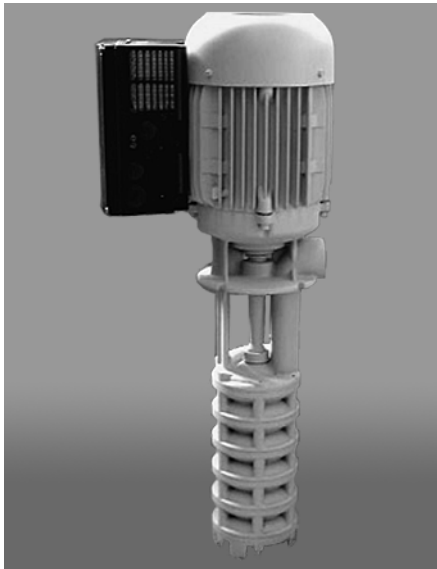


## Control/Regulation

### Brinkmann coolant pumps with frequency converter

Pumps with integrated frequency converter offer the perfect supplement to the existing product line for your application.



With the use of a frequency converter the Q/H curve otherwise typical for centrifugal pumps, is replaced by a performance curve array. This makes it possible to regulate the pump to various operating points within the performance curve array, allowing the pump to perfectly adjust to your specific application.

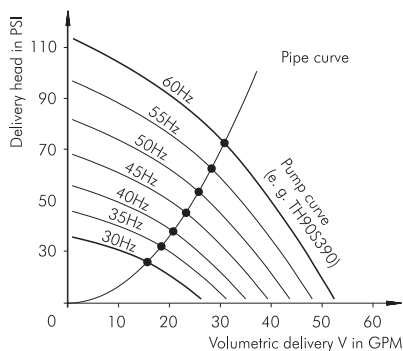


Fig. 1: Performance map

Advantages of pumps with frequency converter:

- Reduction of control panel space requirement
- No shielded leads required (EMC problems)
- Best adaptation to various applications
- Low heat transfer to medium (dimensional stability)
- Energy-savings

### Pump control

Pump control is an operation by which a physical value such as pressure or flow rate is influenced by other values.

With pump control we also speak of an open effective circuit, because the effect of any control operation is not monitored.

Interferences occurring in the system cannot be compensated, because the output value has no effect on the input value.

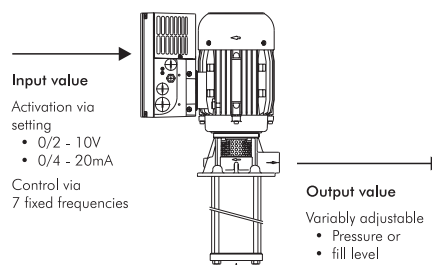


Fig. 2: Control scheme

### 1. Pump control via analog signal

When the coolant pump is controlled by using a frequency converter, nearly an infinite number of pressures can be achieved for different tools, for example.

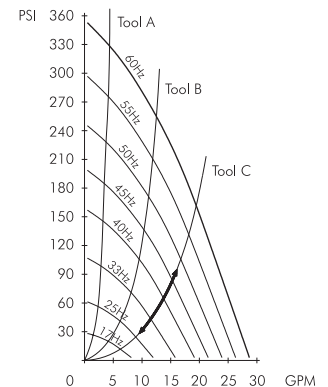


Fig. 3: Analog signal (infinite)

Usually the layout of the pump is limited to the 60 Hz version. Operation at higher frequencies is possible for various pumps with power reserves after consulting with the company.

The frequency converter is then operated at the current limit. This means the motor is operated at the set motor current rating at maximum. If the pump requires more motor power for the operating point, the frequency is reduced until the max. motor current is reached again.

### 2. Pump control via fixed frequencies (max. 7)

An alternative to analog pump control is digital control of the frequency converter over 3 digital inputs. Here up to 7 different fixed frequencies can be set.

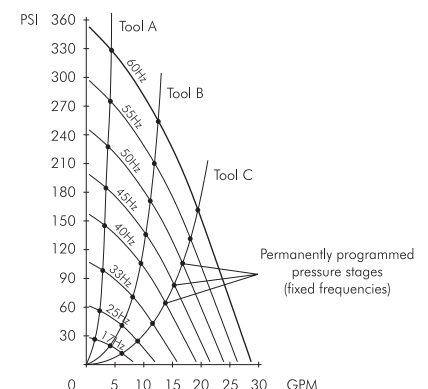


Fig. 4: Fixed frequencies

Using fixed frequency control it is possible to realize special pressure stages with one certain tool.

## Control/Regulation

### 3. Pump regulation

Regulation is an operation by which a physical value such as pressure is continuously sensed and compared with a set value. In the event of deviation the regulation device (here a PI controller) provides for the desired adaptation.

With regulation a check is made of whether a desired state is achieved. This allows a previously set pressure to be held constant within certain ranges in a process regardless of the quantities supplied.

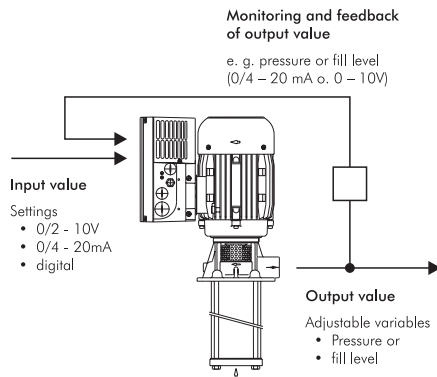


Fig. 5: Scheme of regulation

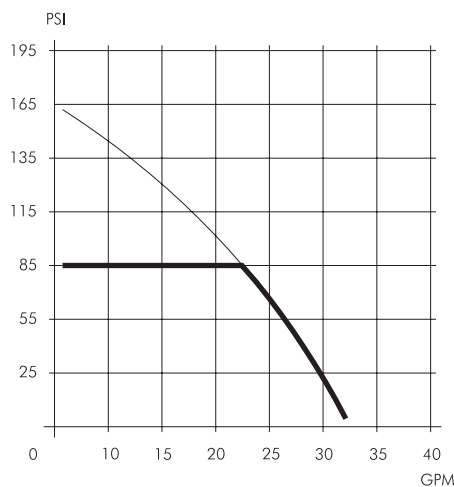


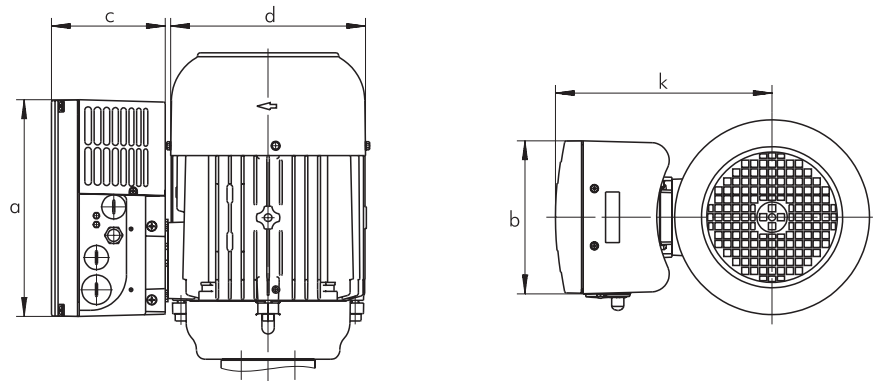
Fig. 6: Pressure regulation limited to max. 85 PSI (6 bar)

### TECHNICAL DATA:

Micromaster integrated (Siemens)

Function	Specification
<b>Rated voltage</b>	208 V ... 240 V ±10% 1 phase 380 V ... 480 V ±10% 3 phases
<b>Output ranges</b>	
1 AC 208 V ... 240 V	0.48 HP ... 1.0 HP
3 AC 380 V ... 480 V	0.48 HP ... 2.0 HP 2.0 HP ... 10 HP
<b>Housing size</b>	A : 4.1 x 5.0 x 6.3 inch B: 5.0 x 6.7 x 9.6 inch
<b>Protective system</b>	IP 55 (converter IP 65)
<b>Filter class A</b>	integrated
<b>Temperature range</b>	14 °F ... 122 °F
<b>Control procedure</b>	U/f
<b>Overload capability</b>	1.5 times rated output current
<b>Protective functions</b>	Overvoltage, undervoltage, overload, short circuit, motor failure, rotor lockup, excessive motor temperature, excessive converter temperature
<b>Output frequency range</b>	according to layout at factory
<b>Setting resolution</b>	0.05 Hz
<b>Digital inputs</b>	3
<b>Fixed frequencies</b>	7
<b>Fadable frequency ranges</b>	4
<b>Relay outputs</b>	1 configurable 24 V DC 1 A
<b>Analog outputs</b>	1 analog output (0/2 – 10 V, 0/4 – 20 mA) 1 input for PI controller
<b>Serial interface</b>	RS 485
<b>Process control</b>	PI

### Dimensions:



Frequency converter type	Motor power for Brinkmann pump HP	Cage size	a inch	b inch	c inch	d inch	k inch
MI 75	– 0.54	A	6.3	5.0	4.1	4.2	7.0
MI 75	0.67 – 1.15	A	6.3	5.0	4.1	5.4	7.5
MI 150	1.2 – 1.5	A	6.3	5.0	4.1	5.4	7.5
MI 150	1.75 – 2.0	A	6.3	5.0	4.1	6.9	8.0
MI 300	2.3 – 3.5	B	9.6	6.7	5.0	6.9	8.7
MI 550	4.4 – 7.4	B	9.6	6.7	5.0	8.6	9.5
MI 750	10	B	9.6	6.7	5.0	10.1	10