TUBE BUNDLE HEAT EXCHANGERS

CNF - CN - CF - SV Series
**CNF - CN - CF - SV Heat Exchangers**

**Tube Bundle Heat Exchangers**

In the gas pressure reduction process by the “Joule-Thomson” effect, temperature drops considerably (about 0.5°C per reduction bar are estimated).

This fall in gas temperature can damage equipment due to formation of dangerous ice crystals produced by water vapor in the gas.

In first stage stations in particular, gas must be heated before pressure is reduced, since high pressure changes are usually involved.

We recommend that, after reduction, gas temperature should not be below 5°C.

One of the best established methods of heating gas in reduction stations is to use heat exchangers employing hot water or steam as their thermal carrier fluid.

The heat exchangers we produce are sized and designed to meet a very wide range of system requirements, and include all connections for accessories.
**Operation**

Gas flowing at heat exchanger inlet is deflected by a separator. Gas passes through the tube plate and flows along the tube bundle. Here, thermal exchange with the thermal carrier fluid occurs.

As a result, gas reaches outlet at an adequately increased temperature.

The thermal carrier fluid (water or steam) enters the upper part and flows out into the lower part of the exchanger through appropriate outlets. The fluid meets a set of diaphragms inside the shell, which are positioned to prolong its path and thus encourage thermal exchange with gas.
CNF - CN - CF - SV Heat Exchangers

Features

Applications
For preheating natural gas in first reception and reduction stations and for all natural gas, or other non aggressive gases, heating requirements.

Models
Water as thermal carrier fluid:
CNF - CN - CF series

Steam as thermal carrier fluid:
SV series

Technical Features

Tube bundle heat exchangers using U-tubes (BEU)
Tube bundle with inspection facility
Gas in tubes section, thermal carrier fluid in shell section
Axial connections in gas section
Designed for installation of automatic air escape
Designed for installation of relief valve

Functional Features

Maximum water temperature
CNF - CN - CF Series: 90 °C

Maximum water temperature
SV Series: 120 °C
Higher temperature version on request

Installation
Heat exchangers designed for installation with vertical tube bundle
Can be supplied with different tube bundle configurations on request

Materials

Shell on gas section: Steel
Flange: Steel
Built-in flange: Steel
Tube plate: Steel
Stud bolts/Nuts: Steel
Connections: Steel
Seals: Nitrile rubber NBR
Heat Exchanger Choice

**Type of thermal carrier fluid**

- **Hot water**
  - Natural convection
    - Recommended for medium capacities up to a maximum of 45000 Kcal/h
      - CNF-05-AP
      - CNF-1-AP
      - CN2-AP
  - Forced convection
    - Recommended for medium and large capacities up to a maximum of 750000 Kcal/h
      - CNF-05-AP
      - CNF-1-AP
      - CF2-AP
      - CF3-AP
      - CF1-AP/5000
      - CF1-AP/8000
      - CF1-AP/12500
      - CF1-AP/17500

- **Steam**
  - If using steam, make sure steam pressure does not exceed 2 absolute bars and 120°C.
  - Therefore, if these values are exceeded, reduce them adequately before use.
  - For these exchangers, it is normal practice to assume the same capacity as for those using forced circulation water
    - SV3-AP
    - SV-AP/5000
    - SV-AP/8000
    - SV-AP/12500
## CNF - CN - CF - SV Heat Exchangers

### CNF - CN - CF Series

#### Connections

<table>
<thead>
<tr>
<th>Rating</th>
<th>Design Pressure (bar)</th>
<th>Hydrostatic Test (bar)</th>
<th>Pneumatic Test (bar)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANSI 300</td>
<td>45</td>
<td>57</td>
<td>7</td>
</tr>
<tr>
<td>ANSI 600</td>
<td>90</td>
<td>113</td>
<td>7</td>
</tr>
</tbody>
</table>

#### Gas Side

<table>
<thead>
<tr>
<th>Rating</th>
<th>Design Pressure (bar)</th>
<th>Hydrostatic Test (bar)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANSI 300</td>
<td>45</td>
<td>57</td>
</tr>
<tr>
<td>ANSI 600</td>
<td>90</td>
<td>113</td>
</tr>
</tbody>
</table>

#### Water Side

<table>
<thead>
<tr>
<th>Rating</th>
<th>Design Pressure (bar)</th>
</tr>
</thead>
<tbody>
<tr>
<td>UNI/DIN PN 6</td>
<td>5</td>
</tr>
</tbody>
</table>

#### Accessories

<table>
<thead>
<tr>
<th>Item</th>
<th>Quantity</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>Coupling 3/8” GAS-F</td>
</tr>
<tr>
<td>2</td>
<td>3</td>
<td>Thredolet 1/2” NPT</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
<td>Nipple 1/2” GAS-M</td>
</tr>
<tr>
<td>4</td>
<td>2</td>
<td>Thredolet 1/4” NPT</td>
</tr>
</tbody>
</table>

### Dimensions (mm) and Weights (kg)

<table>
<thead>
<tr>
<th>Type</th>
<th>De max</th>
<th>Du max</th>
<th>de max</th>
<th>du max</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D*</th>
<th>Ø E</th>
<th>F</th>
<th>L</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>CNF-05-AP</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>1880</td>
<td>700</td>
<td>220</td>
<td>800</td>
<td>141.3</td>
<td>350</td>
<td>500</td>
<td>90</td>
</tr>
<tr>
<td>CNF-1-AP</td>
<td>100</td>
<td>100</td>
<td>65</td>
<td>65</td>
<td>1930</td>
<td>710</td>
<td>247</td>
<td>800</td>
<td>193.7</td>
<td>400</td>
<td>550</td>
<td>200</td>
</tr>
<tr>
<td>CN2-AP</td>
<td>125</td>
<td>125</td>
<td>80</td>
<td>80</td>
<td>2470</td>
<td>1150</td>
<td>320</td>
<td>800</td>
<td>219.1</td>
<td>420</td>
<td>650</td>
<td>255</td>
</tr>
<tr>
<td>CF2-AP</td>
<td>125</td>
<td>125</td>
<td>80</td>
<td>80</td>
<td>2470</td>
<td>1150</td>
<td>320</td>
<td>800</td>
<td>219.1</td>
<td>420</td>
<td>650</td>
<td>255</td>
</tr>
<tr>
<td>CF3-AP</td>
<td>150</td>
<td>150</td>
<td>80</td>
<td>80</td>
<td>2595</td>
<td>1100</td>
<td>430</td>
<td>800</td>
<td>273</td>
<td>600</td>
<td>800</td>
<td>310</td>
</tr>
<tr>
<td>CF1-AP/5000</td>
<td>200</td>
<td>200</td>
<td>80</td>
<td>80</td>
<td>2540</td>
<td>1000</td>
<td>425</td>
<td>800</td>
<td>324</td>
<td>600</td>
<td>800</td>
<td>600</td>
</tr>
<tr>
<td>CF1-AP/8000</td>
<td>250</td>
<td>250</td>
<td>80</td>
<td>80</td>
<td>2995</td>
<td>1050</td>
<td>580</td>
<td>1000</td>
<td>457</td>
<td>800</td>
<td>1100</td>
<td>900</td>
</tr>
<tr>
<td>CF1-AP/12500</td>
<td>300</td>
<td>300</td>
<td>150</td>
<td>150</td>
<td>3050</td>
<td>950</td>
<td>660</td>
<td>1000</td>
<td>508</td>
<td>800</td>
<td>1200</td>
<td>1300</td>
</tr>
<tr>
<td>CF1-AP/17500</td>
<td>350</td>
<td>350</td>
<td>200</td>
<td>200</td>
<td>3315</td>
<td>950</td>
<td>820</td>
<td>1000</td>
<td>560</td>
<td>800</td>
<td>1250</td>
<td>1350</td>
</tr>
</tbody>
</table>

* Proposed height, variable according to installation needs.

### Thermal Features

<table>
<thead>
<tr>
<th>Type</th>
<th>Exchange Surface (m²)</th>
<th>Water Side Volume (liters)</th>
<th>Gas Side Maximum Volume (liters)</th>
<th>Thermal Capacity (Kcal/h)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CNF-05-AP</td>
<td>0.6</td>
<td>11</td>
<td>3.8</td>
<td>14500</td>
</tr>
<tr>
<td>CN1-AP</td>
<td>1.4</td>
<td>23</td>
<td>12</td>
<td>29000</td>
</tr>
<tr>
<td>CN2-AP</td>
<td>2</td>
<td>30</td>
<td>25.5</td>
<td>48500</td>
</tr>
<tr>
<td>CF2-AP</td>
<td>2</td>
<td>30</td>
<td>25.5</td>
<td>64500</td>
</tr>
<tr>
<td>CF3-AP</td>
<td>3.5</td>
<td>55</td>
<td>42</td>
<td>100000</td>
</tr>
<tr>
<td>CF1-AP/5000</td>
<td>5</td>
<td>68</td>
<td>75</td>
<td>161000</td>
</tr>
<tr>
<td>CF1-AP/8000</td>
<td>11.5</td>
<td>120</td>
<td>160</td>
<td>340000</td>
</tr>
<tr>
<td>CF1-AP/12500</td>
<td>15</td>
<td>200</td>
<td>250</td>
<td>485000</td>
</tr>
<tr>
<td>CF1-AP/17500</td>
<td>18</td>
<td>281</td>
<td>336</td>
<td>750000</td>
</tr>
</tbody>
</table>

Thermal capacities are calculated for the following conditions:

- gas inlet pressure 5-75 bar
- gas reduced pressure 4 bar
- inlet gas temperature 5 °C
- after reduction gas temperature 5 °C

For different conditions contact our engineering department.
SV Series

Connections

### Gas Side

<table>
<thead>
<tr>
<th>Rating</th>
<th>Design Pressure (bar)</th>
<th>Hydrostatic Test (bar)</th>
<th>Pneumatic Test (bar)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANSI 300</td>
<td>45</td>
<td>57</td>
<td>7</td>
</tr>
<tr>
<td>ANSI 600</td>
<td>90</td>
<td>113</td>
<td>7</td>
</tr>
</tbody>
</table>

### Steam Side

<table>
<thead>
<tr>
<th>Rating</th>
<th>Design Pressure (bar)</th>
<th>Hydrostatic Test (bar)</th>
</tr>
</thead>
<tbody>
<tr>
<td>UNI/DIN PN 6</td>
<td>5</td>
<td>7.5</td>
</tr>
</tbody>
</table>

### Accessories

<table>
<thead>
<tr>
<th>Item</th>
<th>Quantity</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>Coupling 3/8&quot; GAS-F</td>
</tr>
<tr>
<td>2</td>
<td>3</td>
<td>Thredolet 1/2&quot; NPT</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
<td>Nipple 1/2&quot; GAS-M</td>
</tr>
<tr>
<td>4</td>
<td>2</td>
<td>Thredolet 1/4&quot; NPT</td>
</tr>
</tbody>
</table>

### Dimensions (mm) and Weights (kg)

<table>
<thead>
<tr>
<th>Type</th>
<th>De max</th>
<th>Du max</th>
<th>de max</th>
<th>du max</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D*</th>
<th>Ø E</th>
<th>F</th>
<th>L</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>SV3-AP</td>
<td>125</td>
<td>125</td>
<td>80</td>
<td>80</td>
<td>2498</td>
<td>1100</td>
<td>430</td>
<td>800</td>
<td>273</td>
<td>600</td>
<td>800</td>
<td>310</td>
</tr>
<tr>
<td>SV-AP/5000</td>
<td>150</td>
<td>150</td>
<td>80</td>
<td>80</td>
<td>2485</td>
<td>1000</td>
<td>400</td>
<td>800</td>
<td>324</td>
<td>600</td>
<td>800</td>
<td>600</td>
</tr>
<tr>
<td>SV-AP/8000</td>
<td>200</td>
<td>200</td>
<td>80</td>
<td>80</td>
<td>3000</td>
<td>1050</td>
<td>580</td>
<td>1000</td>
<td>457</td>
<td>800</td>
<td>1100</td>
<td>1100</td>
</tr>
<tr>
<td>SV-AP/12500</td>
<td>250</td>
<td>250</td>
<td>125</td>
<td>125</td>
<td>3019</td>
<td>950</td>
<td>660</td>
<td>1000</td>
<td>508</td>
<td>800</td>
<td>1200</td>
<td>1150</td>
</tr>
</tbody>
</table>

* Proposed height, variable according to installation needs.

### Thermal Features

<table>
<thead>
<tr>
<th>Type</th>
<th>Exchange Surface (m²)</th>
<th>Steam Side Volume (liters)</th>
<th>Gas Side Volume (liters)</th>
<th>Thermal Capacity (Kcal/h)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SV3-AP</td>
<td>3.5</td>
<td>25</td>
<td>40</td>
<td>100000</td>
</tr>
<tr>
<td>SV-AP/5000</td>
<td>5</td>
<td>68</td>
<td>75</td>
<td>161000</td>
</tr>
<tr>
<td>SV-AP/8000</td>
<td>11.5</td>
<td>120</td>
<td>160</td>
<td>340000</td>
</tr>
<tr>
<td>SV-AP/12500</td>
<td>15</td>
<td>200</td>
<td>250</td>
<td>485000</td>
</tr>
</tbody>
</table>

Thermal capacities are calculated for the following conditions:
- gas inlet pressure 5-75 bar
- gas reduced pressure 4 bar
- inlet gas temperature 5 °C
- after reduction gas temperature 5 °C

For different conditions contact our engineering department.
Pre-Heating Systems

**Water Pre-Heating**
1. Boiler with temperature probe
2. On-off valve
3. Pump
4. Expansion tank
5. 3-way non-return valve for water
6. Heat exchanger

---

**Steam Pre-Heating**
1. On-off valve
2. Y-filter for steam
3. Pressure regulator
4. Temperature control pneumatic valve with actuator
5. Heat exchanger
6. Float steam trap
7. Through-flow indicator
8. Non-return valve

---

**Industrial Regulators**
Emerson Process Management Regulator Technologies, Inc.

**USA - Headquarters**
McKinney, Texas 75070 USA
Tel: +1 800 558 5853
Outside US: +1 972 548 3574

**Europe**
Bologna 40013, Italy
Tel: +39 051 419 0611

**Asia-Pacific**
Shanghai 201206, China
Tel: +86 21 2892 9000

**Middle East and Africa**
Dubai, United Arab Emirates
Tel: +971 4811 8100

---

**Natural Gas Technologies**
Emerson Process Management Regulator Technologies, Inc.

**USA - Headquarters**
McKinney, Texas 75070 USA
Tel: +1 800 558 5853
Outside US: +1 972 548 3574

**Europe**
Bologna 40013, Italy
Tel: +39 051 419 0611
Chartres 28008, France
Tel: +33 2 37 33 47 00

**Asia-Pacific**
Singapore 128461, Singapore
Tel: +65 6770 8337

**Middle East and Africa**
Dubai, United Arab Emirates
Tel: +971 4811 8100

---

**LP-Gas Equipment**
Emerson Process Management Regulator Technologies, Inc.

**USA - Headquarters**
McKinney, Texas 75070 USA
Tel: +1 800 558 5853
Outside US: +1 972 548 3574

---

**TESCOM**
Emerson Process Management Tescom Corporation

**USA - Headquarters**
Elk River, Minnesota 55330-2445 USA
Tel: +1 763 241 3238
+1 800 447 1250

**Europe**
Selmsdorf 23923, Germany
Tel: +49 38823 31 287

**Asia-Pacific**
Singapore 128461, Singapore
Tel: +65 6770 8337

---

**For further information visit**
www.emersonprocess.com/regulators

---

The Emerson logo is a trademark and service mark of Emerson Electric Co. All other marks are the property of their prospective owners. Fisher, Tartarini, Francel, Emerson Process Management and the Emerson Process Management design are marks of the Emerson Process Management group of companies.

The contents of this publication are presented for informational purposes only, and while every effort has been made to ensure their accuracy, they are not to be construed as warranties or guarantees, express or implied, regarding the products or services described herein or their use or applicability. We reserve the right to modify or improve the designs or specifications of such products at any time without notice. Emerson Process Management does not assume responsibility for the selection, use or maintenance of any product. Responsibility for proper selection, use and maintenance of any Emerson Process Management product remains solely with the purchaser.

---

O.M.T. Officine Meccanica Tartarini S.R.L., Via P. Fabbri 1, 40013 Castel Maggiore (Bologna), Italy
P.IVA 00623720372, Cap. Soc. 3.074.637 Euro i.v. R.I. 00623720372 - M BO 020330

Francel SAS, 3 Avenue Victor Hugo, CS 80125, Chartres 28008, France
SIRET 552 068 637 00057 APE 2651B, RCS Chartres B 552 068 637, SAS capital 534 400 Euro