Technical brochure

Solenoid valves

EVRA 3 → 40 and EVRAT 10 → 20
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**Technical brochure**  
**Solenoid valves, type EVRA 3 to 40 and EVRAT 10 to 20**

**Introduction**

EVRA is a direct or servo operated solenoid valve for liquid, suction and hot gas lines with ammonia or fluorinated refrigerants.

EVRA valves are supplied complete or as separate components, i.e. valve body, coil and flanges can be ordered separately.

EVRAT is an assisted lift, servo operated solenoid valve for liquid, suction and hot gas lines with ammonia and fluorinated refrigerants.

EVRAT is specially designed to open - and stay open - at a pressure drop of 0 bar. The EVRAT solenoid valve is thus suitable for use in all plant where the required opening differential pressure is 0 bar.

EVRAT is available as components, i.e. valve body, flanges and coil must be ordered separately.

EVRAT 10, 15 and 20 all have spindle for manual operation.

**Approval**

DNV, Det Norske Veritas, Norway  
IT Polski Rejestr Statków, Poland  
MR, Maritime Register of Shipping, Russia  
Pressure Equipment Directive (PED) (97/23/EC) (EVRA 32 and 40 CE marked according to PED)  
UL listed with GP coils

**Technical data**

**Refrigerants**

R 717 (NH₃), R 22, R 134a, R 404A, 410 A, R 744 (CO₂), R 502 etc.

**Temperature of medium**

−40 → +105°C.

Max. 130°C during defrosting.

<table>
<thead>
<tr>
<th>Type</th>
<th>Opening differential pressure with standard coil (Δp bar)</th>
<th>Temperature of medium</th>
<th>Max. working pressure PB bar</th>
<th>kv-value ¹)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Min. 10 W a.c. 21 12 W a.c. 20 W d.c.</td>
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<tr>
<td>EVRA 3</td>
<td>0.00 21 25 14 −40 → 105 42 0.23</td>
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<tr>
<td>EVRA 10</td>
<td>0.05 21 25 18 −40 → 105 42 1.5</td>
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<tr>
<td>EVRA 15</td>
<td>0.05 21 25 16 −40 → 105 42 1.5</td>
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<tr>
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<td>0.05 21 25 16 −40 → 105 42 1.5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EVRA 15</td>
<td>0.05 21 25 16 −40 → 105 42 2.7</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EVRA 20</td>
<td>0.05 21 25 13 −40 → 105 42 4.5</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>EVRA 25</td>
<td>0.05 21 25 13 −40 → 105 42 4.5</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>EVRA 32</td>
<td>0.20 21 25 14 −40 → 105 42 12.0</td>
<td></td>
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<tr>
<td>EVRA 40</td>
<td>0.20 21 25 14 −40 → 105 42 25.0</td>
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</tr>
</tbody>
</table>

¹) The kv value is the water flow in m³/h at a pressure drop across valve of 1 bar, ρ = 1000 kg/m³.

²) MOPD for media in gas form is approx. 1 bar greater.

³) For a.c. only

⁴) For a.c. / d.c.

<table>
<thead>
<tr>
<th>Type</th>
<th>Rated capacity ¹) [kW]</th>
<th>Liquid</th>
<th>Suction vapour</th>
<th>Hot gas</th>
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</thead>
<tbody>
<tr>
<td>R717</td>
<td>R22 R134a R404A</td>
<td>R717</td>
<td>R22 R134a R404A</td>
<td>R717 R22 R134a R404A</td>
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<tr>
<td>EVRA 3</td>
<td>21.8 4.6 4.3 3.2</td>
<td>6.5</td>
<td>2.1 1.7</td>
<td>1.7</td>
</tr>
<tr>
<td>EVRA/T 10</td>
<td>142.0 30.2 27.8 21.1</td>
<td>9.0</td>
<td>3.4 2.5</td>
<td>3.1 42.6 13.9 11.0 11.3</td>
</tr>
<tr>
<td>EVRA/T 15</td>
<td>256.0 54.4 50.1 38.0</td>
<td>16.1  6.2 4.4 5.5</td>
<td>76.7 24.9 19.8 20.3</td>
<td></td>
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<tr>
<td>EVRA/T 20</td>
<td>426.0 90.6 83.5 63.3</td>
<td>26.9 10.3 7.3 9.2</td>
<td>128.0 41.5 32.9 33.9</td>
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<tr>
<td>EVRA 25</td>
<td>947.0 201.0 186.0 141.0</td>
<td>59.7 22.8</td>
<td>16.3</td>
<td>204.0 284.0 92.3 73.2 75.3</td>
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<tr>
<td>EVRA 32</td>
<td>1515.0 322.0 297.0 225.0</td>
<td>95.5 36.5 26.1 32.6</td>
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<tr>
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<td>149.0 57.0 40.8 51.0</td>
<td>710.0 231.0 183.0 188.0</td>
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</tbody>
</table>

1) Rated liquid and suction vapour capacity is based on evaporating temperature tₑ = −10°C, liquid temperature ahead of valve tₐ = +25°C, and pressure drop across valve Δp = 0.15 bar.

2) Rated hot gas capacity is based on condensing temperature tᶜ = +40°C, pressure drop across valve Δp = 0.8 bar, hot gas temperature t₉ = +65°C, and subcooling of refrigerant Δt₀₂₃ = 4 K.
Technical brochure  
Solenoid valves type EVRA 3 to 40 and EVRAT 10 to 20

**Ordering**

<table>
<thead>
<tr>
<th>Code no.</th>
<th>Type</th>
<th>Connection</th>
<th>10 W coil with terminal box</th>
<th>Code no.</th>
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<tbody>
<tr>
<td>032F3102</td>
<td>EVRA 3</td>
<td>032F3103</td>
<td>032F6207</td>
<td>032F6208</td>
</tr>
<tr>
<td>032F6212</td>
<td>EVRA 10</td>
<td>032F6213</td>
<td>032F6217</td>
<td>032F6218</td>
</tr>
<tr>
<td>032F6222</td>
<td>EVRA 20</td>
<td>032F6223</td>
<td>032F6226</td>
<td>032F6225</td>
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</tbody>
</table>

**Complete valves without flanges**

<table>
<thead>
<tr>
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<th>Type</th>
<th>Connection</th>
<th>10 W coil with terminal box</th>
</tr>
</thead>
<tbody>
<tr>
<td>032F3102</td>
<td>EVRA 3</td>
<td>032F3103</td>
<td>032F6207</td>
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<tr>
<td>032F6212</td>
<td>EVRA 10</td>
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<td>032F6217</td>
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<td>032F6222</td>
<td>EVRA 20</td>
<td>032F6223</td>
<td>032F6226</td>
</tr>
</tbody>
</table>

1) Valve body with gaskets, bolts and 10 W a.c. coil. Please specify code no., voltage and frequency. Voltage and frequency can also be given in the form of an appendix number, see table “Appendix numbers”, under EVR.

**Separate valve bodies**

<table>
<thead>
<tr>
<th>Code no.</th>
<th>Type</th>
<th>Connection</th>
<th>Required coil type</th>
<th>Code no.</th>
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<tr>
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<tr>
<td>032F6211</td>
<td>EVRAT 10</td>
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<td>a.c./d.c.</td>
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<tr>
<td>032F6216</td>
<td>EVRA 15</td>
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<td>a.c./d.c.</td>
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<tr>
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<td>032F6216</td>
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<tr>
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<table>
<thead>
<tr>
<th>Code no.</th>
<th>Type</th>
<th>Connection</th>
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<tbody>
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<td>032F6217</td>
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<td>032F6223</td>
<td>032F6226</td>
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**Valves without manual operation**

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<th>Required coil type</th>
<th>Code no.</th>
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<tr>
<td>032F3102</td>
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<td>EVRA 20</td>
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<td>032F6226</td>
<td>032F6225</td>
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<table>
<thead>
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<th>Butt weld connection</th>
<th>DIN</th>
<th>ANSI</th>
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<td>a.c./d.c.</td>
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<tr>
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**Separate valve bodies with butt weld connections**

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**Valves with manual operation**

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<td>EVRA 20</td>
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</tbody>
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**Coils**

See “Coils for solenoid valves”, RD.3J.E3.02.

**Accessories**

Strainer FA for direct mounting, see “FA”, RD.6C.A3.02.

Flanges, see the following pages.

**Example**

EVRA 15 complete valve with terminal box, 220 V, 50 Hz, code no. 032F6218 + ¾ in. weld flange set, code no. 027N1120.

**Example**

EVRA 15 valve body with manual operation, code no. 032F6215 + ¾ in. weld flange set, code no. 027N1120 + coil with terminal box, 220 V, 50 Hz, code no. 018F6701.
Ordering (continued)

Tongue/ tongue flange sets
version 1.3

Used for:
EVRA 3, EVRA/T 10, EVRA/T 15
Each code no. includes two flanges

Separate flange gaskets,
ID 22 x OD 32 x 1.0 mm
(ID 0.866 x OD 1.260 x 0.039 in.);
Code no. 020-2133 (40 stk.), must be ordered separately

Butt welding DIN (2448)
Tongue flange sets

<table>
<thead>
<tr>
<th>Connection</th>
<th>D</th>
<th>D</th>
<th>d1</th>
<th>d1</th>
<th>d2</th>
<th>d2</th>
<th>L</th>
<th>L</th>
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<td>18</td>
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<td>10</td>
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<td>14</td>
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<td>0.669</td>
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Butt welding ANSI B 36.10
Tongue flange sets

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Socket welding (B 16.11)
Tongue flange sets

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FPT internal thread, NPT (ANSI / ASME B 1.20.1)
Tongue flange sets

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Solder DIN (2856)
Tongue flange sets

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Solder ANSI B 16.22
Tongue flange sets

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### Ordering (continued)

**Tongue/ tongue flange sets version 3**

Used for EVRA/T 20, EVRA 25

Each code no. includes two flanges.

Separate flange gaskets, ID 29 x OD 39 x 1.5 mm (ID 1.142 x OD 1.535 x 0.059 in.)

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#### Butt welding DIN (2448)

**Tongue flange sets**

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#### Butt welding ANSI B 36.10

**Tongue flange sets**

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#### Socket welding ANSI (B 16.11)

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#### FPT internal thread, NPT (ANSI / ASME B 1.20.1)

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#### Soldering DIN (2856)

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#### Soldering ANSI B 16.22

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### Technical brochure

**Solenoid valves, type EVRA 3 to 40 and EVRAT 10 to 20**

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<td>EVRA 32</td>
<td>263.0</td>
</tr>
<tr>
<td>EVRA 40</td>
<td>411.0</td>
</tr>
</tbody>
</table>

**R 134a**

<table>
<thead>
<tr>
<th>Type</th>
<th>Qe kW</th>
</tr>
</thead>
<tbody>
<tr>
<td>EVRA 3</td>
<td>3.5</td>
</tr>
<tr>
<td>EVRA/T 10</td>
<td>22.7</td>
</tr>
<tr>
<td>EVRA/T 15</td>
<td>40.9</td>
</tr>
<tr>
<td>EVRA/T 20</td>
<td>68.2</td>
</tr>
<tr>
<td>EVRA 25</td>
<td>152.0</td>
</tr>
<tr>
<td>EVRA 32</td>
<td>243.0</td>
</tr>
<tr>
<td>EVRA 40</td>
<td>379.0</td>
</tr>
</tbody>
</table>

**R 404A**

<table>
<thead>
<tr>
<th>Type</th>
<th>Qe kW</th>
</tr>
</thead>
<tbody>
<tr>
<td>EVRA 3</td>
<td>2.6</td>
</tr>
<tr>
<td>EVRA/T 10</td>
<td>17.2</td>
</tr>
<tr>
<td>EVRA/T 15</td>
<td>31.0</td>
</tr>
<tr>
<td>EVRA/T 20</td>
<td>51.7</td>
</tr>
<tr>
<td>EVRA 25</td>
<td>115.0</td>
</tr>
<tr>
<td>EVRA 32</td>
<td>184.0</td>
</tr>
<tr>
<td>EVRA 40</td>
<td>287.0</td>
</tr>
</tbody>
</table>

**Correction factors**

When sizing valves, the plant capacity must be multiplied by a correction factor depending on liquid temperature tₙ ahead of valve/evaporator.

When the corrected capacity is known, the selection can be made from the table.

<table>
<thead>
<tr>
<th>tₙ°C</th>
<th>−10</th>
<th>0</th>
<th>+10</th>
<th>+20</th>
<th>+25</th>
<th>+30</th>
<th>+40</th>
<th>+50</th>
</tr>
</thead>
<tbody>
<tr>
<td>R 717 (NH₃)</td>
<td>0.84</td>
<td>0.88</td>
<td>0.92</td>
<td>0.97</td>
<td>1.0</td>
<td>1.03</td>
<td>1.09</td>
<td>1.16</td>
</tr>
<tr>
<td>R 22, R 134a</td>
<td>0.76</td>
<td>0.81</td>
<td>0.88</td>
<td>0.96</td>
<td>1.0</td>
<td>1.05</td>
<td>1.16</td>
<td>1.31</td>
</tr>
<tr>
<td>R 404A</td>
<td>0.70</td>
<td>0.76</td>
<td>0.84</td>
<td>0.94</td>
<td>1.0</td>
<td>1.07</td>
<td>1.24</td>
<td>1.47</td>
</tr>
</tbody>
</table>
Technical brochure  
Solenoid valves type EVRA 3 to 40 and EVRAT 10 to 20

Capacity (continued)

Suction vapour capacity $Q_e$, kW

<table>
<thead>
<tr>
<th>Type</th>
<th>Pressure drop across valve $\Delta p$, bar</th>
<th>Suction vapour capacity $Q_e$, kW at evaporating temperature $t_e$, °C</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>-40</td>
<td>-30</td>
</tr>
<tr>
<td>EVRA/T 10</td>
<td>0.1</td>
<td>3.4</td>
</tr>
<tr>
<td></td>
<td>0.15</td>
<td>4.0</td>
</tr>
<tr>
<td></td>
<td>0.2</td>
<td>4.5</td>
</tr>
<tr>
<td>EVRA/T 15</td>
<td>0.1</td>
<td>6.1</td>
</tr>
<tr>
<td></td>
<td>0.15</td>
<td>7.2</td>
</tr>
<tr>
<td></td>
<td>0.2</td>
<td>8.0</td>
</tr>
<tr>
<td>EVRA/T 20</td>
<td>0.1</td>
<td>10.2</td>
</tr>
<tr>
<td></td>
<td>0.15</td>
<td>12.1</td>
</tr>
<tr>
<td></td>
<td>0.2</td>
<td>13.4</td>
</tr>
<tr>
<td>EVRA 25</td>
<td>0.1</td>
<td>22.6</td>
</tr>
<tr>
<td></td>
<td>0.15</td>
<td>26.7</td>
</tr>
<tr>
<td></td>
<td>0.2</td>
<td>29.8</td>
</tr>
<tr>
<td>EVRA 32</td>
<td>0.1</td>
<td>36.2</td>
</tr>
<tr>
<td></td>
<td>0.15</td>
<td>42.7</td>
</tr>
<tr>
<td></td>
<td>0.2</td>
<td>47.7</td>
</tr>
<tr>
<td>EVRA 40</td>
<td>0.1</td>
<td>56.5</td>
</tr>
<tr>
<td></td>
<td>0.15</td>
<td>66.8</td>
</tr>
<tr>
<td></td>
<td>0.2</td>
<td>74.5</td>
</tr>
</tbody>
</table>

**R 717 (NH₃)**

Capacities are based on liquid temperature $t_l = +25°C$ ahead of evaporator.
The table values refer to the evaporator capacity and are given as a function of evaporating temperature $t_e$ and pressure drop $\Delta p$ across valve. Capacities are based on dry, saturated vapour ahead of valve. During operation with superheated vapour ahead of valve, the capacities are reduced by 4% for each 10 K superheat.

**Correction factors**
When sizing valves, the evaporator capacity must be multiplied by a correction factor depending on liquid temperature $t_l$ ahead of expansion valve. When the corrected capacity is known, the selection can be made from the table.

<table>
<thead>
<tr>
<th>$t_l$ °C</th>
<th>-10</th>
<th>0</th>
<th>+10</th>
<th>+20</th>
<th>+25</th>
<th>+30</th>
<th>+40</th>
<th>+50</th>
</tr>
</thead>
<tbody>
<tr>
<td>R 717 (NH₃)</td>
<td>0.84</td>
<td>0.88</td>
<td>0.92</td>
<td>0.97</td>
<td>1.0</td>
<td>1.03</td>
<td>1.09</td>
<td>1.16</td>
</tr>
<tr>
<td>R 22</td>
<td>0.76</td>
<td>0.81</td>
<td>0.88</td>
<td>0.96</td>
<td>1.0</td>
<td>1.05</td>
<td>1.16</td>
<td>1.31</td>
</tr>
</tbody>
</table>
### Technical brochure

**Solenoid valves, type EVRA 3 to 40 and EVRAT 10 to 20**

#### Capacity

(continued)

<table>
<thead>
<tr>
<th>Type</th>
<th>Pressure drop across valve</th>
<th>Suction vapour capacity $Q_e$ kW at evaporating temperature $t_e$ °C</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$\Delta p$ bar</td>
<td>$-40$</td>
</tr>
<tr>
<td>EVRA/T 10</td>
<td>0.1</td>
<td>0.87</td>
</tr>
<tr>
<td></td>
<td>0.15</td>
<td>0.99</td>
</tr>
<tr>
<td></td>
<td>0.2</td>
<td>1.1</td>
</tr>
<tr>
<td>EVRA/T 15</td>
<td>0.1</td>
<td>1.6</td>
</tr>
<tr>
<td></td>
<td>0.15</td>
<td>1.8</td>
</tr>
<tr>
<td></td>
<td>0.2</td>
<td>2.0</td>
</tr>
<tr>
<td>EVRA/T 20</td>
<td>0.1</td>
<td>2.6</td>
</tr>
<tr>
<td></td>
<td>0.15</td>
<td>3.0</td>
</tr>
<tr>
<td></td>
<td>0.2</td>
<td>3.3</td>
</tr>
<tr>
<td>EVRA 25</td>
<td>0.1</td>
<td>5.8</td>
</tr>
<tr>
<td></td>
<td>0.15</td>
<td>6.6</td>
</tr>
<tr>
<td></td>
<td>0.2</td>
<td>7.3</td>
</tr>
<tr>
<td>EVRA 32</td>
<td>0.1</td>
<td>9.3</td>
</tr>
<tr>
<td></td>
<td>0.15</td>
<td>10.6</td>
</tr>
<tr>
<td></td>
<td>0.2</td>
<td>11.7</td>
</tr>
<tr>
<td>EVRA 40</td>
<td>0.1</td>
<td>14.5</td>
</tr>
<tr>
<td></td>
<td>0.15</td>
<td>16.5</td>
</tr>
<tr>
<td></td>
<td>0.2</td>
<td>18.3</td>
</tr>
</tbody>
</table>

#### R 404A

<table>
<thead>
<tr>
<th>Type</th>
<th>Pressure drop across valve</th>
<th>Suction vapour capacity $Q_e$ kW at evaporating temperature $t_e$ °C</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$\Delta p$ bar</td>
<td>$-40$</td>
</tr>
<tr>
<td>EVRA/T 10</td>
<td>0.1</td>
<td>1.2</td>
</tr>
<tr>
<td></td>
<td>0.15</td>
<td>1.4</td>
</tr>
<tr>
<td></td>
<td>0.2</td>
<td>1.6</td>
</tr>
<tr>
<td>EVRA/T 15</td>
<td>0.1</td>
<td>2.1</td>
</tr>
<tr>
<td></td>
<td>0.15</td>
<td>2.5</td>
</tr>
<tr>
<td></td>
<td>0.2</td>
<td>2.8</td>
</tr>
<tr>
<td>EVRA/T 20</td>
<td>0.1</td>
<td>3.5</td>
</tr>
<tr>
<td></td>
<td>0.15</td>
<td>4.1</td>
</tr>
<tr>
<td></td>
<td>0.2</td>
<td>4.6</td>
</tr>
<tr>
<td>EVRA 25</td>
<td>0.1</td>
<td>7.7</td>
</tr>
<tr>
<td></td>
<td>0.15</td>
<td>9.1</td>
</tr>
<tr>
<td></td>
<td>0.2</td>
<td>10.3</td>
</tr>
<tr>
<td>EVRA 32</td>
<td>0.1</td>
<td>12.3</td>
</tr>
<tr>
<td></td>
<td>0.15</td>
<td>14.6</td>
</tr>
<tr>
<td></td>
<td>0.2</td>
<td>16.5</td>
</tr>
<tr>
<td>EVRA 40</td>
<td>0.1</td>
<td>19.3</td>
</tr>
<tr>
<td></td>
<td>0.15</td>
<td>22.9</td>
</tr>
<tr>
<td></td>
<td>0.2</td>
<td>25.8</td>
</tr>
</tbody>
</table>

**Correction factors**

When sizing valves, the evaporator capacity must be multiplied by a correction factor depending on liquid temperature $t_l$ ahead of expansion valve. The corrected capacity is known, the selection can be made from the table.

<table>
<thead>
<tr>
<th>$t_l$ °C</th>
<th>−10</th>
<th>0</th>
<th>+10</th>
<th>+20</th>
<th>+25</th>
<th>+30</th>
<th>+40</th>
<th>+50</th>
</tr>
</thead>
<tbody>
<tr>
<td>R 134A</td>
<td>0.76</td>
<td>0.81</td>
<td>0.88</td>
<td>0.96</td>
<td>1.0</td>
<td>1.05</td>
<td>1.16</td>
<td>1.31</td>
</tr>
<tr>
<td>R 404A</td>
<td>0.70</td>
<td>0.76</td>
<td>0.84</td>
<td>0.94</td>
<td>1.0</td>
<td>1.07</td>
<td>1.24</td>
<td>1.47</td>
</tr>
</tbody>
</table>
## Capacity

(continued)

<table>
<thead>
<tr>
<th>Type</th>
<th>Pressure drop across valve</th>
<th>Evaporating temp $t_e = -10^\circ\text{C}$, Hot gas temp $t_h = t_c + 25^\circ\text{C}$, Subcooling $\Delta t_{\text{sub}} = 4\text{K}$</th>
<th>Condensing temperature $t_c^\circ\text{C}$</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$\Delta p$ bar</td>
<td>$+20$</td>
<td>$+30$</td>
</tr>
<tr>
<td>EVRA 3</td>
<td>0.1</td>
<td>1.8</td>
<td>2.1</td>
</tr>
<tr>
<td></td>
<td>0.2</td>
<td>2.6</td>
<td>2.9</td>
</tr>
<tr>
<td></td>
<td>0.4</td>
<td>3.8</td>
<td>4.2</td>
</tr>
<tr>
<td></td>
<td>0.8</td>
<td>5.1</td>
<td>6.0</td>
</tr>
<tr>
<td></td>
<td>1.6</td>
<td>7.4</td>
<td>8.3</td>
</tr>
<tr>
<td>EVRA/T 10</td>
<td>0.1</td>
<td>12.0</td>
<td>13.4</td>
</tr>
<tr>
<td></td>
<td>0.2</td>
<td>17.1</td>
<td>19.0</td>
</tr>
<tr>
<td></td>
<td>0.4</td>
<td>24.5</td>
<td>27.1</td>
</tr>
<tr>
<td></td>
<td>0.8</td>
<td>34.0</td>
<td>39.0</td>
</tr>
<tr>
<td></td>
<td>1.6</td>
<td>48.5</td>
<td>53.8</td>
</tr>
<tr>
<td>EVRA/T 15</td>
<td>0.1</td>
<td>21.7</td>
<td>24.1</td>
</tr>
<tr>
<td></td>
<td>0.2</td>
<td>30.8</td>
<td>34.2</td>
</tr>
<tr>
<td></td>
<td>0.4</td>
<td>44.1</td>
<td>48.8</td>
</tr>
<tr>
<td></td>
<td>0.8</td>
<td>61.2</td>
<td>70.3</td>
</tr>
<tr>
<td></td>
<td>1.6</td>
<td>87.4</td>
<td>96.9</td>
</tr>
<tr>
<td>EVRA/T 20</td>
<td>0.1</td>
<td>36.1</td>
<td>40.1</td>
</tr>
<tr>
<td></td>
<td>0.2</td>
<td>51.4</td>
<td>57.0</td>
</tr>
<tr>
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<td>0.4</td>
<td>73.5</td>
<td>81.3</td>
</tr>
<tr>
<td></td>
<td>0.8</td>
<td>102.0</td>
<td>117.0</td>
</tr>
<tr>
<td></td>
<td>1.6</td>
<td>146.0</td>
<td>161.0</td>
</tr>
<tr>
<td>EVRA 25</td>
<td>0.1</td>
<td>80.2</td>
<td>89.1</td>
</tr>
<tr>
<td></td>
<td>0.2</td>
<td>114.0</td>
<td>127.0</td>
</tr>
<tr>
<td></td>
<td>0.4</td>
<td>163.0</td>
<td>181.0</td>
</tr>
<tr>
<td></td>
<td>0.8</td>
<td>227.0</td>
<td>260.0</td>
</tr>
<tr>
<td></td>
<td>1.6</td>
<td>324.0</td>
<td>358.0</td>
</tr>
<tr>
<td>EVRA 32</td>
<td>0.1</td>
<td>128.0</td>
<td>143.0</td>
</tr>
<tr>
<td></td>
<td>0.2</td>
<td>183.0</td>
<td>203.0</td>
</tr>
<tr>
<td></td>
<td>0.4</td>
<td>261.0</td>
<td>289.0</td>
</tr>
<tr>
<td></td>
<td>0.8</td>
<td>362.0</td>
<td>416.0</td>
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<tr>
<td></td>
<td>1.6</td>
<td>518.0</td>
<td>574.0</td>
</tr>
<tr>
<td>EVRA 40</td>
<td>0.1</td>
<td>201.0</td>
<td>223.0</td>
</tr>
<tr>
<td></td>
<td>0.2</td>
<td>286.0</td>
<td>317.0</td>
</tr>
<tr>
<td></td>
<td>0.4</td>
<td>408.0</td>
<td>452.0</td>
</tr>
<tr>
<td></td>
<td>0.8</td>
<td>566.0</td>
<td>650.0</td>
</tr>
<tr>
<td></td>
<td>1.6</td>
<td>809.0</td>
<td>897.0</td>
</tr>
</tbody>
</table>

An increase in hot gas temperature $t_h$ of 10 K, based on $t_h = t_c + 25^\circ\text{C}$, reduces valve capacity approx. 2% and vice versa.

A change in evaporating temperature $t_e$ changes valve capacity; see correction factor table below.

### Correction factor

When sizing valves, the table value must be multiplied by a correction factor depending on evaporating temperature $t_e$.

<table>
<thead>
<tr>
<th>$t_e,^\circ\text{C}$</th>
<th>-40</th>
<th>-30</th>
<th>-20</th>
<th>-10</th>
<th>0</th>
<th>+10</th>
</tr>
</thead>
<tbody>
<tr>
<td>R 717 (NH$_3$)</td>
<td>0.89</td>
<td>0.91</td>
<td>0.96</td>
<td>1.0</td>
<td>1.06</td>
<td>1.10</td>
</tr>
</tbody>
</table>
### Capacity (continued)

<table>
<thead>
<tr>
<th>Type</th>
<th>Pressure drop across valve</th>
<th>Hot gas capacity $Q_h\ kW$</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$\Delta p\ \text{bar}$</td>
<td>Evaporating temp. $t_e = -10 °C$. Hot gas temp. $t_h = t_c + 25 °C$. Subcooling $\Delta t_{\text{sub}} = 4K$.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Condensing temperature $t_c °C$</td>
</tr>
</tbody>
</table>

#### R 22

<table>
<thead>
<tr>
<th></th>
<th>0.1</th>
<th>0.2</th>
<th>0.4</th>
<th>0.8</th>
<th>1.6</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>EVRA 3</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$0.1$</td>
<td>0.68</td>
<td>0.72</td>
<td>0.76</td>
<td>0.78</td>
<td>0.79</td>
</tr>
<tr>
<td>$0.2$</td>
<td>0.97</td>
<td>1.0</td>
<td>1.1</td>
<td>1.1</td>
<td>1.1</td>
</tr>
<tr>
<td>$0.4$</td>
<td>1.4</td>
<td>1.5</td>
<td>1.5</td>
<td>1.6</td>
<td>1.6</td>
</tr>
<tr>
<td>$0.8$</td>
<td>1.9</td>
<td>2.0</td>
<td>2.1</td>
<td>2.3</td>
<td>2.3</td>
</tr>
<tr>
<td>$1.6$</td>
<td>2.7</td>
<td>2.9</td>
<td>3.0</td>
<td>3.1</td>
<td>3.2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>0.1</th>
<th>0.2</th>
<th>0.4</th>
<th>0.8</th>
<th>1.6</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>EVRA/T 10</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$0.1$</td>
<td>4.4</td>
<td>4.7</td>
<td>4.9</td>
<td>5.1</td>
<td>5.2</td>
</tr>
<tr>
<td>$0.2$</td>
<td>6.3</td>
<td>6.7</td>
<td>7.0</td>
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<td>7.3</td>
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</table>

#### Correction factor

When sizing valves, the table value must be multiplied by a correction factor depending on evaporating temperature $t_e$. The correction factor table below:

<table>
<thead>
<tr>
<th>$t_e °C$</th>
<th>-40</th>
<th>-30</th>
<th>-20</th>
<th>-10</th>
<th>0</th>
<th>+10</th>
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</thead>
<tbody>
<tr>
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<td>0.90</td>
<td>0.94</td>
<td>0.97</td>
<td>1.00</td>
<td>1.05</td>
<td></td>
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</tbody>
</table>

An increase in hot gas temperature $t_h$ of 10 K, based on $t_h = t_c + 25°C$, reduces valve capacity approx. 2% and vice versa.

A change in evaporating temperature $t_e$ changes valve capacity; see correction factor table below.

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### Type

<table>
<thead>
<tr>
<th>Type</th>
<th>Pressure drop across valve</th>
<th>Hot gas capacity $Q_h \ kW$</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$\Delta p \ \text{bar}$</td>
<td>Hot gas capacity $Q_h \ kW$</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Evaporating temp. $t_e = 10^\circ C$, Hot gas temp. $t_h = t_c + 25^\circ C$, Subcooling $\Delta t_{sub} = 4 \text{K}$</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Condensing temperature $t_c \ ^\circ C$</td>
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<td>1.5</td>
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</table>

An increase in hot gas temperature $t_h$ of 10 K, based on $t_h = t_c + 25^\circ C$, reduces valve capacity approx. 2% and vice versa.

A change in evaporating temperature $t_e$ changes valve capacity; see correction factor table below.

### Correction factor

When sizing valves, the table value must be multiplied by a correction factor depending on evaporating temperature $t_e$.

<table>
<thead>
<tr>
<th>$t_e^\circ C$</th>
<th>−40</th>
<th>−30</th>
<th>−20</th>
<th>−10</th>
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<td>1.08</td>
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</table>

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**Technical brochure Solenoid valves type EVRA 3 to 40 and EVRAT 10 to 20**

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### Capacity (continued)

#### Hot gas capacity \( Q_h \) kW

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<th>Type</th>
<th>Pressure drop across valve</th>
<th>Condensing temperature ( t_c ) °C</th>
<th>Hot gas capacity ( Q_h ) kW</th>
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<tbody>
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<td>+30</td>
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</table>

An increase in hot gas temperature \( t_h \) of 10 K, based on \( t_h = t_c + 25°C \), reduces valve capacity approx. 2% and vice versa.

A change in evaporating temperature \( t_e \) changes valve capacity; see correction factor table below.

#### Correction factor

When sizing valves, the table value must be multiplied by a correction factor depending on evaporating temperature \( t_e \).

<table>
<thead>
<tr>
<th>( t_e ) °C</th>
<th>-40</th>
<th>-30</th>
<th>-20</th>
<th>-10</th>
<th>0</th>
<th>+10</th>
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<td>R 404A</td>
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<td>0.93</td>
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<td>1.03</td>
<td>1.07</td>
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</table>
## Technical brochure

Solenoid valves type EVRA 3 to 40 and EVRAT 10 to 20

### Capacity

(continued)

<table>
<thead>
<tr>
<th>Type</th>
<th>Hot gas temperature $t_\text{g}^\circ\text{C}$</th>
<th>Condensing temperature $t_\text{c}^\circ\text{C}$</th>
<th>Hot gas capacity $G_\text{h}$ kg/s at pressure drop across valve $\Delta p$ bar</th>
</tr>
</thead>
<tbody>
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</tr>
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### R 717 (NH₃)

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<th>Hot gas capacity $G_\text{h}$ kg/s at pressure drop across valve $\Delta p$ bar</th>
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### R 22

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An increase in hot gas temperature $t_\text{g}$ of 10 K reduces valve capacity approx. 2% and vice versa.
### Hot gas capacity $G_h$ kg/s

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<th>Kondense-ringstem. $t_k$ °C</th>
<th>Varmgaskapacitet $G_h$ kg/s ved trykfaldet i ventilen $\Delta p$ bar</th>
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An increase in hot gas temperature $t_h$ of 10 K reduces valve capacity approx. 2% and vice versa.
**Design\nFunction**

4. Coil
16. Armature
18. Valve plate / Pilot valve plate
20. Earth terminal
24. Connection for flexible steel hose
28. Gasket
29. Pilot orifice
30. O-ring
31. Piston ring
36. DIN plug
40. Terminal box
43. Valve cover
44. O-ring
45. Valve cover gasket
48. Flange gasket
49. Valve body
51. Cover / Threaded plug
53. Manual operation spindle
59. Strainer
73. Equalization hole
74. Main channel
75. Pilot channel
76. Compression spring
80. Diaphragm/Servo piston
82. Support washer
83. Valve seat
84. Main valve plate

EVRA solenoid valves are designed on two different principles:

1. Direct operation
2. Servo operation

**1. Direct operation**

EVRA 3 is direct operated. The valve opens direct for full flow when the armature (16) moves up into the magnetic field of the coil. This means that the valve operates with a min. differential pressure of 0 bar. The teflon valve plate (18) is fitted direct on the armature (16).

Inlet pressure acts from above on the armature and the valve plate. Thus, inlet pressure, spring force and the weight of the armature act to close the valve when the coil is currentless.

**2. Servo operation**

EVRA/T 10 → 20 are servo operated piston valves.

The valves are closed with currentless coil. The servo piston (80) with main valve plate (84) closes against the valve seat (83) by means of the differential pressure between inlet and outlet side of the valve, the force of the compression spring (76) and possibly the piston weight.

When current to the coil is switched on, the pilot orifice (29) opens. This relieves the pressure on the piston spring side of the valve. The differential pressure will then open the valve.

The minimum differential pressure needed for full opening of the valves is 0.2 bar.

When current is applied to the coil the armature is drawn up into the magnetic field and opens the pilot orifice. This relieves the pressure above the diaphragm, i.e. the space above the diaphragm becomes connected to the outlet side of the valve. The differential pressure between inlet and outlet sides then presses the diaphragm away from the main orifice and opens it for full flow. Therefore a certain minimum differential pressure is necessary to open the EVRA valve and keep it open. For differential pressure 0 bar use EVRAT valves.

For EVRA 10 → 20 valves this differential pressure is 0.05 bar.

When current is switched off, the pilot orifice closes. Via the equalization holes (73) in the diaphragm, the pressure above the diaphragm then rises to the same value as the inlet pressure and the diaphragm closes the main orifice.

EVRA 25, 32 and 40 are servo operated piston valves.

The valves are closed with currentless coil. The servo piston (80) with main valve plate (84) closes against the valve seat (83) by means of the differential pressure between inlet and outlet side of the valve, the force of the compression spring (76) and possibly the piston weight.

When current to the coil is switched on, the pilot orifice (29) opens. This relieves the pressure on the piston spring side of the valve. The differential pressure will then open the valve.

The minimum differential pressure needed for full opening of the valves is 0.2 bar.
### Material Specification

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
<th>Solenoid valves</th>
<th>Material</th>
<th>Analysis</th>
<th>Mat.no.</th>
<th>W.no.</th>
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### Material Specification

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Dimensions and weight

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<th>H₄</th>
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1) With coil, without flanges

Weight of coil
- 10 W: approx. 0.3 kg
- 12 and 20 W: approx. 0.5 kg

Weight of flange set
- For EVRA 3, 10 and 15: 0.6 kg
- For EVRA 20: 0.9 kg
### Dimensions and weight (continued)

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<th>(H_3)</th>
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1) With coil, without flanges

- **Weigh of coil**
  - 10 W: approx. 0.3 kg
  - 12 and 20 W: approx. 0.5 kg

- **Weight of flange set**
  - For EVRA 25: 0.9 kg