

HPVS SERIES

PILOT CONTROL VALVE



HYDRAULIC PILOT CONTROL

HPV Pilot Control Valves are part of the comprehensive range of Hydreco Hydraulics product.

The product, with its single lever dual axis control, and supported by an extensive range of control curve characteristics and handle options, makes it suitable for a wide range of both mobile and industrial applications.

Our engineers can offer specialist support to optimise this product to suit your application.

The product is supported by a comprehensive Sales and Service facility around the world.

BENEFITS

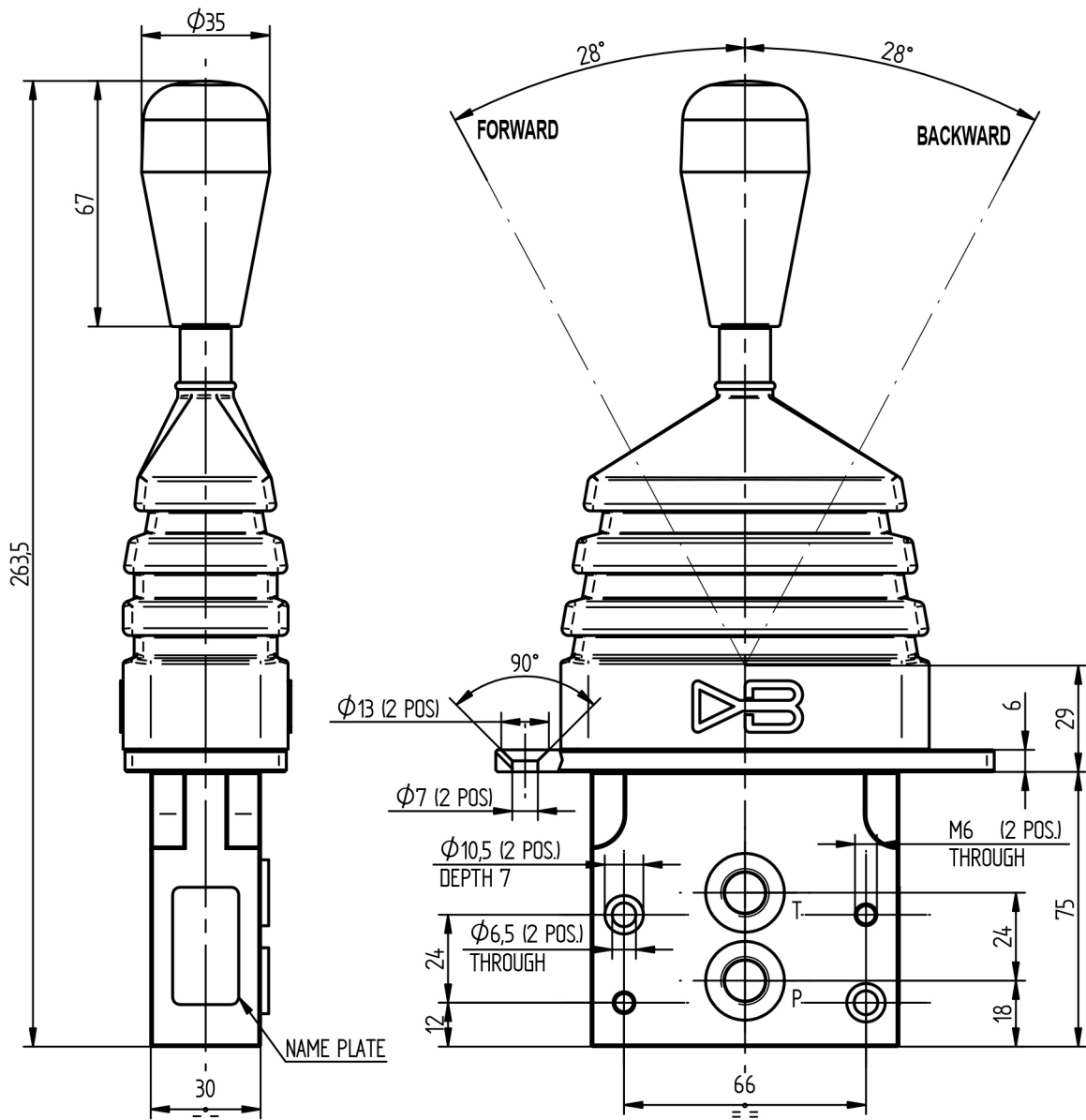
- Compact and light weight
- Suitable for arm rest of console mounting
- Compatible with a wide range of product
- Stylish good looks suitable for modern cabs
- Operator is insulated from high temperature components
- Proven, simple pressure reducing elements
- Wide range of low hysteresis, high accuracy, pressure control curves
- Wide range of electrical options in both standard and multi-functional ergonomic handles
- Low effort lever control

Hydreco Hydraulics reserve the right to update the information and data contained in this catalogue at any time.

HPVS SERIES MODEL CODING

HPVS XX X XX F X X XX

| Micro Switch options | |
|---|---|
| M1 | = 1 switch senses out of center position |
| M2 | = 2 switches sense movement away from neutral each way |
| M3 | = 1 switch senses forward movement away from neutral |
| M4 | = 1 switch senses backward movement away from neutral |
| Port Size & Type | |
| <input type="checkbox"/> | = Omit for 1/4" BSP |
| S | = 7/16"-20 UNF SAE #4 |
| Return Spring | |
| 0 | = 1.4 to 2.8 daN (Standard) |
| 1 | = 3.0 to 4.5 daN |
| F | = Standard Control Plunger |
| Metering curve | |
| see <i>PCV Characteristics</i> catalogue | |
| Handle type | |
| see <i>Handles</i> catalogue | |
| W | = Without Handle |
| Basic Model Number - includes 2 service ports | |
| 01 | = lever spring returned to neutral |
| 02 | = lever detented in any position |
| 03 | = lever detented in any position with neutral sensor |
| 04 | = lever detented at both stroke ends |
| 05 | = lever detented in neutral position |
| 06 | = lever detented in neutral and friction hold in any position |
| 07 | = lever detented to U1 and spring return to neutral from U2 |
| 08 | = lever detented to U2 and spring return to neutral from U1 |
| HPVS | = sectional hydraulic compact pilot valve series S |



PORT OPTIONS

P, T, U1, U2, U3, U4:

1/4" BSP OR 7/16"-20 UNF SAE #4

TECHNICAL SPECIFICATIONS

Maximum Inlet Pressure at Port P: 50 bar

Maximum Back Pressure at Port T: 3 bar

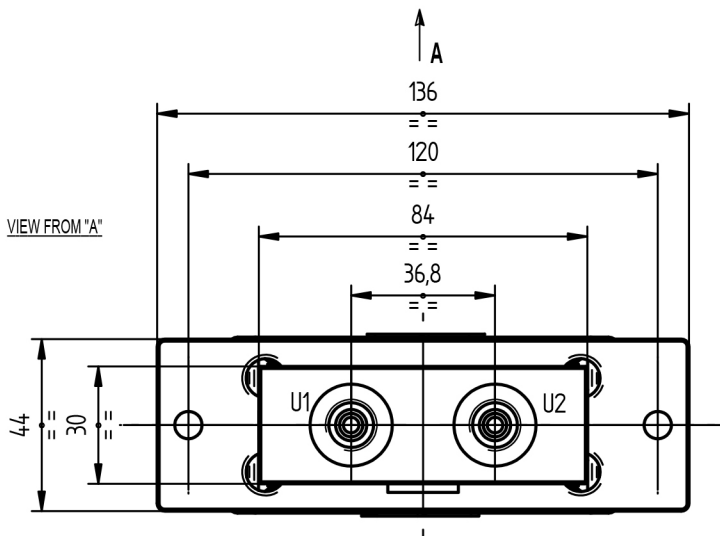
Inlet Flow Range: 5 to 20 litre/min

Maximum Hysteresis Band: +/- 0.5 bar

Fluid: Hydraulic Mineral Oil ISO HM E HV

Contamination Class: 21/16/13 - ISO 4406/1999

Fluid Temperature Range: -20 to +80 °C





HYDRAULIC SOLUTIONS PROVIDER

HANDLES

MULTIFUNCTIONAL ERGONOMIC,
ERGONOMICS AND KNOBS



HANDLES AND KNOBS

The handles and knobs included in this catalogue are available for fitting either to the extensive range of Hydreco Hydraulics pilot valve product or alternatively as separate item for fitting to other type of product.

The materials are chosen to be suitable for either internal or external use and are resistant to ultra-violet effects. They are also suitable for a wide range of other environmental conditions.

The standard straight ergonomic handle is available with a range of switches and push buttons, while the MFE handle range is available with an extensive range of switches and push buttons to suit different operating and environmental conditions. The MFE handle range can be configured to suit either left hand or right hand operation.

Different circuit arrangements can be accommodated within the handle and the wiring can be built into connectors to customer specifications.

BENEFITS

- Range of knobs for individual lever control
- Range of straight levers, with and without switches for dual axis controls
- Extensive range of stylish multifunctional lever options
- Extensive range of electrical switch and button options
- Adaptable to both Hydreco Hydraulics and other manufacturers equipment
- Circuits and connectors to customer requirements
- Switch options allow left hand and right hand operation
- Tolerant to many environmental conditions
- High durability, low maintenance

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HANDLES ERGONOMIC AND KNOB MODEL CODING

K - K SERIES KNOBS

see page 3

- KB** = Duroplast Knob
- KC** = Technopolymer knob
- KD** = Duroplast knob with switch
- KK** = Knob with rubber cap
- KL** = Knob with len
- KP** = Spherical knob
- KW** = Knob with switch

S - S SERIES ERGONOMIC

see page 4

- SA** = Handle without electric switch
- SD** = Handle with electric switch
- SS** = Handle with electric switch to close and safety button
- SX** = Handle with electric switch to close
- SY** = Handle with electric switch dual rocker type

| | |
|---|---|
| <p>KB Duroplast knob</p>  | <p>KD Duroplast knob with switch</p>  <p>Protection: IP64 Rating current: 1 A Input voltage: 30 VDC Electrical life: 10⁶ cycles</p> <p>For installation dimension see knob KB</p>  |
| <p>KC Technopolymer knob</p>  | <p>KW Knob with switch</p>  <p>Protection: IP54 Rating current: 5 A Input voltage: 250 VAC Electrical life: 10⁵ cycles</p> <p>For installation dimension see knob KK</p>  |
| <p>KP Spherical knob</p>  | <p>KK Knob with rubber cap</p>  |
| <p>KL Knob with len</p>  | |

SA Without switch

SY With one 3 position rocker switch on the top spring centered

Protection: IP54
Rating current: 16 A
Input voltage: 250 VDC
Electrical life: 10⁶ cycles

SX With one switch on the top

Protection: IP54
Rating current: 16 A
Input voltage: 250 VDC
Electrical life: 10⁶ cycles

WIRING DIAGRAM

SD With one switch on the top and one switch on the side

Protection: IP54
Rating current: 16 A on X, 1 A on D
Input voltage: 250 VDC on X, 30 VDC on D
Electrical life: 10⁶ cycles

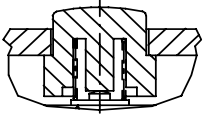

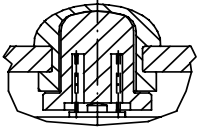

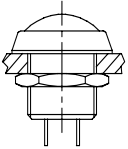

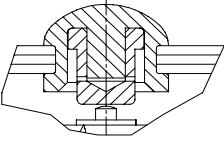

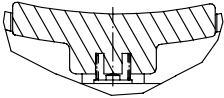


SS With one switch on the top with safety cage



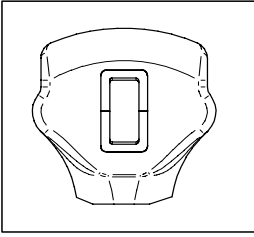
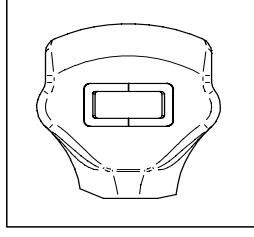
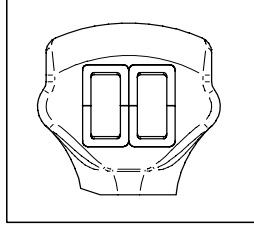
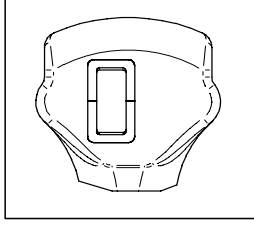
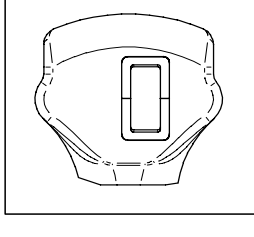
Protection: IP54
Rating current: 16 A
Input voltage: 250 VDC
Electrical life: 10⁶ cycles



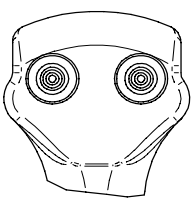
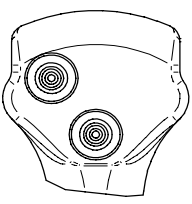
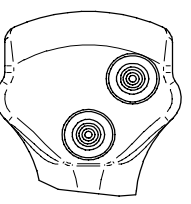
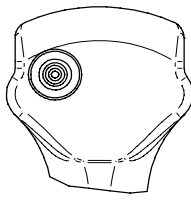
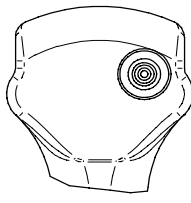
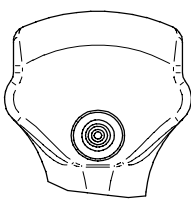
WIRING DIAGRAM

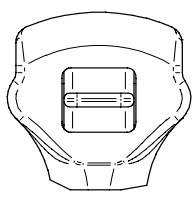

MFE - X - XXXXXX - XX - X X X X - XXX


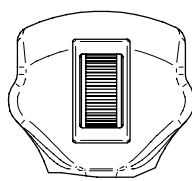
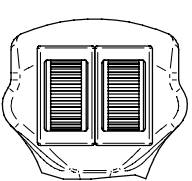
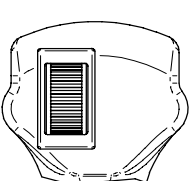
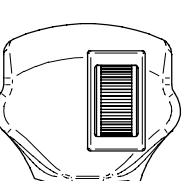
| | |
|---|--|
| Rocker switch option (see page 7-8) | |
| <i>omit if not required</i> | |
| Mounting adapter (see page 11) | |
| 0 | = standard straight M10x1.5 |
| 1 | = tilted 15° forward |
| 2 | = tilted 15° right (LH handle) |
| 3 | = tilted 15° left (RH handle) |
| 4 | = combined tilted 15° forward and 10° right (LH handle) |
| 5 | = combined tilted 15° forward and 10° left (RH handle) |
| 6 | = with spherical joint, adjustable from 0° up to 20° in any direction |
| Gaiter collar (see page 10) | |
| 0 | = basic version without provision for protection boot |
| R | = with provision for round boot |
| S | = with provision for square boot |
| Wiring termination | |
| 0 | = flying leads |
| 2 | = with connector (maker and model number to be specified on order) |
| Safety trigger in position 7 (see page 6) | |
| X | = no safety trigger |
| T | = with standard safety trigger |
| TCAP | = with capacitive safety trigger |
| Push button/switch in position 8 ÷ 17 (see page 6) | |
| For each push button/switch, insert ID position numbers and colours (see 1+6 position) and omit ones that are not required (i.e. 8R10G = red push button/switch in position 8 and green push button/switch in position 10) Note: push button/switch in pos.13-14-15 are available only type C push button type A and B are not available in pos.8 | |
| Push button/switch in position 1 ÷ 6 (see page 6) | |
| Insert ID letter for each button/switch chosen on the following list and in progressive sequence from position 1 up to position 6: Note: Type C not available in pos.1 and 4 | |
| X | = no button switch |
| B | = blue |
| G | = green |
| R | = red |
| Y | = yellow |
| W | = white (available only for type C and E) |
| L | = signalling led |
| Push button/switch option (see page 6) | |
| A | = Plastic push button with microswitches rated 3A at 30 VDC |
| B | = Sealed push button with microswitches rated 3A at 30 VDC |
| C | = Insulated push button with microswitches rated 0.4A at 30 VDC |
| E | = Serviceable sealed push button with microswitches rated 3A at 30 VDC |
| MFE | = Multifunction-Ergonomic |

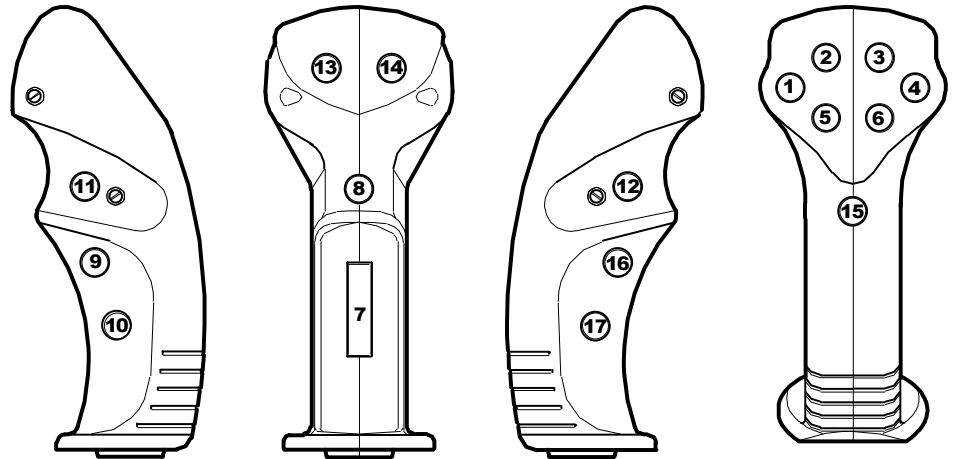
| | | |
|--|--|---|
| <p>A PLASTIC PUSH BUTTON</p> <p>Protection: IP67 Rating current: 3 A Input voltage range 30 VDC Electrical life: 10⁶ cycles</p> |  |  |
| <p>B SEALED PUSH BUTTON</p> <p>Protection: IP67 Rating current: 3 A Input voltage range 30 VDC Electrical life: 10⁶ cycles</p> |  |  |
| <p>C ISOLATED PUSH BUTTON</p> <p>Protection: IP67 Rating current: 0,4 A Input voltage range 30 VDC Electrical life: 10⁶ cycles</p> |  |  |
| <p>E SEALED SERVICEABLE PUSH BUTTON</p> <p>Protection: IP67 Rating current: 3 A Input voltage range 30 VDC Electrical life: 10⁶ cycles</p> |  |  |
| <p>T SAFETY TRIGGER</p> <p>Protection: IP67 Rating current: 3 A Input voltage range 30 VDC Electrical life: 10⁶ cycles</p> |  |  |
| <p>TCAP CAPACITIVE SAFETY TRIGGER</p> <p>Protection: IP54 Rating current: 2,6 A Input voltage range 10-30 VDC Electrical life: 3x10⁶ cycles EMC tested</p> | |  |

| S TYPE | Waterproof rocker switch | R TYPE | Long life rocker switch |
|---|---|--|---|
| Protection: IP68 Rating current: 10A (28 VDC) Life: 5x10 ⁴ Cycles |  | Protection: IP67 Rating current: 0.25A (28 VDC) Life: 10 ⁶ Cycles |  |
|  | <p>Vertical mounted</p> <p>S1B: IP68 3 Position momentary rocker switch S2B: IP68 3 position latched rocker switch</p> <p>R1B: Long life position momentary rocker switch R2B: long life 3 position latched rocker switch</p> | | |
|  | <p>Horizontal mounted</p> <p>S1A: IP68 3 Position momentary rocker switch S2A: IP68 3 position latched rocker switch</p> <p>R1A: Long life position momentary rocker switch R2A: long life 3 position latched rocker switch</p> | | |
|  | <p>Two vertical mounted</p> <p>S4A: IP68 3 Position momentary rocker switch S4B: IP68 3 position latched rocker switch</p> <p>R4A: Long life position momentary rocker switch R4B: long life 3 position latched rocker switch</p> | | |
|  | <p>Vertical mounted left offset</p> <p>S1C: IP68 3 Position momentary rocker switch S2C: IP68 3 position latched rocker switch</p> <p>R1C: Long life position momentary rocker switch R2C: long life 3 position latched rocker switch</p> | | |
|  | <p>Vertical mounted right offset</p> <p>S1D: IP68 3 Position momentary rocker switch S2D: IP68 3 position latched rocker switch</p> <p>R1D: Long life position momentary rocker switch R2D: long life 3 position latched rocker switch</p> | | |

| D 4 WAY ON-OFF SWITCH | | | |
|--|--|--|---|
| Protection: IP68 Rating current: 1A (28 VDC) Electrical life: 10 ⁵ cycles | | |  |
| DLDRDB 3 switches | DLDR 2 switches top | DLDB 2 switches left | DRDB 2 switches right |
|  |  |  |  |
| DL 1 switch left | DR 1 switch right | DB 1 switch center | |
|  |  |  | |

| R3 PROPORTIONAL ANALOGUE ROCKER | | |
|--|---|---|
| Protection: IP65 Rating current: 0,01 A Input voltage range 8-30 VDC Output signal 0,5-4,5 VDC with 2,5V in neutral position Electrical life: 2x10 ⁶ cycles |  |  |

| RP PROPORTIONAL ROLLER | | | |
|---|---|--|---|
| Protection: IP68 Rating current: 0.028 A (5 VDC MAX) Output signal 0,5-4,5 VDC with 2,5V in neutral position Electrical life: 2x10 ⁶ cycles | | |  |
| RP One centered | 2RP Two centered | RPS One left offset | RPD One right offsey |
|  |  |  |  |



KEY

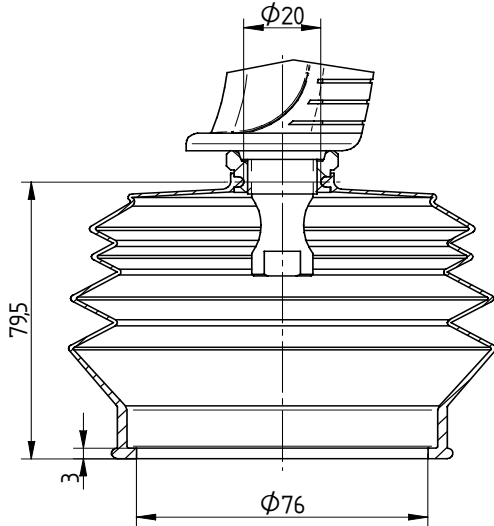
- available combination
- not available

| | PUSH BUTTONS (SEE PAGE 6) | | | | | | | | | | | | | | | | | ON-OFF ROCKER SWITCH POSITIONS (SEE PAGE 7) | | | | | 4 WAY SWITCH POSITIONS (SEE PAGE 8) | | | | PROPORTIONAL ROCKER (SEE PAGE 8) | | | | | | | | | |
|--|---------------------------|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|---|------------------|------------------|------------------|------------------|-------------------------------------|------|------|------|----------------------------------|----|----|----|----|-----|-----|-----|--|--|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | S(R)1B S(R)2B | S(R)1A S(R)2A | S(R)4A S(R)4B | S(R)1C S(R)2C | S(R)1D S(R)2D | DLDRDB | DLDR | DLDB | DRDB | DL | DR | DB | R3 | RP | 2RP | RPS | RPD | | |
| PUSH BUTTONS (SEE PAGE 6) | 1 | | | | | | | | | | | | | | | | | | | | * | | | | | | | | | | | | | | | |
| | 2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 6 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 7 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 8 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 9 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 10 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 11 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 12 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 13 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 14 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 15 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 16 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 17 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ON-OFF ROCKER SWITCH POSITIONS (SEE PAGE 7) | S(R)1B S(R)2B | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | S(R)1A S(R)2A | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | S(R)4A S(R)4B | | | | * | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | S(R)1C S(R)2C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | S(R)1D S(R)2D | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4 WAY SWITCH POSITIONS (SEE PAGE 8) | DLDRDB | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | DLDR | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | DLDB | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | DRDB | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | DL | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | DR | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | DB | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| PROPORTIONAL ROLLER (SEE PAGE 8) | R3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | RP | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 2RP | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | RPS | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | RPD | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

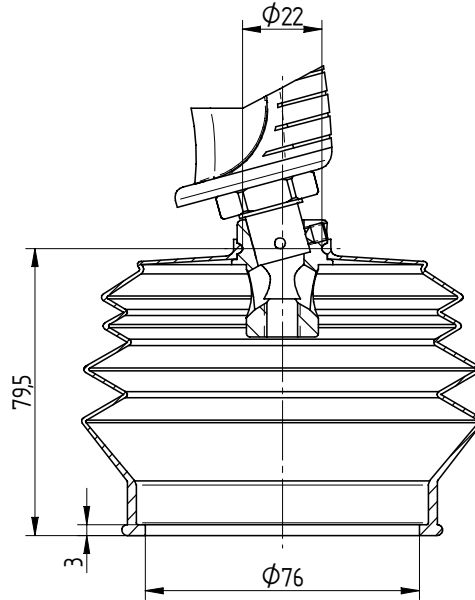
* AVAILABLE ONLY TYPE A

R ROUND PROTECTION BOOT

GAITER COLLAR FOR
STANDARD STRAIGHT
MOUNTING ADAPTOR

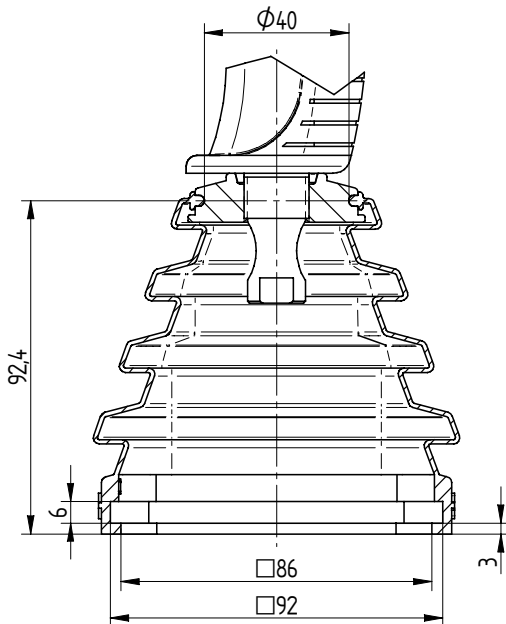


GAITER COLLAR FOR
TILTED MOUNTING ADAPTOR

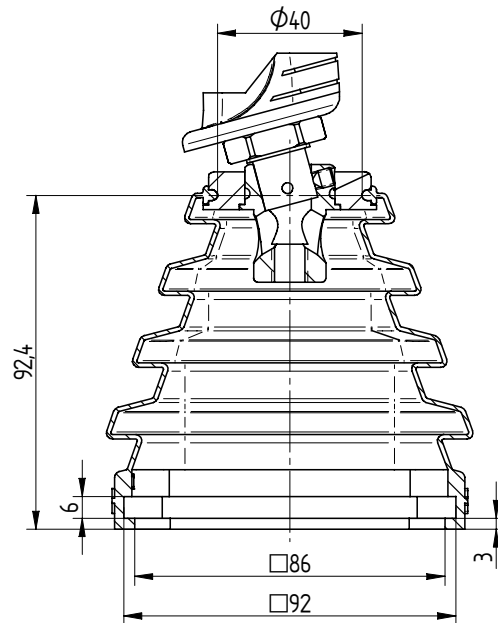


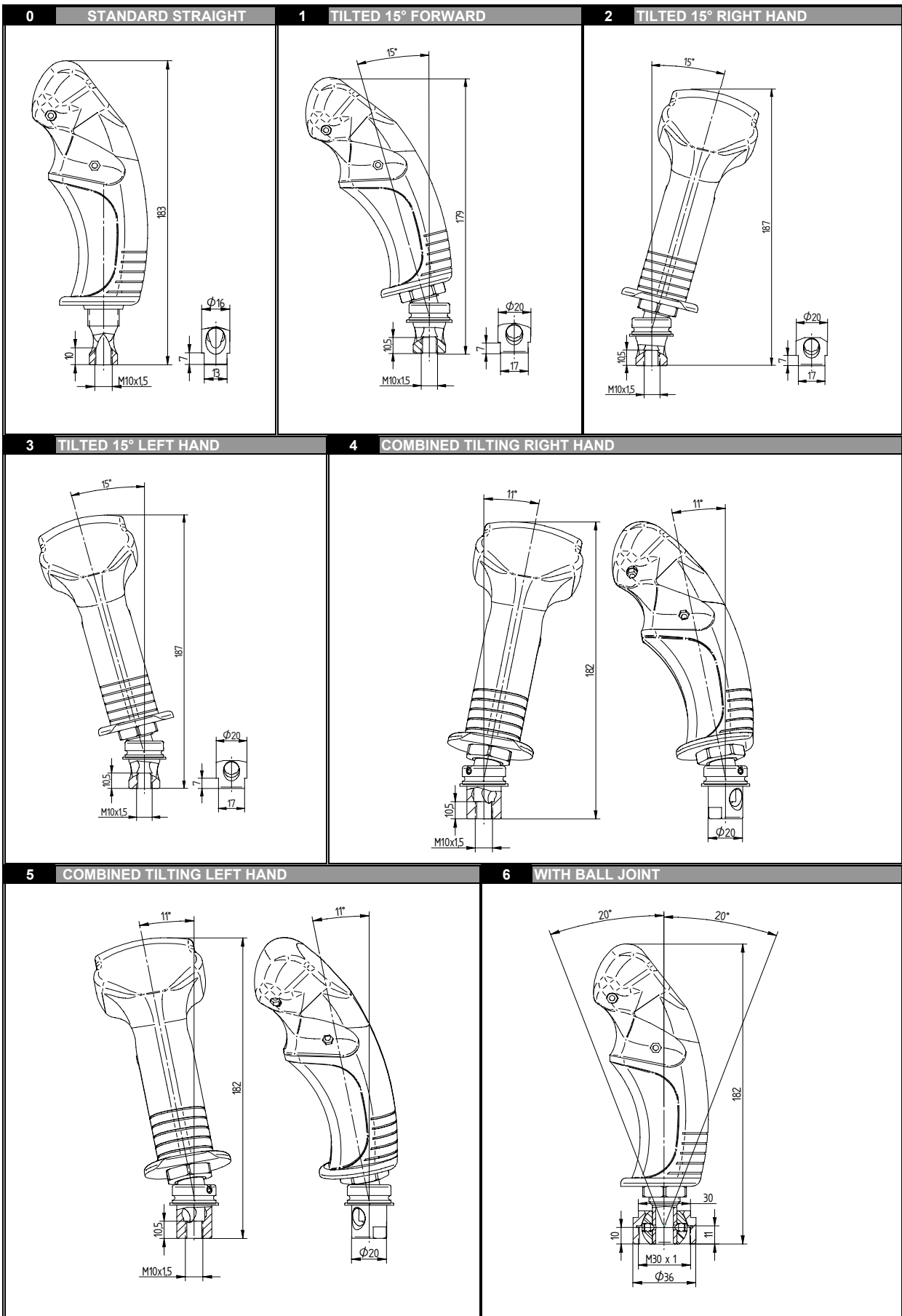
S SQUARE PROTECTION BOOT

GAITER COLLAR FOR
STANDARD STRAIGHT
MOUNTING ADAPTOR



GAITER COLLAR FOR
TILTED MOUNTING ADAPTOR



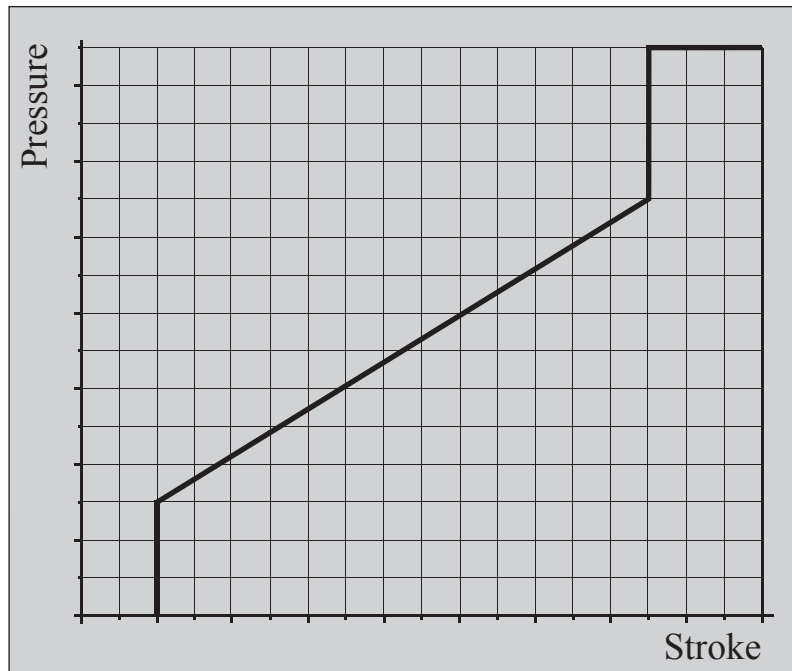




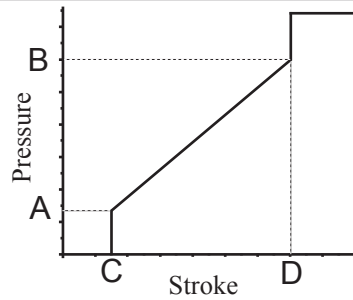
HYDRAULIC SOLUTIONS PROVIDER

CHARACTERISTIC OPTIONS

HYDRAULIC PILOT CONTROLS



PILOT VALVE CHARACTERISTICS

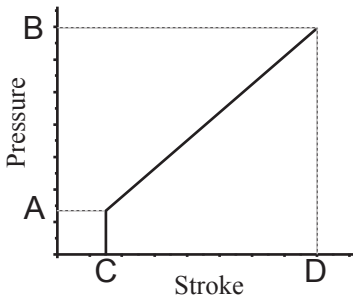


Characteristic - Type B

| PRESSURE (bar) | | STROKE (mm) | | ID No. |
|----------------|------|-------------|-----|--------|
| A | B | C | D | |
| 0.0 | 13.0 | 0.5 | 8.5 | CR027 |
| 0.5 | 4.0 | 1.8 | 8.5 | CR009 |
| 0.5 | 6.5 | 2.0 | 8.5 | CR010 |
| 0.5 | 11.4 | 1.8 | 8.5 | CR047 |
| 0.5 | 18.4 | 1.0 | 8.5 | CR076 |
| 0.8 | 29.0 | 1.4 | 3.5 | CR097 |
| 1.0 | 8.0 | 1.0 | 8.5 | CR011 |
| 1.0 | 12.0 | 1.0 | 8.5 | CR034 |
| 1.5 | 8.5 | 1.0 | 8.5 | CR069 |
| 2.0 | 11.5 | 1.0 | 8.5 | CR012 |
| 2.0 | 11.5 | 2.0 | 8.5 | CR025 |
| 2.0 | 8.0 | 0.5 | 6.5 | CR042 |
| 2.0 | 13.0 | 1.0 | 8.5 | CR045 |
| 2.0 | 20.5 | 0.9 | 8.5 | CR077 |
| 2.0 | 27.5 | 1.0 | 8.5 | CR080 |
| 2.0 | 14.2 | 1.0 | 8.5 | CR163 |
| 2.4 | 16.4 | 1.0 | 8.5 | CR078 |
| 2.8 | 14.9 | 1.0 | 8.5 | CR123 |
| 2.8 | 4.7 | 1.0 | 8.5 | CR129 |
| 3.0 | 9.0 | 2.0 | 8.5 | CR021 |
| 3.0 | 10.0 | 1.0 | 8.5 | CR051 |
| 3.0 | 8.0 | 1.0 | 8.5 | CR125 |
| 3.0 | 21.7 | 0.9 | 8.5 | CR121 |
| 3.2 | 11.7 | 1.8 | 8.5 | CR048 |
| 3.2 | 17.2 | 1.0 | 8.5 | CR062 |
| 3.2 | 15.4 | 1.0 | 8.5 | CR041 |
| 3.4 | 29.4 | 1.0 | 8.5 | CR030 |
| 3.5 | 13.0 | 1.0 | 8.5 | CR101 |
| 3.7 | 29.2 | 1.0 | 8.5 | CR104 |
| 4.0 | 21.5 | 0.9 | 8.5 | CR090 |
| 4.3 | 15.2 | 1.0 | 8.5 | CR049 |
| 4.3 | 13.8 | 1.0 | 8.5 | CR122 |
| 4.4 | 17.0 | 1.8 | 8.5 | CR107 |
| 4.4 | 30.4 | 1.0 | 8.5 | CR138 |
| 4.5 | 18.0 | 0.9 | 8.5 | CR095 |
| 4.5 | 27.0 | 1.0 | 8.5 | CR108 |
| 4.9 | 18.9 | 1.0 | 8.5 | CR018 |
| 4.9 | 17.5 | 1.0 | 8.0 | CR117 |
| 5.0 | 14.5 | 1.0 | 8.5 | CR019 |
| 5.0 | 12.0 | 1.0 | 8.5 | CR023 |
| 5.0 | 21.0 | 1.2 | 6.5 | CR038 |

| PRESSURE (bar) | | STROKE (mm) | | ID No. |
|----------------|------|-------------|-----|--------|
| A | B | C | D | |
| 5.0 | 21.5 | 1.8 | 7.3 | CR099 |
| 5.0 | 24.5 | 1.8 | 8.5 | CR109 |
| 5.0 | 23.0 | 1.0 | 8.5 | CR116 |
| 5.0 | 15.9 | 1.0 | 8.5 | CR026 |
| 5.1 | 19.1 | 1.2 | 8.5 | CR112 |
| 5.5 | 24.2 | 0.9 | 8.5 | CR028 |
| 5.5 | 25.0 | 1.0 | 8.9 | CR139 |
| 5.7 | 17.8 | 1.0 | 8.5 | CR137 |
| 5.8 | 22.0 | 1.8 | 8.5 | CR015 |
| 5.8 | 19.0 | 1.8 | 7.3 | CR016 |
| 5.8 | 19.0 | 0.9 | 6.5 | CR017 |
| 5.8 | 19.0 | 1.6 | 7.3 | CR029 |
| 5.8 | 22.4 | 0.9 | 8.5 | CR082 |
| 5.8 | 22.0 | 0.9 | 8.5 | CR088 |
| 5.8 | 19.8 | 1.0 | 8.5 | CR106 |
| 5.8 | 26.0 | 1.0 | 8.5 | CR115 |
| 5.9 | 12.9 | 1.0 | 8.5 | CR065 |
| 6.0 | 22.5 | 2.0 | 6.5 | CR002 |
| 6.0 | 25.0 | 2.0 | 7.3 | CR006 |
| 6.0 | 21.7 | 2.0 | 6.5 | CR007 |
| 6.0 | 16.3 | 1.6 | 7.3 | CR008 |
| 6.0 | 17.4 | 1.0 | 7.3 | CR050 |
| 6.0 | 28.7 | 1.0 | 8.5 | CR150 |
| 6.5 | 14.0 | 1.0 | 8.5 | CR020 |
| 6.5 | 28.0 | 1.0 | 8.5 | CR063 |
| 6.6 | 20.7 | 1.0 | 8.5 | CR043 |
| 6.7 | 16.2 | 1.0 | 8.5 | CR127 |
| 7.0 | 21.0 | 1.5 | 7.3 | CR081 |
| 7.0 | 26.7 | 0.5 | 8.5 | CR135 |
| 7.2 | 15.3 | 1.0 | 8.9 | CR100 |
| 7.6 | 24.6 | 0.5 | 8.5 | CR136 |
| 8.0 | 24.2 | 0.9 | 8.5 | CR024 |
| 8.0 | 20.7 | 1.8 | 8.5 | CR044 |
| 8.2 | 24.4 | 1.8 | 8.5 | CR013 |
| 8.2 | 24.5 | 1.0 | 8.5 | CR014 |
| 8.4 | 50.0 | 1.0 | 8.5 | CR073 |
| 8.4 | 21.1 | 3.2 | 8.5 | CR098 |
| 8.4 | 27.9 | 1.8 | 8.5 | CR120 |
| 9.0 | 15.5 | 2.0 | 8.5 | CR084 |
| 9.8 | 26.0 | 1.8 | 8.5 | CR032 |
| 14.0 | 29.0 | 1.0 | 8.5 | CR031 |

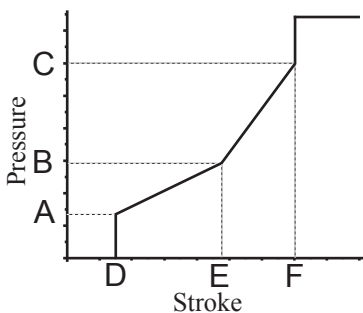
PILOT VALVE CHARACTERISTICS



Characteristic - Type A

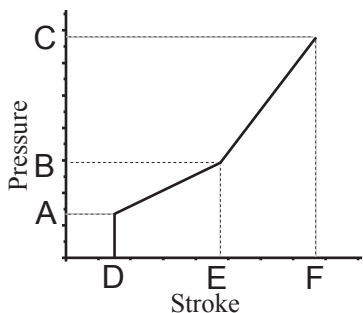
| PRESSURE (bar) | | STROKE (mm) | | ID No. |
|----------------|-------|-------------|-----|--------|
| A | B | C | D | |
| 0.0 | 64.0 | 2.0 | 9.0 | CR022 |
| 0.0 | 115.0 | 2.0 | 9.0 | CR033 |
| 0.0 | 38.0 | 0.9 | 9.0 | CR061 |
| 0.0 | 130.0 | 1.0 | 9.0 | CR143 |
| 0.5 | 12.2 | 1.8 | 9.0 | CR087 |
| 0.7 | 30.0 | 1.0 | 9.0 | CR071 |
| 1.4 | 11.5 | 1.0 | 9.0 | CR072 |
| 1.4 | 12.2 | 1.0 | 9.0 | CR155 |
| 1.5 | 9.0 | 1.0 | 9.0 | CR086 |
| 1.5 | 39.5 | 0.9 | 9.0 | CR093 |
| 2.0 | 8.0 | 2.0 | 9.0 | CR004 |
| 2.0 | 15.0 | 0.9 | 9.0 | CR060 |
| 2.0 | 52.5 | 1.0 | 9.0 | CR092 |
| 2.8 | 5.9 | 1.0 | 9.0 | CR157 |
| 3.0 | 10.0 | 0.8 | 9.0 | CR165 |
| 3.0 | 23.0 | 0.9 | 9.0 | CR058 |
| 3.0 | 14.0 | 1.0 | 9.0 | CR162 |
| 3.2 | 18.0 | 1.0 | 9.0 | CR053 |
| 3.2 | 20.0 | 0.0 | 9.0 | CR096 |
| 3.2 | 16.2 | 1.0 | 9.0 | CR153 |
| 3.8 | 23.7 | 0.9 | 9.0 | CR074 |
| 4.0 | 10.0 | 2.0 | 9.0 | CR005 |
| 4.0 | 8.0 | 1.0 | 9.0 | CR054 |
| 4.0 | 16.0 | 1.0 | 9.0 | CR057 |
| 4.3 | 10.0 | 1.0 | 9.0 | CR158 |
| 4.4 | 21.6 | 0.9 | 9.0 | CR126 |
| 4.7 | 27.6 | 0.8 | 9.5 | CR132 |
| 5.0 | 10.5 | 1.0 | 9.0 | CR066 |
| 5.0 | 18.0 | 2.0 | 9.0 | CR079 |

| PRESSURE (bar) | | STROKE (mm) | | ID No. |
|----------------|------|-------------|-----|--------|
| A | B | C | D | |
| 5.0 | 33.0 | 1.0 | 9.0 | CR085 |
| 5.0 | 20.0 | 1.0 | 9.0 | CR089 |
| 5.0 | 19.9 | 0.9 | 9.0 | CR094 |
| 5.5 | 26.7 | 1.1 | 9.0 | CR067 |
| 5.5 | 25.5 | 0.9 | 9.0 | CR075 |
| 5.5 | 50.0 | 2.0 | 9.0 | CR145 |
| 5.7 | 18.7 | 0.9 | 9.0 | CR055 |
| 5.8 | 23.0 | 1.6 | 9.0 | CR035 |
| 5.8 | 23.0 | 0.9 | 9.0 | CR036 |
| 5.8 | 23.0 | 1.8 | 9.0 | CR037 |
| 5.8 | 30.0 | 0.8 | 9.5 | CR133 |
| 6.0 | 30.0 | 2.0 | 9.0 | CR001 |
| 6.0 | 37.0 | 1.0 | 8.5 | CR040 |
| 6.0 | 40.0 | 0.9 | 9.0 | CR046 |
| 6.0 | 25.8 | 0.9 | 9.0 | CR083 |
| 6.0 | 30.0 | 1.0 | 9.0 | CR091 |
| 6.0 | 30.0 | 1.0 | 5.5 | CR097 |
| 6.0 | 16.0 | 1.0 | 9.0 | CR146 |
| 6.0 | 27.0 | 1.0 | 9.5 | CR149 |
| 7.0 | 28.2 | 1.1 | 9.0 | CR068 |
| 7.0 | 14.5 | 1.0 | 9.0 | CR152 |
| 7.0 | 23.0 | 1.0 | 9.0 | CR159 |
| 8.0 | 15.0 | 2.0 | 9.0 | CR056 |
| 8.1 | 20.1 | 3.2 | 9.0 | CR105 |
| 8.3 | 22.5 | 1.0 | 9.0 | CR059 |
| 8.6 | 25.8 | 0.9 | 9.0 | CR039 |
| 9.1 | 26.8 | 0.9 | 9.0 | CR003 |
| 11.5 | 25.5 | 1.0 | 9.0 | CR160 |



Characteristic - Type D

| PRESSURE (bar) | | | STROKE (mm) | | | ID No. |
|----------------|------|------|-------------|-----|-----|--------|
| A | B | C | D | E | F | |
| 0.2 | 2.8 | 8.4 | 0.5 | 5.7 | 8.5 | CR102 |
| 1.0 | 4.5 | 9.0 | 1.0 | 7.5 | 8.5 | CR114 |
| 1.0 | 8.3 | 14.0 | 1.1 | 7.0 | 8.5 | CR118 |
| 1.1 | 4.0 | 11.0 | 0.6 | 5.4 | 8.5 | CR111 |
| 1.5 | 8.0 | 15.0 | 2.0 | 7.0 | 8.5 | CR103 |
| 2.0 | 5.0 | 8.0 | 1.0 | 7.0 | 8.5 | CR164 |
| 2.0 | 7.0 | 20.0 | 1.0 | 5.0 | 8.5 | CR174 |
| 2.0 | 10.0 | 13.5 | 1.0 | 7.5 | 8.5 | CR110 |
| 5.0 | 9.5 | 21.5 | 1.3 | 5.0 | 8.5 | CR154 |
| 6.0 | 15.0 | 28.0 | 1.0 | 6.0 | 8.5 | CR156 |
| 7.5 | 15.0 | 28.0 | 1.8 | 6.0 | 8.5 | CR134 |
| 7.5 | 15.0 | 32.0 | 1.0 | 6.0 | 8.5 | CR151 |
| 7.5 | 15.0 | 20.7 | 1.2 | 5.4 | 6.5 | CR184 |
| 7.5 | 12.0 | 24.2 | 1.0 | 5.2 | 8.5 | CR161 |
| 8.5 | 12.5 | 32.0 | 1.0 | 3.0 | 8.5 | CR144 |



Characteristic - Type C

| PRESSURE (bar) | | | STROKE (mm) | | | ID No. |
|----------------|------|------|-------------|-----|-----|--------|
| A | B | C | D | E | F | |
| 0.0 | 20.0 | 90.0 | 0.8 | 6.0 | 9.3 | CR130 |
| 1.5 | 8.0 | 17.3 | 2.0 | 7.0 | 9.0 | CR124 |
| 2.0 | 8.0 | 28.0 | 1.0 | 5.0 | 9.0 | CR194 |
| 3.5 | 6.2 | 11.5 | 1.0 | 6.5 | 9.0 | CR166 |
| 5.5 | 20.0 | 33.0 | 0.8 | 6.5 | 9.0 | CR141 |
| 7.0 | 20.0 | 32.5 | 0.8 | 6.5 | 9.0 | CR142 |
| | | | | | | CR119 |