BAYLAN
WATER METERS

BTB-10 DOUBLE LINE
FULLY AUTOMATIC TEST BENCH

Model	: BTB – 10 Double Line
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 Double Line 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 and the pneumatic pressure piston set lever, rest of all systems can work fully automatically for the both test lines.

Baylan BTB-10 Double Line Fully Automatic 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	2x10	2,5	15
190	2x10	2,5	20
190	2x10	4,0	20
260	2x6	6,3	25
260	2x6	10	32
300	2x5	16	40
300	2x5	25	50

Baylan BTB-10 Double Line 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

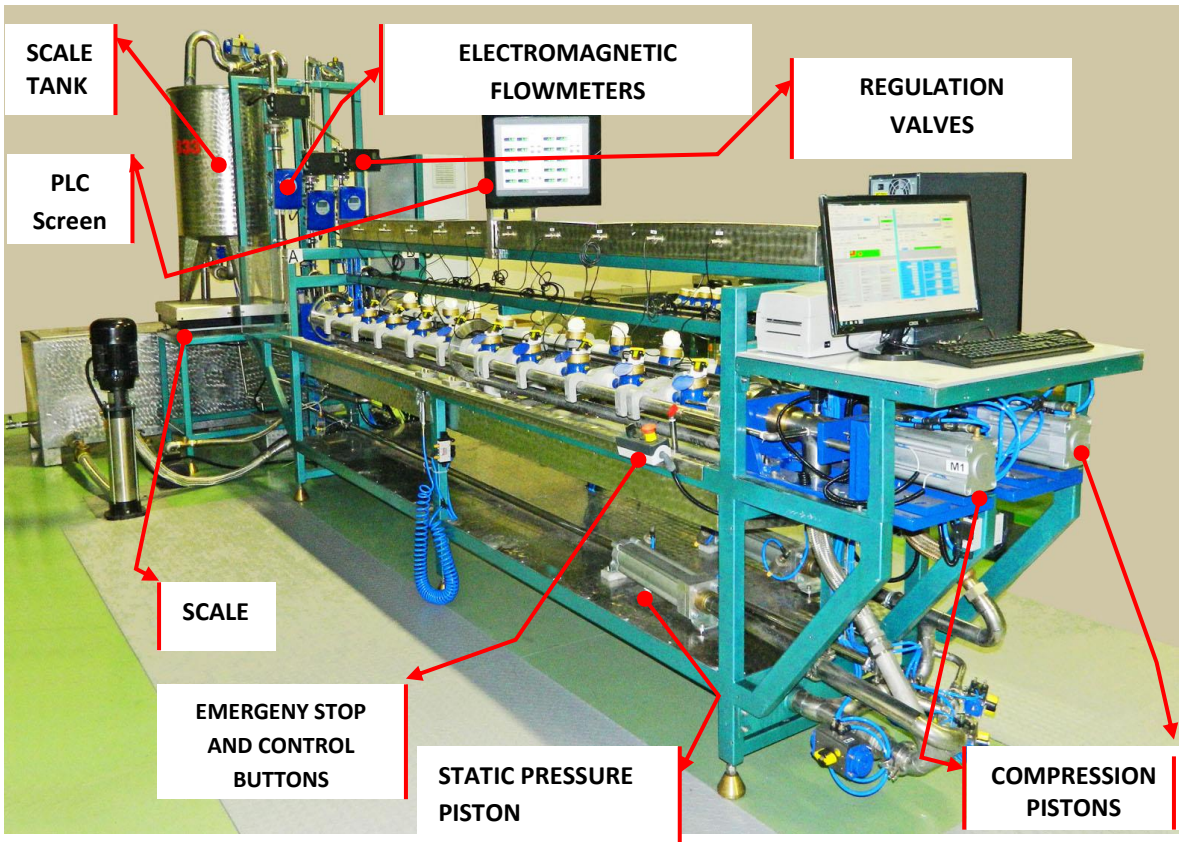


Figure 1 - Components of the Baylan Test Bench

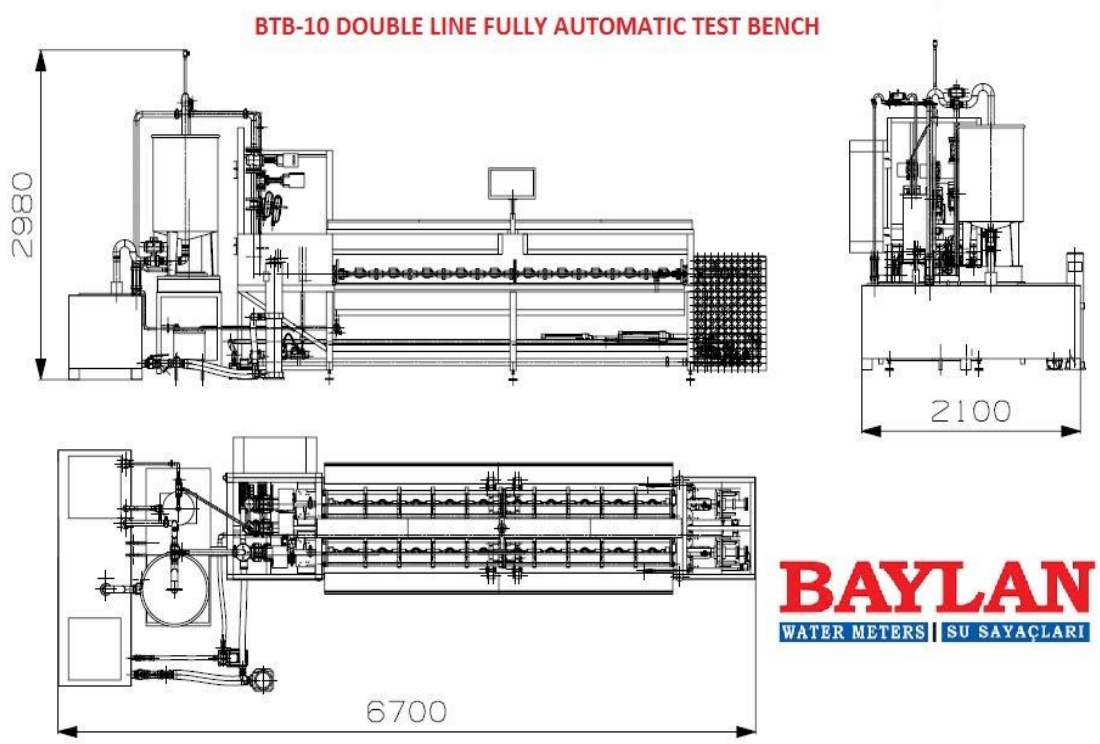


Figure 2 - BTB-10 Double Line Test Bench Dimensioned Technical Drawing

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 4 l/h – 32m^3/h . (Figure 3)

Specifications	
Flowmeter Type	Electromagnetic Flowmeter
Electrodes	Fixed Two Pairs of Hastelloy C22
IP Koruması	IP 66/67 EN 60529
Display Screen	IFC 100 Compact Model
Nominal Diameter (DN)	DN2,5 DN10 DN40
Voltage	24V

Figure 3 – Flowmeter

- Pressure Transmitter

Pressure transmitters are located at the inlet and outlet of the test bench test lines and they are capable of measuring pressures between 0-40 Bar. Transmitters transfer the measured data to the PLC 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 0-400 °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	0-400 °C
Temperature Sensor	PT 100

Figure 5 – Temperature Sensor – Figure 6

- ## Optic Sensors

Optic sensors are reading sensors that calculates the error curve of the meter by counting the movement of sensitive flow indicator. (Figure 7) BTB-10 Fully Automatic Test Bench is equipped with 10 sensors for each sides 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 7 – Optic Sensor

- ## Electronic Scales

In order to calculate the test results and error curves, BTB-10 Fully Automatic Test Bench has a two scales which can transfer datas to the related computer. The tank placed on the big scale has a capac ity of holding up to 300kg of water. (Figure – 13)

Big Scale Specifications	
Measuring Range	300 kg (270) kg
Connection Cable	2,5 meter
Pre-load Capacity	64 kg
Repeatability	1 g
Linearity	2 g±
Sensitivity	2 g
IP Class	IP66 veya IP67 Cleanable Unit
Working Principle	Loadcell with Electromagnetic level balancing + IDNET converter

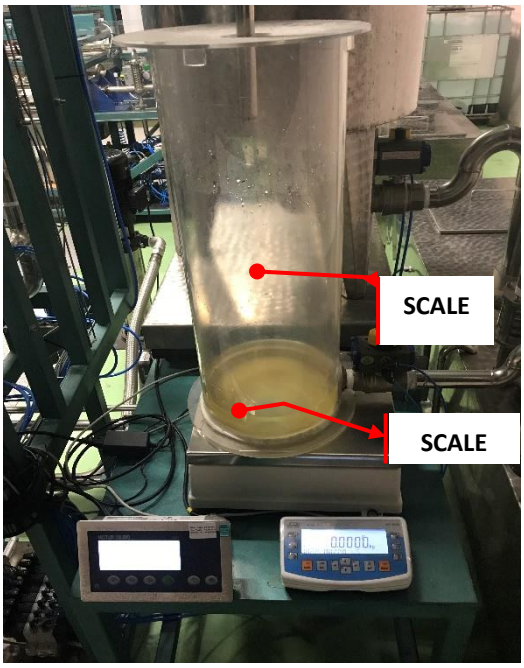


Figure 8 – Big and Small Electronic Scales

Small Scale Specifications	
Measuring Range	35 Kg
Connection Cable	2,5 meter
Pre-load Capacity	8 Kg
Repeatability	0,1 g
Linearity	0,3 g±
Sensitivity	0,1 g
IP Class	IP66 veya IP67 Cleanable Unit
Working Principle	Loadcell with Electromagnetic level balancing + IDNET converter

Figure 9 – Electronic Scale Screen

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

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.

Figure 10 –Big Pump

- 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	32m^3/h (*)

- Small Pump

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

Small Pump Specifications	
Control Type	Frequency Controlled
Obtainable Working Pressure	5 bar
Maximum Flowrate	3,2 m^3/h (*)

Figure 11 – Small Pump

(*) NOTE: Maximum flow rate of the pumps can change with the water meters quantity, magnitude and pipes inner circle diameters.

2.3.Water Tanks

- 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 waterflow.

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

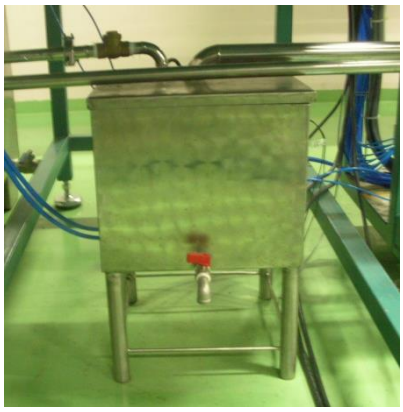
Figure 12 – Main Water Tank

- 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 system.

Figure 13 – 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 14 – Discharge Tank

2.4.Body

Specifications	
Material Type	ST-37
Paint Type	Epoxy

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.

2.5. Regulatory and Controlling Equipments

- ### Compression Piston

Meters which will be mounted to the test lines 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 9until the compression piston fully compresses the test line.

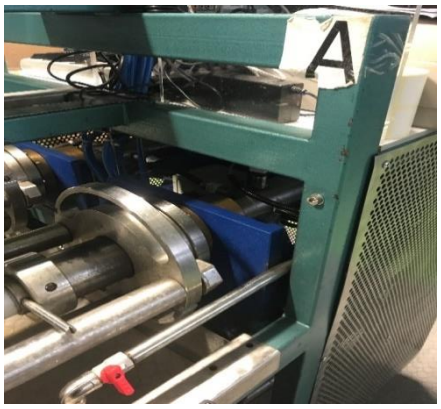


Figure 15 – Compression Piston

Rotative Key (Switch):

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

Figure 16 –Emergency Stop and Rotative Key

- ### 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 17) If the pneumatic adjuster moves down, pressure raises up and if it moves up it releases the pressure at the inlet. (Figure 18)

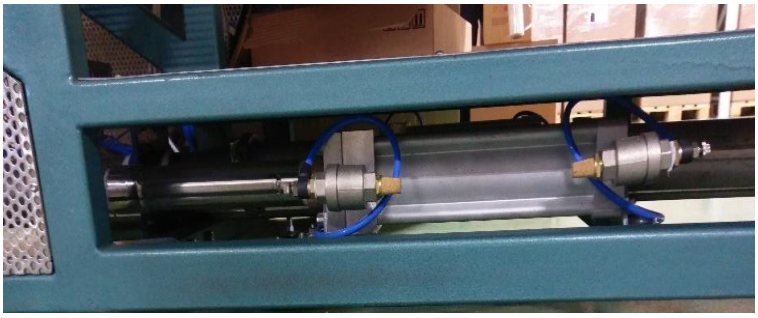


Figure 17 – Static Pressure Piston

Figure 18 - 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 10 l/h–32 m^3/h.

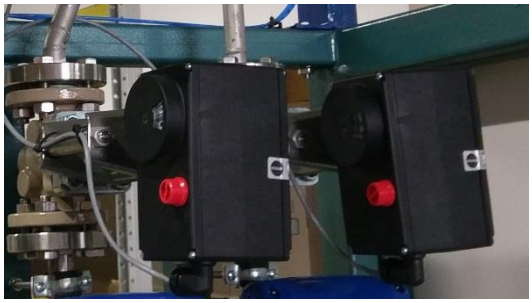


Figure 19 - Regulator Valves - Figure 20

Specifications	
Valve Type	Engined, 2 ways pneumatic valve
KVS	2,5 10 40
Material	Stainless Steel
Working Range	-10 / 220 C
Flow Characteristic	Evenly
Engine Type	Electrical Motor 5824 5824 3374
Voltage	24V
Control Signal	4-20mA

- Pneumatic Valves

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

Figure 21 – Pneumatic Valves

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

Discharge Valve: Discharge valve 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.

2.6.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	15"
Screen Type	Color Screen
Input Mode	Touch Screen
Connection TypeConnection Type	USB + Ethernet + RS32 + RS488hernet + RS32 + RS 488

Figure 22 – PLC Screen

2.7.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.

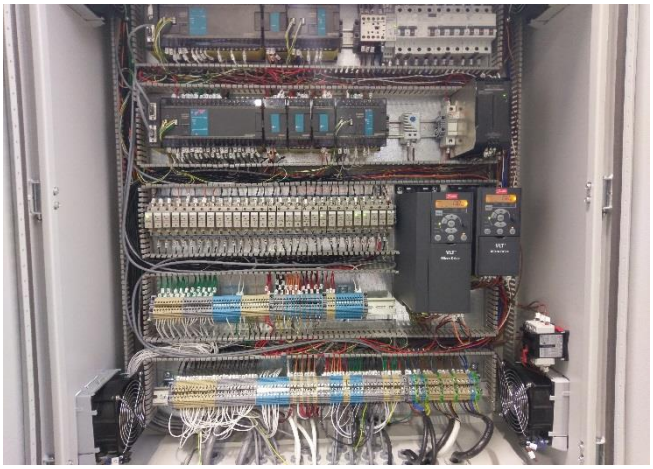


Figure 23 - Electrical Panel - Figure 24

2.8.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 in order to connect meters. POM aparatus are durable againts strikes and breakage.

Figure 25 – POM Connection Apparatus

Figure 26 – Support Apparatus

Connection Aparatus 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 Lenght	DN32 / 260mm
Nominal Diameter / Meter Length	DN40 / 300mm
Nominal Diameter / Meter Lenght	DN50 / 300mm

2.9.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.

Compressor Specifications	
Air Pressure (Minimum)	8 bar
Air Tank Capacity	100 liter
Voltage	220 V

Figure 27 – Compressor