

- | | | | | | |
|---------------------|------|------------------------------|---------|-------------------|---------|
| 1 Pneumatic Knocker | K 40 | 6 Pneumatic Knocker | K160 | 11 Solenoid Valve | MV314 |
| 2 Pneumatic Knocker | K 63 | 7 Pneumatic Distance-Knocker | QJ 63 | 12 Impulser | TG-BC |
| 3 Pneumatic Knocker | K 80 | 8 Welding Plate | AP 80 | 13 Impulser | TGES-BC |
| 4 Pneumatic Knocker | K100 | 9 Maintenance unit | WE38 CP | 14 Stepping Relay | SR |
| 5 Pneumatic Knocker | K125 | 10 Sound Insulation Hood | KSH 63 | | |

Pneumatic Knocker

General description and accessories



Pneumatic Knocker – General information

1 USAGE

The Pneumatic Knocker is used on bulk solids with material flow disturbances such as bridging and rest formation when high speed vibrators with soft sinusoidal oscillations are not effective. The effect of the knocker is comparable to the effect of the infamous "silo hammer", without having dented silo spouts making the material flow even more difficult.

The effectiveness of the knocker is evaluated with the following rule: If the product can be made to flow with a hand hammer, the Pneumatic Knocker is also effective.

2 CONSTRUCTION AND FUNCTIONING

The Pneumatic Knocker achieves a very high impact energy by spontaneously released stored compressed air energy. Figure 1 shows the structure of the knocker.

The percussion piston (1) is a permanent magnet and in basic position this piston adheres to the anchor plate (2) until the compressed air supplied through the lid (3) overcomes the magnetic force. The percussion piston (1) is released from the anchor plate (2) and highly accelerated by the stored compressed air. The piston strikes with 6 to 7 m/s on the striker bolt (4), which transfers the impact to the silo wall. After ventilation, the spring (5) pushes the percussion piston (1) back to the starting position.

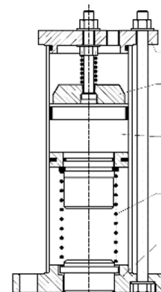


Figure 1



Figure 2 Knocker Type K 63

The Pneumatic Knocker generates an ideal elastic shock, which is specified as impact energy $E = m / 2 \times v^2$ [kgm / s² = Nm] and as impulse (momentum) $J = m \times v$ [kgm / s = Ns]. There is no impact force or imbalance like with vibrators.

The Pneumatic Knocker has the greatest effect when the impact is transferred undamped to the silo wall. It makes no sense to dampen the impact in order to reduce the noise. We suggest our Sound Insulation Hood for the reduction of noise emission of the Pneumatic Knocker.

The surface to be knocked should be able to swing, so that the impact can spread to all sides. Reinforcements of the silo walls and additional ribs are to be avoided, as this increases the weight and strength of the silo walls and reduces the impact of the knocker.

3 SELECTION KNOCKER SIZE AND REQUIRED NUMBER

The size and required number of pneumatic knockers for a round 60° cone can be taken as a guide from Figure 3.

On rectangular containers, at least two knockers are mounted on the two flatter sides.

4 CONTROL

The knocker is controlled by an electrical control with a solenoid valve. It requires a working time (pressure applied) for the function and a pause time (vented) for returning to the starting position.

During discharge out of silos, cycle times of 5 to 20 seconds are selected. Do not knock too much, otherwise the product may thicken. Continuously accumulated product is knocked off regularly with cycle times of up to 30 minutes. Product layers which are too thick can induce an avalanche-like break-off and block the outlet or overload the following machines. If larger silos require more than one knocker on the circumference, they are best activated one after the other. The product flow and air consumption then become more evenly. Remains in a hopper scale are emptied with 2 to 4 strokes in a cycle time of 2 to 4 seconds. Required accessories for manual, electrical or remote operation, see point 9.

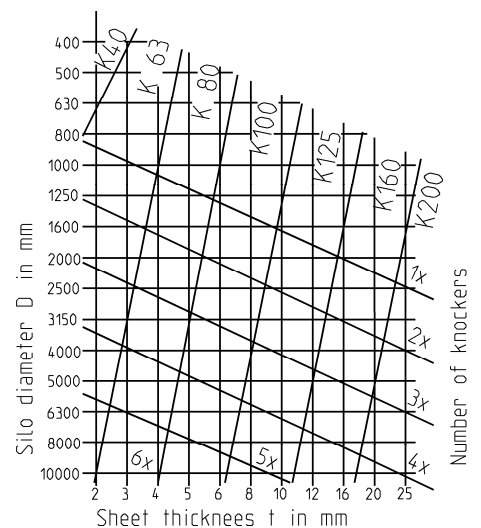


Figure 3 Selection Chart Pneumatic Knockers

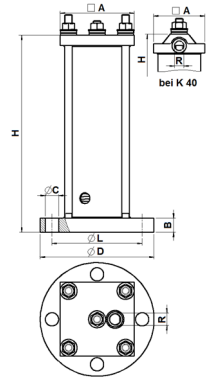
5 RANGE OF APPLICATION

Not approved in ATEX areas. It is intended for use in industrial interiors. Device is not splash-proof.

For outdoor use, in the presence of humidity and extreme dirt and dust, we recommend the use of the Sound Insulation Hood (KSH), which is available as an accessory. Versions in stainless steel are available too.

6 TECHNICAL DATA PNEUMATIC KNOCKER TYPE KXXX-XX:

| Type | Dimensions in mm | | | | | | | Magnetic adhesion N | Impact weight kg | Stroke mm | Impact energy Nm | Impulse Ns | Weight kg | Air consumption per impact at 3 bar Liter |
|------|------------------|----|-----|-----|-----|-----|--------|------------------------|---------------------|--------------|---------------------|---------------|--------------|--|
| | A | B | C | D | H | L | R | | | | | | | |
| K 40 | 54 | 11 | 9,5 | 85 | 174 | 65 | G 1/8" | 220 | 0,34 | 35 | 7,7 | 2,2 | 1,35 | 0,18 |
| K 63 | 78 | 15 | 14 | 120 | 208 | 95 | G 1/4" | 640 | 1,30 | 40 | 25,6 | 7,5 | 3,60 | 0,70 |
| K 80 | 92 | 19 | 14 | 140 | 249 | 115 | G 1/4" | 1160 | 2,44 | 55 | 63,8 | 16,7 | 6,60 | 1,30 |
| K100 | 115 | 22 | 18 | 182 | 320 | 145 | G 3/8" | 1620 | 4,99 | 57 | 92,3 | 28,5 | 13,50 | 2,90 |
| K125 | 150 | 27 | 18 | 205 | 405 | 170 | G 1/2" | 2560 | 9,13 | 80 | 204,8 | 60,5 | 26,50 | 6,20 |
| K160 | 190 | 33 | 26 | 300 | 486 | 240 | G 3/4" | 4150 | 16,45 | 102 | 423,3 | 115,0 | 62,00 | 12,00 |



7 SPECIAL DESIGNS

The Pneumatic Knocker is available in different material versions and for different temperature ranges up to a maximum operating temperature of 140 °C. All available versions see point 10.

8 PNEUMATIC DISTANCE-KNOCKER TYPE QJ

The Pneumatic Distance-Knocker is suitable for knocking against slow-moving drums and filling or emptying stations with moving containers.

The knocker type QJ can be mounted at a distance from the rotating drum or a container. The operating principle is identical to the knocker type K, but the impact pulse is transferred to a piston rod which moves to the container. The drum or container wall is touched only briefly during beating and transmits the impact pulse. The Distance-Knocker type QJ is described in more detail in a separate data sheet.



9 NECESSARY ACCESSORIES FOR THE INSTALLATION AND OPERATION OF THE PNEUMATIC KNOCKER

| Manual operation | Automatic operation |
|--|--|
| Welding and mounting plate for the knocker | |
| Maintenance unit with oiler and pressure reducer | |
| Pneumatic connection fittings and pneumatic hoses | |
| Pneumatic 3/2 directional control valve with manual override | Electrical control for the timing of compressed air and electro-pneumatic 3/2 directional solenoid valve |

More about available accessories - see point 11.

10 AVAILABLE VERSIONS

| Pneumatic Knocker K | | | | | | | |
|---------------------|------------------------------------|-----------------|------------|------------------------|------------------------|------------------------------------|------------------------|
| | Type Size 40 - 160 - Version | Version | Temp. [°C] | | Material | | |
| | | | From | to | Lid and bottom plate | Tube | Striker bolt |
| Pneumatic Knocker | K__ | Standard design | 0 | 60 | Aluminium | Steel powder-coated on the outside | Galvanized steel |
| | K__ - N2 | Special design | 0 | 80 | | | |
| | K__ - N3 | | 0 | 120 | | | |
| | K__ - S1 | | 0 | 60 | Galvanized steel | | |
| | K__ - S4 | | 0 | 140 | | | |
| | K__ - T1 | | 0 | 60 | Stainless steel 1.4541 | | |
| | K__ - T4 | | 0 | 140 | | | |
| | K__ - V1 | | 0 | 60 | Aluminium | Vulcollan | |
| | K__ - K1 | | 0 | 60 | Stainless steel 1.4541 | Stainless steel 1.4541 | Stainless steel 1.4021 |
| | K__ - K1PU | | 0 | 60 | | | Vulcollan |
| | K__ - K4 | 0 | 140 | Stainless steel 1.4021 | | | |

| Pneumatic Distance-Knocker QJ | | | |
|-------------------------------|---------------------------------|-----------|--|
| | | Temp. | Accessories |
| QJ__A | Piston rod without thread | 0- 60 °C | Vulcollan buffer for coating on piston rod |
| QJ__B | Piston rod with external thread | | Vulcollan buffer for coating on thread |
| QJ__C | Piston rod with internal thread | | Grooved nut KM__ |
| QJ__A/B/C - S4 | | 0 - 140°C | Vulcollan buffer for screwing on |
| | | | Without buffer |

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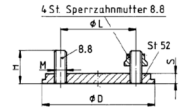
11 AVAILABLE ACCESSORIES FOR INSTALLATION AND OPERATION KNOCKER K AND DISTANCE-KNOCKER QJ

11.1 Welding and mounting plates for attaching the knocker on the silo.

11.1.1 For welding to round, conical or rectangular containers

Standard Type AP

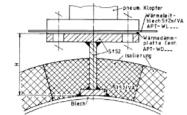
The knocker is screwed over 4 existing studs on the Welding Plate. Available in steel and stainless steel. See also dimension sheet 100-089DE.



11.1.2 For welding to small diameters, e.g. pipes or insulated containers

Type APT

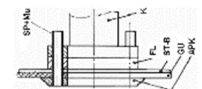
It is a small bridge welded. The knocker is mounted at a distance with four screw connections on a flange plate. Available in steel, stainless steel and mixed construction. See dimension sheets 100-089DE and 100-075C.



11.1.3 For mounting the knocker to rubberized containers

Type APK

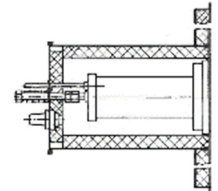
For this purpose, the studs must be passed through the container wall to the outside. Available in steel and stainless steel. See also dimension sheet 100-089DE.



11.2 Sound Insulation Hood (KSHxxx)

to reduce the noise emission of the knocker. See also dimension sheet 100-088.

Can also be used as protection against entrainment of the ventilation holes and protection against parts which are loosened if the knocker is damaged.



11.3 Pneumatic solenoid valves (MVxxx-xx)

in 24V DC and 230V AC. Special voltages on request.

Depending on the type used and the number of knockers available in 1/8", 1/4", 1/2".



11.4 Impulser (TG-xx-xx)

For easy control and adjustment of the pause and working times for the timing of the Pneumatic Knocker.

Available in 24V DC and 230V AC. Quick installation and setting into operation of the knocker. Particularly suitable if the optimal setting times are not known yet. Pauses and working times can be changed manually at any time via two potentiometers.



11.5 Stepping Relay (SDxx-xx)

Stepping relay for 4-8 knockers. Outputs can be programmed in sequence with working, pause and reset time. Remote control for operation of remote maintenance.



11.6 Maintenance unit (WExx-xx)

With pressure reducer and oiler for cleaned and oiled compressed air supply.

