### Double throttle/check valve, Type Z2FS Series 30

**Features:**
- Sandwich plate design
- Porting pattern to DIN 24 340, from A ISO 4401
  and CETOP-RP 121H
- Limiting of main or pilot flow with two service ports.
- Meter-in or meter-out control.

### Functional Section

Valves type Z2FS are double throttle/check valves in sandwich plate design. They are used to limit main or pilot oil flow at one or two service ports. Two symmetrically arranged throttle/check valves limit flow (by means of adjustable throttle spools) in one direction and permit free return flow in the other direction.

**Main flow limiting**
The double throttle/check valve is fitted between the directional valve and the subplate to change the speed of an actuator (main flow limiting).

**Pilot flow limiting**
In the case of pilot operated directional valves, the double throttle/check valve may be used as a pilot choke adjustment (pilot flow limiting). In this case, it is fitted between the main valve and the pilot valve.

![Diagram of Double throttle/check valve, Type Z2FS6](image)

<table>
<thead>
<tr>
<th>Meter-in control: S</th>
<th>Meter-out control: S2</th>
<th>A Meter-out control: S3</th>
<th>A Meter-in control: S4</th>
</tr>
</thead>
<tbody>
<tr>
<td>![Diagram 1]</td>
<td>![Diagram 2]</td>
<td>![Diagram 3]</td>
<td>![Diagram 4]</td>
</tr>
</tbody>
</table>
Principle of Hydraulic Systems

Ordering details

<table>
<thead>
<tr>
<th>Z2FS</th>
<th>-30</th>
<th>B</th>
<th>+</th>
</tr>
</thead>
<tbody>
<tr>
<td>Double throttle/check valve</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nominal size 6 = 6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nominal size 16 = 16</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nominal size 22 = 22</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Series 30 to 39 → 30</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(30 to 39: unchanged installation and connection dimensions)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Technology of Beijing Huade Hydraulic = B</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Further details in clear text

No code = Mineral oil
V = Phosphate ester

No code = (With two throttle/check valves)
S = Meter-in
S2 = Meter-out
S3 = Meter-out on port A, meter-in on port B
S4 = Meter-in on port A, meter-out on port B

Technical data (for applications outside these parameters, please consult us!)

<table>
<thead>
<tr>
<th>Size</th>
<th>6</th>
<th>16</th>
<th>22</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max flow (L/min)</td>
<td>80</td>
<td>250</td>
<td>350</td>
</tr>
<tr>
<td>Max working pressure (MPa)</td>
<td>31.5</td>
<td>35</td>
<td></td>
</tr>
<tr>
<td>Pressure fluid</td>
<td>Mineral oil (for NBR seal) or Phosphate ester (for FPM seal)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Viscosity range (mm²/s)</td>
<td>10 to 600</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fluid temperature range (°C)</td>
<td>-30 to +60</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Characteristic curves (measured at $v = 41 \, \text{mm}^2/\text{s}$ and $t = 50 \, ^\circ \text{C}$)

Pressure difference $\Delta p$ in relationship to the flow $q_v$ via the check valve (throttle closed)

Z2FS6

Z2FS16

Pressure difference in MPa

Flow in L/min →

Pressure difference in MPa

Flow in L/min →

Pressure difference $\Delta p$ in relationship to the flow $q_v$ at a constant throttle setting.

Z2FS6

Z2FS16

Pressure difference in MPa

Flow in L/min →

Pressure difference in MPa

Flow in L/min →
**Characteristic curves** (measured at $v = 41 \text{ mm}^2/\text{s}$ and $t = 50 ^\circ \text{C}$)

Pressure difference $\Delta p$ in relation to the flow $c_v$ at constant throttle setting

![Graph showing characteristic curves](image)

**Unit dimensions**

*(Dimensions in mm)*

Type Z2FS6:

![Diagram showing unit dimensions](image)

- Name plate
- Setting screw for alteration of flow cross section
- Turn anti-clockwise = increases flow
  
  turn clockwise = decreases flow
- Valve fixing holes
- Ports A, B, P, T
- O-ring plate
- To change from meter-in to meter-out, rotate the unit about the "X" axis
Type Z2FS16:

Type Z2FS22

1. Name plate
2. Setting screw for alteration of flow cross section
3. Turn anti-clockwise = increases flow
   turn clockwise = decreases flow
4. 2 two locating pins
5. 2 two locating pins holes
6. 6 Valve fixing holes
7. O-ring for ports A, B, P, T
8. O-ring for ports X, Y, L
Notice

1. The fluid must be filtered. Minimum filter fineness is 20 μm.
2. The tank must be sealing up and an air filter must be installed on air entrance.
3. Products without subplate when leaving factory, if need them, please ordering specially.
4. Valve fixing screws must be high intensity level (class 10.9). Please select and use them according to the parameter listed in the sample book.
5. Roughness of surface linked with the valve is required to 0.8 μ.
6. Surface finish of mating piece is required to 0.01/100mm.
Double throttle/check valve, Type Z2FS 10 Series 20

Features:
- Sandwich plate design
- Porting pattern to DIN 24 340, from A, ISO 4401 and CETOP-RP 121H
- Limiting of main or pilot flow of two service ports.
- Meter-in or meter-out control.

Functional, section

Valves type Z 2 FS10...20D/... are double throttle/check valves in sandwich plate design. They are used to limit main or pilot oil flow at one or two service ports. Two symmetrically arranged throttle/check valves limit flow (by means of adjustable throttle spools) in one direction and permit free return flow in the other direction.

Main flow limiting
The double throttle/check valve is fitted between the directional valve and the subplate to change the speed of an actuator (main flow limiting).

Pilot flow limiting
In the case of pilot operated directional valves, the double throttle/check valve may be used as a pilot choke adjustment (pilot flow limiting). In this case, it is fitted between the main valve and the pilot valve.
## Principle of Hydraulic system

<table>
<thead>
<tr>
<th>Meter-in control:</th>
<th>S</th>
<th>Meter-out control:</th>
<th>S2</th>
<th>Meter-in control on port A</th>
<th>Meter-out control on port B</th>
</tr>
</thead>
</table>

### Ordering details

- **Z2FS**
- **20**
- **B**
- **I**
- **E**

- Double throttle/check valve
- Nominal size: 10
- Series 20 to 29
  - (20 to 29: unchanged installation and connection dimensions)
- Technology of Beijing Huade Hydraulic

Further details in clear text:

- No code = Mineral oil
- Y = Phosphate ester

- No code = (With two throttle/check valves)
- Meter-in/meter-out throttling (this valve can be turned)

<table>
<thead>
<tr>
<th>S</th>
<th>Meter-in</th>
</tr>
</thead>
<tbody>
<tr>
<td>S2</td>
<td>Meter-out</td>
</tr>
<tr>
<td>S3</td>
<td>Meter-out on port A, meter-in on port B</td>
</tr>
<tr>
<td>S4</td>
<td>Meter-in on port A, meter-out on port B</td>
</tr>
</tbody>
</table>

### Technical data (for applications outside these parameters, please consult us!)

<table>
<thead>
<tr>
<th>Size</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum flow (L/min)</td>
<td>160</td>
</tr>
<tr>
<td>Maximum working pressure (MPa)</td>
<td>31.5</td>
</tr>
<tr>
<td>Pressure fluid</td>
<td>Mineral oil for NBR seal or Phosphate ester for FPM seal</td>
</tr>
<tr>
<td>Viscosity range (mm²/s)</td>
<td>10 to 800</td>
</tr>
<tr>
<td>Fluid temperature range (°C)</td>
<td>-30 to +80</td>
</tr>
</tbody>
</table>
**Characteristic curves** (measured at $v = 41\ \text{mm/s}$ and $t = 50^\circ\text{C}$)

$\Delta p - q_a$ - characteristic curve across check valve (throttle closed)

Pressure difference $\Delta p$ in relation to the flow $q_a$ at constant throttle setting.

**Unit dimensions**  (Dimensions in mm)

1. Name plate
2. Setting screw for alteration of flow cross section
3. Turn anti-clockwise = increases flow  
   turn clockwise = decreases flow
4. Valve fixing holes
5. Ports A, B, P, T
6. O-ring plate
7. To change from meter-in to meter-out, rotate the unit about the "X" axis" axis
Notice

1. The fluid must be filtered. Minimum filter fineness is 20 μm.
2. The tank must be sealing up and an air filter must be installed on air entrance.
3. Products without subplate when leaving factory, if need them, please ordering specially.
4. Valve fixing screws must be high intensity level (class 10.9). Please select and use them according to the parameter listed in the sample book.
5. Roughness of surface linked with the valve is required to △R.
6. Surface finish of mating piece is required to 0.01/100mm.
<table>
<thead>
<tr>
<th>BEIJING HUADE HYDRAULIC INDUSTRIAL GROUP CO., LTD.</th>
<th>Double throttle/check valve, Type Z2FS 6 Series 40 (New Series)</th>
<th>RE: 27500/12.2004</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Size 6</strong></td>
<td>up to 31.5MPa</td>
<td>up to 80 L/min</td>
</tr>
</tbody>
</table>

**Features:**
- Sandwich plate valve
- Parting pattern to DIN 24340, from A, ISO 4401 and CETOP-RP 121H
- 4 adjustment elements:
  - Screw with locknut and protective cap
  - Lockable rotary knob with scale
  - Spindle with internal hexagon and scale
  - Rotary knob with scale
- For limiting the main or pilot fluid flow of 2 service ports
- For meter-in or meter-out control

**Function, section**

Valve type Z2FS 6-40B/.. is a double throttle/check valve in sandwich plate design. They are used to limit the main or pilot flow of one or two service ports. Two symmetrically arranged throttle/check valves limit the flow in one direction and allow free-flow in the opposite direction. For meter-in control fluid passes from port A1 to port A2 via the throttling point (1), which is made up to the valve seat (2) and the throttling spool (3). The throttling spool (3) is axially adjustable via the adjustment screw (4), thus allowing the throttling point (1) to be adjusted. Flow flowing back from the service port A2 moves the valve seat (2) against spring (5) in the direction of the throttling spool (3), causing the valve to act as a check valve and allowing free-flow. Depending upon the way in which the valve is installed, the throttling effect can be arranged as a meter-in or a meter-out control.

**Limiting the main fluid flow (style ..2Q..)**
In order to change the velocity of an actuator (main fluid flow), the double throttle/check valve is installed between the directional valve and the sub-plate.

**Limiting the pilot fluid flow (style ..1Q..)**
In pilot operated directional control valves, the double/throttle check valve is installed as a pilot choke adjustment (pilot fluid flow). It is fitted between the main valve and the pilot valve.
## Ordering details

<table>
<thead>
<tr>
<th>Z2FS</th>
<th>0</th>
<th>-40</th>
<th>B</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Double throttle/check valve</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nominal size 6 = 6</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Throttle/check valve ports A and B = -</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Throttle/check valve port A = A</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Throttle/check valve port B = B</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Further details in clear text

<table>
<thead>
<tr>
<th>No code=</th>
<th>Mineral oil</th>
</tr>
</thead>
<tbody>
<tr>
<td>V=</td>
<td>Phosphate ester</td>
</tr>
</tbody>
</table>

1Q = With fine control
2Q = Standard version

### Adjustment element:
- Screw with locknut = 2
- Lockable rotary knob with scale = 3
- Spindle with internal hexagon and scale = 5
- Rotary knob with scale = 7

### Series 40 to 49 = 40
(40 to 49: unchanged installation and connection dimensions)

### Technology of Beltin Huade Hydraulic = B

Note: Type Z2FS 6-...-40B/... has the same adjustment elements on ports A and B

### Symbols

(① = valve side, ② = sub-plate)

**Z2FS 6-...-40B/... (meter-in)**

```
\[\text{P} \quad \text{①} \quad \text{②} \quad \text{B} \quad \text{T}\]
```

**Z2FS 6-...-40B/... (meter-out)**

```
\[\text{P} \quad \text{①} \quad \text{②} \quad \text{B} \quad \text{T}\]
```

**Z2FS 6A-...-40B/... (meter-out)**

```
\[\text{P} \quad \text{①} \quad \text{②} \quad \text{B} \quad \text{T}\]
```

**Z2FS 6B-...-40B/... (meter-in)**

```
\[\text{P} \quad \text{①} \quad \text{②} \quad \text{B} \quad \text{T}\]
```
### Technical data
(for applications outside these parameters, please consult us!

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Mineral oil</th>
<th>Phosphate ester</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pressure fluid</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pressure fluid temperature range (°C)</td>
<td>-30 to +80</td>
<td></td>
</tr>
<tr>
<td>Viscosity range (mm²/s)</td>
<td>10 to 600</td>
<td></td>
</tr>
<tr>
<td>Degree of contamination</td>
<td>Maximum permissible degree of contamination of the hydraulic fluid to NAS 1638 class 3. We therefore recommend a filter with a minimum retention rate of βₚ₀ &gt; 75</td>
<td></td>
</tr>
<tr>
<td>Maximum working pressure (MPa)</td>
<td>up to 31.5</td>
<td></td>
</tr>
<tr>
<td>Maximum flow (L/min)</td>
<td>up to 80</td>
<td></td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>approx. 0.8</td>
<td></td>
</tr>
</tbody>
</table>

### Characteristic curves
(measured at v = 41 mm²/s and t = 50°C)

![Characteristic curves](image)

Δp-q - characteristic curves - types Z3FS6 - 40/20V
Throttling setting in turns

Δp-q - characteristic curves - type Z3FS6 - 40/10V
Throttling setting in turns

Δp-q - characteristic curve across check valve (throttling closed)
1 Name plate
2 Adjustment element “2”
3 Adjustment element “3”
4 Adjustment element “4”
5 Adjustment element “7”
6 Space required to remove key
7 Valve fixing holes
8 Locknut 10 A/F
9 Adjustment screw/spindle to set flow
cross-section (internal hexagon 5 A/F)
10 O-ring 9.25 x 1.78 for ports A, B, P, T
11 O-ring plate
12 For all adjustment elements:
turn anti-clockwise = increases flow
turn clockwise = decreases flow
13 To change from meter-in to meter-out,
   rotate the unit about the “X”-“X” axis
14 Stroke

Valve fixing screws
M5 – 10.9 (GB/T70.1-2000)
Tightening torque $M_A = 8.9 \text{ Nm}$,
Notice

1. The fluid must be filtered. Minimum filter fineness is 20 μm.
2. The tank must be sealing up and an air filter must be installed on air entrance.
3. Products without subplate when leaving factory, if need them, please ordering specially.
4. Valve fixing screws must be high intensity level (class 10.9). Please select and use them according to the parameter listed in the sample book.
5. Roughness of surface linked with the valve is required to 0.8 μ.
6. Surface finish of mating piece is required to 0.01/100mm.
## Double throttle/check valve

### Type Z2FS 10...-30B/... (New Series)

<table>
<thead>
<tr>
<th>Size</th>
<th>up to 31.5 MPa</th>
<th>up to 160 L/min</th>
</tr>
</thead>
</table>

### Features:
- Sandwich plate valve
- Porting pattern to DIN 24340 form A, ISO 4401 and CETOP-RP 121 H
- For limiting the main or pilot fluid flow of 2 service ports
- 3 adjustment elements:
  - Lockable rotary knob with scale
  - Spindle with internal hexagon and scale
  - Rotary knob with scale
- For meter-in or meter-out control

### Function, section

Valve type Z2FS 10...-30B/... is a double throttle/check valve in sandwich plate design. It is used to limit the main or pilot flow of one or two service ports. Two symmetrically arranged throttle/check valves limit the flow in one direction and allow free-flow in the opposite direction. For meter-in control, fluid passes from port A1 to port A2 via the throttling point (1), which is made up of the valve seat (2) and the throttling spool (3.1). The throttling spool (3.1) is axially adjustable via the spindle (4), thus allowing the throttling point (1) to be adjusted. At the same time, the fluid in port A1 reaches spool side (6) via bore (5). The pressure present in addition to the spring force holds the throttle spool (3.1) in its throttling position. Flow flowing back from the service port B2 moves the throttle spool (3.2) against the spring (7) causing the valve to act as a check valve and allowing free-flow. Depending upon the way in which the valve is installed, the throttling effect can be arranged as a meter-in or meter-out control.

#### Limiting the main fluid flow

In order to change the velocity of an actuator (main fluid flow), the double throttle/check valve is installed between the directional valve and the sub-plate.

#### Limiting the pilot fluid flow

In pilot operated directional control valves, the double/throttle check valve is installed as a pilot choke adjustment (pilot fluid flow). It is fitted between the main valve and the pilot valve.
### Ordering details

<table>
<thead>
<tr>
<th>Z2FS</th>
<th>10</th>
<th>-</th>
<th>30</th>
<th>B</th>
<th></th>
</tr>
</thead>
</table>

**Double throttle/check valve**

- Nominal size 10  
  \[= 10\]

- Throttle/check valve ports A and B  
  \[= .\]
- Throttle/check valve port A  
  \[= A\]
- Throttle/check valve port B  
  \[= B\]

**Adjustment element**

- Lockable rotary knob with scale  
  \[= 3\]
- Spindle with internal hexagon and scale  
  \[= 5\]
- Rotary knob with scale  
  \[= 7\]

**Series 30 to 39**

\[= 30\]

(30 to 39: unchanged installation and connection dimensions)

**Technology of Beijing Huade Hydraulic**  
\[= B\]

**Further details in clear text**

- No code = Mineral oil
- \[\text{V} = \text{Phosphate ester}\]

**No code = (With two throttle/check valves) Meter-in/meter-out throttling, 
(this valve can be turned)**

- \[S = (...)A\cdot30B/3\] meter-in on port A, (...)B\cdot30/3 meter-in on port B
- \[S2 = (...)A\cdot30B/32\] meter-out on port A, (...)B\cdot30/32 meter-out on port B
- \[S3 = (...)A\cdot30B/33\] meter-out on port A, (...)B\cdot30/33 meter-in on port B
- \[S4 = (...)A\cdot30B/34\] meter-in on port A, (...)B\cdot30/34 meter-out on port B

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**Note:** Type Z2FS 10\(\ldots\)30B\(\ldots\) has the same adjustment elements on ports A and B!

---

### Symbols

- \(\odot\) = valve side, \(\ominus\) = sub-plate

---

**Z2FS10\(\ldots\)30B\(\ldots\)(meter-in)**

```
\[
\text{T}_A \quad \text{P} \quad \text{A} \quad \ominus \quad \text{B} \quad \text{T}_B
\]
```

---

**Z2FS10\(\ldots\)30B\(\ldots\)(meter-out)**

```
\[
\text{T}_A \quad \text{P} \quad \text{A} \quad \odot \quad \text{B} \quad \text{T}_B
\]
```
**Technical data** (for applications outside these parameters, please consult us!)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pressure fluid</td>
<td>Mineral oil (for NBR seal) or Phosphate ester (for FPM seal)</td>
</tr>
<tr>
<td>Pressure fluid temperature range</td>
<td>-30 to +80°C</td>
</tr>
<tr>
<td>Viscosity range</td>
<td>10 to 600 mm²/s</td>
</tr>
<tr>
<td>Degree of contamination</td>
<td>Maximum permissible degree of contamination of the hydraulic fluid in NAS 1998 class 5. We therefore recommend a filter with a minimum retention rate of ( \beta_{10} \geq 75 ).</td>
</tr>
<tr>
<td>Maximum working pressure</td>
<td>up to 31.5 MPa</td>
</tr>
<tr>
<td>Maximum flow</td>
<td>up to 180 L/min</td>
</tr>
<tr>
<td>Weight</td>
<td>approx 3.1 kg</td>
</tr>
</tbody>
</table>

**Characteristic curves** (measured at \( v = 41 \, \text{mm}^2/\text{s} \) and \( t = 50°C \))

1. **Pressure difference** \( \Delta p \) in relation to the flow \( q_s \) at constant throttle setting

   ![Graph 1](image1)

   - Flow in L/min
   - Pressure difference in MPa
   - Throttle setting in turns

2. **Pressure difference** \( \Delta p \) in relation to the flow \( q_v \) across the check valve

   ![Graph 2](image2)

   - Flow in L/min
   - Pressure difference in MPa
   - 1 Throttle closed
   - 2 Throttle open
Unit dimensions

Type Z2FS 10..30B/

(Dimensions in mm)
1 Nameplate
2 Adjustment "5"
3 Adjustment "3"
4 Adjustment "7"
5 4 through holes for valve fixing screws
6 O-ring 9.25x1.78 for ports A, B, P, TA, TB
7 O-ring plate
8 To change from meter-in to meter-out, rotate the unit about the "X"-"X" axis
9 Space required to remove key
10 Only for adjustment "3"
11 All setting device
   Clockwise rotation for increasing flow
   Counter-clockwise rotation for reducing flow

Valve fixing screws
M5 -10.9 (GB/T70.1-2000)
Tightening torque $M_A = 15.5$ Nm.

Required surface finish of mating piece
Notice

1. The fluid must be filtered. Minimum filter fineness is 20 μm.
2. The tank must be sealing up and an air filter must be installed on air entrance.
3. Products without subplate when leaving factory, if need them, please ordering specially.
4. Valve fixing screws must be high intensity level (class 10.9). Please select and use them according to the parameter listed in the sample book.
5. Roughness of surface linked with the valve is required to 0.8 μm.
6. Surface finish of mating piece is required to 0.01/100mm.