

Minimum quantity lubrication system
AerosolMaster 4000 Cryolub

KNOLL
.It works

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AerosolMaster 4000 Cryolub



Properties

Oil content and air pressure adjustable as required via 30 programs

Very fine and homogeneous aerosol

Almost dry machining

Immediate availability of aerosol and CO₂ at the cutting edge as soon as spindle starts

Long aerosol lines up to 50 m possible

Optional machine connection via ProfiBus or ProfiNet

CO₂ content adjustable as required

Benefits

- Defined aerosol quality and constant aerosol flow, even when tools change
- No pressure fluctuations at the tool
- Great process reliability
- Long tool lives, short machining times
- Low air and oil consumption
- Easy handling
- Low-loss lubrication
- No sticking
- Minimal cleaning of parts and machine required
- No wait times
- Great process reliability
- Flexible setup
- Quick and variable NC programming
- Little adaptation effort
- Very user-friendly
- Low consumption
- Optimum tool temperature
- Workpiece temperature = room temperature

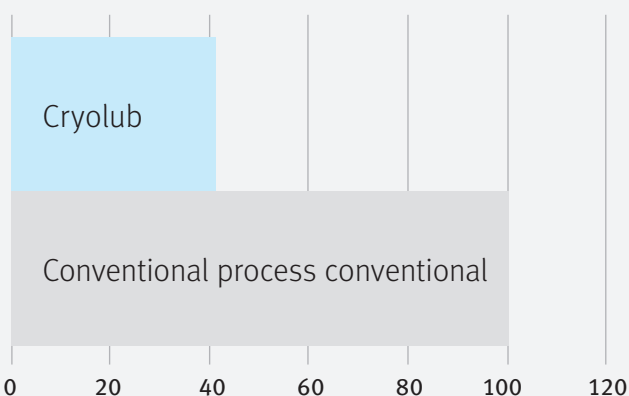
Application

The KNOLL AerosolMaster 4000 Cryolub is a minimum quantity lubrication system based on cryogenic cooling technology for manufacturing processes that use geometrically defined cutting edges, e.g. on machining centers, transfer lines, turning, milling, drilling and sawing machines.

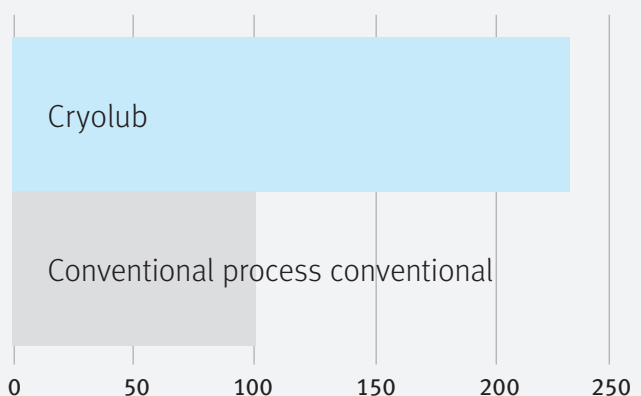
Thanks to unique ATS technology in combination with Cryolub cryogenic cooling technology, the system is ideal for demanding machining of titanium- and nickel-based alloys (e.g. implants), Inconel, composite materials (e.g. carbon) in the medical device, aircraft and energy industries.

Performance

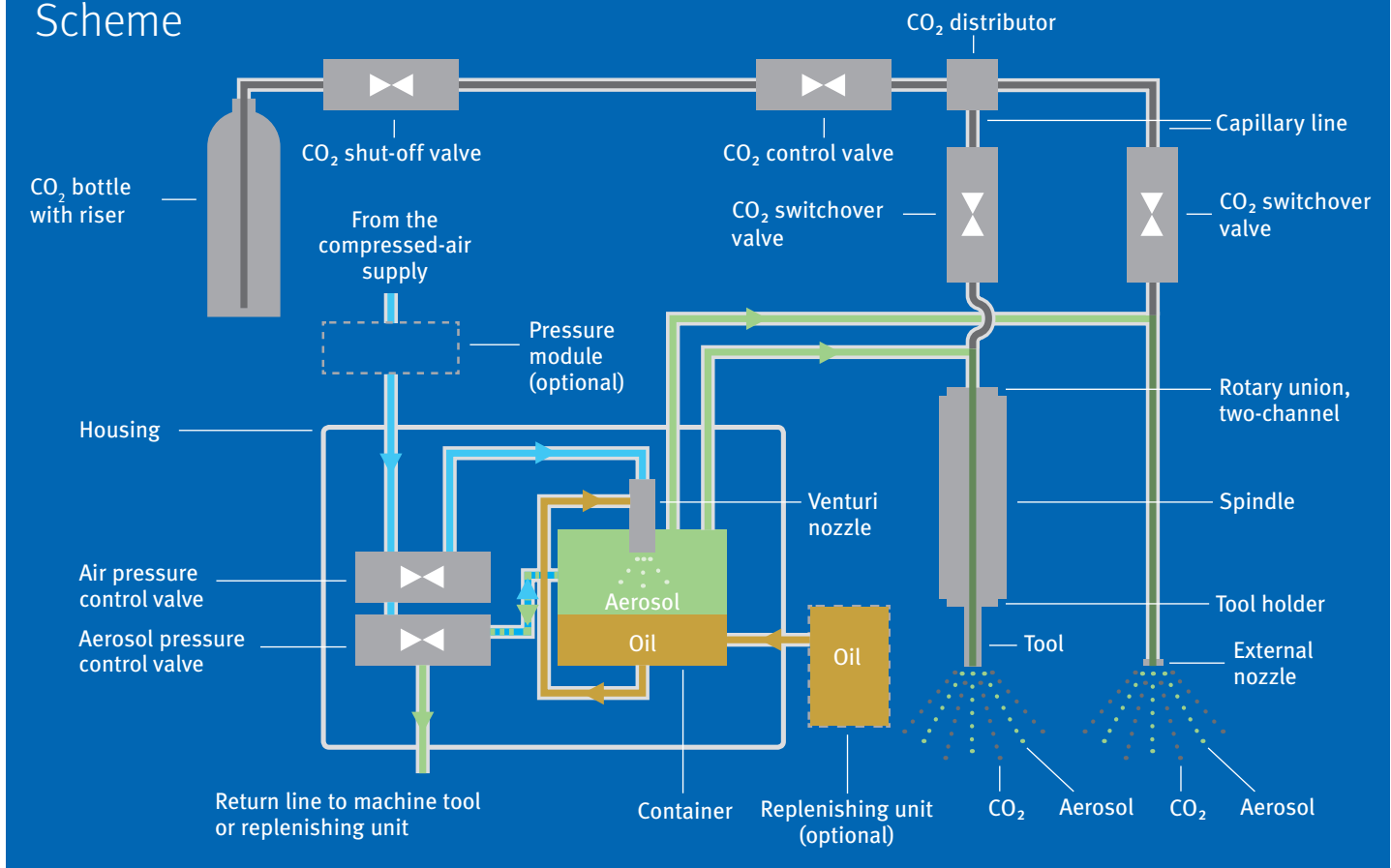
Manufacturing costs in %



Removal rate per cutting edge in %



Scheme



MQL description

1. Compressed air flows into the venturi nozzle through a compressed-air control valve
2. The venturi nozzle draws in oil from the container and mixes it with the air to form a fine aerosol
3. Air pressure and aerosol pressure control valves define the air pressure and saturation level of the aerosol
4. The oil/air mixture flows through, in succession, the: → rotary union → spindle → tool holder → tool → discharge opening(s) at the machining point(s)

Cryolub description

1. CO₂ supply by the customer
2. CO₂ switchover valve: Disconnects the CO₂ in case of danger
3. CO₂ control valve: Controls the cooling capacity via the CO₂ flow rate
4. CO₂ distributor (optional): Allows additional, external cooling nozzles
5. CO₂ switchover valve: Provides fastest response times
6. Aerosol and/or CO₂ discharged at the tool or the external nozzle.

Combination possibilities

Cryolub combination	Medium outside of the lance	Medium inside of the lance	Tool, single-channel	Tool, two-channel
Air	Air		X	
Air + liquid CO ₂	Air	CO ₂		X
MQL	MQL		X	
MQL + liquid CO ₂	MQL	CO ₂		X
liquid CO ₂		CO ₂	X	

Equipment based on example of AerosolMaster 4000 Cryolub

30 selectable programs for aerosol setting for the tools	●	
Integrated PLC (Siemens S7-1200)	○	
Digital electrical connection via inputs/outputs	○	
Electrical connection via ProfiBus	○	
Electrical connection via ProfiNet	○	
Mounting frame with wheels	○	
Ball valve, 2-way	○	
Ball valve, 3-way (for second medium, e.g. cooling lubricant)	○	
Aerosol switchover valve (for robot head or sliding lathes)	○	
External aerosol nozzle + external cold aerosol nozzles (CO ₂)	○	
Automatic replenishing unit, 10 liters for 1 AerosolMaster	○	
Automatic replenishing unit, 25 liters for maximum of 6 AerosolMasters	○	
Pressure module, 10 bar	○	
Pressure module, 16 bar	○	
Manual control unit	○	
	●	Standard equipment
	○	Option

Product overview

	AerosolMaster 4000 Cryolub
Use	demanding (e.g. machining centers)
Programs	30 (automatic)
Control	own and/or machine
Filling	automatic
Replenishing unit	yes
Cooling gas	yes
Cooling capacity	down to -78°C
Internal cooling channels	< 0.5 - 6 mm

Technical data

	AerosolMaster 4000 Cryolub
Dimensions(HWT)	600x600x210 mm
Space requirement (HWT)	750x640x830 mm
Weight	43 kg
Fill capacity	2.3 l
Usable volume	1.7 l
Power supply	24 VDC
Current draw	4 A
Input pressure	6-10/16 bar
Compressed air quality class	5 ISO 8573-1
Compressed air connection line	1 Nm ³ /min at 6 bar***
Air consumption*	10-1300 NI/min
Oil quantity**	0-350 ml/h
Level monitoring	4-point, 24 VDC
Aerosol container pressure	max. 10/16 bar
Aerosol pressure	0.5-9/15 bar
Cooling gas supply	45-65 bar
Cooling gas consumption	**** 3-10kg/h

* Depending on internal cooling channel diameter and aerosol pressure
** Depending on internal cooling channel diameter, aerosol pressure and lubricant
*** Nm³ = Standard cubic meters
**** Depending on material to be machined and the nozzles/tools used

Replenishing units

Replenishing units guarantee continued operation of machining processes. They ensure occupational safety and are very user-friendly. One replenishing unit can automatically fill a maximum of 6 AerosolMasters.

Replenishing units	Container capacity (l)	Aerosol return
ARU 10 for 1 AerosolMaster	10	yes
ARU 25 for maximum of 6 AerosolMaster	25	yes

Pressure modules

Pressure modules are used if the existing system pressure is insufficient for optimal swarf removal, e.g. during deep-hole drilling. Process-dependent activation/deactivation of the pressure modules ensures optimized air consumption.

Pressure modules	Air flow rate (l/min)	Output pressure (bar)
PBM 10	200	10
PBM 10	400	10
PBM 16	100	16

Oil

AerosolMaster lubricant is formulated specifically for Cryolub technology. The oil permits resource-saving and energy-efficient production with the lowest oil consumption.

Article	Area of use	Properties
AM lubricant c-al	Aluminum, plastic, nonferrous metal, steel	Cryolub-capable down to -78 °C
AM lubricant c-st	Heavy-duty machining, steel, Inconel	Cryolub-capable down to -78 °C
AM lubricant c-ti	Titan	Cryolub-capable down to -78 °C

AerosolMaster 4000 Cryolub

Dimensions

AerosolMaster 4000 Cryolub

