	0.8	1.0	1.0
MB 600, Inch-Version		0.6	0.8	0.8	1.0	0.8	1.0	1.0
MB 700		0.6	0.8	0.8	1.0	0.8	1.0	1.0
MB 850		0.5	0.6	0.6	1.0	0.6	1.0	1.0
CV 173		0.5	0.6	0.7	0.8	0.7	0.8	0.8
CV 588		0.6	0.8	0.8	1.0	0.8	1.0	1.0
SK		0.5	0.6	0.6	1.0	0.6	1.0	1.0
LP		0.3	0.3	0.3	0.5	0.4	0.5	0.5
LK 600		0.4	0.5	0.5	0.8	0.7	0.7	0.7
LK 950		0.3	0.3	0.4	0.6	0.5	0.5	0.5
RE		0.3	0.3	0.5	0.6	0.5	0.5	0.5

# DESIGN GUIDELINES

## Required Installation Lengths



$d_N$	Series MB			Series SK		Series LP		Series LK		Threaded Plugs DIN 908	
	$d_1$	$l_3$ min.	$l_4$ min.	$d_1$	$l_4$ max.	$d_1$	$l_2$ min.	$d_1$	$l_4$ max.	$d_1$	$l_4$ max.
2.0	3.0	3.4	5.0								
3.0	4.0	3.8	5.5								
4.0	5.0	5.3	7.0	4.0	6.5	4.40	7.0	4.0	4.0		
5.0	6.0	6.3	8.5	5.0	7.5	5.40	8.0	5.0	4.8	M8x1.5	11.5
6.0	7.0	7.3	9.5	6.0	8.0	6.40	8.5	6.0	5.3	M8x1.5	11.5
7.0	8.0	8.3	11.0	7.0	9.0	7.40	8.5	7.0	5.8	M10x1.5	12.0
8.0	9.0	9.8	12.5	8.0	10.5	8.45	9.5	8.0	6.8	M10x1.5	12.0
9.0	10.0	10.8	13.5	9.0	11.0	9.60	10.0	9.0	6.8	M12x1.5	16.0
10.0	12.0	12.8	16.0	10.0	12.5	10.65	11.0	10.0	6.8	M12x1.5	16.0
12.0	14.0	14.5	18.0	12.0	16.5	12.75	12.0	12.0	7.8	M14x1.5	16.0
14.0	16.0	16.5	20.0					14.0	8.7	M16x1.5	16.5
16.0	18.0	18.5	22.5					16.0	11.5	M18x1.5	17.5
18.0	20.0	21.5	25.5					18.0	13.0	M20x1.5	19.5
20.0	22.0	24.5	28.5					20.0	13.0	M22x1.5	19.5

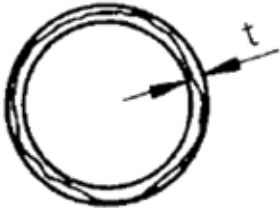
$d_N$  = Given nominal bore / system bore size

### \*Installation Lengths Series MB

The required installation length ( $l_4$ ) min. for MB plugs is for base materials with hardness greater than HB = 90.

For softer materials, deeper installation is required.

## ROUNDNESS TOLERANCE



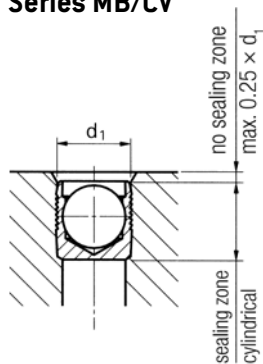
To ensure reliable functioning of the KOENIG EXPANDER® with regard to pressure performance and to ensure leak tight sealing, a **roundness tolerance of  $t = 0.05 \text{ mm}$**  must be held.

By using a double lipped twist drill, the called out hole and roundness tolerances are reached. Better tolerances, particularly for larger diameter holes, can be held by using a **triple lipped twist drill**.

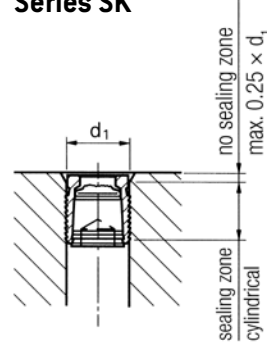
## CONICITY OF THE BORE

Within the effective sealing area of the KOENIG EXPANDER, the bore must be according to the dimensional sheets. The bore lead in can be chamfered up to a depth of  **$0.25 \times d_1$  (LK:  $0.15 \times d_1$ )** because this area has no significant effect on the sealing function.

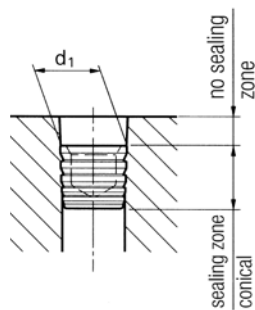
### Series MB/CV



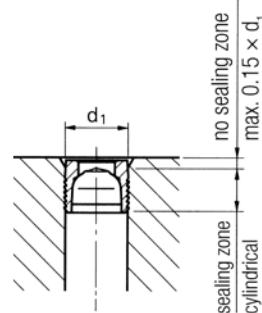
### Series SK



### Series LP

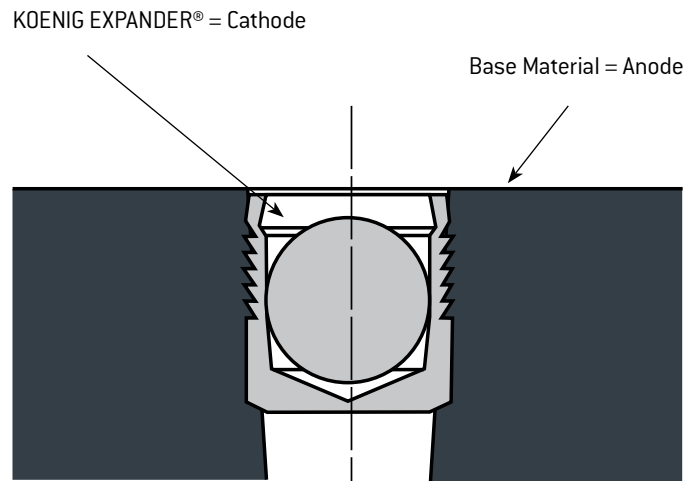


### Series LK

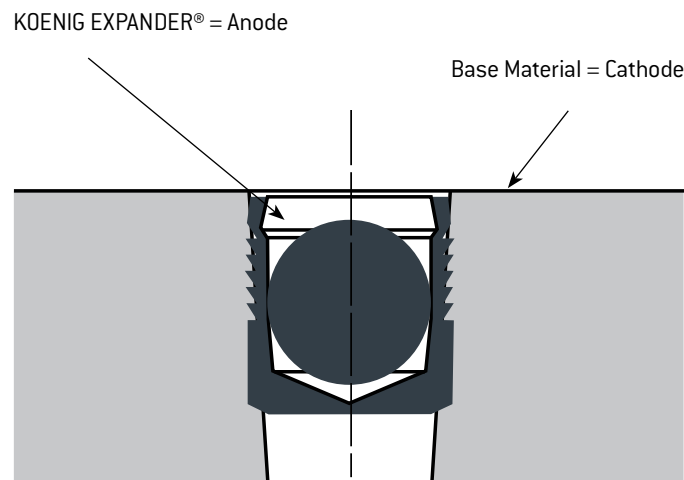


# GALVANIC CORROSION

In choosing a KOENIG EXPANDER® you must consider that the material of the sealing plug and the material of the production piece can show different electrical potentials. In the presence of an electrolyte (e.g. 5% water-NaCl solution), this potential difference causes electrochemical attack on the least noble of the metals in contact – galvanic corrosion. In this case, either the base material or its surface protection will become the anode and will be transferred to the pure metal of the cathode. The corrosion speed or the current density will be determined by the relative surface area or volume of the anode and cathode as illustrated below.



Large Anode Area → Low Current Density at the Anode → **Slow Corrosion**



Small Anode Area → High Current Density at the Anode → **Fast Corrosion**



# GALVANIC CORROSION

## EFFECT OF GALVANIC CORROSION

The following table shows the expected galvanic corrosion behavior of KOENIG EXPANDER® plugs in common base materials allowing for the relative surface areas of both metals, which influences the speed of corrosion.

Installation Material	Series										
	MB 600	MB 700	MB 850	CV 173	CV 588	SK	LP	LK 600	LK 950	BF/BR	RE
Steel, Carbon/Low Alloy, Plain											
Steel, Carbon/Low, Zn Plated, Chromate											
Steel, Carbon/Low Alloy, Phosphatized											
Nitrided or Case Hardening Steel	Behavior Depends on the Method Used										
Stainless Steel, X8CrNiS18-9, 1.4305, ANSI 303											
Stainless Steel, X12CrS13, 1.4005, ANSI 416											
Cast Iron, EN 1561, Plain											
Cast Iron, EN 1561, Zn Plated, Chromate											
Cast Iron, EN 1561, Phosphatized											
Ductile Cast Iron, EN 1563, Plain											
Ductile Cast Iron, EN 1563, Zn Plated, Chromate											
Ductile Cast Iron, EN 1563, Phosphatized											
AlMg1SiCu EN AW-6061											
AlMgSiPb EN AW-6062											
AlCu4Mg1 EN AW-2024											
AlZnMgCu1,5 EN AW-7075											
G-AlSi7Mg A-Norm 356											
G-AlSi9Mg											
G-AlSi10Mg											

 = Accelerated     = Not Accelerated     = Slightly Accelerated

Key to the galvanic corrosion behavior of KOENIG EXPANDER® plugs in the presence of an electrolytic medium installed in base materials per the above table.

### Suggestions to Prevent Galvanic Corrosion

- Choose materials with no or low potential difference.
- Use corrosion reducing designs, i.e. if possible prevent the accumulation of fluids on the outer surface of the workpiece.
- By using suitable surface coatings, corrosion attack can be considerably reduced.

**Salt spray testing per DIN EN ISO 9227 is available upon request**

# INSTALLATION INSTRUCTIONS FOR KOENIG CHECK VALVE®

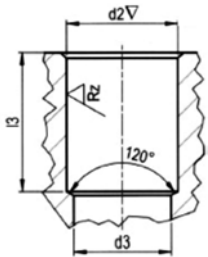


Fig. 1

Before Installation

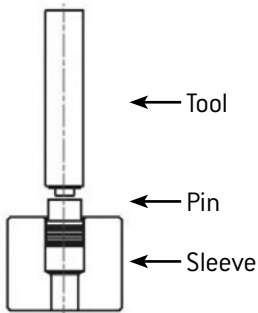


Fig. 2

After Installation

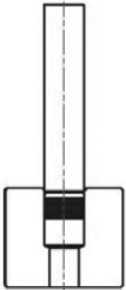


Fig. 3

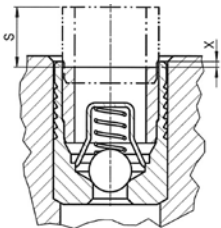


Fig. 4 (Reverse Flow)

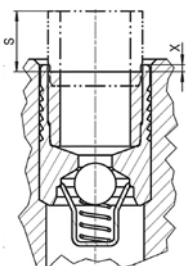


Fig. 5 (Forward Flow)

## DRILLED HOLE

- The drilled hole (Fig. 1) must be within the tolerances shown on the preceding dimensional sheets.
- The counter-bored hole (d2) must be properly sized for the through hole (d3) according to the dimensional sheets.
- Hole must be round within 0.05 mm.
- With hard materials (HB > 190) the bore roughness should be from Rz = 10 – 30 µm for best results.
- Longitudinal rifles and spiral grooves should be avoided.
- The bore must be free of oil, grease and chips.
- Additional reaming operation on the hole is not required.

## SETTING PROCEDURE

- With the pin facing out, the KOENIG CHECK VALVE® is inserted in the counter-bored hole (Fig. 2). The top surface of the sleeve should not be above the top surface of the base material.
- With only a slight or no counter-bore, the base of the sleeve must be adequately supported during installation.
- The pin can now be pressed in until the top of the pin is flush with the top surface of the sleeve. Corresponding approximate values for stroke S, as well as the dimension X can be referred from the dimensional sheets (Fig. 3, 4 and 5).

## Note

- Use the proper size setting tool for the KOENIG CHECK VALVE® according to the data sheet.
- Clean/degrease the KOENIG CHECK VALVE® before installation; only spray cleaning with air drying is allowed (no dipping or vacuum drying).
- Sealants or locking compounds should not be applied on the KOENIG CHECK VALVE®.

## PRESS

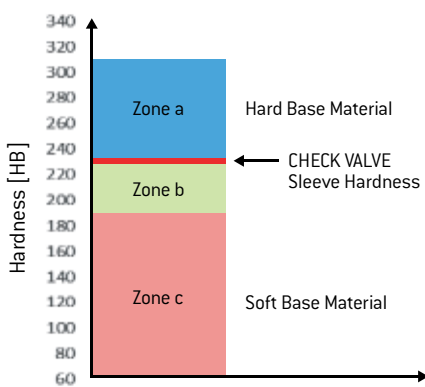
Small quantities or single parts can be installed with a hammer and setting tool. Installation can also be done with an arbor press. It is preferred to limit stroke travel when using a press because insertion force is difficult to control. The KOENIG CHECK VALVE® is also ideal for automated installation.

# ANCHORAGE PRINCIPLES FOR KOENIG CHECK VALVE®

The required bore roughness is directly related to the hardness and the mechanical characteristics of the base material. Depending on the combination of the KOENIG CHECK VALVE® and the base material, anchorage takes place either by the groove profile of the KOENIG CHECK VALVE® sleeve biting into the base material or on anchorage to the surface roughness of the bore.

**Note:**

When selecting a KOENIG CHECK VALVE®, the bore roughness must always be adjusted according to the hardness of the base material. Anchorage between sleeve and base material is achieved when the sleeve is a minimum of HB = 30 greater than the base material. If the hardness difference is less, hole roughness of 10 to 30 µm is needed to achieve good anchorage for the rated working pressure differential values.



- Zone a – Hard Base Material (HB > 220)**  
To achieve the allowable working pressure, anchorage to the bore roughness of the base material is required.  
Roughness  $R_z = 10 - 30 \mu\text{m}$ .
- Zone b – Transition Zone (HB 190 - 220)**  
To achieve the allowable working pressure, anchorage to the bore roughness of the base material is required.  
Roughness  $R_z = 10 - 30 \mu\text{m}$ .
- Zone c – Soft Base Material (HB < 190)**  
Anchorage to the bore of the base material occurs automatically due to the serrations on the sleeve.

**Reference:**

Base Material of the Installation		
Steel	Cast Iron	Aluminum Alloy
Rz = 10 – 30 µm		Rz = 4 – 30 µm

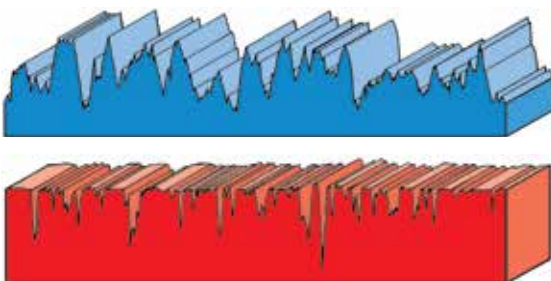
**ROUGHNESS PROFILE**

**Required Roughness Profile**

The ideal bore roughness for anchorage is attained by drilling with a twist drill or a core drill.

**Undesirable Roughness Profile**

By reaming, a one-sided, smooth roughness profile is created. This is not desirable.

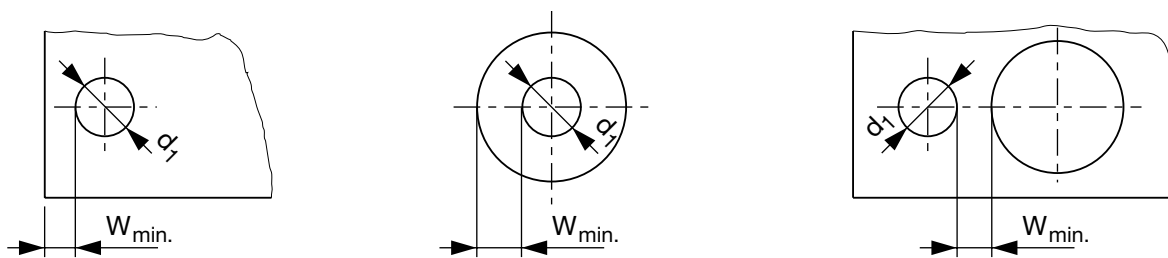


# DESIGN GUIDELINES FOR KOENIG CHECK VALVE®

## WALL THICKNESS / DISTANCE FROM EDGE:

As the radial expansion of the KOENIG CHECK VALVE® sleeve occurs, the base material in which it anchors plastically deforms. The resultant strength, as well as the hydraulic pressure and temperature service conditions depending on the characteristics of the base material, require a minimum wall thickness or distance from edge.

The guideline values for minimum wall thickness and distance from edge ( $W_{min.}$ ) express these influencing factors. At these minimum values, only slight deformation on the exterior profile of the base material of less than 20  $\mu\text{m}$  is likely. This does not affect the function of the KOENIG CHECK VALVE®. Below the guideline values ( $W_{min.}$ ) the possibility of overloading the base material exists, which can adversely influence the function of the KOENIG CHECK VALVE®. In such cases, tests must be conducted.

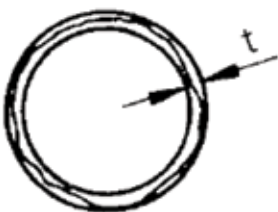


$$W_{min.} = f_{min.} \times d_1$$

Base Material of the Installation				
ETG-100 / 44SMn28 AISI 1144	EN 1563: GJS-600-3 ASTM A536: 80-60-03	AISI 303 EN 1.4305 X8CrNiS18-9	EN 1563: GJS-450-10 ASTM A536: 65-45-12	AlCu4Mg1 / EN AW-2024-T3 AA: 2024 T4/T6
Factor, $f_{min}$				
0.4	0.5	0.5	0.8	0.5

## ROUNDNESS TOLERANCE

To ensure reliable functioning of the KOENIG CHECK VALVE® with regard to pressure performance and to ensure leak tight sealing, a roundness tolerance of  $t = 0.05 \text{ mm}$  must be held. By using a double-lipped twist drill, the called out hole and roundness tolerances are reached. Better tolerances, particularly for larger diameter holes, can be held by using a triple-lipped twist drill.



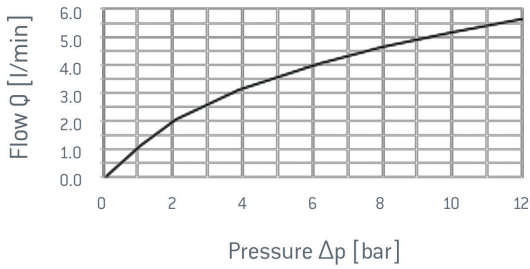
## CONICITY OF THE BORE

Within the effective anchorage area of the KOENIG CHECK VALVE®, the bore must be in accordance with the dimensional sheets. The bore lead in can be chamfered up to a depth of  $0.25 \times d_1$  [check valve diameter] because this area has no significant effect on the anchorage function.

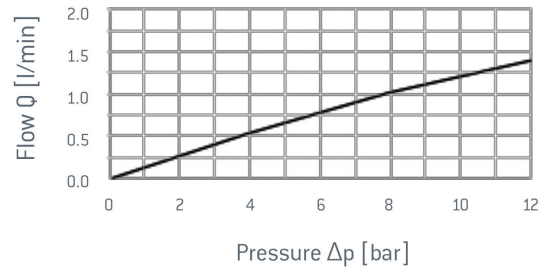
# TECHNICAL INFORMATION FOR KOENIG CHECK VALVE®

## FLOW CURVES

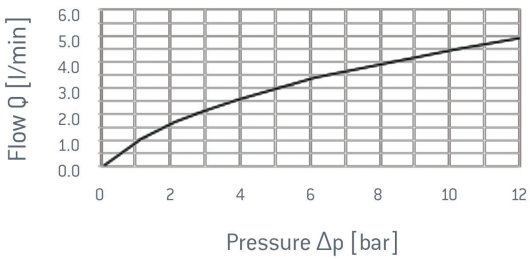
**CHECK VALVE FLOW CURVE - UNSCREENED**  
BFAA055U014; T=50°C; Hydraulic Oil HLP46



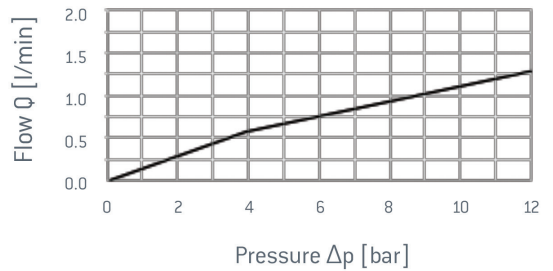
**CHECK VALVE FLOW CURVE - SCREENED**  
BFAA055S014; T=50°C; Hydraulic Oil HLP46



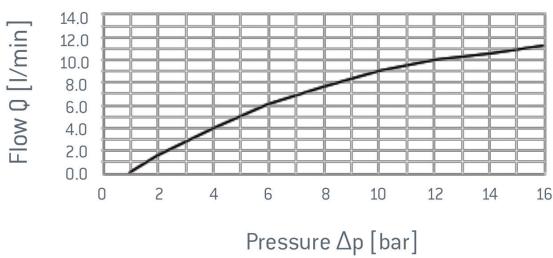
**CHECK VALVE FLOW CURVE - UNSCREENED**  
BRAA055U014; T=50°C; Hydraulic Oil HLP46



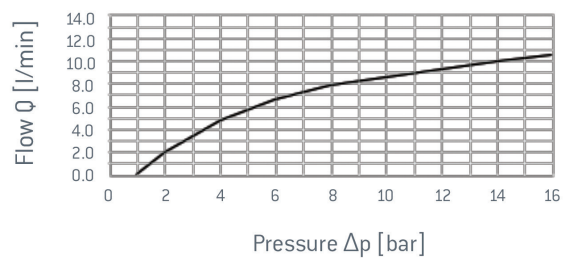
**CHECK VALVE FLOW CURVE - SCREENED**  
BRAA055S014; T=50°C; Hydraulic Oil HLP46



**CHECK VALVE FLOW CURVE - UNSCREENED**  
BF660080024100; T=50°C; Hydraulic Oil HLP46



**CHECK VALVE FLOW CURVE - UNSCREENED**  
BR660080024100; T=50°C; Hydraulic Oil HLP46





# TECHNICAL INFORMATION KOENIG RESTRICTOR®

SFC KOENIG provides several restrictor options for different application requirements, and customers can select the restrictor's orifice size. This allows you to have complete design control – CV expansion and threaded restrictors are custom-made to meet your orifice performance requirements. As with any component in your system design, there are many technical factors to consider. This is one method for calculating orifice diameter for the SFC KOENIG restrictor products.

- This equation was derived by rearranging Bernoulli's Equation and using a Coefficient of Discharge (CD).
- The Coefficient of Discharge (CD) accounts for pressure losses resulting from factors such as orifice geometry, turbulence near the orifice hole, the length of the orifice hole, and flow dynamics.
- This equation for calculating the restrictor orifice diameters should be used as reference only. SFC KOENIG recommends that you perform testing in the actual application environment to determine the flow constant.
- This equation is intended as a guide for fluid applications only; it is not applicable for gas flow applications.

## Metric

To calculate restrictor orifice diameter in mm:

$$d_{\text{orifice}} \approx \sqrt{2.144 \times Q \left( \sqrt{\frac{SG}{\Delta p}} \right)}$$

To calculate restrictor flow rate in mm:

$$Q \approx \frac{d_{\text{orifice}}^2}{2.144 \times \sqrt{\frac{SG}{\Delta p}}}$$

Where:

- $d_{\text{orifice}}$  > Orifice diameter, measured in mm
- $Q$  > Fluid flow rate, measured in liters/minute
- $\Delta p$  > Fluid pressure difference across the restrictor, measured in bar
- $SG$  > Specific gravity of the fluid
- 2.144 > Constant = Unit conversion factor x CD

**Please visit our web site for a more precise flow calculator formula**

## Metric

To calculate orifice length in mm:

$$L = (\emptyset \times 0.207) + t$$

$L$  = length of orifice (mm)

$\emptyset$  = orifice diameter (mm)

$t$  = see chart to right

Tolerance: +/- [( $\emptyset \times 0.021$ ) + 0.13] mm

RE Size	t (mm)
4 mm	0.67
5 mm	0.76
6 mm	0.97
7 mm	0.89
8 mm	0.81
9 mm	1.14
10 mm	1.14

# HARDNESS CONVERSION TABLE

For Hardening Carbon and Low Alloy Steel

Tensile Strength 2) N/mm <sup>2</sup>	Vickers Hardness (F ≥ 98 n)	Brinell Hardness 1) $\left(0.102 \cdot \frac{F}{D^2} = 30 \frac{N}{mm^2}\right)$	Rockwell Hardness		
			HRB	HRC	HRA
255	80	76.0			
270	85	80.7	41.0		
285	90	85.5	48.0		
305	95	90.2	52.0		
320	100	95.0	56.2		
335	105	99.8			
350	110	105	62.3		
370	115	109			
385	120	114	66.7		
400	125	119			
415	130	124	71.2		
430	135	128			
450	140	133	75.0		
465	145	138			
480	150	143	78.7		
495	155	147			
510	160	152	81.7		
530	165	156			
545	170	162	85.0		
560	175	166			
575	180	171	87.1		
595	185	176			
610	190	181	89.5		
625	195	185			
640	200	190	91.5		
660	205	195	92.5		
675	210	199	93.5		
690	215	204	94.0		
705	220	209	95.0		
720	225	214	96.0		
740	230	219	96.7		
755	235	223			
770	240	228	98.1	20.3	60.7
785	245	233		21.3	61.2
800	250	238	99.5	22.2	61.6
820	255	242		23.1	62.0
835	260	247	[101]	24.0	62.4
850	265	252		24.8	62.7
865	270	257	[102]	25.6	63.1
880	275	261		26.4	63.5
900	280	268	[104]	27.1	63.8
915	285	271	[105]	27.8	64.2
930	290	276		28.5	64.5
950	295	280		29.2	64.8
965	300	285		29.8	65.2
995	310	295		31.0	65.8
1030	320	304		32.2	66.4
1060	330	314		33.3	67.0
1095	340	323		34.3	67.6
1125	350	333		35.5	68.1

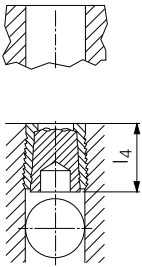
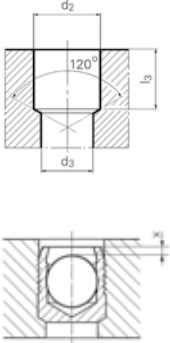
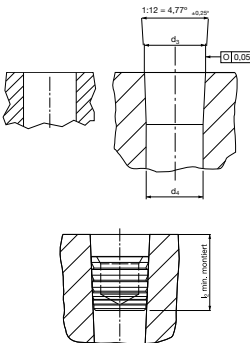
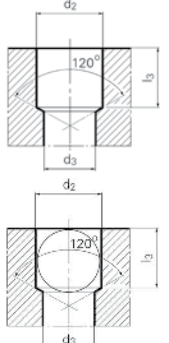
Tensile Strength 2) N/mm <sup>2</sup>	Vickers Hardness (F ≥ 98 n)	Brinell Hardness 1) $\left(0.102 \cdot \frac{F}{D^2} = 30 \frac{N}{mm^2}\right)$	Rockwell Hardness		
			HRB	HRC	HRA
1155	360	342		36.6	68.7
1190	370	352		37.7	69.2
1220	380	361		38.8	69.8
1255	390	371		39.8	70.3
1290	400	380		40.8	70.8
1320	410	390		41.8	71.4
1350	420	399		42.7	71.8
1385	430	409		43.6	72.3
1420	440	418		44.5	72.8
1455	450	428		45.3	73.3
1485	460	437		46.1	73.6
1520	470	447		46.9	74.1
1555	480	[456]		47.7	74.5
1595	490	[466]		48.4	74.9
1630	500	[475]		49.1	75.3
1665	510	[485]		49.8	75.7
1700	520	[494]		50.5	76.1
1740	530	[504]		51.1	76.4
1775	540	[513]		51.7	76.7
1810	550	[523]		52.3	77.0
1845	560	[532]		53.0	77.4
1880	570	[542]		53.6	77.8
1920	580	[551]		54.1	78.0
1955	590	[561]		54.7	78.4
1995	600	[570]		55.2	78.6
2030	610	[580]		55.7	78.9
2070	620	[589]		56.3	79.2
2105	630	[599]		56.8	79.5
2145	640	[608]		57.3	79.8
2180	650	[618]		57.8	80.0
	660			58.3	80.3
	670			58.8	80.6
	680			59.2	80.8
	690			59.7	81.1
	700			60.1	81.3
	720			61.0	81.8
	740			61.8	82.2
	760			62.5	82.6
	780			63.3	83.0
	800			64.0	83.4
	820			64.7	83.8
	840			65.3	84.1
	860			65.9	84.4
	880			66.4	84.7
	900			67.0	85.0
	920			67.5	85.3
	940			68.0	85.6

Numbers in parentheses indicate hardness values, which are outside the definition area of the standard hardness test, but often used as approximate values. The Brinell values in parenthesis are only used when measured with a hard metal ball.

1) Calculated as: HB = 0.95 x HV


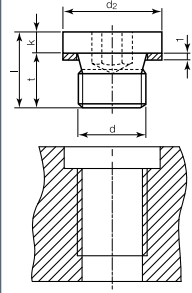
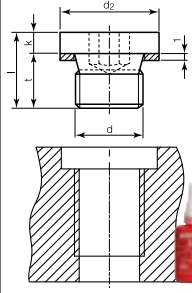
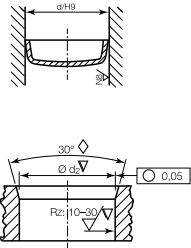
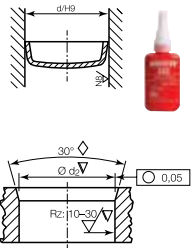
2) The tensile strength values shown in the table are only to be used as approximate values. To get the exact tensile strength values a tensile test must be performed.

# SFC KOENIG EXPANDER® SYSTEMS / PRODUCT COMPARISON

SFC KOENIG EXPANDER® SYSTEMS / PRODUCT COMPARISON				
Type of Sealing Element	Expander Series SK/LK	Expander Series MB/CV	Expander Series LP	Ball
<b>Operations</b>				
Bore	■	■	■	■
Bore (step)	□	■	□	□
Chamfering	□	□	□	■
Face Milling	□	□	□	(■ <sup>3)</sup> )
Reaming	□	□	□	■
Tapping	□	□	□	□
Cleaning	■	■	■	■
Placing Sealant on Screw	□	□	□	□
Positioning of Element	■ By Setting Tool	■ Put Into Bore	■ By Setting Tool	■
Setting of Sealing Element	■ By Pulling the Mandrel	■ By Setting Tool	■ By Setting Tool	■ By Setting Tool
Cramping	□	□	□	■
Torque Check (in line)	□	□	□	□
Insertion-Control	(■ <sup>2)</sup> )	(■ <sup>2)</sup> )	(■ <sup>2)</sup> )	(■ <sup>2)</sup> )
Pressure Test	□ Upon Request Only	□ Upon Request Only	□ Upon Request Only	■
Total No. of Operation	<b>4</b> (5)	<b>5</b> (6)	<b>4</b> (5)	<b>8</b> (10)
Warranty by Supplier	Provided	Provided	Provided	None
Expander Diameter Available	4 – 12/4 – 20 mm	3 – 22/4 – 18 mm	4.4 – 12.7 mm	

<sup>1)</sup> = Without Bore Applicable as Well    <sup>2)</sup> = Optional Control Unit    <sup>3)</sup> = In Dependence on Assembly    □ = Unnecessary    ■ = Necessary

# SFC KOENIG EXPANDER® SYSTEMS / PRODUCT COMPARISON

SFC KOENIG EXPANDER® SYSTEMS / PRODUCT COMPARISON					
	Set Screw	Screwed Sealing Plug (metallic sealing)	Screwed Plug with Sealant (e.g. Loctite)	DIN Plug	DIN Plug
<b>Operations</b>					
Bore	■	■	■	■	■
Bore (step)	□	■	■	□	□
Chamfering	■	■	■	■	■
Face Milling	□	□	□	(■ <sup>3)</sup> )	(■ <sup>3)</sup> )
Reaming	□	□	□	■	■
Tapping	■	■	■	□	□
Cleaning	■	■	■	■	■
Placing Sealant on Screw	■	□	■	□	■
Positioning of Element	■	■	■	■ By Setting Tool	■ By Setting Tool
Setting of Sealing Element	■	■	■	■ By Pressing In	■ By Pressing In
Cramping	□	□	□	□	□
Torque Check (in line)	■	■ <sup>2)</sup>	■ <sup>2)</sup>	□	□
Insertion-Control	□	□	□	(■ <sup>2)</sup> )	(■ <sup>2)</sup> )
Pressure Test	■	■	■	■ Upon Request Only	■ Upon Request Only
Total No. of Operation	9	9	10	7 [9]	8 [10]
Warranty by Supplier	None	None	None	None	None

<sup>1)</sup> = Without Bore Applicable as Well    <sup>2)</sup> = Optional Control Unit    <sup>3)</sup> = In Dependence on Assembly    □ = Unnecessary    ■ = Necessary

# QUALITY ASSURANCE



At SFC KOENIG quality is our highest priority. Our components meet customers' ever-increasing demands for performance, reliability and safety with efficient and integrated quality and reward management. As the market leader in the area of high-quality sealing technology, our customers predominantly include OEMs and suppliers in the automobile and industrial hydraulics sector. SFC KOENIG is certified according to IATF 16949 and ISO 14001 and delivers "Total Quality Management" to our customers through:

### Clear specifications

in cooperation with our suppliers.

### Precise instructions and work processes

for all staff.

### Rules

for testing.

### Process control

in production and installation.

### Quality monitoring

using statistical techniques such as SPC, control charts, etc.

### Design control

in development, planning and change management.

### Staff training

by regular internal auditing and implementation of quality circles.

### Important:

All KOENIG EXPANDER®, KOENIG RESTRICTOR® and KOENIG CHECK VALVE® products are identified by batch numbers (production serial number) on the package label. This batch number ensures traceability of all quality-related characteristics of production and procurement.

<b>KOENIG EXPANDER®</b>		
LK 600-080		 <b>8,0 MM</b>
<b>300162299</b>	300162299	SWISS MADE
		
	Batch <b>1000583754</b>	 Anzahl <b>1000</b>
HÜLSE: NICHTRÖST STAHL 1.4305 DOUILLE: ACIER INOX 1.4305 STIFT: NICHTRÖST STAHL 1.4542 MANDRIN: ACIER INOX 1.4542		 <b>49/17</b>
SFC Koenig AG is certified: ISO/TS 16949 ISO 14001		<b>SFC-KOENIG</b> Leader in Sealing & Flow Control Technology
KD.ART.NR:		







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**KOENIG EXPANDER®**

**KOENIG CHECK VALVE®**

**KOENIG RESTRICTOR®**



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