

1. Description

The ALPHA Clamp is a high-power tool designed for use in clamping tasks processing sheet metal. It consists of a pneumatic cylinder, a metal housing with several mounting possibilities, and a clamp arm with receiver for the contour piece.

When used for clamping, the pneumatic cylinder functions on an integrated curve mechanism and moves the clamp arm. The position control of the clamp arm is achieved through limit switches fixed on an integrated cassette system.

The ALPHA Clamp was specially developed for the clamping of sheet metal/components. Direct sheet metal forming or any other tasks which are not meant for clamping are not intended with the ALPHA Clamp.

2. Safety

The ALPHA Clamp was not conceived to be a complete tool, ready for independent applications and has therefore not been fitted with safety equipment. Only when it is installed correctly in a production system and a corresponding safety control system is added, all safety requirements will be met.

Should any faults occur that place personnel at risk, the ALPHA Clamp is to be switched off immediately. Maintenance measures are only to be undertaken when the machine is at a complete standstill and by suitably qualified specialists.

After maintenance work has been carried out, the protection devices are to be refitted in the correct way.

3. Assembly of the ALPHA Clamp

- The clamp is installed by means of socket head cap screws on the mounting front or rear.
- Connect to supply air between pneumatic control valve and clamp (connections "N").

Installation of flow control valves is recommended to reduce the clamp opening and closing speed and to adjust to the proper system / line speed

Attention: The ALPHA Clamp is equipped with an integrated cushion on the return stroke (sizes 50 and 63). At excessive clamp arm weight, the safe function of the cushion is not warranted. Maximum permitted clamp arm weight design guidelines must be adhered to (see data sheet "Allowed clamp arm weight...").

A. Inductive Position Sensing (T12)

Connect sensor per electrical diagram to control line by inserting connector "C" and tightening connector coupling nut. **Caution:** Operation with wrong current or current higher than specified may short out the system and lead to personnel injury.

Function of the integrated LEDs is as follows:
 greenSystem current
 redClamp closed
 yellow.....Clamp open

4. Blocking system "B" (Option)

The version "B" ALPHA Clamps are equipped with a mechanical locking system acting in „open" direction. In case of a spontaneous failure of the compressed air supply, the movement of the clamp arm in "open" direction will be prevented. In this case, the holding force will be at least 50% of the nominal force.

IMPORTANT:

Exceeding of this holding force can destroy internal components or can cause shorter lifetime, even if the holding function applies for a short time.

Blocking system "B"

The blocking system consists of balls which are arranged in a cone concentric to the piston rod. The balls are pressed into the cone by spring force. This leads to jamming of the piston rod in the intended movement direction for opening.

The locking is released automatically with the pneumatic control of the clamp in "open" direction.

At zero pressure the clamping of the piston rod on the return side is available in any position of the clamp arm

Important:

When the clamp is used for dynamic applications on grippers, the forward stroke must be pressurised shortly, before actuating the return stroke. This leads to a safe releasing of the piston rod brake.

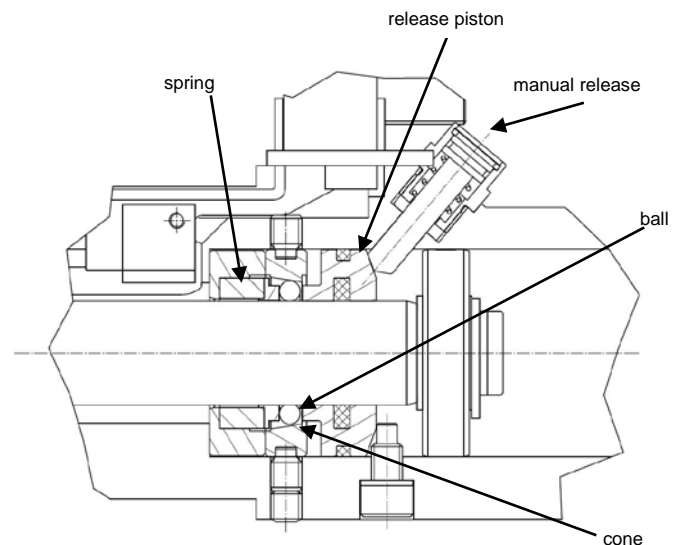


Fig. 1: Drawing APH ... B

5. Holding functions „H“ / „HD“ (optional)

For the purpose of safety-relevant applications (e.g. gripper system, overhead installation), the ALPHA clamp can be equipped with a pneumatic holding function (version „H“). This pneumatic self-locking function keeps the drive cylinder in the „clamp closed“ position via an unlockable, pressurised check valve integrated into the cylinder bottom. Due to this pressurization, the clamp cannot be opened automatically. The pneumatic self-lock is released via switching of the main valve or through manual activation of the check valve. A special, external pneumatic control is not required.

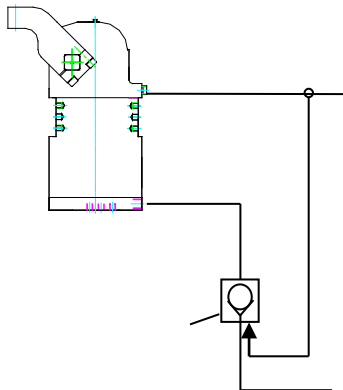


Fig. 2: Wiring diagram check valve

Additionally, version „HD“ is equipped with an unlockable check valve for position „clamp opened“. Hereby an accidental closing of the clamp will be prevented.

6. Set up for the ALPHA Clamp

Attention! Before the contour (N/C) block is disassembled, the clamp arm must be removed from the clamp! This is the only way to avoid damage to the clamp.

Caution! Danger of crushing!

When the clamp arm is being set, fingers could be severed or crushed. Do not reach into the swivel area of the clamp arm while the ALPHA Clamp is in operation. Before operations are stated the air supply must be shot off.

The ALPHA Clamp is equipped with a special curve mechanism, which generates a defined clamping force over a clamping angle of $\pm 1,5^\circ$. The contour pieces are to be built so they fit into the work piece in a clamp arm position of 0° and 90° . This ensures a clamping way and so a power reserve in process.

- Tighten contour piece on clamp arm.
- Close the clamp and check the 0° position with appropriate measuring equipment. If necessary, adjust with shims under the corresponding contour piece. When set correctly, the release pin „P“ lifts slightly from the housing.

Attention When release pin „P“ is fully extended the clamping distance of the ALPHA clamp is exhausted and no more power reserve is available (= release pin „P“ is jammed).

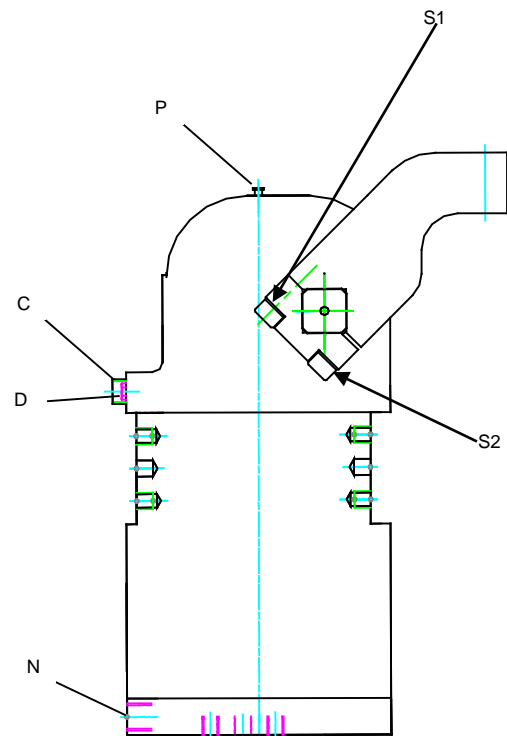


Fig. 3: ALPHA Clamp

7. Release of Toggle

When the toggle lever is in the upper dead centre position, the clamp may be mechanically unlocked and thereby opened by operating pin „P“.

Caution! Danger of crushing! By operating pin „P“ the clamp arm can open abruptly. Do not reach into the swivel area of the clamp arm!

For maintenance, the locking mechanism can be unlocked manually. For this purpose, actuate the manual unlocking device, designed as pressure switch on the rear side using a suitable tool (screwdriver, Allen key).

If the actuating plunger (A) has been pressed in for approx. 10 mm, the tension hook can simultaneously be brought to the desired position.

Caution! The clamp arm may move unpredictably when actuating the manual release.



Fig. 4: APH 40 B clamped position

8. Adjusting the opening angle

The opening angle on the ALPHA Clamp is infinitely adjustable. Changing the opening angle also changes the angle limitation, the position sensors and the end position damping. The standard opening angle range is as follows:

APH 40:	10 – 135°
APH 50, 63:	15 – 135°
APH 80:	30 – 135°

Adjustment:

- Bring clamp arm to open position.
- Read the pre-adjusted angle at the scale placed laterally at the clamp housing.
- Remove the inner screw plug at the cylinder bottom.
- Screw the hexagon socket inside the cylinder bottom until the desired opening angle is reached.
- Screw in the inner screw plug at the cylinder bottom to secure the adjusting screw.

Attention: Mind the max. opening angle of 95° in clamp arm version 2!

9. Replacement of limit switch cartridge

- Remove limit switch cartridge by releasing screw "D".
- Set new limit switch cartridge for relevant opening angle (see 5) and assemble.

10. Changing of clamp arm

In order to avoid warping of the square-section shaft, it must be ensured when changing the clamp arm that fixing screw "S1" (flange contact surface, clamp arm at stop) is tightened first, followed by the second fixing screw, "S2" (see fig. 3).

Recommended tightening torque:

APH 40:	8.7 Nm
APH 50:	17 Nm
APH 63:	41 Nm
APH 80:	80 Nm

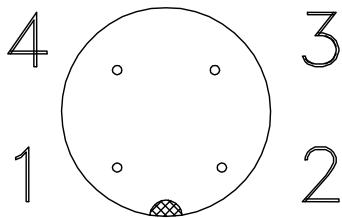
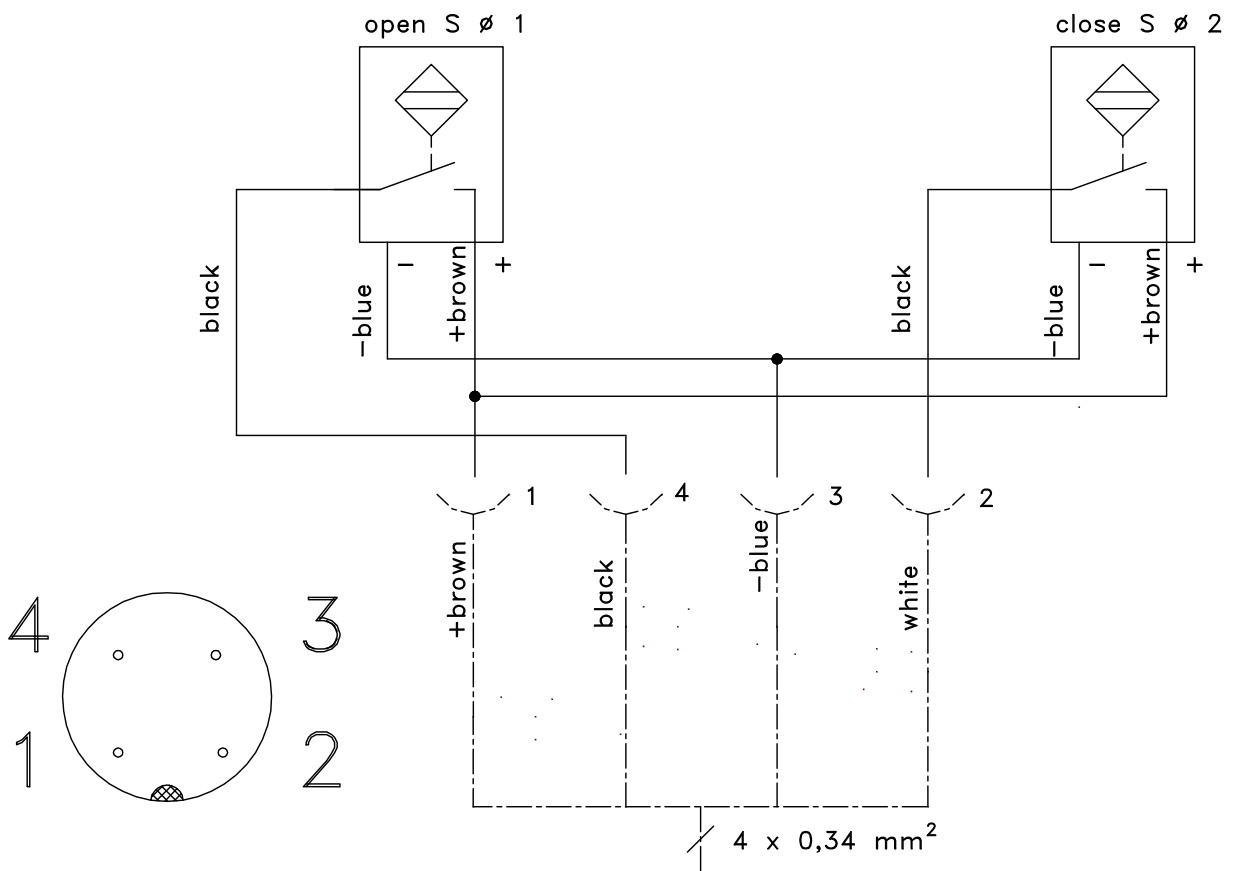
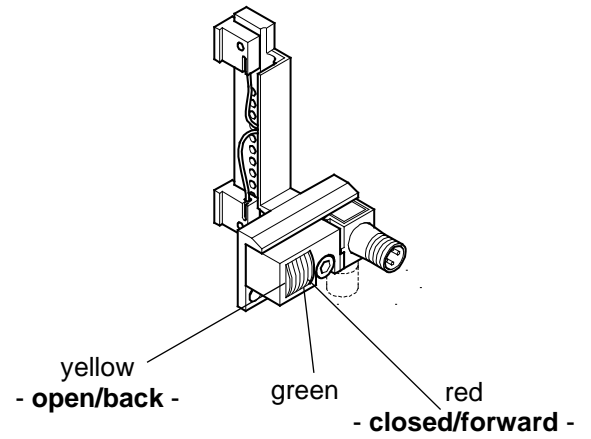
11. Maintenance

Bearings and wear faces on the ALPHA Clamp have been designed with consideration for high production applications. This technical concept allows 3 million cycles without significant component wear.

Attention: To provide protection from welding slag and other debris, the clamp is equipped with a fully closed housing. Therefore, no special maintenance is required. Cleaning with high-pressure steam or dry ice may damage the ALPHA Clamp mechanism.

Option „B“

In regular intervals, at least every 100,000 cycles, the blocking system must be tested at its function. For this purpose, the clamp must be placed in the pressure-less state and the clamp arm must be set into a position between 10° and 135°. If the clamp arm will be pulled into the open position by hand force (50% of the maximum allowable holding torque must not be exceeded), the clamp arm must not yield more than 5° before the blocking unit accesses. The unit must be exchanged immediately if the blocking function is not given or if the allowable angle range is exceeded.



Technical Specifications

Inductive switch (Standard version)
 Short circuit proof
 Rated voltage 10-30 V
 Working current 32 mA (one initiator connected with PLC)
 Closer PNP exit



Subject to technical modifications.

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