# Frese ALPHA Cartridges



## Application

The Frese Alpha Cartridges are particularly designed and manufactured for the automatic balancing of heating and cooling circuits. They are integral part of the Frese Automatic Balancing Valves keeping the flow constant at the specified level even under fluctuating pressure conditions. From small size valves (DN15) to big wafer types (DN800), from small heating units to sea-water district cooling applications, there is a Frese Alpha Cartridge that can guarantee the specified flow.
The advanced patented design of the Frese Alpha Cartridges introduces the orifice plate concept for higher performance and flexibility. With the Frese Alpha Cartridges it is no longer needed to change the cartridge every time the design flow is modified. Each cartridge contains an orifice plate specific for every flow that can be easily removed and replaced by another one.

## Advantages

- Only one differential pressure operating range (up to 600KPa) making the sizing of the cartridge very easy (depending only on the design flow).
- Complete, broad and well-balanced distribution of flows for the full range of heating and cooling applications (from 0.007 l/s and 7 kPa min. differential pressure to 11.381 l/s, per cartridge).
- Minimized friction and noise due to the patented cartridge design based on the metal-rubber diaphragm-metal contact.
- Improved response to water hummer due to the chock absorption by the rubber diaphragm of the cartridge
- No impact of debris on the performance of the cartridge. The design of the inlet and the outlet areas makes the accumulation of particles inside the cartridge very difficult.

## Benefits

Design
- Less time to define the necessary equipment for a hydraulic balanced system.
- No impact if the calculated distribution of pressure in the installation is not accurate.
- Security that the specified flow is also the real one.
- Flexibility if the system is modified after the initial installation.

Installation
- Cartridge solution makes flushing procedure very easy.
- Quick and easy installation of the cartridge in the valve.
- Minimized commissioning time due to automatic balancing of the system.

Operation
- Unproblematic performance even with high concentration of debris.
- Noiseless operation.
- High comfort for the end-users

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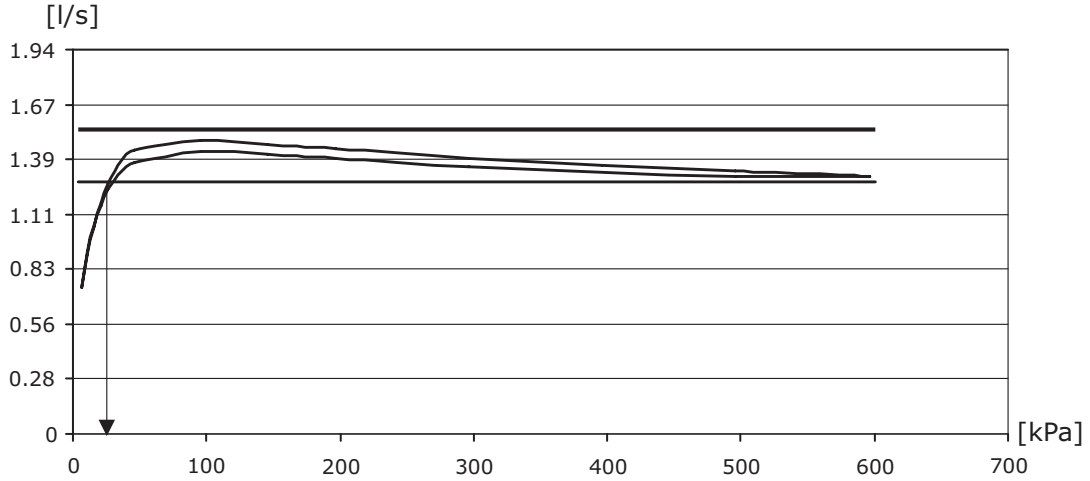
## Flow rate graph

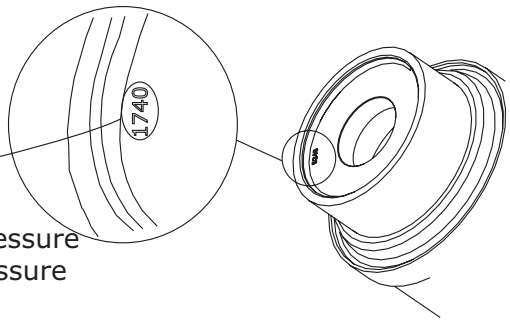



*Schematic view of the flow development for cartridge type 40, Frese no. 49-44176. Nominal flow 1.388 l/s. The cartridge enters the pressure range at 23 kPa and maintains the flow at a constant level all the way till 600 kPa.*

## Indication of flow rate on the orifice plate

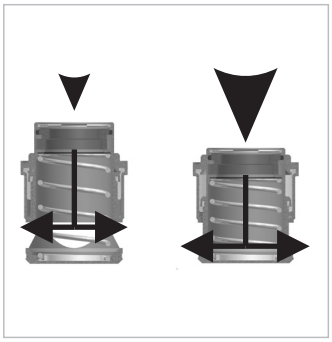
A four-digit number on the orifice plate is identical with the last four digits in the Frese number. The cartridge can be identified by means of this number and the corresponding flow rate can be read from the above flow rate tables.

| Frese no. | Flow [gpm] | Flow [l/s] | Min.ΔP [kPa] |
|---|---|---|---|
| 49-11735 | 3.24 | 0.204 | 14 |
| 49-11740 | 3.52 | 0.222 | 16 |
| 49-11745 | 3.83 | 0.242 | 19 |
| 49-11750 | 4.12 | 0.260 | 21 |




## Cartridge operation

When the pressure increases the spring will be compressed and thereby the piston will reduce the outlet area and vice versa. The result is a constant flow rate through the valve, independent of pressure fluctuations.



## Flow calculation

The flow through the cartridge can be identified simply by measuring the differential pressure across the valve:
- If the measured differential pressure is below the min.ΔP stated on the cartridge table for the specific cartridge, the calculation of the flow is based on the formula $Q=k_v x\sqrt{\Delta P}$. The $k_v$ value is calculated by combining the nominal flow and the minΔP for every cartridge, i.e. cartridge 49-11400, flow 205l/h, minΔP 12 kPa; $k_v=Q/\sqrt{\Delta P}=(205/\sqrt{12})/100=0.59$;
- If the measured differential pressure is above the minΔP, the flow is the one stated on the cartridge table for the specific cartridge.

# Frese ALPHA - Cartridges



## Technical data

## Cartridges for valves from DN15 to DN50

### High Pressure

**Material:** Tin/nickel plated brass
**O-rings:** EPDM
**Spring:** Stainless steel
**Diaphragm:** Reinforced HNBR
**Max. differential pressure:** 600 kPa
**Medium temperature:** -20 to +120°C

### Low Pressure

**Material:** Brass
**O-rings:** EPDM
**Spring:** Stainless steel
**Diaphragm:** HNBR
**Max. differential pressure:** 350 kPa
**Medium temperature:** -20 to +120°C

## Product Range for Valves DN15-DN25, 0.007 l/s - 0.680 l/s

| Article type | High Pressure Frese no. | Low Pressure Frese no. | Flow [gpm] | Flow [l/s] | Min.ΔP [kPa] |
|---|---|---|---|---|---|
| 10 | | 50-11150 | 0.11 | 0.007 | 7 |
| 10 | | 50-11170 | 0.15 | 0.010 | 7 |
| 10 | | 50-11190 | 0.20 | 0.012 | 7 |
| 10 | 49-11210 | 50-11210 | 0.24 | 0.015 | 7 |
| 10 | 49-11230 | 50-11230 | 0.33 | 0.021 | 8 |
| 10 | 49-11260 | 50-11260 | 0.39 | 0.024 | 9 |
| 10 | 49-11290 | 50-11290 | 0.46 | 0.029 | 10 |
| 10 | 49-11300 | 50-11300 | 0.50 | 0.032 | 10 |
| 10 | 49-11320 | 50-11320 | 0.57 | 0.036 | 11 |
| 10 | 49-11350 | 50-11350 | 0.68 | 0.043 | 11 |
| 10 | 49-11370 | 50-11370 | 0.77 | 0.049 | 12 |
| 10 | 49-11400 | 50-11400 | 0.90 | 0.057 | 12 |
| 10 | 49-11430 | 50-11430 | 1.06 | 0.067 | 12 |
| 10 | 49-11460 | 50-11460 | 1.23 | 0.078 | 12 |
| 10 | 49-11490 | 50-11490 | 1.41 | 0.089 | 13 |
| 10 | 49-11510 | 50-11510 | 1.54 | 0.097 | 13 |
| 10 | 49-11540 | 50-11540 | 1.76 | 0.111 | 13 |
| 10 | 49-11570 | 50-11570 | 2.10 | 0.132 | 14 |
| 10 | 49-11620 | 50-11620 | 2.40 | 0.151 | 14 |
| 11 | 49-11725 | 50-11725 | 2.71 | 0.171 | 14 |
| 11 | 49-11730 | 50-11730 | 2.95 | 0.186 | 14 |
| 11 | 49-11735 | 50-11735 | 3.24 | 0.204 | 14 |
| 11 | 49-11740 | 50-11740 | 3.52 | 0.222 | 16 |
| 11 | 49-11745 | 50-11745 | 3.83 | 0.242 | 19 |
| 11 | 49-11750 | 50-11750 | 4.12 | 0.260 | 21 |

| Article type | High Pressure Frese no. | Low Pressure Frese no. | Flow [gpm] | Flow [l/s] | Min.ΔP [kPa] |
|---|---|---|---|---|---|
| 20 | 49-20700 | 50-20700 | 4.49 | 0.283 | 22 |
| 20 | 49-20740 | 50-20740 | 4.76 | 0.300 | 22 |
| 20 | 49-20770 | 50-20770 | 5.26 | 0.332 | 22 |
| 20 | 49-20820 | 50-20820 | 5.88 | 0.371 | 23 |
| 20 | 49-20860 | 50-20860 | 6.53 | 0.412 | 23 |
| 20 | 49-20880 | 50-20880 | 6.96 | 0.439 | 23 |
| 20 | 49-20920 | 50-20920 | 7.81 | 0.493 | 24 |
| 20 | 49-20940 | 50-20940 | 8.07 | 0.509 | 24 |
| 20 | 49-20990 | 50-20990 | 9.16 | 0.578 | 25 |
| 20 | 49-21030 | 50-21030 | 9.91 | 0.625 | 26 |
| 20 | 49-21060 | 50-21060 | 10.21 | 0.644 | 27 |
| 20 | 49-21090 | 50-21090 | 10.78 | 0.680 | 28 |

# Frese ALPHA - Cartridges



## Product Range for Valves DN25L-DN50, 0.188 l/s - 3.154 l/s

| Article type | High Pressure Frese no. | Low Pressure Frese no. | Flow [gpm] | Flow [l/s] | Min.ΔP [kPa] |
|---|---|---|---|---|---|
| 30 | 49-33073 | 50-33073 | 2.97 | 0.188 | 12 |
| 30 | 49-33082 | 50-33082 | 3.79 | 0.239 | 12 |
| 30 | 49-33089 | 50-33089 | 4.49 | 0.283 | 12 |
| 30 | 49-33094 | 50-33094 | 5.00 | 0.315 | 12 |
| 30 | 49-33096 | 50-33096 | 5.24 | 0.331 | 12 |
| 30 | 49-33098 | 50-33098 | 5.60 | 0.353 | 13 |
| 30 | 49-33102 | 50-33102 | 5.94 | 0.375 | 13 |
| 30 | 49-33107 | 50-33107 | 6.54 | 0.413 | 13 |
| 30 | 49-33111 | 50-33111 | 6.90 | 0.435 | 14 |
| 30 | 49-33112 | 50-33112 | 7.18 | 0.453 | 14 |
| 30 | 49-33118 | 50-33118 | 7.99 | 0.504 | 14 |
| 30 | 49-33124 | 50-33124 | 8.81 | 0.556 | 15 |
| 30 | 49-33125 | 50-33125 | 9.00 | 0.568 | 16 |
| 30 | 49-33129 | 50-33129 | 9.56 | 0.603 | 16 |
| 30 | 49-33132 | 50-33132 | 10.00 | 0.631 | 17 |
| 30 | 49-33135 | 50-33135 | 10.48 | 0.661 | 17 |
| 30 | 49-33138 | 50-33138 | 11.00 | 0.694 | 18 |
| 30 | 49-33142 | 50-33142 | 11.62 | 0.733 | 18 |
| 30 | 49-33148 | 50-33148 | 12.64 | 0.797 | 19 |
| 30 | 49-33156 | 50-33156 | 14.05 | 0.886 | 21 |
| 30 | 49-33161 | 50-33161 | 15.00 | 0.946 | 22 |
| 30 | 49-33163 | 50-33163 | 15.35 | 0.968 | 22 |

| Article type | High Pressure Frese no. | Low Pressure Frese no. | Flow [gpm] | Flow [l/s] | Min.ΔP [kPa] |
|---|---|---|---|---|---|
| 40 | 49-44148 | 50-44148 | 16 | 1.009 | 20 |
| 40 | 49-44152 | 50-44152 | 17 | 1.072 | 21 |
| 40 | 49-44156 | 50-44156 | 18 | 1.136 | 21 |
| 40 | 49-44164 | 50-44164 | 19 | 1.199 | 21 |
| 40 | 49-44168 | 50-44168 | 20 | 1.262 | 22 |
| 40 | 49-44173 | 50-44173 | 21 | 1.325 | 22 |
| 40 | 49-44176 | 50-44176 | 22 | 1.388 | 23 |
| 40 | 49-44182 | 50-44182 | 24 | 1.514 | 24 |
| 40 | 49-44191 | 50-44191 | 26 | 1.640 | 25 |
| 40 | 49-44194 | 50-44194 | 28 | 1.766 | 26 |
| 40 | 49-44200 | 50-44200 | 30 | 1.893 | 27 |
| 40 | 49-44205 | 50-44205 | 32 | 2.019 | 28 |
| 40 | 49-44211 | 50-44211 | 34 | 2.145 | 30 |
| 40 | 49-44217 | 50-44217 | 36 | 2.271 | 31 |
| 40 | 49-44222 | 50-44222 | 38 | 2.397 | 33 |
| 40 | 49-44229 | 50-44229 | 40 | 2.523 | 34 |
| 40 | 49-44235 | 50-44235 | 42 | 2.650 | 36 |
| 40 | 49-44241 | 50-44241 | 44 | 2.776 | 38 |
| 40 | 49-44248 | 50-44248 | 46 | 2.902 | 40 |
| 40 | 49-44250 | 50-44250 | 48 | 3.028 | 42 |
| 40 | 49-44262 | 50-44262 | 50 | 3.154 | 44 |

## Specification text

**High pressure cartridges for valves DN15 - DN50**
The cartridge (for automatic balancing valve) should be made of tin/nickel plated brass; There should be only one differential pressure control range up to 600kPa; The flow rate should be defined by replaceable orifice plate. The diaphragm should be made of reinforced HNBR, the O-rings should be made of EPDM.

**Low pressure cartridges for valves DN15 - DN50**
The cartridge (for automatic balancing valve) should be made of brass; There should be only one differential pressure control range up to 350kPa; The flow rate should be defined by replaceable orifice plate. The diaphragm should be made of HNBR; the O-rings should be made of EPDM.

# Frese ALPHA - Cartridges



## Cartridges for valves from DN50-DN800 (with flanged housings)

**Material:** AISI 304
AISI 316 (higher resistance to corrosion)
**O-rings:** EPDM
**Spring:** AISI 304
AISI 316 (higher resistance to corrosion)
**Diaphragm:** Reinforced HNBR
**Max. differential pressure:** 600 kPa
**Medium temperature:** -20 to +120°C

## Product Range for Valves DN50-DN800 flanged

| Article type | AISI 304 Frese no. | AISI 316 Frese no. | Flow [gpm] | Flow [l/s] | Min.ΔP [kPa] |
|---|---|---|---|---|---|
| 50 | 52-55179 | 51-55179 | 16.82 | 1.061 | 13 |
| 50 | 52-55184 | 51-55184 | 17.31 | 1.092 | 13 |
| 50 | 52-55189 | 51-55189 | 17.83 | 1.125 | 13 |
| 50 | 52-55194 | 51-55194 | 18.49 | 1.167 | 13 |
| 50 | 52-55200 | 51-55200 | 19.37 | 1.222 | 13 |
| 50 | 52-55206 | 51-55206 | 20.43 | 1.289 | 14 |
| 50 | 52-55213 | 51-55213 | 21.80 | 1.375 | 14 |
| 50 | 52-55220 | 51-55220 | 23.38 | 1.475 | 14 |
| 50 | 52-55227 | 51-55227 | 25.10 | 1.583 | 14 |
| 50 | 52-55235 | 51-55235 | 27.34 | 1.725 | 14 |
| 50 | 52-55243 | 51-55243 | 28.67 | 1.808 | 14 |
| 50 | 52-55251 | 51-55251 | 31.18 | 1.967 | 14 |
| 50 | 52-55260 | 51-55260 | 34.79 | 2.194 | 15 |
| 50 | 52-55269 | 51-55269 | 39.19 | 2.472 | 16 |
| 50 | 52-55279 | 51-55279 | 45.79 | 2.889 | 19 |
| 50 | 52-55287 | 51-55287 | 50.00 | 3.154 | 22 |
| 50 | 52-55292 | 51-55292 | 55.00 | 3.470 | 23 |
| 50 | 52-55298 | 51-55298 | 59.00 | 3.722 | 24 |
| 50 | 52-55303 | 51-55303 | 65.00 | 4.100 | 27 |
| 50 | 52-55308 | 51-55308 | 70.45 | 4.444 | 29 |

| Article type | AISI 304 Frese no. | AISI 316 Frese no. | Flow [gpm] | Flow [l/s] | Min.ΔP [kPa] |
|---|---|---|---|---|---|
| 60 | 52-66285 | 51-66285 | 75.02 | 4.733 | 34 |
| 60 | 52-66292 | 51-66292 | 79.91 | 5.041 | 34 |
| 60 | 52-66301 | 51-66301 | 82.77 | 5.221 | 35 |
| 60 | 52-66305 | 51-66305 | 85.72 | 5.408 | 35 |
| 60 | 52-66312 | 51-66312 | 90.11 | 5.684 | 35 |
| 60 | 52-66319 | 51-66319 | 94.79 | 5.980 | 36 |
| 60 | 52-66326 | 51-66326 | 98.85 | 6.236 | 36 |
| 60 | 52-66332 | 51-66332 | 103.40 | 6.523 | 36 |
| 60 | 52-66338 | 51-66338 | 108.02 | 6.815 | 37 |
| 60 | 52-66344 | 51-66344 | 112.82 | 7.117 | 38 |
| 60 | 52-66349 | 51-66349 | 116.81 | 7.369 | 38 |
| 60 | 52-66356 | 51-66356 | 121.91 | 7.690 | 38 |
| 60 | 52-66362 | 51-66362 | 128.39 | 8.099 | 38 |
| 60 | 52-66367 | 51-66367 | 131.90 | 8.320 | 39 |
| 60 | 52-66373 | 51-66373 | 136.40 | 8.605 | 39 |
| 60 | 52-66379 | 51-66379 | 142.05 | 8.961 | 40 |
| 60 | 52-66385 | 51-66385 | 147.80 | 9.324 | 40 |
| 60 | 52-66391 | 51-66391 | 153.91 | 9.709 | 40 |
| 60 | 52-66393 | 51-66393 | 160.00 | 10.093 | 42 |
| 60 | 52-66398 | 51-66398 | 165.94 | 10.468 | 43 |
| 60 | 52-66400 | 51-66400 | 170.00 | 10.724 | 44 |
| 60 | 52-66407 | 51-66407 | 180.41 | 11.381 | 46 |

## Specification text

**High pressure cartridges for valves DN50 - DN800**
The cartridge for automatic balancing valve (flanged housing) should be made of stainless steel; There should be only one differential pressure control range up to 600kPa; The flow rate should be defined by replaceable orifice plate. The diaphragm should be made of reinforced HNBR, the O-rings should be made of EPDM.

The minimum required differential pressure is measured using the measurement outlets on the valve housing. In pressure ranges from 0 to 400 kPa the flow rate is +/- 5%. In pressure ranges up to 600 kPa the flow rate is +/- 10%.



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