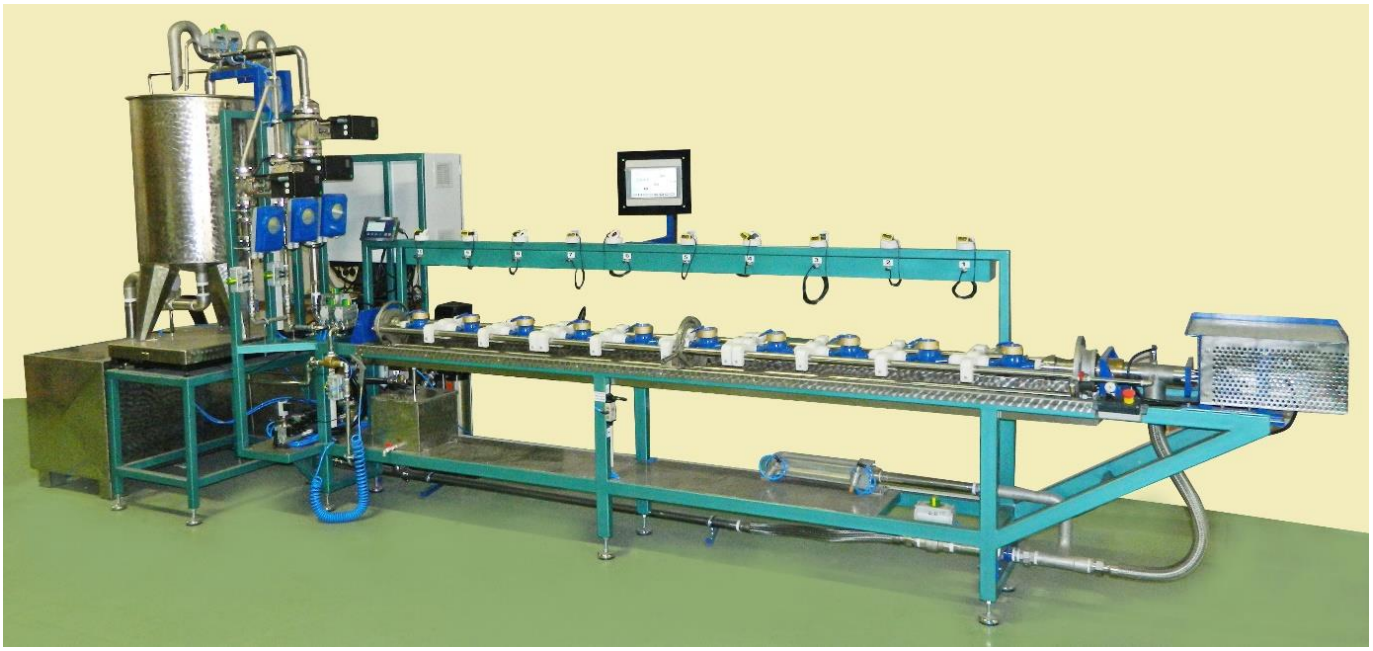
BAYLAN
WATER METERS



BTB-10
FULLY AUTOMATIC TEST BENCH

Model	: BTB – 10
Nominal Diameter	: DN15 – DN50
Flowrate Range	: 10 l / h – 32 m^3 / h

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1. General Information

The correction of the water meter is determined via calculating the errors at various flows using Baylan BTB-10 Fully Automatic Test Bench. In addition to that, whether the flow meter has a leakage under high pressures can be checked by means of the leakage test. There by, the strength of the water meter against high pressures is tested.

The movement of the piston which compresses meters is controlled by the switch located on control panel. Except the control of the switch, rest of all systems can work fully automatically.

Baylan BTB-10 Test Bench can perform tests within required flowrates for the meters between DN15 and DN50. The table below shows the quantity of the meters that can be connected to the bench in terms of nominal diameters and Q_3 measuring flow rates.

Quantity of water meters can be connected and the Q_3 value of the meters according to the nominal diameters and lenghts.

Lenght (mm)	Pieces	Q_3 (m^3/h)	Nominal Diameter
165	10	2,5	15
190	10	2,5	20
190	10	4,0	20
260	6	6,3	25
260	6	10	32
300	5	16	40
300	5	25	50
200(FLANGED)	2	25	50(FLANGED)

Baylan BTB-10 Fully Automatic Test Bench provides tests according to the directive and standards below;

Recommended	OIML R49 E13
Standard	TS EN ISO 4064 E2015
Directive	2014/32/EU (MID) MI-001

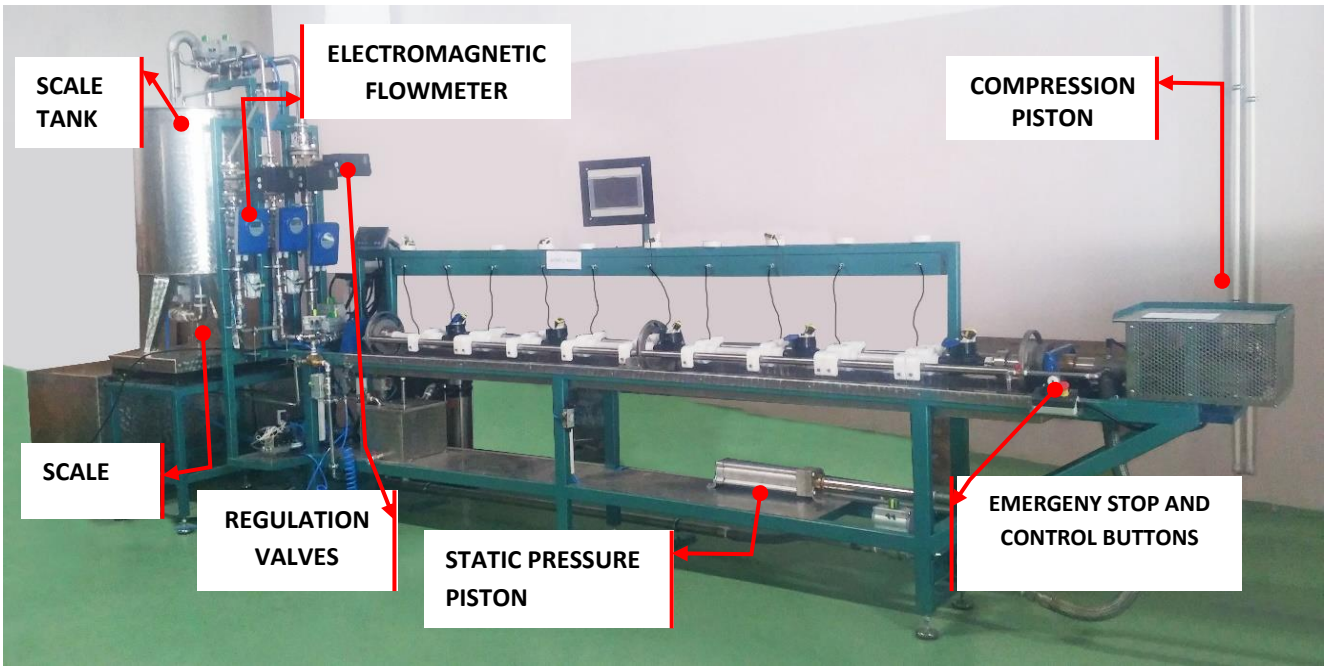


Figure 1 - *Components of the Baylan Test Bench*

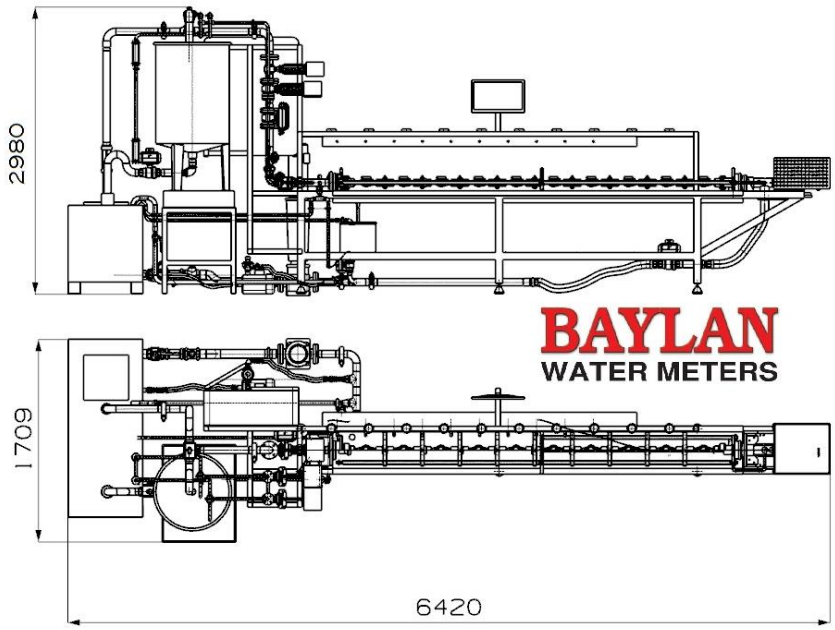


Figure 2 - BTB-10 DN15-DN50 Single Line Test Bench Dimensioned Technical Drawing

"Due to continuous development of our products, we reserve the right to modify our product design or construction without prior notice."

2.Components of the Test Bench

2.1. Measuring Components

- ### Flowmeter

In order to carry out the test within required flows, the flows should be stabilized at the given values. The test bench has three electromagnetic flow meters, whose measuring range is between 10 l/h – 32 m^3/h . (Figure 3)

Specifications	
Flowmeter Type	Electromagnetic Flowmeter
Electrodes	Fixed Two Pairs of Hastelloy C2
IP Koruması	IP 66/67 EN 60529
Display Screen	IFC 100 Compact Model
Voltage	24V

Figure 3 – Flowmeter

- ### Pressure Transmitter

Pressure transmitters are located at the inlet and outlet of the test bench and they are capable of measuring pressures between 0-40 Bar. Transmitters transfer the measured data to the PLC screen and related computer.(Figure – 4)

Specifications	
Measuring Range	0-40 Bar
Control Signal	4-20mA

Figure 4 – Pressure Transmitter

- ## Temperature Sensors

The temperature sensors are located at the inlet and outlet of the test line of the bench. This sensors can measure between 0-100 °C. The sensors will transfer the measured temperature values to the PLC screen and to the computer in order to calculate the actual volume of the water.(Figure 5)

Specifications	
Measuring Range	0-100 °C
Temperature Sensor	PT 100

Figure 5 – Temperature Sensor

- ## Optic Sensors

Optic sensors are reading sensors that calculates the error curve of the meter by counting the movement of sensitive flow indicator. (Figure 6) BTB-10 Fully Automatic Test Bench is equipped with 10 sensors that can send the read data to PLC.

Specifications	
Accuracy Class	1
Setting	Manual or Automatic
Output	PNP ve NPN
Exterior Material	ABS
IP Protection Class	IEC IP67; NEMA 6
Voltage	24V

Figure 6 – Optic Sensor

- ## Electronic Scale

In order to calculate the test results and error curves, BTB-10 Fully Automatic Test Bench has a scale which can transfer datas to the related computer. The tank placed on the scale has a capacity of holding up to 300 kg of water. (Figure 7)

Scale Specifications	
Measuring Range	300 kg (*)
Connection Cable	2,5 meter
Pre-load Capacity	64 kg
Repeatability	1 g
Linearity	2 g±
Sensitivity	5 g
IP Class	IP66 veya IP67 Cleanable Unit
Working Principle	Loadcell with Electromagnetic level balancing + IDNET converter

Scale Screen	
IP Class	69k
Serial	RS232
Body Type	AISI 304
Screen	LCD Crystal Screen

Figure 7 – Electronic Scale Screen

(*) NOTE: The maximum limit can be set from PLC screen to prevent the scale tank from overflowing.

2.2.Pumps

BTB-10 Fully Automatic Test Bench has 2 different pumps working seperatly for high and low flowrates. In order to provide clean water passage between the tanks and the pumps, closing valves and control valves are equiped with filters.

➢ Pumps to be used in the system can be optionally choose according to the brand desired by the client.

- ## Big Pump

For the flowrates higher than 0,5m^3/h.

Big Pump Specifications	
Control Type	Frequency Controlled
Working Principle	Centrifuge
Obtainable Working Pressure	11 bar
Maximum Flowrate	31,25 m^3/h (*)

- ## Small Pump

For the flowrates lower than 0,5m^3.

Small Pump Specifications	
Control Type	Frequency Controlled
Obtainable Working Pressure	5 bar
Maximum Flowrate	0,5 m^3/h (*)

Figure 8 – Small and Big Pump

(*) NOTE: The maximum flow of the big pump rate is specified by calculating the Q_4 value of the biggest meter that can be connected to the test bench. Pumps together with pressure losses will provide at least this value.

2.3.Water Tanks

Specifications of Water Tanks	
Material Type	AISI 304 Stainless Steel
Main Water Tank	600 liter
Scale Tank	300 liter
Discharge Tank	12 liter

- ## Main Water Tank

Main water tank is a tank that where all the water is collected after the measurement of the water mass. In order to prevent any overflow, the appendent water-gauge inside of the tank sends order to the system to stop water flow.

Figure 9 – Main Water Tank

- ## Scale Tank

Scale tank is the tank that measures and collects the weight of water that water meters passes through within the testing process. If the weight is over the capacity of the tank the PLC system will shut down the inlet valve and in addion to this discharging valve will start working in order to discharge the water from scale tank to main tank. Besides, water-gauge which located inside of the scale tank, does the same job as flooding security.

Figure 10 – Scale Tank

- ## Discharge Tank

In the process of mounting and dismounting meters to the test line, discharging tank holds the water . By the submerge pump , water will be transferred from discharge tank to the main water tank. Also there is valve added for evacuation.

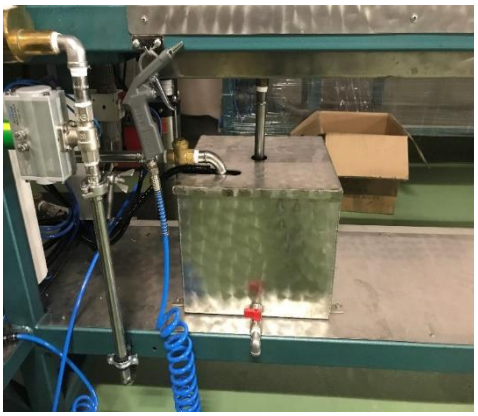


Figure 11 – Discharge Tank

2.4.Body

It's a construction that gathers the components of the test bench. It's made of steel covered with stainless sheet. It is ergonomicly designed for easy use.

Specifications	
Material Type	ST-37
Paint Type	Epoxy

2.5. Regulatory and Controlling Equipments

- ### Compression Piston

Meters which will be mounted to the test line are stabled by the pneumatic piston. Within this system there is security valve and non-return valve. System is controlled by the rotative key. To make sure compression process is complete, user should control the arrows that shows compressor piston accuracy on the PLC screen. The system, will not start testing, vacuuming or apply pressure until the compression piston fully compresses the test line.*(See:Page 16)*

Figure 12- Compression Piston

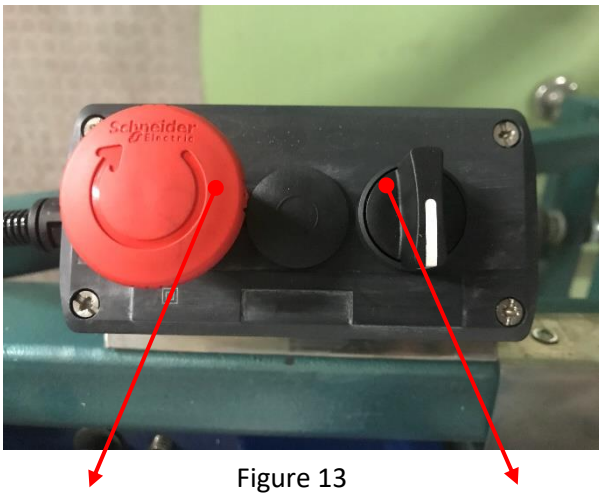


Figure 13
Emergency Stop and Rotative Key

Rotative Key (Switch):

Switch makes compressor piston goes forward and backwards. The piston will move to the direction where switch is rotated.

- ### Static Pressure Piston

While applying the static pressure test, required pressured air is manually set by use of pneumatic pressure adjuster by the operator. (Figure 14) If the pneumatic adjuster moves down, pressure raises up and if it moves up it releases the pressure. (Figure 15)

Figure 14 – Static Pressure Piston

Figure 15 - Pneumatic Pressure Adjuster

- ## Regulator Valves

Baylan BTB-10 Fully automatic test bench has three different regulator valves and three different flow meters which control the flowrates between 3 l/h–32 m^3/h.

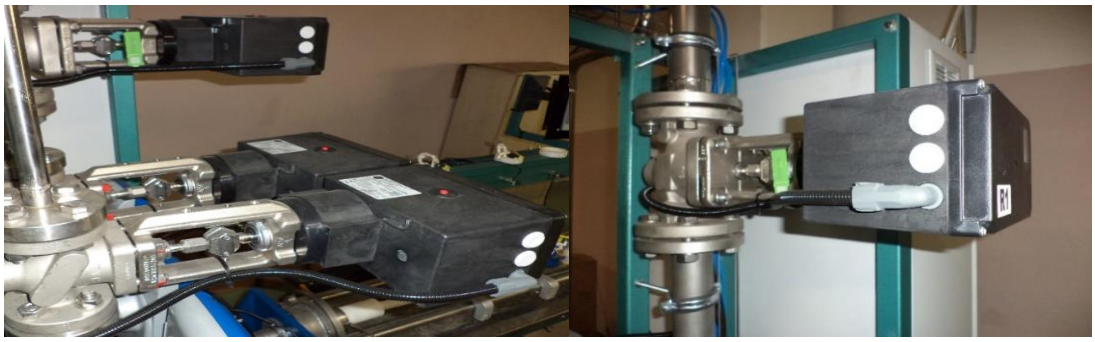


Figure 16 - Regulator Valves

Specifications	
Valve Type	Engined, 2 ways pneumatic valve
KVS	0,25 2,5 100
Material	Stainless Steel
Working Range	-10 / 220 C
Flow Characteristic	Evenly
Engine Type	5824 5824 5824
Voltage	24V
Control Signal	4-20Ma

- ## Pneumatic Valves

Pneumatic controlled spherical valves controls the water flow. Movement of the spherical valves is provided by the parameters that has entered before.

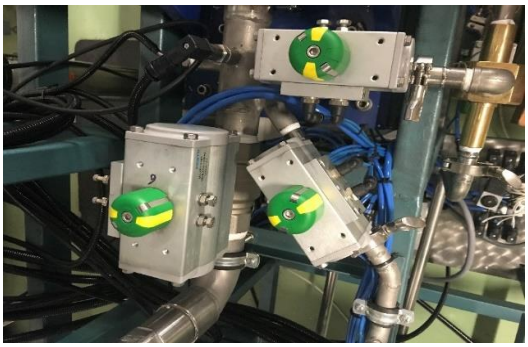


Figure 17 – Pneumatic Valves

Main Valve: The main valve is which starts the water flow at the test bench.

Discharge Valve: Discharge valves are which provides the water inside of scale tank evacuates to main tank.

Vacuum Valve: Vacuum valve is the valve that which provides connection between main line and vacuum line. By this way it is used for vacuuming air.

By-Pass Valve: By-pass valve is used for creating circulation for vacuuming.

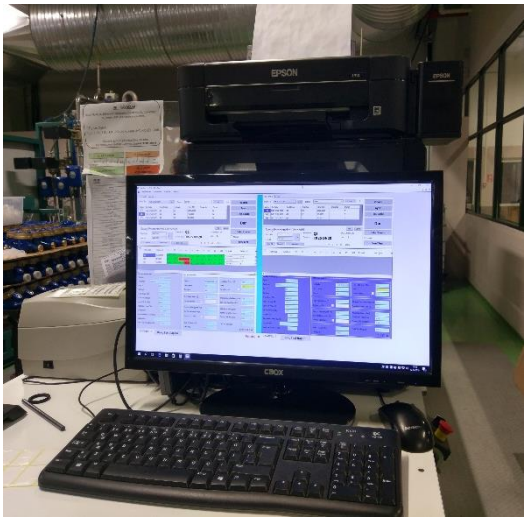
Three way valves: Three way valve allow flow coming water from the meters to water tank or scale tank.

- Pressure Regulator

The pressure regulator is used to regulate the pressure of the high-pressure air required to control the pneumatic system.

Figure 18 – Pressure Regulator

2.6. Computer



With the test bench program in the computer, new meter recording can be created, old parameters can be changed. Tests can be performed with the registered meter information. A detailed report of each test can be taken. With the serial number registered in the system, the results can be examined.

➢ The features of the computer can be improved by adding a **barcode printer** or a **barcode reader** system to the client's request.

Figure 19 – Computer

2.7.PLC Screen

Through the PLC screen, error curves of the meters and the results can be displayed. Besides, the system and testing process can be control by using touchscreen. In terms of rotatability of the PLC screen, it is mounted to the test bench's body and it can be positioned as required.

Specifications	
Screen Size	10"
Screen Type	Color Screen
Input Mode	Touch Screen
Connection TypeConnection Type	USB + Ethernet + RS32 + RS488hernet + RS32 + RS 488

Figure 20 – PLC Screen

2.8. Numeric Keyboard (Wireless)

BTB-10 Fully Automatic Test Bench is equipped with numaratic keyboard for entering first and last indexes on manual tests for the meters which can not be tested with optical sensor reading system.

Figure 21 – Numeric Keyboard

2.9.Electrical Panel

Electrical panel which located on the test bench has PLC command unit, power source (24 V), frequency control unit which set the motors rotation of pumps, electrical switches which run the devices that operates with electric.

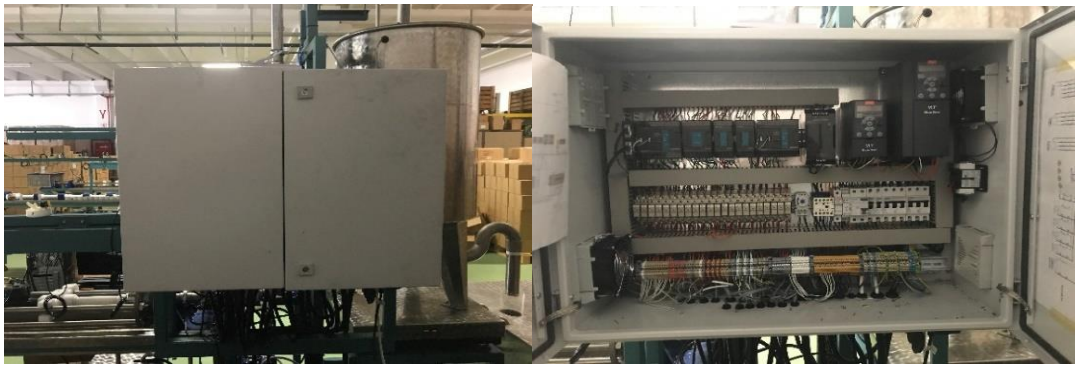


Figure 22 - Electrical Panel

2.10.Connection Apparatus

Before the test begins, in order to mount meters to the connection line, between every single meters and also at the inlet and outlet of connection line, there should be aparatus made of POM. POM aparatus are durable againts strikes and breakage. Also, POM apparatus made from the same material with the support apparatus for stabilizing the water meters to the test bench.

Figure 23– POM Connection Apparatus and Support Apparatus

Specifications	
Material Type	POM
Nominal Diameter / Meter Length	DN15 / 170mm
Nominal Diameter / Meter Length	DN20 / 190mm
Nominal Diameter / Meter Length	DN25 / 260mm
Nominal Diameter / Meter Length	DN32 / 260mm
Nominal Diameter / Meter Length	DN40 / 300mm
Nominal Diameter / Meter Length	DN50 / 300mm

2.11.Compressor

Test panel system requires compressed air. The compressor provides this compressed air requirement. Compressor is powered by single-phase electric line and operating voltage is 220V in this test bench.

Specifications	
Air Pressure (Minimum)	6 bar
Air Tank Capacity	50 litre
Voltage	220 V

Figure 24 – Compressor