The BLAIN EV4-vvvf program includes the widest range of vvvf solution offered to the elevator industry for high performance passenger elevators. Easy to install, EV4’s are smooth, reliable and precise in operation throughout extreme load and temperature variations with inbuilt overload protection and different energy saving modes. The EV4 system uses the control of L1000H vvvf drive in the up travel, while down travel is managed by the EV4 valve itself. In this way, the EV4-vvvf solution offers the most cost-effective and energy-efficient solution.

### Description
Available port sizes are ¾", 1½", 2" and 2½" pipe threads, depending on flow. EV4 eliminates high inrush currents and do not require wye-delta switching. According to customers’ elevator data, valves are factory adjusted, ready for operation and very simple to readjust if desired. The L1000H Yaskawa drive combined with feedback systems that are designed to compensate elevator speed fluctuations regardless oil temperature and car load conditions.

**Caution:** The EV4 valve is to be used only together with Yaskawa L1000H inverter and not as standalone control valve. EV4 valves include the following features essential for efficient installation and trouble free service:

- Simple Responsive Adjustment
- Temperature and Pressure Compensations
- Pressure Gauge and Shut Off Cock
- Self Closing Manual Lowering
- Self Cleaning Pilot Line Filters
- Self Cleaning Main Line Filter (Z-T)
- Built-in Turbulence Suppressors
- 70 HRc Rockwell Hardened Bore Surfaces
- 100% Continuous Duty Solenoids
- Compact and aesthetic design

### Technical Data:

<table>
<thead>
<tr>
<th>Port Size</th>
<th>¾&quot; EV4</th>
<th>1½&quot; &amp; 2&quot; EV4</th>
<th>2½&quot; EV4</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Flow Range:</strong></td>
<td>l/min</td>
<td>bar (psi)</td>
<td>bar (psi)</td>
</tr>
<tr>
<td></td>
<td>10-125 (2-33)</td>
<td>30-800 (8-212)</td>
<td>500-1530 (130-405)</td>
</tr>
<tr>
<td><strong>Pressure Range (valve):</strong></td>
<td>&amp;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>bar (psi)</td>
<td>8-55 (117-797)</td>
<td>8-55 (117-797)</td>
<td>8-55 (117-797)</td>
</tr>
<tr>
<td><strong>Burst Pressure Z:</strong></td>
<td>&amp;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>bar (psi)</td>
<td>575 (8340)</td>
<td>505 (7324)</td>
<td>340 (4931)</td>
</tr>
<tr>
<td><strong>Pressure Drop P–Z:</strong></td>
<td>&amp;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>bar (psi)</td>
<td>6 (88) at 125 l/min</td>
<td>4 (58) at 800 l/min</td>
<td>4 (58) at 1530 l/min</td>
</tr>
<tr>
<td><strong>Weight:</strong></td>
<td>5 (11)</td>
<td>10 (22)</td>
<td>14 (31)</td>
</tr>
<tr>
<td><strong>Oil Viscosity:</strong></td>
<td>25-75 cSt. at 40°C (104°F).</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Max. Oil Temperature:</strong></td>
<td>55°C (131°F)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Solenoids AC:</strong></td>
<td>24 V/1.8 A, 42 V/1.0 A, 110 V/0.43 A, 230 V/0.18 A, 50/60 Hz.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Solenoids DC:</strong></td>
<td>12 V/2.0 A, 24 V/1.1 A, 42 V/0.5 A, 48 V/0.6 A, 80 V/0.3 A, 110 V/0.25 A, 196 V/0.14 A.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

**Elevator Control Valves**

Designer and Manufacturer of the highest quality control valves & safety components for hydraulic elevators

Blain Hydraulics GmbH
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Germany

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Fax +49 7131 282199
www.blain.de
info@blain.de

GmbH
Optional Equipment

**EN** Emergency Power Solenoid  
**CSA** CSA Solenoids  
**KS** Slack Rope Valve  
**BV** Main Shut-Off Valve  
**HP** Hand Pump  

**DH** High Pressure Switch  
**DL** Low Pressure Switch  
**CX** Pressure Compensated Down  
**MX** Auxiliary Down

---

**EV4**

1. **¾"**
2. **1½" & 2" EV4**
3. **2½"**

**Up**

- Up to 1 m/s (200 fpm). 3 Full Speeds and 1 Levelling Speed.
- Up Start, speeds, transition times and up stop are adjusted by inverter parameters.

**Down**

- Up to 1 m/s (200 fpm). 1 Full Speed and 1 Levelling Speed.
- All down functions are smooth and adjustable.

---

Control Elements

- **C** Solenoid (Down Deceleration)
- **D** Solenoid (Down Stop)
- **H** Manual Lowering
- **S** Relief Valve
- **U** By Pass Valve
- **V** Check Valve
- **X** Full Speed Valve (Down)
- **Y** Levelling Valve (Down)
- **F** Filter

---

Hydraulic Circuit

---

Electrical Sequence

---

Adjustments UP

- None (Fixed Orifice)

---

Adjustments DOWN

- **6** Down Acceleration
- **7** Down Full Speed
- **8** Down Deceleration
- **9** Down Levelling Speed

---

**Caution:** Please refer to the detailed installation and set-up procedure of the EV4 handbook and L1000H technical manual.

The up direction control is done by the Yaskawa L1000H inverter. The inverter with the help of its software calculates the load in the car, read the current oil temperature through a temperature sensor and process oil and pump performance data in order to obtain motor speeds for the nominal, intermediate, inspection and levelling speeds.

After giving the oil type and elevator data a teach run with empty car is sufficient enough for the inverter to self-learn and configure itself fully automatic during the initial set-up.
### Adjustments DOWN

**Valves are already adjusted and tested.** Check electrical operation before changing valve settings. Test that the correct solenoid is energised, by removing nut and raising solenoid slightly to feel pull.

**Nominal Settings:** Adjustments 7 & 9 approx. level with flange face. Two turns in either direction may then be necessary. Adjustments 6 & 8 turn all the way ‘in’ (clockwise), then 1.5 turns ‘out’ (c-clockwise). One final turn in either direction may be necessary.

#### 6. Down Acceleration:
When solenoids C and D are energised, the car will accelerate downwards according to the setting of adjustment 6. ‘In’ (clockwise) provides a softer down acceleration, ‘out’ (c-clockwise) a quicker acceleration.

#### 7. Down Speed:
With solenoids C and D energised as in 6 above, the full down speed of the car is according to the setting of adjustment 7. ‘In’ (clockwise) provides a slower down speed, ‘out’ (c-clockwise) a faster down speed.

#### 8. Down Deceleration:
When solenoid C is de-energised whilst solenoid D remains energised, the car will decelerate according to the setting of adjustment 8. ‘In’ (clockwise) provides a softer deceleration, ‘out’ (c-clockwise) a quicker deceleration.

**Attention:** Do not close all the way in! Closing adjustment 8 completely (clockwise) may cause the car to fall on the buffers.

#### 9. Down Levelling:
With solenoid C de-energised and solenoid D energised as in 8 above, the car will proceed at its down levelling speed according to the setting of adjustment 9. ‘In’ (clockwise) provides a slower, ‘out’ (c-clockwise) a faster down levelling speed.

**Down Stop:** When solenoid D is de-energised with solenoid C remaining de-energised, the car will stop according to the setting of adjustment 8 and no further adjustment will be required.

**KS Slack Rope Valve:** Both solenoids C and D must be de-energized beforehand! Loosen the small grub screw on the top of the KS on the left hand side. The KS is adjusted with a 3 mm Allan Key by turning the screw ‘in’ for higher pressure and ‘out’ for lower pressure. With KS turned all the way ‘in’, then half a turn back out, the unloaded car should descend when Manual Lowering H is opened. Should the car not descend, H must be backed off until the car just begins to descend, then backed off a further half turn to ensure that with cold oil, the car can be lowered as required.

### Adjustments pressure relief valve

**Valves are already checked for functionality.** Check electrical operation before changing inverter settings. Please refer to the EV4 inverter manual for necessary parameter settings.

**S Relief Valve:** ‘In’ (clockwise) produces a higher, ‘out’ (c-clockwise) a lower maximum pressure setting. After turning ‘out’, open manual lowering H for an instant.

**Important:** When testing relief valve, close ball valve gradually.
### EV4 Spare Parts List

#### Pos. No. Item

- **F3** Lock Screw - Flange
- **FO** O-Ring - Flange
- **1F4** Flange - By Pass
- **UO** O-Ring - By Pass Valve
- **U4** By Pass Valve
- **UD** Noise Suppressor
- **UF1** Spring - By Pass
- **UF2** Spring - By Pass
- **US** Dead Stop
- **2** Fixed orifice
- **3** Plug
- **4F4** Flange - Check Valve
- **FO** O-Ring - Flange
- **VF** Spring - Check Valve
- **VO** Seal - Check Valve
- **V** Check Valve
- **W** Up-Levelling Valve
- **WO** O-Ring - Up Levelling Valve
- **VO** Seal - Check Valve
- **W6** Screw - Check Valve
- **5** Plug
- **6** Adjustment - Down Acceleration
- **7F** Flange - Down Valve
- **7O** O-Ring - Down Valve
- **XO** Seal - Down Valve
- **XD** Noise Suppressor
- **F** Main Filter
- **8** Adjustment - Down Deceleration
- **EO** O-Ring - Adjustment
- **9E** Adjustment - Down Levelling
- **SF** Spring - Down Valve
- **Y** Down Levelling Valve
- **H** Manual Lowering - Self Closing
- **HO** Seal - Manual Lowering
- **SE** Adjustment - Screw
- **SM** Hexagonal
- **MS** Grub Screw
- **SO** O-Ring - Nipple
- **SZ** Nipple
- **SP** Spring
- **SK** Piston
- **MM** Nut - Solenoid
- **M** Coil - Solenoid (indicate voltage)
- **DR** Tube - Solenoid 'Down'
- **MO** O-Ring - Solenoid
- **DF** Spring - Solenoid 'Down'
- **DN** Needle - 'Down'
- **DK** Core - Solenoid
- **DG** Seat Housing with Screen - 'Down'
- **FD** Filter Solenoid
- **DS** Seat - Solenoid 'Down'

#### O-Ring-Größe

<table>
<thead>
<tr>
<th>No.</th>
<th>1/4&quot;</th>
<th>3/8&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>FO</td>
<td>26x2P</td>
<td>47x2.5P</td>
</tr>
<tr>
<td>EO</td>
<td>9x2P</td>
<td>9x2P</td>
</tr>
<tr>
<td>UO</td>
<td>26x2V</td>
<td>19.5x2.62V</td>
</tr>
<tr>
<td>WO</td>
<td>5.28x1.78V</td>
<td>5.28x1.78V</td>
</tr>
<tr>
<td>VO</td>
<td>23x3.5V</td>
<td>42x3V</td>
</tr>
<tr>
<td>TO</td>
<td>5.28x1.78P</td>
<td>9x2P</td>
</tr>
<tr>
<td>XO</td>
<td>13x2V</td>
<td>30x3V</td>
</tr>
<tr>
<td>MO</td>
<td>5.28x1.78V</td>
<td>5.28x1.78V</td>
</tr>
<tr>
<td>SO</td>
<td>5.28x1.78P</td>
<td>5.28x1.78P</td>
</tr>
<tr>
<td>US</td>
<td>26x2P</td>
<td>26x2P</td>
</tr>
</tbody>
</table>

* FO an 4F 2¾" ist 67x2.5P ** 90 Shore O-Ring: V=FKM-Viton P=NBR-Perbunan

**US is only for EV4 1 1/2" and above sizes!**

#### Solenoid Valves

- **C+D**
- **D**
- **C**

#### Fix orifice

- **FO**
- **2**
- **3+5**

#### Adjustments

- **S**
- **SK**
- **SF**
- **SO**
- **SM**
- **SE**

#### Flow Guide Selection Charts for Down Direction

- **3/4" US gpm**
- **1 1/2" & 2" US gpm**
- **2 1/2" US gpm**

To order EV4: Size (inch), state pump flow, empty car pressure (or flow guide size) and solenoid voltage.

**Example order:** 1 1/2"EV4, 380l/min, 18bar (empty), 110AC or 1 1/2"EV4/4/110AC

---

**Taper threads:** Do not exceed 8 turns of piping into the valve connections.

---

**Static pressure with empty car. psi**

In case of down leakage, replace and test in the following order: **DS & DN, XO, VO, WO, FO + HO.**

---

**To order EV4: Size (inch), state pump flow, empty car pressure (or flow guide size) and solenoid voltage.**

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**BLAIN HYDRAULICS** Designer and Manufacturer of High Quality Valves for Hydraulic Elevators Printed in Germany

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