BPR-SWG

# TEST BENCHES FOR SANITARY TAPS
# LABORATORY LINE 2023

# INDEX



GIUSSAN

# 1 - INTRODUCTION

The laboratory test benches have been designed to carry out tests to measure the hydraulic and regulating characteristics under dynamic conditions such as stability, response time, sensibility, leakage, on the following products:

- hydro-sanitary taps,
- single-control mixers,
- thermostatic mixers,
- automatic taps,
- self-closing valves,
- showers,
- flexible hoses and accessories.

The benches have been conceived to operate in compliance with the most important international standards: NF, KIWA, EN, UNI, ASME, ASSE, JAPMO, etc.
The test benches **BPR-SWG** are equipped with workstation with 23" LCD 16:9 monitor, acquisition card, in order to allow the real-time analysis and recording all the test parameters; each test can be displayed or stored together with the most significant diagrams; a colour laser printer is also included.
The standard software package includes an acquisition motor device to read up to 16 channels with high acquisition frequency adjustable from 300 to 5000 Hz.
The software for laboratory management can be integrated with the optional software according to the installed accessories and the external units added to the main bench.

The base unit **BPR-SWG5010** can be integrated or completed with:

**WATER SUPPLY EQUIPMENTS:**

| | | |
|---|---|---|
| - | TCW B2 | hot and cold water supply generator. |
| - | BPR-OPZ-HCR | water recovery device. |

**OPTIONAL EQUIPMENTS, APPLICATIONS AND SOFTWARE for performance tests:**

| | | |
|---|---|---|
| - | BPR-OPZ-D08 | hydraulic rig according to D08 standard with 2+2 supply temperature jumps. |
| - | BPR-OPZ-DELTAP | outlet plant according to EN 1111 standard. |
| - | BPR-OPZ-DIGM | digital manometer for very low-pressure measurement. |
| - | BPR-OPZ-ROTMOT | rotary motor and accessories for laboratory and endurance tests. |
| - | BPR-OPZ-LINMOT | linear motor and accessories for laboratory and endurance tests. |
| - | BPR-OPZ-C-TM | sensitivity and fidelity tests. |
| - | AQ2TB-ASTD | automatic software for test according to EN 1111:2017 chap. 13.5.1. |
| - | BPR-OPZ-SL-FM | hard point (F1-F2) strength measure according to NF 077 standard. |
| - | BPR-OPZ-FM | device for mechanical strength test according to EN 817 standard. |
| - | BPR-OPZ-TP | clamping device for production tests on cartridges. |
| - | BPR-OPZ-HP | static and pulsing (water hammer) test station for faucets. |
| - | BPR-OPZ-HPFLEX | static and pulsing (water hammer) test station for flexible hoses. |
| - | BPR-OPZ-ES01 | electrical supply panel. |
| - | BPR-OPZ-HAMTEST | hydraulic plant to measure the peak of pressure. |
| - | AQ2TB-DT/DQ | automatic software for flow variation tests according to NF and EN standards. |
| - | BPR-OPZ-QFLEX | device for flow-rate tests on flexible hoses. |

## ADDITIONAL EQUIPMENTS AND ACCESSORIES:

- BT400-RUB comparison pump with protection cover for static pressure test.
- BPR-OPZ-SHOWER cabinet for testing showers and showers column.

## OPTIONAL EQUIPMENTS AND SOFTWARE for endurance tests:

- BPR-OPZ-LM equipment and software for endurance of single lever mixers.
- BPR-OPZ-LBM equipment and software for endurance of swivel spouts.
- BPR-OPZ-LR equipment and software for endurance of on-off flow controls.
- BPR-OPZ-LPC equipment and software for endurance of progressive cartridges.
- BPR-OPZ-LCD equipment and software for endurance of diverter cartridges.
- BPR-OPZ-LD equipment and software for endurance of diverters & showers diverters.
- BPR-OPZ-LCT equipment and software for endurance of thermostatic mixers (thermal element).
- BPR-OPZ-LMWS equipment and software for endurance of multiway selectors.
- BPR-OPZ-LH&C equipment and software for thermal shock tests.

## BENCHES FOR SPECIFIC TESTS:

- ACOUSTIC TEST BENCH (see specific documentation).
- ENDURANCE TEST BENCHES (see specific documentation).

# 2 - BASIC CONFIGURATION OF THE BENCHES

## 2.1 - BPR-SWG5010

- Flow rate at 10 bar: 47+47 L/min (free outlet).
- Pressure range: 0,1 to 10 bar.
- Max. static pressure: 11 bar.
- Adjustable pressure rate: 0,1 to 10 bar continuously.

**Note:** several special versions are available:
**BPR-SWG506:** Flow-rate: 47+47 L/min – Maximum dynamic pressure: 6 bar.
**BPR-SWG1006:** Flow-rate: 105+105 L/min – Maximum dynamic pressure: 6 bar.
**BPR-SWG10010:** Flow-rate: 105+105 L/min – Maximum dynamic pressure: 10 bar.

**BPR-SWGxxxxx-L:** Version without thermostatic mixers for temperature jumps.

### *2.1.1 - Applications:*

1) MEASUREMENT OF THE HYDRAULIC CHARACTERISTICS:
- Measurement and acquisition in continuous mode and graphic recording of the instant flow, pressure and temperature of cold and hot water.
- Measurement and acquisition in continuous mode and graphic recording of the instant flow and temperature of mixed water.

2) MEASUREMENT OF THE SAFETY CHARACTERISTICS:
- Checking of the response time of thermostatic mixers after the drop of the supply pressure of cold or hot water, according NF, EN, D08 and CSA standard.

3) MEASUREMENT OF THE REGULATING CHARACTERISTICS:
- Checking of the mixed water temperature after temperature, pressure or flow rate jumps of the supply water.
- Checking of the repeatability and stability of mixed water temperature.

4) CHECKING OF LEAKTIGHTNESS AND MECHANICAL RESISTANCE:
- Checking of the leaktightness and of the mechanical behavior with static and dynamic pressure tests.

### *2.1.2 - Basic software installed:*

**A) AQ2TB-BASEMOD** "SWG" service software with multichannel acquisition engine, management of users, calibration, change of units of measure, change of language, messages, water and air temperature regulation (if available on the bench).

**B) AQ2TB-COMBILAB+** hydraulic test measurement with flow/pressure/temperature acquisition in real time. At the end of the acquisition, it is possible to enlarge a part of the graph and analyse the area with measuring functions: the software allows the tracing of some vertical and horizontal reference lines and perform many measurements between the intersections.
With this software, it is possible to carry out the most important test of sanitary faucet:

- Permitted temperature change in mixed water after supply pressure variations.
- Permitted temperature change in mixed water after supply temperature variations.
- Permitted temperature change in mixed water after flow rate variations.
- Response time of mixer temperature after temperature control variations.

**C) WINDOWS 10** OEM Multilanguage.

**D) MACRIUM BACKUP** software for automatic back up of test data and operative system.

**E) SOMACHINE** software for management of PLC.

**F) TEAM VIEWER** internet remote control.

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

### *2.1.3 - Ethernet connection:*

The test bench is provided with Ethernet plug in order to allow the connection to Internet and enable the remote assistance functionalities through TEAMVIEWER software (installed by default on the PC).
The Ethernet plug also allows the integration of the bench inside the customer's network (intranet). In this way is possible to export data and reports and remotely check the functioning of the bench.
It allows, in conjunction with AQ2TB-MANSYS software, the incoming (from corporate server to test bench) and outgoing data exchange (from bench to server).

### *2.1.4 - Main components:*

- **Two multi-stage vertical pumps** with speed control, inverter and feedback pressure transducers. Pressure adjustable from 0,1 up to 10 bar, with 47 L/min maximum flow-rate, the pressure is kept constant independently of the supply flow-rate.
  Possibility to perform pressure changes that are controlled directly from the workstation.
  It is possible to control the pressure continuously by a slider or by 10 prefixed steps.
  **It is possible to deactivate the pressure feedback controls to perform tests according to ASSE/ASME/CSA standards.**
- **Electromagnetic flow meters** with range 0,2÷47 L/min with pipe line according the EN Standards.
- **Testing station to connect the faucet under test, two outlets ¾"** with 150 mm axial pitch, size and dimensions according EN 1111 standard, cold-hot water supply, two temperature probes and three pressure transducers (hot, cold and differential pressure), internal ball valves with pneumatic actuator, thermocouple probe for measuring mixed water temperature.
- **Thermostatic mixers** before the hot and cold pumps for changing supply temperature, including ball valves with pneumatic actuator controlled by the operator.
  **Note:** this function can be excluded **– code: L.**

### *2.1.5 - PC and software:*

***Installed WORKSTATION consisting of:***

- **Intel processor** – the configuration changes according the last components in the market: acquisition card National Instruments, network cards, two hard disks, DVD burner.
- **Keyboard and mouse wireless.**
- **A4 colour laser printer and support trolley – Code: KIT-LASERPRINTER.**
- **23" LCD monitor** 16:9, assembled on adjustable holder.
  - Available on request **Touchscreen monitor - Code: 4MONITOR23-TS.**
- **UPS power supply 500 W.**
- **Back-up external unit – USB HDD.**
- **Instruction manuals and Help on-line.**

***Operative system and acquisition software SWG:***

- Operative system: **Windows 10 Enterprise LTSC**.
- **Dedicated software: SWG 2023** 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:
  - ◊ Start-up screen with several options available: the account (admin/users) and passwords management, calibration, transducers check, selection of software language, units of measure, messages and software for the execution of the tests.
  - ◊ Main screen showing the virtual synoptically panel, with all the measures acquired in real time.
  - ◊ Specific screen showing the temperature, pressure and flow-rate in a graphic format with adjustable video size, possibility to perform enlargements of the working area, final summary data with the minimum, maximum and average values at the end of the acquisition.
  - ◊ Final report 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.

### *2.1.6 - Structural characteristic of the bench:*

- Supporting structural frame made of aluminium and laminated panels.
- Working tank in stainless steel (1,5 mm) with drain.
- Slide guide for holder, anticorodal made for fixing the samples under test.
- Assembly on rotating wheels provided with parking brakes.
- 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.

### *2.1.7 - Transducers installed:*

TEMPERATURE: accuracy ±0,3 °C, resolution 0,01 °C.
Pt100 low-inertia, 3-wires probes.
thermocouple K fast response.

PRESSURE: operative range 0-20 bar.
accuracy ±0,05% of the full-scale value.
resolution 0,01 bar, pressure probes with high dynamic response.

FLOW-RATE: accuracy ±0,25% of reading value (from 5 to 47 L/min).
resolution 0,01 L/min with precision electromagnetic
flow meter with output connected to microprocessor converter.

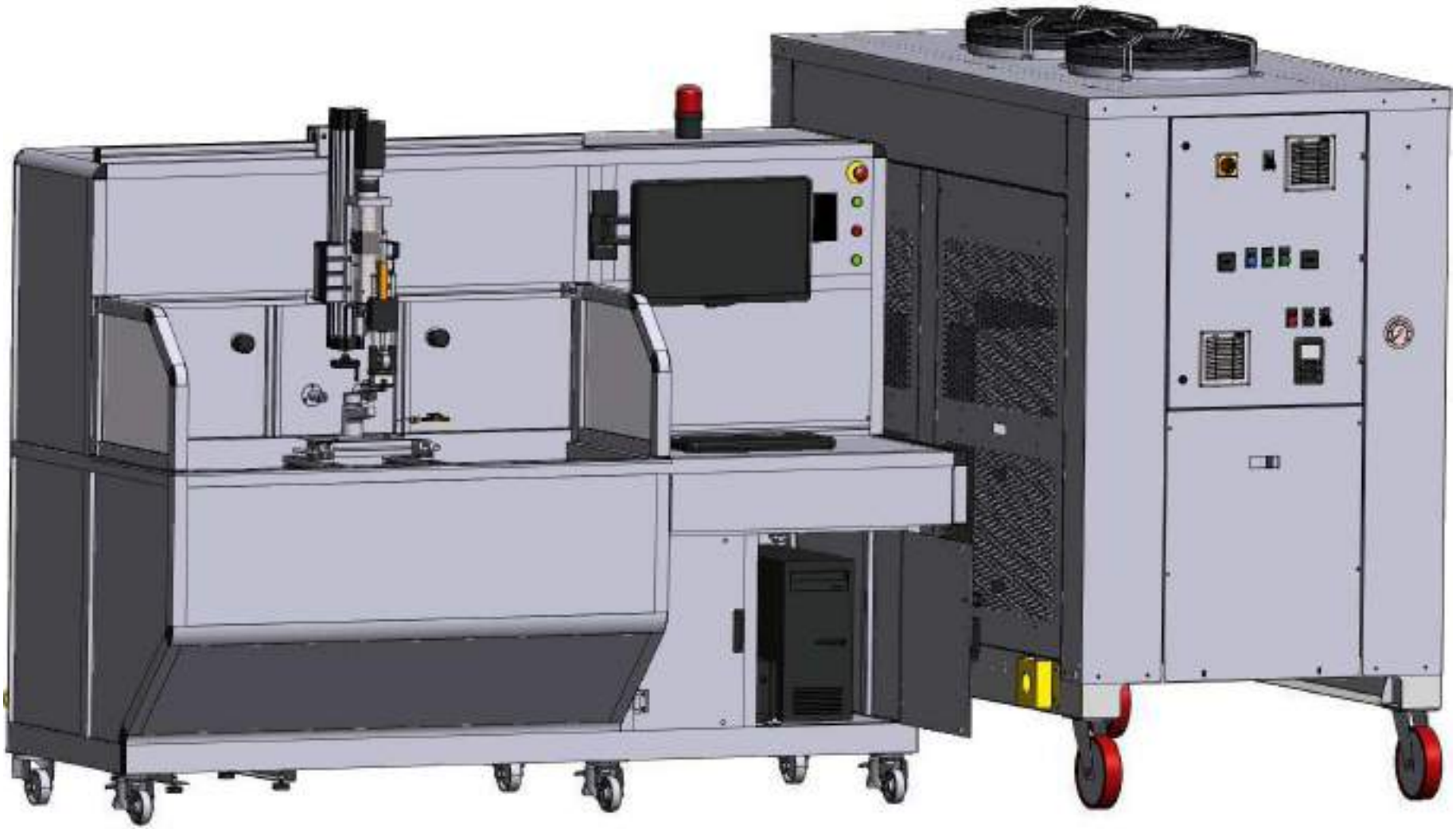
**The measuring equipment assembled on the bench is equipped with an inspection report relative to the operational fields and performed according to the ISO 9001 standards, with reference to the ACCREDIA (Italian Calibration Service) primary samples.**

**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.**

### *2.1.8 - Technical data:*

| **WEIGHT AND DIMENSION** | |
|---|---|
| - LENGTH | 2400 mm |
| - DEPTH | 1100 mm (+100 mm) |
| - HEIGHT | 1800 mm |
| - WEIGHT (APPROX.) | 600 kg |
| **SUPPLY CHARACTERISTICS** | |
| - ELECTRICAL SUPPLY | 400 V 3 phases + N + GND<br>50 Hz |
| - POWER | 6,0 kW |
| - HYDRAULIC SUPPLY<br>(From external tanks or TCW B2) | 50 L/min |
| - PNEUMATIC SUPPLY | 6÷9 bar |
| - WATER DRAIN FLOW | 80 L/min |
| - WATER TEMPERATURE<br>(From external tanks or TCW B2) | 10÷90 °C |

## 2.2 - EXAMPLE



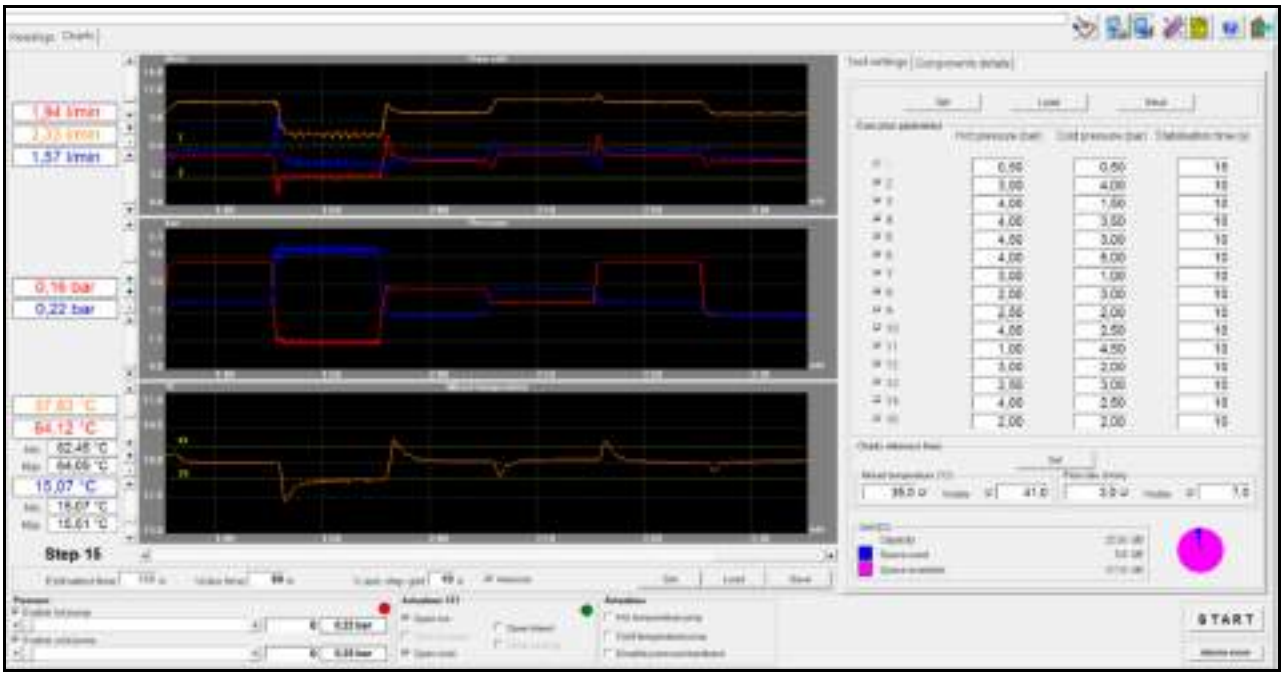
Test bench BPR-SWG + cold and hot water generator TCW

# *3 - OPTIONAL SOFTWARE*

## 3.1 - Software for laboratory tests

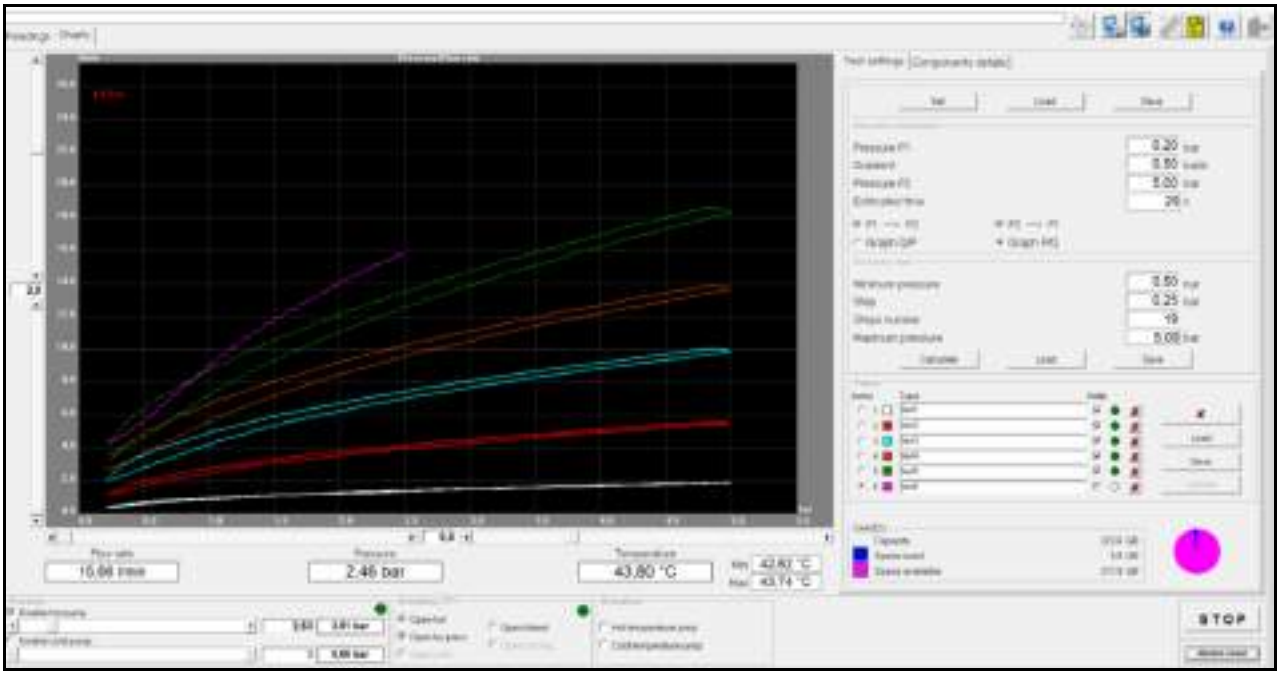
**1) AQ2TB-FLOW-STEP test code: F05**

Flow-rate test with automatic pressure jumps sequence for cold and/or hot water supply, specific for thermostatic mixers. Final report with hot, cold and mixed water flow-rate, pressure and mixed water temperature.




**2) AQ2TB-FLOW-LIN test code: F06**

Flow-rate test with linear increase and/or decrease of pressure and multi-trace flow-rate/pressure or pressure/flow-rate charts.



**3) AQ2TB-M-LAB-NF test code: ST01**

Software for performing water supply failure tests on thermostatic mixers, adapt for detecting hot water loss in case of cold/hot-water failure, in accordance with NF Standard (NF 077 TD077-04 rev.03).

**4) AQ2TB-M-LAB-EN test code: ST01**

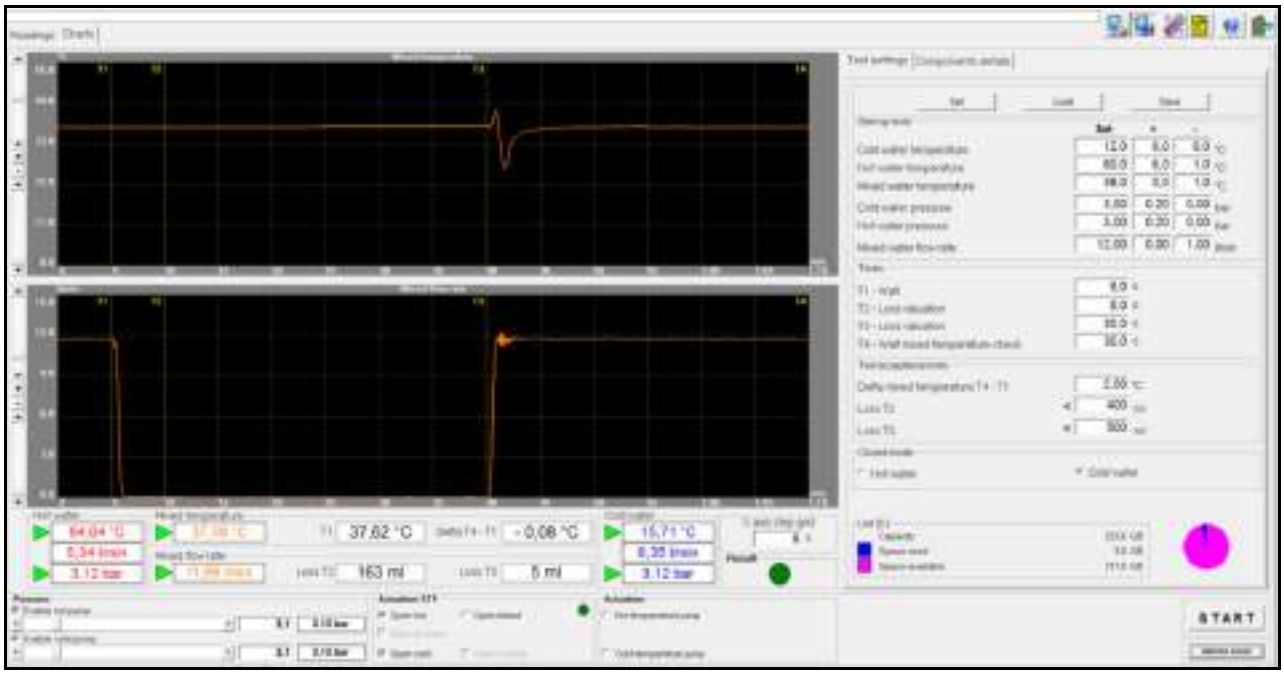
Software for performing water supply failure tests on thermostatic mixers, adapt for detecting hot water loss in case of cold/hot-water failure, in accordance with EN 1111-2017 Standard.

**5) AQ2TB-M-LAB-D08 test code: ST01**

Software for performing water supply failure tests on thermostatic mixers, adapt for detecting hot water loss in case of cold/hot-water failure, in accordance with D08 (2017) Standard.

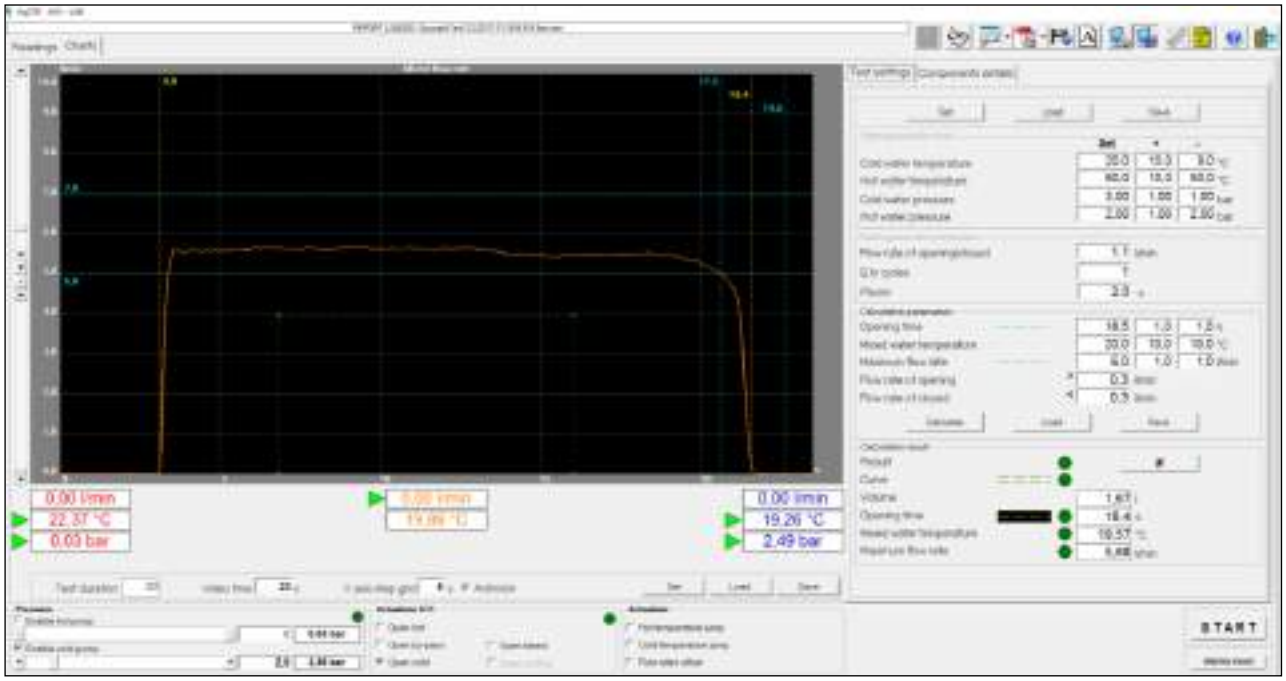
**6) AQ2TB-M-LAB-CSA test code: ST01**

Software for performing water supply failure tests on thermostatic mixers, adapt for detecting hot water loss in case of cold/hot-water failure, in accordance with ASSE/ASME/CSA 1016-2017 Standard.



**7) AQ2TB-ASV** **test code: F07**

Software for the automatic execution of flow-rate tests on automatic shut-off valves according to EN 816 Standard.
With this software is possible to measure the maximum flow-rate, the opening time, the outlet temperature, the total volume of water and evaluate the shape of flow-rate graph.
Anytime is possible to reload a test report, change the calculation parameters and obtain different results.




**Code: SOFTWAREPACK3** software pack including three software.

**Code: SOFTWAREPACK4** software pack including four software.

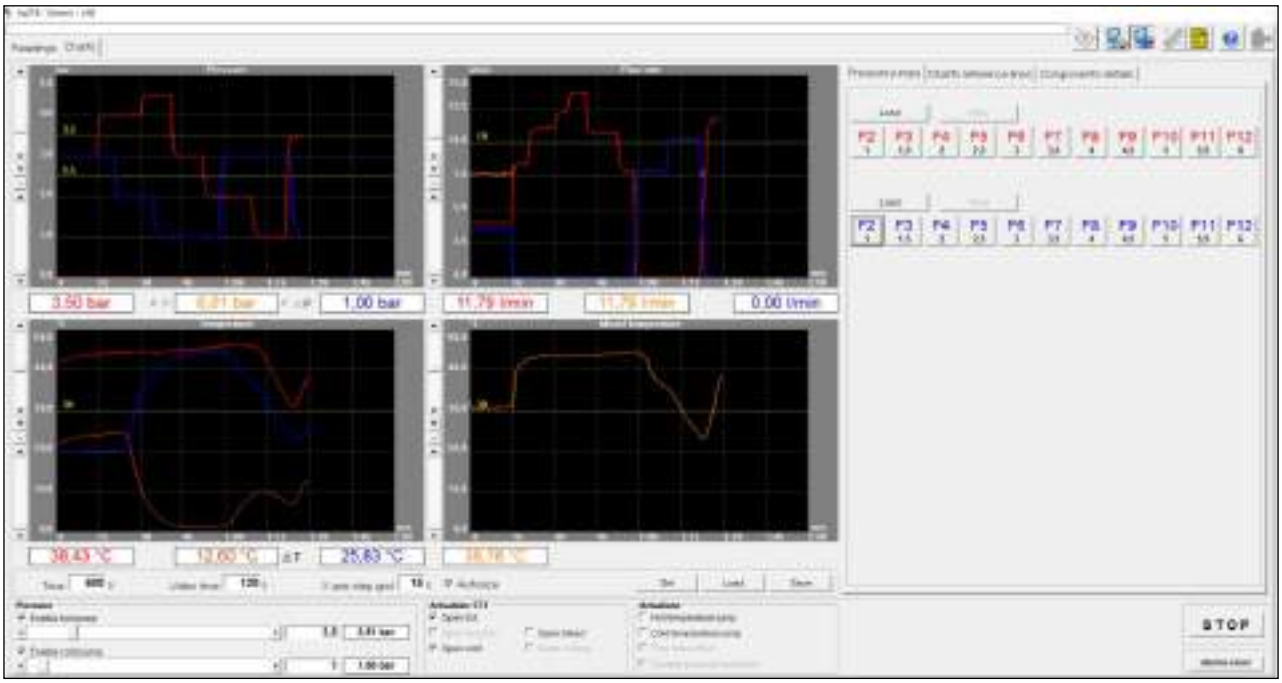
**Code: SOFTWAREPACK5** software pack including five software.

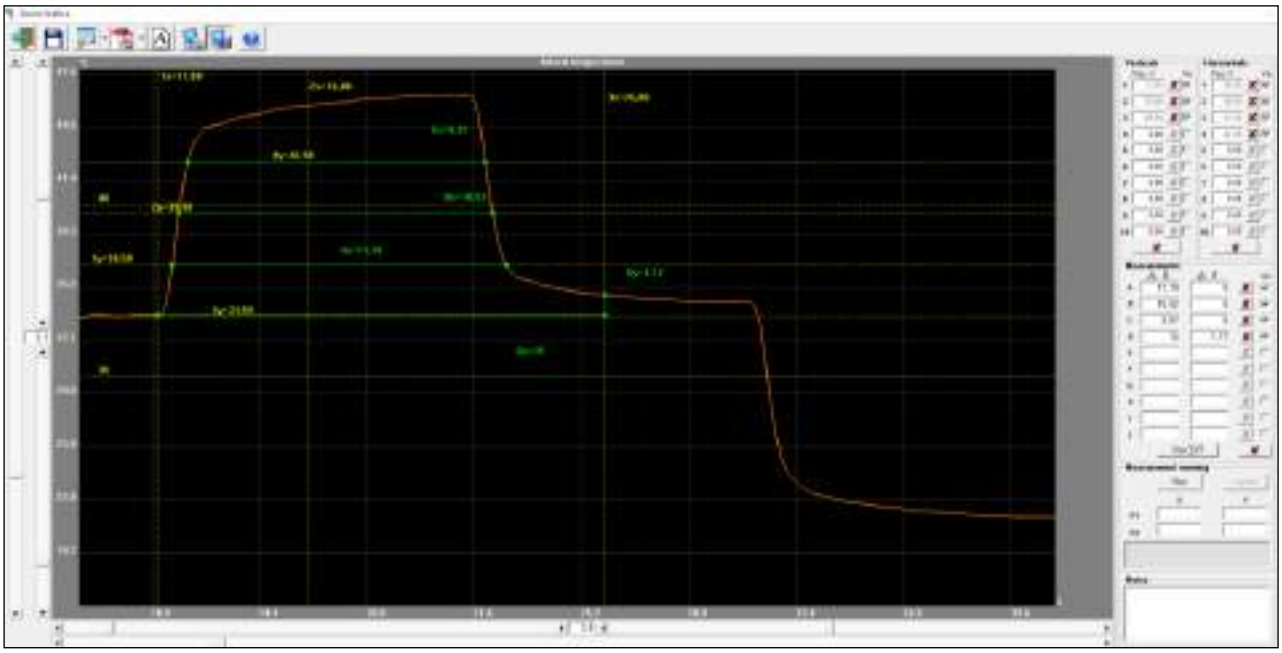
**Code: SOFTWAREPACK6** software pack including six software.

**Code: SOFTWAREPACK7** software pack including seven software.

**NOTE:** With the basic software **AQ2TB-COMBILAB+** it is possible to measure in real time flow-rate, pressure and temperature to verify the reaction and the performance of components under test and to perform in addition the following test:

- **PRESSURE JUMP TESTS** **code: PJ01**
- **TEMPERATURE JUMP TESTS** **code: TJ01**
- **FLOW RATE VARIATION TESTS** **code: FV01**
- **TEMPERATURE CONTROL VARIATION TESTS** **code: TV01**



## 3.2 - 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-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.

**AQ2TB-TCW-ETH** Option to manage the functioning of the TCW generator by Ethernet communication from the test bench.
Includes the possibility to choose the working modality (on/off – stand-by – weekly switch-on timer), read in real time the temperature of hot and cold water, modify the set points, and manage the alarms (real time status reading and events history).

**AQ2TB-DATA-INFO** Additional option for the personalization of the test information in all the active languages. The standard menu, composed in English by the entries "*Client*", "*Category*", "*Line*", "*Model*", "*Serial number*" and "*Test description*" can be modified in order to adapt the management of the tests on bench (including the reports) to the modality adopted by the company internally.

## 3.3 - AQ2TB-MANSYS

This optional software, installable on one or more PCs with suitable characteristics and integrated into the company network, can be used for remote management activities on the test bench.

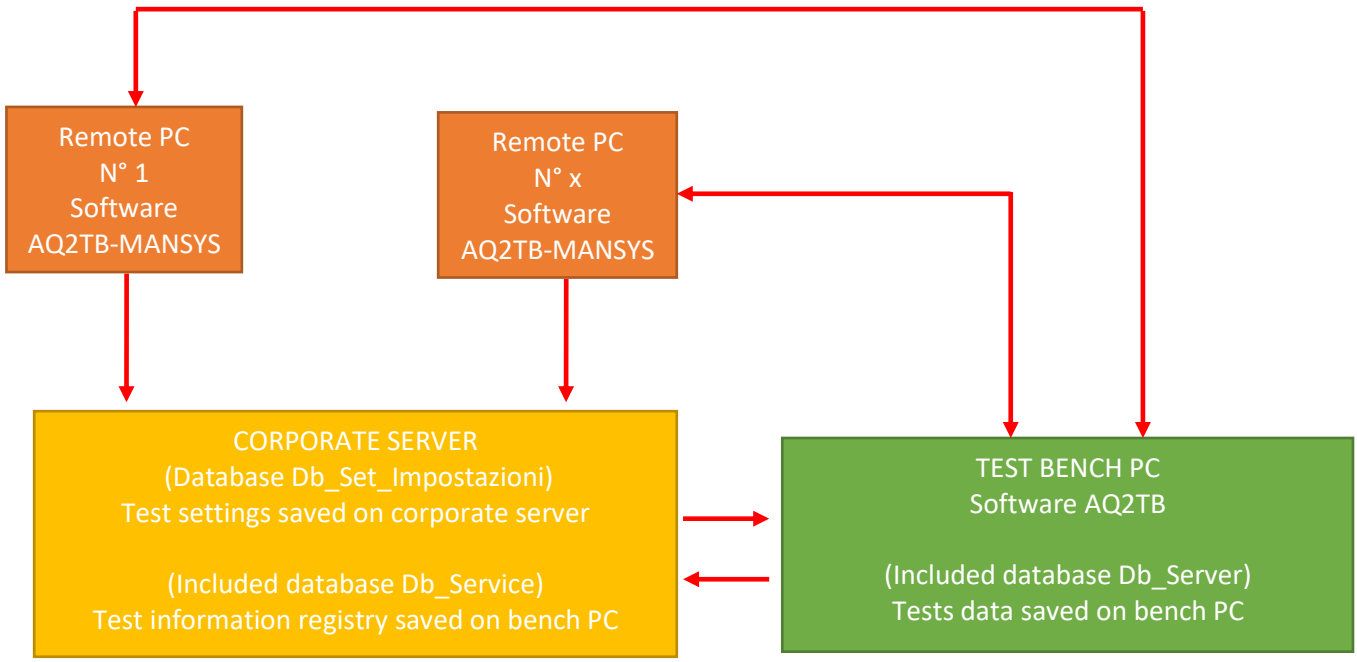
**Software specification:**

- The software allows the remote creation, modification and cancellation of the tests execution parameters for each test. (*)
- The software allows the access to the test data and, consequently, to their analysis and exportation; it allows the creation of the test report independently from the activity carried out on the bench in that moment. (**)
- It allows the visualisation of the bench status (normal functioning or in alarm) and the kind of test in execution in real time. (**)
- It allows the creation of test information registry usable on the bench during the saving procedure. (*)

* The bench will not have access to data in case of absence of network connection.
** Features active only in case of available network connection.

**Notes:**

- In case of absence of network connection, the normal functioning of the bench is always guarantee.
- The effective functioning of the software depends on the corporate server features, and cannot be guaranteed before the start-up of the bench.



# 4 - Accessories

## 4.1 - KIT OF SUPPORTS

Accessories for installation of faucet: see below detailed description
**Code: KITSUPPORTI**

- **Adjustable universal holder**
  With possibility of vertical regulation, adjustable rotation (0 ÷ 180 °) and blocking levers
  (Fig. 1)

**Fig. 1**

- Universal taps support platen (Fig.2)

**Fig. 2**

- **Tube for drain water convey**
  to collect water from the outlet.
  Axial, vertical and rotational adjustement.
  Including connection for temperature probe.
  (Fig. 3)

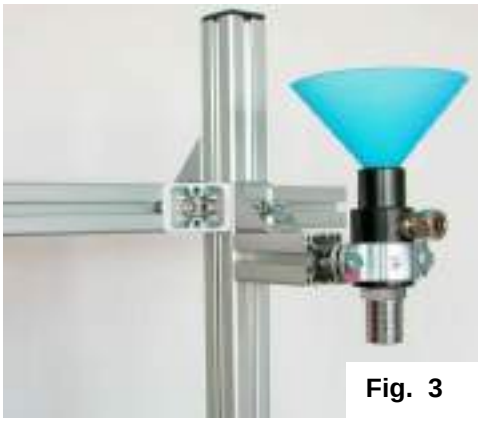


**Fig. 3**

- **Showers support**
  Sliding holder with angular rotation, longitudinal and vertical adjustments, including ¾" G connection and flexible hose.
  (Fig. 4)

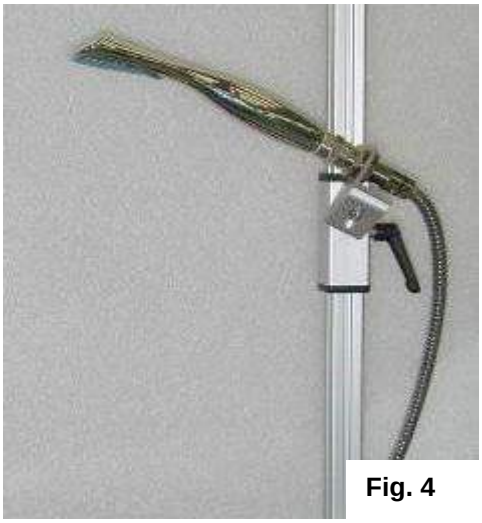


**Fig. 4**

- Kit of fittings including reductions, nipples, caps, gaskets and screws according the configuration of the test bench. **Code: SERV.KIT-RUB.PN10**
  **Note:** includes kit of hand tools comprising adjustable wrench, screwdrivers, hex key and hydraulic key. **Code: 2FRGKIT.UT**

## 4.2 - BPR-OPZ-SPLASHGUARD

Adjustable and easily removable front splashguard suitable to prevent dripping outside the test tank in the case of testing on large objects (for example showerheads or swivel spouts).

## 4.3 - SPARE PARTS KIT

The spare parts kit includes transducers, valves, fuses, lamps according to the configuration of the test bench.
**Code: SPARE-PARTS**

**Note:**
Basic kit including TcK probe, fuses and lamps provided with the test bench.
(Code: **SPARE-PARTSBASIC**)

# *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 and 5.2).**

## 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 and Ethernet communication with the test bench.
**Flow rate in continuous mode:** 12+12 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:** 36,0 kW.
**Filling from customer supply plant.**

**CODE: TCWB2NMSBXGS200**

**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.
Weight: 6,0 kg – Filtering capacity: 8100 L at 17 °f (10 °d).
**Note:** special models are available.

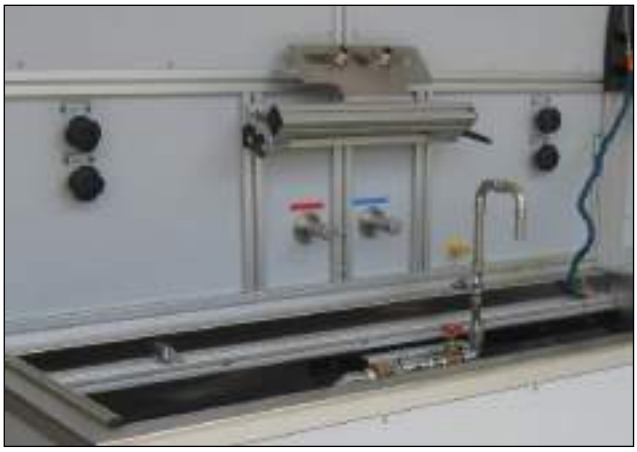
**KIT-FILTRO-OPUR** for the filtering of the water recovered from the bench; N°2 high temperature filters, size 1-1/4", 300 µm, maximum filtering flow-rate 5,5 m³/h. Includes manometers for the control of the correct functioning.

## 5.2 - BPR-OPZ-HCR
This device is connected to the water drained from the bench and is equipped with two pneumatic ball valves, controlled by a temperature probe, to separate and collect the water in two different tanks depending of the temperature.
Two pumps convey water in the tanks inside the TCW B2 generator.
This equipment saves water and energy.
**Size:** 500 x 500 x (h) 550 mm.
**Electrical supply:** 240 V - 50 Hz.
**Power:** 1,6 kW.
**Weight:** approx. 80 kg.
Packing included into the other box.

# 6 - Optional equipment and applications for performance tests

## 6.1 - BPR-OPZ-D08

- Hydraulic test rig designed according to **D08 standard** requirements (U.K. market).
- Hydraulic supply rig with **four thermostatic mixers** and four pneumatic valves installed before the pumps for changing of cold and hot water temperature.
- Pressure loss measurement (external pressure box, ball valve and temperature probe).
- The device can be moved on profile inside the working tank.
- Dedicate software upgrade to change the temperature supply with four temperature jumps.



## 6.2 - BPR-OPZ-DELTAP

- Outlet plant for thermostatic mixer according to EN 1111 Standard, includes pressure box, temperature measure box and flow-rate regulator.
- The device can be moved on profile inside the working tank.
- Adjustable: it allows the connection with any kind of thermostatic mixers.
- The equipment is required to measure the performance of thermostatic mixers to simulate the pressure and temperature loss due to the components installed after the taps under test.

## 6.3 - BPR-OPZ-DIGM

**Low-pressure digital manometer.**
Measurement device for low-pressure tests; it can be installed on the bench and it consists of a high-accuracy digital manometer.
Includes quick coupling connector.

Range: 0 ÷ 1 bar.
Accuracy: 0,05% full scale value.

The device allows a very precise measurement of dynamic pressure delivered in the range up to 1 bar.

## 6.4 - BPR-OPZ-ROTMOT

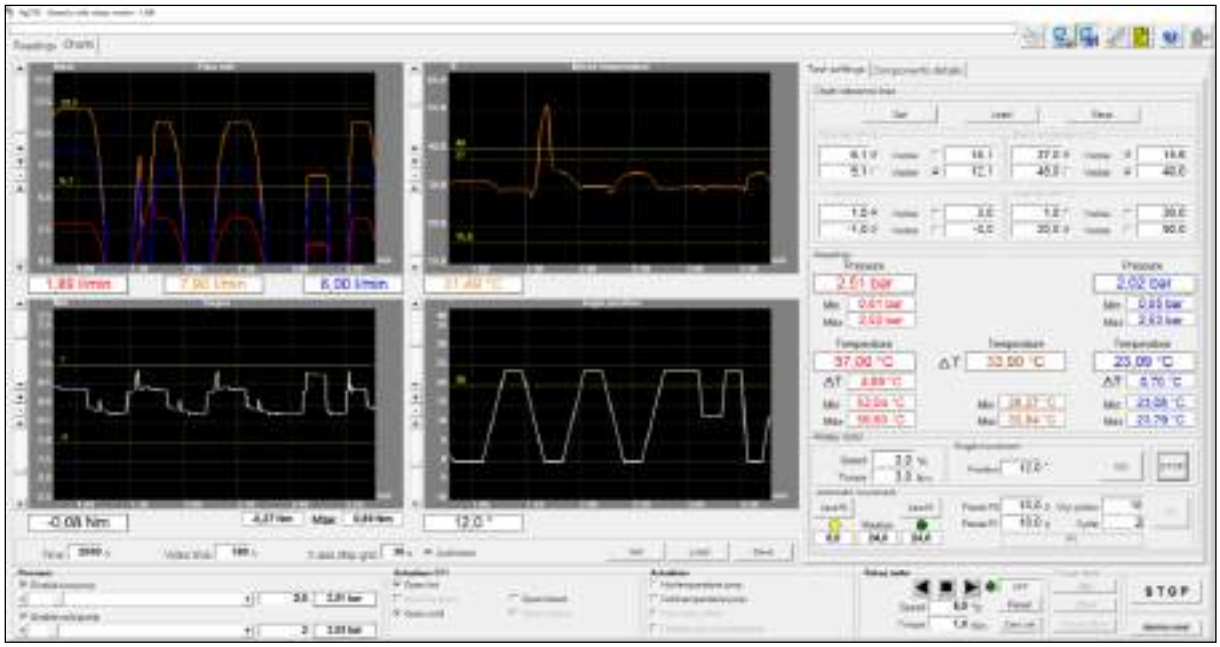
**Rotary motor.**

This option is mandatory for all the applications that require the use of a rotary motor.
This option includes:
- Rotary motor: 3 Nm.
- Planetary gearbox (ratio 1:5).
- Electric actuator.
- Connection cables.
- Torque meter: 10 Nm (accuracy ±0,1 Nm).
- Support structure.

The motor is a brushless device with the feedback control of the supplied torque.
For each test, the dedicated software allows to:
- Control in real-time the position of the motor.
- Control the motor speed.
- Set the maximum resistant torque acceptable for each test.

Features:
- Adjustable rotating speed: 0,5 ÷ 300 °/s.
- Adjustable torque: 1 ÷ 10 Nm.
- Adjustable angular position: 0 ÷ 3.600 °.

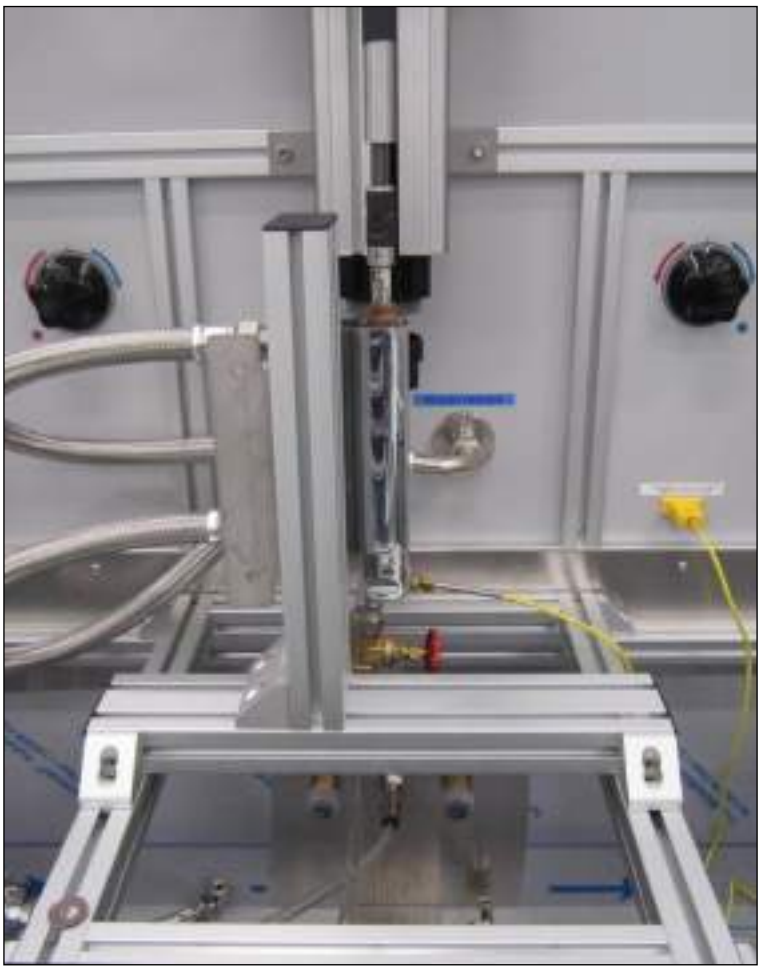
### 6.4.1 - AQ2TB-COMBI-RM




Generic laboratory software designed to perform, with the use of the rotary motor, manual movements or simply programmable automatic movements sequences.
The software allows the acquisition in real time of all the main physical quantities and it shows in graphic format, in addition to flow-rates and mixed water temperature, the torque and the angular position and allows to perform the evaluations of the gotten results.

## 6.4.2 - ROTARY MOTOR ACCESSORIES KIT

Kit of accessories and supports for the installation of the devices under test and the connection to the motors and to the water supply.



Includes:

- Working tank square supporting frame.
- Aluminum “L” supporting frame.
- Universal joint.
- Water supply flexible hoses.
- Adjustable universal holder.
- Universal taps support platen.
- Suitcase.

Code: **KIT-ACC-ROTMOT**

**Note:** this option requires **KITSUPPORTI** device.

## 6.5 - BPR-OPZ-LINMOT

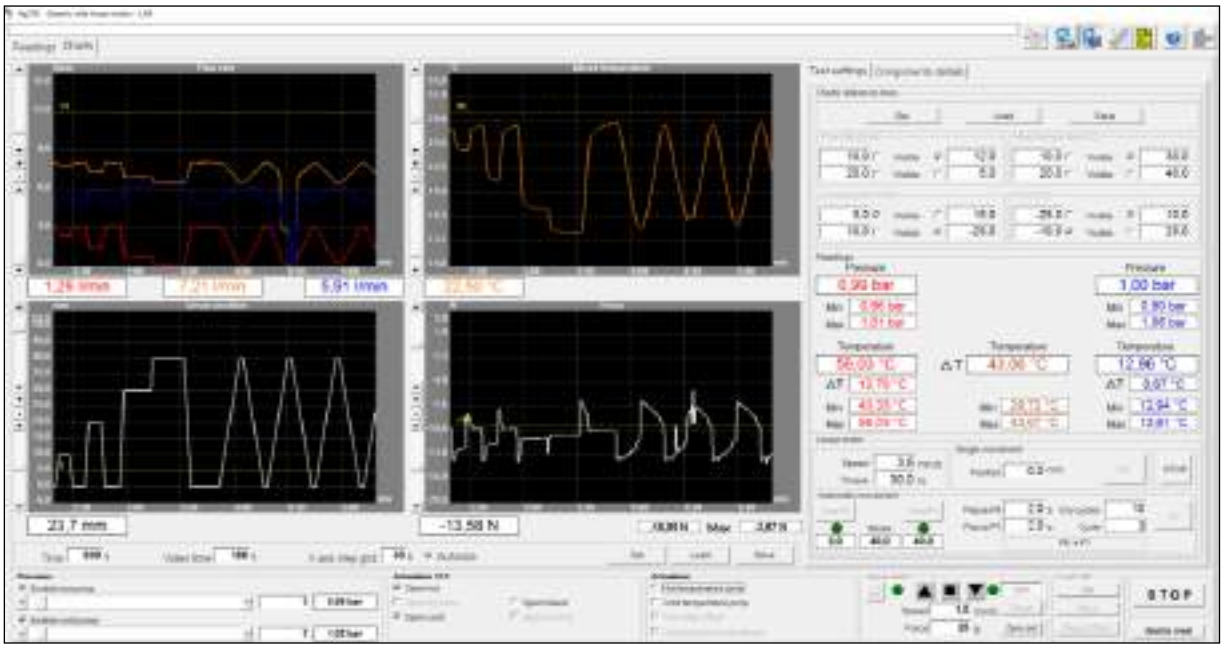
**Linear motor.**

This option is mandatory for all the applications that require the use of a linear motor.
This option includes:
- Linear motor: peak 67 N (continuously: 25 N).
- Electric actuator.
- Connection cables.
- Load cell: 250 N (accuracy ±0,5 N).
- Support structure.

The motor is an electromagnetic device with the feedback control of the supplied force.
For each test, the dedicated software allows to:
- Control in real-time the position of the motor.
- Control the motor speed.
- Set the maximum resistant force acceptable for each test.

Features:
- Adjustable linear speed: 1 ÷ 300 mm/s.
- Adjustable force: 1 ÷ 44 N.
- Adjustable linear position: 0 ÷ 100 mm.

### 6.5.1 - AQ2TB-COMBI-LM



Generic laboratory software designed to perform, with the use of the linear motor, manual movements or simply programmable automatic movements sequences.
The software allows the acquisition in real time of all the main physical quantities and it shows in graphic format, in addition to flow-rates and mixed water temperature, the force and the linear position and allows to perform the evaluations of the gotten results.

## 6.6 - BPR-OPZ-C-TM

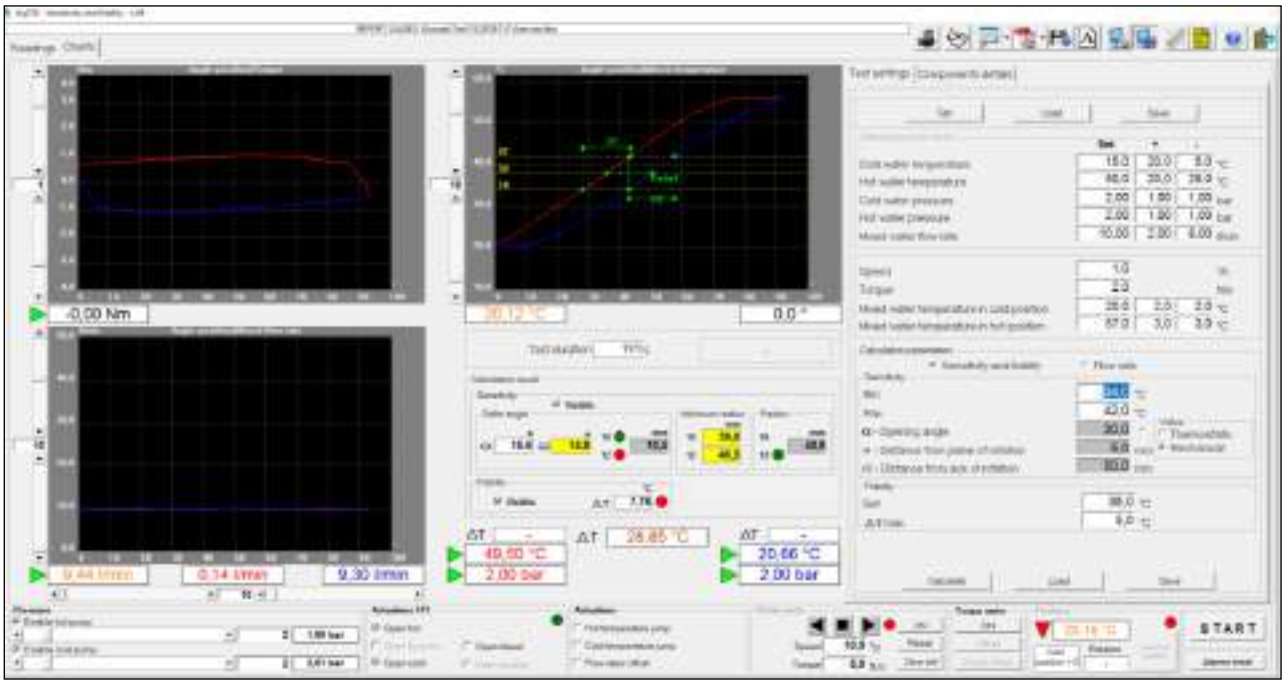
**Sensitivity and fidelity test for thermostatic and mechanical mixers according to EN and NF standards.**
(Applicable only to the benches supplied with TCW B2 generator).

The movement system is used in order to verify the sensitivity and the fidelity of the mechanical and thermostatic mixers. It measures the minimum amplitude movement of the temperature control device required for a specific variation in the mixed water temperature, during the test the mixed water temperature is measured as a function of the angular position.


The procedure consists to move the temperature control handle from cold to hot position and return at controlled speed with stable water supply conditions.

The device includes the mechanical equipment necessary to connect the taps under test with the rotary motor.

Dedicated software including flow-rate measurement for mechanical mixers according EN817.

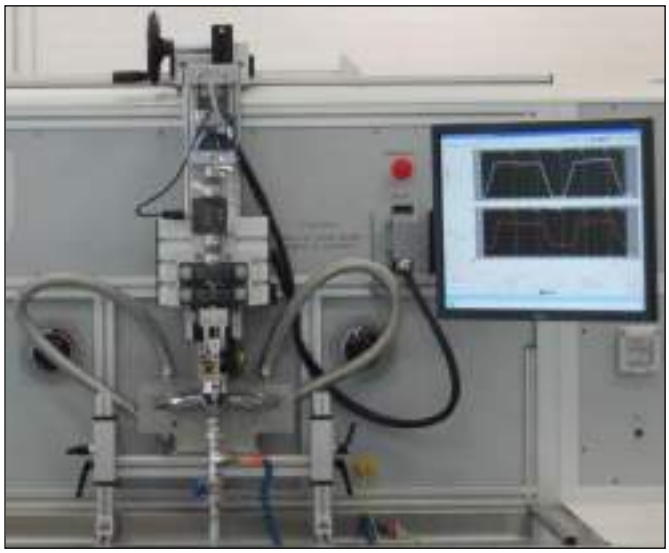



**Software: AQ2TB-F+S-DRIVE**
**Test code: SF01 - SF02**

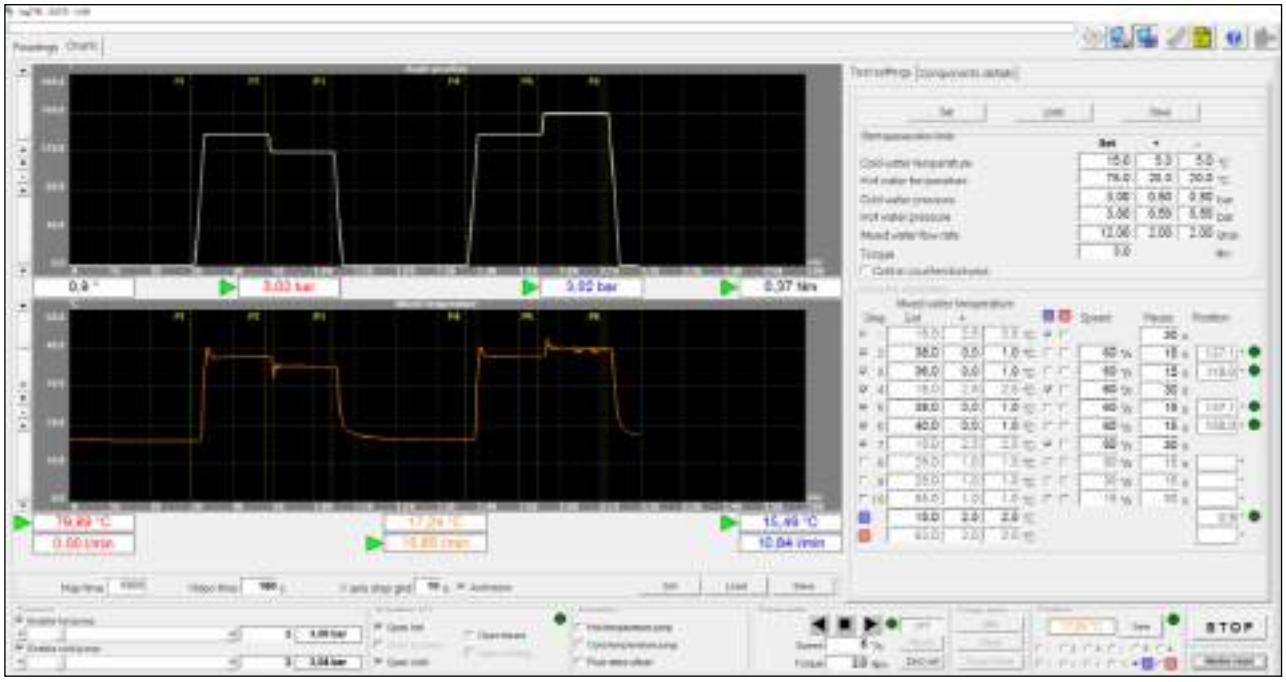
**Note:** this option requires the installation of the **BPR-OPZ-ROTMOT** device.

## 6.7 - AQ2TB-ASTD

Software for checking the peak temperature generated by position variations of the temperature control device of thermostatic mixers, carried out with rotary motor.



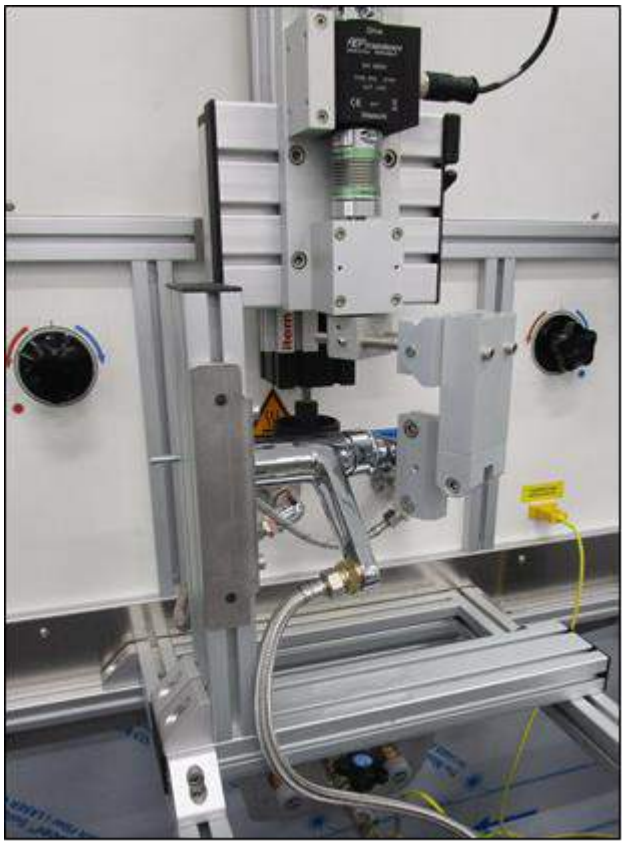
Standard reference:
EN 1111 (2017) chapter 13.5.1.
With this software is possible to set up to 10 steps of angular position. For each steps is possible to select the angular speed and the waiting time.
The acquisition graph shows the angular position and the mixed water temperature. Supply temperatures, pressures and flow-rate are controlled continuously.




**Software: AQ2TB-ASTD  test code: ASTD01**
**Note:** this software requires the installation of the **BPR-OPZ-ROTMOT** device.

## 6.8 - BPR-OPZ-SL-FM

**Rating ECAU – C2 classification**



Device for measuring the force necessary to move the handle of mechanical mixers and the strength of hard point F2-F1 according to NF 077 TD077-03 rev.03 chap. 2.6.7.2 and 2.6.14 standard.

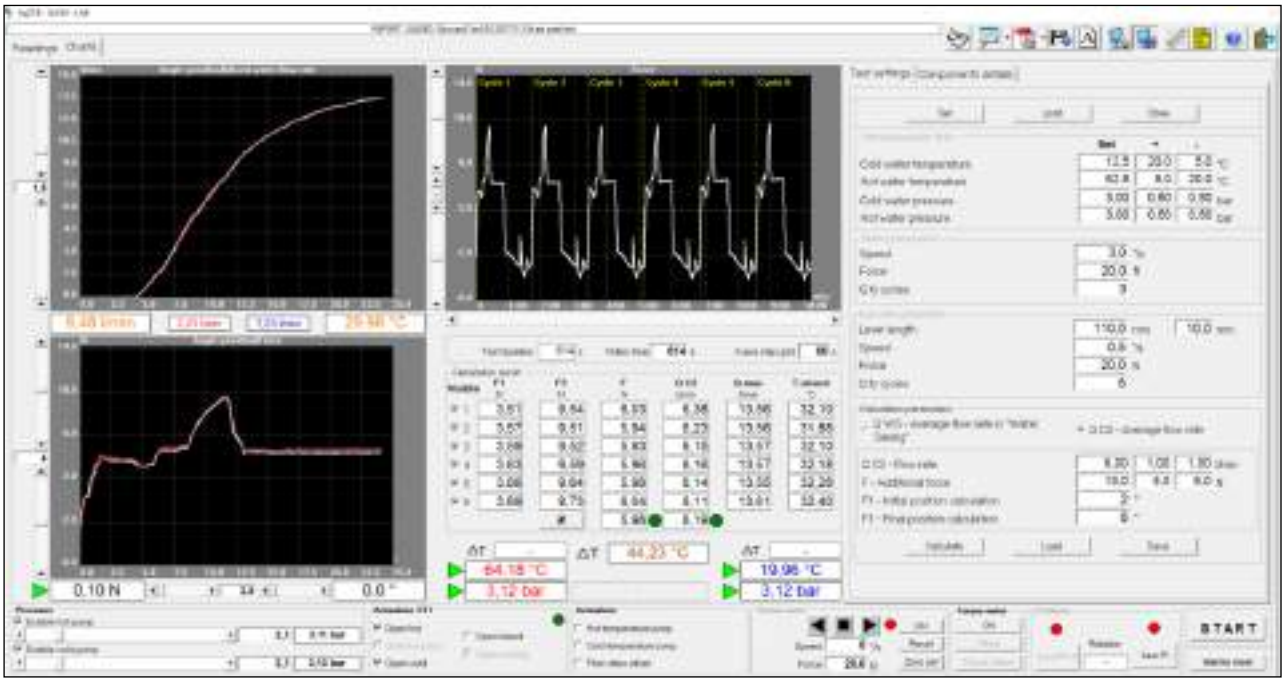
In order to exclude all the influences generated by the weight of the lever, the tap is installed in horizontal position. The system measures the torque and, using a simple mathematical calculation, shows the equivalent force to move the lever.

The software includes two multi-line graphs showing force and flow-rate as a function of the angular position and two graphs showing force and flow-rate as a function of time.

The system opens and closes the mixer five time measuring the opening force and showing the force variations together, in the same graph.

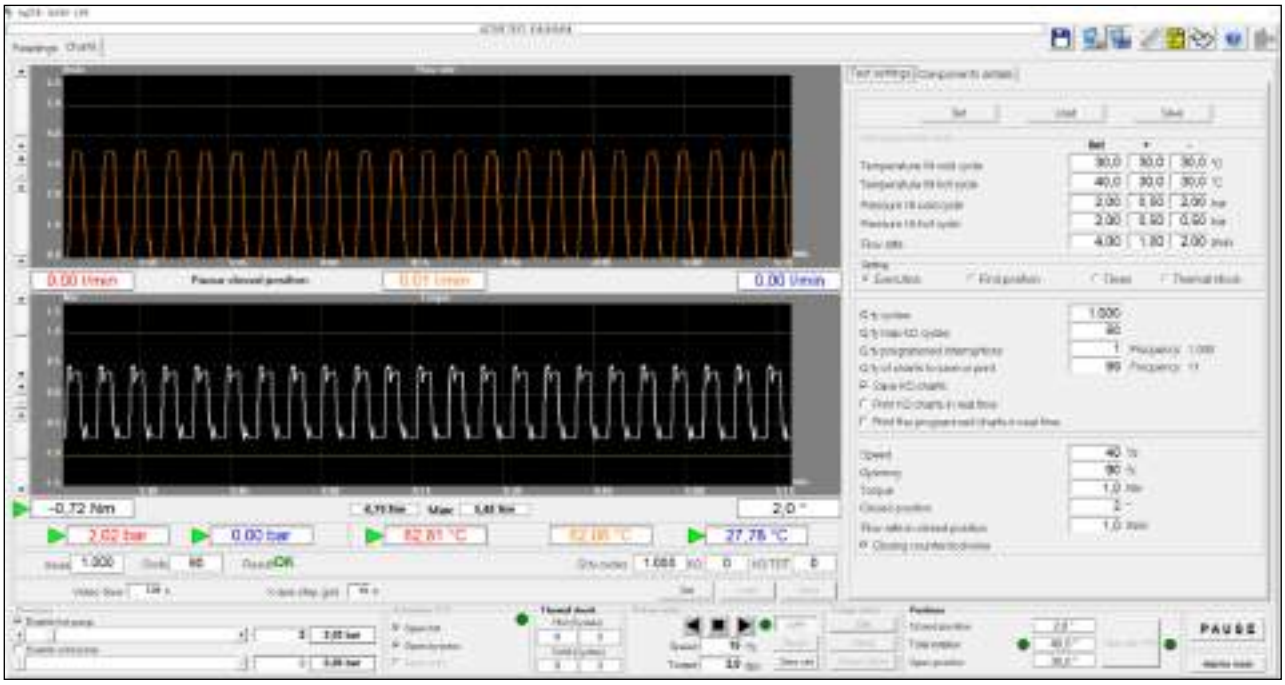
At the end of the acquisition is possible, by opening a relevant area with the ZOOM function, to measure the values F1 and F2.

**Software: AQ2TB-SLFM** **test code: SLFM**



SOFTWARE FOR ENDURANCE TEST:
With this software, it is possible to perform the endurance test of the cartridge by opening, closing, and measuring the maximum resistant force each cycle.

**Software: AQ2TB-SLFM-LIFE test code: SLFM-LIFE**



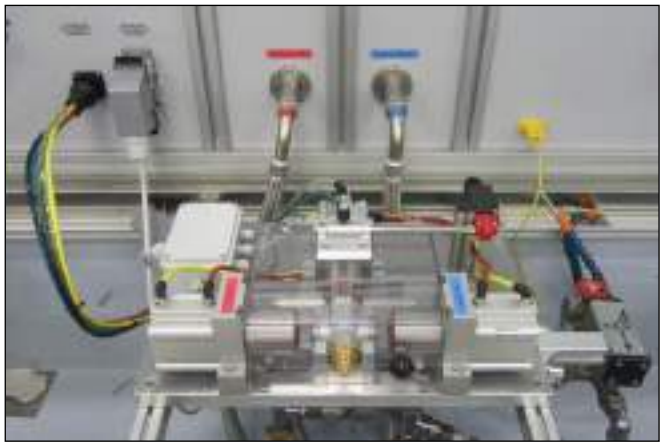

**Note:** this option requires the installation of the **BPR-OPZ-ROTMOT** device.

## 6.9 - BPR-OPZ-TP

**Special equipment and software for automatic production tests on thermostatic mixers.**

The equipment includes:

- Device for fast clamping and locking of the cartridge with one support including valves and cylinders.
- Hot and cold air blowing plants and residual pressure drain, box control, specific PLC software for the automatic test sequence, pneumatic and electric connections, micro switches and safety door.
- Standard software for production tests.



**Software: AQ2TB-TMV-PROD-NF / AQ2TB-TMV-PROD-EN**

**Note: special clamping devices and test sequences available on request.**

## 6.10 - BPR-OPZ-HP

**Static, burst and pulsing (hammer) pressure tests.**

Check of mechanical performances under static pressure tests and water hammer tests.

- Pressure intensifier (booster) ratio 1:17, equipped with micro-switches to control the start and the end of the stroke to permit the automatic refill of the component.
- Static pressure: 0÷100 bar.
- Pulsing pressure tests (hammer test): 0÷100 bar - max frequency: 1 Hz.
- Safety cover with micro-switch.
- Reference for sanitary taps: NF 077 standard.
- Check the leakage upstream of the obturator, obturator closed.
- Check the leakage downstream of the obturator, obturator opened.
- Dedicated software.

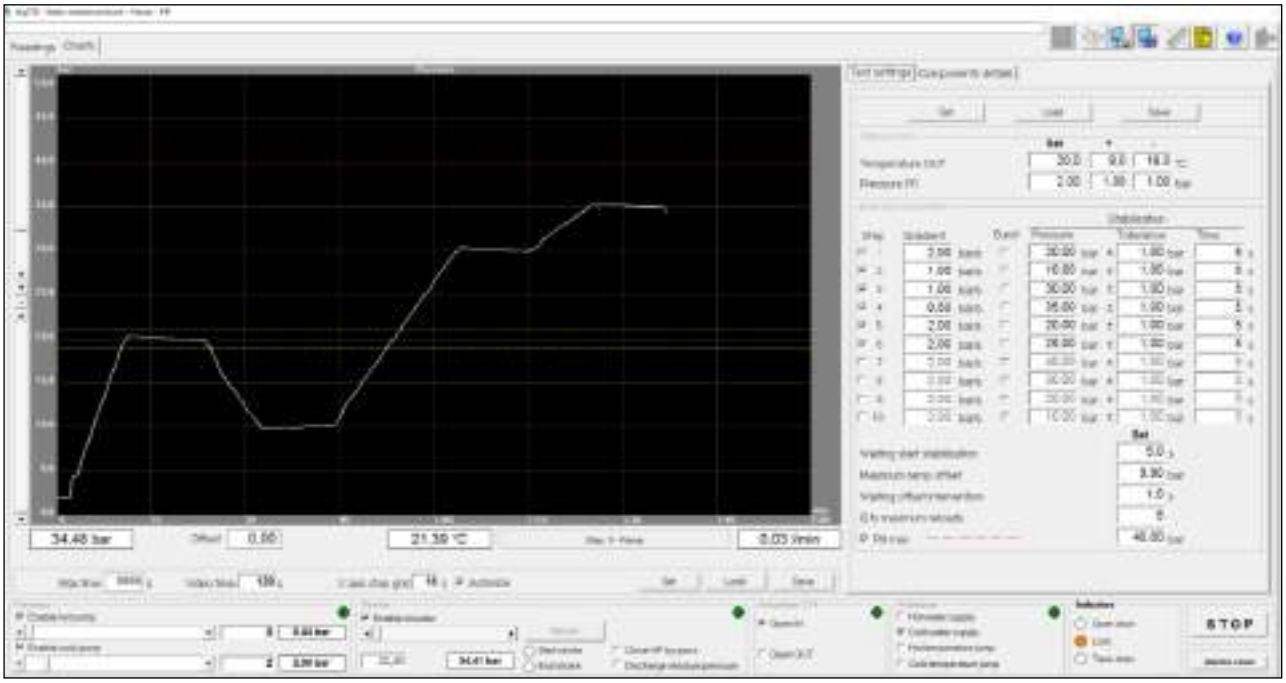

**Software:**

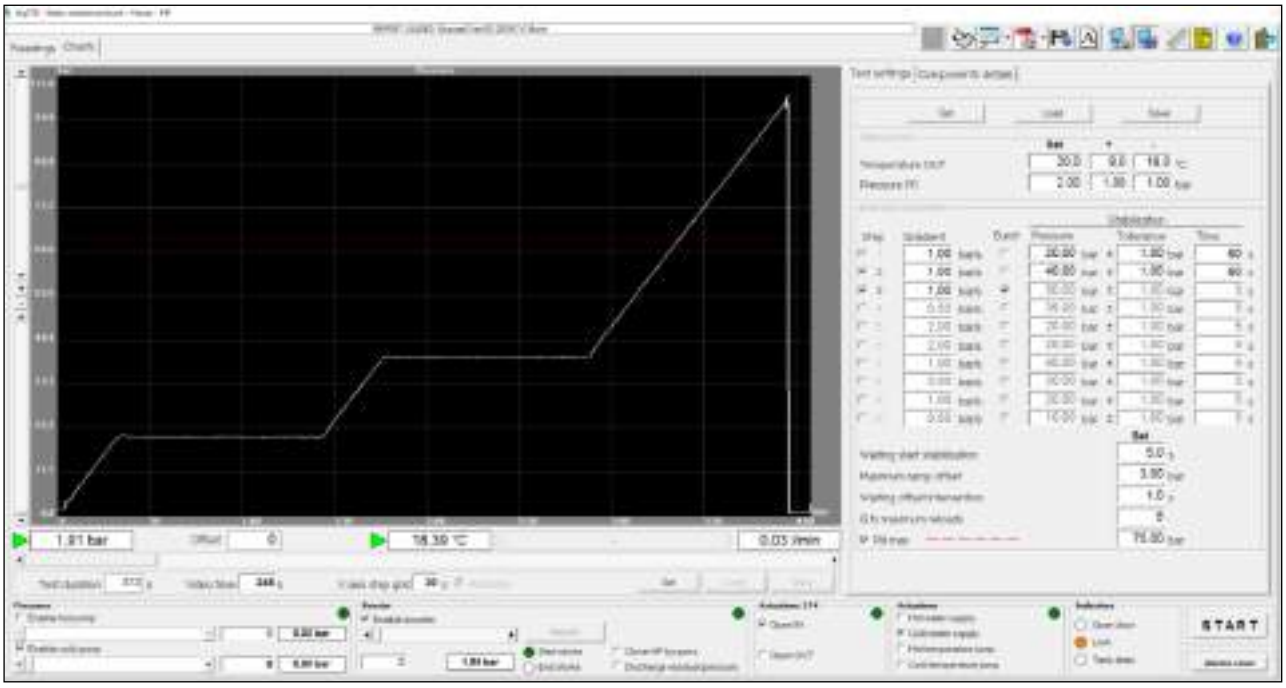
| | |
|---|---|
| **AQ2TB-PULSEAUT** | **test code: P02** |
| **AQ2TB-STATICAUT** | **test code: P01-P04** |
| **AQ2TB-COMBI-PR** | **test code: P01-P04** |

**Note:**
It is possible to install this option only on the big size bench: 2900 x 1100 (+100) x (h) 1800 mm.
The price includes the extra cost for this bench oversize.
Code: **STRUCT-BPR2900**.

## 6.10.1 - AQ2TB-STATICAUT

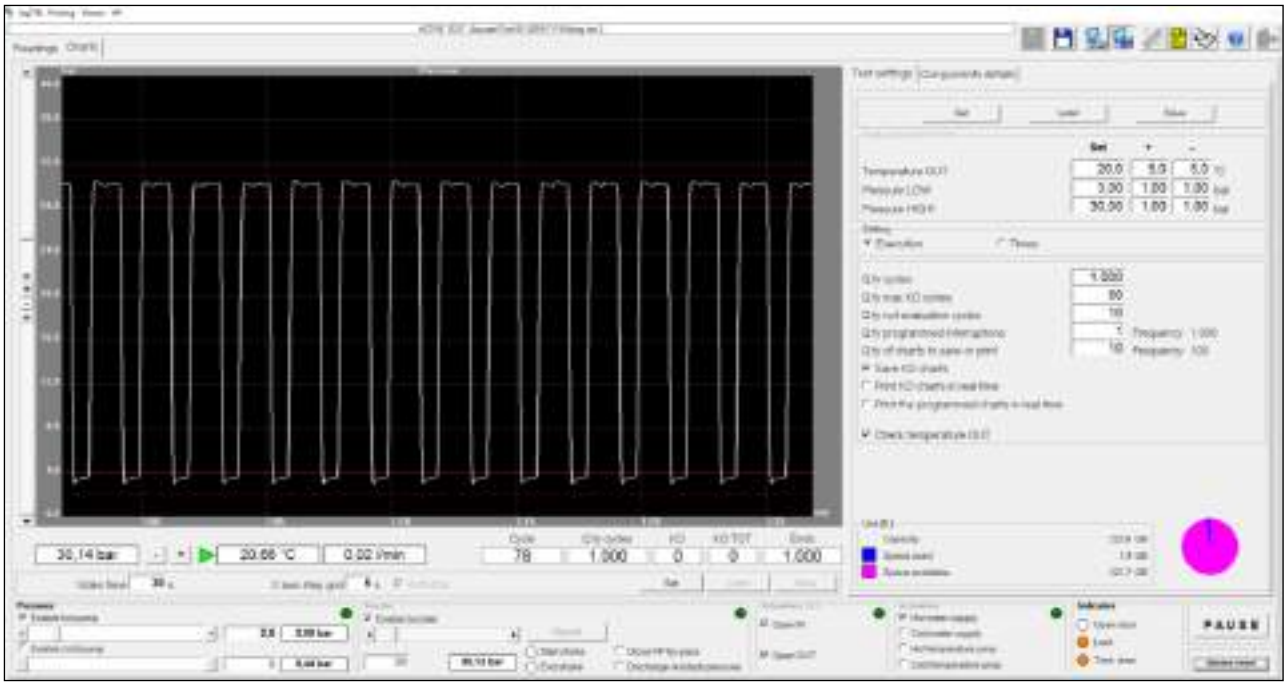
Automatic software for leak-tightness tests on sanitary taps, flexible hoses and generic hydraulic components.
The software allows to perform up to 10 stabilization steps with adjustable times and rising/falling ramps customizable.
It allows also the check of the maximum pressure before the burst of the component.



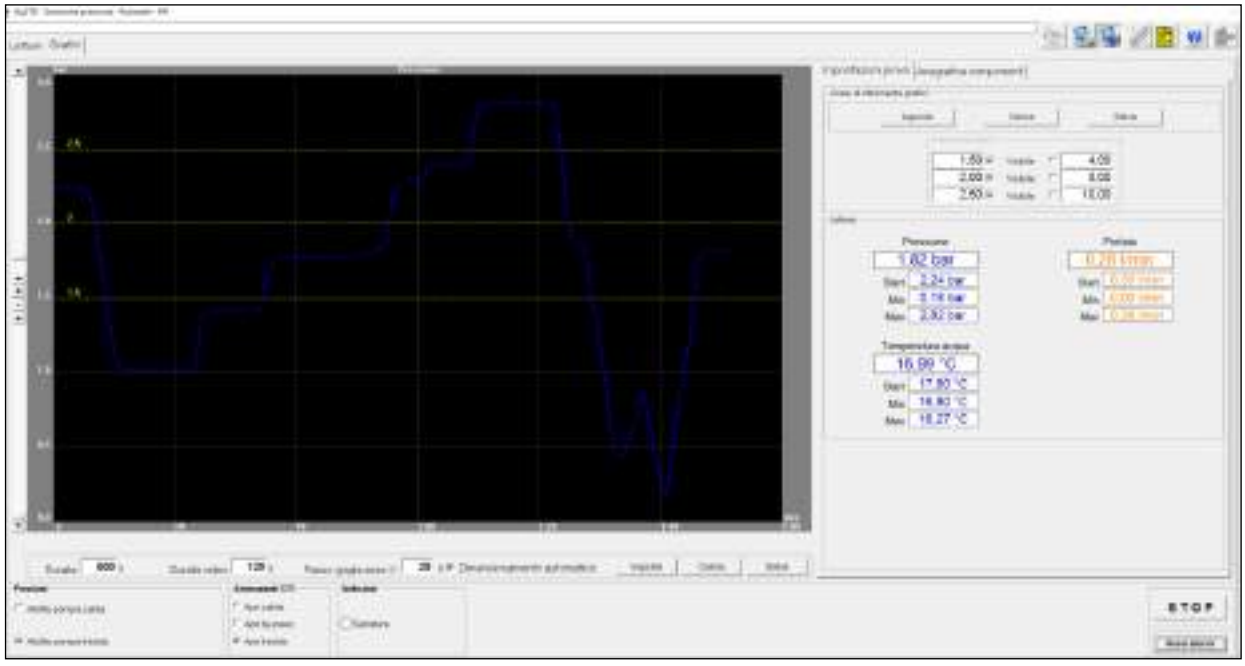
## 6.10.2 - AQ2TB-PULSEAUT

Automatic endurance software for pulsing pressure tests (check of water hammer resistance).
It is possible to set the number of cycles, minimum and maximum pressure, pulsing frequency, and cycle times. Control in real time of pressure and check of the water temperature for test performed with water circulation.




## 6.10.3 - AQ2TB-COMBI-PR

Generic software for static pressure manual tests. With this software is possible to check the leak tightness of the component under test pressurizing the plant with hydraulic multi-stages pump or pressure booster without constrains in the test sequence. It allows to perform static test according to EN, NF and ASME/CSA Standards. At the end of the acquisition, it is possible to save the data and generate a multi-language report.



## 6.11 - BPR-OPZ-HP-FLX

**Special test station for static, burst and pulsing (hammer) pressure tests on flexible hoses.**

Check of mechanical performances under static pressure tests and water hammer tests.

- Pressure intensifier (booster) ratio 1:28, equipped with micro-switches to control the start and the end of the stroke to permit the automatic refill of the component.
- Static pressure: 0÷200 bar.
- Pulsing pressure tests (hammer test): 0÷100 bar - max frequency: 1 Hz.
- Safety door with micro-switch.
- Test chamber size: 900 x 500 x 450 mm.
- Two separate test stations for pulsing test (up to 4 devices under test at the same time) and static/burst tests.
- Reference for flexible hoses and hydraulic components: DVGW W543, NF 077, EN 13618, KIWA BRL-K622 standards.

**Note:** this option requires the installation of the **BPR-OPZ-HP** optional device.

**Note:** includes kit of connections and accessories for high-pressure tests **(code: SERV.KIT-RUB.PN200).**

**Note:** it is possible to install this option only on the special big size bench: 3200 x 1100 (+100) x (h) 1800 mm. The price includes the extra cost for this bench oversize.
Code: **STRUCT-BPR3200**.

**Optional software -** on request it is possible to install dedicated software for specific tests:

**AQ2TB-1LD-H&C** **Code: TS01**
Software for thermal shock tests.

**AQ2TB-CYCLEAUT** **Code: P03**
Software for cyclical pressure tests (pressure generated by pump with water circulation) and thermal shock.

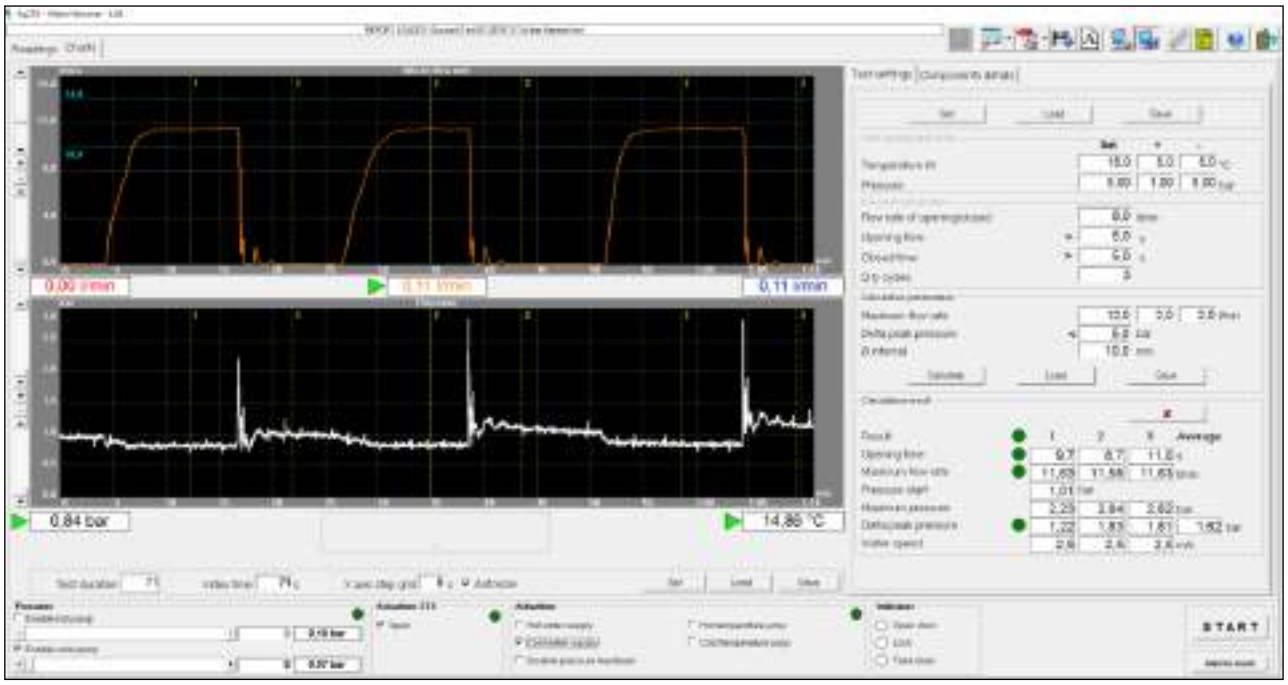
**AQ2TB-STATIC-LT** **Code: PT01 - PT01H**
Software for ageing tests.

## 6.12 - BPR-OPZ-HAMTEST

**Hammer test rig to measure the peak of pressure produced during the immediate electronic opening and/or closing of sanitary tapware.**

Component installed:
- 9 m copper pipe DN 15x1 mm coiled DN 300 mm approx.
- Pressure box and 5 kHz pressure transducer.
- Acquisition frequency: 2,5 kHz.
- This option is installed in the same area of static & pulsing pressure test (if installed).
- Test rig according to standard EN 15091.
- Dedicated software.

**Software:**
**AQ2TB-HAMTEST** **test code: WH01**




**Note:**
It is possible to install this option only on the big size bench: 2900 (3200) x 1100 (+100) x (h) 1800 mm.
The price DOES NOT include the extra cost for test bench oversize.
Code: **STRUCT-BPR2900**.

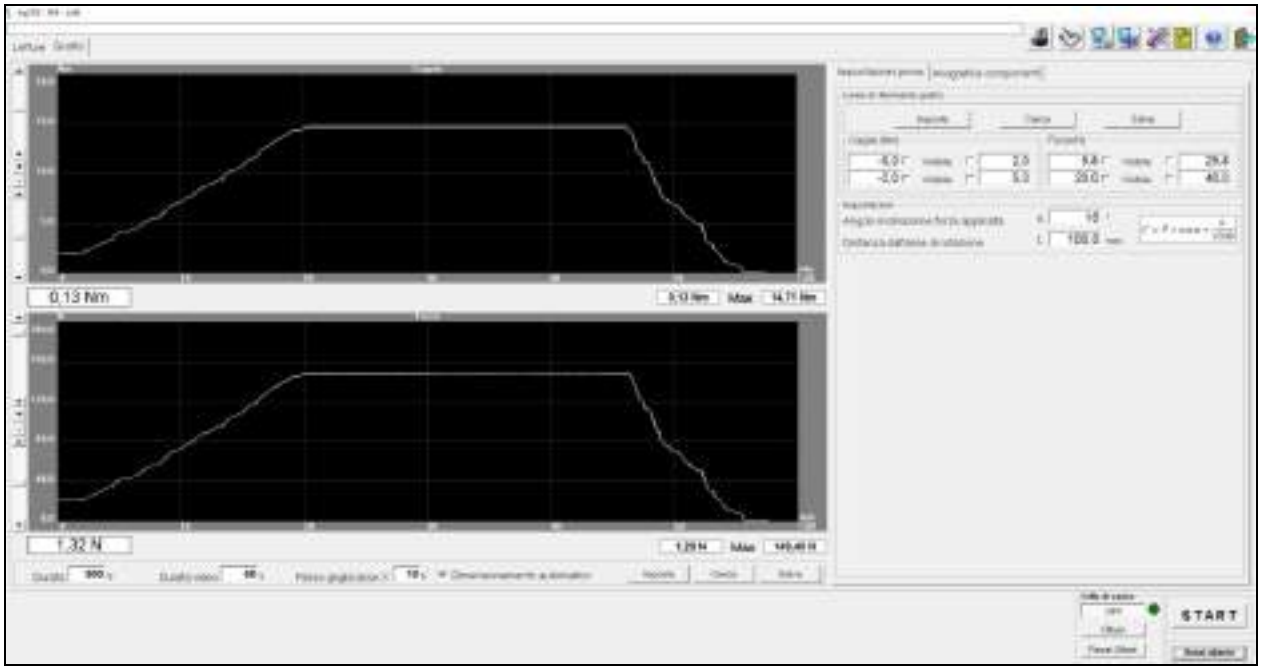
## 6.13 - BPR-OPZ-FM

Special mechanical equipment to carry out a test to verify the torsional strength of the operating mechanism of mechanical mixing valves according to EN 817 (chapter 11).

**Note:** this optional equipment requires the installation of the **BPR-OPZ-LINMOT** device.

### AQ2TB-COMBI-FM

Generic software for the measure of the force generated by the OPZ-FM device and conversion, through parameters chosen by the user, in torque as requested by the standards.

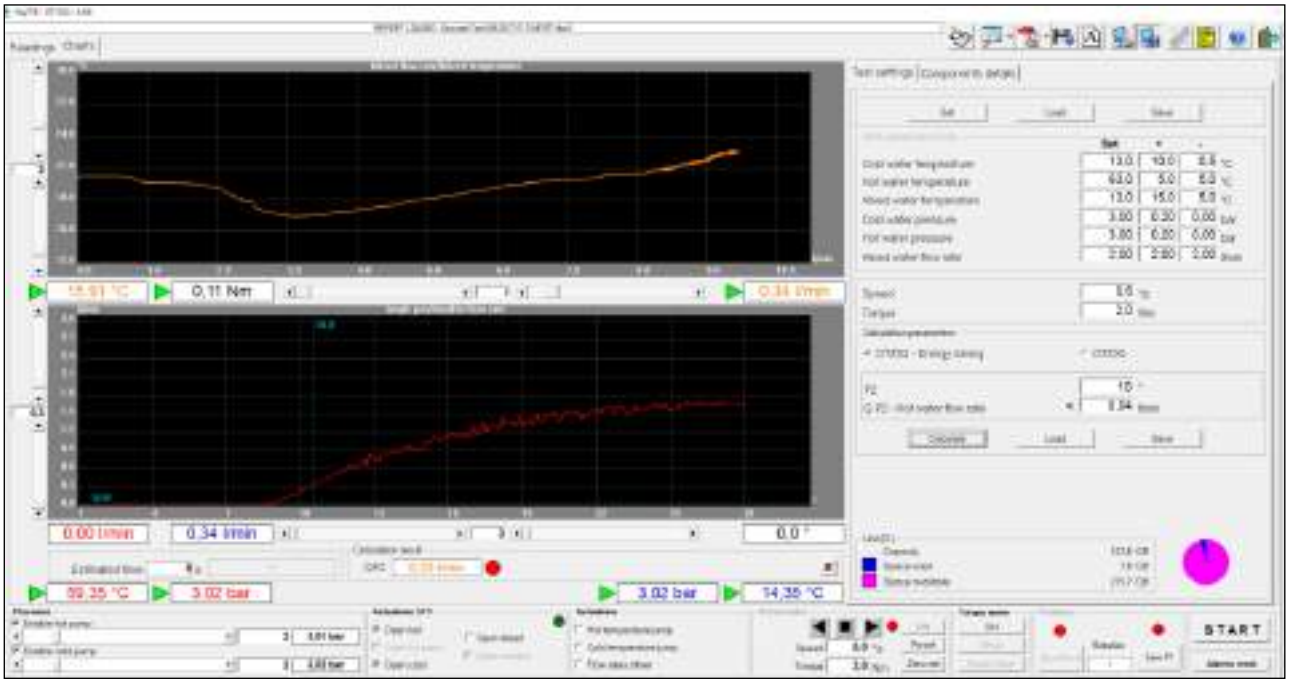


## 6.14 - AQ2TB-DT/DQ

Automatic software for flow variation tests on mechanical mixers according to:

- NF 077 TD077-03 rev.03 chap. 2.6.7.1.3, 2.6.7.1.4, 2.6.7.3.1 and 2.6.7.6.1 (**Rating ECAU – C1, C3 and Ch3 classification)**

**Software: AQ2TB-DT/DQ test code: FV01**
**Note:** this software requires the installation of the **BPR-OPZ-ROTMOT** and **BPR-OPZ-SL-FM** devices.

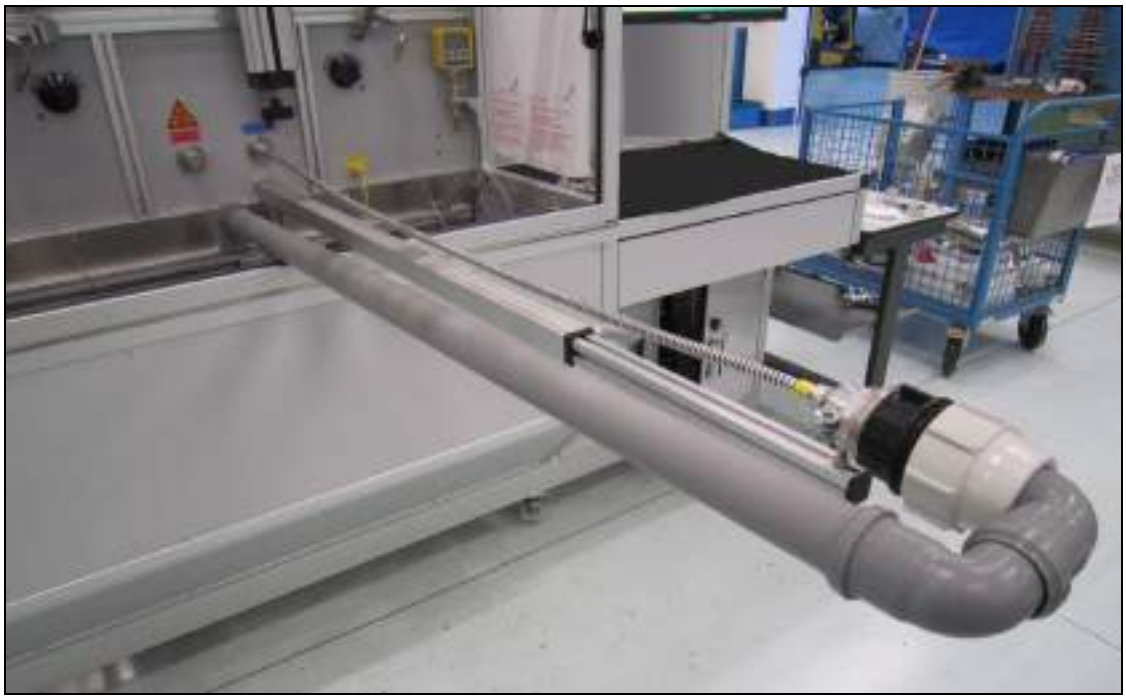



## 6.15 - BPR-OPZ-ES01

Electrical supply to connect electro-valves or other electronic equipment under test; it includes:
- Three electrical sockets: 230 V AC – 230 V AC – 24 V DC.
- All the socket are protected by an isolation transformer and safety push bottom.
- Variable power supply 0-30 V DC, 0-5 A, with digital indication of voltage and current.

## 6.16 - BPR-OPZ-Q-FLEX

Adjustable telescopic support device for flow-rate tests on flexible hoses, with length from 500 mm up to 2000 mm.



# 7 - ADDITIONAL EQUIPMENT AND ACCESSORIES

## 7.1 - BT400-RUB + dial gauge + protection cover

**(Reference to included drawing)**

The comparison pump **BT400-RUB (1)** is an hand pressure that allows to generate hydraulic pressures up to 400 bar for static pressure tests of single taps, mixers, hoses and hydraulic components for checking leakages and for mechanical pressure stress.

**Technical data:**

- Range of use: 0÷400 bar (0÷5000 psi).
- Media: water.
- Total capacity: 73 $cm^3$.
- Test pressure: 600 bar max.
- Dimensions: 450 x 360 x 300 mm.
- Weight: 18 kg.

**Accessories included:**

- Rear mounting support, completed with ¾" connections. Support for external groups, with 110÷200 mm adjustable pitch; support for basin mixer **(4)**.
- Connection with two output **(3)** + flexible connection pipe and quick pipe fittings **(6)**.
- Ball valve to fill the rig by external water supply.
- Ch.27 service box wrench.
- ½" gas rotating connection.
- Complete series of spare gaskets.

### Precision dial gauge

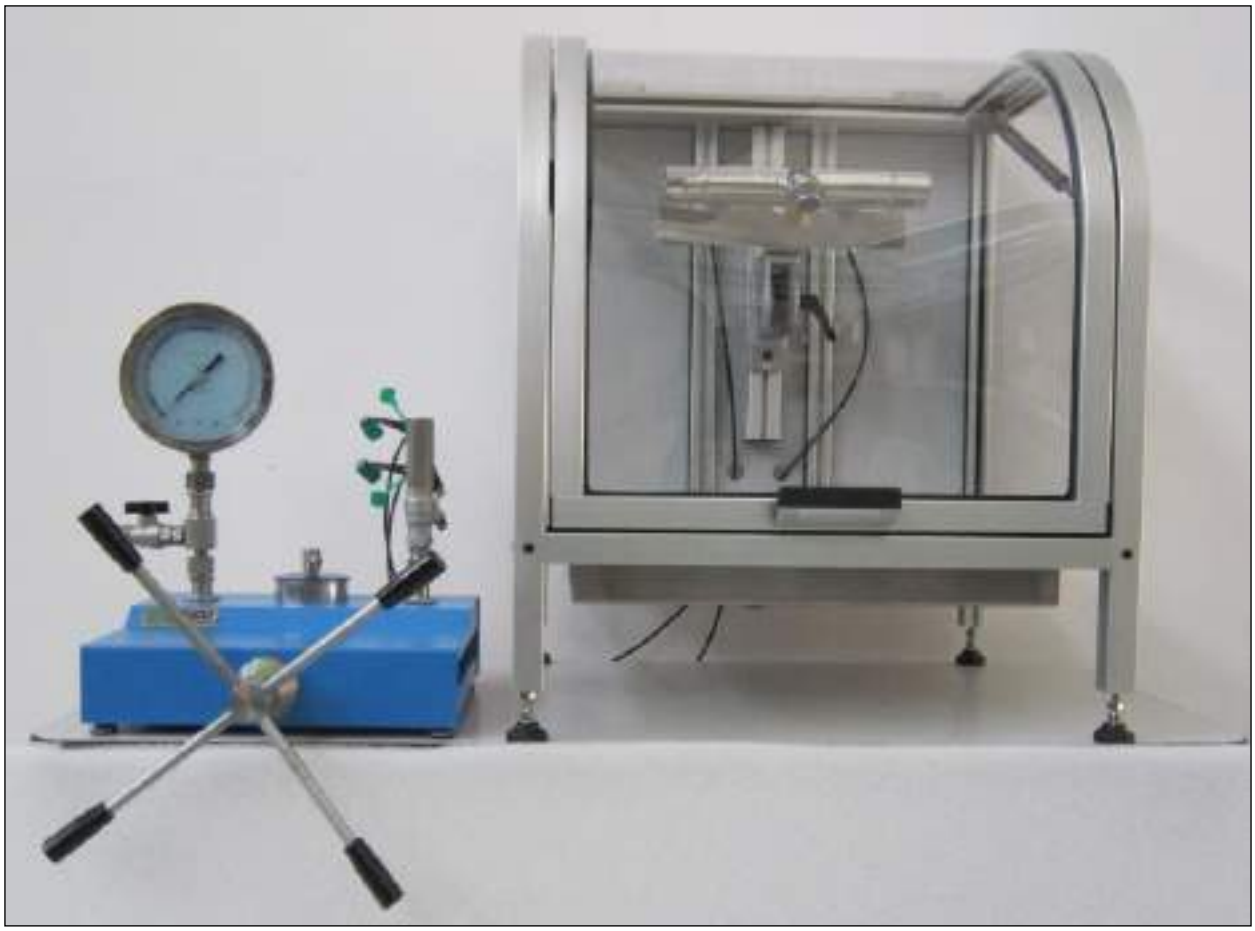
**(2)** Code: NF/C - precision pressure gauges DN 160 mm, accuracy ±0,25%,
Range 0÷40 bar, with *Accredia* traceability (different pressure range at request).

### Precision digital gauge

**(2)** Code: BIT02 - accuracy ±0,2%,
Range 0÷100 bar, with *Accredia* traceability (different pressure range at request).

## Protection cover

- Aluminium made + polycarbonate panel and frontal opening door.
- Stainless steel tank on the bottom to collect the water leakage.
- Slide guide **(5)** for holder anticorodal made for fixing the samples under test.
- Internal available dimension: 500 x 500 x (h) 500 mm approx.



**Code*: BT400-RUB-COVER**
*includes the BT400-RUB pump and the protection cover.

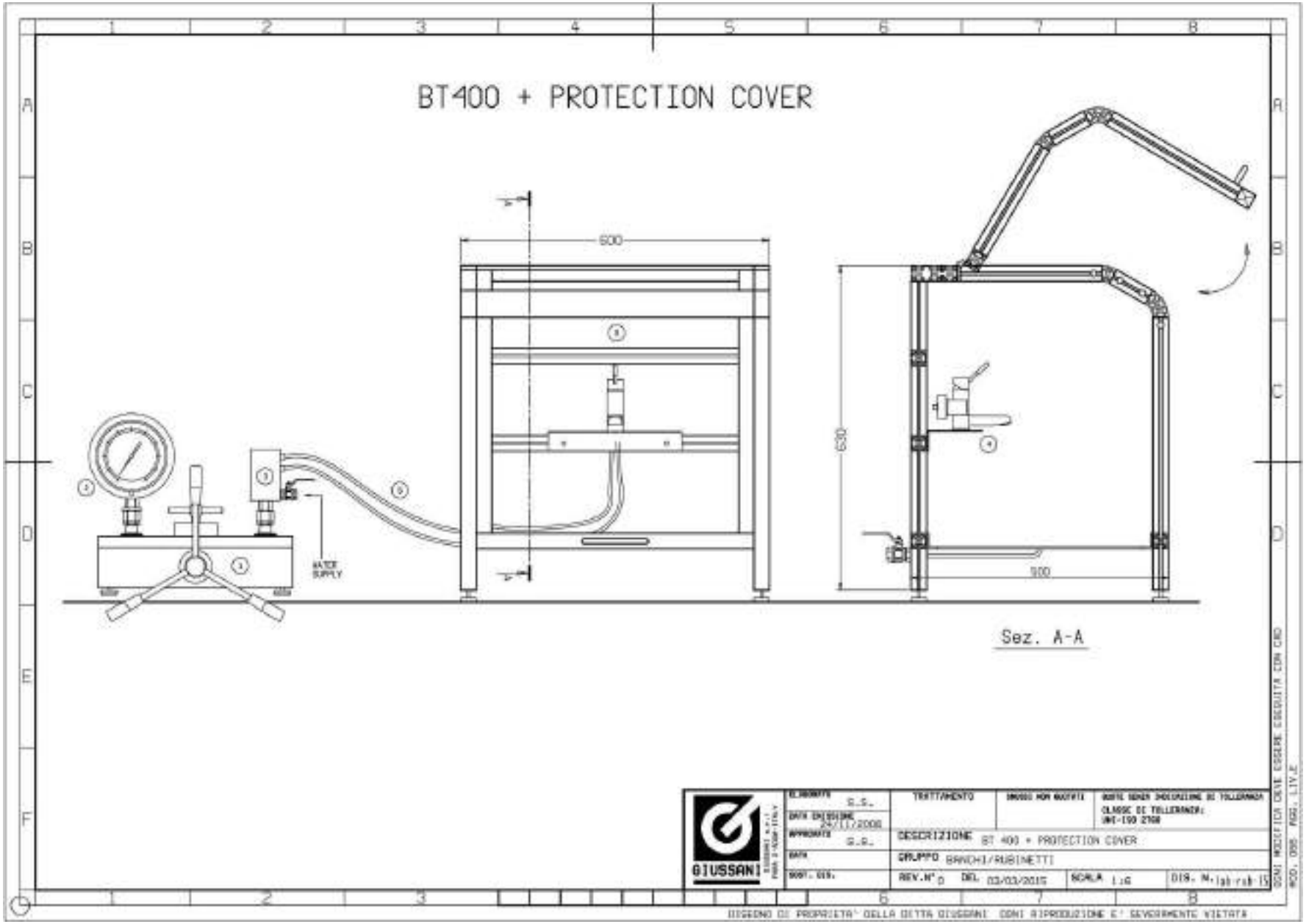
## 7.1.1 - TEST BENCH PACKAGE

This package includes a dedicated pressure transducer connectable to the test bench, it allows the visualization of the pressure signal on the PC, it allows also the memorization of the tests performed and the generation of test reports.

**Includes:**

- Dedicated pressure transducer: 100 bar – 0,1% accuracy.
- Arrangement for the connection of the transducer on the test bench.
- Dedicated software for the acquisition of the external pressure signal and test reports generation (AQ2TB-COMBI-EXT).

**Code:** BT400-TO-SWG


BT400 + PROTECTION COVER
600
650
300
WATER SUPPLY
Sez. A-A
GIUSSANI
TRATTAMENTO
DESCRIZIONE BT 400 + PROTECTION COVER
GRUPPO BANCHI/RUBINETTI
REV.N° 0 DEL 03/03/2015
SCALA 1:6
DISEGNO DI PROPRIETA' DELLA DITTA GIUSSANI OGNI RIPRODUZIONE E' SEVERAMENTE VIETATA

## 7.2 - BPR-OPZ-SHOWER

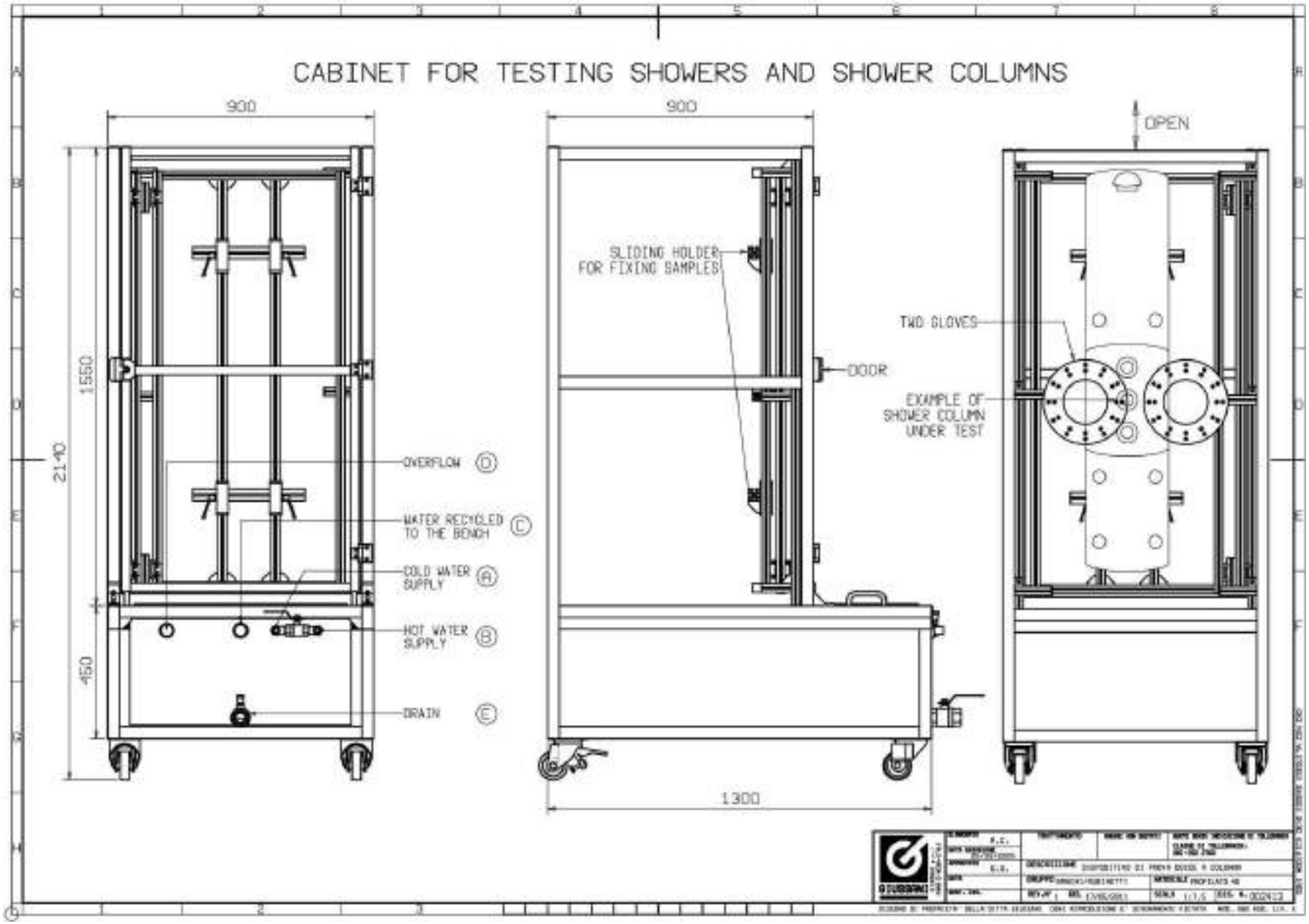
### Cabin for testing showers and showers columns

The cabin is connected to the BPR-SWG test bench by flexible hoses with additional outputs on the rear of the bench.
It makes possible to carry out the hydraulic tests by adjusting the temperature and pressure on the computer of the bench and measuring the flow-rate and, with a thermocouple inside the cabinets, the mixed water temperature.
The water collected on the floor tank is recycled to the bench by a pump.

**Mechanical characteristics:**

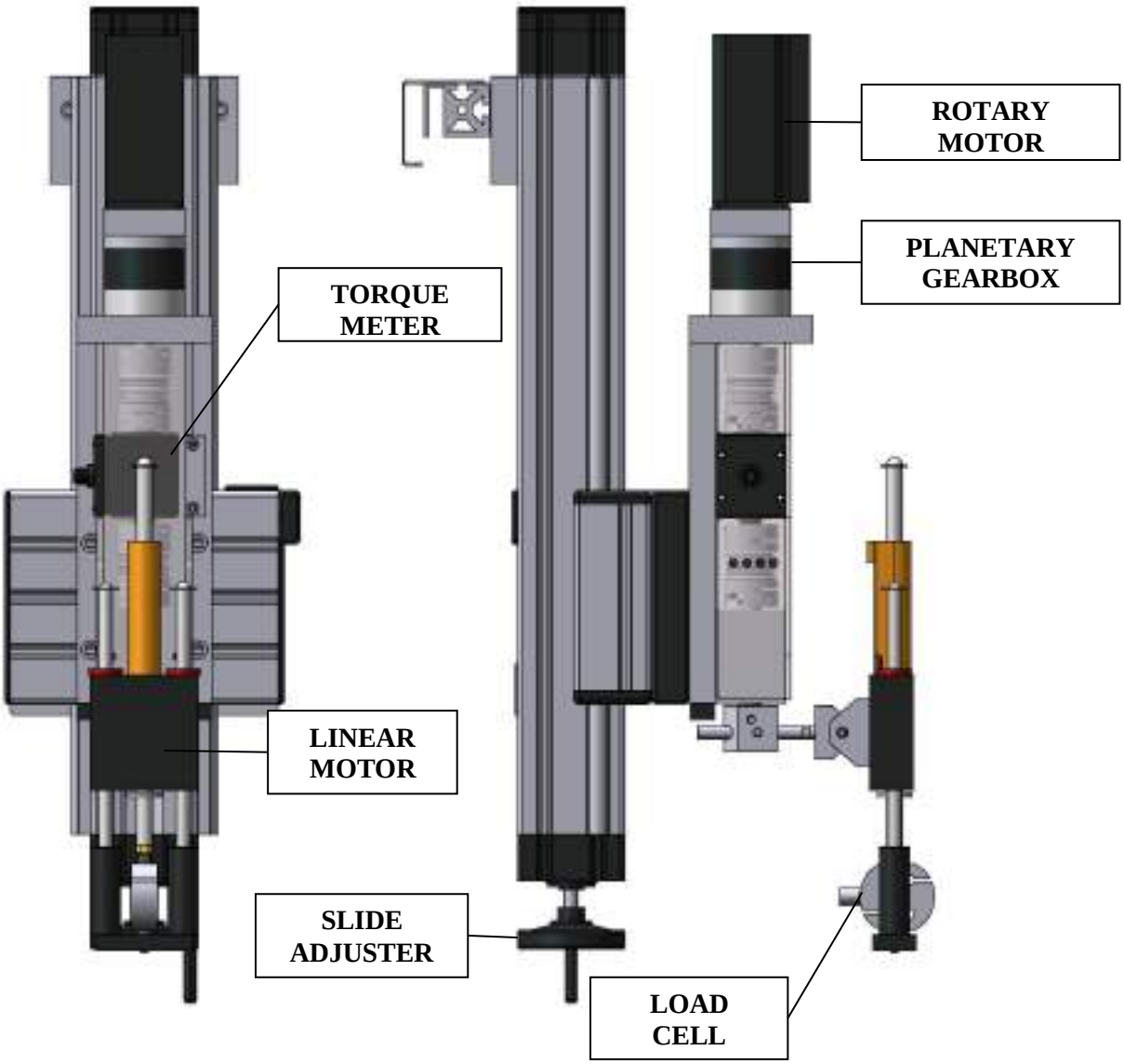
- Structural frame using high-tensile aluminium profiles, side panels glass made.
- Frontal panel equipped with two gloves for adjusting the showers during the test.
- Stainless steel tank on the floor to collect the water to the test bench by a pump.
- Door on the rear for installing the showers in the testing area.
- Movable structure frame equipped with sliding holder for fixing samples under test.
- Assembly on rotating wheels provided with parking brakes.
- Thermocouple for temperature measurement connected to the test bench.

Testing area: 820 x 820 x (h) 1550 mm.
Dimensions: 900 x 1300 x (h) 2150 mm (special size cabins available).


CABINET FOR TESTING SHOWERS AND SHOWER COLUMNS
900
900
OPEN
2140
1550
450
OVERFLOW D
WATER RECYCLED TO THE BENCH C
COLD WATER SUPPLY A
HOT WATER SUPPLY B
DRAIN E
SLIDING HOLDER FOR FIXING SAMPLES
DOOR
TWO GLOVES
EXAMPLE OF SHOWER COLUMN UNDER TEST
1300

# 8 - ADDITIONAL EQUIPMENT FOR ENDURANCE TESTS

## Endurance equipment included in options BPR-OPZ-ROTMOT and BPR-OPZ-LINMOT (see chapters 6.4 and 6.5).




## Specifications:

- Adjustable angular speed: 0,5 ÷ 300 °/s.
- Adjustable torque: 1÷10 Nm.
- Adjustable rotation angle: 0÷1.080 °.
- Adjustable linear speed: 1÷300 mm/s.
- Adjustable linear force: 1÷44 N.
- Adjustable linear position: 0÷100 mm.

**Safety cover for endurance tests on request: BPR-DOOR-LIFE**

**Note:** all the optional devices for the endurance tests can be installed on the main test station of the test bench or in dedicated separate station (test bench size: 2900 x 1100 x (h) 1800 mm and dedicated hydraulic plant with extra cost – Code: **STRUCT-BPR2900-L**).

## 8.1 - BPR-OPZ-LM

**Special equipment and dedicated software for endurance test on single lever mixers.**

This optional device allows to perform endurance test on single lever mechanical mixers according to standards: EN 817, EN 1286, ASME A112.18.1/CSA B125.1 and NF 077 TD077-03, etc.

**Software:**
**AQ2TB-LM-ENCSA**
**AQ2TB-LM-JOST (Joystick cartridge)**

**Test code:**
**ESL01**

**Note:** this option requires the installation of the **BPR-OPZ-ROTMOT** device.
**Note:** this option requires the installation of the **BPR-OPZ-LINMOT** device.

## 8.2 - BPR-OPZ-LBM

**Special equipment and dedicated software for endurance test on swivel spouts.**

This optional device allows to perform endurance test on swivel spouts according to standards: EN 817, EN 1286, EN 200, EN 1287, EN 1111, ASME A112.18.1/CSA B125.1, ect.

**Software:**
**AQ2TB-LBM-ENCSA**

**Test code:**
**ESS01**

**Note:** this option requires the installation of the **BPR-OPZ-ROTMOT** device.

## 8.3 - BPR-OPZ-LR

**Special equipment and dedicated software for endurance test on on/off controls (ceramic and traditional single taps, valves, flow control of thermostatic mixers).**

This optional device allows to perform endurance test on on/off controls according to standards EN 200, EN 1287, EN 1111, ASME A112.18.1/CSA B125.1, ect.

**Software:**
**AQ2TB-LR-ENCSA**

**Test code:**
**EFC01**

**Note:** this option requires the installation of the **BPR-OPZ-ROTMOT** device.

## 8.4 - BPR-OPZ-LPC

**Special equipment and dedicated software for endurance test on progressive cartridges.**

This optional device allows to perform endurance test according to standards EN 1111 chap. 16.2.

**Software:**
**AQ2TB-LPC-ENCSA**

**Test code:**
**EFC01**

**Note:** this option requires the installation of the **BPR-OPZ-ROTMOT** device.

## 8.5 - BPR-OPZ-LCD

**Special equipment and dedicated software for endurance test on diverter cartridges.**

This optional device allows to perform endurance test according to standards EN 1111 chap. 16.4.

**Software:**
**AQ2TB-LCD-ENCSA**

**Test code:**
**EFC01**

**Note:**
Diverter cartridges are closed in the central position.

**Note:** this option requires the installation of the **BPR-OPZ-ROTMOT** device.

## 8.6 - BPR-OPZ-LD

**Special equipment and dedicated software for endurance test on diverters.**

This optional device allows to perform endurance test on diverters according to standards: EN 817, EN 1286, EN 200, EN 1287, EN 1111, ASME A112.18.1/CSA B125.1, ect.

**Software:**
**AQ2TB-LD-ENCSA**

**Test code:**
**ED01**

**Note:** this option requires the installation of the **BPR-OPZ-LINMOT** device.

## 8.7 - BPR-OPZ-LCT

**Special equipment and dedicated software for endurance test on the thermal element of thermostatic mixers.**

This optional device allows to perform endurance test on the thermal element of thermostatic mixers according to standards: EN 1111 and NF 077 TD077-04.

**Software:**
**AQ2TB-1LM-DRIVE**

**Test code:**
**ETM02**

**Note:** this option requires the installation of the **BPR-OPZ-ROTMOT** device.

## 8.8 - BPR-OPZ-LMWS

**Special equipment and dedicated software for endurance test on multiway selectors (shower mechanism and rotating diverters).**

This optional device allows to perform endurance test on multiway selectors according to standards: ASME A112.18.1/CSA B125.1.

**Software:**
**AQ2TB-LMWSENCSA**

**Test code:**
**EMWS01**

**Note:** this option requires the installation of the **BPR-OPZ-ROTMOT** device.

## 8.9 - BPR-OPZ-LH&C

**Special equipment and dedicated software for thermal shock tests.**

This optional device allows to perform thermal shock test on showers, flexible hoses and generic devices according to standards: EN 1112, EN 1113 and NF 079 doc.8.

**Software: AQ2TB-1LD-H&C** **Test code: TS01**

***Software on request:***
**AQ2TB-1LM–H&C** **Test code: ETV01**
Life test software according to standards EN 1111 (2017) chap. 16.8.3 and EN 15092 chap. 7.10.

# 9 - BENCHES FOR SPECIFIC TESTS

## 9.1 - BP-RUMORE

### Test bench for acoustic measures

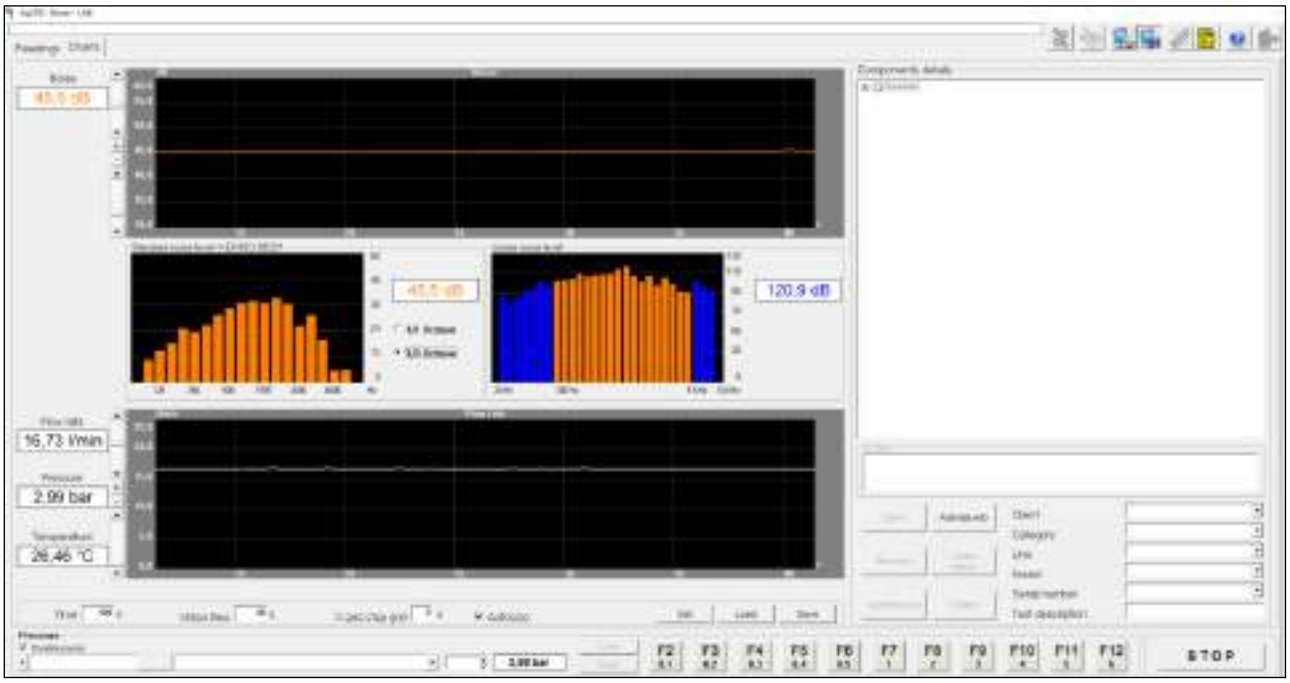
**Technical specification:**

- Hydraulic test rig according to standard EN 3822.
- Multistage vertical pump controlled by inverter and feedback pressure transducer.
- Flow meter range: 5-47 L/min; accuracy 0,25% of reading value.
- Pressure transducer accuracy: 0,1%.
- Temperature probe: Pt100.
- Noise meter and analyser, accuracy ±1 dB.
- PC including acquisition card, two hard disk for data and operative system.
- External hard disk for backup.
- UPS power supplier: 500 W.
- Monitor LCD 23" 16:9 with adjustable holder.
- Keyboard and mouse wireless.
- Holders and accessories to install the faucet under test.
- Colour laser printer A4.

**Software included:**

| | |
|---|---|
| **WINDOWS 10:** | OEM Multilanguage. |
| **MACRIUM BACKUP:** | Software for automatic back up of test data and operative system. |
| **TEAM VIEWER:** | Internet remote control. |
| **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). |
| **AQ2TB-NOISE** | Dedicated software for noise measure with acquisition of flow-rate, pressure and temperature. |

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




## 9.1.1 - Technical data:

| **WEIGHT AND DIMENSION** | |
|---|---|
| - LENGTH | 1500 mm |
| - DEPTH | 1500 mm |
| - HEIGHT | 1800 mm |
| - WEIGHT (APPROX.) | 350 kg |
| **SUPPLY CHARACTERISTICS** | |
| - ELECTRICAL SUPPLY | 400 V 3 phases + N + GND<br>50 Hz |
| - POWER | 2,0 kW |
| - HYDRAULIC SUPPLY | From internal tank |
| - HYDRAULIC PUMP MAXIMUM FLOW RATE | 47 L/min |
| - WATER DRAIN FLOW | 80 L/min |
| - WATER TEMPERATURE | 10÷35 °C |

## 9.1.2 - Service kit for BP-RUMORE

The service kit includes reductions, nipples, bends, hoses, gaskets, accessories and spare parts for the connection of the taps on the test station of the test bench.

**Code: SERV.KIT-RUMORE**

## 9.1.3 - Installation noise standard

Master noise generator (INS) 45 dB for the calibration of the bench with ISO 17025 calibration report.
Including connection bend, fittings and carrying case.
Code: **2FIBP-INS-STD**

As an alternative: installation noise standard with reference report to the INS master.
Code: **2FIBP-INS-WORK**

## 9.1.4 - HYDRAULIC RESISTANCES KIT

**Code: KIT-RESISTENZE**

Kit of hydraulic resistances for noise test (**N° 5 pcs**) according the standards EN-ISO 3822-4

| TYPE | Flow rate at 3 bar (L/s) | Flow rate at 3 bar (L/min) |
|---|---|---|
| Class Z | 0,15 | 9,0 |
| R25 class A | 0,25 | 15,0 |
| R33 class S | 0,33 | 19,8 |
| R42 class B | 0,42 | 25,2 |
| R50 class C | 0,50 | 30,0 |
| R63 class D | 0,63 | 37,8 |

Adaptors to connect the resistances to the taps under test:

- Type A1 male
  - ◊ N°1 mod. M22x1
  - ◊ N°1 mod. M24x1
  - ◊ N°1 mod. ½" G.
  - ◊ N°1 mod. ¾" G.
- Type A2 female
  - ◊ N°1 mod. M22x1
  - ◊ N°1 mod. M24x1
  - ◊ N°1 mod. ½" G.
  - ◊ N°1 mod. ¾" G.

N°1 special adaptor type A1.0 M16x1 / M28x1.

Flow rate and noise level test report at 3 bar.

## 9.2 - TEST BENCHES FOR ENDURANCE TESTS

### Test benches for mechanical endurance tests

**Note**: for detailed information, see the technical specification of BPR-2L-VM-SWG.

The test benches have been designed to carry endurance tests according to the standard EN, NF, ASME, CSA on the following products:

- *Single lever mixers.*
- *Swivel spouts.*
- *On/off controls.*
- *Diverters.*
- *Multiway selectors.*
- *Thermal element of thermostatic mixers.*
- *Thermal shock.*

The test benches are equipped with workstation with 23” LCD 16:9 monitor, acquisition card, in order to allow the real-time analysis and recording of all the test parameters; each test can be displayed or saved with the most significant diagrams.
The standard software package includes an acquisition motor device, virtual panel, calibration, messages, change of language and users.
The base configuration includes software and hardware connection device for endurance tests on single lever mixers. Additional options are available for perform endurance test on several devices:

| | |
|---|---|
| BPR-OPZ-LBM | equipment for endurance test of swivel spouts. |
| BPR-OPZ-LR | equipment for endurance test of on/off control devices. |
| BPR-OPZ-LD | equipment for endurance test of diverters. |
| BPR-OPZ-LCT | equipment for endurance test of thermal element of thermostatic mixers. |
| BPR-OPZ-LMWS | equipment for endurance test of multiways selectors. |
| BPR-OPZ-LH&C | equipment for thermal shock tests. |

Special software for endurance tests on joystick cartridge, progressive cartridge and other devices are available.

**BPR-1L-VM-SWG** - standard test bench at one station.

**BPR-2L-VM-SWG** - endurance test bench with two independent test stations

**Note**: the supply conditions (pressure and water temperature) are the same for both stations.

# *10 - PACKAGING*

## 10.1 - BPR-SWG50 packaging

Wooden box with anti-vibrating damper.
Exp. model with sealed plastic bag and ISPM treatment.
Code: 8CASSABPR240EXP

## 10.2 - BPR-SWG50 (2900) packaging

Wooden box with anti-vibrating damper.
Exp. model with sealed plastic bag and ISPM treatment.
Code: 8CASSABPR300EXP

## 10.3 - BPR-SWG50 (3200) packaging

Wooden box with anti-vibrating damper.
Exp. model with sealed plastic bag and ISPM treatment.
Code: 8CASSABPR320EXP

## 10.4 - TCW B2 packaging

Wooden box with anti-vibrating damper.
Exp. model with sealed plastic bag and ISPM treatment.
Code: 8CASSATCWB2-EXP

## 10.5 - BPR-OPZ-SHOWER packaging

Wooden box with anti-vibrating damper.
Exp. model with sealed plastic bag and ISPM treatment.
Code: 8CASSA-SHOWER

## 10.6 - BP-RUMORE packaging

Wooden box with anti-vibrating damper.
Exp. model with sealed plastic bag and ISPM treatment.
Code: 8CASSABPR160EXP

## 10.7 - Accessories packaging

Wooden box with anti-vibrating damper.
Exp. model with sealed plastic bag and ISPM treatment.
Code: 8CASSA-WORKT

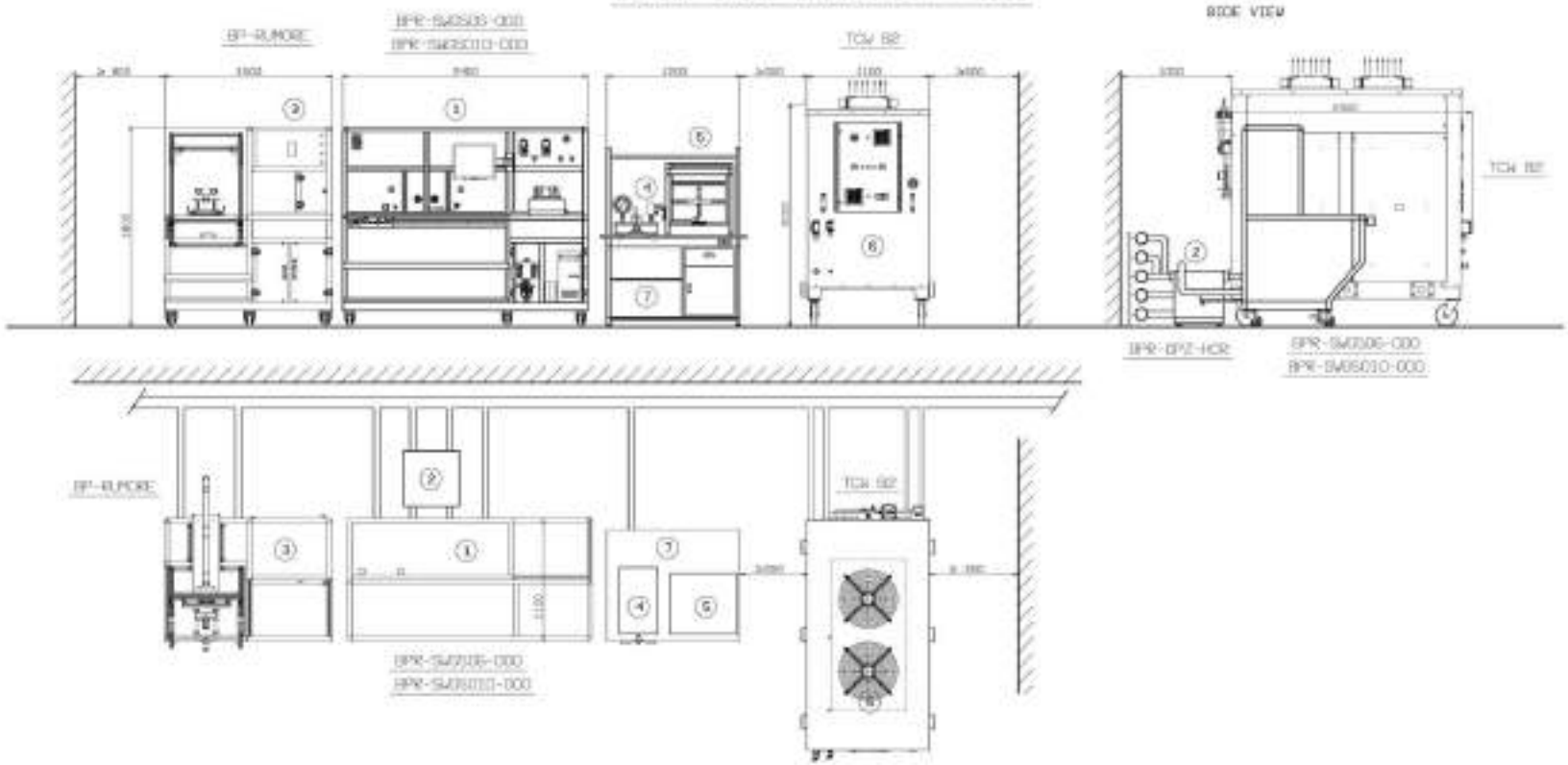
# 11 - APPENDIX

## 11.1 - Comparative table

| Physical quantities | Range | Sensibility | Accuracy | Note |
|---|---|---|---|---|
| **BPR-SWG506-000** | | | | |
| Dynamic pressure | 0,1÷6 bar | 0,01 bar | 0,1% * | * % of full scale value |
| Static pressure | 7 bar | 0,01 bar | 0,1% * | * % of full scale value |
| Temperature | 10÷90 °C | 0,01 °C | 0,3 °C | |
| Hot flow-rate | 1÷47 L/min | 0,01 L/min | 0,5% * | * % of reading value |
| Cold flow-rate | 1÷47 L/min | 0,01 L/min | 0,5% * | * % of reading value |
| **BPR-SWG5010-000** | | | | |
| Dynamic pressure | 0,1÷10 bar | 0,01 bar | 0,1% * | * % of full scale value |
| Static pressure | 11 bar | 0,01 bar | 0,1% * | * % of full scale value |
| Temperature | 10÷90 °C | 0,01 °C | 0,3 °C | |
| Hot flow-rate | 1÷47 L/min | 0,01 L/min | 0,5% * | * % of reading value |
| Cold flow-rate | 1÷47 L/min | 0,01 L/min | 0,5% * | * % of reading value |
| **BPR-OPZ-C-TM** | | | | |
| Angular speed | 0,5÷300 °/s | 0,1 °/s | - | Angular degrees |
| Angular rotation | 3600 ° | 0,01 ° | 0,1 ° | Angular degrees |
| Torque | 0,5÷10 Nm | 0,1 Nm | 0,1 Nm | |
| **BPR-OPZ-HP** | | | | |
| Pressure | 1÷100 bar | 0,01 bar | 0,1% * | * % of full scale value |
| Pulse frequency | Max. 1 Hz | - | - | |
| **BPR-OPZ-DIGM** | | | | |
| Pressure | 0÷1000 mbar | 0,1 mbar | 0,5 mbar | |
| **TCW B2** | | | | |
| Cold temperature | 10÷25 °C * | 0,1 °C | 0,5 °C | 5 °C for special executions |
| Hot temperature | 40÷90 °C * | 0,1 °C | 0,5 °C | 95 °C for special executions |
| Thermal capacity | 12+12 L/min | - | - | Continuous service with hot water at 65 °C and cold water at 15 °C |

# HYDRAULIC LABORATORY FOR SANITARY TAPWARE

## LAYOUT BASIC LABORATORY - 2023

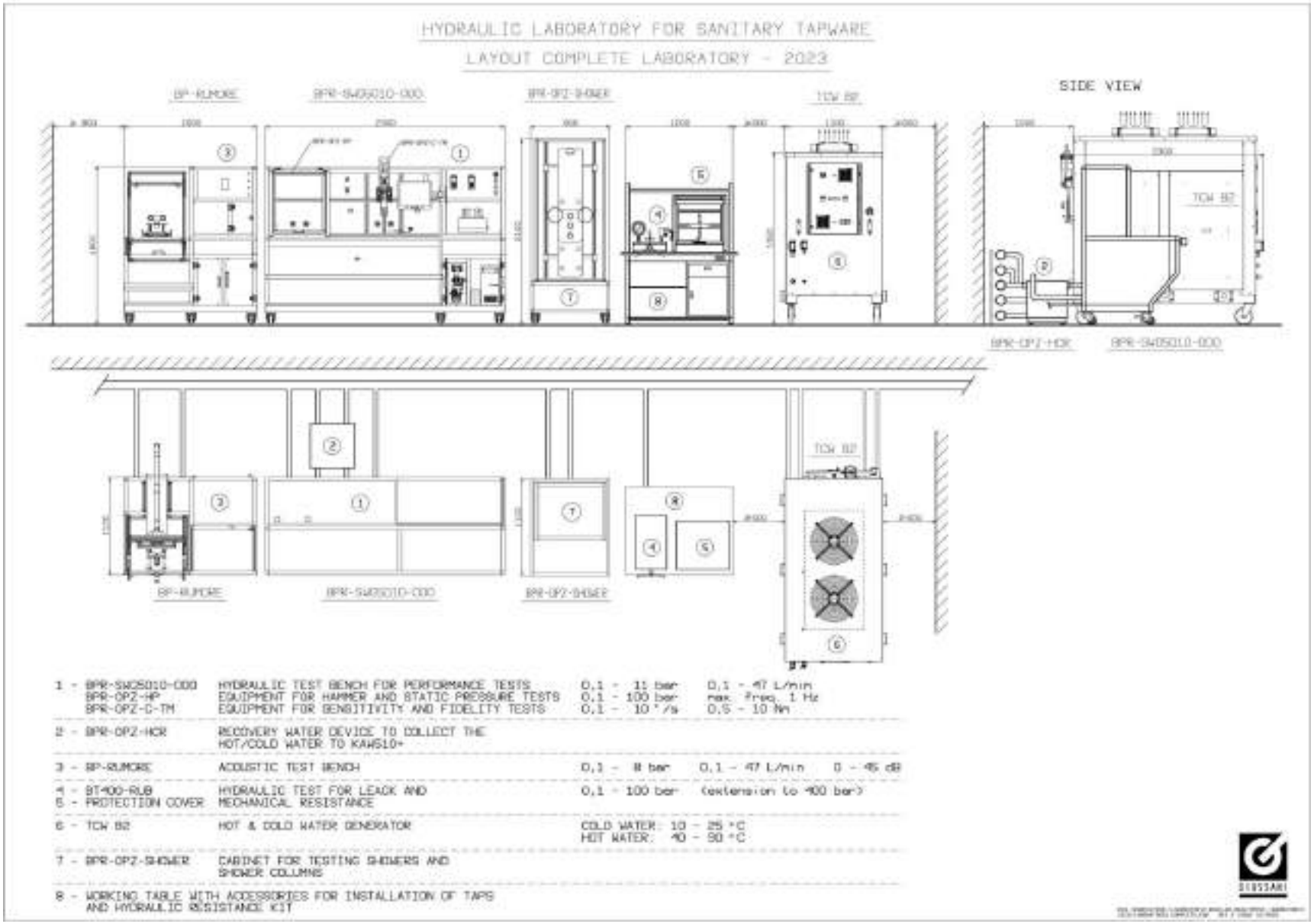



| | | | | |
|---|---|---|---|---|
| 1 - BPR-SWGS06-000<br>BPR-SWGS010-000 | HYDRAULIC TEST BENCH FOR PERFORMANCE TESTS<br>HYDRAULIC TEST BENCH FOR PERFORMANCE TESTS | 0,1 - 7 bar<br>0,1 - 11 bar | 0,1 - 47 L/min<br>0,1 - 47 L/min | |
| 2 - BPR-OPZ-HOR | RECOVERY WATER DEVICE TO COLLECT THE HOT/COLD WATER TO TCW B2 | | | |
| 3 - BP-RUMORE | ACOUSTIC TEST BENCH | 0,1 - 8 bar | 0,1 - 47 L/min | 0 - 45 dB |
| 4 - BT400-RUB<br>5 - PROTECTION COVER | HYDRAULIC TEST FOR LEACK AND MECHANICAL RESISTANCE | 0,1 - 100 bar | (extension to 400 bar) | |
| 6 - TCW B2 | HOT & COLD WATER GENERATOR | COLD WATER: 10 - 25 °C<br>HOT WATER: 40 - 90 °C | | |
| 7 - WORKING TABLE WITH ACCESSORIES FOR INSTALLATION OF TAPS AND HYDRAULIC RESISTANCE KIT | | | | |

GIUSSANI

# HYDRAULIC LABORATORY FOR SANITARY TAPWARE

## LAYOUT COMPLETE LABORATORY - 2023




| | | | | |
|---|---|---|---|---|
| 1 - BPR-SW2S010-000<br>BPR-OPZ-HP<br>BPR-OPZ-C-TM | HYDRAULIC TEST BENCH FOR PERFORMANCE TESTS<br>EQUIPMENT FOR HAMMER AND STATIC PRESSURE TESTS<br>EQUIPMENT FOR SENSITIVITY AND FIDELITY TESTS | 0,1 - 11 bar<br>0,1 - 100 bar<br>0,1 - 10 °/s | 0,1 - 47 L/min<br>max. freq. 1 Hz<br>0,5 - 10 Nm | |
| 2 - BPR-OPZ-HCR | RECOVERY WATER DEVICE TO COLLECT THE HOT/COLD WATER TO KAWS10+ | | | |
| 3 - BP-RUMORE | ACOUSTIC TEST BENCH | 0,1 - 8 bar | 0,1 - 47 L/min | 0 - 45 dB |
| 4 - BT400-RUB<br>5 - PROTECTION COVER | HYDRAULIC TEST FOR LEACK AND MECHANICAL RESISTANCE | 0,1 - 100 bar | (extension to 400 bar) | |
| 6 - TCW B2 | HOT & COLD WATER GENERATOR | COLD WATER: 10 - 25 °C<br>HOT WATER: 40 - 90 °C | | |
| 7 - BPR-OPZ-SHOWER | CABINET FOR TESTING SHOWERS AND SHOWER COLUMNS | | | |
| 8 - WORKING TABLE WITH ACCESSORIES FOR INSTALLATION OF TAPS AND HYDRAULIC RESISTANCE KIT | | | | |