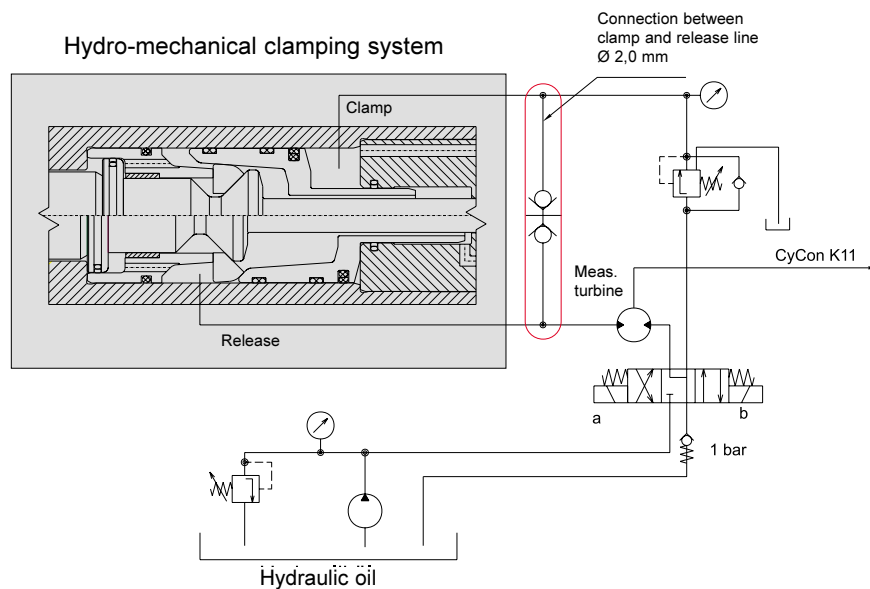


3.3 Venting of clamping system



1. Adjust pressure for clamping and releasing
2. Clamp
3. Relieve pressure from lines
4. Connect clamp and release lines
5. Apply pressure for release line for 2 minutes
6. Relieve pressure from lines
7. Shut connection between clamp and release line
8. Repeat steps 1 to 6 at least 10 times depending on length of lines

With systems using Cytec controllers (CyCon 2 or K11) repeat until constant values for clamping and releasing are measured.

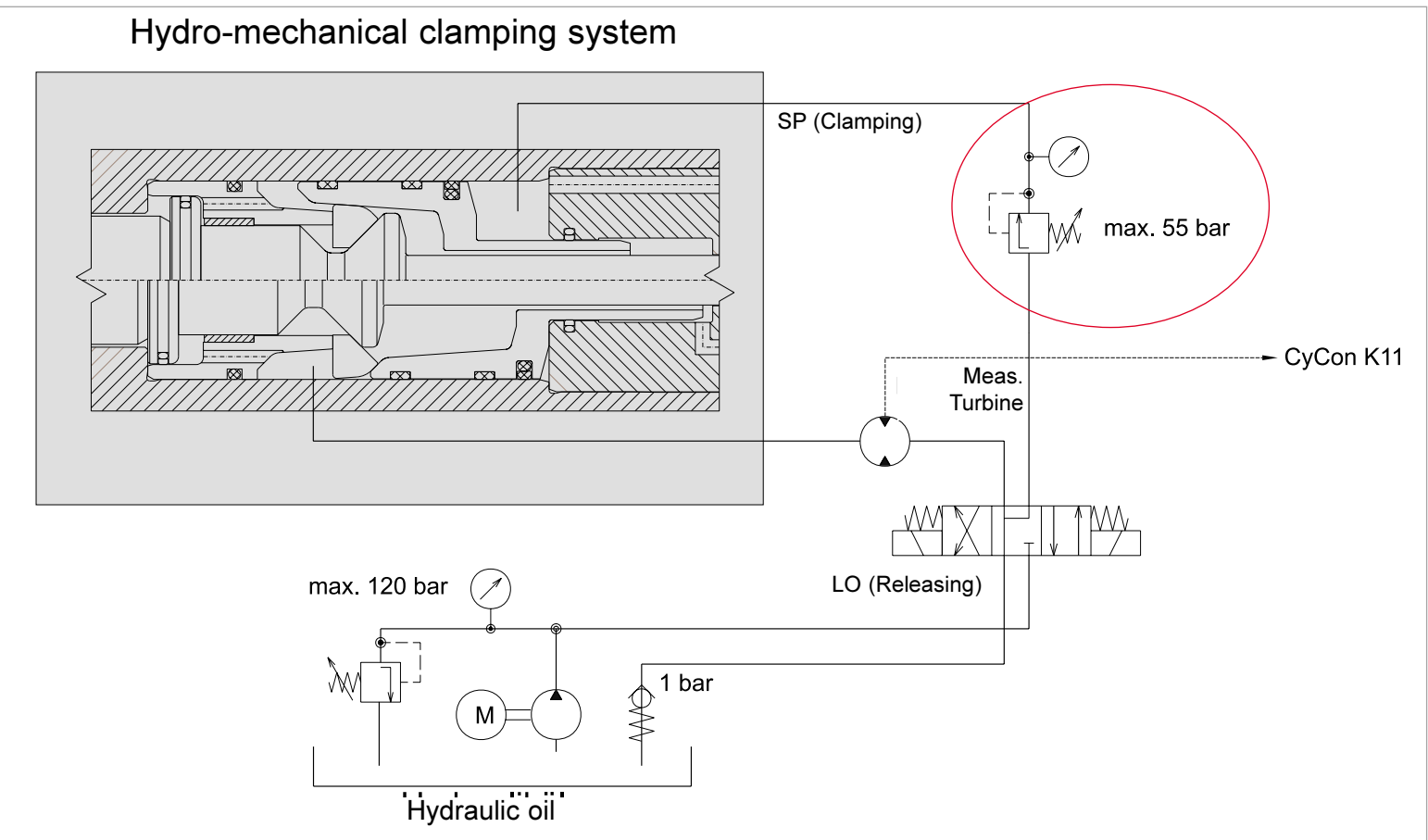
The connecting line between clamp and release line should be as close to the header as possible. If applicable, use additional clamp and release connection of the header.

3.4

Fluidic Diagrams

3.4.1

Tool clamping (hydraulic)



3.5 Adjustments with Controller CyCon K11

For a successful first start up the respective skilled personnel must have read and understood the complete instruction manual (incl. Annex) of the CyCon K11 controller.

The following information specially refers to the operation with motor spindles.

3.5.1 Clamp and Release Control

For the clamp and release control the hydraulic oil flow is measured by a measuring turbine. The revolutions of the measuring turbine are measured by proximity switches (PNP or NPN-types) and are evaluated by the controller (K11) as a frequency. At the same time the pulse sequence is counted. To determine a correct clamp or release procedure the following conditions must be fulfilled:

1. Before a check of the final conditions is performed a dwell time (must be set by the user) has to elapse (stop frequency).
2. Undershooting of the stop frequency
3. The number of pulses counted (=oil quantity) must be within a set window.

Whenever one of these conditions is not fulfilled it was **not correctly** clamped or released.

The spindle must be shut down!

The minimum metering time can be set to “zero” in most cases.

Only in systems which do not have a continuous oil flow (e.g. 2 spindles with one common hydraulic power source) this time setting must be adapted.

A pre-setting of parameters or parameter recommendations by the manufacturer is possible as these parameters must be adapted to the hydraulic system of the machine.

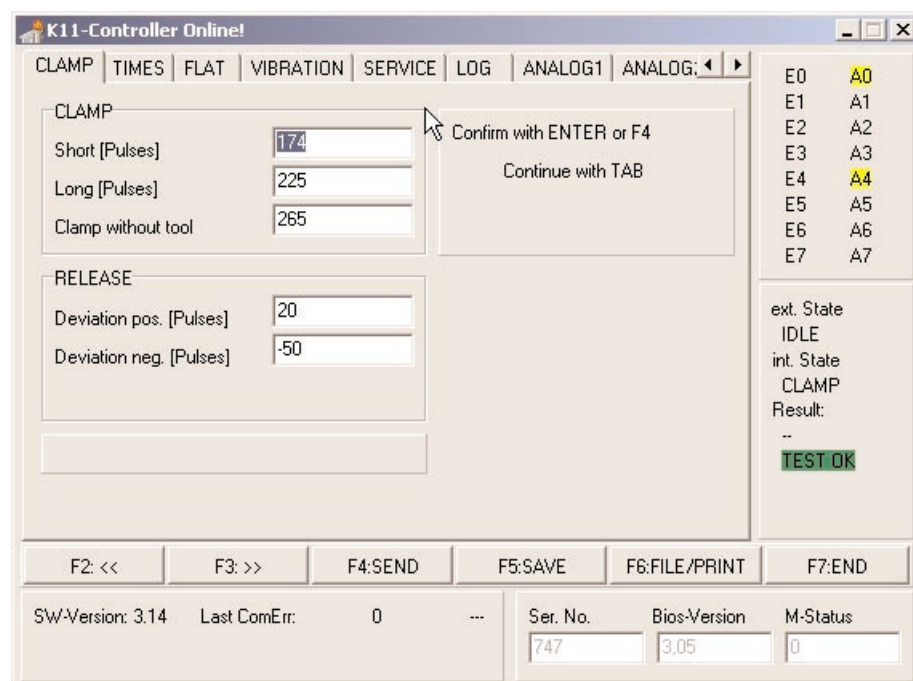
3.5.2 Determination and Setting of Parameters

The following conditions must be fulfilled:

- The hydraulic system must be operating
- Clamp and release pressures must be set
- The hydraulic system and the tool drawbar system must be vented
- It must be possible to clamp and release tools manually
- The Controller must be wired (according to manual / documentation of the K11 Controller)
- The measuring turbine must be installed in the release line

The procedure is as follows:

- Connect controller with a PC
- Start up user software as per manual; each modified entry must be confirmed with "Return/Enter" and each register card must be saved by double clicking on the F5:SAVE - Button.
- Select Register "Clamping"



- Enter the following settings:

Clamping:

Short = 0

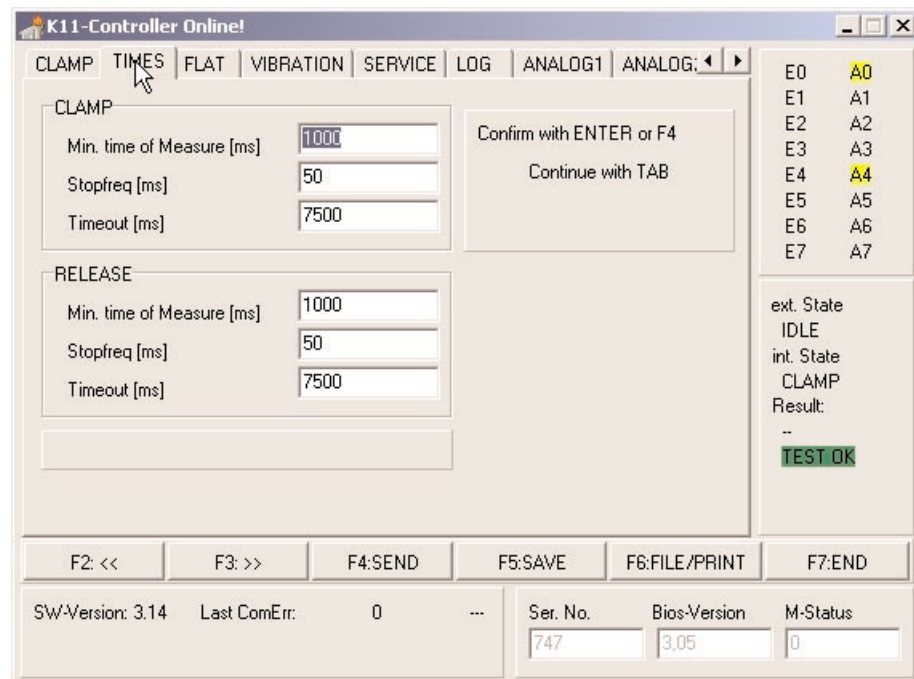
Long = 1000

Clamp without Tool = 1020

Releasing:

Deviation pos : = 1000

Deviation neg: = -1000



- Select Register "Times"

- Enter the following settings:

Clamping:

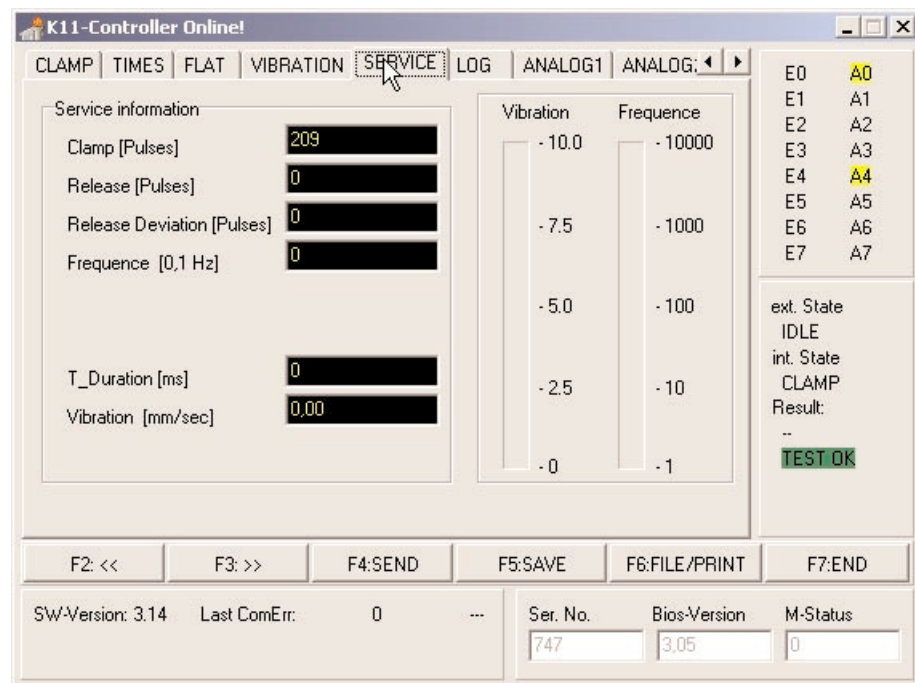
Minimum Measuring Time = 500

Stop Frequency = 150

Timeout = 5000

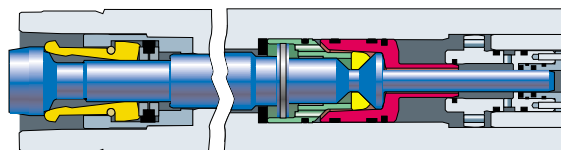
Releasing:

same as "Clamping"



- Select Register "Service"
- Clamp without tool:
Clamp and release repeatedly (15 times) without tool in the spindle. Note each value (clamp pulses / release deviation pulses) and calculate mean value.

Should the values differ significantly (difference > 10 pulses) it can be assumed that there is still air in the hydraulic system. It must be vented anew.

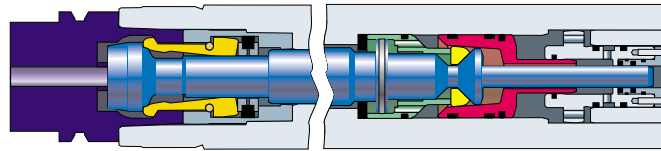


Tab. 1

Nr.	Clamp pulses	Release deviation
1	138	2
2	134	8
3	140	2
4	139	6
5	140	3
:	:	:
:	:	:
15	135	4
Ø 138		

max. value

- **Clamp "Zero" - Tool:**
After this clamp a tool whose interface contour is within tolerance. This tool must be labeled "zero" - tool. For this purpose a tool should be used which was checked by a force gauge or on a measuring machine.



Tab. 2

Nr.	Clamp pulses	Release deviation
1	88	.2
2	91	.6
3	88	.2
4	89	.2
5	87	.1
:	:	:
:	:	:
15	89	.4
\varnothing 89		

Measurement of the clamp and release pulses should also be repeated (15 times) and the mean value calculated.

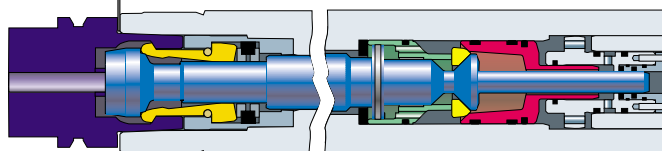
- **Clamp "Minus" - Tool:**
After having completed this procedure place two feeler gauges each 0,2 mm thick between tool and spindle nose. The clamping cone now is 0,2 mm too close to the spindle's planar surface. This tool is labeled "minus" - tool. The drawbar movement will now be reduced.

Tab. 3

Nr.	Clamp pulses	Release deviation
1	65	.2
2	70	.6
3	66	.2
4	68	.2
5	68	.1
:	:	:
:	:	:
15	66	.4
\varnothing 67		

min. value

Feeler gauge 0,2 mm



As above, measurement of the clamp and release pulses should be repeated (15 times) and the mean value calculated.

- Select Register "Clamping"

The lowest measured number of pulses out of table 3 minus 5 is now the lowest limit for "Clamping / Short":

$$65 - 5 = \underline{60}$$

The difference of the mean values of the "zero" and the "minus"- tools (tables 2 and 3) is added to the value of the "zero"- tool plus 5. This represents the limit for "clamp/long":

$$89 - 67 = 22; \mathbf{89 + 22 = \underline{111}}$$

The smallest deviation measured when releasing ("release-dev.", tab. 3) plus 5 is entered at "releasing/deviation pos.":

$$\mathbf{-1 + 5 = \underline{4}}$$

The biggest deviation measured when releasing out of table 1 minus 5 is entered at "releasing / deviation neg.":

$$\mathbf{-8 - 5 = \underline{-13}}$$

As parameter for "clamping without tool" enter the mean value of table 1 minus 10 pulses:

$$\mathbf{138 - 10 = \underline{128}}$$

If the signal "clamping without tool" is not used enter 999.

Each modified entry must be confirmed by pressing the Return/Enter key and each register must be saved by double clicking on the "Save" - buttons.

The higher the entered value for "stop frequency" the slower the measuring turbine has to turn before the signal "Test Finished" is read out.

A "stop frequency" of 100 can be considered to be a good standard value.

"Minimum Metering Time" is the time set to count all pulses, however, without considering the "Stop Frequency". The signal "Test Finished" is only read out after the minimum metering time has elapsed and after the subsequent check whether the stop frequency was undercut.

Adjustment of the Minimum Metering Time without the use of an Oscilloscope

- Select Register "Times" and enter the following values:

Clamping:

Minimum Metering Time = 0

Stop Frequency = 100

Timeout = 5000

Releasing:

same as for clamping.

- Select Register "Service"
- Repeatedly clamp and release tool. Note each displayed time and subtract the set stop frequency (100) from the longest time. Enter at least 2/3 of this result as minimum metering time.

Nr	Time clamp	Time release
1	285	263
2	281	270
3	283	267
4	291	269
5	282	264
15	286	266

Longest time = 291

Stop frequency = 100

$$\frac{2 \times (291\text{ms} - 100\text{ms})}{3} = 127,3 \text{ ms}$$

Minimum Metering Time to be set = 127 ms

Should the time reading vary very much this is a sign of air in the hydraulic system.