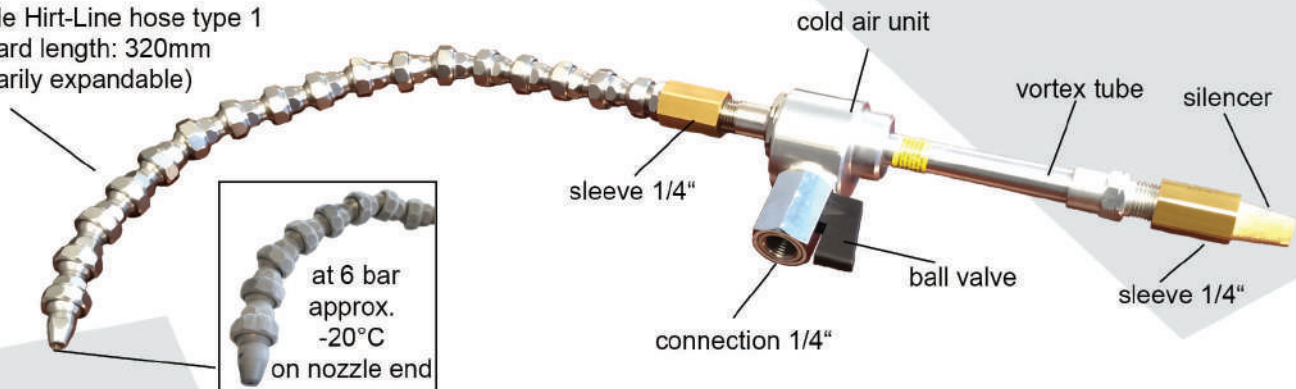


Cold-Air Nozzle

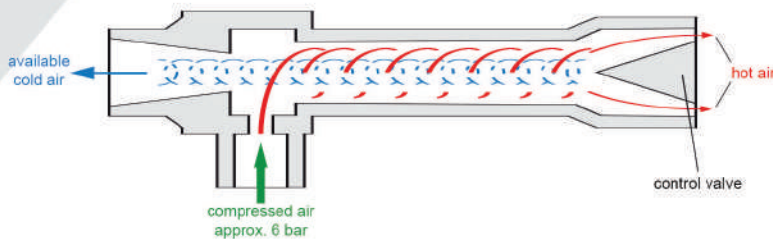
Flexible Hirt-Line hose type 1
Standard length: 320mm
(arbitrarily expandable)



Cooled air reduces temperatures in the cutting area, which in turn permits higher cutting speeds and longer tool life. This type of cooling enables modern coatings to achieve their full potential, as damage to the cutting edge resulting from thermal shock is avoided.

Moreover, the cold-air nozzle helps to remove the tiny chips produced in copy milling even from deep recesses or cavities. The function of the cold-air nozzle is based on the principle of vortex tubes. Normal pressurized air is divided up into a cold and a hot air stream. Without any additional energy supply by electrical current or moving components, the cold-air nozzle can produce cooling energy up to 733 W or temperatures of approx. -40°C, all it needs is standard pressurized air of approx. 6 bar. We recommend using a water separator or a maintenance unit before the nozzle itself. A regulation valve in the hot-air outlet allows adjustment of temperatures and airflow.

The drawing below illustrates the operation of a cold-air nozzle. Compressed air strikes in a tangential been drilled, a stationary generator, the air along the long wall flow in the direction of the orbital hot air control valve pushes, where the speed of sound is produced. A proportion of the air escapes through the needle valve at the hot air exhaust. Are not leaked air is forcibly returned through the center of the sound velocity air stream where it causes a simple heat exchange. The inner spiral air - slow motion - heat to the outer, faster spiral from. When the inner coil through the center of the stationary generator and out of the cooling air exhaust outlet, it has reached an extremely low temperature. The flow velocity of the outer stream (hot air) is always higher than that of the inner stream (cold air), as a part of the outer stream is discharged through the hot air valve.



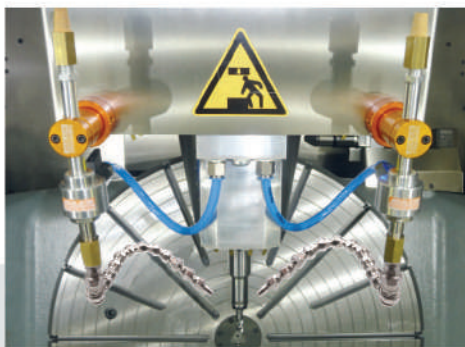
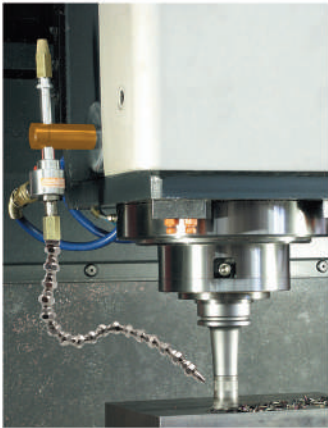
Please note: The regulation valve can only be adjusted after the silencer has been screwed off. The vortex tube on the hot-air outlet side can be heated up to temperatures up to 100°C – Do not touch before it has cooled!

Temperature, measured at the effective exit of the vortex tube (not the end of the nozzle)

| Supply air pressure | Temperature of usable air in °C, with a cold air percentage of | | |
|---------------------|--|-----|-----|
| | 25% | 50% | 75% |
| 3 bar | -31 | -22 | -6 |
| 4 bar | -35 | -35 | -8 |
| 5 bar | -39 | -28 | -10 |
| 6 bar | -42 | -31 | -11 |
| 7 bar | -46 | -34 | -13 |

Air consumption, with supply air temperature of 21 °C

| Input pressure | Air consumption | Capacity |
|----------------|-----------------|------------|
| 6,9 bar | 7,08 l/sec | 226 kCal/h |
| 6,9 bar | 25,5 m³/h | 263 W |



Application example:

Increased tool life using the cold-air nozzle

Workpiece: Hardened mould, material hot work tool steel 1.2343 (X38CrMoV5-1) with 46-48 HRC
 Operation: Roughing the mould
 Tool: Time-S-Cut screw-in end mill 9130.350524 with inserts 9585A.08015
 Cutting conditions: $vc = 150 \text{ m/min} \cdot n = 1364 \text{ min}$
 $fz = 1,11 \text{ mm} \cdot vf = 6057 \text{ mm/min}$
 $ap = 0,4 \text{ mm} \cdot \text{æ} = 20 \text{ mm}$

| Tool life without coolant | Tool life with cold-air nozzle |
|---------------------------|--------------------------------|
| 50 minutes | 68 minutes |

By using the cold-air nozzle, it was possible to increase the tool life by 36%.

Part.-No. HL6910.15

cold-air nozzle with 320mm Hirt-Line type1 coolant pipe
 nozzle with 3,2mm outlet
 connection female 1/4" incl. ball valve
 material of cold-air nozzle aluminium and brass,
 material of coolant pipe 1.4404 V4A



Part.-No. HL6910.25

Magnetic holder for cold-air nozzle HL6910.15
 D= 80x82 mm

Part.-No. HL6910.24

Clamping arm with basic holder for cold-air nozzle HL6910.15
 D= 45x68 mm