BPR-SWG

PRODUCTION TEST BENCHES FOR THERMOSTATIC MIXERS - LINE 2024

INDEX

GIUSSANI

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 - BPRODUCTION TEST BENCH WITH ONE STATION

2.1 - BPR-SWG5010-1TP

- 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.

2.1.1 - Applications:

1) AUTOMATIC SEQUENCE FOR PRODUCTION TESTS OF THERMOSTATIC MIXERS:
- Checking the proper functioning of thermostatic mixers with dedicated clamping device and dedicated software sequence. Manual regulation of the device under test made by the operator.

2) 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.

3) 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.

4) 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.

5) 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) WINDOWS 10 OEM Multilanguage.

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

D) SOMACHINE software for management of PLC.

E) 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:

- **One test station** with supply valves for hot and cold lines and by-pass. Pressures and temperatures measured upstream.
- **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 standard, cold-hot water supply, two temperature probes and three pressure transducers (hot, cold and differential pressure), internal ball valves with pneumatic actuator.
- **TcK** probe for measuring the mixed water temperature. The position of the probe (distance from the outlet) should be discussed with your technical department.
- **Heat exchanger** to warm the compressed air and blow the components at the end of the test.
- **Box control for the execution of the test sequence.** Includes emergency button, start, stop, continue and repeat buttons and alarm lamps.

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 2024** 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.
  - ◊ 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.

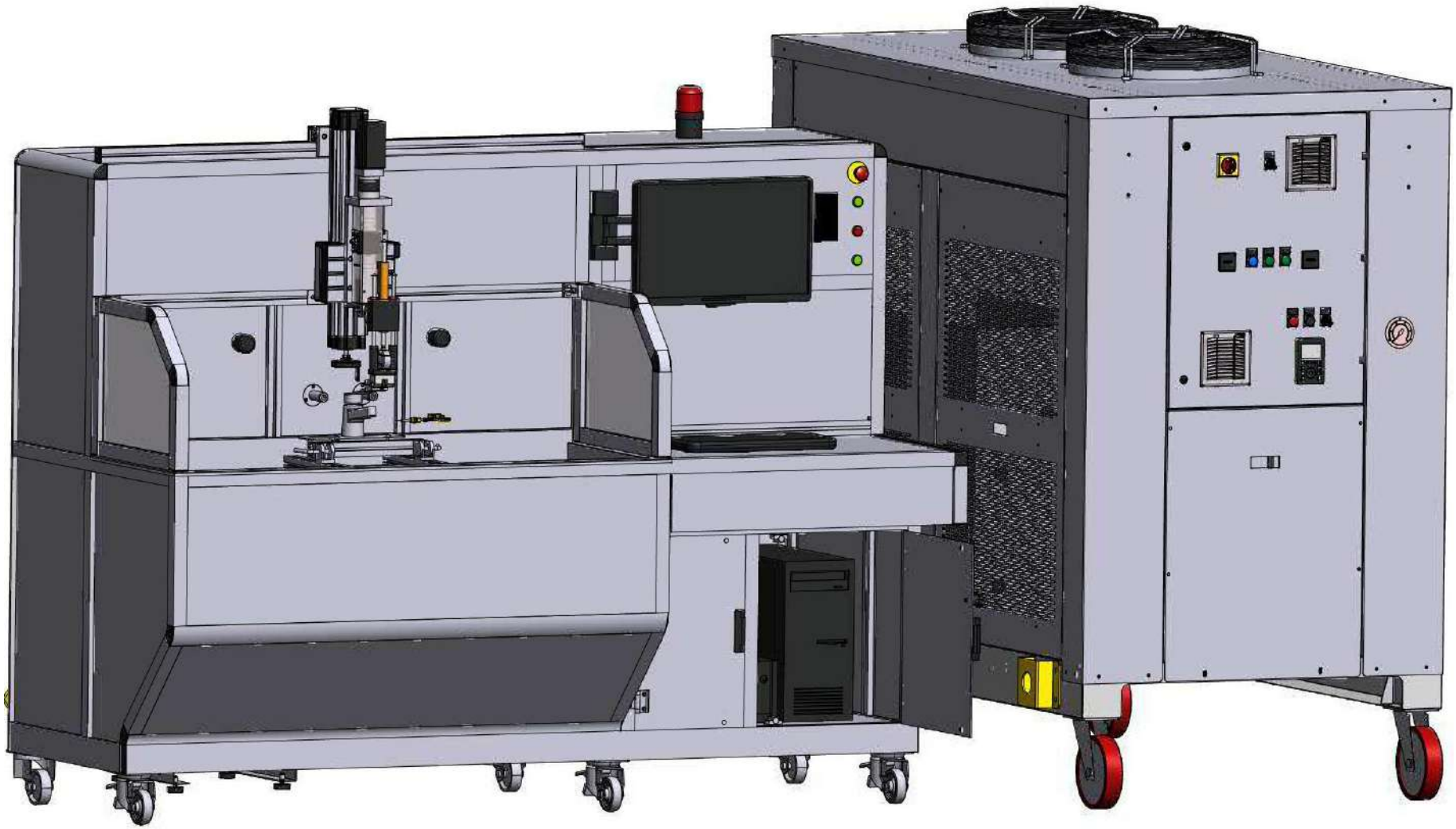
The measuring equipment assembled on the bench is equipped with an inspection report relative to the operational fields and performed according to the ISO 9001 standards, with reference to the ACCREDIA (Italian Calibration Service) primary samples.

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 (+100 mm)
- WEIGHT (APPROX.)	600 kg
SUPPLY CHARACTERISTICS	
- ELECTRICAL SUPPLY	400 V 3 phases + N + GND 50 Hz
- POWER	6,5 kW
- HYDRAULIC SUPPLY (From external tanks or TCW B2)	50 L/min
- PNEUMATIC SUPPLY	6÷9 bar
- WATER DRAIN FLOW	80 L/min
- WATER TEMPERATURE (From external tanks or TCW B2)	10÷90 °C

2.2 - EXAMPLE



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

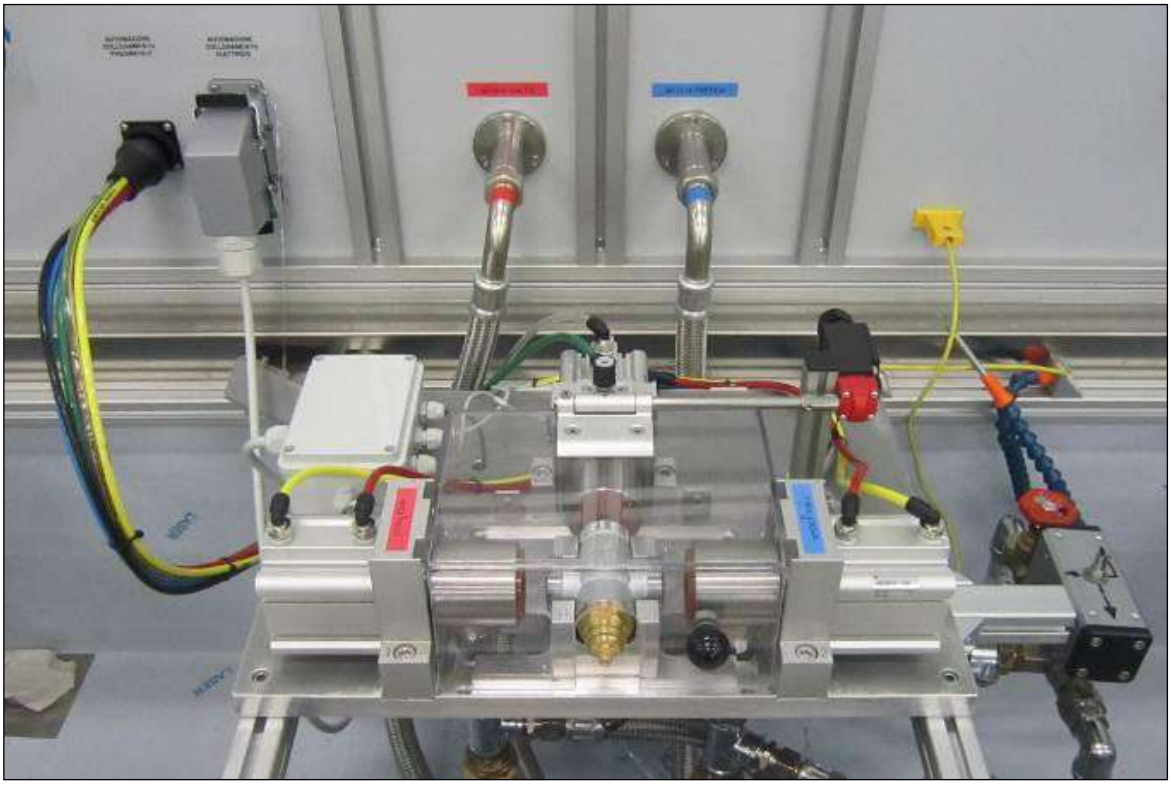
3 - PRODUCTION DEVICES

3.1 - BPR-OPZ-TP-XX-A

Clamping device for automatic production tests on thermostatic mixers.

The device includes:

- Aluminium backing plate.
- N° 3 **pneumatic cylinders** for fast clamping and locking of cartridge under tests.
- Clamping system with sealing made by pads or O-Rings.
- **Micro switches** in order to verify the presence of piece and the correct clamping of each piston.
- Support adapters for testing different kinds of taps on the same device.
- Flow-rate regulation valve.
- The test station includes n°3 **quick F coupling connections** for water supply, drain and blowing. These connections guarantee low-pressure drop and faster procedure for the installation of the device. The corresponding M connection are included in each clamping device.

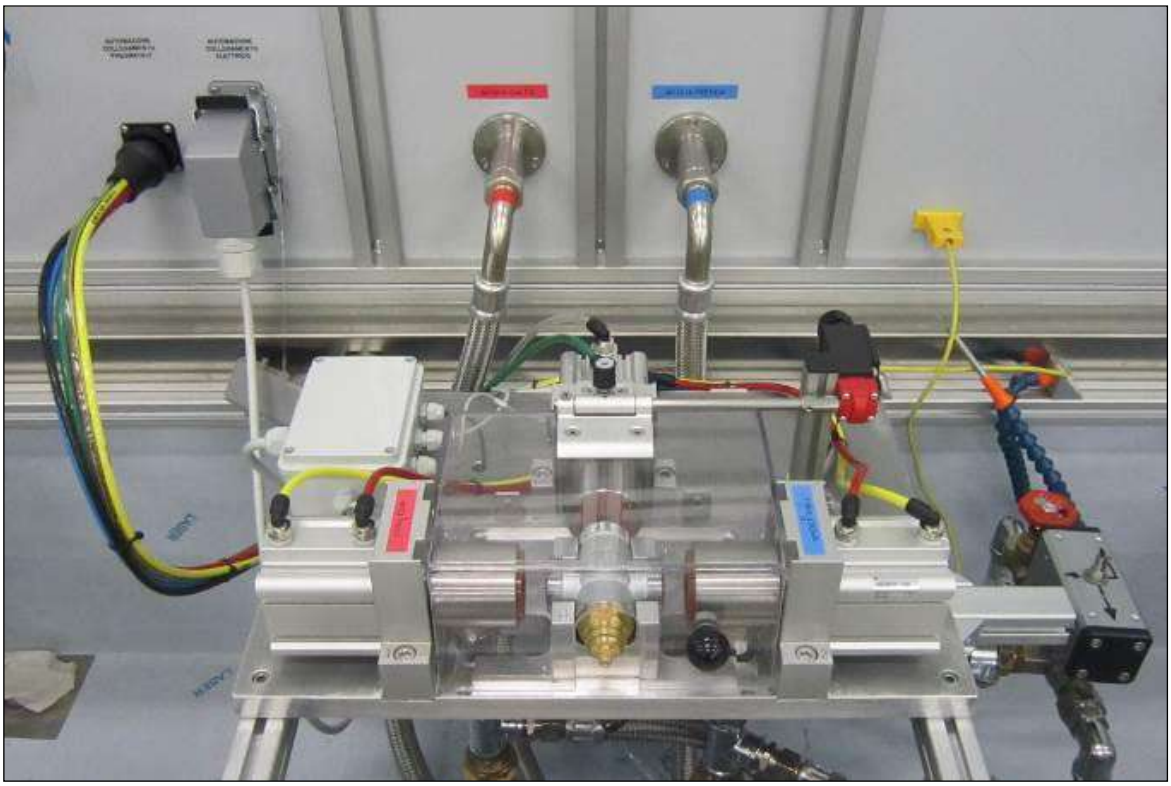


3.2 - BPR-OPZ-TP-XX-B

Clamping device for automatic production tests on thermostatic mixers.

The device includes:

- Aluminium backing plate.
- N° 3 **pneumatic cylinders** for fast clamping and locking of cartridge under tests.
- Clamping system with sealing made by pads or O-Rings.
- **Micro switches** in order to verify the presence of piece and the correct clamping of each piston.
- Support adapters for testing different kinds of taps on the same device.
- Flow-rate regulation valve.
- The test station includes n°3 **quick F coupling connections** for water supply, drain and blowing. These connections guarantee low-pressure drop and faster procedure for the installation of the device. The corresponding M connection are included in each clamping device.



3.3 - AQ2TB-TMV-PROD-NF

Description: Generic software for production tests on thermostatic mixers including safety test according NF standard.

Test sequence: adjustable test sequence with manual regulation of the device under test made by the operator.

The software allows to set up to 6 personalized step according the technical specification of each device under tests.
With this solution is possible to have the maximum programming flexibility.
Each sequence can be saved and applied when requested.

List of available steps:

- MIN temperature research.
- MAX temperature research.
- Mixed temperature research.
- NF safety test.
- Blowing.

The software includes a two “Giussani” reports: one of each sample tested and one summary report for each lot.

3.4 - AQ2TB-TMV-PROD-EN

Description: Generic software for production tests on thermostatic mixers including safety test according EN standard.

Test sequence: adjustable test sequence with manual regulation of the device under test made by the operator.

The software allows to set up to 6 personalized step according the technical specification of each device under tests.
With this solution is possible to have the maximum programming flexibility.
Each sequence can be saved and applied when requested.

List of available steps:

- MIN temperature research.
- MAX temperature research.
- Mixed temperature research.
- EN safety test.
- Blowing.

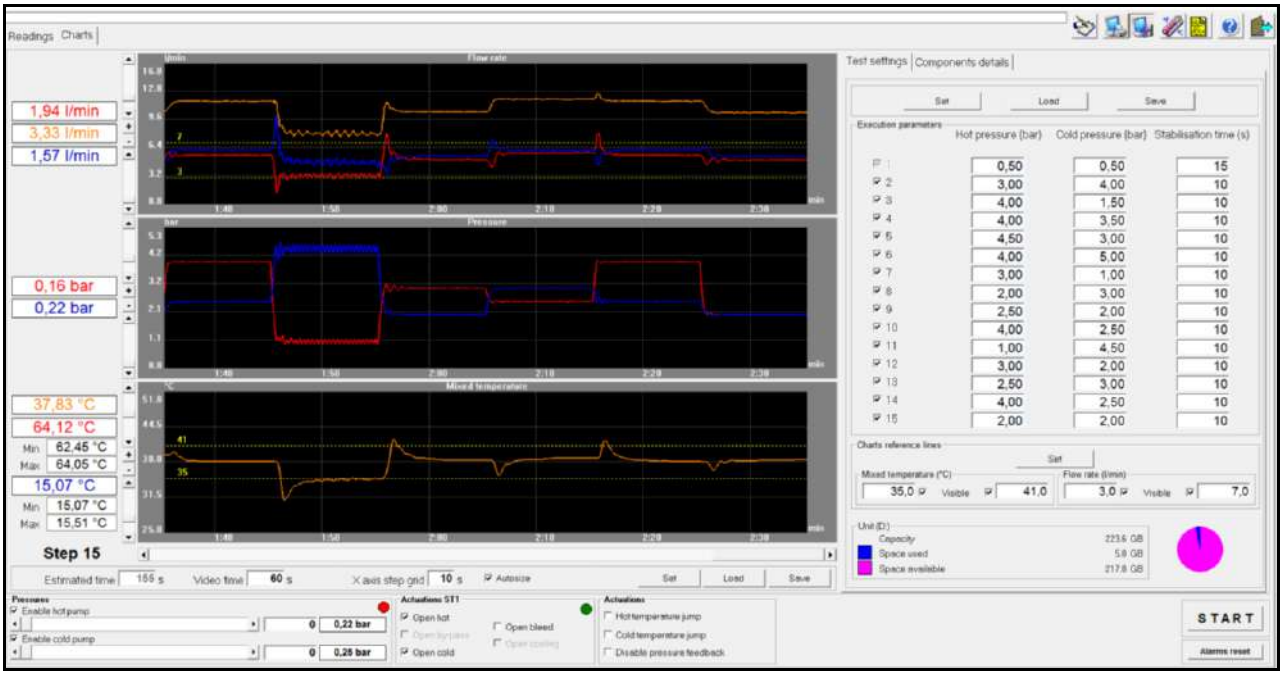
The software includes a two “Giussani” reports: one of each sample tested and one summary report for each lot.

4 - OPTIONAL SOFTWARE

4.1 - Software for laboratory tests

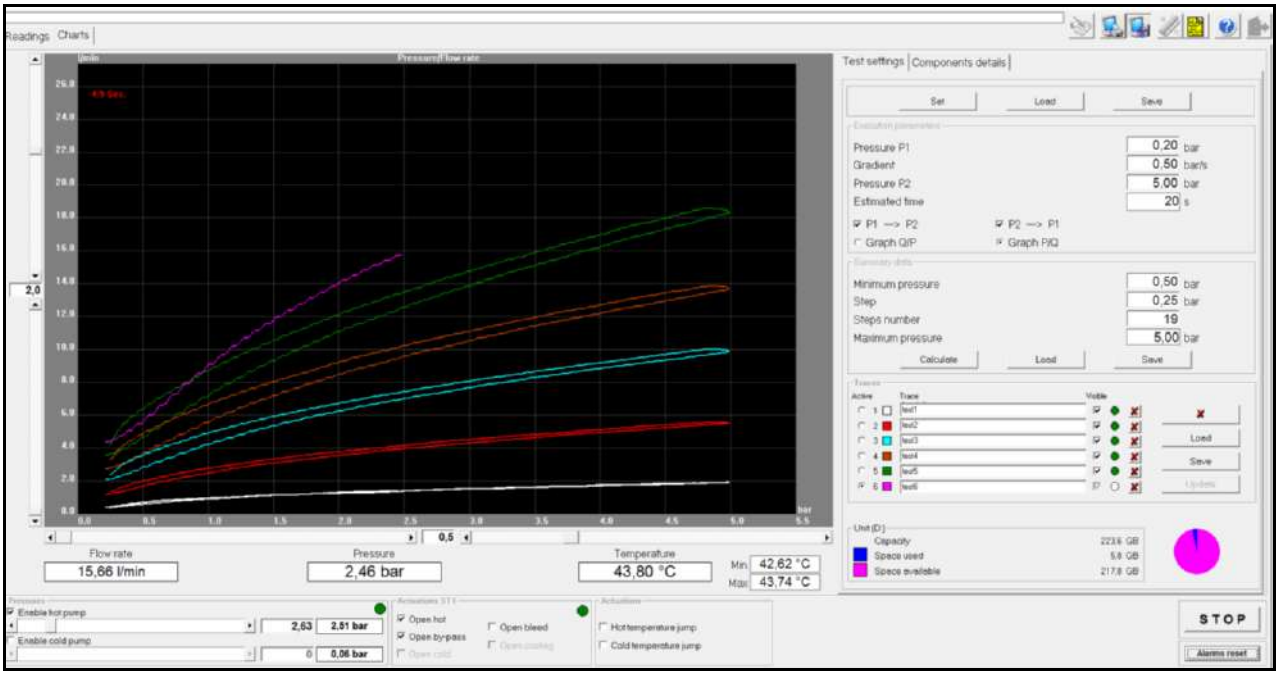
1) AQ2TB-FLOW-STEP test code: F05

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

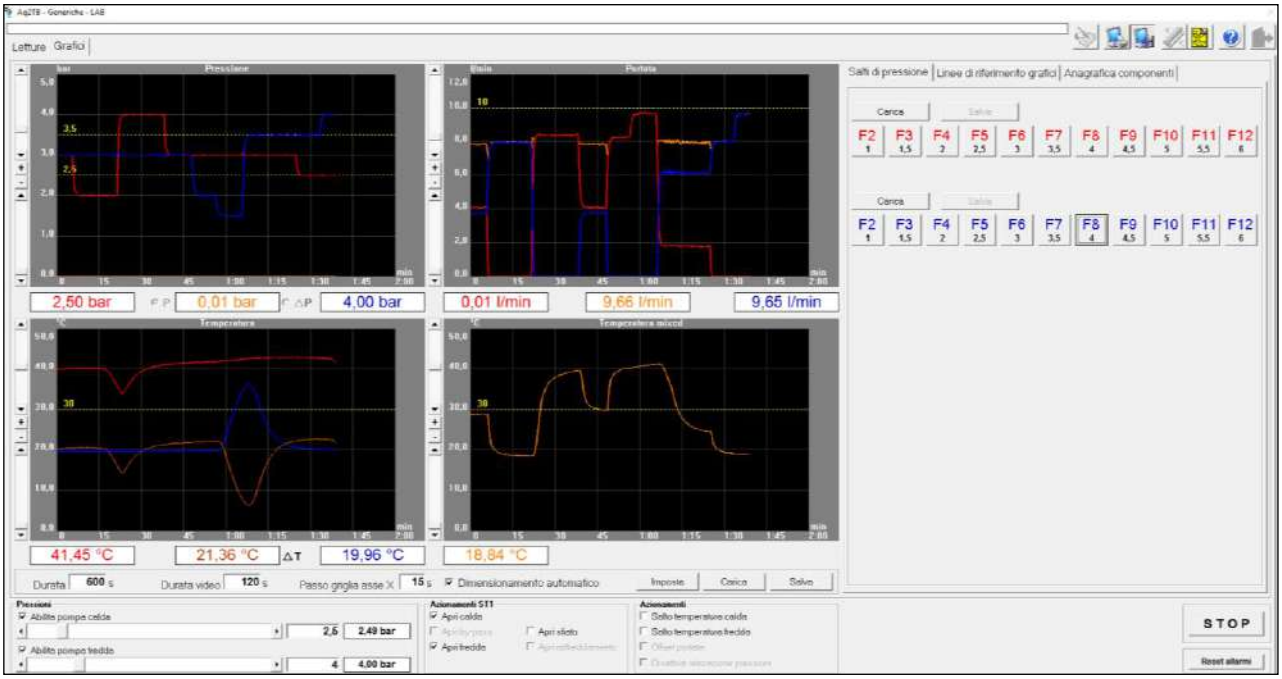
Flow-rate test with linear increase and/or decrease of pressure and multi-trace flow-rate/pressure or pressure/flow-rate charts.

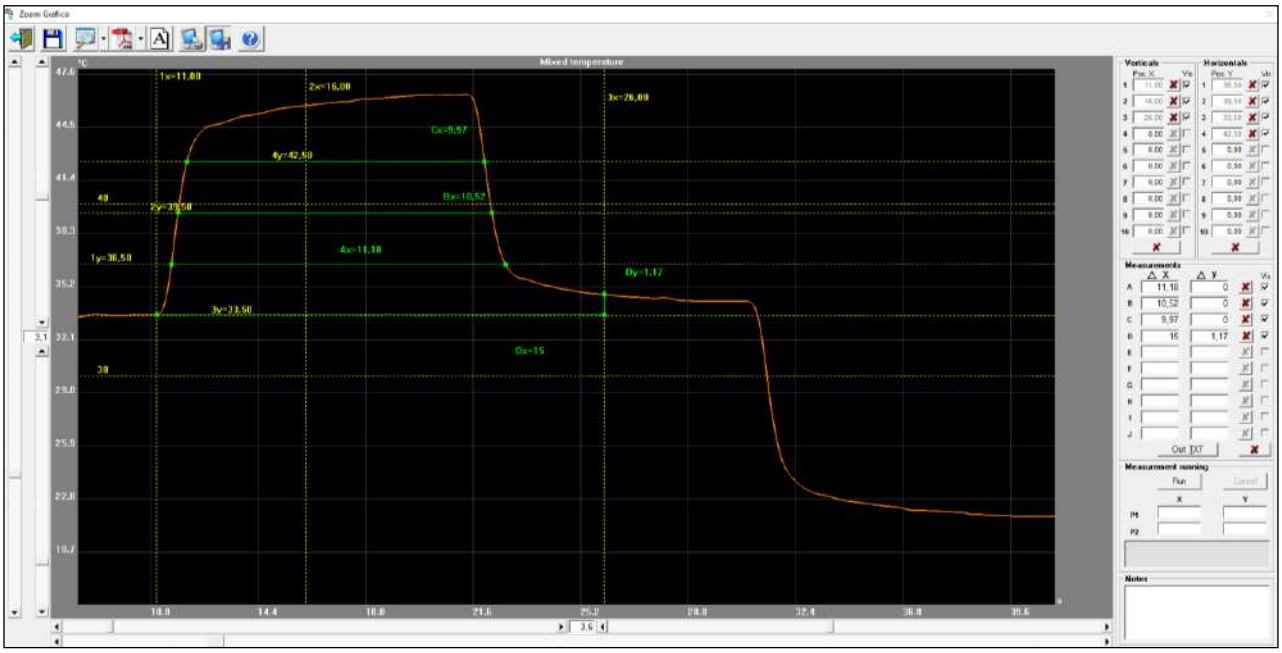


3) AQ2TB-COMBILAB+

Basic software for the measure in real time of 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**





4) 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).

5) AQ2TB-M-LAB-EN test code: ST01

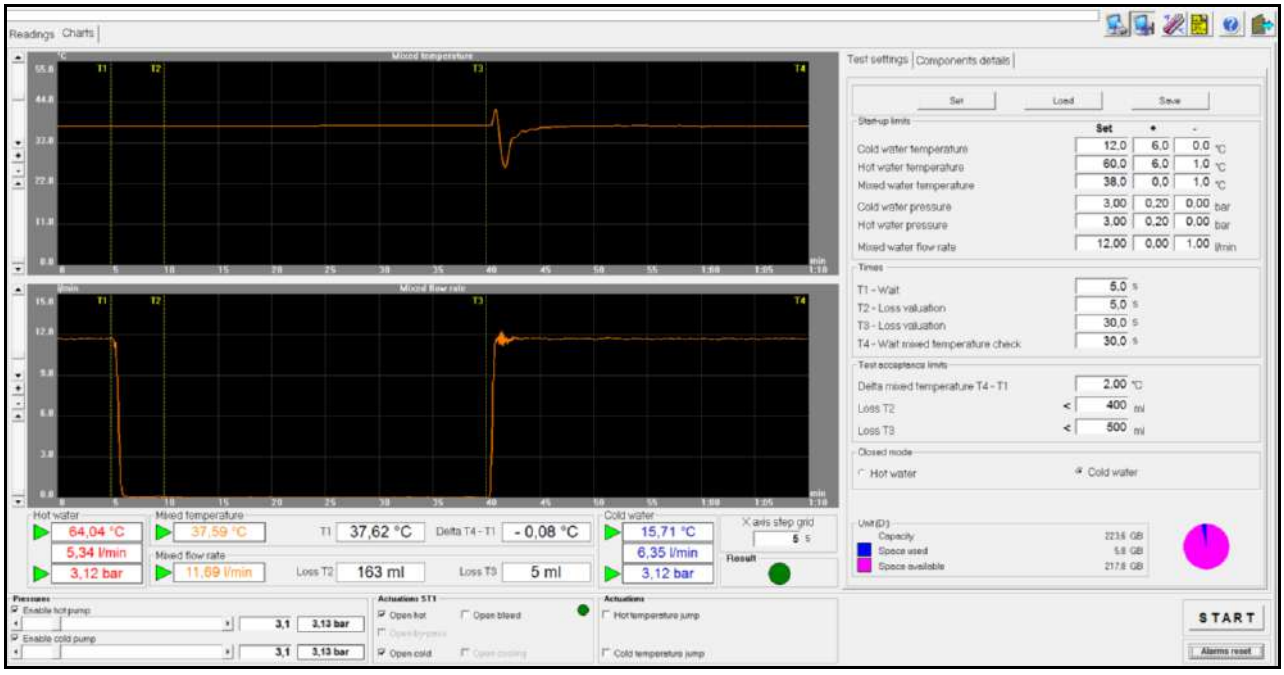
Software for performing water supply failure tests on thermostatic mixers, adapt for detecting hot water loss in case of cold/hot-water failure, in accordance with EN 1111-2017 Standard.

6) 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.

7) 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.



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.

4.2 - 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.

4.3 - 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.

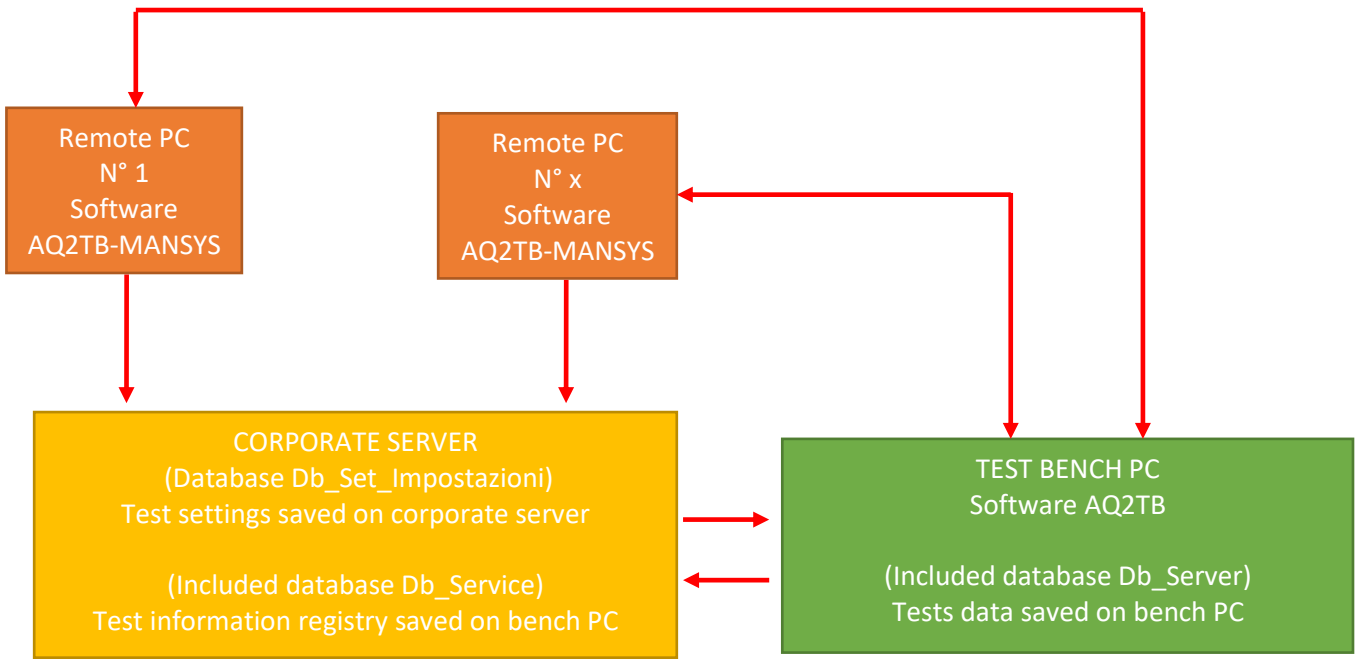
Software specification:

- 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.



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: 450 x 550 x (h) 500 mm.
Electrical supply: 240 V - 50 Hz.
Power: 1,5 kW.
Weight: approx. 80 kg.
Packing included into the other box.

6 - Optional equipment and applications

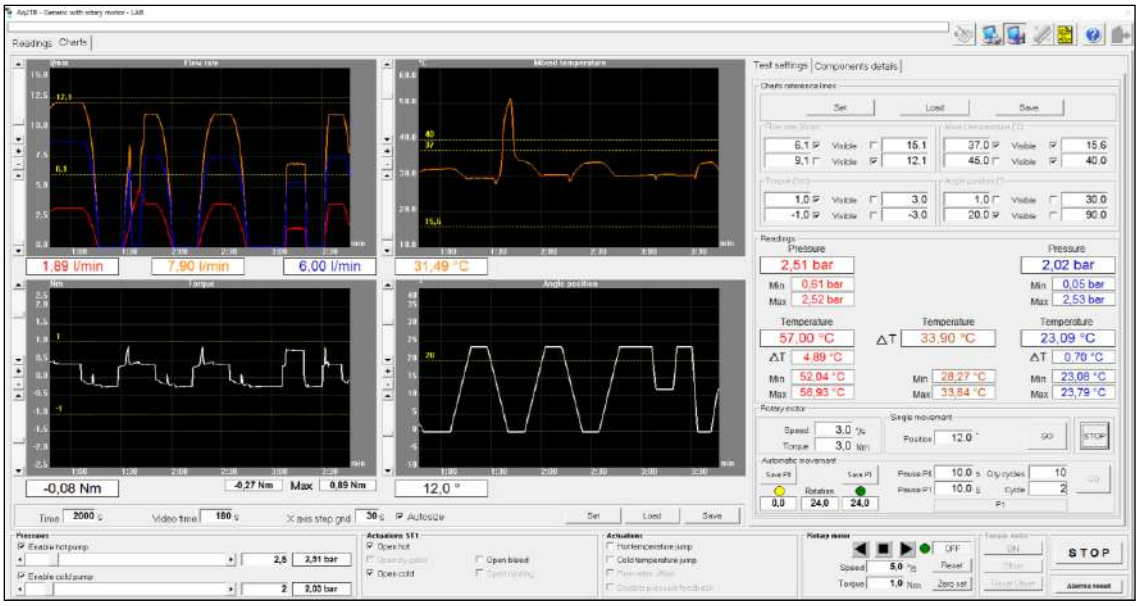
6.1 - BPR-OPZ-ROTMOT

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 °.

6.1.1 - 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.

6.2 - 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 - FITTINGS KIT

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**

6.4 - 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-RL**)

7 - PACKAGING

7.1 - BPR-SWG50 packaging

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

7.2 - TCW B2 packaging

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

7.3 - Accessories packaging

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