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Vysoklotlaké aplikace a hydaulika BIERI

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HIGH PRESSURE
& MICRO
Hydraulic Solutions

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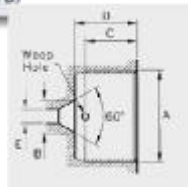
Novotného lávka
5.června 2019

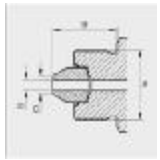
Hranice tlaku hydrauliky

≤ 320 bar – konvenční hydraulika, velmi široké portfolio prvků, kapalin , výkonů ..

≤ 630 bar – omezené portfolio prvků , řešitelné standardní potrubí, ….

≤ 1000 bar – velmi omezené portfolio prvků, bez proporcionální techniky, zcela jiné komponenty potrubí – hadic





≤ 7000 (10 000) bar – zcela jiná hydraulika i materiál komponentů

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Bieri Hydraulik AG

History / Milestones

- 1950 Foundation
- 1975 Development of BMH-1000 bar valve program
- 1991 Development of hydraulic-system of surgery tables
- 1997 Instroduction of standard hydraulic program
- 2003 AKP pump for Baker
- 2011 part of Hydac International

Figures 2017

- Turnover CHF 11.7 Mio.
- 60 Employees (7 R&D Ingenieure)
- Export approx. 90%
- R & D, sales and production in Switzerland

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Location

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Unsere Produkte
Our products

BIERI
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Pumpen
Pumps

- Axialkolbenpumpen
- *Axial piston pumps*

- Radialkolbenpumpen
- *Radial piston pumps*

- Mehrkreispumpen
- *Multi outlet pumps*

- Kombinationspumpen
- *Combination pumps*

Ventile
Valves

- Wegesitzventile
- *Seated valved*

- Stromventile
- *Flow control valves*

- Sperrventile
- *Shut-off valves*

- Druckventile
- *Pressure valves*

Aggregate
Power units

- Hochdruckaggregate
- *High pressure power units*

- Kompaktaggregate
- *Compact power units*

Systeme
Systems

- Komplette Hydraulik-systeme bestehend aus Aggregaten, Steuer-blöcken und Zylindern
- Complete hydraulic systems consisting of power units, control blocks and cylinders

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Pumpen
Pumps

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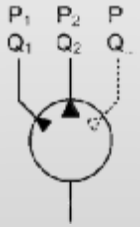
Radialkolbenpumpen
Radial piston pumps

- BRK501/2
  BRK701/2
  BRK11/12
  0,24 – 8,14 ccm/rev
  500 – 700 – 1000 bar

- SRK701/701
  0,47 – 8,14 ccm/rev
  700 bar
  500 – 1800 rpm

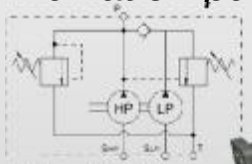
- HRK01/02/03/04
  0,12 – 1,88 ccm/rev
  700 bar
  (3600) 2000 rpm

Mehrkreispumpen
Multi outlet pumps



- MRK701/2
  max. 9 outlets
  0,16 – 3,62 ccm/outlet
  700 bar
  500 – 2000 rpm

Kombinationspumpen
Combination pumps



- BKP – MKP
  HP 0,24 – 8,14 ccm/rev
  LP 4,0 – 61,1 ccm/rev
  HP 500 – 700 – 1000 bar
  LP 160 – 250 bar

- SKPI
  HP 0,47 – 2,71 ccm/rev
  LP 4,5 – 14,0 ccm/rev
  HP 700 bar / LP 50 – 250 bar
  500 – 2000 rpm

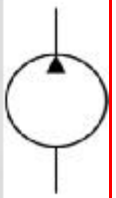
- KKP01/2/3/4/5
  HP 0,24 – 2,71 ccm/rev
  LP 0,94 – 5,43 ccm/rev
  HP 700 bar / LP 60 – 160 bar
  (3600) 2000 rpm

Axialkolbenpumpen
Axial piston pumps

- Axialkolbenpumpe
  Axial piston pump
  0,1 – 0,3 ccm/rev
  500 bar
  500 – 5000 rpm

- Micropumpen
  Micro pumps
  0,012 – 2,2 ccm/rev
  120 – 850 bar
  500 – 6000 rpm

BRK 500 / 700 / 1000 bar



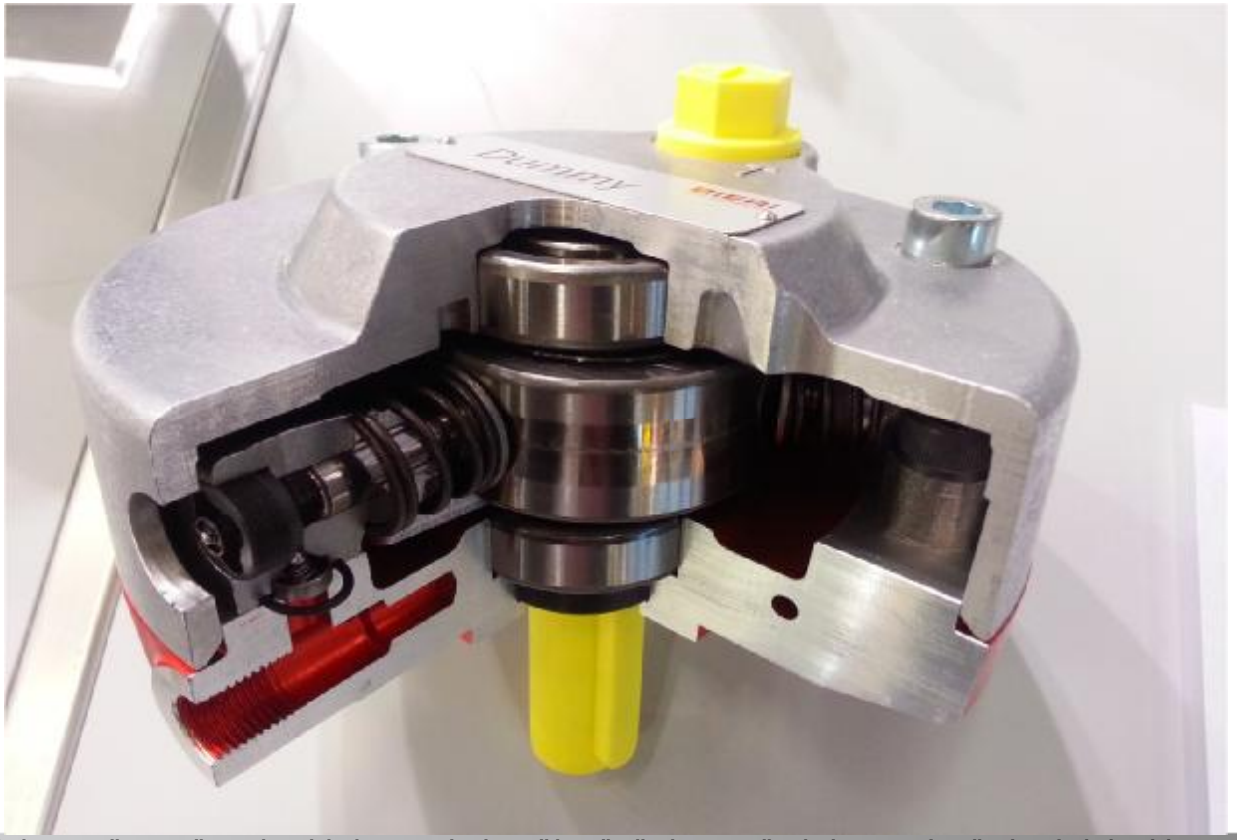
BRK 501 / 502 - 500 bar	BRK 701 / 702 - 700 bar	BRK 11 / 12 - 1000 bar
Pressure flange made of aluminum/steel	Pressure flange made of forged steel	Pressure flange drilled of heat treated steel
Bearing life time: > 500 h at constant pressure (BRK 501/502)	Bearing life time: > 1500 h at constant pressure (BRK 701/702)	Bearing life time: > 1500 h at constant pressure (BRK 11/12)
Vg = 0.24 – 8.14 ccm/rev	Vg = 0.24 – 8.14 ccm/rev	Vg = 0.47 – 4.40 ccm/rev

Cutaway-model BRK

Piston elements

Extender shaft

Roller bearing



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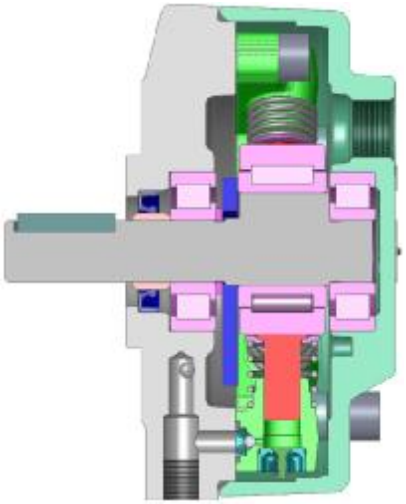
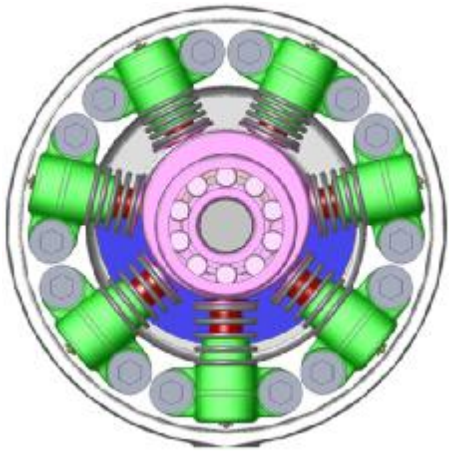
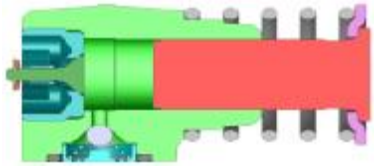
BRK–internals

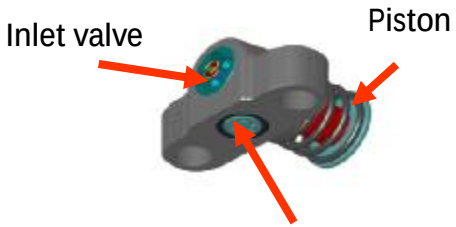




- 3, 5, 7 or 9 piston elements
- Low pulsation; k= 1.05 … 1.01
- Rotation speed: 500 – 2000 rev/min
- Each piston with own in- and outlet valve
- Each piston sucks and dispenses at each revolution
- No axial load
- Independent direction of rotation
- Low volumetric losses
- Each piston can dispense in an own circuit (multiport - MRK)

BRK piston elements (PEH)



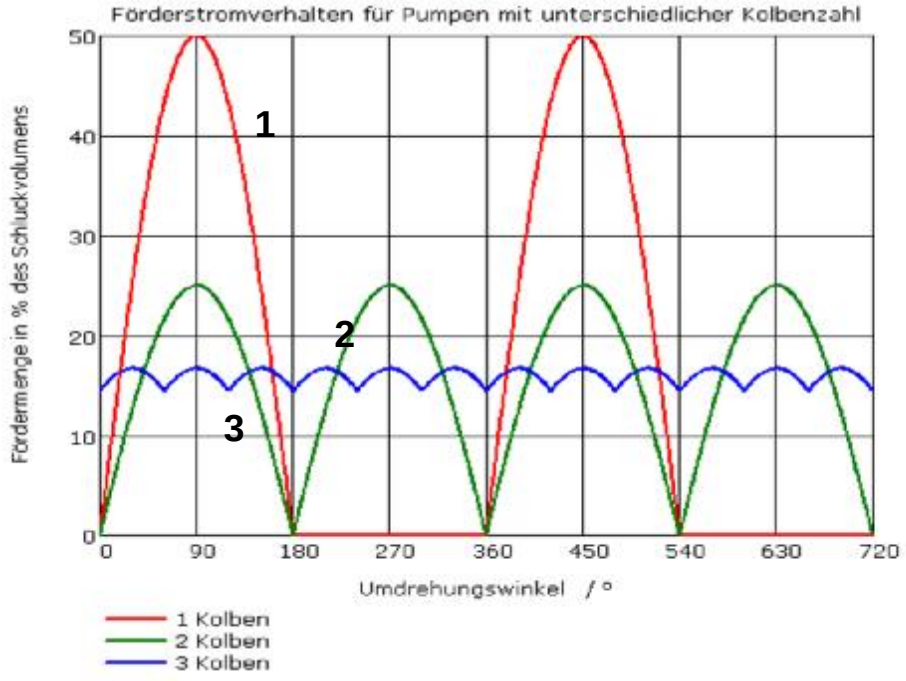


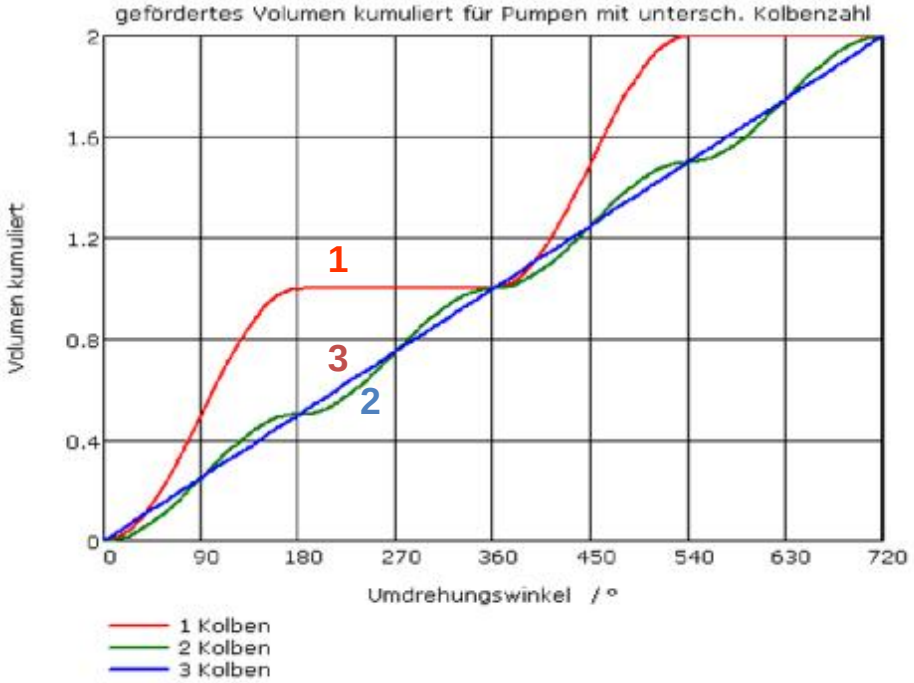
Piston diameter [mm]	ø 5	ø 6	ø 8	ø 9	ø 10	ø 12
. Displacement at stroke = 8mm [cm^3/rev]	0.157	0.226	0.402	0.509	0.628	0.905
Max. pressure [bar]	1000				900	850

- §Volum. efficiency: min. 90%; typical 98 ... 95%
- §Self-priming, self-venting
- §Speed range : 100 ... 2000 min^{-1}

Eccentric bearing limits pressure on 1000 / 700 / 500 bar each

Pump Pulsation–
Interdepence No of piston elements

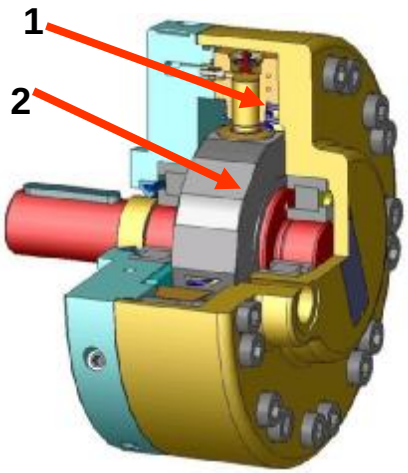




Brzda vysokonapěťových generátorů

BRK701

SRK 701/702 und SRK-ATEX –



Radial piston pump SRK

- Operating with low viscose media.
- 3-, 5-, 7-, 9- low friction piston elements with piston elements with low gliding speeds.

P: 700 bar

Vg / n: 0,47 → 8,14 cm3/rev; 500 → 1800 min-1

CE Ex II2G c T4

Radial piston pump SRK-ATEX

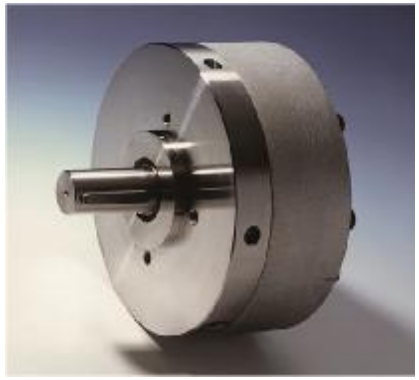
- Usage in explosive environments group II: gas, steam, haze (certification on request).

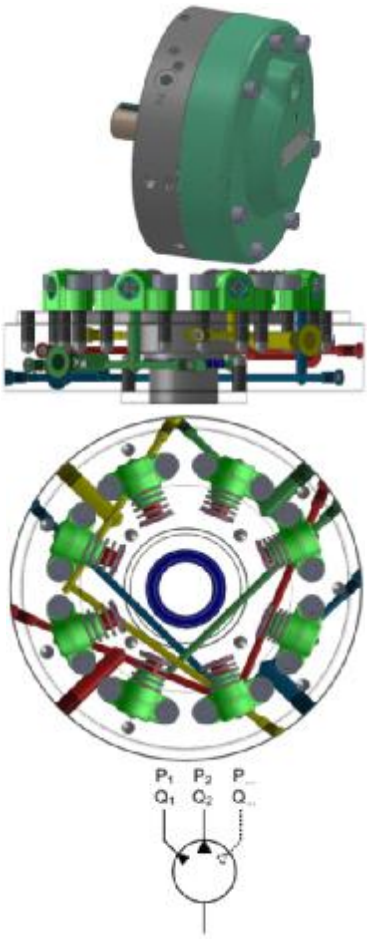
Design according BRK701/702 with additonal features:

- Polygon eccenter bearing: piston bases are on flats (2).
- Pistons are special coated (1)
- Reduced piston clearance by honing and pairing with piston cylinder
- Outlet valve with bigger diameter
- Roller bearing, even barrel roller bearing at SRK701.
- Temperature class T4 (max. 135°C)
- Bearing life time: min. 1500 h bei full load and normal lubrication

Vrtné soupravy - řízení

BRK
SRK-ATEX





Multi port pumps MRK

Multi port pumps MRK

Various outlet according customer's request, self-priming, self-venting, valve controlled, hgh volumetric efficiency, No of circuits: 2 - 9.

P	700 bar
Vg/circuit /n	0,16 - 3,62 cm3/rev; 500 - 2000 min-1

Characteristics according BRK701/702, in addition:

- Reduced pulsation in multi circuits by arrangement of piston elements
- Difference in displacements between various circuits < 2 %
- Combinable with gear pump -> MKP

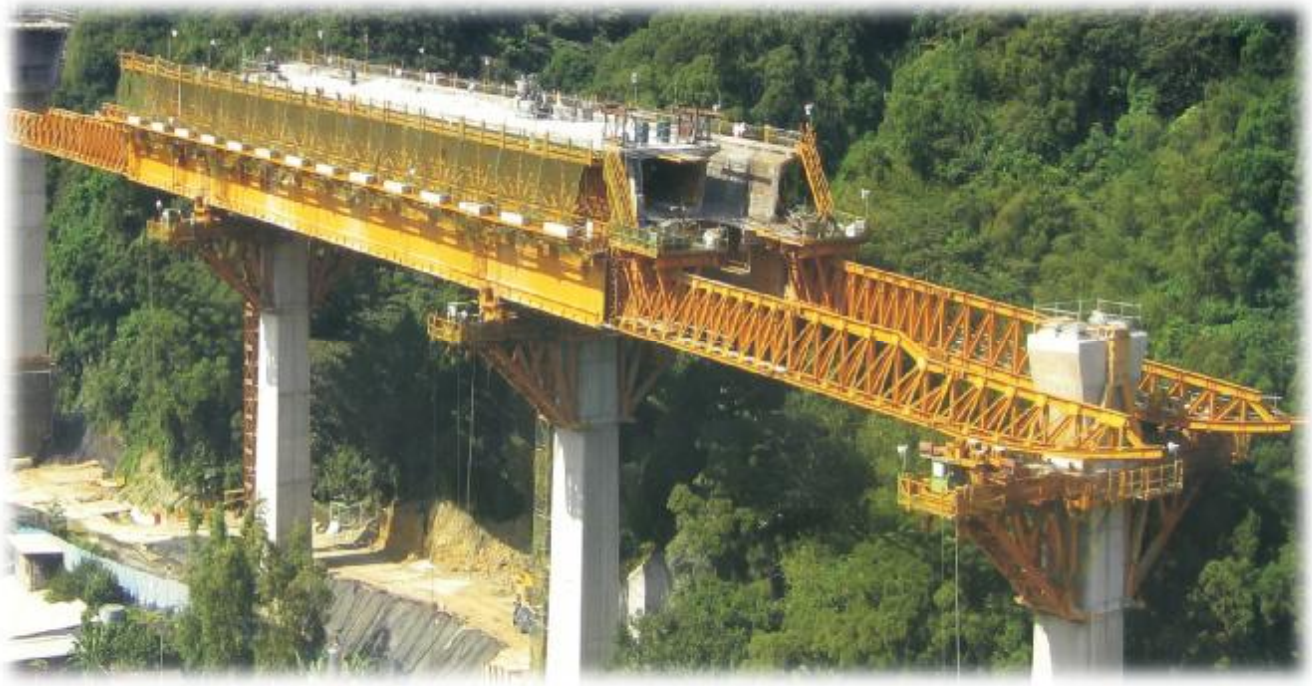
Applications

- Synchron lifting and launching systems (more precisely than flow devider)
- Various displacements on each circuit possible (on request)
- Hydraulic systems with different displacements and pressures
  - Where combination pumps need too much space
  - Where pulsation need to be low

Indication:

- 1 piston per circuit occur very strong pulsation, 2 pistons per circuit occur strong pulsation -> high noise
- Pumps with only 1 piston per circuit where only 1 circuit is under load will have very strong vibrations and very high noise (k = 3.1)

Synchronizované zvedání



Synchronised Lifting

HRK – Radial piston pump

Hollow shaft

Technical Data

§p	700 bar HP
§Vg	0,12 - 1,88 cm3/rev
§n	500 - 3600/2000 rev/min
§Flange IEC	Ø 150 – Ø 205 mm

4 Sizes

E-motor

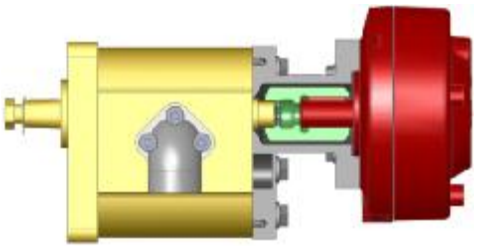
§ HRK01	stroke 6 mm	BG 71 small
§ HRK02	stroke 6 mm	BG 71
§ HRK03	stroke 8 mm	BG 90
§ HRK04	stroke 8 mm	BG 100/112

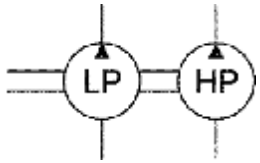
Test Benches – Material Testing

HRK

BKP Combination Pump

External tooth gear pump with flange-mounted BIERI radial piston pump





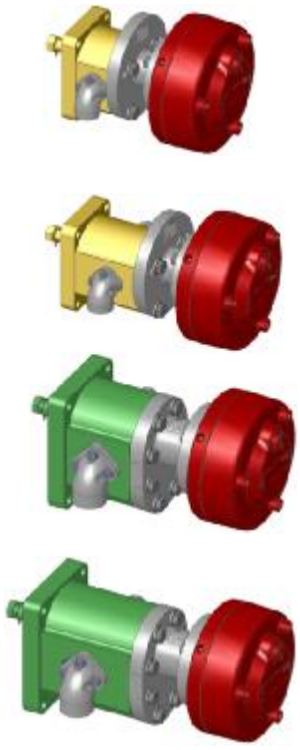
- Modular design with gear pump sets:

BKP11/12	and BRK11/12
BKP501/502	and BRK501/502
BKP701/702	and BRK701/702
MKP701/702	and MRK701/702

- Gear pump 2SP: 4.0 ... 26.0 cm^3/U
  combinable with:
  - BRK11, BRK501, BRK701, MRK701

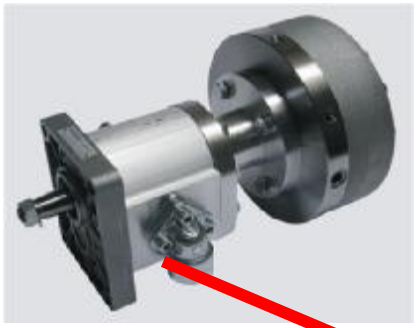
- Gear pump 3SP: 22.3 ... 61.1 cm^3/U
  combinable with:
  - BRK11, BRK501, BRK701, MRK701
  - BRK12, BRK502, BRK702, MRK702

- Shaft of gear pump is to transmit torque of overal performance
  This torque is limited



Filter Presses

BKP701-6,33-350-22,5-250



Heavy Lifting

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Summary

BIERI Pumps 500, 700, 1000 bar

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Radial piston pumps BRK

Self-priming, self-venting, valve controlled.
High volumetric efficiency. 3-, 5-, 7-, 9- Kolben.

P	500 bar, 700 bar, 1000 bar
Vg / n	0,24 - 8,14 cm3/U; 500 - 2000 min-1

Radial piston pumps SRK-ATEX

Ussage in explosive areas, ambient group II: gas, steam, mist (certificate on request).

P	700 bar
Vg / n	0,47 - 8,14 cm3/U; 500 - 1800 min-1

Radial piston pumps SRK

Self-priming, self-venting, valve controlled. Operation with low viscose media. 3-, 5-, 7-, 9- low friction piston elements and low gliding speed.

P	700 bar
Vg / n	0,47 - 8,14 cm3/U; 500 - 1800 min-1

Multi port pumps MRK

Various circuits on customer's request, self-priming, self-venting, valve controlled, High volumetric efficiency,
Nos of circuits 2 bis 9.

P	700 bar
Vg/Kreis /n	0,16 - 3,620cm3/U; 500 - 2000 min-1

Radial piston pumps HRK

Compact design; direct installation of motor, no coupling, no bellhousing. Version with hollow shaft, with or without pressure relief valve. 1-, 2- piston elements.

P	700 bar
Vg / n	0,12 - 4,52 cm3/U; 500 - 3600 min-1

Combination pumps KKP

Compact and lightweight, integrated low-pressrue shut-off valve and pressure relief valve. Self-venting, design with hollow shaft. 2-, 3- and 4-piston elements

p	LP 160 bar, HP 700 bar
Vg / n	LP 0,35 - 5,43;HP 0,12 - 2,71 cm3/U 500 - 3600 min-1 (KKP01-02) 500 – 2000 min-1 (KKP03-05)

Combination pumps SKPI

Hollow shaft. Externen tooth gear pump. Optionally integrated low-pressure shut-off valve. Self-venting. 2- or 3-piston elements

p	LP 100 bar, HP 700 bar
Vg / n	LP 4,45 - 16,71; HP 0,45 - 2,71 cm3/U 500 - 2000 min-1

Combination pumps PKP

Combination of BRK pump and gear pump, outstanding energy efficiency ratio, fixed displacement, any installation position possible

p	LP 250 bar, HP 1000 bar
Vg / n	LP: 4,0 - 61,1 ; HP: 0,47 - 8,14 cm3/U 500 - 2000 min-1

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Wegesitzventile
Seated valves

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NG4 / 500bar

2/2
3/2
3/3

4/2
4/3

NG4 / 700bar

2/2
3/2
3/3

4/2

NG6 / 500bar

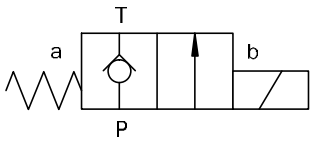
2/2
3/2
3/3
3/4
4/2
4/3
4/4

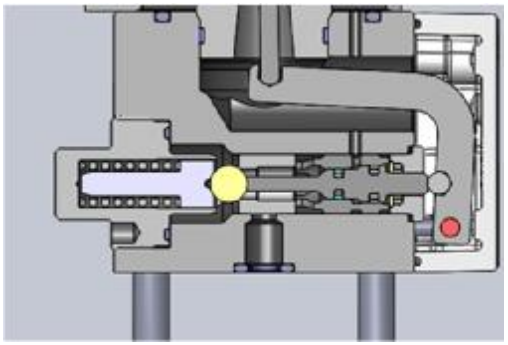
NG6 / 700bar

2/2
3/2
3/3

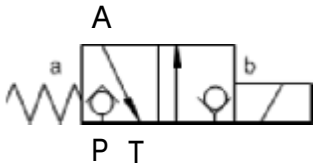
4/2
4/3

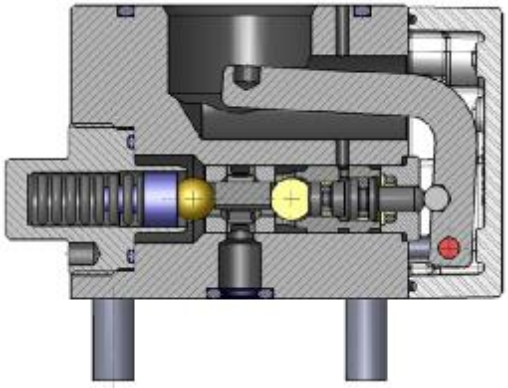
Sectional drawing of 2/2 – 3/2 valves





Sectional drawing
2/2-WS- valve



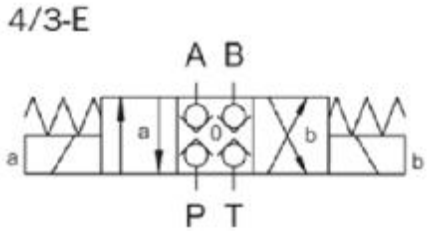


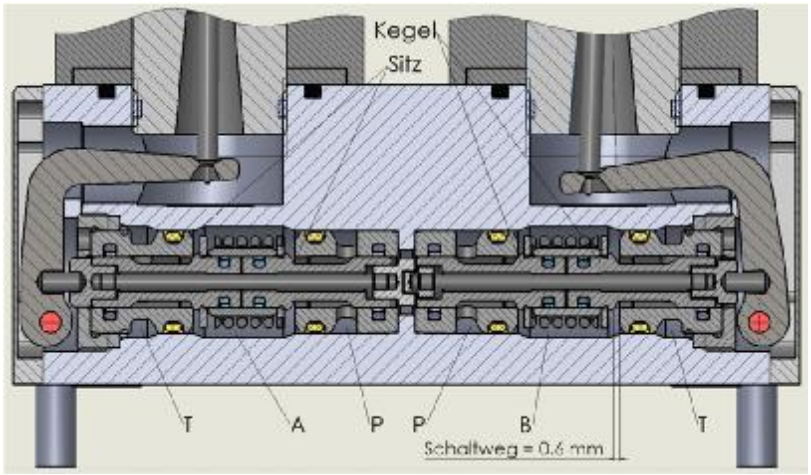
Funciton of 3/2-L seated valve

At WVH700 and WVM-4B flow direction, respectively pressure difference pP > pA ≥ pB ≥ pT to be considered!

Example 3/2-L-valve: (if pP < pA, channel to P opens)

Sectional drawing of 4/3 valve





Function of 4/3- seated valve

- On each channel (P, T, A, B) a „controll component“ (→ seat + poppet) is necessary., at 4 ports 4 elements are required
- These elements are arranged „in line“ at WVM valves

Lubrication of rail tracks

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Synchronised Lifting

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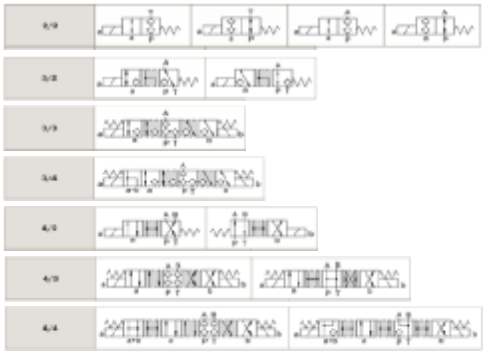
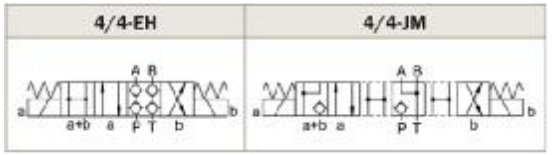
WVM-6I – 500 bar NG6



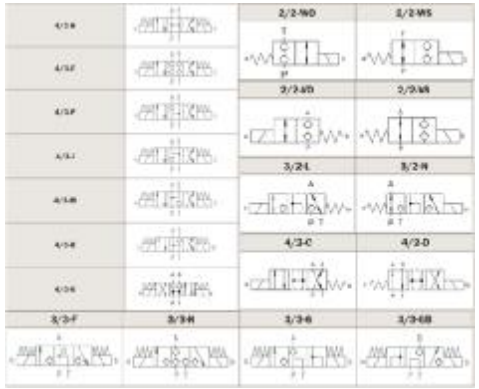


Description

BIERI WVM-6I
direct operated
leckage free solenoid valves
High load cycles (duty cycles)
High variety on switching symbols: 2/2-, 3/2-, 3/3-, 4/2-, 4/3-, 4/4- way function
positive and negative overlap
superior and space saving alternative to spool valves

Technical Data

§p/ size	500 bar / NG 6 (ISO 4401)
§Q	25 L/min
§U solenoid	24VDC, 12VDC, 110VAC, 220VAC



WV700 – 700 bar, NG 6

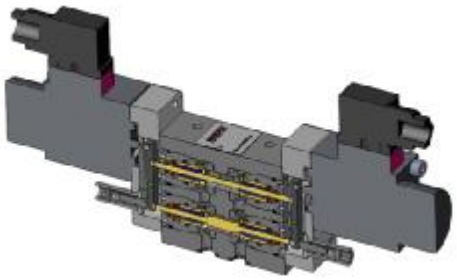
Description

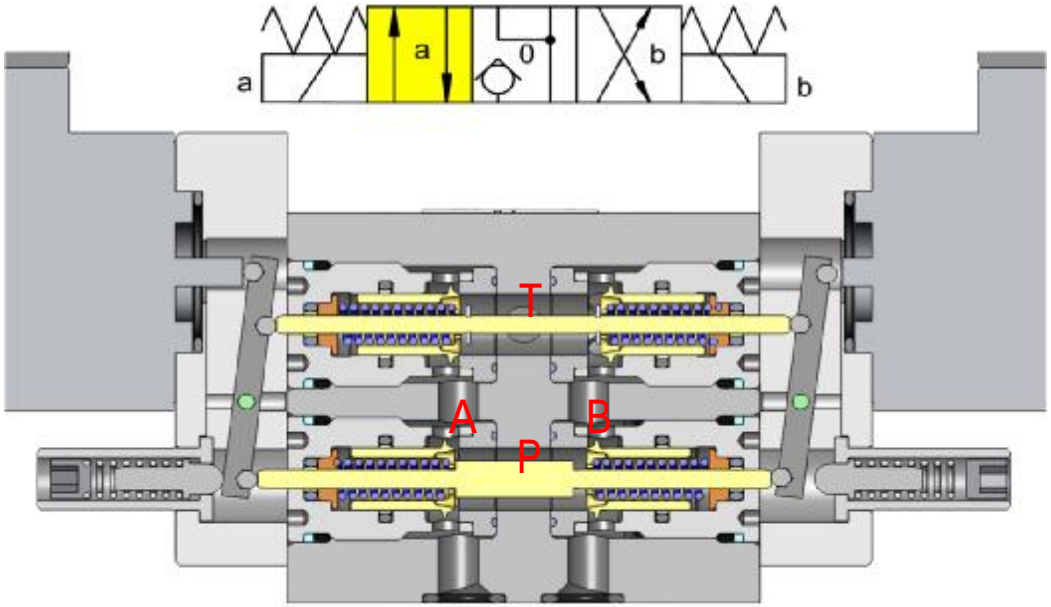
BIERI WV700
direct operated
leckage free
constant pressure: 700 bar
highest demands
Great variety on symbols: 2/2-, 3/2-, 3/3-, 4/2-, 4/3-way functions
positive or negative overlap

Technical Data

§p/ size	700 bar / NG 6 (ISO 4401)
§Q	25 L/min
§U solenoid	12, 24, 107, 196 VDC

WV700 – 4/3 sectional drawing





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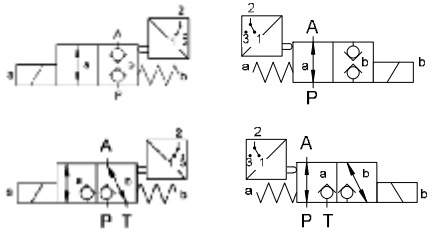
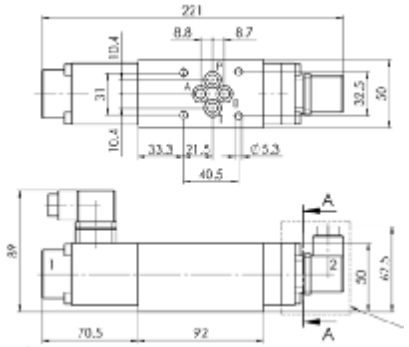
Seated valve with limit switch type WV700 - ES

BIERI HYDAC INTERNATIONAL



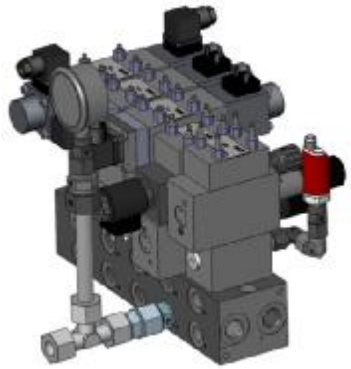


Description

BIERI WV700
direct operated
leckage free
2/2- and 3/2-way walve
mechanical limit switch, obsererving cone elements
High durable and safety tested limit switch
Voltage: 3V DC – 230 V AC

Technical Data

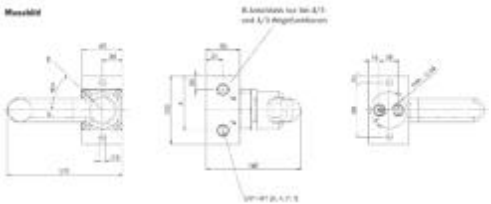
§p/ size 700 bar / NG 6 (ISO 4401)
§Q 25 L/min
§U solenoid 12, 24, 107, 196 VDC

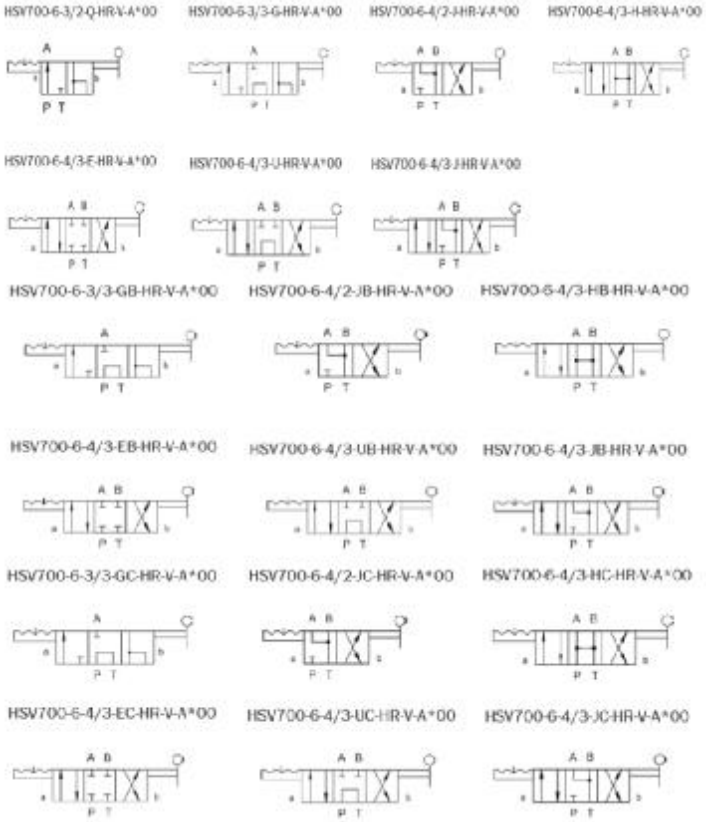


HYDAC INTERNATIONAL

BIERI HYDAC INTERNATIONAL

Manual shear seal valve HSV 700





Characteristics

§ Installation on hydraulic power units

Design

§ Minimal weight
§ Good price/performance ratio
§ Shear-seal-valve
§ Ready to plug in
§ CETOP 3, NG6 / on block / in-line housing

Applications

Single and double acting jacks

HYDAC INTERNATIONAL

Druckventile
Pressure valves

BIERI
HYDAC INTERNATIONAL

Druckbegrenzungs-ventile
Pressure relief valves

p: 500 / 700 / 1000 bar
Q_{max} 30 l/min

Druckabschalt-ventile
Unloading valves

p: 500 / 700 bar
Q_{max} 40 l/min

Druckminderventile
Pressure reducing valves

p prim.: 500 / 700 bar
p sec.: 450 / 600 bar
Q_{max} 30 l/min

Proportionaldruck-ventile
Proportional pressure relief valves

p : 400 / 550 / 700 bar
Q_{max} direct: 2 l/min
Q_{max} pilot op.: 30 l/min

HYDAC INTERNATIONAL

BIERI HYDAC INTERNATIONAL

PDV700 proportional relief valve

Description

PDV700
proportional relief valve NG6 700 bar
Direkt operated for small flow rates
pilot operated for higher flow rates via main stage
Controller «open loop» or «closed loop»

Technical Data

§p/ size	400/550/700 bar / NG 6
§Q	2 L/min direct operated; 25 L/min pilot operated

HYDAC INTERNATIONAL

Stromventile
Flow valves

BIERI
HYDAC INTERNATIONAL

Drosselventile NG4
Throttle valve NG4

p : 500 bar
Q_{max} 25 l/min

Drosselrückschlag-ventile NG4
Throttle check valve NG4

p : 500 bar
Q_{max} 25 l/min

Drosselventile NG6 (ISO Bohrbild)
Throttle valve NG6 (according to ISO)

p : 700 bar
Q_{max} 25 l/min

Drosselrückschlag-ventile NG6 (ISO Bohrbild)
Throttle check valve NG6 (according to ISO)

p : 700 bar
Q_{max} 25 l/min

HYDAC INTERNATIONAL

Sperrventile
Shut-off valves

BIERI
HYDAC INTERNATIONAL

Absperrventile
Shut-off valves

p : 700 / 1000 bar
Q_{max} 32 l/min

Rückschlagventile
Check valves

p : 500 / 700 bar
Q_{max} 45 l/min

Entsperrbare Rückschlagventile
Piloted check valves

p : 500 / 700 bar
Q_{max} 63 l/min

Lasthalte-senkbremsventile
Load holding – lowering valves

p : 700 bar
Q_{max} 25 l/min

HYDAC INTERNATIONAL

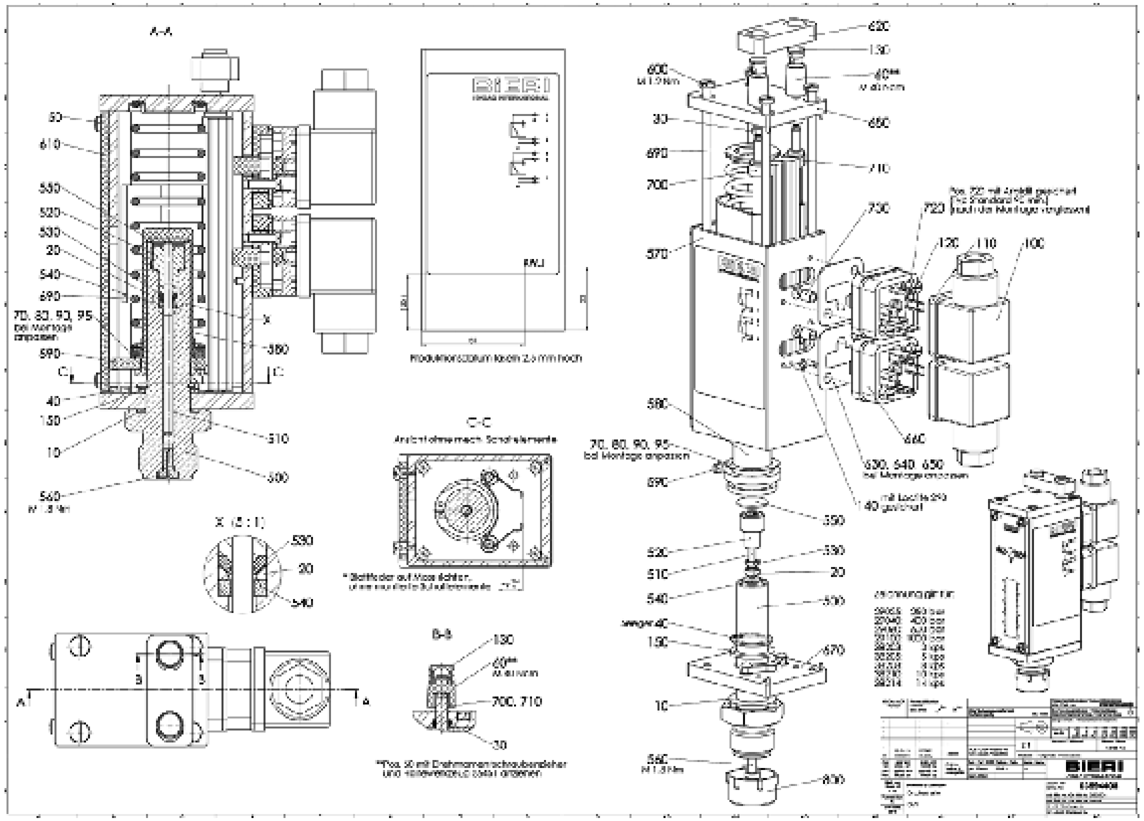
BIERI
HYDAC INTERNATIONAL

DV7.2 1000 bar 2-point pressure switch

Material 3658757 DV7.1000.2910...
Werk 4100 Bieri Hydraulik AG
Alternative 1

Material | Dokument | Allgemein

Pos.	P...	Kompone...	Menge	Komponentenbezeichnung	ME	SortBegr.	EGV
0010	D	3994460	1	2-Punkt Druckschalter DV7	ST		☐
0010	L	4003134	1	ORAR00115-N90C2	ST		☐
0020	L	4003133	1	ORAR00007-V90O3	ST		☐
0030	L	4003449	2	O-Ring 3.68X 1.78-NBR -70Sh	ST		☐
0040	L	4003132	1	Sicherungsring für Welle DIN 471/A 16	ST		☐
0050	L	4006140	4	Linsenschraube ISO 7045/BN 384/3x6	ST		☐
0060	L	4003160	2	Drehknopf	ST		☐
0070	L	4005050	1	Pass-Scheibe DIN988- 19x 26x1 -St2K...	ST		☐
0080	L	4006171	1	Pass-Scheibe DIN988- 19x 26x0.3-St2K	ST		☐
0090	L	4005451	1	Pass-Scheibe DIN988- 19x 26x0.5-St2K...	ST		☐
0095	L	417165	1	Pass-Scheibe DIN988- 19x 26x0,1-St2K...	ST		☐
0100	L	4003135	2	Gerätesteckdose MPMC18209N21	ST		☐
0110	L	4003136	2	Flachdichtung G 23	ST		☐
0120	L	4003555	4	Zyl.-Schr. ISO 1207/BN 330/M3x10	ST		☐
0130	L	4003147	2	Deckel Typ3010133 zu Drehknopf Nr.8...	ST		☐
0140	L	4003170	2	Gew.-Sti. ISO 4766/BN 427/M3x6	ST		☐
0150	L	4003174	1	Stützscheibe DIN 988	ST		☐
0500	L	3994435	1	Zylinder	ST		☑
0510	L	3993789	1	Stössel	ST		☑
0520	L	3994370	1	Führung	ST		☑
0530	L	3683962	1	Dichtungsring	ST		☑
0540	L	4001462	1	Zwischenscheibe	ST		☑
0550	L	3994381	1	Scheibe	ST		☑
0560	L	3683656	1	Blende Ø 0.2	ST		☑
0570	L	4003362	1	Gehäuse vormontiert	ST		☑
0580	L	3994181	1	Halter	ST		☑
0590	L	3994175	1	Zeiger	ST		☑
0600	L	3994382	4	Befestigungsschraube	ST		☑
0610	L	3994463	1	Skala 0-1000 bar	ST		☑
0620	L	3994368	1	Drehsicherung	ST		☑
0630	L	3994383	2	Flachdichtung	ST		☑
0680	L	3994456	3	Flachdichtung	ST		☑
0650	L	3994457	2	Flachdichtung	ST		☑



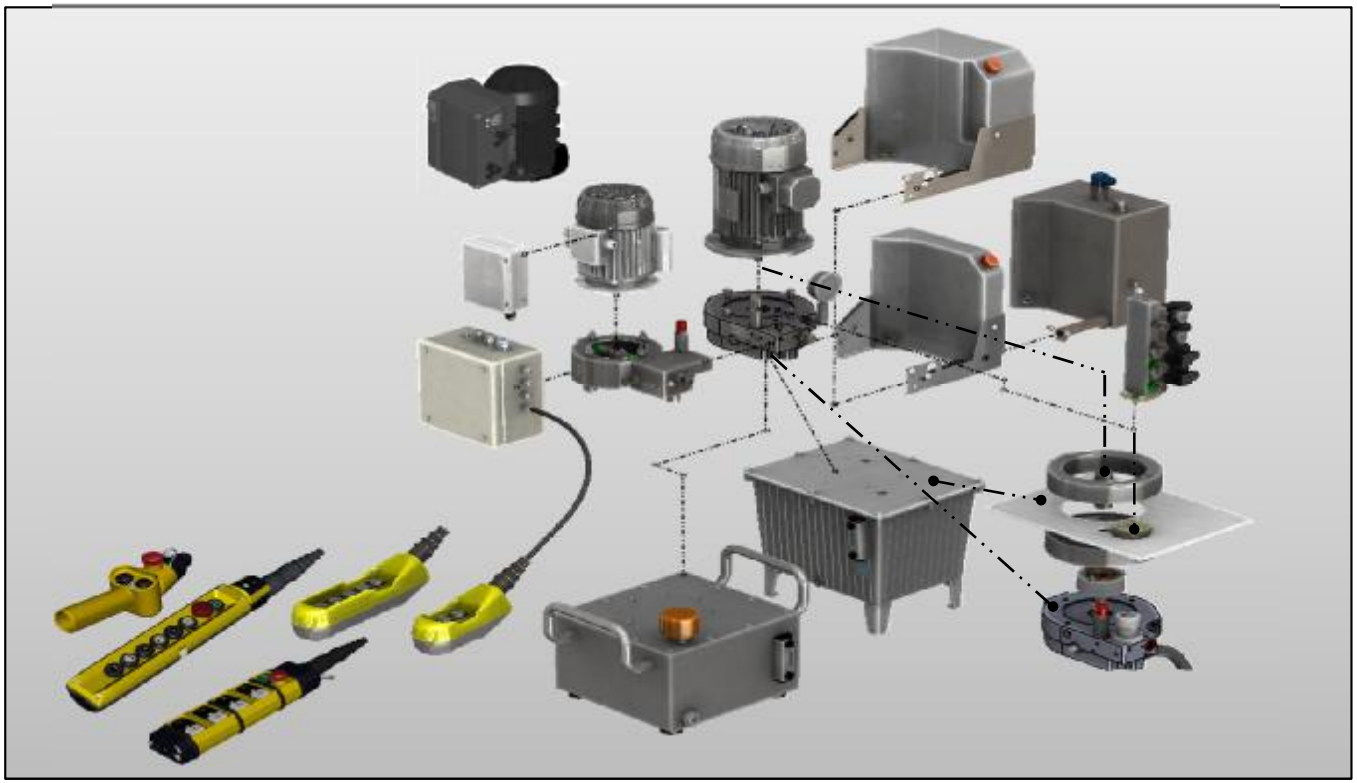
HYDAC INTERNATIONAL

Hochdruckaggregate
High pressure power units

BIERI
HYDAC INTERNATIONAL

Technische Daten:
- BIERI Radialkolbenpumpe
- 1- und 2-stufig bis 700 bar
- LP: 100 bar / 2,8 - 10,4 l/min
- HP: 700 bar / 0,3 - 1,8 l/min
- Motor 0,55 kW bis 2,2 kW
- Ventilverkettung BIERI NG4

Technical Data:
- *BIERI radial piston pump*
- *1- and 2-stage up to 700 bar*
- *LP: 100 bar / 2,8 to 10,4 l/min*
- *HP: 700 bar / 0,3 to 1,8 l/min*
- *Motor 0,55 kW to 2,2 kW*
- *Valve bank BIERI NG4*



BKA compact power unit

Anwendungen
Applications

Anheben schwerer Lasten
Lifting heavy loads

Liftsysteme / Lifting systems

NG 4 / 700 bar 2/2
200 pcs / 140,- CHF

ADIDAS-Atrium Herzogenaurach

Stanzen von Schaltschrankschienen
Punching of bus bars for control cabinets

Kleine Pressen und Stanzen
Small presses and punches




ALFRA / AB-Nord

Aufgabenstellung */ Task:*

- **Aggregat zum Stanzen von Schaltschrankschienen (hoher Druck, kleiner Bauraum)**
  Power unit to drive punches for bus bars (high pressure, small installation space)


- **Anforderungen** */ Requirements*:
  - **Druck bis 700 bar** */ pressure up to 700 bar*
  - **Einphasenmotor 50 / 60 Hz**
    one-phase motor 50 / 60 Hz

Nummernschildpresse
Stamping press for license plates

Kleine Pressen
Small presses

Utsch / AB-West

Aufgabenstellung / *Task:*

- **Antriebsaggregat für Nummernschildpresse**
  Power unit for stamping license plates
- **Anforderungen** / *Requirements*:
  - **Hochdruck** / *High pressure* **2,5 l/min – 435 bar**
    Niederdruck / *Low pressure* **9,3 l/min – 20 bar**
  - **Behälter Aluminium Druckguss** /
    Reservoir aluminum die casting

Fertigung von Rohrflanschen
Manufacturing of pipe flanges

Krimpen / *Crimping*

AB-West

Aufgabenstellung / *Task:*

- **Antriebsaggregat für Umformmaschine zur Rohrflanschfertigung**
  Power unit to drive a forming machine for manufacturing of large pipe flanges

- **Anforderungen** / *Requirements*:
  - **Hochdruck** / *High pressure* **1,4 l/min – 700 bar**
    Niederdruck / *Low pressure* **8,2 l/min – 80 bar**
  - **Edelstahlbehälter** / *reservoir stainless steel*

Leitungsbau mit flexiblen Rohren
Line construction with flexible pipes

Oil & Gas Pipeline

Hülse positionieren
Sleeve positioning

Verpressen
Crimping

HYDAC Canada

Aufgabenstellung */ Task:*

§ **Tragbares Hydraulikaggregat für Baustellen mit Handfernbedienung**
Portable hydraulic power unit for construction sites with cable remote

§ **Anforderungen** */ Requirements*:

Hochdruck */ High pressure* **1,0 l/min – 700 bar**
Niederdruck */ Low pressure* **7,1 l/min – 70 bar**

Cyklická zkušebna tlakových nádob

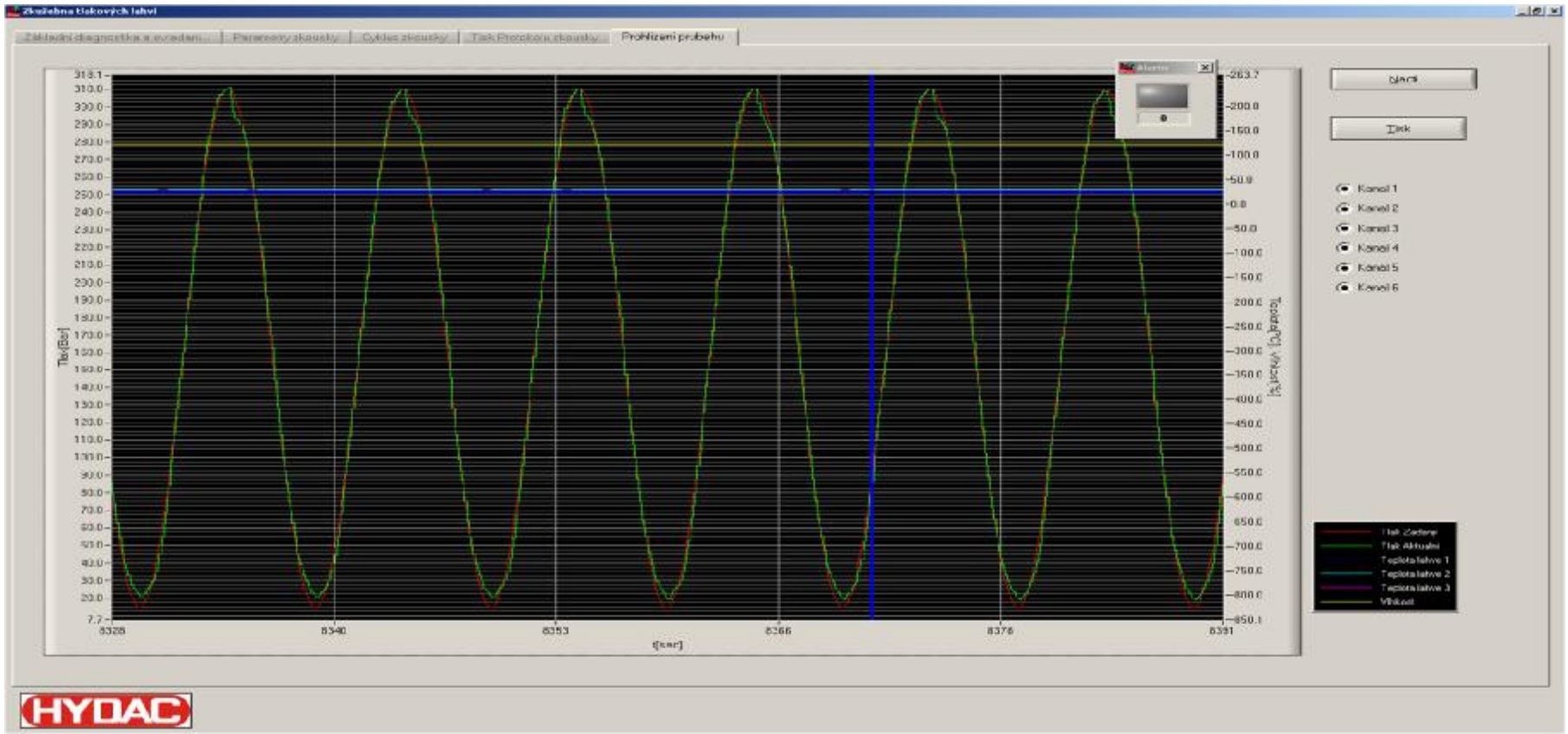
Hlavní data

- Nádoby do celkového objemu o 240 l
- Maximální tlak 500 bar
- Max frekvence cyklování 15/s
- HLP VG 46

Dodáno :

- Testovací box
- Hydraulika
- Řízení SIMATIC S7-300
- Montáž
- Uvedení do provozu

Vizualizace testu

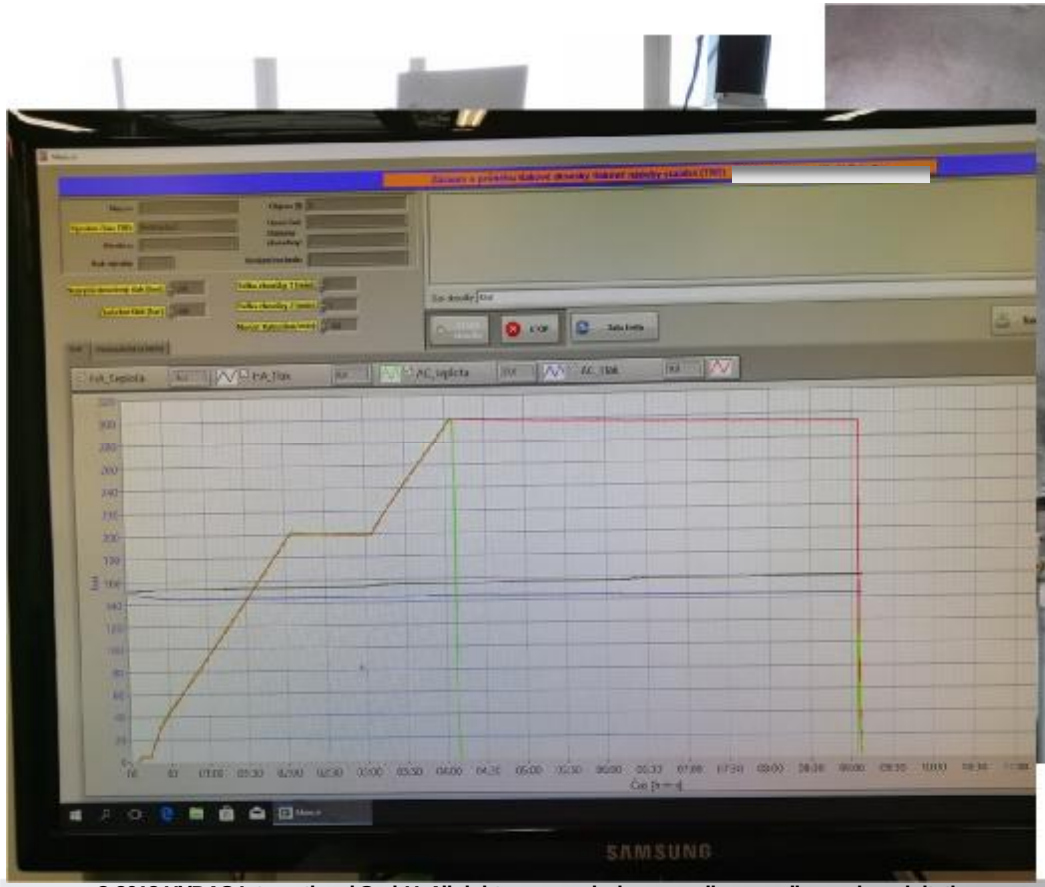


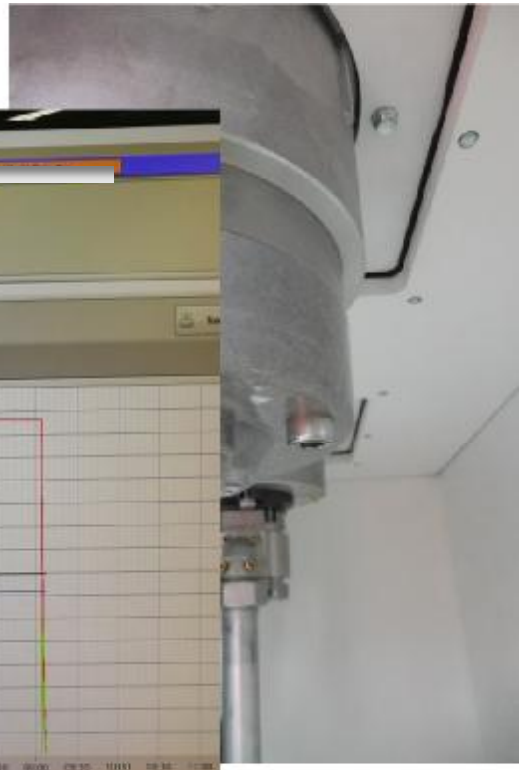
Test až do poškození

Testování hydraulických válců – 700 bar ,
proporcionální řízení, automatický chod testu dle receptůry

Periodické zkoušení těles akumulátorů – do 1000 bar ,

proporcionální řízení, automatický chod testu dle receptury, nárůst tlaku 5 bar / min dle ČSN





ard
erating pressure:

me:
0.5 ... 200 l

5.1.3 **High pressure**
Permitted operating pressure:
up to 1000 bar
Nominal volume:
1 ... 50 l
other volumes on request

Děkuji za Vaši pozornost !