

BPF-T-3000-SWG

UNIVERSAL TEST BENCH FOR FITTINGS, MULTILAYER TUBES, FLEXIBLE HOSES, VALVES AND HYDRAULIC COMPONENTS CONFIGURATION 2017

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1 - INTRODUCTION

The laboratory test benches BPF series have been designed to carry out laboratory and endurance tests on fittings, multilayer tubes, flexible hoses, plastic tubes and several hydraulic components measuring the hydraulic characteristics in real operative conditions.

With this bench, it is possible to simulate pressure and temperature variation in compliance with the most relevant standards of the sector.

The standard unit **BPF-T-3000-SWG** can be integrated or completed with:

WATER SUPPLY EQUIPMENTS:

- TCW B2 hot and cold water supply generator.

OPTIONAL EQUIPMENTS:

- BPF-OPZ-LOAD Optional device for testing tubes with axial force.
- BPF-OPZ-Q100 Optional device to perform flow-rate tests up to 100 L/min.
- BPF-OPZ-LVALVE Equipment for endurance test of ball valves with rotating movement.
- KUN40 Air conditioning system for test chamber.

2 - BASIC CONFIGURATION OF THE BENCH

2.1 - BPF-T-3000-SWG

- Static pressure (without water circulation): 1÷140 bar.
- Burst pressure (without water circulation): 1÷140 bar.
- Pulsing pressure (without water circulation): 1÷100 bar.
- Cycling pressure (with hot or cold water circulation): 0,2÷14 bar.
- Flow-rate: 0÷100 L/min.
- Water temperature: 10÷90 °C.

2.1.1 - Applications:

STATIC PRESSURE TEST:

- Test code:** P01.
- Test condition:** With the component under constant pressure, maximum pressure 140 bar, adjustable pressure slope.
- Modality:** Component filled with hot or cold water, pressure increase by booster, stabilization and return to initial pressure. Water temperature not controlled during the test.
- Number of piece under test:** 1.
- Standard Reference:** DVGW W543 5.5.7 - UNI 9028 10.3.2.4 - CEI EN 50084 8.6
KIWA BRL-K622/01 - EN 13618 B2-B4.

PULSING PRESSURE TEST:

- Test code:** P02.
- Test condition:** With the component filled with water, max pressure 100 bar, max frequency 1 Hz. No water circulation during the test.
- Modality:** Water hammer test cycles carried out with adjustable pressure booster within the range from 1 to 100 bar and max frequency 1 Hz. Water temperature not controlled during the test.
- Number of piece under test:** 1-3.
- Standard Reference:** NF 077 DOC.2 - DVGW W543 5.5.8 - EN 13618 B.5 and B.6
UNI 9028 10.3.2.6.

CYCLING PRESSURE TEST:

- Test code:** P03.
- Test condition:** By pump with water circulation: max pressure 14 bar, maximum frequency 0,5 Hz.
- Modality:** Water test cycles carried out by the pump with adjustable pressure from 1 to 14 bar and water circulation. It is possible to carry out the test with cold or hot water.
- Number of piece under test:** 1-3.



BURST PRESSURE TEST:

Test code:	P04.
Test condition:	With the component under constant pressure, maximum pressure 140 bar, adjustable pressure slope.
Modality:	Component filled with hot or cold water, pressure increase by booster, stabilization, increase of the pressure until the burst. Water temperature not controlled during the test.
Number of piece under test:	1.
Standard Reference:	UNI 9028 10.3.2.1 - KIWA BRL-K622/0.

THERMAL CYCLE TEST:

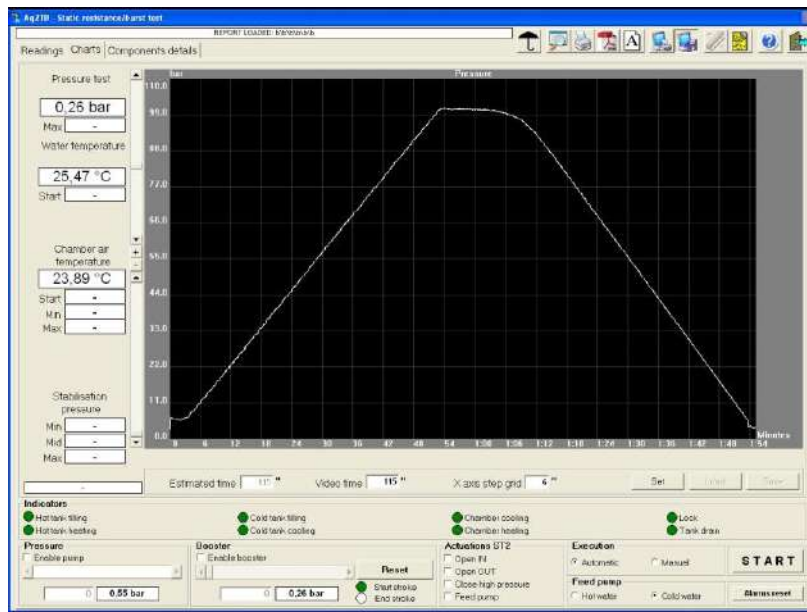
Test code:	TC01.
Test condition:	Maximum flow rate at 10 bar: 50 L/min. Cold water temperature: 10-25 °C*. Hot water temperature: 40-90 °C*.
Modality:	Thermal cycle carried out with cold and hot water supplied by external generator and hydraulic pumps controlled by inverter with adjustable range of pressure from 0,2 to 14 bar. Minimum cycle time: 5 min hot supply + 5 min cold supply. The test cycle is carried out supplying alternately cold and hot water.
Number of piece under test:	1 hydraulic plant.
Standard Reference:	DVGW W543 5.5.9 - EN 12293 - EN 13618 B7 – ISO 1587-5 ISO 21003-5 - SI 5433-5 - AS/NSZ 4020.

Note: The test bench allows to perform thermal cycle tests at conditions stricter than required by the standard. Instead, it is not possible to install in the test chamber a tubes/connections assembly with the dimension required by the standards, because of the chamber size.

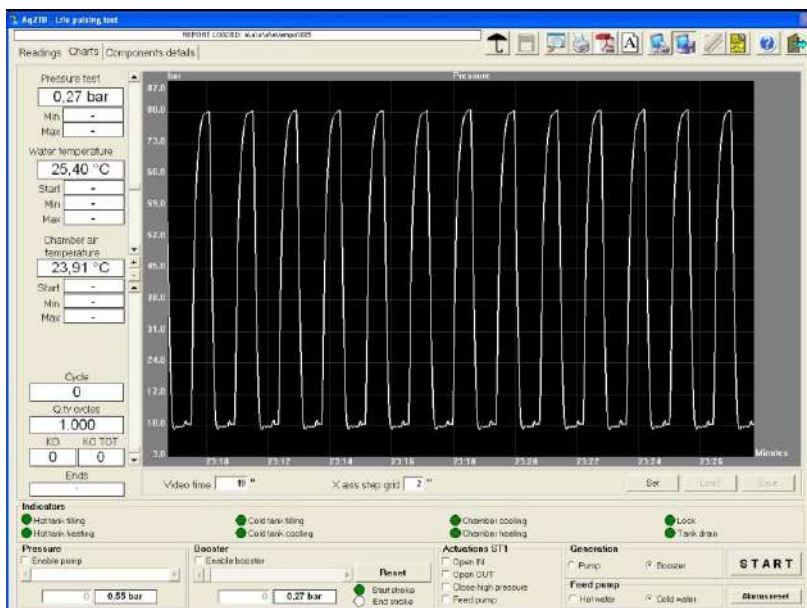
Note: *Temperature range with TCW B2 generator, different water generators are available with extended temperature ranges.

2.1.2 - Basic software installed:

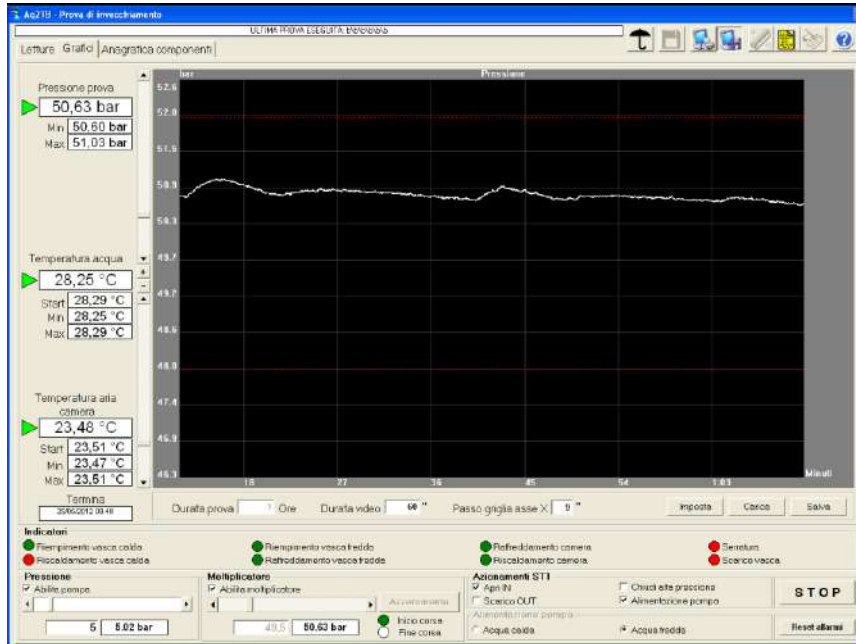
- A) **AQ2TB-BASEMOD** “SWG” service software with multichannel acquisition engine, management of users, calibration, change of language, messages, water and air temperature regulation (if available on the bench).
- B) **AQ2TB-STATICAUT** Software for performing static pressure tests and burst tests on hydraulic devices. The software allows to evaluate the tightness of the device under test when subjected to static pressure according to the conditions established by the main international Standards; it also allows to evaluate the maximum pressure that can reach the device before the burst.



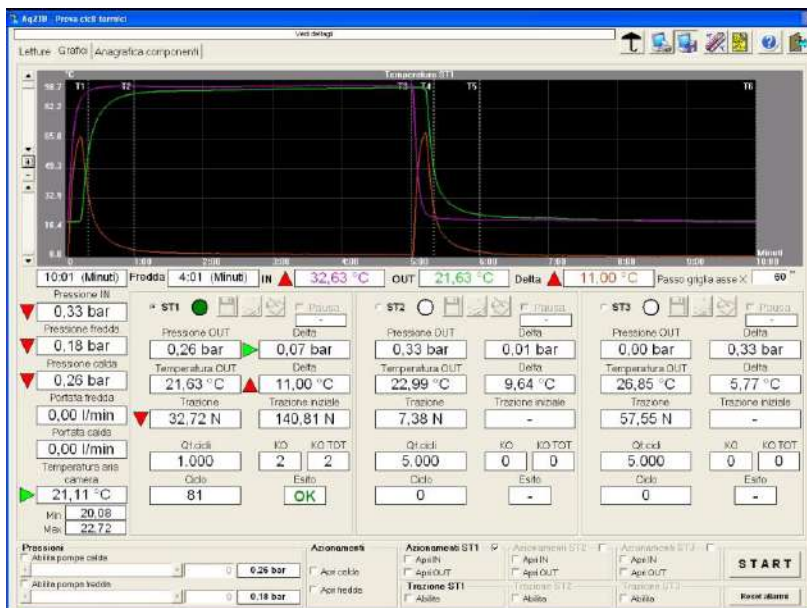
- C) **AQ2TB-PULSEAUT** Software for performing water hammer tests and cycling pressure tests. The software allows to evaluate the strength and tightness of the component under test as a result of fast variations of supply pressure. It is possible to perform cycling pressure tests with water circulation (by hydraulic pump) and tests of resistance to water hammer without water circulation (by hydraulic booster).



D) AQ2TB-STATIC-LT Long-term static test with cold or hot water and with or without water circulation.



E) AQ2TB-EN12293 Software suitable to perform thermal cycle tests on multi-layer piping assemblies and fittings. The test consists to submit the device to temperature cycles with the passage of alternating hot and cold water.



F) WINDOWS 10 OEM Multilanguage.

G) ACRONIS BACKUP automatic back up of test data and operative system.

H) TEAM VIEWER internet remote control.

Basic software included is in Italian language + second language English or German. Others language only by request with extra cost.



2.1.3 - Main components:

Pressure intensifier BOOSTER ratio 1:17 to generate static pressure up to 140 bar and water hammer up to 100 bar, with real piston displacement of approx 140 cc.

Final pressure with air pressure supply 7 bar = 140 bar approx.

The booster is equipped with two micro-switches to control the start and the end of the stroke to permit, by the control of the computer, to refill the booster automatically.

Pneumatic circuit controlled by high flow supply electro-pneumatic valves and supply circuit with rising and descending cycles controlled by timer and pre-settable stroke counter.

Pneumatic circuit for supply and pulse cycle management with servo-valve.

- **Test circuit for pulsing pressure test** with two multistage vertical pumps (4 kW), with operative range from 0,2 to 14 bar, controlled by inverter with microprocessor and feedback pressure transducer. Needle valve for adjusting the flow rate during the test.
- **Electromagnetic flow meters** with range 0,5÷100 L/min with pipe line according to the standard.
- **Testing chamber 2000 x 550 x (h) 1400 mm (approx.)** safe guard made of profiled aluminum bar with double tempered glass protection and safety lock device. The testing tank, made of stainless steel, is provided with drain tube and profiled aluminum supports with track for the eventual clamping of the tested devices. In the tank are located the pressure fittings stainless steel made with Viton OR to easier connection of the device under test.
Two fittings (inlet and outlet) to connect the tubes (1 to 3 pieces) for cycling and pulsing pressure tests (according to standard EN 12295).
Two fittings (inlet and outlet) to connect the tube for static/burst tests.
- **Movable equipment for pulsing test designed for three tubes under test** with pressure valve and adjustable holder for different sizes of tubes.

2.1.4 - PC and software:

Installed WORKSTATION consisting of:

- **Intel processor** – the configuration changes according the last components in the market: acquisition card National Instruments, network card, two hard disks, DVD burner.
- **Keyboard and mouse wireless.**
- **A4 colour laser printer.**
- **23” LCD monitor 16:9**, assembled on adjustable holder.
- **UPS power supply 500 W.**
- **Back-up external unit – USB HDD.**
- **Help on-line.**

Operative system and acquisition software SWG:

- Operative system: **Windows 10.**
- **Dedicated software: SWG 2017** to perform hydraulic tests.
The new multilanguage software SWG allows to work with different units of measure, it allows to acquire the parameters for the functioning of the bench and to provide documentation for the tests through the following screens:
 - ◇ Direct access to the various installed applications.
 - ◇ Main screen showing the virtual synoptically panel, with all the measures acquired in real time.
 - ◇ Specific software for static pressure, pulsing pressure and thermal cycle tests. For each software, the main parameters (temperature and/or pressure and/or flow-rate) are shown in a graphic format with adjustable video size, possibility to perform enlargements of the working area, final summary data.

- ◇ Final reports with all the test data and a significant video screen. It is possible to generate each report in different languages.
- ◇ It is possible to control the opening and closing of all the internal valves and the pumps by clicking with the mouse on the graphic symbol representing each components in the synoptic panel.
- ◇ All the existing screens may be printed with customer's notes and logo.
- ◇ Help On-line support, with all the main operational instructions.

2.1.5 - Structural characteristic of the bench:

- Supporting structural frame made of aluminium and laminated panels.
- Anticorodal made rails for fixing the samples under test.
- Assembly on rotating wheels provided with parking brakes.
- Working tank in stainless steel (1,5 mm) with drain.
- Internal hydraulic plant for the supply of hot and cold water, made with thermally insulated stainless steel piping, adequate to supply at the maximum nominal flow-rate.
- Valves installed on hydraulic plant with pneumatic actuators.
- Internal separation between hydraulic plant and the area with PC and electrical cabling.
- Double-stage filter unit.

2.1.6 - Transducers installed:

- TEMPERATURE:** accuracy $\pm 0,3$ °C, resolution 0,01 °C.
 Pt100 low-inertia, 3-wires probes.
- PRESSURE:** operative range 0-20 bar.
 accuracy $\pm 0,05\%$ of the full-scale value.
 resolution 0,01 bar, pressure probes with high dynamic response.
 operative range 0-250 bar.
 accuracy $\pm 0,10\%$ of the full-scale value.
 resolution 0,1 bar, pressure probes with high dynamic response.
- FLOW:** magnetic flow meter range 0-100 L/min, resolution 0,01 L/min.
 accuracy $\pm 1\%$ of reading from 0,15 to 4 L/min.
 accuracy $\pm 0,5\%$ of reading from 4 to 25 L/min.
 accuracy $\pm 0,25\%$ of reading over 25 L/min.
 flow meter with output connected to microprocessor converter.

The measuring equipment assembled on the bench is equipped with an inspection report relative to the operational fields and performed according to the ISO 9001 standards, with reference to the ACCREDIA (Italian Calibration Service) primary samples.

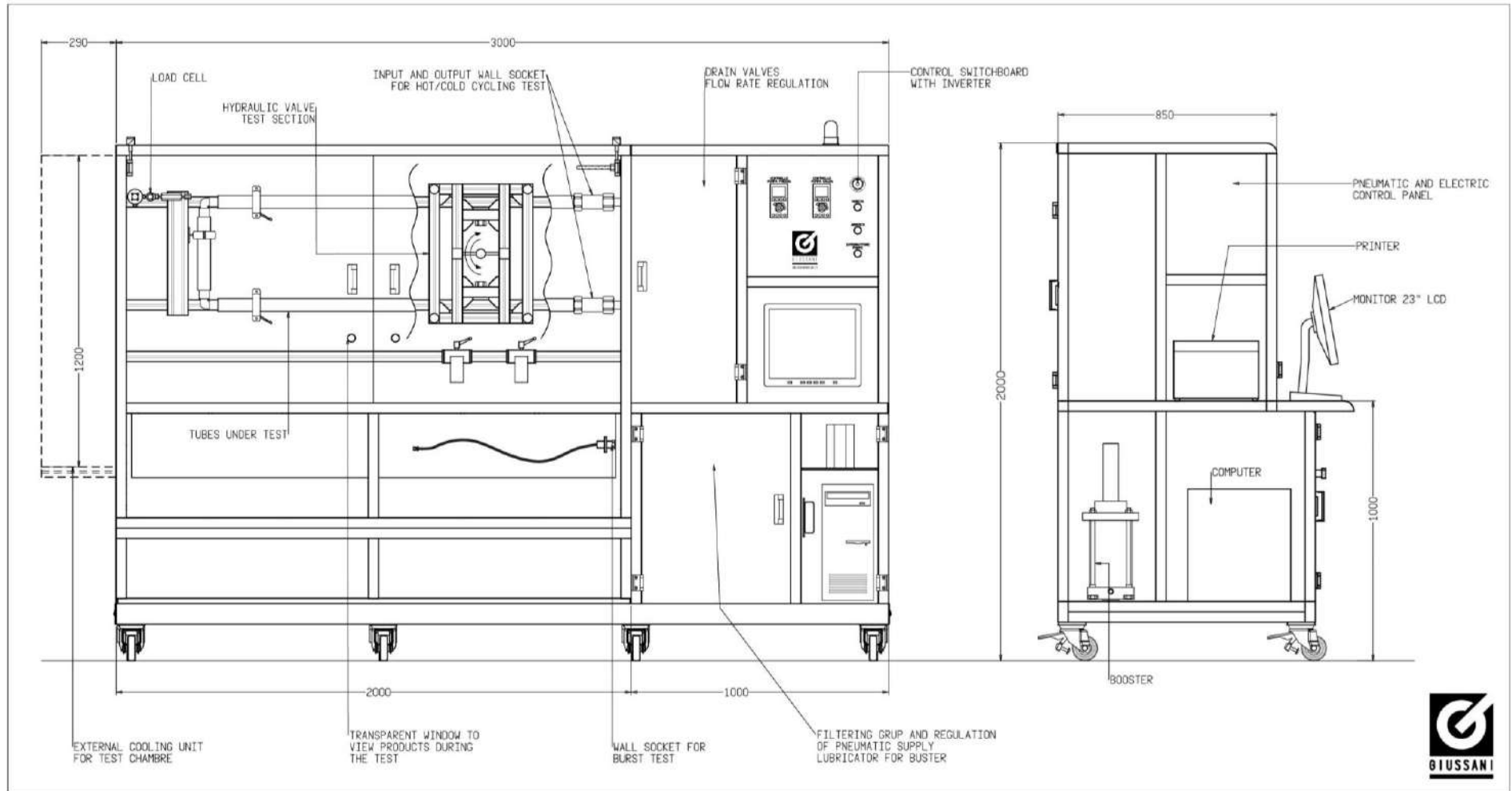
The test bench is provided with a final test report of electrical safety according to standard CEI EN 60204-1 and CE declaration of conformity.

2.1.7 - Technical data:

WEIGHT AND DIMENSION	
- LENGTH	3000 mm 3300 mm (with air conditioning system)
- DEPTH	1150 mm
- HEIGHT	2000 mm (+100 mm)
- WEIGHT (APPROX.)	1000 kg
SUPPLY CHARACTERISTICS	
- ELECTRICAL SUPPLY	400 V 3 phases + N + GND 50 Hz
- POWER	9 kW
- HYDRAULIC SUPPLY (From external tanks or TCW B2)	100 L/min
- PNEUMATIC SUPPLY	6÷9 bar (600 NL/min)
- WATER DRAIN FLOW	80 L/min
- WATER TEMPERATURE (From external tanks or TCW B2)	10÷90 °C

2.2 - EXAMPLE





3 - OPTIONAL SOFTWARE

3.1 - Service functionalities

- AQ2TB-OPZ-MLG** Possibility to generate and print in five different languages (Italian, English, German, French and Spanish) all the test reports. The language of the report is independent from the language of the software. Each report can be generated more than one time in different languages.
- AQ2TB-OPZ-TXT** Possibility to export in a TXT format file the summary final data of a test. This option is applicable only at the software that generates a final summary table (AQ2TB-FLOW-LIN, AQ2TB-FLOW-STEP, AQ2TB-KV-LAB, etc.).
- AQ2TB-DATA-EXP** Possibility to export in a TXT format file all the samples acquired during a test. It is possible to activate this function for all the software; this function is independent by the graphs shown in each software. For laboratory tests, it is possible to export the data of the entire test. For endurance tests, it is possible to export data of a single cycle, the number of saved cycle can be chosen by the operator. The maximum acquisition frequency is about 10 Hz (sample per second) for each channel.

4 - ACCESSORIES

4.1 - SPARE PARTS KIT

The spare parts kit includes transducers, valves, fuses, lamps according to the configuration of the test bench.

Code: SPARE-PARTS

5 - WATER SUPPLY

IMPORTANT: to supply the bench with cold and hot water there are two possibilities:

- 1) By the customer plant (that provide hot and cold water): in this way it is necessary to install two tanks between the external plant and the bench.**
- 2) The test bench is supplied by the hot and cold water generator TCW B2 with closed circuit (reference chapter 5.1).**

5.1 - TCW B2

Hot and cold water supply generator

The TCW water generator allows to supply continuously, in closed circuit, the sanitary taps test bench. It is equipped with two 300+300 L tanks for hot and cold accumulation.

Heating power: 24 kW, three heating resistances 8+8+8 kW, hot water range: 40÷90 °C.

Cooling power: 23 kW, scroll type compressor, cold-water range: 10÷25 °C.

PLC for faults controller.

Flow rate in continuous mode: 10+10 L/min of water at 65±1 °C and 15±1 °C.

Size: 1200 x 2300 x (h) 2050 mm.

Weight: 680 kg (approx.).

Electrical supply: 400 V - 50 Hz.

Power: 36 kW.

Filling from customer supply plant.

CODE: TCWB2NMSBXGS000

Note: special models are available for applications that require higher cooling or heating power.

Note: special models are available for different power supply (extra Europe market).

KIT-FILTROBWT water treatment to reduce the hardness and contamination of water supply, including mechanical filter and flow counter.

6 - Optional equipment and applications

6.1 - BPF-OPZ-LOAD

Device for testing tubes with axial force.

The tubes and connections system, installed on the thermal cycle test station, is submitted at a linear force by a pneumatic cylinder. The force is measured by a 3000 N load cell. During the test it is possible to supply the device with cold or hot water. The tube is fixed on a sliding carriage.



6.1.1 - Additional transducers installed:

FORCE: operative range 0-3000 Nm.
 accuracy ± 10 N, resolution 0,1 N.

6.2 - BPF-OPZ-Q100

Optional device to perform flow-rate tests up to 100 L/min.

6.2.1 - Applications:

LINEAR FLOW-RATE TEST:

Test code: F01

Test condition: Flow-rate test with hoses in horizontal position, performed in open circuit with cold water: operating range 1-100 L/min.

Modality: The device under test is connected directly to the outlet. The pressure is increased automatically with linear slope.

Number of piece under test: 1

Standard Reference: EN 13618 B1

KV COEFFICIENT CALCULATION TEST:

Test code: F02

Test condition: Flow-rate test with differential pressure and Kv coefficient calculation: operating range 1-100 L/min.

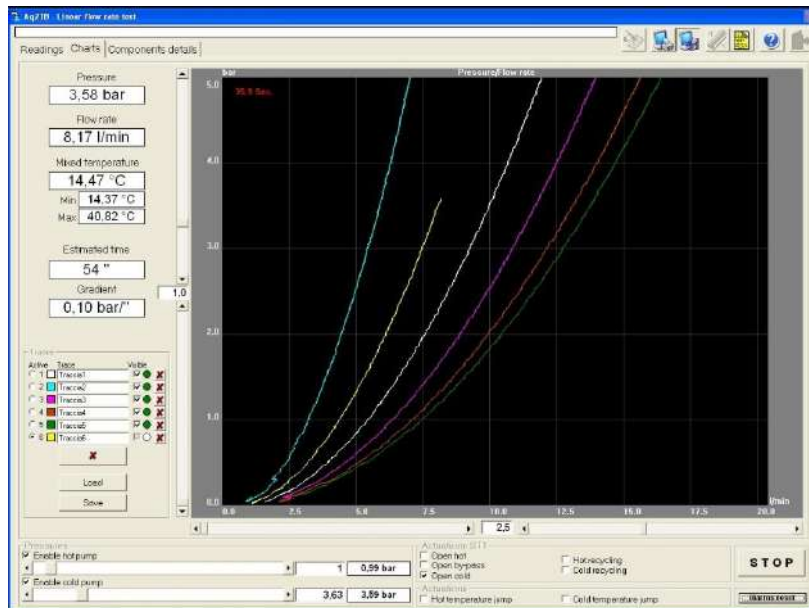
Modality: The device under test is connected to the measure line including pressure transducers. The software measures the pressure loss of the hydraulic plant and calculate the pressure loss of the components. The operator changes manually the flow-rate and the system keep constant the supply pressure.

Number of piece under test: 1

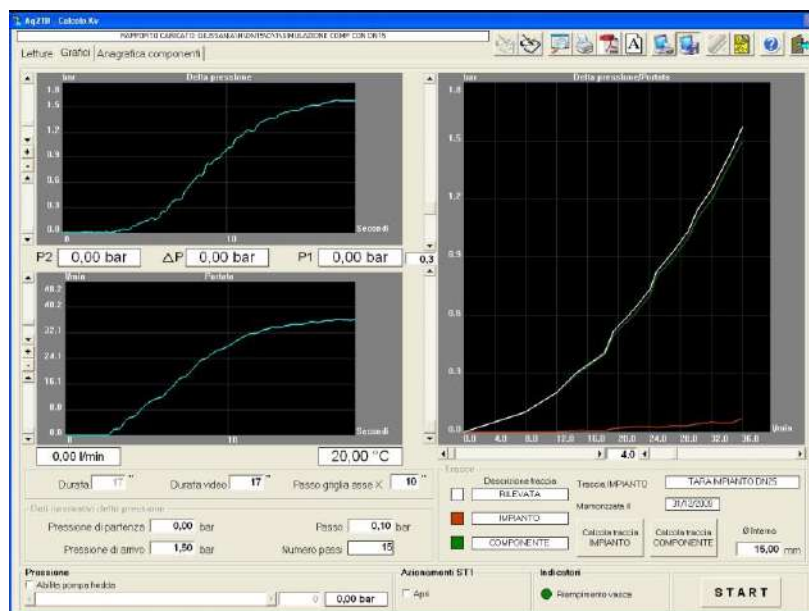
Standard Reference: DIN 3546

6.2.2 - Dedicated software installed:

A) **AQ2TB-FLOWLIN** Software for performing flow-rate tests with linear increase of pressure and multi-trace flow-rate/pressure chart.



B) **AQ2TB-KV-LAB** Software for the evaluation of the pressure loss, caused by a device installed in a hydraulic plant, measuring the differential pressure ΔP as a function of flow-rate.



6.2.3 - Additional components:

- **Pipeline** stainless steel made, with pneumatic valves to connect the component under test, pressure box according to the standards.
- **Support** to maintain the hoses in straight position.
- **DN 15** hydraulic plant realized according to the standard (for Kv coefficient calculation tests).
- **Pressure transducers:** range 0÷20 bar, accuracy 0,05%.

6.3 - BPF-OPZ-LVALVE

Equipment for endurance test of ball valves with rotating movement.



6.3.1 - Applications:

BALL VALVES ENDURANCE TEST:

Test code: TC03

Test condition: Cold and/or hot water supply, maximum supply pressure: 15 bar, flow-rate adjusted downstream.

Modality: The device under test is subjected to a specific number of opening and closing manoeuvre; angular speed and closure torque are defined by the standards. The device can be supplied by hot and cold water alternately or with the same water for the entire test.

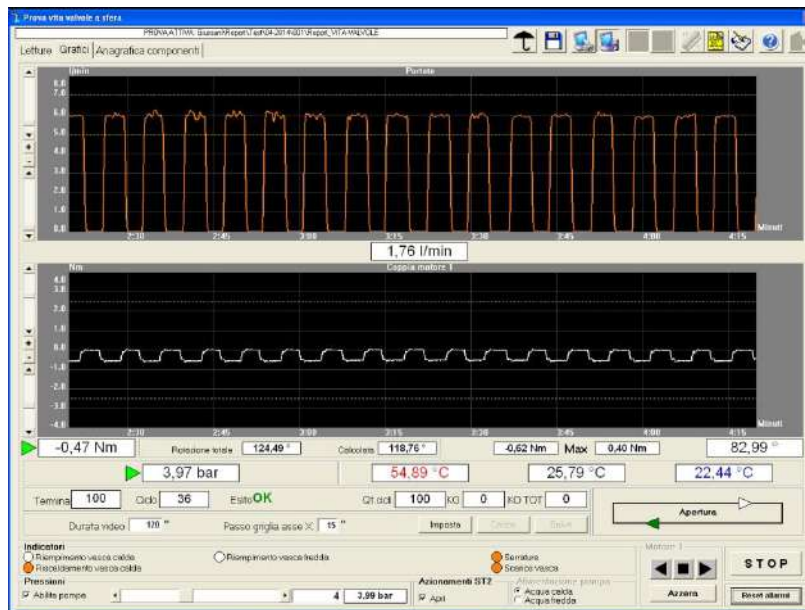
Number of piece under test: 1

Standard Reference: EN 331 Chap. 7.6 - UNI 8470 Chap. 4.10.3
EN 13828 Chap. 7.6

6.3.2 - Dedicated software installed:

A) AQ2TB-LVALVE

Software for performing endurance tests on hydraulic valves.



6.3.3 - Additional components:

- **Rotating motor** directly controlled by PLC and PC, maximum torque 80 Nm, Ethernet communication. The devices allow an interactive control of rotation, angular speed and torque. Feedback control of maximum torque.
- **Torque meter** (100 Nm).
- **Adjustable and removable valves support**, structural frame made of aluminum, adapt for the connection of several different kind of valves from 1/2" to 3".
- Adjustable parameters:
 - o Angular speed: $1 \div 180$ °/s.
 - o Torque: $2 \div 80$ Nm.
 - o Angular position: $0 \div 1.080$ °.

6.3.4 - Additional transducers installed:

TORQUE: operative range 0-100 Nm.
accuracy $\pm 0,1$ Nm, resolution 0,01 Nm.

The measuring equipment assembled on the bench is equipped with an inspection report relative to the operational fields and performed according to the ISO 9001 standards, with reference to the ACCREDIA (Italian Calibration Service) primary samples.

6.4 - KUN40.07.AA

Air conditioning system for test chamber, to avoid the increase of temperature inside the test chamber: thermal power: 2 kW.

7 - PACKING

7.1 - BPF-T-3000-SWG packing

Wooden box with anti-vibrating damper.

Exp. model with sealed plastic bag and ISPM treatment.

Code: 8CASSABPR330EXP

7.2 - TCW B2 packing

Wooden box with anti-vibrating damper.

Exp. model with sealed plastic bag and ISPM treatment.

Code: 8CASSATCWB2-EXP

7.3 - Accessories packing

Wooden box with anti-vibrating damper.

Exp. model with sealed plastic bag and ISPM treatment.

Code: 8CASSA-WORKT