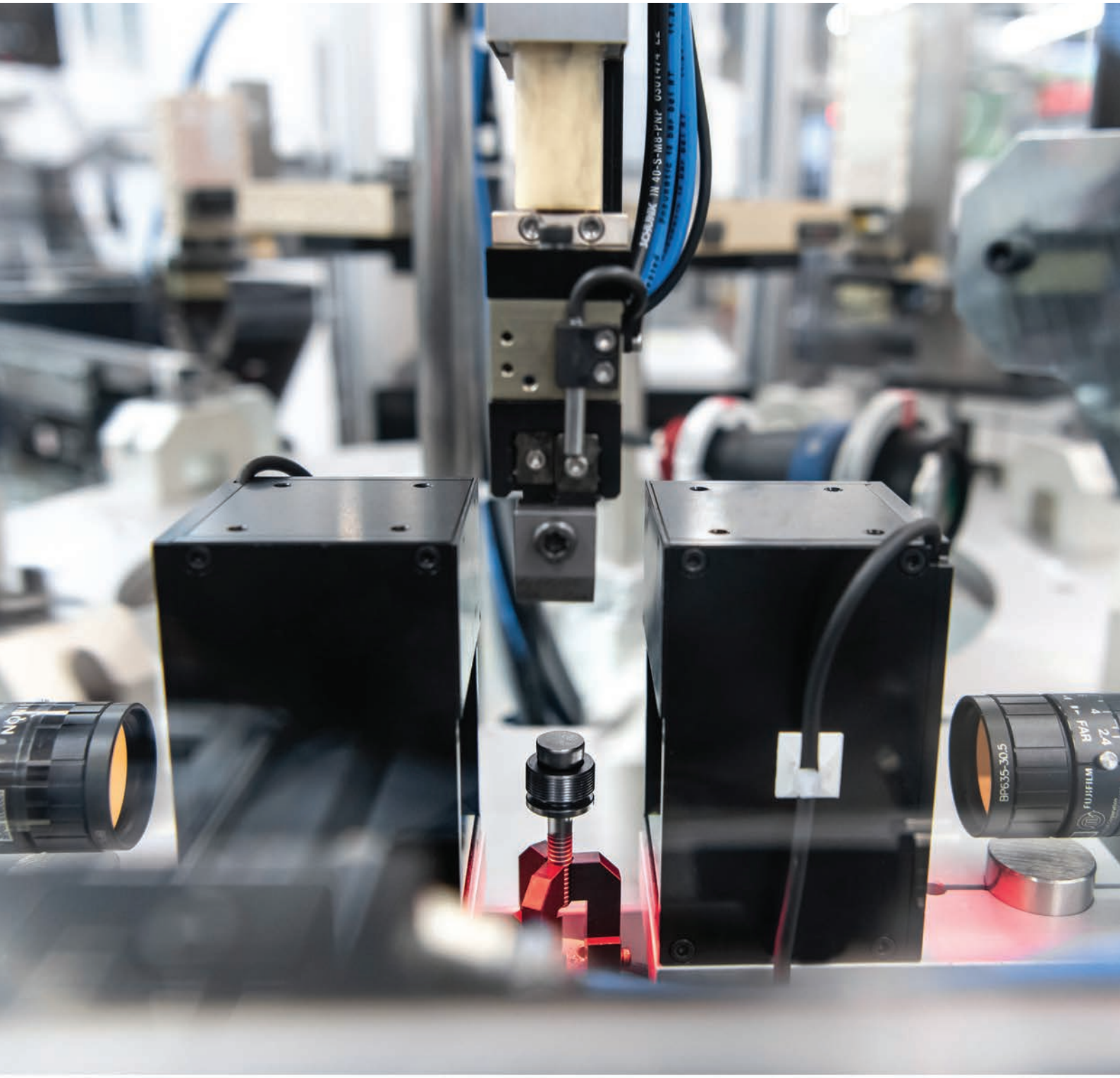
SFC KOENIG

Leader in
Sealing & Flow Control
Technology





KOENIG CHECK VALVE®



KOENIG EXPANDER®



KOENIG RESTRICTOR®

SFC-KOENIG

The World's Leading Sealing & Flow Control Technology

With over 5 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 95 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.

As a member of the IDEX family of companies, everyone at SFC KOENIG is dedicated to continual improvement and an in-depth understanding of our customers' needs; consistently providing products and services that meet or exceed expectations. We are committed to the responsible use of resources and protecting our environment. We work constructively to ensure a healthy, safe, and rewarding workplace for all our associates, and we believe in making a positive impact on the communities where we work and live.

CONTENT

ABOUT US 4
INNOVATIONS 5
HISTORY 6-7
APPLICATIONS 8-13
AUTOMATION 14
QUALITY ASSURANCE 15
DISTRIBUTORS 16
SUSTAINABILITY 17

18-37

PUSH TYPE EXPANDERS

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 18-37

- 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



38-47

PULL TYPE EXPANDERS

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 / SKC 38-43

- Sealing plugs for operating pressures up to 500 bar / 7200 psi
- Liberal manufacturing tolerance 0 / + 0.12mm
- Available with long mandrel for deeper setting



SERIES LK 44-47

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



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48-59

FLOW CONTROL

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 48-55

- Forward-flow and reverse-flow types available
- Pressure rated up to 280 bar / 4060 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 56-59

- 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



60-94

CUSTOM ENGINEERED SOLUTIONS 60-61

SETTING TOOL EQUIPMENT 62-69

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
- EXTOOLS 030, 040-1, 040-2 and 050 - Hydropneumatic Hand Tools
- EXTOOL B-010 - Battery Hand Tool



TECHNICAL INFORMATION 70-94

WE ARE A LEADING SOLUTION PROVIDER OF SEALING AND FLOW CONTROL TECHNOLOGY

Advanced Solutions from the Leader in Sealing and Flow Control

SFC KOENIG delivers the results others simply cannot, from design through manufacturing and process integration. In addition to our versatile standard products, we regularly develop solutions for unique requirements. Our skilled team are experts in automotive, hydraulic, aerospace and a wide variety of applications, and we closely collaborate with customers to custom engineer components that meet their needs.

Support and Expertise

Our commitment to innovation is enhanced by collaborative partnerships with leading OEMs, suppliers, research and development teams and universities. With an expert understanding of metal and composite specifications, SFC KOENIG is committed to manufacturing products that meet the demands of new materials, new designs and new regulations.

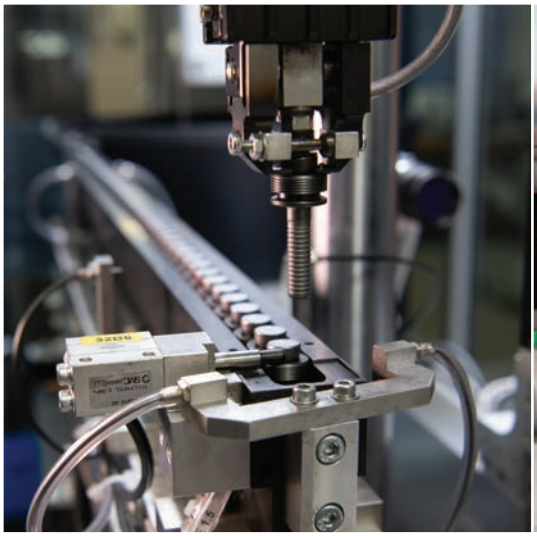
Globally Recognized Quality and Compliance

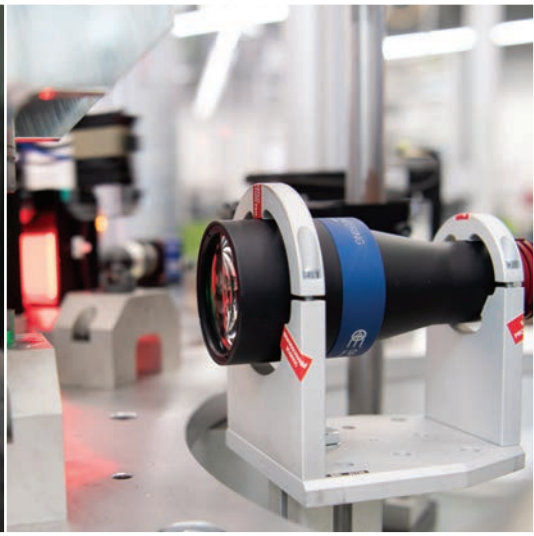
From first concept through final installation, SFC KOENIG processes are built to improve performance, eliminate risk and increase profitability. With Agile project management, using both Scrum and Kanban strategies, as well as FEM (finite element method) simulations, we optimize our efforts to achieve efficiency and compliance at every step. Our strict quality management processes and process controls, including FMEA (failure mode & effects analysis) testing, ensure we deliver parts on time and at the highest standard.

Our Commitment

As a global manufacturing leader, we strive to reduce our environmental impact and improve the health and lives of our customers, employees and communities. Together we can help keep our planet and its people healthy and thriving.







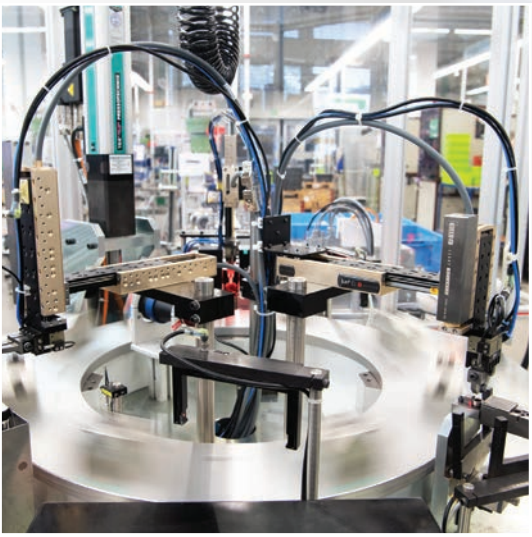
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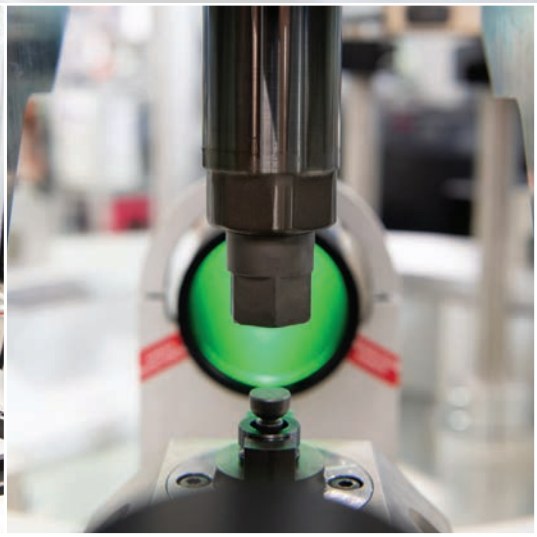
KOENIG EXPANDER - ALUMINUM®

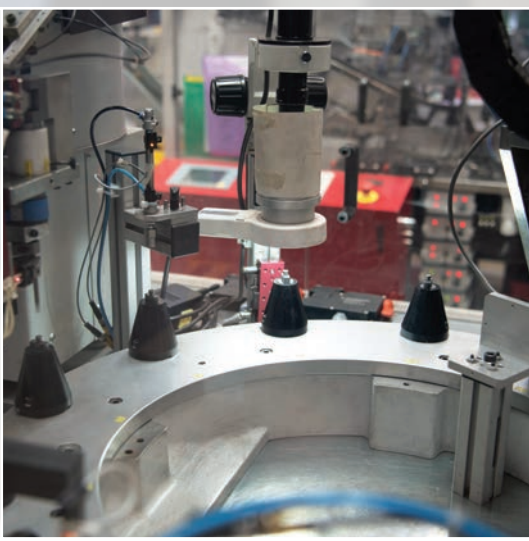
To create more corrosion-resistant products for electro mobility, SFC KOENIG has developed the first all-aluminum Pull Expander product on the market.

KOENIG EXPANDER - LEAD FREE®

Our new MB product family, which uses lead free materials and low installation forces for thin wall aluminum applications for EDU markets.







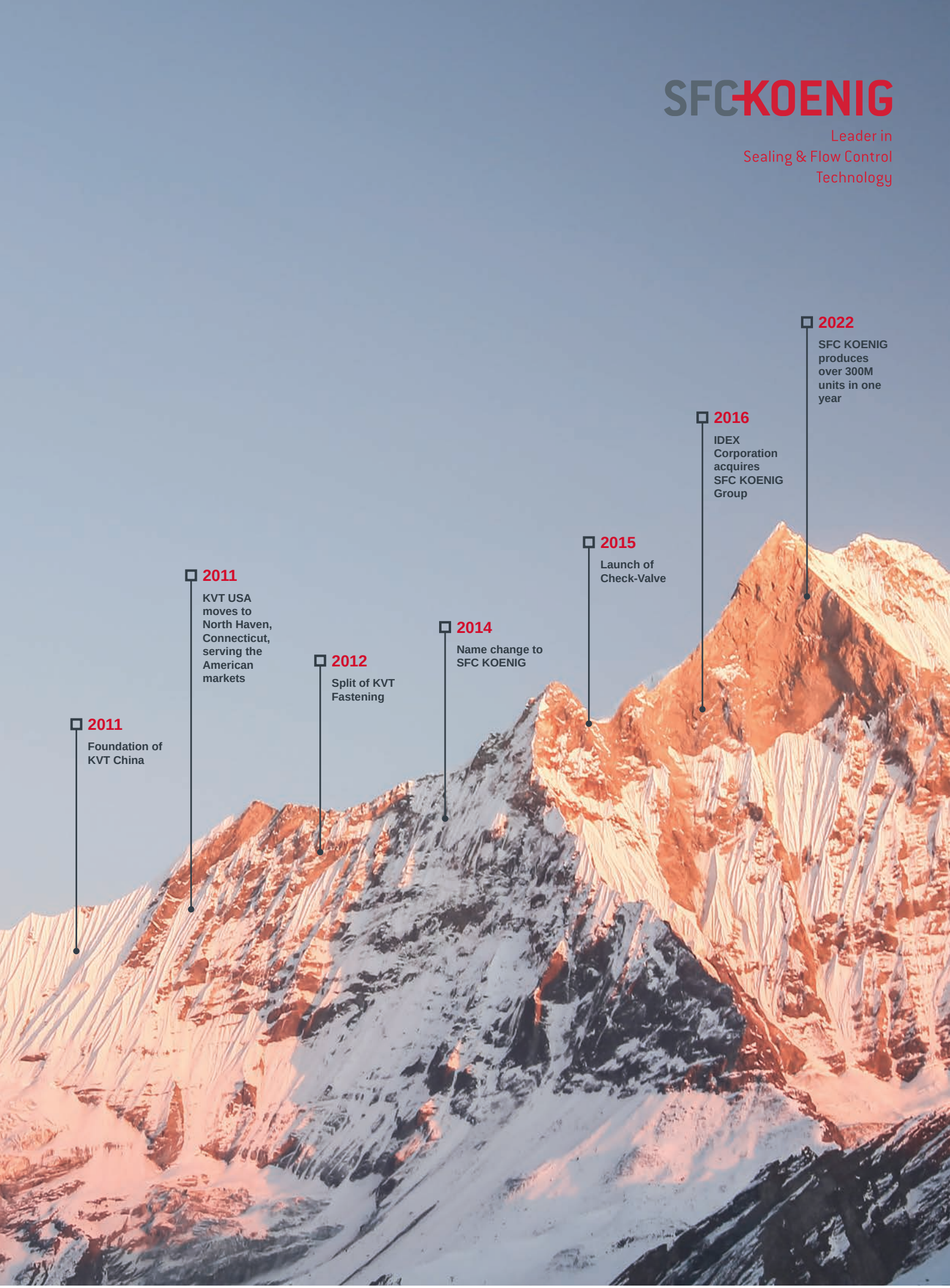
HISTORY



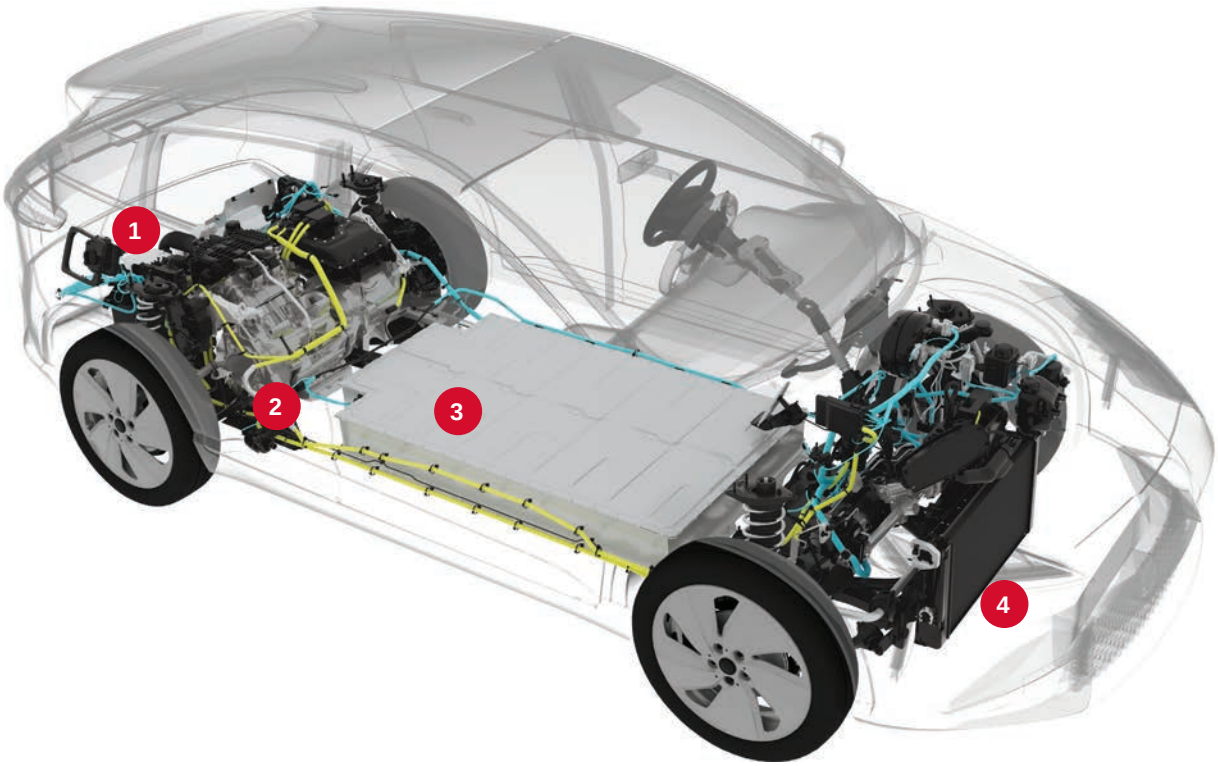
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SFC KOENIG

Leader in
Sealing & Flow Control
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ELECTRIC VEHICLES



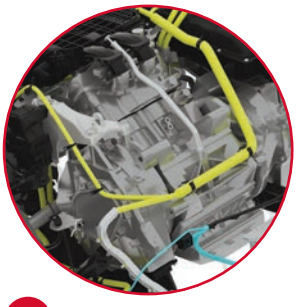
Application Examples



1

KOENIG EXPANDER®

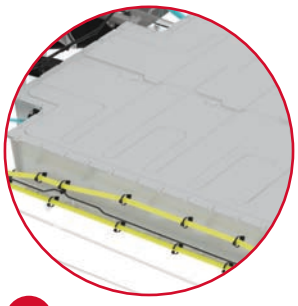
Push Type MB used to Prevent Access in Battery Pack and Motor Housing Covers and Safety Systems



2

KOENIG RESTRICTOR®

Used in Suspension System Hydraulics, Hybrid Transmissions, Water Pumps, and Integrated Electric Drive Units



3

KOENIG EXPANDER®

Pull Type LK used in Power Inverters, Gearboxes, Vacuum Pumps, and Motors



4

KOENIG CHECK VALVE®

Used to Control Fluids in Cooling Systems, Oil Pumps, Braking Systems, and Steering Systems



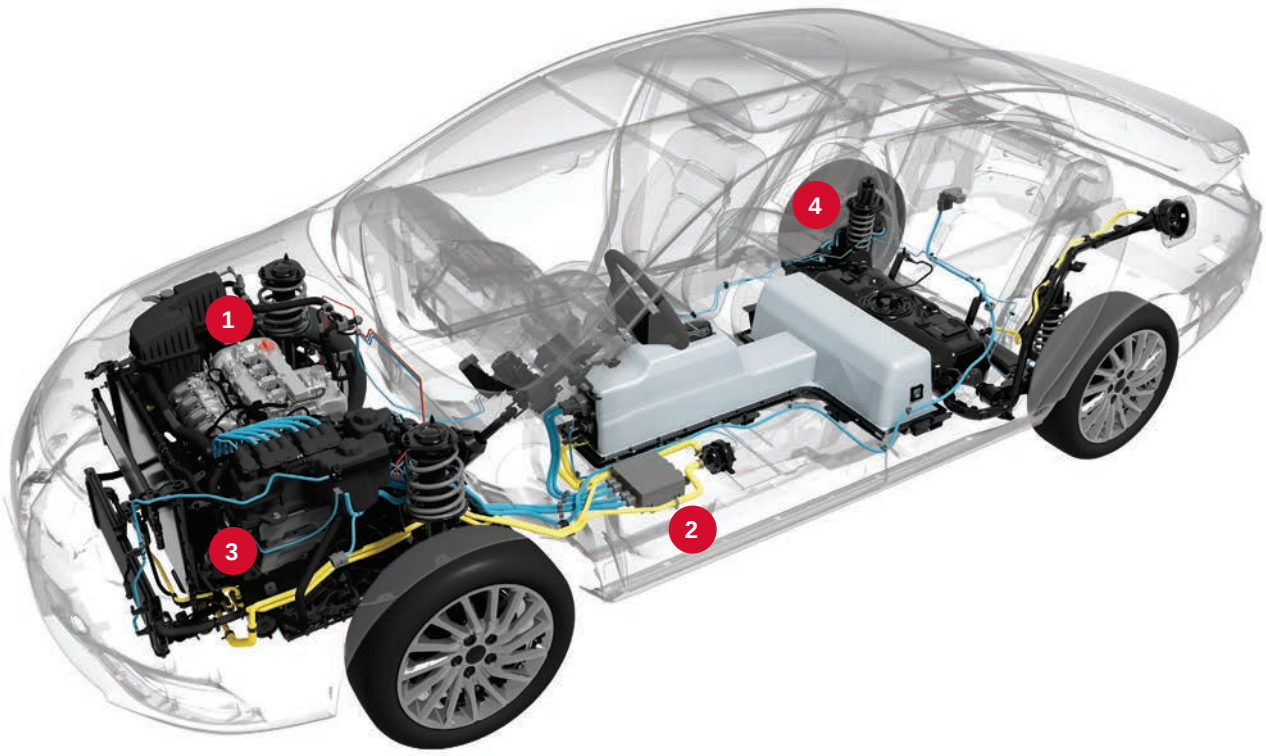






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HYBRID VEHICLES



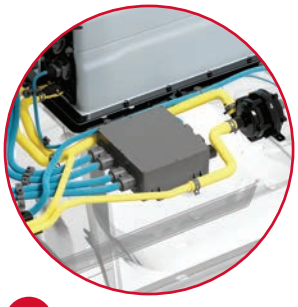
Application Examples



1

KOENIG EXPANDER®

Push Type MB used in Braking Calipers, Disc Brakes, Motor Housings, and to Secure Multiple Access Points



2

KOENIG RESTRICTOR®

Used to Control Fluid in Hydrogen Storage Systems, Hybrid Transmissions, and Inverters



3

KOENIG EXPANDER®

Pull Type LK used in Engine Gearboxes, Water Pumps, Turbochargers, Crankshafts, and Axles



4

KOENIG CHECK VALVE®

Used in Fuel Systems, Braking Systems, Vacuum Pumps, Emissions Systems, and Suspensions

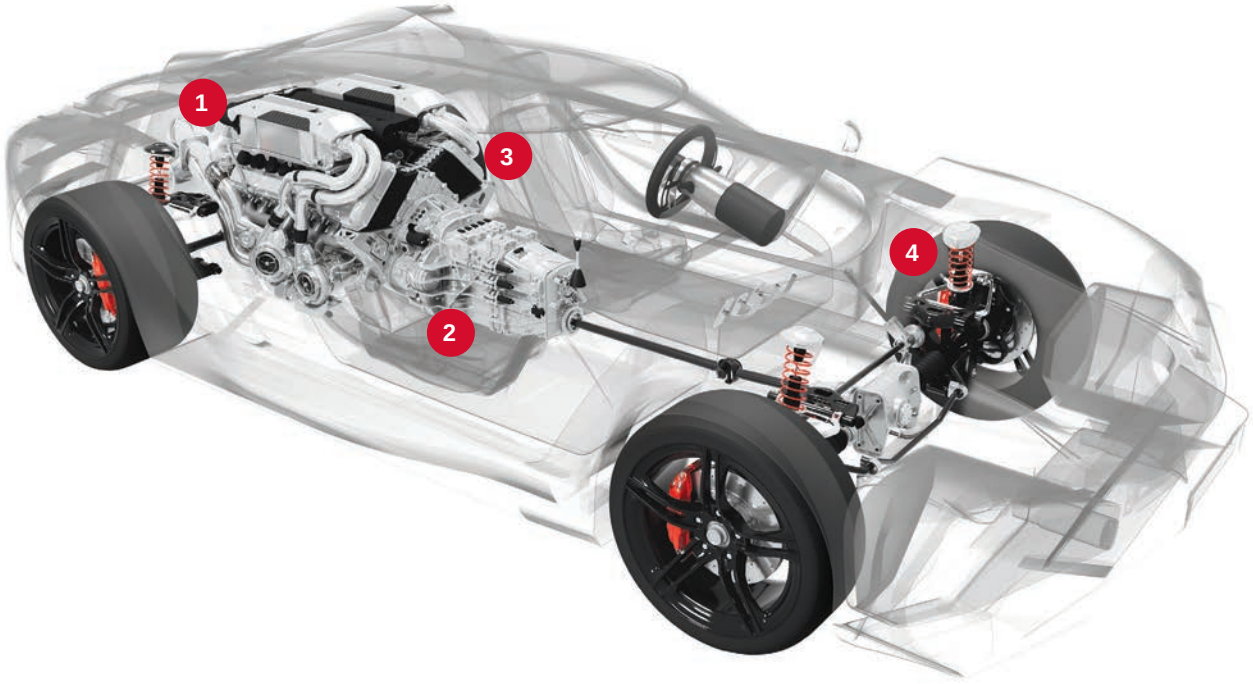








COMBUSTION VEHICLES



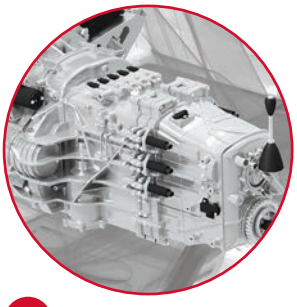
Application Examples



1

KOENIG EXPANDER®

Push Type MB
used in Fuel Injectors, Vacuum Pumps, and Engine Body Covers



2

KOENIG RESTRICTOR®

Used in Automatic Transmissions, Crankshafts, and Lubrication Systems



3

KOENIG EXPANDER®

Push Type LK used in Engine Covers and Crankshafts, Transmission Cases, Turbocharger Systems, and Cylinder Heads



4

KOENIG CHECK VALVE®

Used in Braking Systems and Calipers, Oil Pumps, Steering Systems, and Suspension Systems









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AEROSPACE



Application Examples



1

KOENIG EXPANDER®

Push Type MB used in Landing Gear, Hydraulic Reactor Jacks, and Braking Systems



2

KOENIG RESTRICTOR®

Used in Hydraulic Valves, Pumps, Air Bleeds, Flight Control Systems,and Propeller Controls



3

KOENIG EXPANDER®

Pull Type LK used in Engines, Fuel Manifold Systems, Power Transfer Units, and Thrust Reverser Actuators



4

KOENIG CHECK VALVE®

Used in Air Conditioning and Cooling Systems, Filter Modules, and High Pressure Pumps

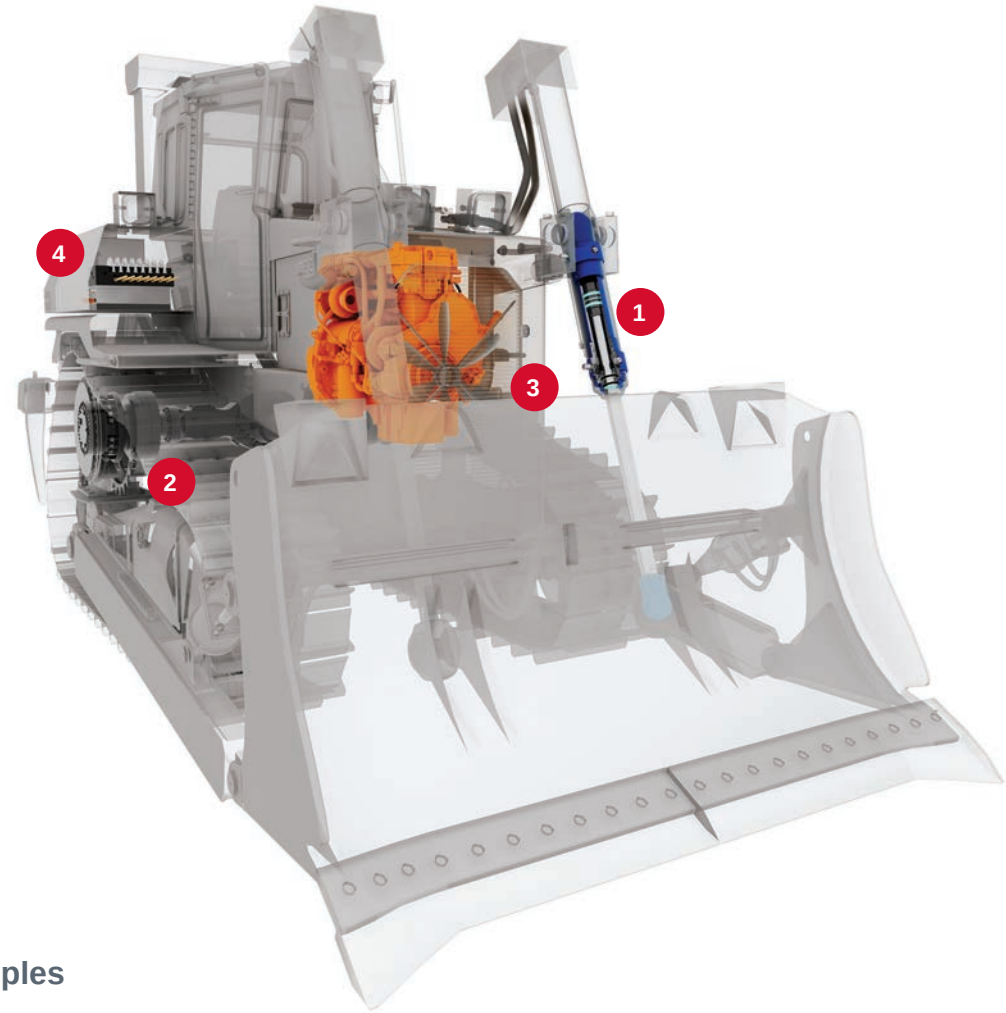








FLUID POWER



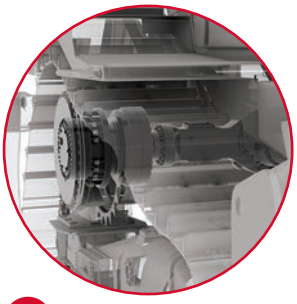
Application Examples



1

KOENIG EXPANDER®

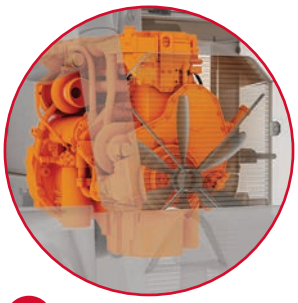
Push Types MB/CV & Pull Type SK/SKC used in Hydraulic Manifolds, Cylinders, Pumps, and Control Valves



2

KOENIG RESTRICTOR®

Used in Axles, Transmissions, Fuel Injection Systems, and Hydraulic Manifolds



3

KOENIG EXPANDER®

Pull Type LK used in Engine Blocks, Water Pumps, and Drivetrains



4

KOENIG CHECK VALVE®

Used in Hydraulic Manifolds, Oil and Vacuum Pumps, Hydraulic Cylinders, and Hydraulic Brake Systems



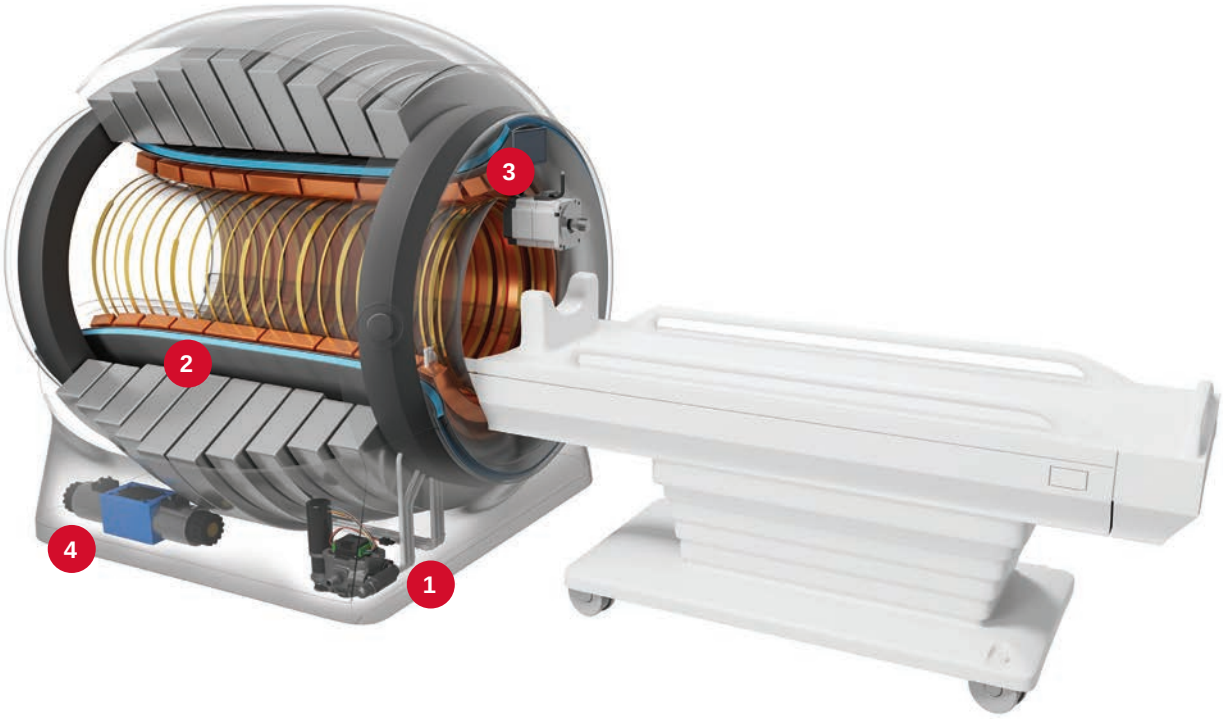






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MEDICAL



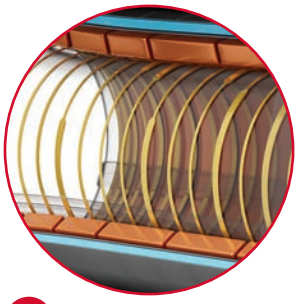
Application Examples



1

KOENIG EXPANDER®

Push Type MB used in Positive Displacement Pumps and to Seal Critical Access Points



2

KOENIG RESTRICTOR®

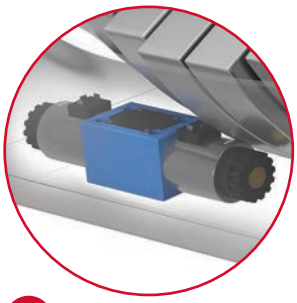
Used in Image Positioning System Hydraulics for Fluid Flow Control, and in Oxygen Regulators



3

KOENIG EXPANDER®

Pull Type LK used in Drive Control Power Transfer Systems, Hydraulic Manifolds, and Heating Elements



4

KOENIG CHECK VALVE®

Used in Multiple Hydraulic Systems and Cylinders for Rotation and Positioning









SYSTEMS AND AUTOMATION SOLUTIONS

At SFC KOENIG, we understand that engineering a successful sealing and flow control system not only requires the right products, but also the correct assembly and installation procedures. With advanced technologies and expertise, we help OEMs and tier suppliers integrate our parts into their operations, improving efficiency and consistency while lowering total costs.

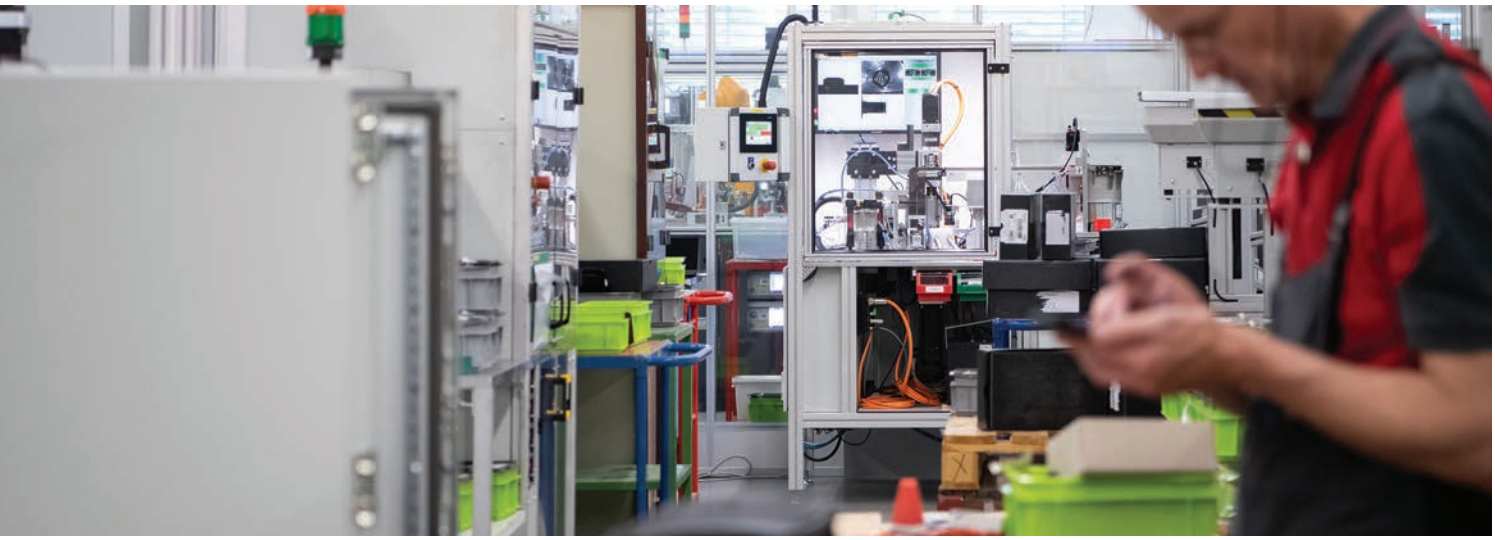
We support customers throughout the entire project – from planning, design and product selection, through process development and implementation. SFC KOENIG installation equipment, such as presses and hydraulic tools, combined with our product feeding, process control monitoring and production automation capabilities, allow us to deliver a customized solution for your operation.

Collaborative Automation Partnerships

In cooperation with HONSEL®, our tools and automation solutions partner since 2007, SFC KOENIG offers single-head workstations as well as fully-controlled assembly equipment. Our team will review your existing production environment, advise on the appropriate assembly equipment, and partner with your team to build an optimal solution. Based on your needs we can develop systems for both automated and manual assembly lines, customizing the direction, type and number of assembly heads and tools. Built-in diagnostics control the process for reliable and consistent product quality, and support real-time monitoring and control via IoT devices.

Designed to Improve Results

SFC KOENIG systems and automation solutions increase throughput and help ensure that products are installed accurately and consistently, eliminating errors and potential risks. With strictly-managed installation procedures, high process speed capabilities and PLC monitoring, our high-quality systems are ready to be integrated into your production environment.



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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 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.





















100%

Quality Inspection

> 5 Billion

Pieces Installed – in-field failure rates <1 PPM

Our Commitment

to quality, the environment and our customers is reflected in our compliance to a range of certification standards

- IATF 16949
- ISO 9001
- ISO 14001

SFC KOENIG DISTRIBUTOR LIST

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SUSTAINABILITY

We are on the road to net zero emissions by 2030.

We are developing sustainable products using green steel and lead-free material.

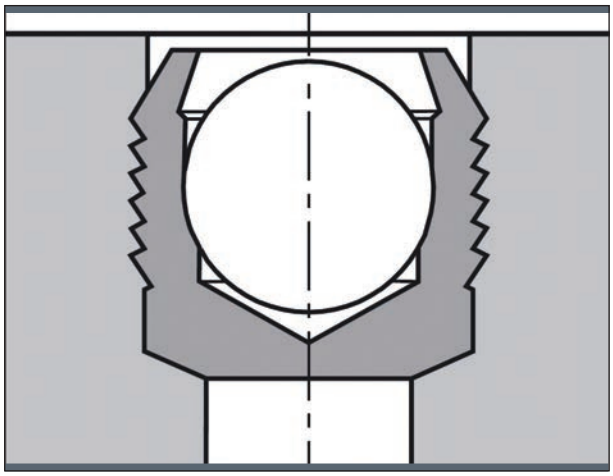


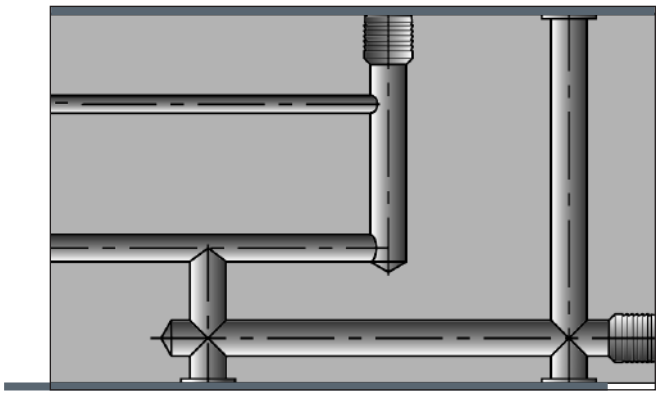
KOENIG EXPANDER®

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 Ø 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/CV

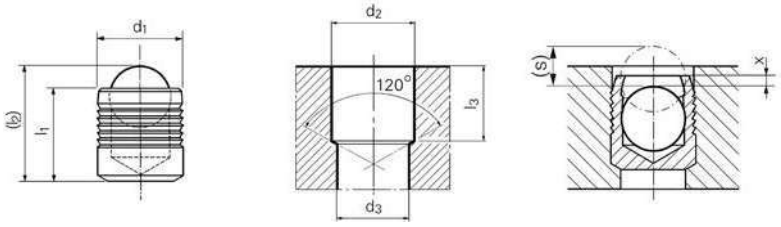
EXPRESS 3000	Hydropneumatic Table Press	See page 64 for more information
EXPRESS 5000	Hydropneumatic Table Press	See page 64 for more information

KOENIG EXPANDER® SEALING PLUGS
Series MB 600
Sleeve Passivated per ASTM A967M-17



Material:
Sleeve: Stainless Steel 1.4305
Ball: Bearing Steel 1.4301

Important:
See installation instructions on pages 78–79
Installation requirements on page 73



Part Number	d_1	l_1	(l_2) ~ Ref.	d_2 +0.1 0	d_3 max	l_3 min.	x ±0.2	(s) ~ Ref.	Packaging Unit*	Weight in gram/pcs.
MB 600-030	3.0	3.6	4.6	3.0	2.2	3.4	0.4	1.2	1000	0.17
MB 600-040	4.0	4.0	5.1	4.0	3.3	3.8	0.2	1.5	1000	0.34
MB 600-050	5.0	5.5	7.1	5.0	4.3	5.3	0.4	2.0	1000	0.68
MB 600-060	6.0	6.5	8.6	6.0	5.3	6.3	0.4	2.5	500	1.18
MB 600-070	7.0	7.5	10.1	7.0	6.4	7.3	0.4	3.0	250	1.91
MB 600-080	8.0	8.5	11.6	8.0	7.4	8.3	0.3	3.5	250	2.86
MB 600-090	9.0	10.0	13.5	9.0	8.4	9.8	0.4	4.0	250	4.02
MB 600-100	10.0	11.0	15.1	10.0	9.4	10.8	0.4	4.5	250	5.50
MB 600-120	12.0	13.0	17.8	12.0	10.6	12.8	0.4	5.5	100	9.37
MB 600-140	14.0	15.0	20.5	14.0	12.7	14.5	0.4	6.35	100	14.81

Dimensions in millimeters
**Standard pack quantities may vary by sales organization*

PRESSURE PERFORMANCE

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

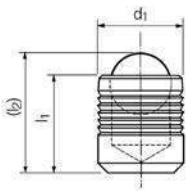
Proof Pressure Test - Ⓑ
Max. Allowable Working Pressure = Nominal Pressure

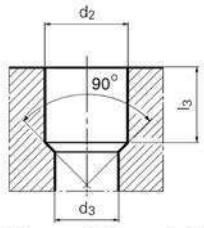
**SFC KOENIG's North American Engineering Department utilizes 2024-T4/T6 as a test base material.*

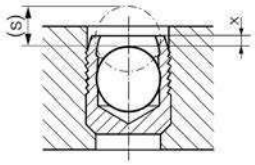
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KOENIG EXPANDER® SEALING PLUGS
Series MB 600 Inch
Sleeve Passivated per ASTM A967M-17







Toleranzen / *Tolérances* d_2 : MB 600-093A = $^{+0,002}_{0}$
MB 600-125A bis/à MB 600-281A = $^{+0,004}_{0}$

Material:
Sleeve: Stainless Steel 1.4305
Ball: Stainless Steel 1.4301 (1.4034 MB 600-093)

Important:
See installation instructions on pages 78–79
Installation requirements on page 73

Part Number	d_1	l_1	(l_2) ~ Ref.	d_2	d_3 max	l_3 min.	x 0 -0.012	(s) ~ Ref.	Packaging Unit*	Weight in gram/pcs.
MB600-093A	0.093	0.100	0.120	0.0937	0.062	0.095	0.012	0.031	1000	0.07
MB600-125A	0.125	0.138	0.172	0.1250	0.093	0.125	0.012	0.047	1000	0.17
MB600-156A	0.156	0.150	0.196	0.1562	0.125	0.130	0.012	0.059	1000	0.31
MB600-187A	0.187	0.193	0.259	0.1875	0.156	0.152	0.012	0.079	500	0.53
MB600-218A	0.218	0.225	0.301	0.2187	0.187	0.187	0.012	0.094	500	0.86
MB600-250A	0.250	0.260	0.352	0.2500	0.218	0.212	0.012	0.109	500	1.26
MB600-281A	0.281	0.285	0.380	0.2812	0.250	0.250	0.012	0.118	500	1.87

Dimensions in inches
**Standard pack quantities may vary by sales organization*

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

PRESSURE PERFORMANCE

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

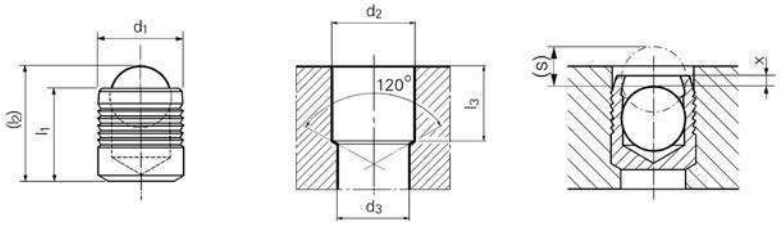
**SFC KOENIG's North American Engineering Department utilizes 2024-T4/T6 as a test base material.*

KOENIG EXPANDER® SEALING PLUGS
Series MB 700



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

Important:
See installation instructions on pages 78–79
Installation requirements on page 73



Part Number	d_1	l_1	(l_2) ~ Ref.	d_2 +0.1 0	d_3 max	l_3 min.	x ±0.2	(s) ~ Ref.	Packaging Unit*	Weight in gram/pcs.
MB 700-030	3.0	3.6	4.6	3.0	2.2	3.4	0.4	1.2	1000	0.17
MB 700-040	4.0	4.0	5.2	4.0	3.3	3.8	0.2	1.5	2000	0.34
MB 700-050	5.0	5.5	7.0	5.0	4.3	5.3	0.4	1.9	2000	0.68
MB 700-060	6.0	6.5	8.6	6.0	5.3	6.3	0.4	2.0	2000	1.17
MB 700-070	7.0	7.5	10.1	7.0	6.4	7.3	0.4	3.0	1000	1.90
MB 700-080	8.0	8.5	11.6	8.0	7.4	8.3	0.3	3.5	1000	2.84
MB 700-090	9.0	10.0	13.5	9.0	8.4	9.8	0.4	4.0	500	4.00
MB 700-100	10.0	11.0	15.1	10.0	9.4	10.8	0.4	4.5	500	5.47
MB 700-120	12.0	13.0	17.8	12.0	10.6	12.8	0.4	5.5	250	9.31
**MB 700-140	14.0	15.0	20.4	14.0	12.7	14.5	0.4	6.35	250	14.72
**MB 700-160	16.0	17.0	23.4	16.0	14.7	16.5	0.6	7.0	100	22.00
**MB 700-180	18.0	19.0	26.3	18.0	16.7	18.5	0.6	8.0	100	31.34
**MB 700-200	20.0	22.0	30.0	20.0	18.7	21.5	0.8	9.0	100	44.24
**MB 700-220	22.0	25.0	34.0	22.0	20.7	24.5	0.8	10.0	50	58.61

Dimensions in millimeters
**Standard pack quantities may vary by sales organization*

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

PRESSURE PERFORMANCE

Series MB 700 mm	① ETG-100 / 44SMn28 AISI 1144	② C15Pb / 1.0403 ~ SAE 1015 (10L15)	③ EN 1563: GJS-600-3 ASTM A536: 80-60-03	⑤ EN 1561: GJL-250 ASTM A48: NO.35	⑥ AlCu4Mg1 / EN AW-2024-T3 AA: 2024 T4/T6*	⑦ AlMgSiPb / EN AW-6012-T6 AA: 6012-T6	⑧ G-AlSi7Mg / EN-AC-42100 ASTM/UNS: A356
	Base Material of the Installation						
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**	

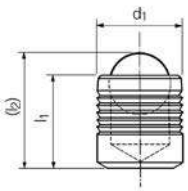
Proof Pressure Test - Ⓑ
Max. Allowable Working Pressure = Nominal Pressure

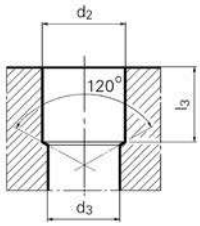
**SFC KOENIG's North American Engineering Department utilizes 2024-T4/T6 as a test base material.*

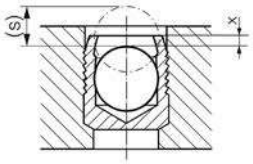
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KOENIG EXPANDER® SEALING PLUGS
Series MB 850







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

Important:
See installation instructions on pages 78–79
Installation requirements on page 73

Part Number	d_1	l_1	(l_2) ~ Ref.	d_2 +0.1 0	d_3 max	l_3 min.	x ±0.2	(s) ~ Ref.	Packaging Unit*	Weight in gram/pcs.
MB 850-030	3.0	3.6	4.6	3.0	2.2	3.4	0.4	1.2	1000	0.17
MB 850-040	4.0	4.0	5.2	4.0	3.3	3.8	0.2	1.5	2000	0.34
MB 850-050	5.0	5.5	7.1	5.0	4.3	5.3	0.4	1.9	2000	0.68
MB 850-060	6.0	6.5	8.6	6.0	5.3	6.3	0.4	2.0	2000	1.17
MB 850-070	7.0	7.5	10.1	7.0	6.4	7.3	0.4	3.0	1000	1.91
MB 850-080	8.0	8.5	11.6	8.0	7.4	8.3	0.3	3.5	1000	2.84
MB 850-090	9.0	10.0	13.6	9.0	8.4	9.8	0.4	4.0	500	4.00
MB 850-100	10.0	11.0	15.1	10.0	9.4	10.8	0.4	4.5	500	5.47
MB 850-120	12.0	13.0	17.9	12.0	10.6	12.8	0.4	5.5	250	9.31
**MB 850-140	14.0	15.0	20.6	14.0	12.7	14.5	0.4	6.35	250	14.72
**MB 850-160	16.0	17.0	23.4	16.0	14.7	16.5	0.6	7.0	100	22.00
**MB 850-180	18.0	19.0	26.4	18.0	16.7	18.5	0.6	8.0	100	31.34
**MB 850-200	20.0	22.0	30.1	20.0	18.7	21.5	0.8	9.0	100	44.24
**MB 850-220	22.0	25.0	34.0	22.0	20.7	24.5	0.8	10.0	50	58.61

Dimensions in millimeters
**Standard pack quantities may vary by sales organization*

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

PRESSURE PERFORMANCE

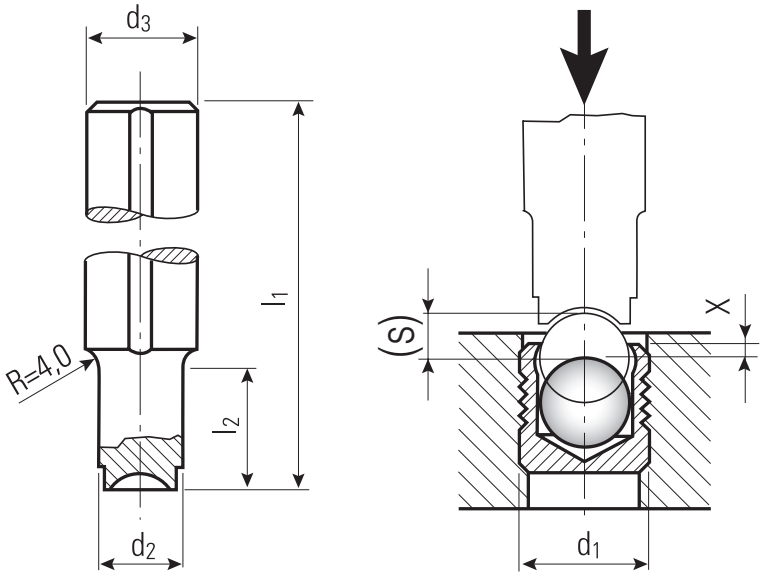
Series MB 850 mm	① ETG-100 / 44SMn28 AISI 1144	② C15Pb / 1.0403 ~ SAE 1015 (10L15)	③ EN 1563: GJS-600-3 ASTM A536: 80-60-03	⑤ EN 1561: GJL-250 ASTM A48: NO.35	⑥ AlCu4Mg1 / EN AW-2024-T3 AA: 2024 T4/T6*	⑦ AlMgSiPb / EN AW-6012-T6 AA: 6012-T6	⑧ G-AlSi7Mg / EN-AC-42100 ASTM/UNS: A356
	Base Material of the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

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.*

KOENIG EXPANDER® SETTING TOOLS
Series MB

Material:
Tool Steel, Heat Treated,
Hardness Approx. HRC 50



Part Number	d_1 Expander	d_3 -h9	l_1	d_2	l_2	x ±0.2	(s) ~ Ref.	Weight in gram/pcs.
MB 030	3.0	10	100	2.8	10	0.4	1.2	55
MB 040	4.0	10	100	3.8	10	0.2	1.5	55
MB 050	5.0	10	100	4.8	12	0.4	1.9	55
MB 060	6.0	10	100	5.8	15	0.4	2.0	55
MB 070	7.0	10	100	6.8	18	0.4	3.0	55
MB 080	8.0	10	100	7.8	20	0.3	3.5	55
MB 090	9.0	14	100	8.8	22	0.4	4.0	120
MB 100	10.0	14	100	9.8	25	0.4	4.5	120
MB 120	12.0	14	150	11.7	30	0.4	5.5	180
MB 140	14.0	20	150	13.7	35	0.4	6.35	350
MB 160	16.0	20	150	15.7	40	0.6	7.0	350
MB 180	18.0	20	150	17.7	45	0.6	8.0	350
MB 200	20.0	25	150	19.7	50	0.8	9.0	550
MB 220	22.0	25	150	21.7	55	0.8	10.0	550

Dimensions in millimeters
North American customers please refer to page 32

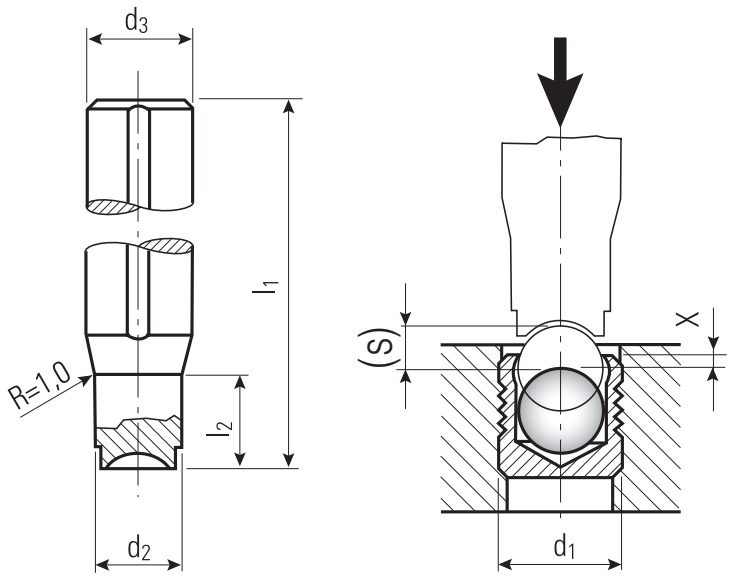
RECOMMENDED SETTING EQUIPMENT FOR SERIES MB

EXPRESS 3000	Hydropneumatic Table Press	See page 64 for more information
EXPRESS 5000	Hydropneumatic Table Press	See page 64 for more information

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KOENIG EXPANDER® SETTING TOOLS
Series MB Inch

Material:
Tool Steel, Heat Treated,
Hardness Approx. HRC 50



Part Number	d_1 Expander	d_3 -h9	l_1	d_2	l_2	x 0 -0.012	(s) ~ Ref.	Weight in gram/pcs.
MB 093A	0.093	0.394	3.94	0.082	0.137	0.012	0.031	55
MB 125A	0.125	0.394	3.94	0.117	0.137	0.012	0.047	55
MB 156A	0.156	0.394	3.94	0.148	0.137	0.012	0.059	55
MB 187A	0.187	0.394	3.94	0.180	0.137	0.012	0.079	55
MB 218A	0.218	0.394	3.94	0.211	0.400	0.012	0.094	55
MB 250A	0.250	0.394	3.94	0.242	0.400	0.012	0.109	55
MB 281A	0.281	0.394	3.94	0.273	0.400	0.012	0.118	55

Dimensions in Inches
North American customers please refer to page 34

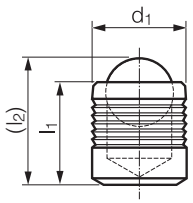
RECOMMENDED SETTING EQUIPMENT FOR SERIES MB

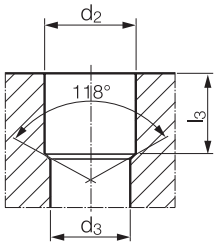
EXPRESS 3000	Hydropneumatic Table Press	See page 64 for more information
EXPRESS 5000	Hydropneumatic Table Press	See page 64 for more information

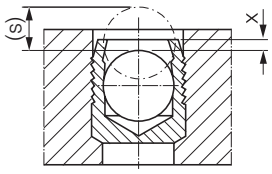
KOENIG EXPANDER® SEALING PLUGS
Series CV 173



Material:
Sleeve: Aluminum 2024-T4, QQ-A 225/6
Ball: Stainless Steel, AISI 302/304, Wax Film Lubrication (Diameter Dependant)







Part Number	d_1	l_1	(l_2) ~ Ref.	d_2 +0.1 0	d_3 max	l_3 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	1000	0.09
CV 173-040	4.0	4.00	5.2	4.0	3.3	3.8	0.2	1.4	1000	0.20
CV 173-050	5.0	5.50	7.0	5.0	4.3	5.3	0.2	1.9	1000	0.44
CV 173-060	6.0	6.50	8.6	6.0	5.3	6.3	0.2	2.3	1000	0.78
CV 173-070	7.0	7.50	10.1	7.0	6.2	7.3	0.2	2.8	1000	1.28
CV 173-080	8.0	8.50	11.7	8.0	7.2	8.3	0.2	3.4	1000	1.96
CV 173-090	9.0	10.00	13.7	9.0	8.2	9.8	0.2	3.7	1000	2.88
CV 173-100	10.0	11.00	15.2	10.0	9.2	10.8	0.2	4.2	500	4.01
CV 173-120	12.0	13.00	18.0	12.0	11.0	12.8	0.2	5.1	250	7.06

Dimensions in millimeters
**Standard pack quantities may vary by sales organization*

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

PRESSURE PERFORMANCE

Series CV 173 mm	❶ ETG-100 / 44SMn28 AISI 1144	❸ EN 1563: GJS-600-3 ASTM A536: 80-60-03	❹ EN 1563: GJS-450-10 ASTM A536: 65-45-12	❻ AlCu4Mg1 / EN AW-2024-T3 AA: 2024 T4/T6*	❽ G-AlSi7Mg / EN-AC-42100 ASTM/UNS: A356
	Base Material of the Installation				
Ø 3 – 10				650 bar / 9400 psi **210 bar / 3000 psi**	
Ø 12				300 bar / 4300 psi **100 bar / 1500 psi**	

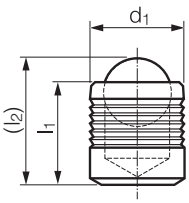
Proof Pressure Test - Ⓑ
Max. Allowable Working Pressure = Nominal Pressure

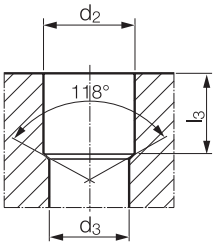
**SFC KOENIG's North American Engineering Department utilizes 2024-T4/T6 as a test base material.*

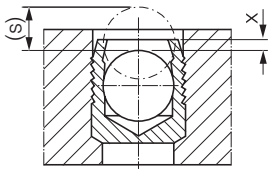
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KOENIG EXPANDER® SEALING PLUGS
Series CV 173 Inch







Material:
Sleeve: Aluminum 2024-T4, QQ-A 225/6
Ball: Stainless Steel, AISI 302/304, Wax Film Lubrication (Diameter Dependant)

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

Dimensions in inches
**Standard pack quantities may vary by sales organization*

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

PRESSURE PERFORMANCE

Series CV 173 Inch	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-AlSi7Mg / EN-AC-42100 ASTM/UNS: A356
	Base Material of the Installation				
Ø 0.156 – 0.437				650 bar / 9400 psi **210 bar / 3000 psi**	

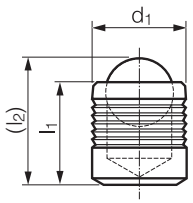
Proof Pressure Test - Ⓑ
Max. Allowable Working Pressure = Nominal Pressure

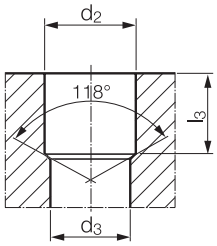
**SFC KOENIG's North American Engineering Department utilizes 2024-T4/T6 as a test base material.*

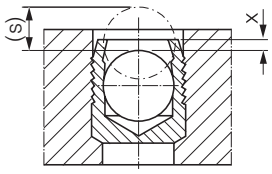
KOENIG EXPANDER® SEALING PLUGS
Series CV 173 Inch Short



Material:
Sleeve: Aluminum 2024-T4, QQ-A 225/6
Ball: Stainless Steel, AISI 302/304, Wax Film Lubrication (Diameter Dependant)







Part Number	d_1	l_1	(l_2) ~ Ref.	d_2 +0.004 0	d_3 max.	l_3 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	1000	0.10
CV 173-156S	0.156	0.125	0.17	0.1562	0.130	0.113	0.000	0.040	1000	0.15
CV 173-187S	0.187	0.187	0.24	0.1875	0.160	0.170	0.010	0.066	1000	0.33
CV 173-218S	0.218	0.187	0.25	0.2187	0.190	0.170	0.000	0.063	1000	0.46
CV 173-250S	0.250	0.225	0.30	0.2500	0.220	0.196	0.000	0.083	1000	0.76
CV 173-281S	0.281	0.255	0.35	0.2812	0.250	0.233	0.000	0.091	1000	1.08
CV 173-312S	0.312	0.280	0.39	0.3125	0.281	0.255	0.000	0.107	1000	1.52
CV 173-343S	0.343	0.307	0.43	0.3437	0.312	0.275	0.000	0.118	500	2.01
CV 173-406S	0.406	0.365	0.52	0.4062	0.375	0.308	-0.010	0.143	500	3.59

Dimensions in inches
**Standard pack quantities may vary by sales organization*

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

PRESSURE PERFORMANCE

Series CV 173 Inch Short	❶ ETG-100 / 44SMn28 AISI 1144	❸ EN 1563: GJS-600-3 ASTM A536: 80-60-03	❹ EN 1563: GJS-450-10 ASTM A536: 65-45-12	❻ AlCu4Mg1 / EN AW-2024-T3 AA: 2024 T4/T6*	❽ G-AlSi7Mg / EN-AC-42100 ASTM/UNS: A356
	Base Material of the Installation				
Ø 0.125 – 0.406				400 bar / 5800 psi **150 bar / 2100 psi**	

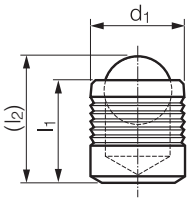
Proof Pressure Test - Ⓑ
Max. Allowable Working Pressure = Nominal Pressure

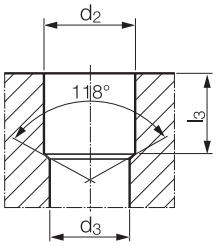
**SFC KOENIG's North American Engineering Department utilizes 2024-T4/T6 as a test base material.*

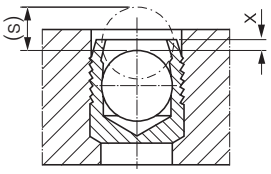
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KOENIG EXPANDER® SEALING PLUGS
Series CV 588







Material:
Sleeve: Stainless Steel (316) ASTM A580, Passivate, QQ-P-35C
Ball: Stainless Steel, AISI 316, Wax Film Lubrication (Diameter Dependant)

Part Number	d_1	l_1	(l_2) ~ Ref.	d_2 +0.1 0	d_3 max	l_3 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	1000	0.36
CV 588-050	5.0	5.50	7.0	5.0	4.3	5.3	0.2	1.9	1000	0.76
CV 588-060	6.0	6.50	8.6	6.0	5.3	6.3	0.2	2.3	1000	1.28
CV 588-070	7.0	7.50	10.1	7.0	6.2	7.3	0.2	2.8	1000	2.00
CV 588-080	8.0	8.50	11.7	8.0	7.2	8.3	0.2	3.4	1000	2.96
CV 588-090	9.0	10.00	13.7	9.0	8.2	9.8	0.2	3.7	1000	4.31
CV 588-100	10.0	11.00	15.2	10.0	9.2	10.8	0.2	4.2	500	5.88

Dimensions in millimeters
**Standard pack quantities may vary by sales organization*

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

PRESSURE PERFORMANCE

Series CV 588 mm	❶ ETG-100 / 44SMn28 AISI 1144	❸ EN 1563: GJS-600-3 ASTM A536: 80-60-03	❹ EN 1563: GJS-450-10 ASTM A536: 65-45-12	❻ AlCu4Mg1 / EN AW-2024-T3 AA: 2024 T4/T6*	❽ G-AlSi7Mg / EN-AC-42100 ASTM/UNS: A356
	Base Material of the Installation				
Ø 4 – 9	1000 bar / 14500 psi **350 bar / 5000 psi**				
Ø 10	860 bar / 12500 psi **280 bar / 4000 psi**				

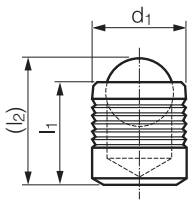
Proof Pressure Test - Ⓑ
Max. Allowable Working Pressure = Nominal Pressure

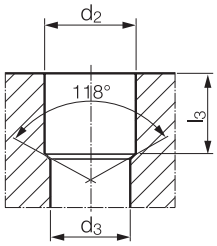
**SFC KOENIG's North American Engineering Department utilizes 2024-T4/T6 as a test base material.*

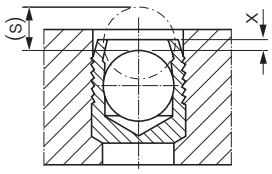
KOENIG EXPANDER® SEALING PLUGS
Series CV 588 Inch



Material:
Sleeve: Stainless Steel (316) ASTM A580, Passivate, QQ-P-35C
Ball: Stainless Steel, AISI 316, Wax Film Lubrication (Diameter Dependant)







Part Number	d_1	l_1	(l_2) ~ Ref.	d_2 +0.004 0	d_3 max.	l_3 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	1000	0.35
CV 588-187	0.187	0.217	0.27	0.1875	0.160	0.208	0.010	0.066	1000	0.71
CV 588-218	0.218	0.217	0.28	0.2187	0.190	0.208	0.010	0.078	1000	0.94
CV 588-250	0.250	0.256	0.34	0.2500	0.220	0.247	0.010	0.094	1000	1.42
CV 588-281	0.281	0.296	0.40	0.2812	0.250	0.287	0.010	0.110	1000	2.92
CV 588-312	0.312	0.335	0.46	0.3125	0.281	0.326	0.010	0.129	1000	3.88
CV 588-343	0.343	0.394	0.52	0.3437	0.312	0.385	0.010	0.140	500	4.11
CV 588-375	0.375	0.394	0.54	0.3750	0.343	0.385	0.010	0.153	500	4.86

Dimensions in inches
**Standard pack quantities may vary by sales organization*

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

PRESSURE PERFORMANCE

Series CV 588 Inch	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-AlSi7Mg / EN-AC-42100 ASTM/UNS: A356
	Base Material of the Installation				
Ø 0.156 – 0.375	1000 bar / 14500 psi **350 bar / 5000 psi**				

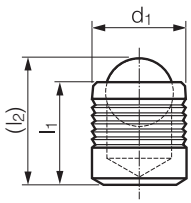
Proof Pressure Test - Ⓑ
Max. Allowable Working Pressure = Nominal Pressure

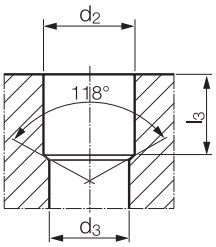
**SFC KOENIG's North American Engineering Department utilizes 2024-T4/T6 as a test base material.*

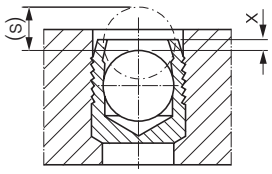
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KOENIG EXPANDER® SEALING PLUGS
Series CV 588 Inch Short







Material:
Sleeve: Stainless Steel, AISI 316, ASTM A580, Passivate, QQ-P-35C
Ball: Stainless Steel, AISI 316, Wax Film Lubrication (Diameter Dependant)

Part Number	d_1	l_1	(l_2) ~ Ref.	d_2 +0.004 0	d_3 max.	l_3 min.	x ±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	1000	0.18
CV 588-156S	0.156	0.125	0.17	0.1562	0.130	0.113	0.000	0.040	1000	0.29
CV 588-187S	0.187	0.187	0.24	0.1875	0.160	0.170	0.010	0.066	1000	0.60
CV 588-218S	0.218	0.187	0.25	0.2187	0.190	0.170	0.000	0.063	1000	0.81
CV 588-250S	0.250	0.225	0.30	0.2500	0.220	0.196	0.000	0.083	1000	1.20
CV 588-281S	0.281	0.255	0.35	0.2812	0.250	0.233	0.000	0.091	1000	1.77

Dimensions in inches
**Standard pack quantities may vary by sales organization*

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

PRESSURE PERFORMANCE

Series CV 588 Inch Short	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-AlSi7Mg / EN-AC-42100 ASTM/UNS: A356
	Base Material of the Installation				
Ø 0.125 – 0.281	560 bar / 8100 psi **250 bar / 3600 psi**				

Proof Pressure Test - Ⓑ
Max. Allowable Working Pressure = Nominal Pressure

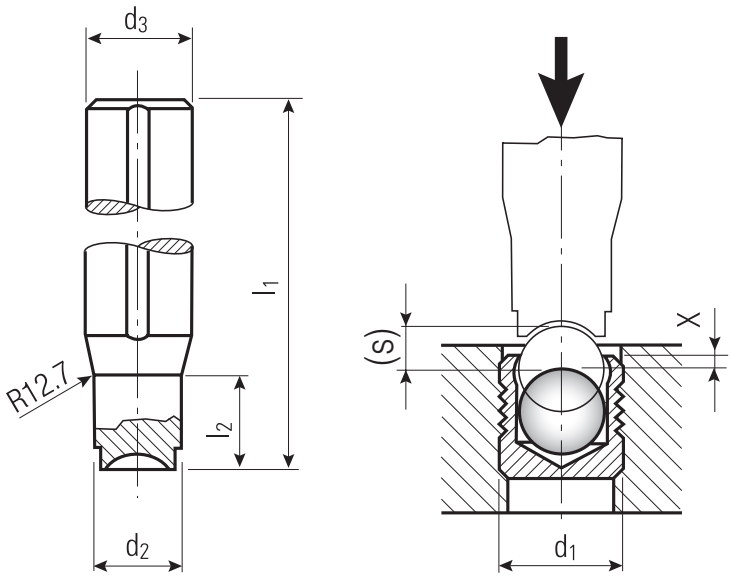
**SFC KOENIG's North American Engineering Department utilizes 2024-T4/T6 as a test base material.*

KOENIG EXPANDER® SETTING TOOLS

Series MB/CV

North American Tool Option

Material:
Tool Steel, Heat Treated,
Hardness Approx. HRC 50



Part Number	d_1 Expander	d_3 ±0.12	l_1	d_2	l_2	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

RECOMMENDED SETTING EQUIPMENT FOR SERIES MB/CV

EXPRESS 3000	Hydropneumatic Table Press	See page 64 for more information
EXPRESS 5000	Hydropneumatic Table Press	See page 64 for more information

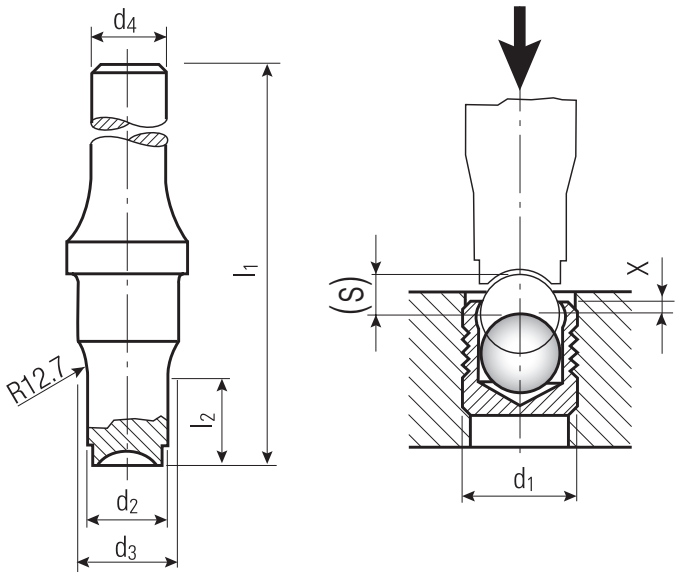
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KOENIG EXPANDER® SETTING TOOLS

Series MB/CV Air Hammer

North American Tool Option

Material:
Tool Steel, Heat Treated,
Hardness Approx. HRC 50



Part Number	d_1 Expander	d_3 ±0.12	d_4 (AH only)	l_1	d_2	l_2	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

RECOMMENDED SETTING EQUIPMENT FOR SERIES MB/CV

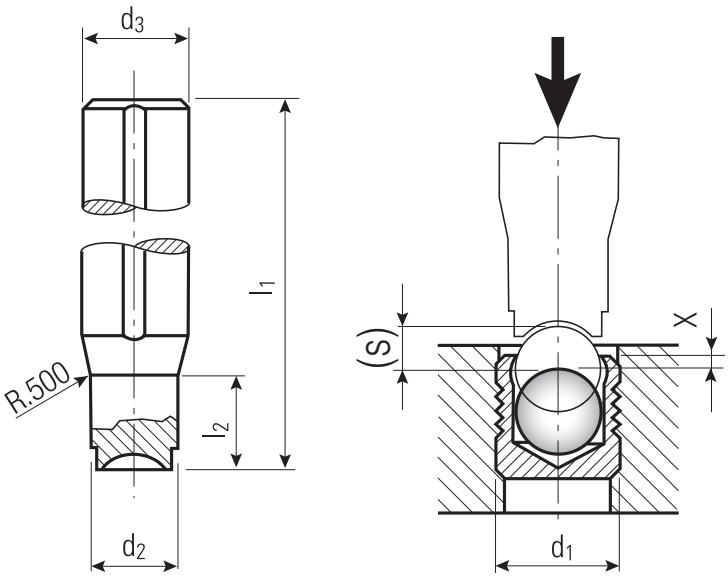
North American customers please contact application engineering for ExHammer recommendations.

KOENIG EXPANDER® SETTING TOOLS

Series MB/CV

North American Tool Option

Material:
Tool Steel, Heat Treated,
Hardness Approx. HRC 50



Part Number	d_1 Expander	d_3 ±0.005	l_1	d_2	l_2	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

RECOMMENDED SETTING EQUIPMENT FOR SERIES MB/CV

EXPRESS 3000	Hydropneumatic Table Press	See page 64 for more information
EXPRESS 5000	Hydropneumatic Table Press	See page 64 for more information

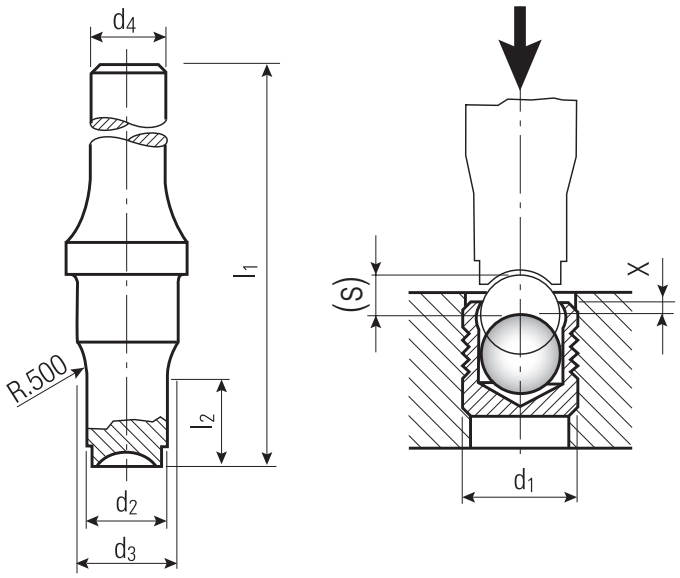
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KOENIG EXPANDER® SETTING TOOLS

Series MB/CV Air Hammer

North American Tool Option

Material:
Tool Steel, Heat Treated,
Hardness Approx. HRC 50



Part Number	d_1 Expander	d_3 ±0.005	d_4	l_1	d_2	l_2	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-312	CV XXX-312	0.5	0.401	4.0	0.298	1.3	0.010	0.107	73
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

RECOMMENDED SETTING EQUIPMENT FOR SERIES MB/CV

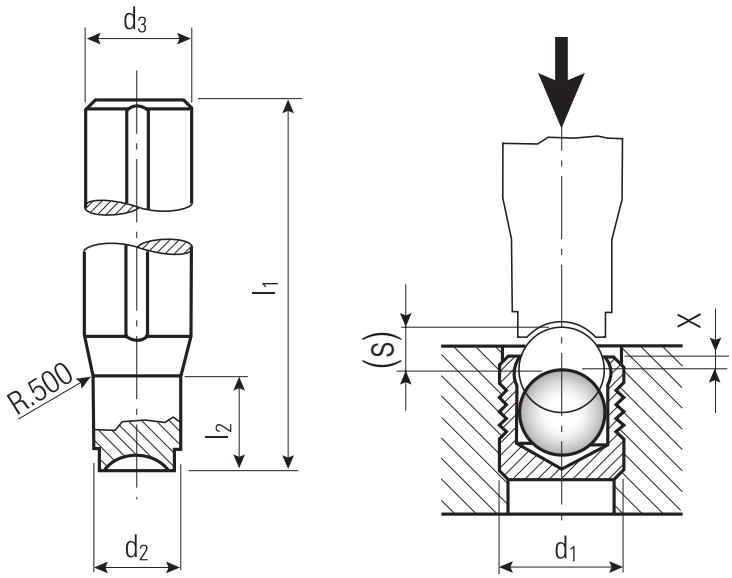
North American customers please contact application engineering for ExHammer recommendations.

KOENIG EXPANDER® SETTING TOOLS

Series MB/CV Short

North American Tool Option

Material:
Tool Steel, Heat Treated,
Hardness Approx. HRC 50



Part Number	d_1 Expander	d_3 ±0.005	l_1	d_2	l_2	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

RECOMMENDED SETTING EQUIPMENT FOR SERIES MB/CV

EXPRESS 3000	Hydropneumatic Table Press	See page 64 for more information
EXPRESS 5000	Hydropneumatic Table Press	See page 64 for more information

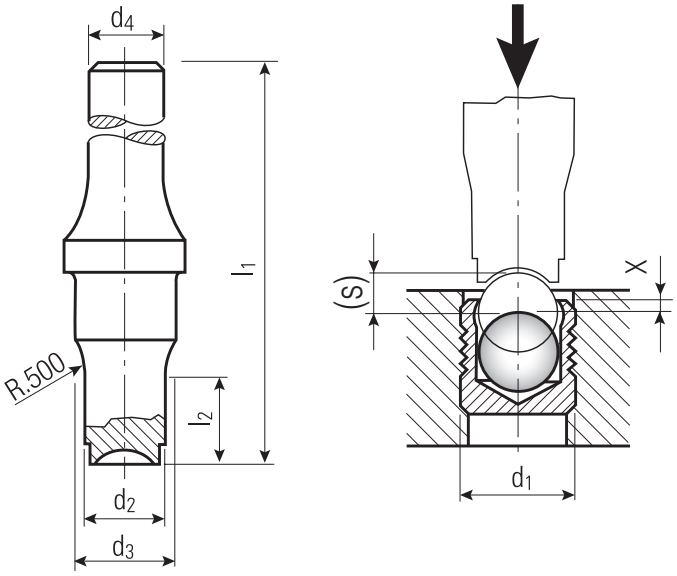
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KOENIG EXPANDER® SETTING TOOLS

Series MB/CV Short Air Hammer

North American Tool Option

Material:
Tool Steel, Heat Treated,
Hardness Approx. HRC 50



Part Number	d_1 Expander	d_3 ±0.005	d_4	l_1	d_2	l_2	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

RECOMMENDED SETTING EQUIPMENT FOR SERIES MB/CV

North American customers please contact application engineering for ExHammer recommendations.

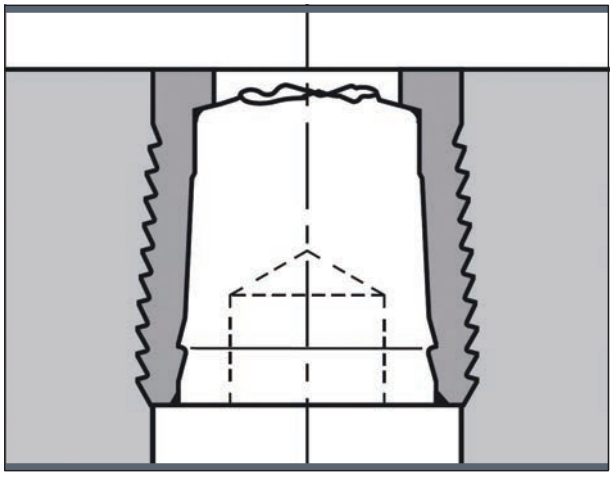

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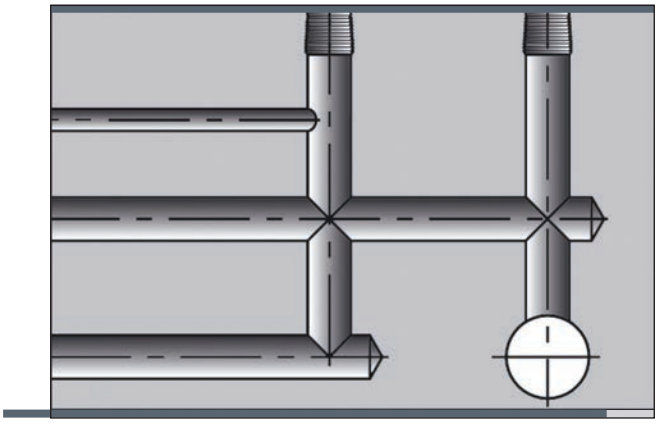
KOENIG EXPANDER®

Series SK / SKC

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

- Operating pressures up to 500 bar / 7200 psi
- Liberal drilling manufacturing tolerance 0 / + 0.12 mm
- Direct installation into drilled 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

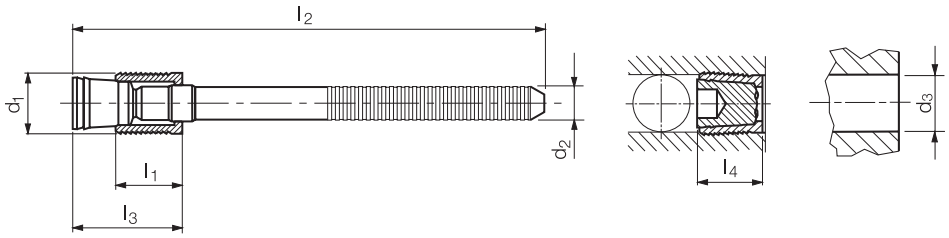
EXTOOL-030	Hydraulic/Pneumatic Tool	See page 65 for more information
EXTOOL-040-1	Hydraulic/Pneumatic Tool	See page 66 for more information
EXTOOL-040-2	Hydraulic/Pneumatic Tool	See page 67 for more information
EXTOOL-B-010	Battery Tool	See page 69 for more information

KOENIG EXPANDER® SEALING PLUGS
Series SK 550 / SKC 550



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

Important:
See installation instructions on page 80
Installation requirements on page 73



Part Number	d_1	l_1	d_2	l_2	l_3 max.	l_4 max.	d_3 +0.12 0	Packaging Unit*	Weight in gram/pcs.
SKC550-040	4.0	4.5	2.50	39	8.6	6.5	4.0	1000	1.71
SKC550-050	5.0	5.5	2.80	41	10.0	7.5	5.0	1000	2.50
SKC550-060	6.0	6.5	3.30	38	12.0	8.5	6.0	500	3.50
SKC550-070	7.0	7.5	4.00	38	13.5	9.5	7.0	500	5.10
SK550-080	8.0	8.5	4.20	40	14.9	10.5	8.0	500	6.33
SK550-090	9.0	9.5	4.50	43	17.1	11.5	9.0	250	8.23
SK550-100	10.0	10.5	4.80	43	19.1	13.5	10.0	250	10.57

Dimensions in millimeters
**Standard pack quantities may vary by sales organization*

PRESSURE PERFORMANCE

Series SK / SKC 550 mm	❶ ETG-100 / 44SMn28 AISI 1144	❷ C15Pb / 1.0403 ~ SAE 1015 (10L15)	❸ EN 1563: GJS-600-3 ASTM A536: 80-60-03	❺ EN 1561: GJL-250 ASTM A48: NO.35	❻ AlCu4Mg1 / EN AW-2024-T3 AA: 2024 T4/T6*	❼ AlMgSiPb / EN AW-6012-T6 AA: 6012-T6	❽ G-AlSi7Mg / EN-AC-42100 ASTM/UNS: A356
	Base Material of the Installation						
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

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

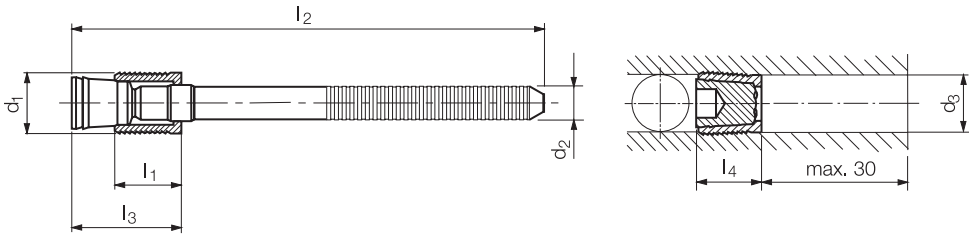
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KOENIG EXPANDER® SEALING PLUGS
Series SK 552 Long Mandrel
Special Type: With Mandrel 30mm Longer than Standard

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

Important:
See installation instructions on page 80
Installation requirements on page 73



Part Number	d_1	l_1	d_2	l_2	l_3 max.	l_4 max.	d_3 +0.12 0	Packaging Unit*	Weight in gram/pcs.
SK552-040	4.0	4.5	2.5	69	8.2	6.5	4.0	1000	2.87
SK552-050	5.0	5.5	3.0	71	10.2	8.0	5.0	500	4.32
SK552-060	6.0	6.5	3.4	73	12.0	8.0	6.0	500	5.65
SK552-070	7.0	7.5	4.1	68	13.6	9.5	7.0	250	8.01
SK552-080	8.0	8.5	4.2	70	14.9	10.5	8.0	250	9.60
SK552-090	9.0	9.5	4.5	73	17.1	11.5	9.0	100	11.97
SK552-100	10.0	10.5	4.8	75	19.1	13.5	10.0	100	14.73

Dimensions in millimeters
**Standard pack quantities may vary by sales organization*

PRESSURE PERFORMANCE

Series SK 552 mm	❶ ETG-100 / 44SMn28 AISI 1144	❷ C15Pb / 1.0403 ~ SAE 1015 (10L15)	❸ EN 1563: GJS-600-3 ASTM A536: 80-60-03	❺ EN 1561: GJL-250 ASTM A48: NO.35	❻ AlCu4Mg1 / EN AW-2024-T3 AA: 2024 T4/T6*	❼ AlMgSiPb / EN AW-6012-T6 AA: 6012-T6	❽ G-AlSi7Mg / EN-AC-42100 ASTM/UNS: A356
	Base Material of the Installation						
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

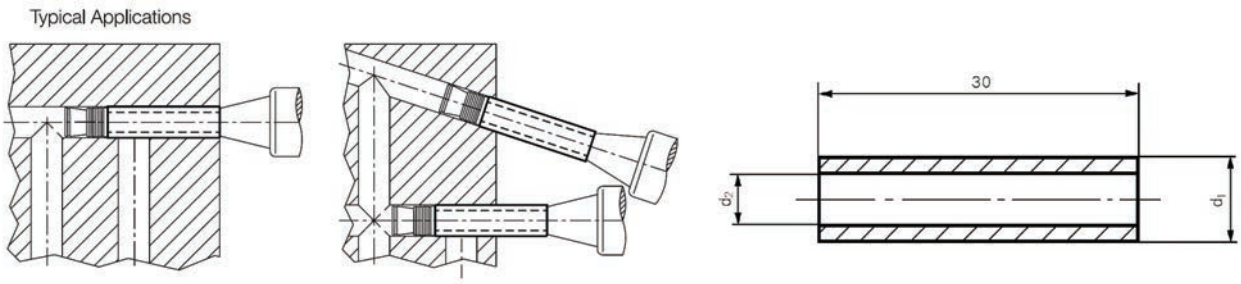
**SFC KOENIG's North American Engineering Department utilizes 2024-T4/T6 as a test base material.*

KOENIG EXPANDER® SPACERS

Series SK Setting Tools SK552

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

Material:
Case Hardening Steel, Case Hardened



Part Number	d_1	d_2	Series 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

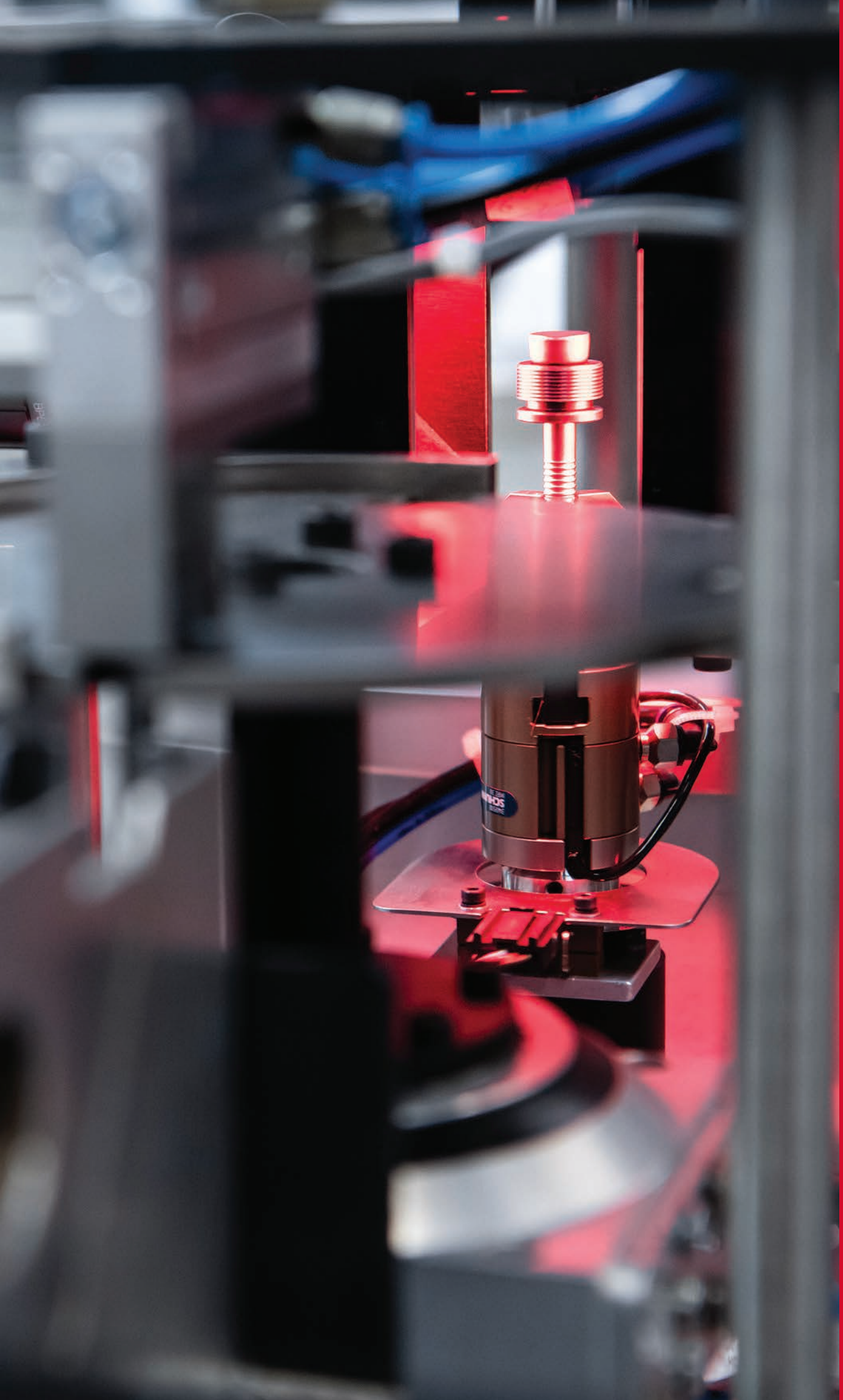
Dimensions in millimeters

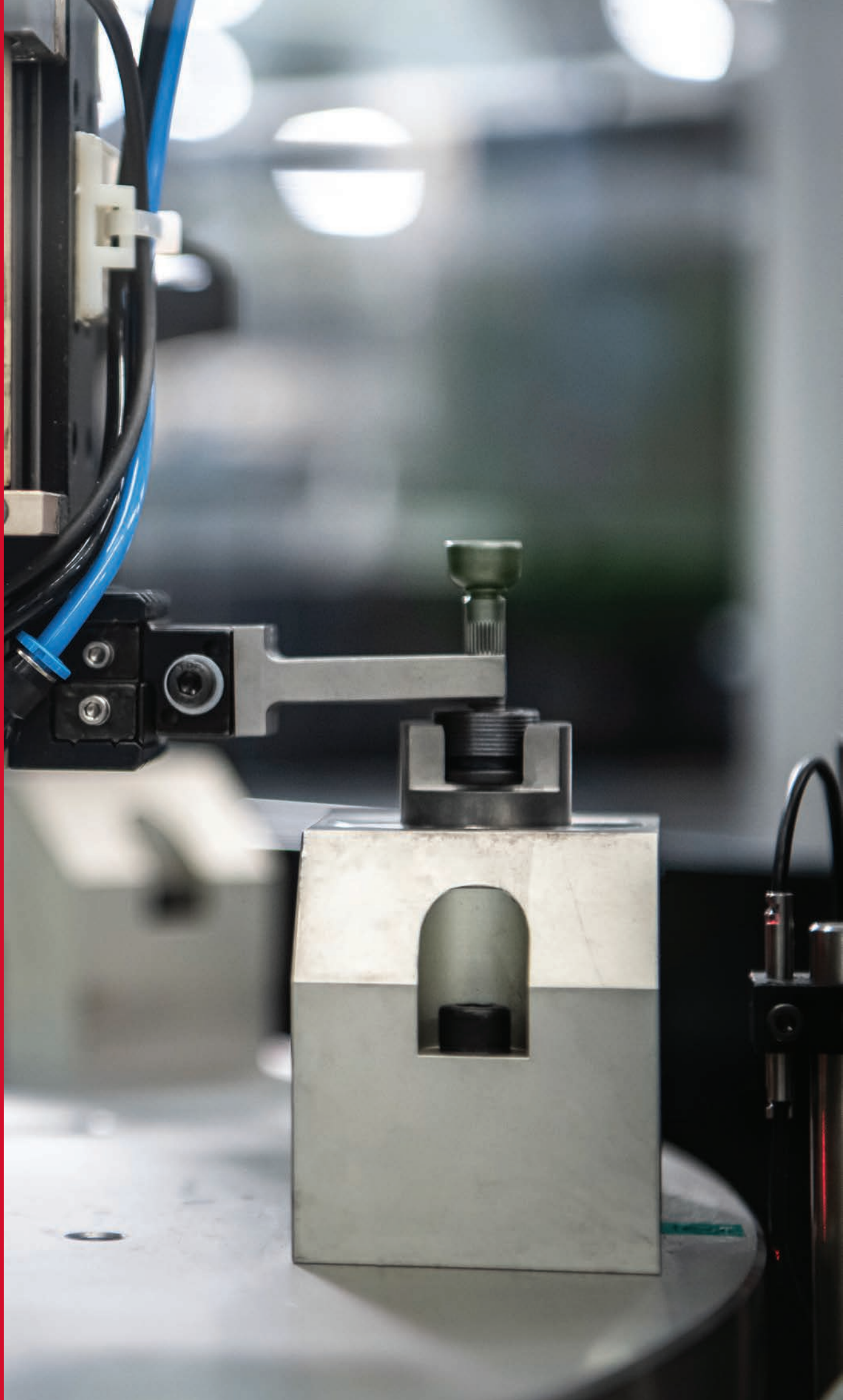


RECOMMENDED SETTING EQUIPMENT FOR SERIES SK

EXTOOL-030	Hydraulic/Pneumatic Tool	See page 65 for more information
EXTOOL-040-1	Hydraulic/Pneumatic Tool	See page 66 for more information
EXTOOL-040-2	Hydraulic/Pneumatic Tool	See page 67 for more information
EXTOOL-B-010	Battery Tool	See page 69 for more information

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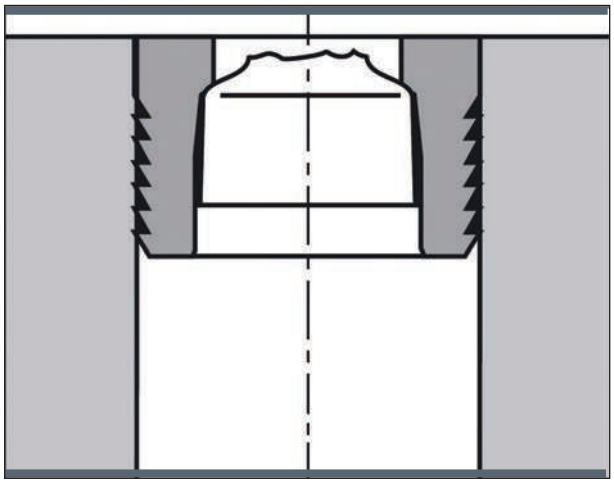


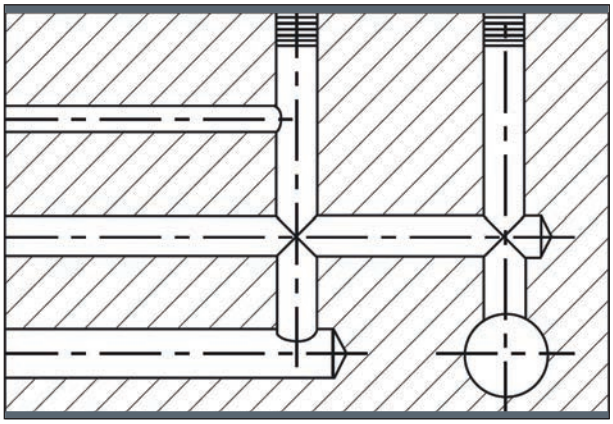
KOENIG EXPANDER®

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 drilling manufacturing tolerance 0 / + 0.12 mm
- Direct installation into drilled bores
- Purely mechanical sealing through anchorage system
- Installation using convenient processing tools
- Comprehensive product range for Ø 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

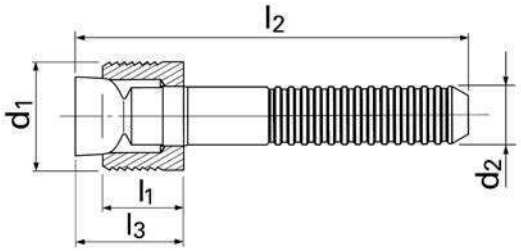
EXTOOL-030	Hydraulic/Pneumatic Tool	See page 65 for more information
EXTOOL-040-1	Hydraulic/Pneumatic Tool	See page 66 for more information
EXTOOL-040-2	Hydraulic/Pneumatic Tool	See page 67 for more information
EXTOOL-050	Hydraulic/Pneumatic Tool	See page 68 for more information
EXTOOL-B-010	Battery Tool	See page 69 for more information

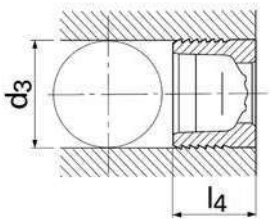
KOENIG EXPANDER® SEALING PLUGS
Series LK 600



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

Important:
See installation instructions on page 81
Installation requirements on page 73





Part Number	d_1	l_1	d_2	l_2	d3 +0.12 0	l_3 max.	l_4 max.	Packaging Unit*	Weight in gram/pcs.
LK 600-040	4.0	3.7	2.2	33	4.0	6.1	4.0	1000	1.19
LK 600-050	5.0	4.5	2.5	36	5.0	7.4	4.8	1000	1.81
LK 600-060	6.0	5.0	3.2	36	6.0	8.2	5.5	1000	2.95
LK 600-070	7.0	5.5	3.8	32	7.0	9.1	5.8	500	3.70
**LK 600-080	8.0	6.5	4.3	34	8.0	10.8	7.0	500	5.26
**LK 600-100	10.0	7.0	4.9	34	10.0	11.3	7.5	500	7.65

Dimensions in millimeters
**Standard pack quantities may vary by sales organization*
****Not all items in stock – MOQ and production lead times may apply**

PRESSURE PERFORMANCE

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

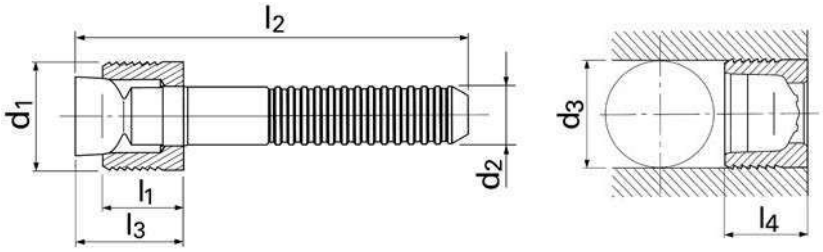
Proof Pressure Test - Ⓑ
Max. Allowable Working Pressure = Nominal Pressure

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

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KOENIG EXPANDER® SEALING PLUGS
Series LK 950



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

Important:
See installation instructions on page 81
Installation requirements on page 73
Long mandrel versions available upon request

Part Number	d_1	l_1	d_2	l_2	d_3*	l_3 max.	l_4 max.	Packaging Unit**	Weight in gram/pcs.
LK 950-040	4.0	3.7	2.2	36	4.0	5.5	4.0	1000	1.26
LK 950-050	5.0	4.5	3.0	36	5.0	6.9	4.8	1000	2.28
LK 950-060	6.0	5.0	3.4	36	6.0	7.7	5.3	1000	3.12
LK 950-070	7.0	5.5	4.2	34	7.0	8.5	5.8	500	4.70
LK 950-080	8.0	6.5	4.3	34	8.0	9.8	6.8	500	5.32
LK 950-090	9.0	6.5	4.7	34	9.0	9.8	6.8	500	6.53
LK 950-100	10.0	6.5	5.1	36	10.0	9.8	6.8	500	8.23
LK 950-120	12.0	7.5	5.9	36	12.0	11.7	7.8	500	12.21
LK 950-140	14.0	8.0	5.9	36	14.0	12.2	8.7	250	13.98
LK 950-160	16.0	10.5	5.9	42	16.0	16.5	11.5	250	21.17
LK 950-180	18.0	11.0	6.60	50.0	18.0	17.7	13.0	200	29.99
LK 950-200	20.0	11.0	6.60	50.0	20.0	17.7	13.0	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
***Standard pack quantities may vary by sales organization*

PRESSURE PERFORMANCE

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



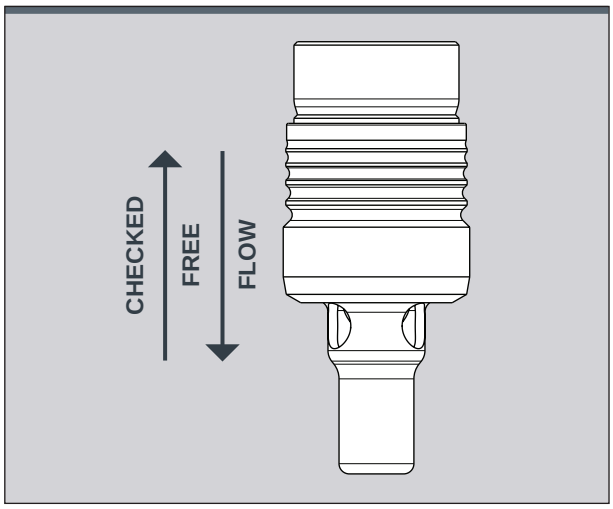
KOENIG CHECK VALVE®

Check Valves – Series BF and BR

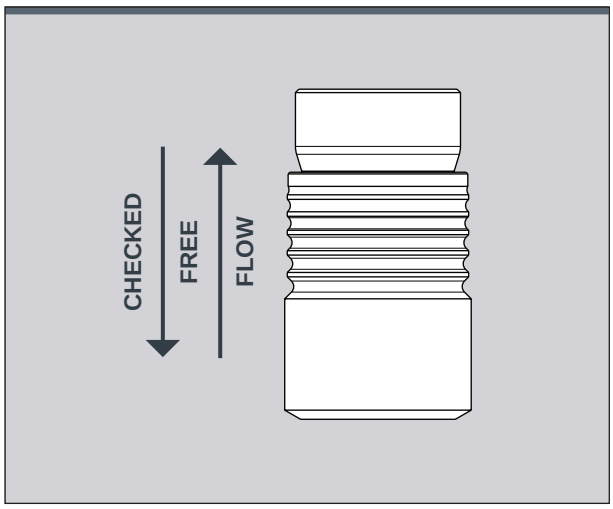
Max. Working Pressure Differential: 280 bar / 4060 psi in Checked Direction

- 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.



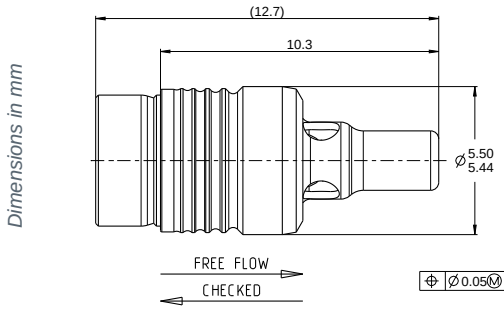
RECOMMENDED SETTING EQUIPMENT FOR SERIES BF AND BR

EXPRESS 3000	Hydropneumatic Table Press	See page 64 for more information

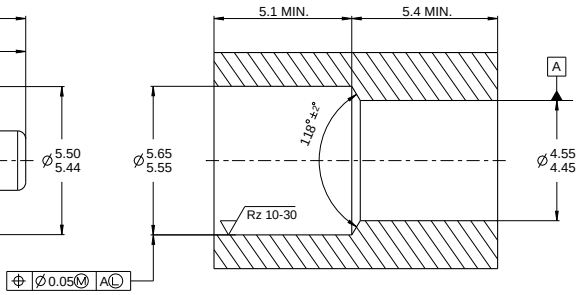
KOENIG CHECK VALVE®
Series BF 5.5mm Forward



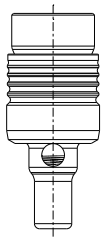
FORWARD FLOW CHECK VALVE



INSTALLATION HOLE

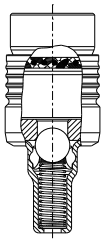


CHECK VALVE FORWARD FLOW - UNSCREENED

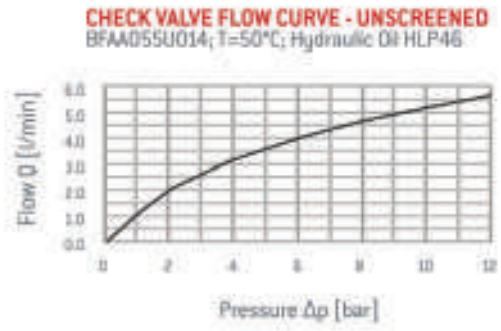


Part Number	Cracking Pressure (bar)
BFAA055U000	0.00 (no spring)
BFAA055U014	0.14 (± 0.05)
BFAA055U025	0.25 (± 0.10)
BFAA055U040	0.40 (± 0.30)
BFAA055U050	0.50 (± 0.30)
BFAA055U100	1.00 (± 0.30)
BFAA055U200	2.00 (± 0.30)

CHECK VALVE FORWARD FLOW - SCREENED

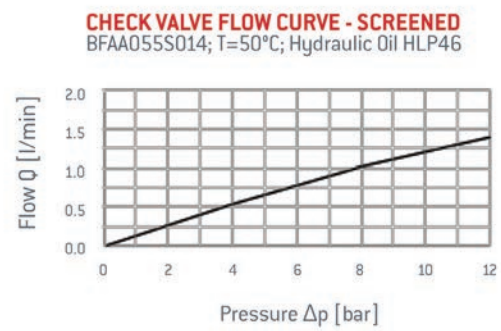


Part Number	Cracking Pressure (bar)
BFAA055S000	0.00 (no spring)
BFAA055S014	0.14 (± 0.05)
BFAA055S025	0.25 (± 0.10)
BFAA055S040	0.40 (± 0.30)
BFAA055S050	0.50 (± 0.30)
BFAA055S100	1.00 (± 0.30)
BFAA055S200	2.00 (± 0.30)



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

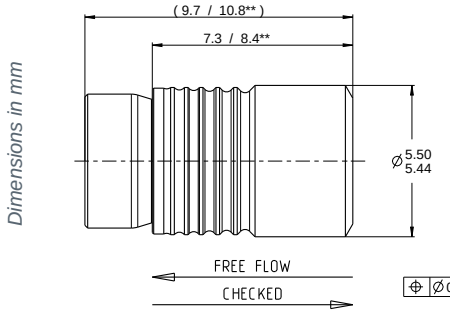
Check Valve Forward Flow – Unscreened	ST – 055 – 0335
Check Valve Forward Flow – Screened	ST – 055 – 0280

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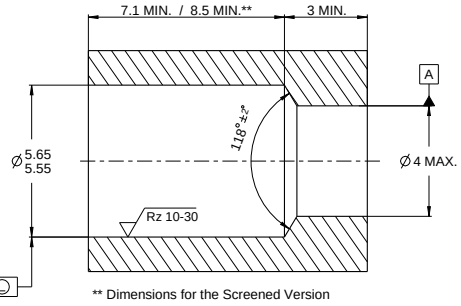


KOENIG CHECK VALVE®
Series BR 5.5mm Reverse

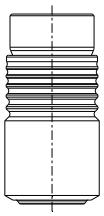
REVERSE FLOW CHECK VALVE



INSTALLATION HOLE

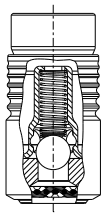


CHECK VALVE REVERSE FLOW - UNSCREENED



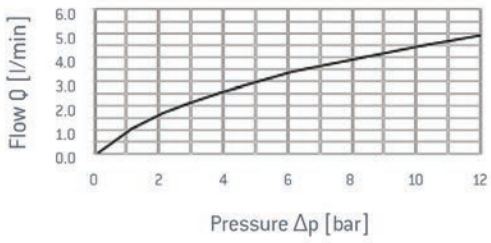
Part Number	Cracking Pressure (bar)
BRAA055U000	0.00 (no spring)
BRAA055U014	0.14 (± 0.05)
BRAA055U025	0.25 (± 0.10)
BRAA055U040	0.40 (± 0.30)
BRAA055U050	0.50 (± 0.30)
BRAA055U100	1.00 (± 0.30)
BRAA055U200	2.00 (± 0.30)

CHECK VALVE REVERSE FLOW - SCREENED

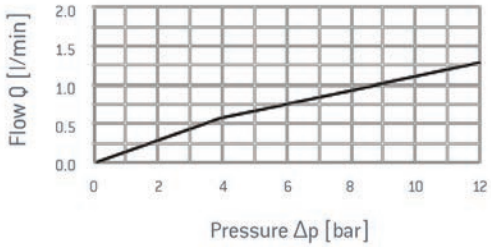


Part Number	Cracking Pressure (bar)
BRAA055S000	0.00 (no spring)
BRAA055S014	0.14 (± 0.05)
BRAA055S025	0.25 (± 0.10)
BRAA055S040	0.40 (± 0.30)
BRAA055S050	0.50 (± 0.30)
BRAA055S100	1.00 (± 0.30)
BRAA055S200	2.00 (± 0.30)

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

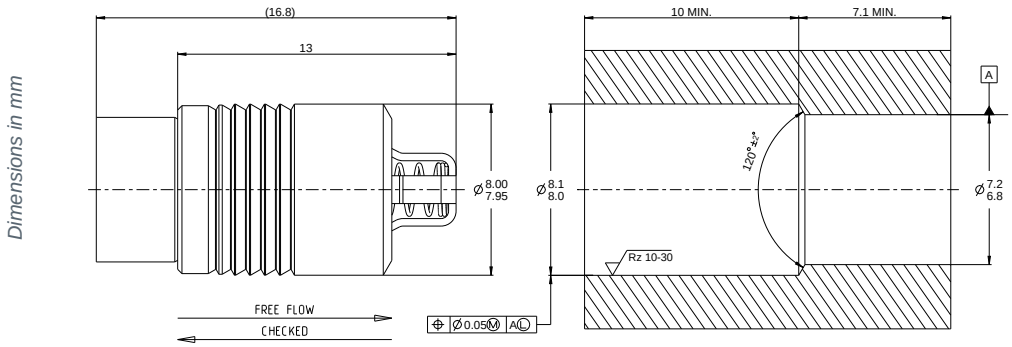
Check Valve Reverse Flow – Unscreened	ST – 055 – 0335
Check Valve Reverse Flow – Screened	ST – 055 – 0335

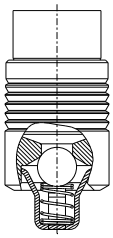
KOENIG CHECK VALVE®
Series BF 8.0mm Forward



FORWARD FLOW CHECK VALVE

INSTALLATION HOLE

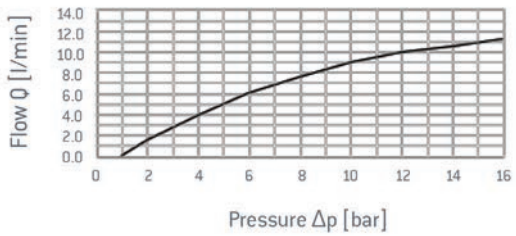




CHECK VALVE FORWARD FLOW - UNSCREENED

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



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

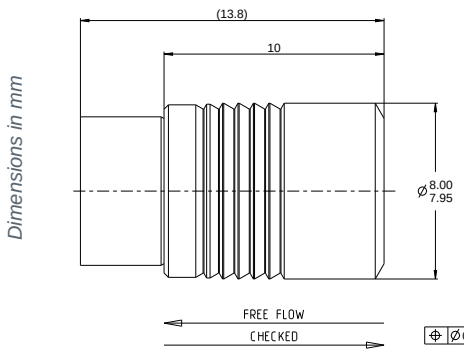
Check Valve Forward Flow – Unscreened	ST – 080 – 0380

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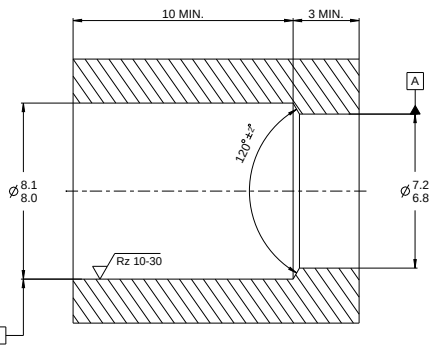


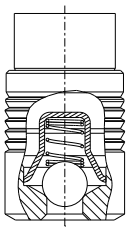
KOENIG CHECK VALVE®
Series BR 8.0mm Reverse

REVERSE FLOW CHECK VALVE



INSTALLATION HOLE



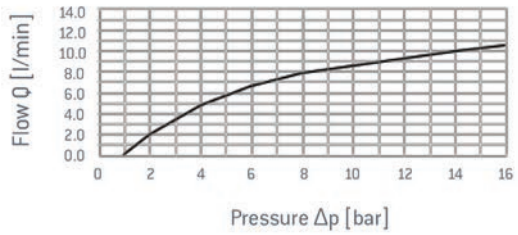


CHECK VALVE REVERSE FLOW - UNSCREENED

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



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

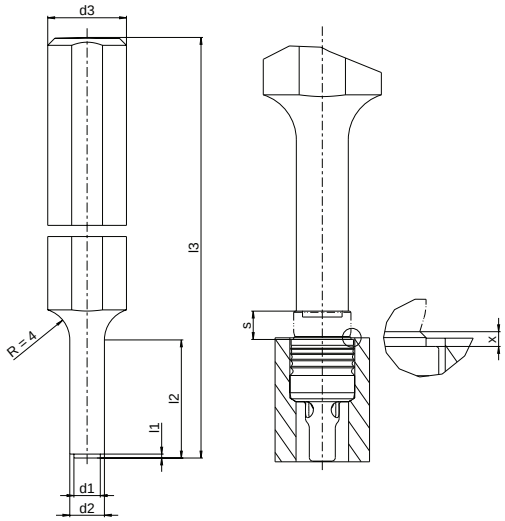
MATERIALS

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

KOENIG CHECK VALVE® SETTING TOOL
Series BF and BR



Part Number	Part Name	d_1 ±0.05	d_2 ±0.05	d_3 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	1 00	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

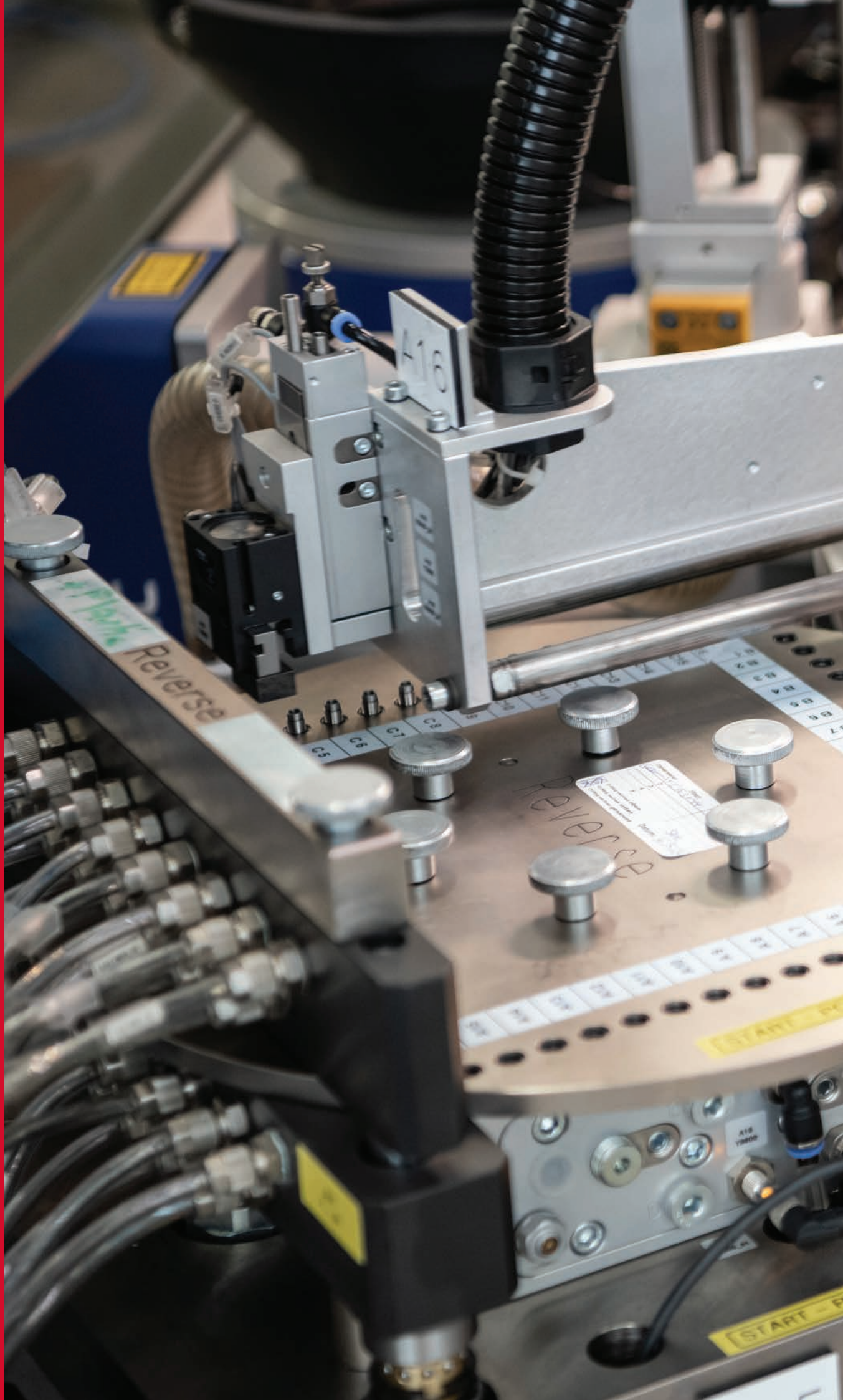
Dimensions in millimeters

RECOMMENDED SETTING EQUIPMENT FOR SERIES BF AND BR

EXPRESS 3000 Hydropneumatic Table Press See page 64 for more information

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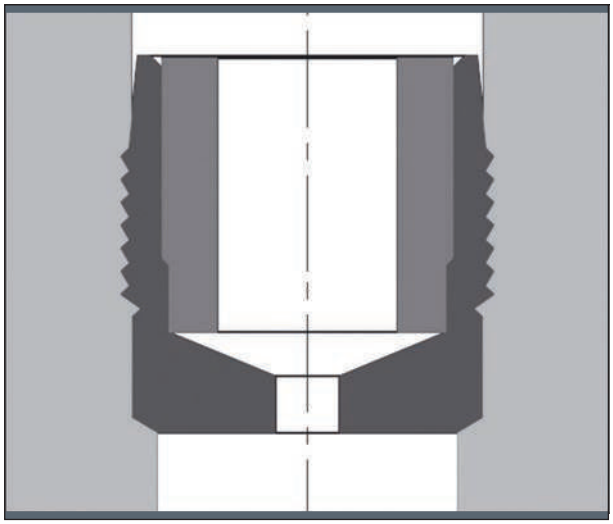


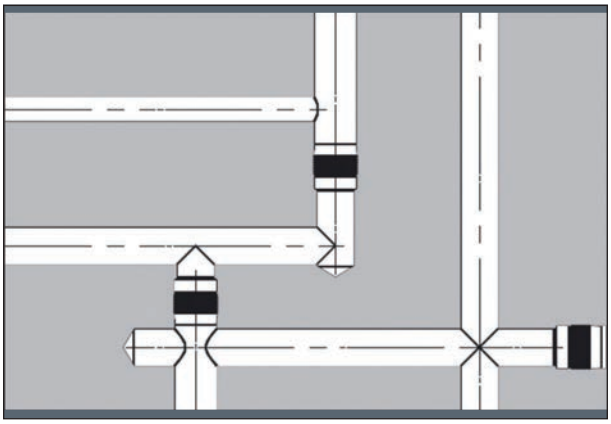

Reverse
Reverse
START

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

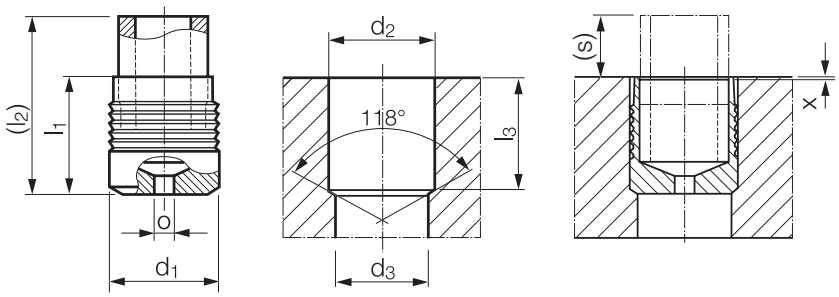
EXPRESS 3000	Hydropneumatic Table Press	See page 64 for more information
EXPRESS 5000	Hydropneumatic Table Press	See page 64 for more information

KOENIG RESTRICTOR® ORIFICE RESTRICTORS
Series RE



Material:
Sleeve: Stainless Steel AISI 303/304
Pin: Stainless Steel 17-4 PH

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



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

Dimensions in millimeters
**Standard pack quantities may vary by sales organization*
The weight depending on the orifice diameter
To calculate orifice diameter/length please refer to page 91

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

PRESSURE PERFORMANCE

Series RE Inch	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
	Base Material of the Installation			
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			

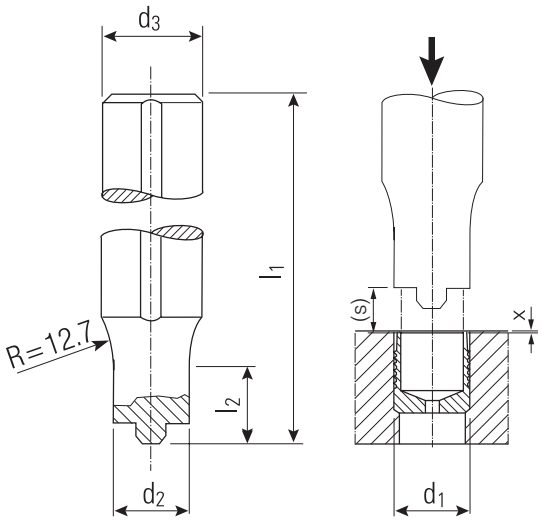
Max. Allowable Working Pressure = Nominal Pressure

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

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KOENIG RESTRICTOR® SETTING TOOLS
Series RE

Material:
Tool Steel, Heat Treated,
Hardness Approx. HRC 50



Part Number	d_1 Series RE	d_3 ±0.20	l_1	d_2	l_2	(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

RECOMMENDED SETTING EQUIPMENT FOR SERIES RE

EXPRESS 3000	Hydropneumatic Table Press	See page 64 for more information
EXPRESS 5000	Hydropneumatic Table Press	See page 64 for more information



Custom Engineered Solutions

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 5 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.

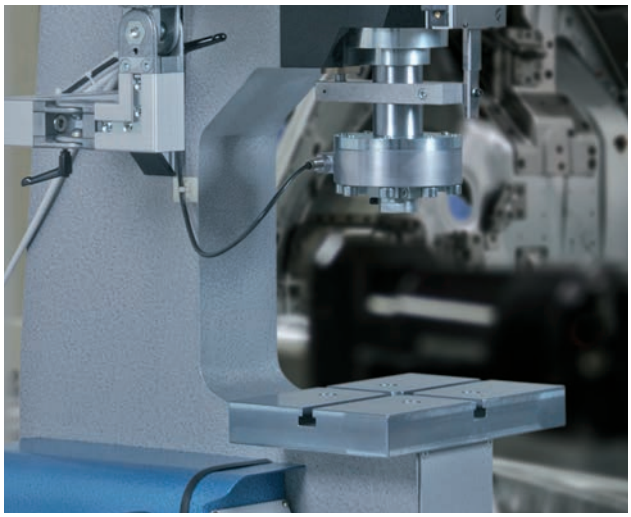


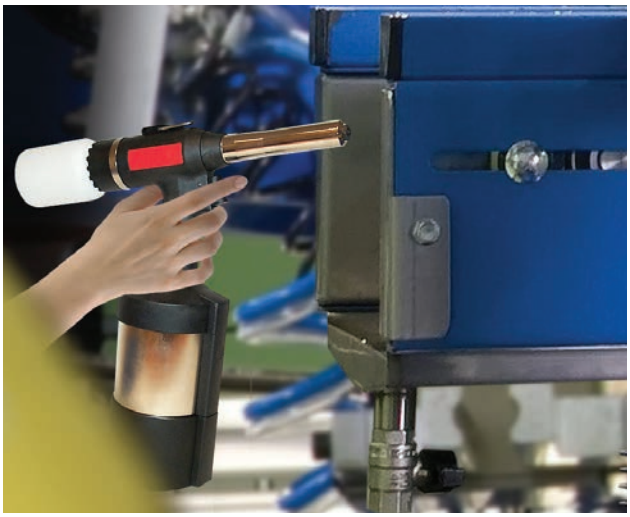


SETTING TOOL EQUIPMENT

Setting Equipment for All Series

- Express 3000 / Hydropneumatic Table Press
- Express 5000 / Hydropneumatic Table Press
- EXTOOL 030, 040-1, 040-2 and 050 / Hydraulic / Pneumatic Tool with Mandrel Collection Device
- EXTOOL B-010 / Battery Tool with Mandrel Collection Device





SETTING TOOLS
EXPRESS 3000/5000
Hydropneumatic Table Press for Series MB / CV / 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 and CV from Ø 3 - 10mm (.156" - .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).

SETTING TOOL DATA

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

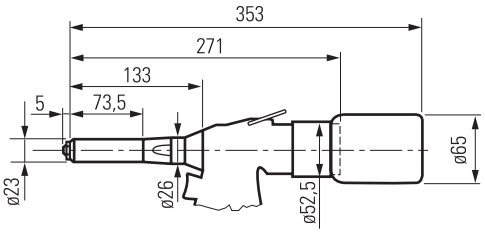
SETTING TOOL DATA

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

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SETTING TOOL
EXTOOL-030
Hydropneumatic Tool for Series LK / SK / SKC with Mandrel Collection Device



TECHNICAL DATA

TYPE	EXTOOL-030
Series	LK / SK / SKC
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

REQUIRED ACCESSORIES: Please select based on the diameter of your EXPANDERS

TYPE	ORDER NUMBER
Nosepiece LK600-040	300161993
Nosepiece Expander Ø 4.0	LK / SK 300161899 | SKC 300180305
Nosepiece Expander Ø 5.0	LK / SK 300161901 | SKC 300180306
Nosepiece Expander Ø 6.0	LK / SK 300161902 | SKC 300180307

Nosepieces not included

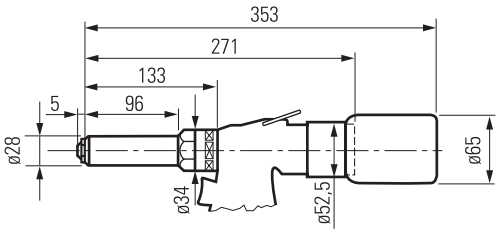
REPLACEMENT PARTS: Please select based on the diameter of your EXPANDERS

TYPE	ORDER NUMBER
Jaws Expander LK / SK and SKC Ø 4.0 - 6.0	300161883
Jaws case Expander LK / SK and SKC Ø 4.0 - 6.0	300161882
Jaws pusher Expander LK / SK and SKC Ø 4.0 - 6.0	300161884

Replacement parts included

SETTING TOOL
EXTOOL-040-1
Hydropneumatic Tool for Series LK / SK / SKC with Mandrel Collection Device





TECHNICAL DATA

TYPE	EXTOOL-040-1
Series	LK / SK / SKC
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

REQUIRED ACCESSORIES: Please select based on the diameter of your EXPANDERS

TYPE	ORDER NUMBER
Nosepiece Expander Ø 7.0	LK / SK 300161911 | SKC 300180308
Nosepiece Expander Ø 8.0	LK / SK 300161912
Nosepiece Expander Ø 9.0	LK / SK 300161913
Nosepiece Expander Ø 10.0	LK / SK 300161914

Nosepieces not included

REPLACEMENT PARTS: Please select based on the diameter of your EXPANDERS

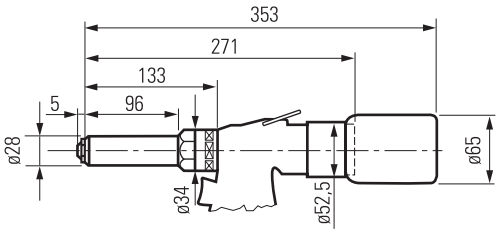
TYPE	ORDER NUMBER
Jaws Expander LK / SK and SKC Ø 7.0 - 10.0	300161903
Jaws case Expander LK / SK and SKC Ø 7.0 - 10.0	300161900
Jaws pusher Expander LK / SK and SKC Ø 7.0 - 10.0	300161905

Replacement parts included

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SETTING TOOL
EXTOOL-040-2
Hydropneumatic Tool for Series LK / SK with Mandrel Collection Device



TECHNICAL DATA

TYPE	EXTOOL-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

REQUIRED ACCESSORIES: Please select based on the diameter of your EXPANDERS

TYPE	ORDER NUMBER
Nosepiece Expander Ø 12.0	LK / SK 300161931
Nosepiece Expander Ø 14.0	LK 300161932
Nosepiece Expander Ø 16.0	LK 300161933

Nosepieces not included

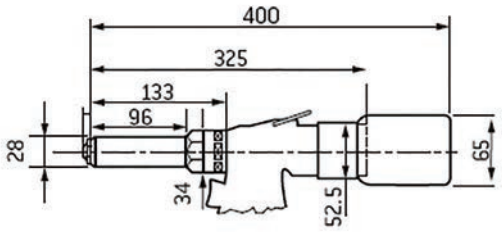
REPLACEMENT PARTS: Please select based on the diameter of your EXPANDERS

TYPE	ORDER NUMBER
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
Jaws pusher Expander LK / SK and SKC Ø 7.0 - 10.0	300161905

Replacement parts included

SETTING TOOL
EXTOOL-050
Hydropneumatic Tool for Series LK with Mandrel Collection Device





TECHNICAL DATA

TYPE	EXTOOL-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

REQUIRED ACCESSORIES: Please select based on the diameter of your EXPANDERS

TYPE	ORDER NUMBER
Nosepiece Expander Ø 18.0	LK 300179935
Nosepiece Expander Ø 20.0	LK 300179938

Nosepieces not included

REPLACEMENT PARTS: Please select based on the diameter of your EXPANDERS

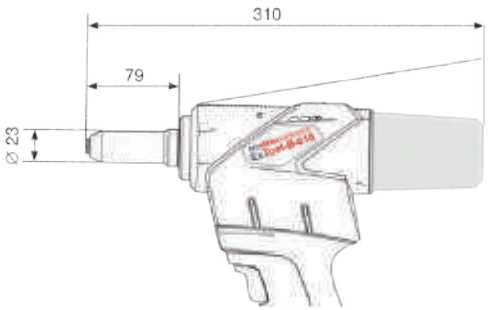
TYPE	ORDER NUMBER
Jaws Expander LK Ø 18.0 - 20.0	300179934
Jaws case Expander LK Ø 18.0 - 20.0	300179921
Jaws pusher Expander LK Ø 18.0 - 20.0	300179922

Replacement parts included

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SETTING TOOL
EXTOOL-B-010
Battery Tool for Series LK / SK / SKC with Mandrel Collection Device



TOOL EQUIPMENT: (2 Batteries, fast charging base and hard case included)

TYPE	EXTOOL-050
Series	LK / SK / SKC
Order number	300179894
Weight	2.0 kg (with battery)
Pull force	24 kN
Working stroke	30 mm
Noise level	78.8 dB
Nominal voltage	20 V
Capacity	Li-Ion 2.0 Ah
Charging Time	90% in 22 min / 100% in 30 min

REQUIRED ACCESSORIES: Please select based on the diameter of your EXPANDERS

TYPE	EQUIPMENT KIT	NOSEPIECES
Series	LK / SK / SKC	LK / SK / SKC
Equipment Ø 4.0 - 6.0 (nosepiece not included)	300179925	
Nosepiece Expander Ø 4.0		LK / SK 300161899 | SKC 300180305
Nosepiece Expander Ø 5.0		LK / SK 300161901 | SKC 300180306
Nosepiece Expander Ø 6.0		LK / SK 300161902 | SKC 300180307
Equipment Ø 7.0 - 10.0 (nosepiece not included)	300179926	
Nosepiece Expander Ø 7.0		LK / SK 300161911 | SKC 300180308
Nosepiece Expander Ø 8.0		300161912 (LK only)
Nosepiece Expander Ø 9.0		300161913 (LK only)
Nosepiece Expander Ø 10.0		300161914 (LK only)
Equipment Ø 12.0 - 16.0 (nosepiece not included)	300179927 (LK only)	
Nosepiece Expander Ø 12.0		300161931 (LK only)
Nosepiece Expander Ø 14.0		300161932 (LK only)
Nosepiece Expander Ø 16.0		300161933 (LK only)


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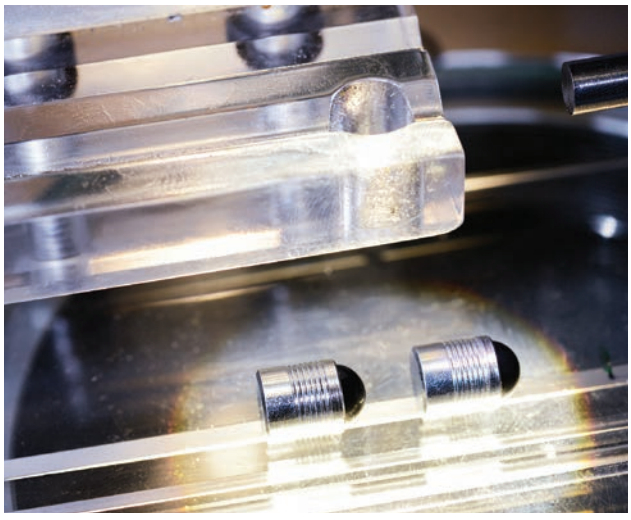
TECHNICAL INFORMATION

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 custom engineered solutions to meet your individual needs.

CHAPTER CONTENTS

72	Test Pressure
73	Base Materials / Installation Requirements
74 – 75	Pressure Performance
76 – 77	Anchoring Principle
78 – 81	Installation Instructions
82 – 84	Design Guidelines
85 – 86	Galvanic Corrosion
87 – 90	KOENIG CHECK VALVE®
91	KOENIG RESTRICTOR®
92 – 93	KOENIG EXPANDER® Systems / Product Comparison
94	Hardness Conversion Table for Hardenable Carbon and Low Alloy Steel



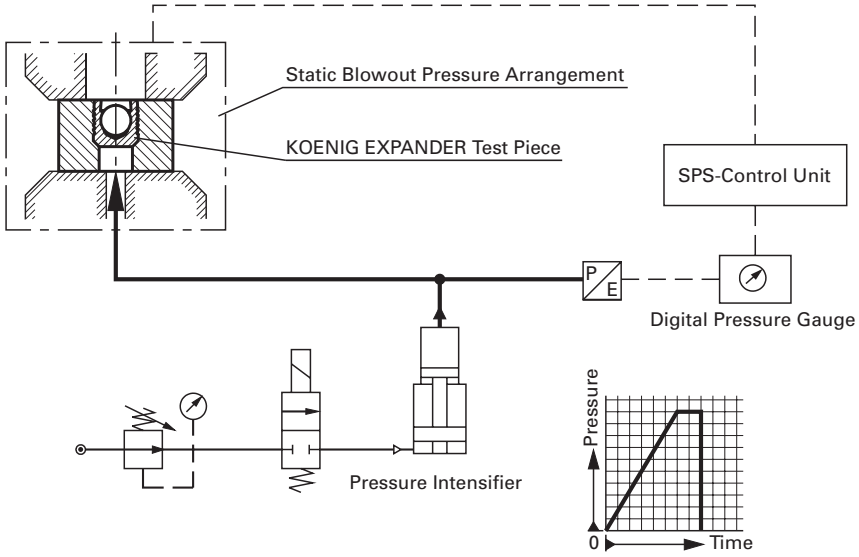


KOENIG EXPANDER® TEST PRESSURE

TEST PRESSURE Ⓐ

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.

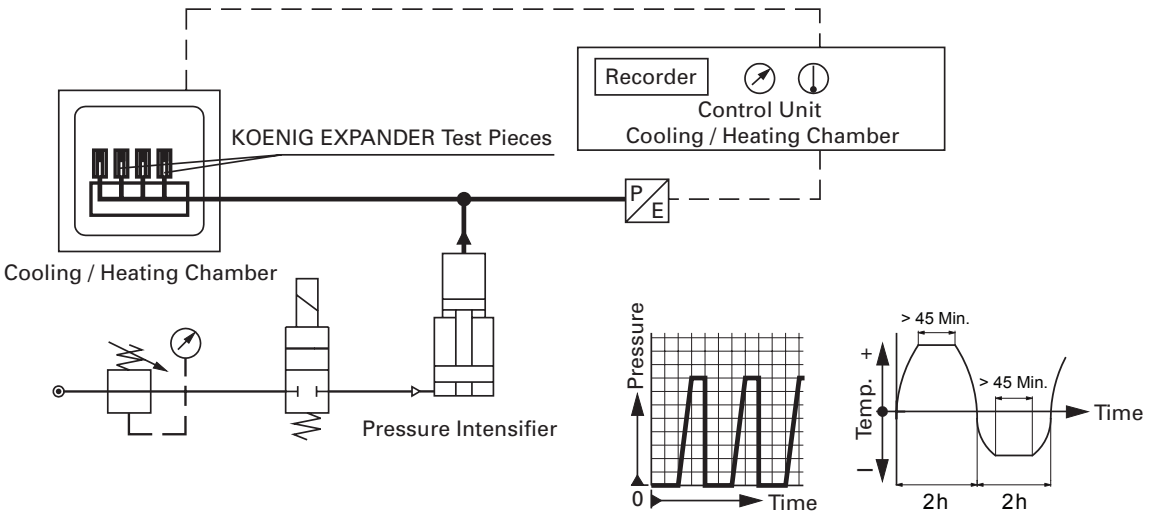


TEST PRESSURE, TEST Ⓑ

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: > 45 min. at +100°C (Series LK partially at +150°C) / > 45 min. at -40°C
- Pressure: Intermittent, 24 sec. 0 bar / 36 sec. proof pressure (10,000 cycles)
- 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



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BASE MATERIALS / INSTALLATION REQUIREMENTS

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

	Base Material of the Installation	Tensile Strength Rm [N/mm2]	Elongation A5 [%]	Yield Strength Rp0.2 [N/mm2]	Hardness HB
❶	**High Strength Steel ETG-100 / 44SMn28 AISI 1144**	960 - 1000	6	min. 865	320 avg.
❷	**Case Hardened Steel C15Pb / 1.0403 AISI 10L15**	430 - 730	10	min. 280	200 avg.
❸	**Ductile Cast Iron EN 1563: GJS-600-3 ASTM A536: 80-60-03**	min. 600	3	min. 370	200 - 290
❹	**Ductile Cast Iron (Dura-Bar®) EN 1563: GJS-450-10 ASTM A536: 65-45-12**	450 avg.	12	310 avg.	131 - 217
❺	**Gray Cast Iron EN 1561: GJL-250 ASTM A48: NO.35**	350 avg.	0.3	165 - 228	160 - 250
❻	**Aluminum-Alloy AlCu4Mg1 / EN AW-2024-T3 AA: 2024 T4/T6***	min. 450	8	min. 310	120 avg.
❼	**Aluminum-Alloy AlMgSiPb / EN AW-6012-T6 AA: 6012-T6**	min. 310	8	min. 260	105 avg.
❽	**Cast Aluminum-Alloy G-AlSi7Mg / 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 high-strength aluminum alloys, 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 10^6 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 ETG-100 / 44SMn28 AISI 1144	② C15Pb / 1.0403 ~ SAE 1015 (10L15)	③ EN 1563: GJS-600-3 ASTM A536: 80-60-03	⑤ EN 1561: GJL-250 ASTM A48: NO.35	⑥ AlCu4Mg1 / EN AW-2024-T3 AA: 2024 T4/T6*	⑦ AlMgSiPb / EN AW-6012-T6 AA: 6012-T6	⑧ G-AlSi7Mg / 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_z 10 – 30 µm				Anchorage in Base Metal		

Series MB 600 Inch	Base Material of the Installation						
	① ETG-100 / 44SMn28 AISI 1144	② C15Pb / 1.0403 ~ SAE 1015 (10L15)	③ EN 1563: GJS-600-3 ASTM A536: 80-60-03	⑤ EN 1561: GJL-250 ASTM A48: NO.35	⑥ AlCu4Mg1 / EN AW-2024-T3 AA: 2024 T4/T6*	⑦ AlMgSiPb / EN AW-6012-T6 AA: 6012-T6	⑧ 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
Hole Tolerance	Ø 0.093 0 / +0.002 Inch from Ø 0.125 0 / +0.004 Inch						
Hole Roughness	R_z 10 – 30 µm				Anchorage in Base Metal		

Series MB 700 mm	Base Material of the Installation						
	① ETG-100 / 44SMn28 AISI 1144	② C15Pb / 1.0403 ~ SAE 1015 (10L15)	③ EN 1563: GJS-600-3 ASTM A536: 80-60-03	⑤ EN 1561: GJL-250 ASTM A48: NO.35	⑥ AlCu4Mg1 / EN AW-2024-T3 AA: 2024 T4/T6*	⑦ AlMgSiPb / EN AW-6012-T6 AA: 6012-T6	⑧ G-AlSi7Mg / 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_z 10 – 30 µm				Anchorage in Base Metal		

Series MB 850 mm	Base Material of the Installation						
	① ETG-100 / 44SMn28 AISI 1144	② C15Pb / 1.0403 ~ SAE 1015 (10L15)	③ EN 1563: GJS-600-3 ASTM A536: 80-60-03	⑤ EN 1561: GJL-250 ASTM A48: NO.35	⑥ AlCu4Mg1 / EN AW-2024-T3 AA: 2024 T4/T6*	⑦ AlMgSiPb / EN AW-6012-T6 AA: 6012-T6	⑧ G-AlSi7Mg / 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_z 10 – 30 µm				R_z 10 – 30 µm	Anchorage in Base Metal	

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-AlSi7Mg / 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_z 10 – 30 µm			Anchorage in Base Material	

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-AlSi7Mg / 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_z 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 Principle related to the base materials on page 76.

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PRESSURE PERFORMANCE

Series SK / SKC / LK / RE

Series SK / SKC mm	Base Material of the Installation						
	❶ ETG-100 / 44SMn28 AISI 1144	❷ C15Pb / 1.0403 ~ SAE 1015 (10L15)	❸ EN 1563: GJS-600-3 ASTM A536: 80-60-03	❺ EN 1561: GJL-250 ASTM A48: NO.35	❻ AlCu4Mg1 / EN AW-2024-T3 AA: 2024 T4/T6*	❼ AlMgSiPb / EN AW-6012-T6 AA: 6012-T6	❽ 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
Hole Tolerance	0 /+0.12 mm						
Hole Roughness	R_z 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 LK 600 mm	Base Material of the Installation						
	❶ ETG-100 / 44SMn28 AISI 1144	❷ C15Pb / 1.0403 ~ SAE 1015 (10L15)	❸ EN 1563: GJS-600-3 ASTM A536: 80-60-03	❺ EN 1561: GJL-250 ASTM A48: NO.35	❻ AlCu4Mg1 / EN AW-2024-T3 AA: 2024 T4/T6*	❼ AlMgSiPb / EN AW-6012-T6 AA: 6012-T6	❽ G-AlSi7Mg / 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_z 10 – 30 µm					Anchorage in Base Metal	

❶❷❸❺ Temperature range for proof pressure test Ⓑ: – 40 °C to + 150 °C ❻❼❽ Temperature range for proof pressure test Ⓑ: – 40 °C to + 100 °C

Series LK 950 mm	Base Material of the Installation						
	❶ ETG-100 / 44SMn28 AISI 1144	❷ C15Pb / 1.0403 ~ SAE 1015 (10L15)	❸ EN 1563: GJS-600-3 ASTM A536: 80-60-03	❺ EN 1561: GJL-250 ASTM A48: NO.35	❻ AlCu4Mg1 / EN AW-2024-T3 AA: 2024 T4/T6*	❼ AlMgSiPb / EN AW-6012-T6 AA: 6012-T6	❽ G-AlSi7Mg / 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_z 10 – 30 µm					R_z 10 – 30 µm	Anchorage in Base Metal

❶❷❸❺ Temperature range for proof pressure test Ⓑ: – 40 °C to + 150 °C ❻❼❽ 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			
	❶ ETG-100 / 44SMn28 AISI 1144	❹ EN 1563: GJS-450-10 ASTM A536: 65-45-12	❻ AlCu4Mg1 / EN AW-2024-T3 AA: 2024 T4/T6*	❽ 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			

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_z = 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_z = 10 to 30 µm.**

See Anchorage Principle related to the base materials on page 76.

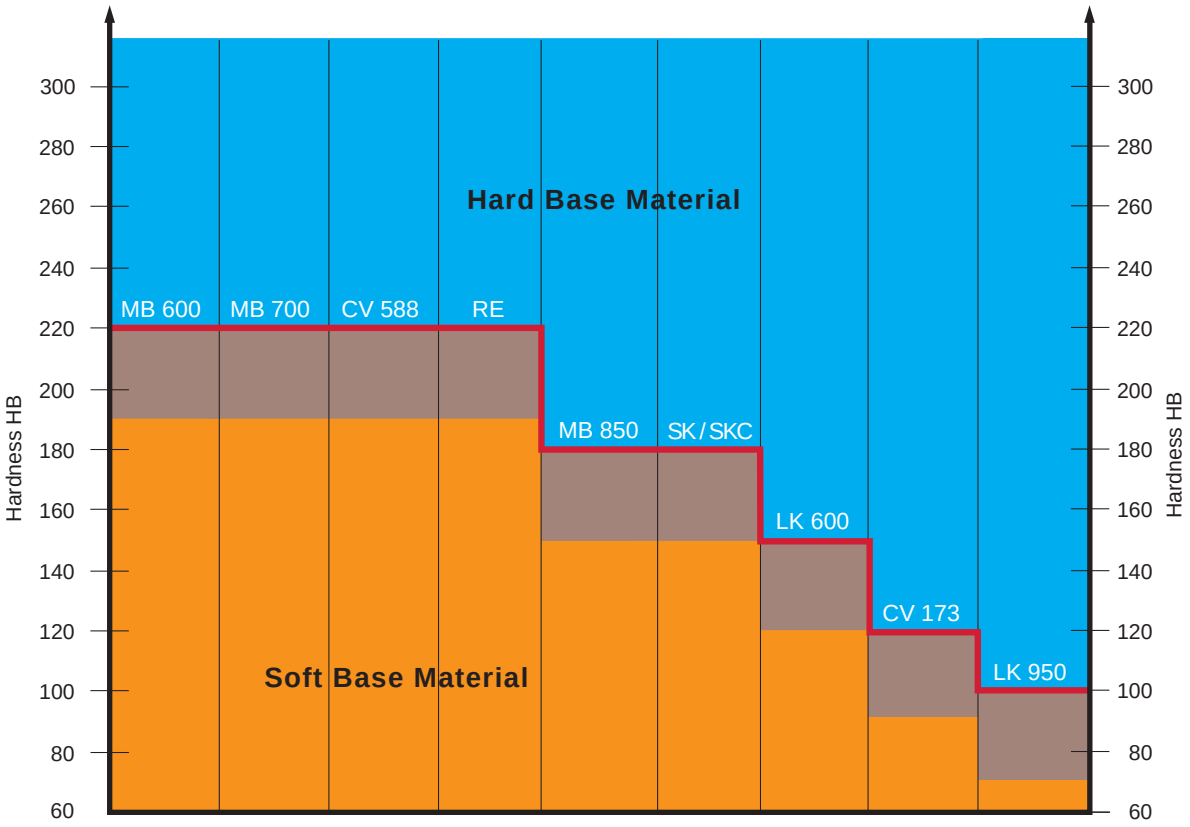
ANCHORAGE PRINCIPLE

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®

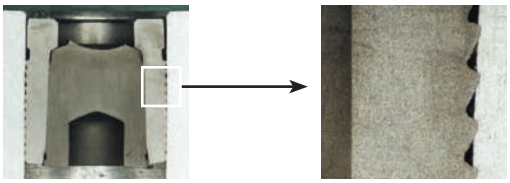
Base Material Harder than Expander: To achieve the allowable working pressure, anchorage to the bore roughness of the base material is required.
Roughness R_z = 10 – 30 µm.

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®.

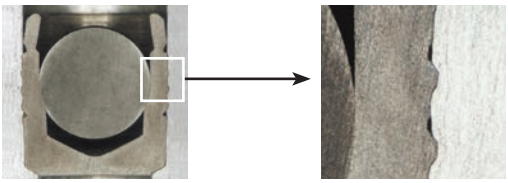
Transition Zone: To achieve the allowable working pressure, anchorage to the bore roughness of the base material is required.
Roughness R_z = 10 to 30 µm.

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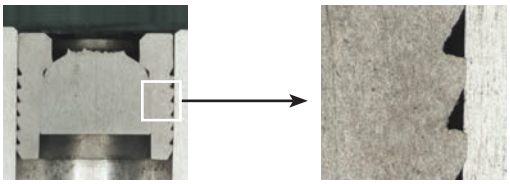
ANCHORAGE PRINCIPLE



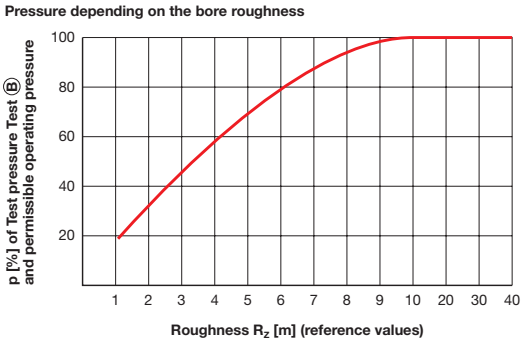
Anchorage due to plug sleeve serrations
KOENIG EXPANDER® **Series SK / SKC**
In aluminum-alloy HB = 90



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

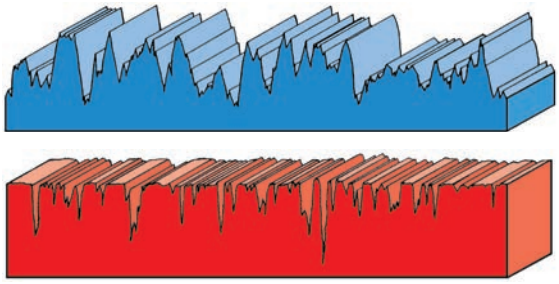


Sufficient anchorage due to plug sleeve serrations
KOENIG EXPANDER® **Series LK 950**
In aluminum-alloy HB = 90



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 = 10–30 µm. At a roughness greater than R_z = 30 µm 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 / CV

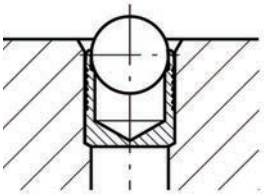


Fig. 1

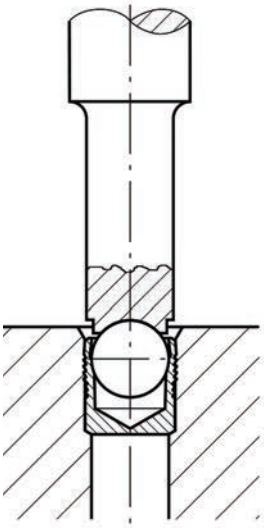


Fig. 2

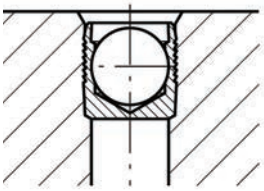


Fig. 3

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 µm 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

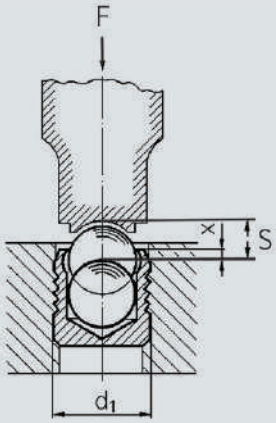
- With the ball facing out the KOENIG EXPANDER® is inserted in the counterbored hole. The top sleeve should not be above the surface of the base material (Fig. 1).
- With only a slight or no counterbore, the base of the sleeve must be adequately supported during installation.
- The ball can now be pressed 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 / 700 / 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) ±0.2	Position of Top of Ball Relative to Top of Sleeve	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) 0/-0.012	Position of Top of Ball Relative to Top of Sleeve	Flush to .012 Below the Sleeve						

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INSTALLATION INSTRUCTIONS FOR SERIES MB / CV

PLUG REMOVAL

With KOENIG EXPANDER® MB / CV 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
CV 173/CV 588 (all sizes)	Ball HB ~ 250	High Speed Steel 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®.

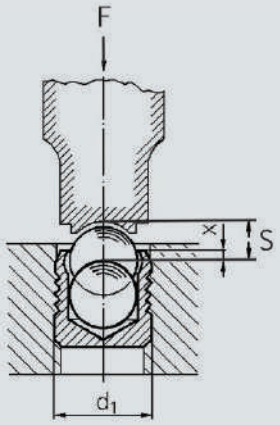
Note:
After plug removal always use the next larger size plug.

INSTALLATION CHART

Series CV 173 / 588										
d1 (mm)		3	4	5	6	7	8	9	10	12
S (mm)	Stroke (approx. values)	1.0	1.4	1.9	2.3	2.8	3.4	3.7	4.2	5.1
X (mm) ±0.1	Position of Top of Ball Relative to Top of Sleeve	Flush to .02 Below the Sleeve								

Series CV 173 / 588 Inch-Version											
d1 (inch)		.156	.187	.218	.250	.281	.312	.343	.375	.406	.437
S (in)	Stroke (approx. values)	.053	.066	.078	.094	.110	.129	.140	.153	.162	.166
X (in) ±0.004	Position of Top of Ball Relative to Top of Sleeve	.080	Flush to .010 Below the Sleeve								

Series CV 173 / 588 Inch Short										
d1 (inch)		.125	.156	.187	.218	.250	.281	.312	.343	.406
S (in)	Stroke (approx. values)	.042	.040	.066	.063	.083	.091	.107	.118	.143
X (in) ±0.004	Position of Top of Ball Relative to Top of Sleeve	.007	.000	.010	.000					-.010



INSTALLATION INSTRUCTIONS FOR SERIES SK / SKC

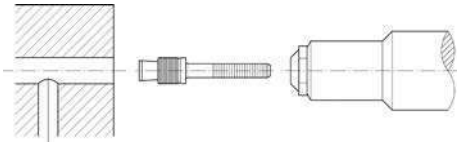


Fig. 1

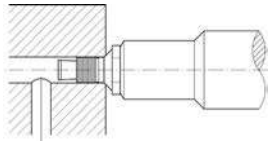


Fig. 2

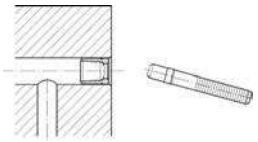


Fig. 3

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 = 10–30 µm 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 / SKC 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.

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INSTALLATION INSTRUCTIONS FOR SERIES LK

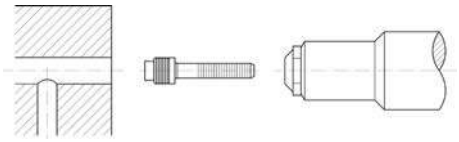


Fig. 1

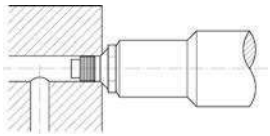


Fig. 2

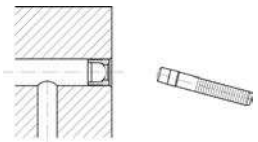


Fig. 3

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
   - ≥ 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 = 10–30 µm 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.

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.

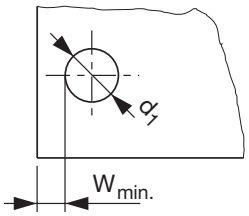
PROCEDURE:

- 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®.

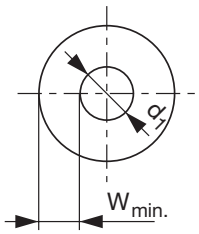
Note:
After plug removal always install the next larger size plug.

DESIGN GUIDELINES

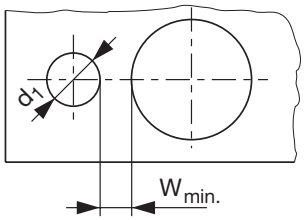
Distance to External Wall



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 µm 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 / CV / SK /SKC

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

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

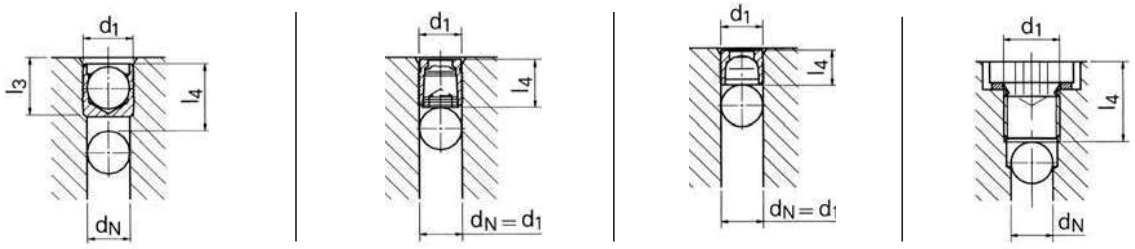
KOENIG EXPANDER® diameters Series LK / RE

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

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

		❶	❷	❸	❺	❻	❼	❽
	Description	ETG100	C15Pb	EN-GJS-600-3	EN-GJL-250	AlCu4Mg1	AlMgSiPb	G-AlSi7Mg
Base Material	Avg. Tensile Strength RM [N/mm²]	1000	560	650	300	480	340	260
	Minimum Elongation A5 [%]	6	10	3	0.3	8	8	2
	Avg. Ultimate Strength Rp 0.2 [N/mm²]	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 Ø4-12		0.5	0.6	0.6	1.0	0.8	1.0	1.0
SKC Ø4		0.4	0.5	0.5	1.0	0.8	0.9	0.9
SKC Ø5		0.4	0.5	0.5	1.0	0.8	0.8	0.8
SKC Ø6		0.5	0.6	0.7	1.0	0.9	1.0	1.0
SKC Ø7		0.5	0.7	0.7	1.2	1.2	1.2	1.2
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

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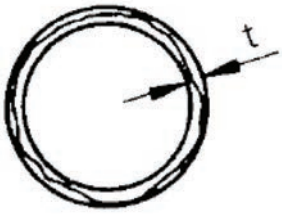
d_N	Series MB / CV			Series SK / SKC		Series LK		Threaded Plugs DIN 908	
	Expander Size d_1	l_3 min.	l_4 min.	d_1	l_4 max.	d_1	l_4 max.	d_1	l_4 max.
2.0	3.0	3.4	5.0						
3.0	4.0	3.8	5.5						
4.0	5.0	5.3	7.0	4.0	6.5	4.0	4.0		
5.0	6.0	6.3	8.5	5.0	7.5	5.0	4.8	M8x1.5	11.5
6.0	7.0	7.3	9.5	6.0	8.5	6.0	5.3	M8x1.5	11.5
7.0	8.0	8.3	11.0	7.0	9.5	7.0	5.8	M10x1.5	12.0
8.0	9.0	9.8	12.5	8.0	10.5	8.0	6.8	M10x1.5	12.0
9.0	10.0	10.8	13.5	9.0	11.0	9.0	6.8	M12x1.5	16.0
10.0	12.0	12.8	16.0	10.0	12.5	10.0	6.8	M12x1.5	16.0
12.0	14.0	14.5	18.0	12.0	16.5	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 / CV**

The required installation length (l_4) min. for MB / CV plugs is for base materials with hardness greater than HB = 90.
For softer materials, deeper installation is required.

DESIGN GUIDELINES



ROUNDNESS TOLERANCE

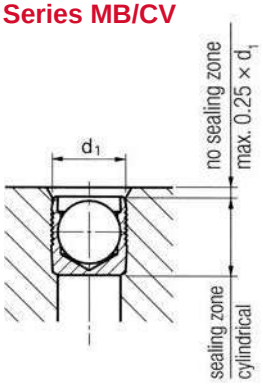
To ensure reliable functioning of the KOENIG EXPANDER® with regard to pressure performance and to ensure leak tight sealing, a **roundness tolerance of t = 0.05 mm** must be held.

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.

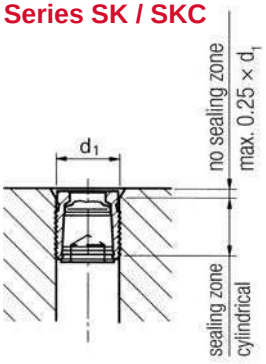
CONICITY OF THE BORE

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 x d_1 (LK: 0.15 x d_1)** because this area has no significant effect on the sealing function.

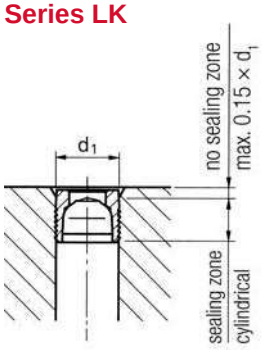
Series MB/CV



Series SK / SKC



Series LK



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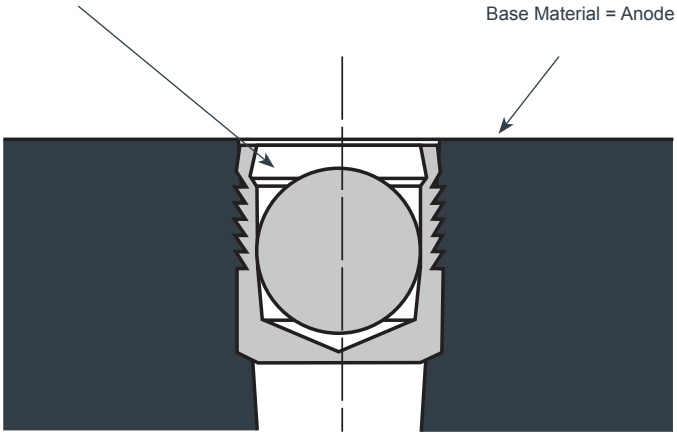
GALVANIC CORROSION

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.

Cathode **Anode**

KOENIG EXPANDER® = Cathode

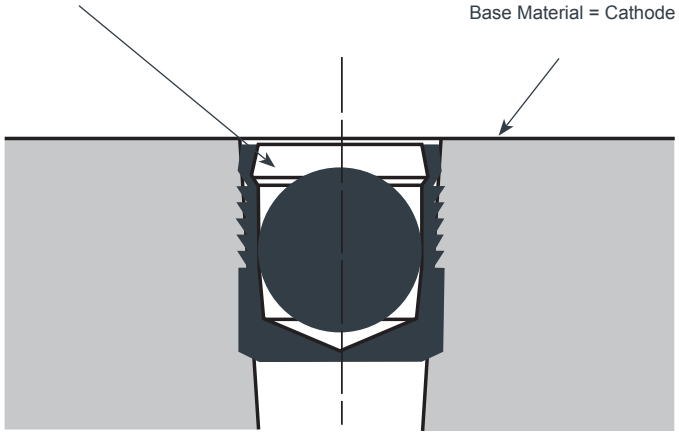
Base Material = Anode



Large Anode Area —> Low Current Density at the Anode —> **Slow Corrosion**

KOENIG EXPANDER® = Anode

Base Material = Cathode



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/SKC	LK 600	LK 950	BF/BR	RE
Steel, Carbon/Low Alloy, Plain										
Steel, Carbon/Low, Zn Plated, Chromate			■	■						
Steel, Carbon/Low Alloy, Phosphatized										
Nitrated 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

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INSTALLATION INSTRUCTIONS FOR KOENIG CHECK VALVE®

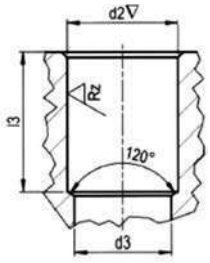


Fig. 1

Before Installation

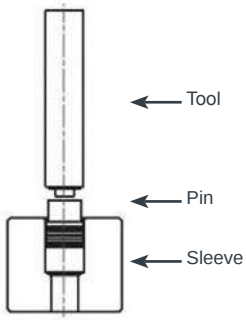


Fig. 2

After Installation


Fig. 3

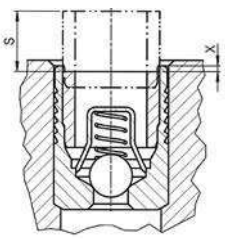


Fig. 4 (Reverse Flow)

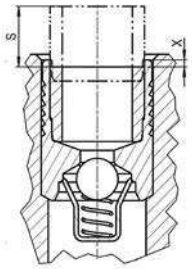


Fig. 5 (Forward Flow)

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®.

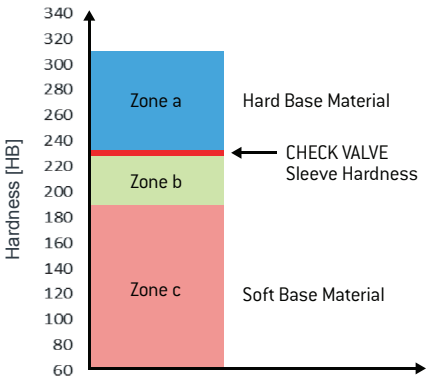
PRESS

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.



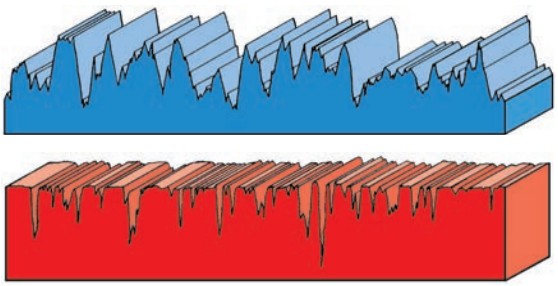
Zone a – Hard Base Material (HB > 220)
To achieve the allowable working pressure, anchorage to the bore roughness of the base material is required.
Roughness R_z = 10 – 30 µm.

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 µm.

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.

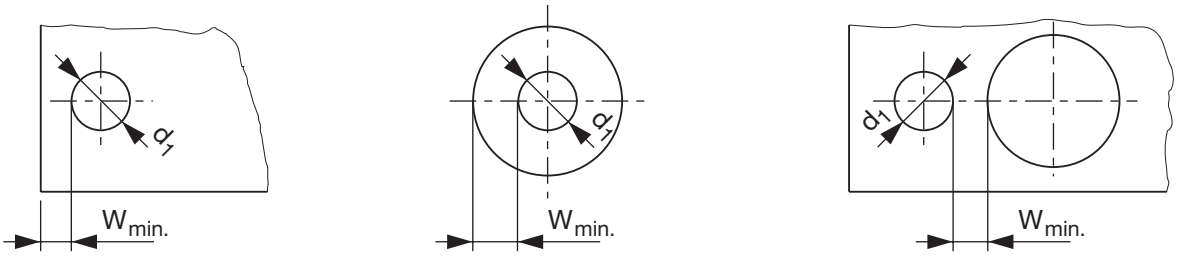
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DESIGN GUIDELINES FOR KOENIG CHECK VALVE®

WALL THICKNESS / DISTANCE FROM EDGE:

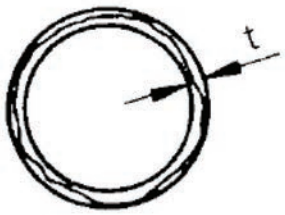
As the radial expansion of the KOENIG CHECK VALVE® sleeve occurs, the base material in which it anchors plastically deforms. The resultant strength, as well as the hydraulic pressure and temperature service conditions depending on the characteristics of the base material, require a minimum wall thickness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

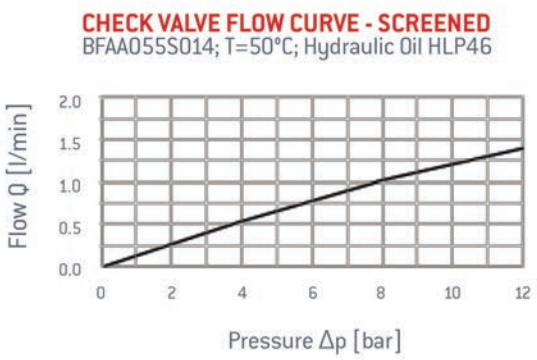
CONICITY OF THE BORE

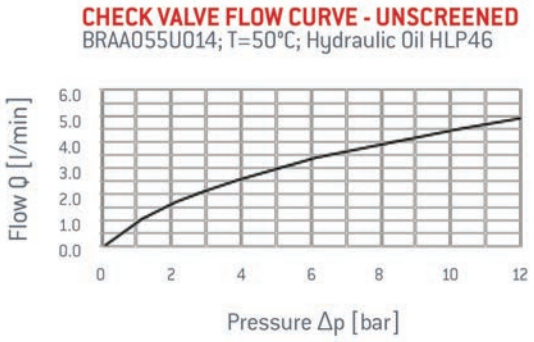
Within the effective anchorage area of the KOENIG CHECK VALVE®, the bore must be in accordance with the dimensional sheets. The bore lead in can be chamfered up to a depth of 0.25 x d_1 (check valve diameter) because this area has no significant effect on the anchorage function.

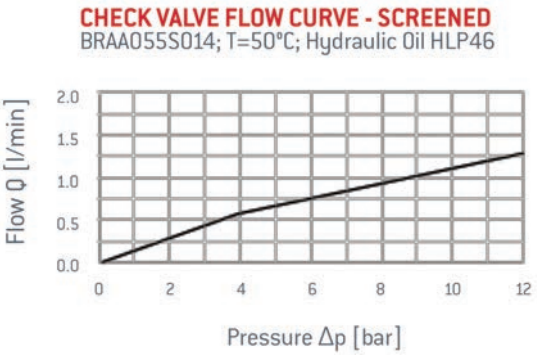
TECHNICAL INFORMATION FOR KOENIG CHECK VALVE®

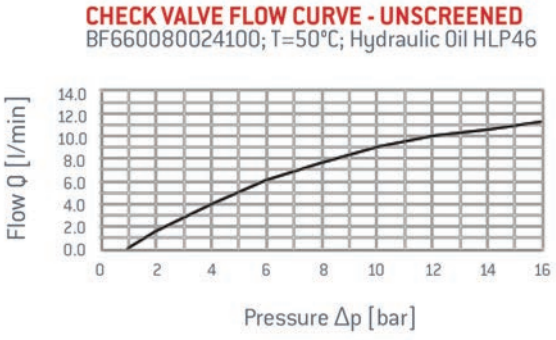
FLOW CURVES

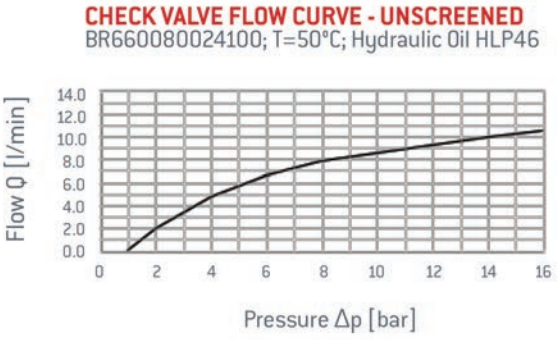












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TECHNICAL INFORMATION KOENIG RESTRICTOR®

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:

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

To calculate restrictor flow rate in mm:

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

Where:

dorifice > Orifice diameter, measured in mm
Q > Fluid flow rate, measured in liters/minute
Δp > 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

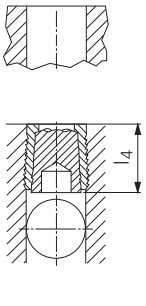
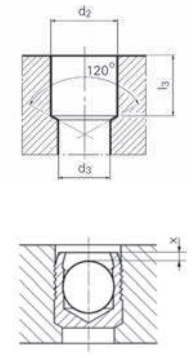
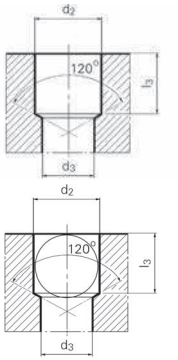
To calculate orifice length in mm:

L = (Ø x 0.207) + t
L = length of orifice (mm)
Ø = orifice diameter (mm)
t = see chart to right
Tolerance: +/– ((Ø x 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

SFC KOENIG EXPANDER® SYSTEMS / PRODUCT COMPARISON

SFC KOENIG EXPANDER® SYSTEMS / PRODUCT COMPARISON

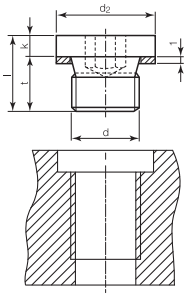
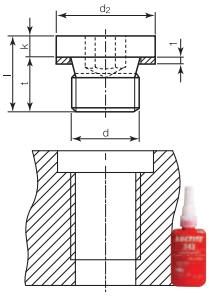
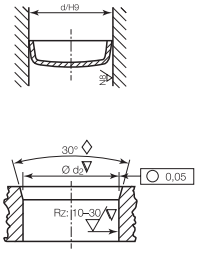
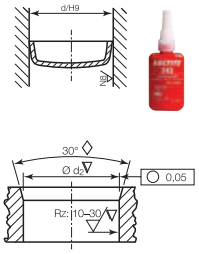
Type of Sealing Element	Expander Series SK/SKC/LK	Expander Series MB/CV	Ball
Operations			
Bore	■	■	■
Bore (step)	□	■	□
Chamfering	□	□	■
Face Milling	□	□	(■[2)])
Reaming	□	□	■
Tapping	□	□	□
Cleaning	■	■	■
Placing Sealant on Screw	□	□	□
Positioning of Element	■ By Setting Tool	■ Put Into Bore	■
Setting of Sealing Element	■ By Pulling the Mandrel	■ By Setting Tool	■ By Setting Tool
Cramping	□	□	■
Torque Check (in line)	□	□	□
Insertion-Control	(■[1)])	(■[1)])	(■[1)])
Pressure Test	□ Upon Request Only	□ Upon Request Only	■
Total No. of Operation	**4** (5)	**5** (6)	**8** (10)
Warranty by Supplier	Provided	Provided	None
Expander Diameter Available	4 –12/4 –20 mm	3 –22/4 –18 mm	

[1)] = Optional Control Unit [2)] = In Dependance on Assembly □ = Unnecessary ■ = Necessary

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SFC KOENIG EXPANDER® SYSTEMS / PRODUCT COMPARISON

SFC KOENIG EXPANDER® SYSTEMS / PRODUCT COMPARISON

Type of Sealing Element	Set Screw	Screwed Sealing Plug (metallic sealing)	Screwed Plug with Sealant (e.g. Loctite)	DIN Plug	DIN Plug
Operations					
Bore	■	■	■	■	■
Bore (step)	□	■	■	□	□
Chamfering	■	■	■	■	■
Face Milling	□	□	□	(■[2)])	(■[2)])
Reaming	□	□	□	■	■
Tapping	■	■	■	□	□
Cleaning	■	■	■	■	■
Placing Sealant on Screw	■	□	■	□	■
Positioning of Element	■	■	■	■ By Setting Tool	■ By Setting Tool
Setting of Sealing Element	■	■	■	■ By Pressing In	■ By Setting In
Cramping	□	□	□	□	□
Torque Check (in line)	■	■[1)]	■[1)]	□	□
Insertion-Control	□	□	□	(■[1)])	(■[1)])
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

[1)] = Optional Control Unit [2)] = In Dependance on Assembly □ = Unnecessary ■ = Necessary

HARDNESS CONVERSION TABLE

For Hardening Carbon and Low Alloy Steel

Tensile Strength 2) N/mm²	Vickers Hardness (F≥98n)	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/mm²	Vickers Hardness (F≥98n)	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.

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