

1 Pneumatic Knocker	K 40	6 Pneumatic Knocker	K160	11 Solenoid Valve	MV314
2 Pneumatic Knocker	K 63	7 Pneumatic Impulse 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, however, 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.

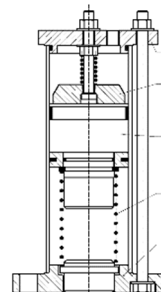


Figure 1



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 / s<sup>2</sup> = 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.

## 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.

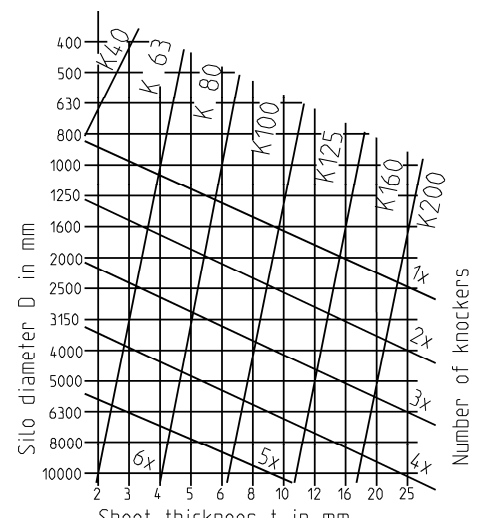
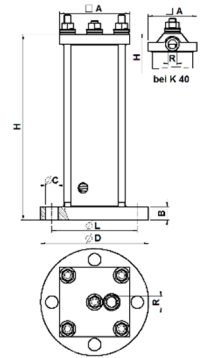


Figure 3 Selection Chart Pneumatic Knockers

## 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	58,0	16,7	6,60	1,30
K100	115	22	18	182	320	145	G 3/8"	1620	4,99	57	97,0	28,5	13,50	2,90
K125	150	27	18	205	405	170	G 1/2"	2560	9,13	80	205,0	60,5	26,50	6,20
K160	190	33	26	300	486	240	G 3/4"	4150	16,45	102	415,0	115,0	62,00	12,00



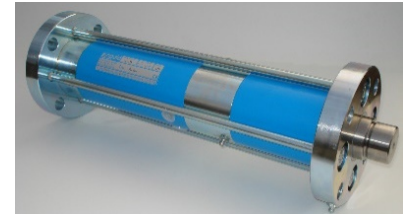
## 7 SPECIAL DESIGNS

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 IMPULSE KNOCKER TYPE QJ

The Pneumatic Impulse 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 Impulse 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	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	Galvanized steel	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 Impulse 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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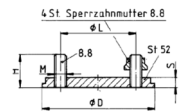
## 11 AVAILABLE ACCESSORIES FOR INSTALLATION AND OPERATION KNOCKER K AND IMPULSE KNOCKER QJ

### 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

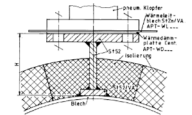
The knocker is screwed over 4 existing studs on the Welding Plate. Available in steel and stainless steel. See also dimension sheet 100-089DE.



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

##### Type APT

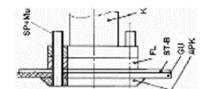
It is a small bridge welded. The knocker is mounted at a distance with four screw connections on a flange plate. Available in steel, stainless steel and mixed construction. See dimension sheets 100-089DE and 100-075C.



#### 11.1.3 For mounting the knocker to rubberized containers

##### Type APK

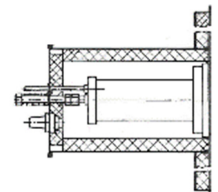
For this purpose, the studs must be passed through the container wall to the outside. Available in steel and stainless steel. See also dimension sheet 100-089DE.



### 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.

