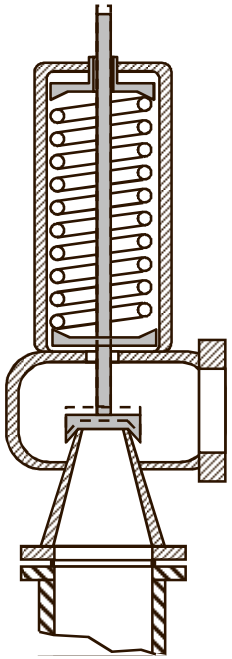
Comid √alve Services

√eri-Test

online safety valve test

Web: www.comid.co.uk Email: sales@comid.co.uk

√eri-Test - The Basics



For the plant operator:

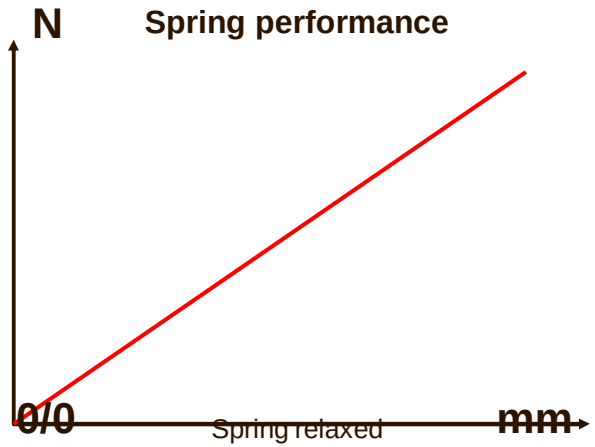
“A safety valve to ensure a safe operation of pressure vessels”

For the on-line tester:

“Primarily a pre-stressed spring, secondary a cover on a hole”

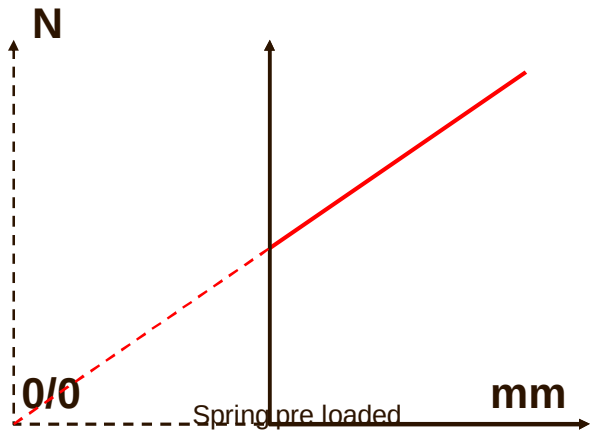
On-line valve testing means analysing the spring inside the valve

Spring Constant & Performance



$$F_{Spring}[N] = C[N/mm] \text{ x } \Delta X[mm]$$

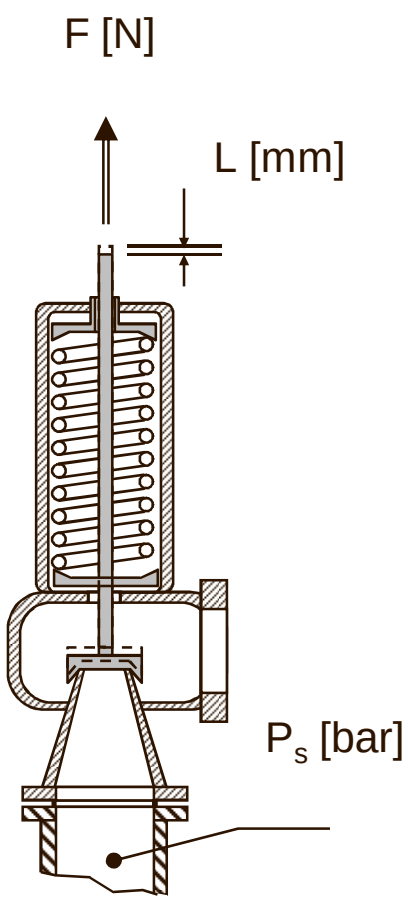
The more force you set on a spring, the more you squeeze it together. The force - lift diagram is called "**spring performance**"



By setting a safety valve to a specific set pressure, the spring is pre loaded with force.

The aim of the on-line test is to measure the pre-stress of the safety valves spring!

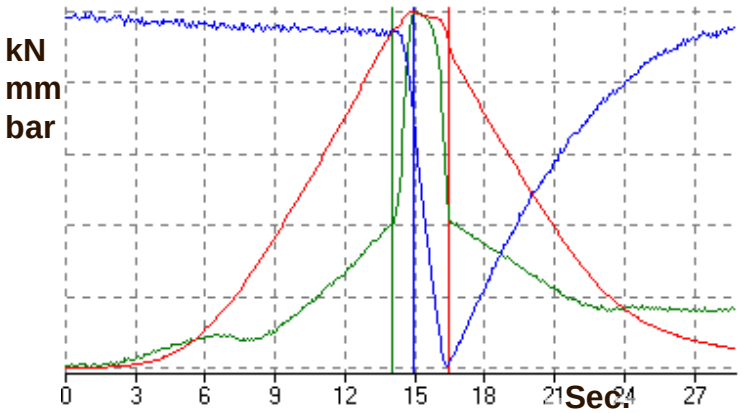
Measuring the pre-load



- Connect a force generating unit on the valves spindle.
- Set force on the spindle until it slightly moves.
- Record force, lift and system pressure while operating on the valves spindle.
- Analyse the recorded diagrams and find the point, where the spring starts to move - squeezes together.

To visualise the pre-stress the valve disk MUST move - the valve has to be opened slightly.

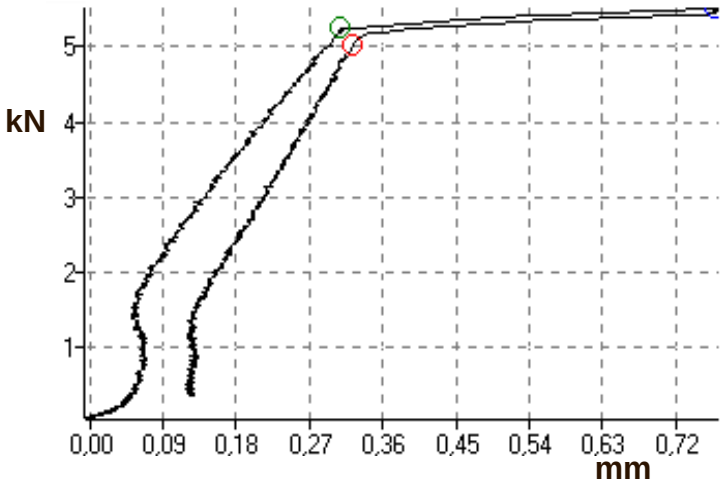
Result diagram of √eri-Test on-line test



Standard diagram

Force, lift and system pressure recorded over test time.

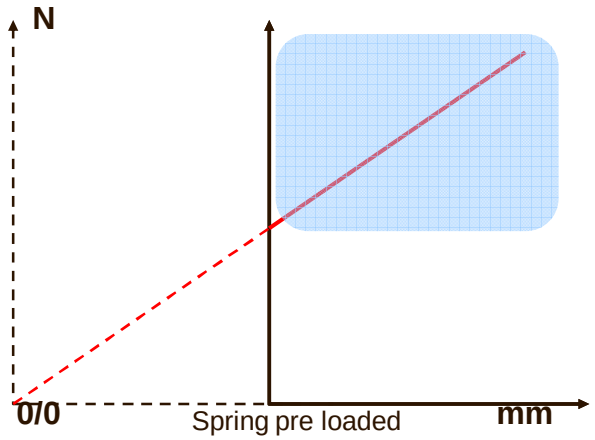
(the diagram in √eri-Test is normalised to emphasis the graphs quality)

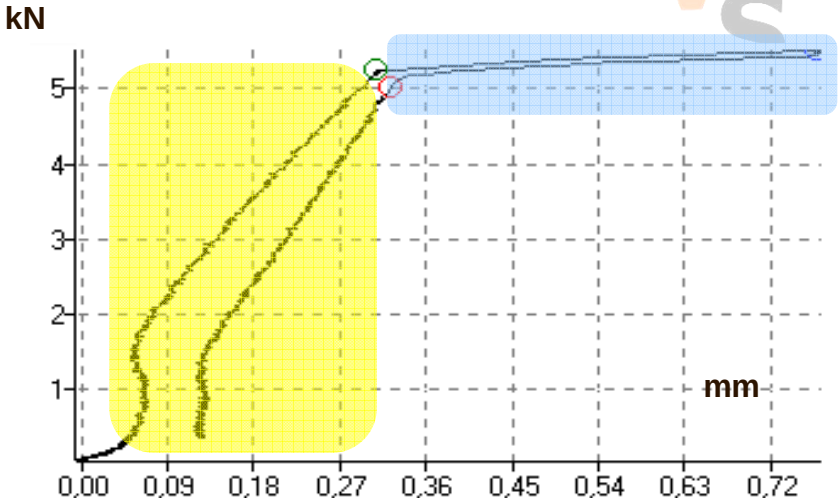


√eri-Test Diagram

Special feature in √eri-Test - Diagram of force over lift to enable a precise identification of the set pressure point

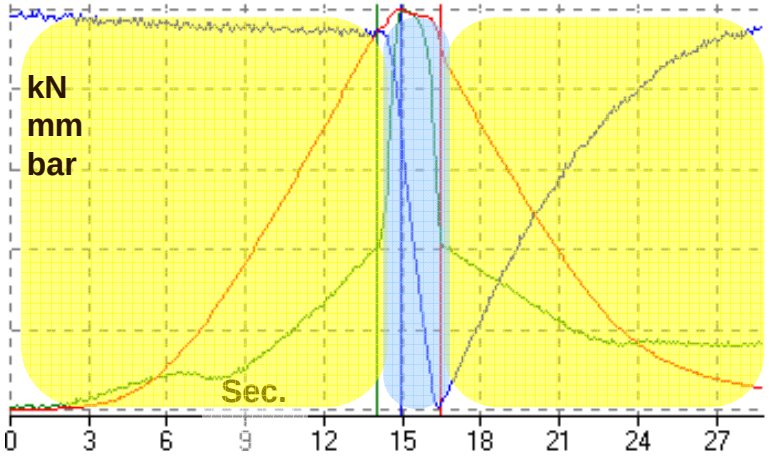
Result Diagram Interpretation



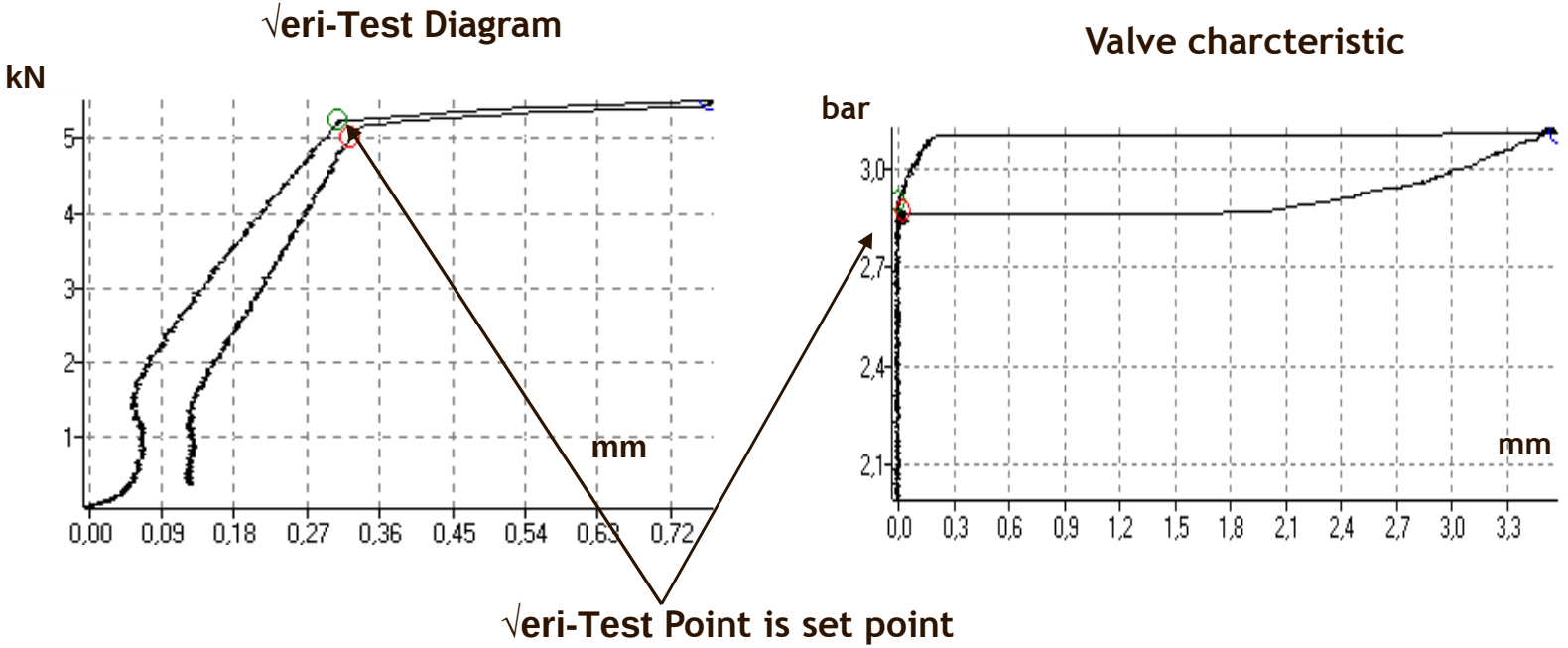


Spring movement
=
Disk movement

Test rig and bonnet compression + spindle prolongation

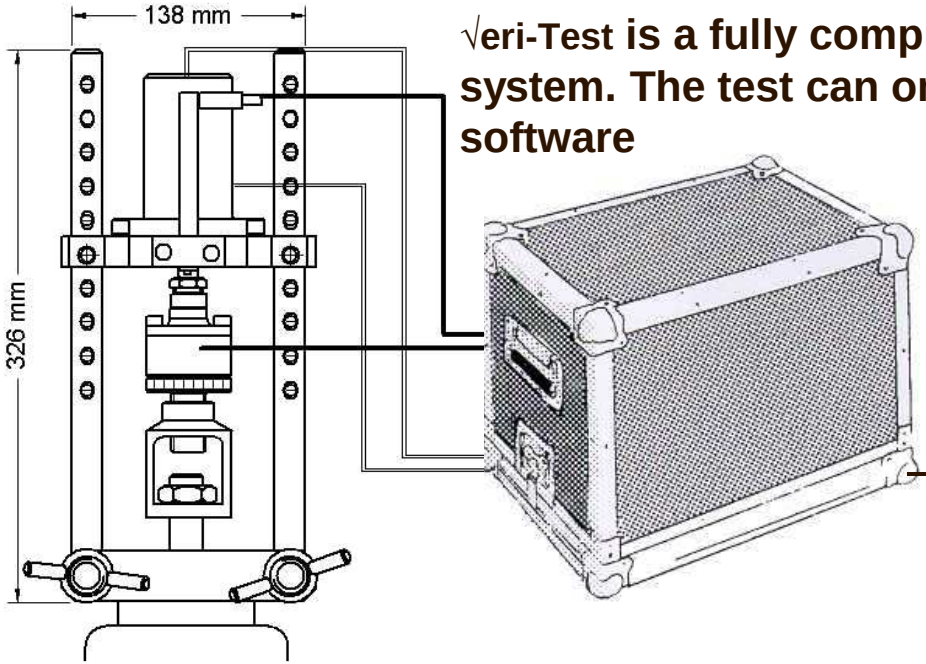


Set point definition



~~The set point is the moment when the disk starts to lift~~
while the valve is in an operational condition

Components of √eri-Test



√eri-Test is a fully computerised Safety Valve test system. The test can only be performed by using the software

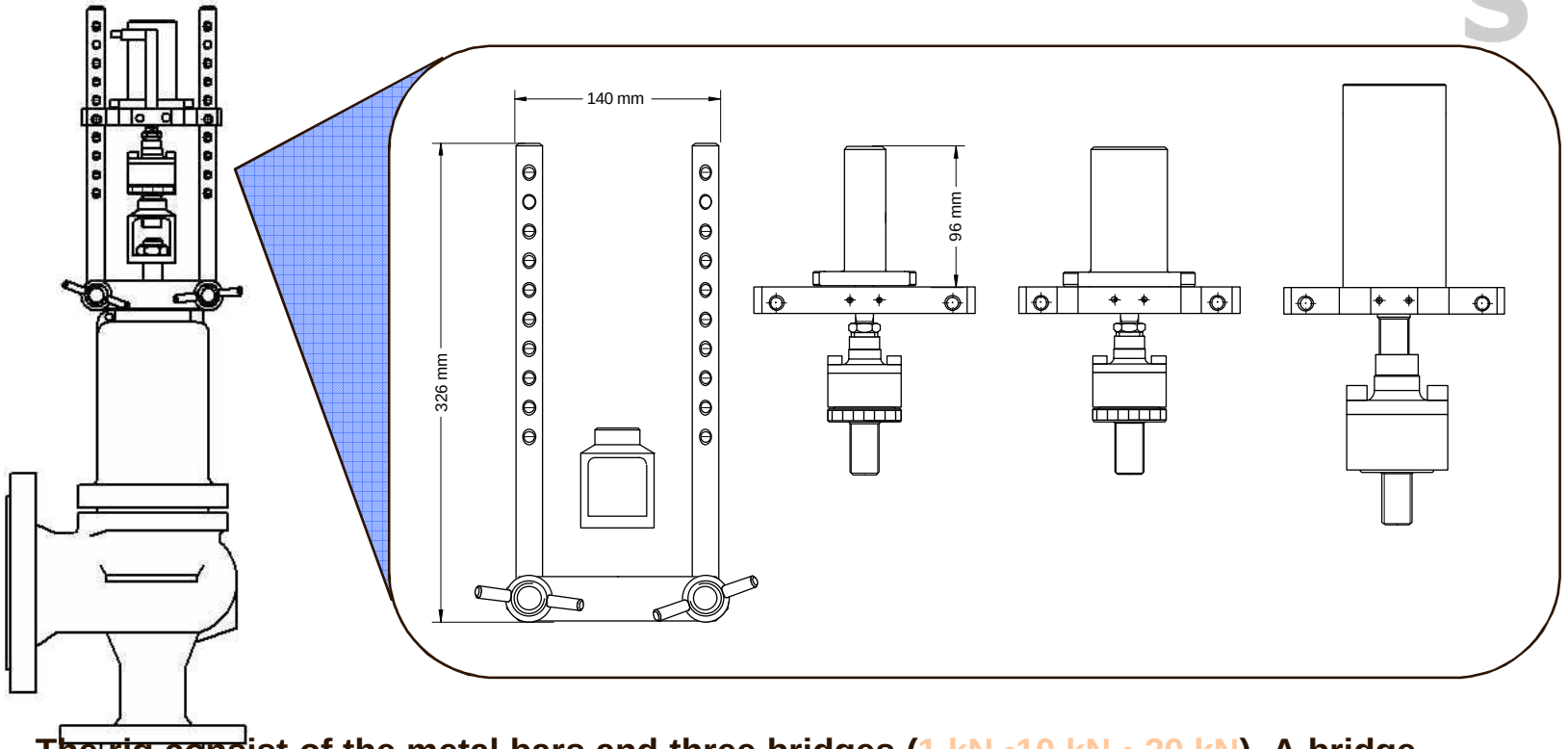
Data only

Test rig
- Piston
- Force sensor
- Lift sensor

Power Box
- Control electronic
- Mobile pump
- Hydraulic valves

Notebook
- Software

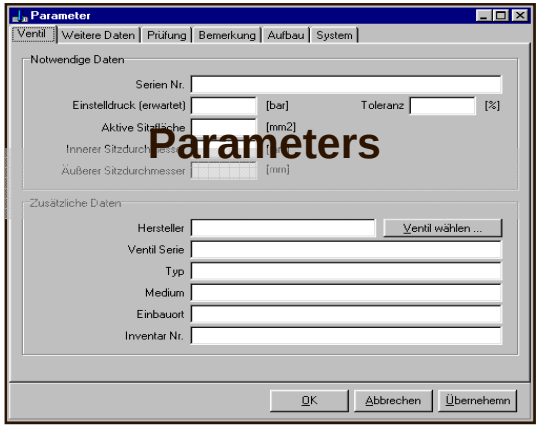
Test Rig Details

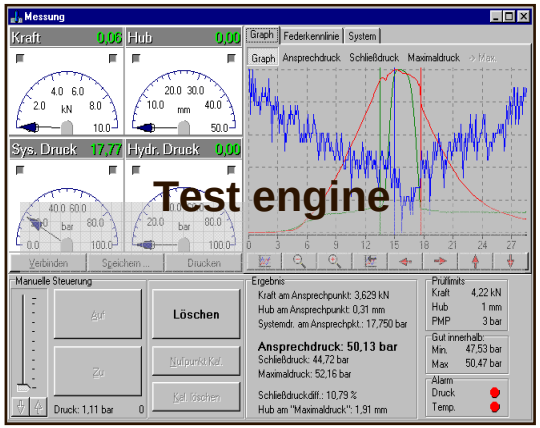


The rig consist of the metal bars and three bridges (1 kN •10 kN • 20 kN). A bridge includes a hydraulic cylinder and a force sensor.

√eri-Test Power Box Details

√eri-Test Software





Built up

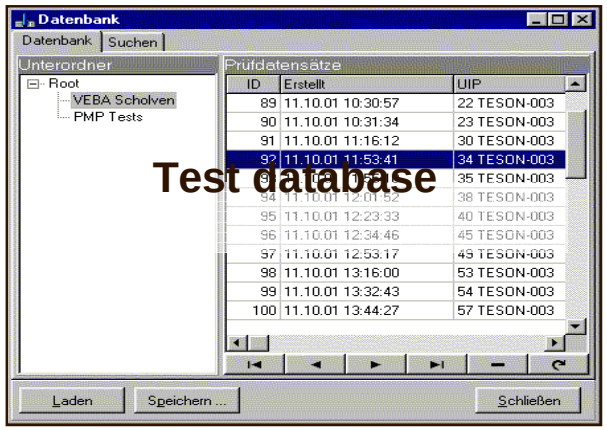
get settings

Add graph

Memory table in RAM

Load

Save

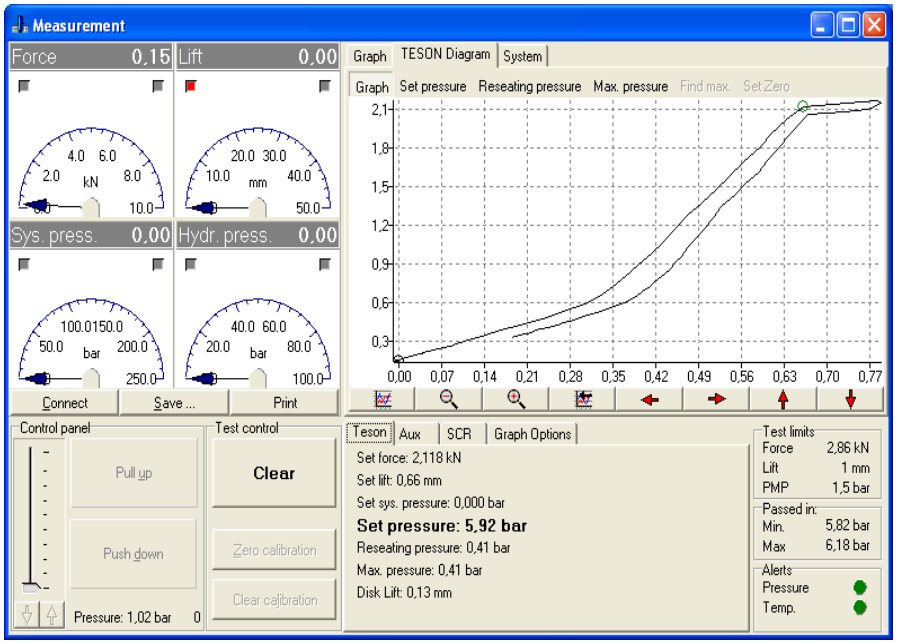


- The memory table is the central data exchange hub
- The “parameter” window visualises parts of the memory table.
- All changes are only made in memory table unless you press “save”

Measurement Window

If the diagram is cleared and the system is ready to start a new test, the virtual scales show the actual signals form the sensors

If a diagram is visible, the virtual scales show the channel value of the mouse cursor position when browsing the mouse over the diagram. To get numeric data of a specific diagram point, simply move the mouse to the position and check the related virtual scale device.



The measurement window is the “control room” for the test and analysis

Piston Control

Control panel

- **set piston force to rig up,close valve or while manual testing**
- **Move piston rod Up / Down**

Clear

- **Multi functional button to “Start”, “Break” and “Stop” the test and to “Clear” the diagram.**

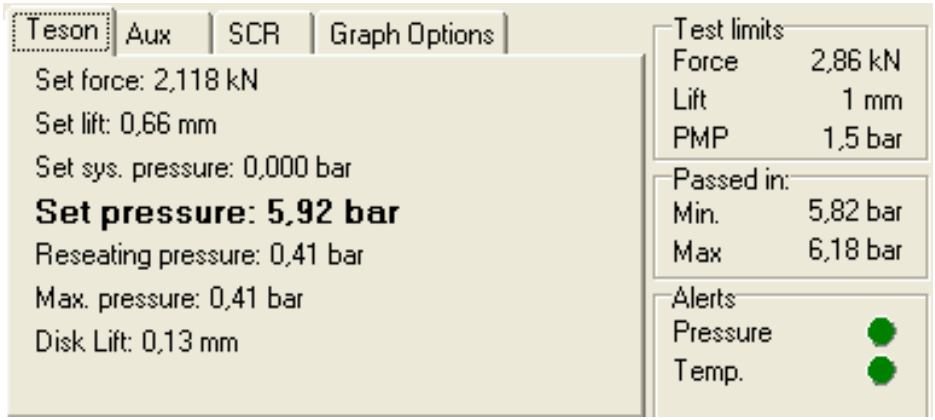
The maximum of the control panel potentiometer is always set to the maximum calculated test force. This enable a safe operation and prevents accidental overloading a safety valve.

Measurement Window - Results

Graph values taken form "set pressure" marker

Calculated and pre set test limits

Calculated results for all three markers



Accepted result range calculated from "tolerance" of the valve

Additional results

Warning if a system pressure or motor temperature reach a critical level

Data Requirements

The more known about the valve the better it can be tested and results interpreted. This includes knowing:

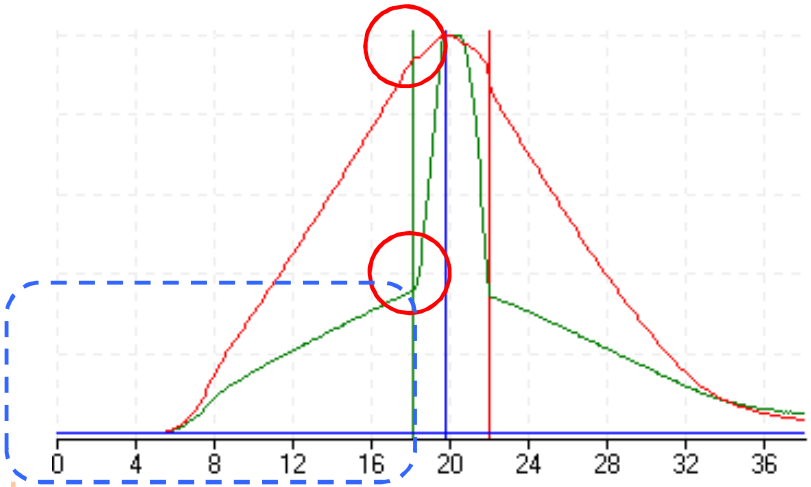
- Expected set pressure
- Active diameter or active seat area
- Serial no. or inventory no. or any other identification

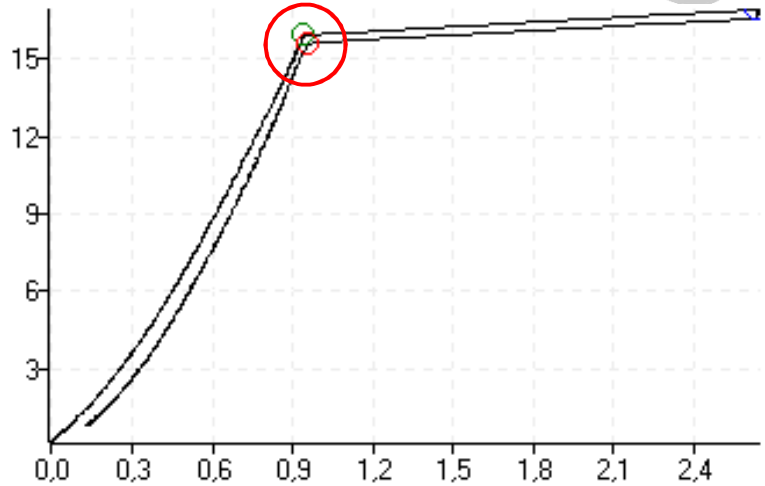
In addition it is helpful to know:

- Inner and outer diameter for the accuracy calculation
- Valve type like full-lift, proportional etc.
- Medium under the valve and time since last test or maintenance - valve might be sticking or dirt might block the seat after opening the valve.

Never guarantee for data of a valve that is NOT under your full maintenance control. It happens, that service divisions exchange the valve seat. In this case your applied parameters will never lead to a usable result.

Cold Test - Typical Diagrams

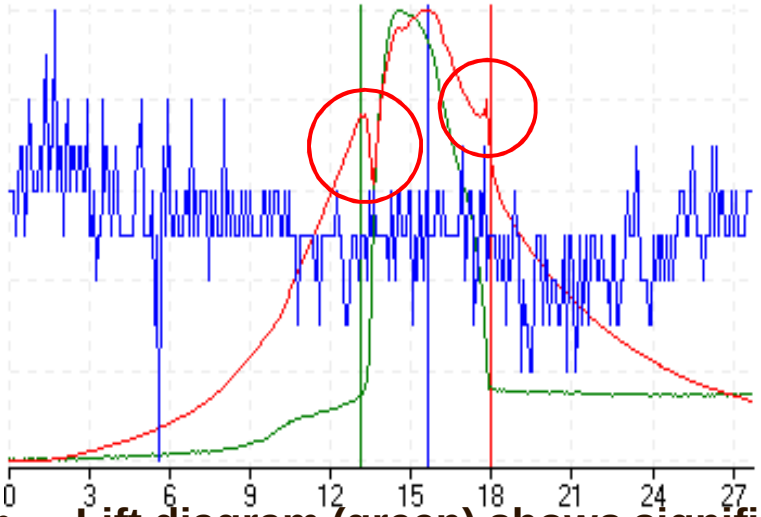


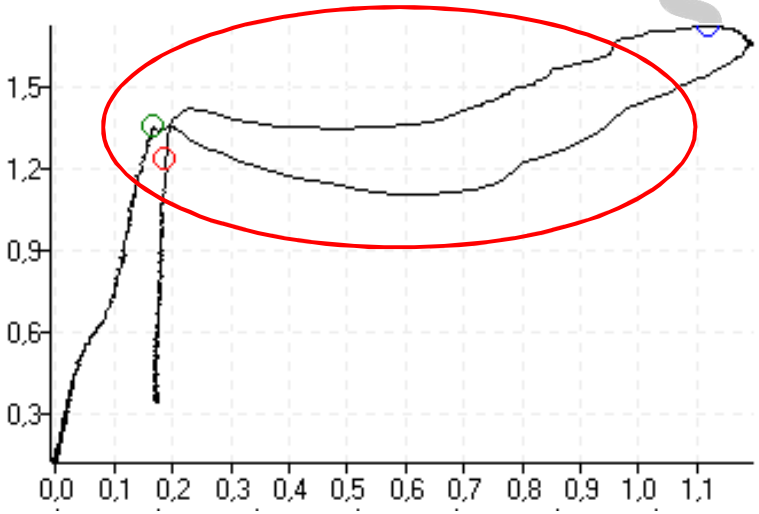


Compression of test rig and valve bonnet - NO real spindle movement !!!

- **Lift diagram (green) shows significant upward lift**
- **Force diagram (red) shows a significant bend simultaneously with the bend in lift (green)**
- **Spring performance shows a linear characteristic after the set pressure point was passed and a significant bend**

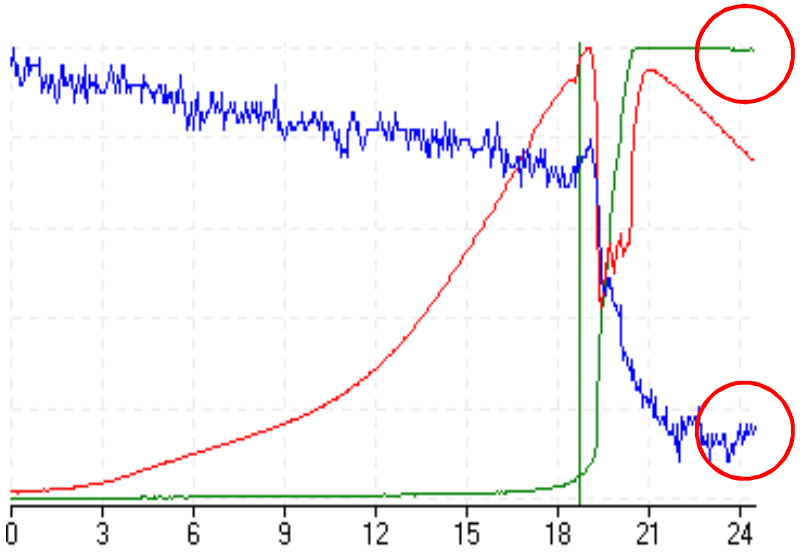
“Hot” Test - Typical Diagrams

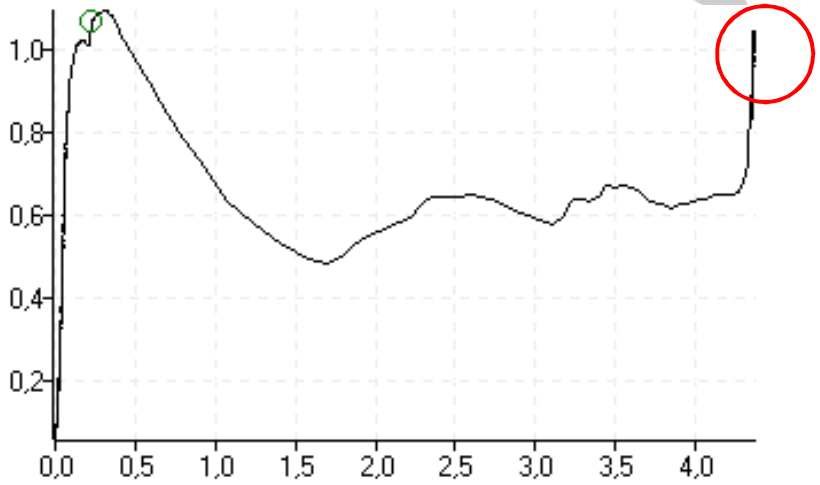




- **Lift diagram (green) shows significant upward lift**
- **The starting medium stream causes an additional lifting force on the spindle - force (red) decreases for a short time.**
- **Spring performance shows a non linear characteristic after the set pressure point was passed**
- **System pressure (blue) MIGHT decrease**

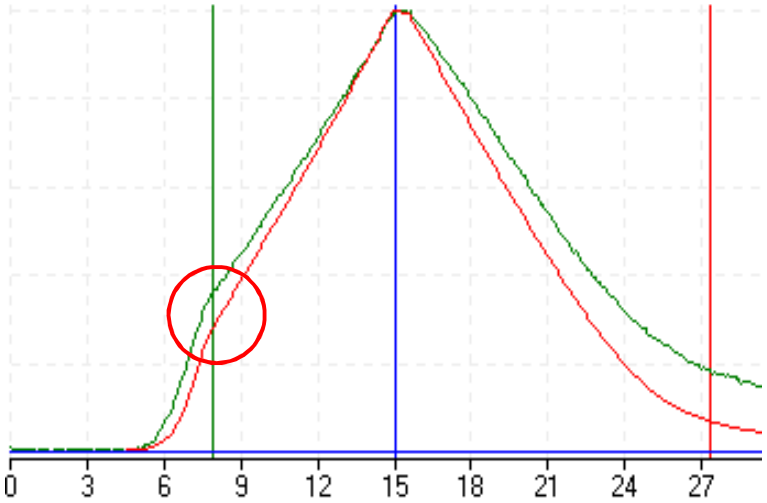
Valve Remains Open - Typical Diagrams

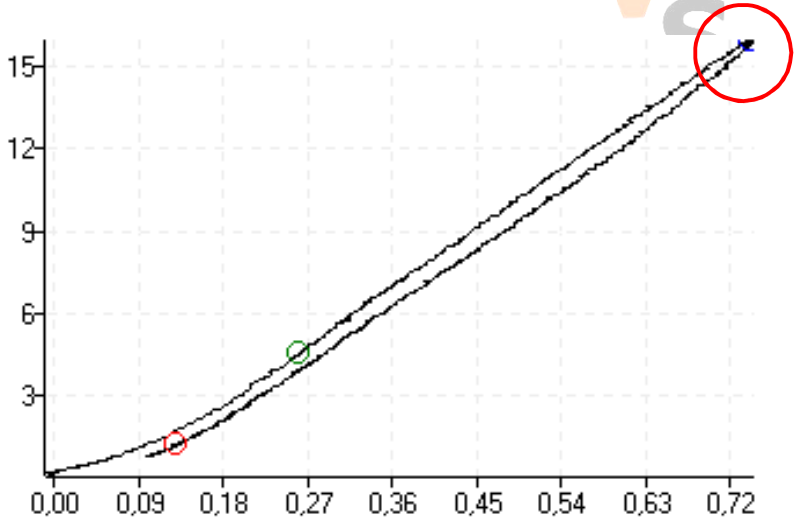




- **Pressure (blue) keeps on decreasing**
- **Lift (green) stays high**
- **Spring performance diagram refuses to return to 0/0**

Valve did not move - Typical Diagrams





- **No significant upward bend in lift diagram (green)**
- **No significant bend in force diagram (red)**
- **No bend at all in spring performance diagram**

Raise force for the next test by increasing the overload factor.

√eri-Test

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