

End Customer Details	User Manual For	Enquiry Details
METRO RAIL, KOLKATA	Computerized Control Universal Brake Test Bench	COMOW Order No:- COFMOW/IR/S/P-I/OP-406772 Dated 24.08.2021

USER MANUAL OPERATION AND MAINTENANCE

Project : **Computerized Control Universal Brake Test Bench**

Client : **Metro Rail, Kolkata**

PO No. : **COFMOW/IR/S/P-I/OP-406772**

PO Date : **24/08/2021**

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Page 1 of 35	Document Name: A2674-PED-OPERATIONAL AND MAINTENANCE MANUAL-CCUBTB-REV-00	20 th MAY,2022

End Customer Details	User Manual For	Enquiry Details
METRO RAIL, KOLKATA	Computerized Control Universal Brake Test Bench	COMOW Order No:- COFMOW/IR/S/P- I/OP-406772 Dated 24.08.2021

Dear User,

Neometrix is grateful for this opportunity provided to us to offer our products & services to you. We sincerely hope that you will be delighted to use our system and give us more opportunities to serve you.

Neometrix is very focused on Aviation and Railway industries and offers complete range of systems & services which can be of immense use to you. We specialize in Hydraulic/ Servo Hydraulic Test Rigs, Fuel System Test Rigs, Pneumatic System Test Rigs, Oxygen/ Special Gases system Test Rigs, Very High Pressure Systems, Electronic & Electrical Test Rigs. Our services include among others, the followings:

- State of the art Test Rig Design, Development, Fabrication, Installation, Commissioning, Training & Support.
- Refurbishment/ Up gradation of the Existing Test Rigs.
- Maintenance (AMC) contracts of Existing Test Rigs.
- Operations Contract for the Test Rigs.
- Setting up of complete Testing Infrastructure including civil infrastructure.

The following pages talk about some of our systems in brief. Please feel free to contact us for details of any particular system of your interest.

Neometrix is committed to offer its best solutions & services to you all the times

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Page 2 of 35	Document Name: A2674-PED- OPERATIONAL AND MAINTENANCE MANUAL- CCUBTB-REV-00	20 th MAY,2022

End Customer Details	User Manual For	Enquiry Details
METRO RAIL, KOLKATA	Computerized Control Universal Brake Test Bench	COMOW Order No:- COFMOW/IR/S/P- I/OP-406772 Dated 24.08.2021

and wish to become your preferred supplier for these services.

With Best Regards,

Shailendra Pratap Singh
CEO

Warnings:

1. Make sure that all electronic products are earth-grounded, to ensure Personal safety and proper operation.



2. All sensors are very sensitive; please never try to touch them.

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Page 3 of 35	Document Name: A2674-PED- OPERATIONAL AND MAINTENANCE MANUAL- CCUBTB-REV-00	20 th MAY,2022

End Customer Details	User Manual For	Enquiry Details
METRO RAIL, KOLKATA	Computerized Control Universal Brake Test Bench	COMOW Order No:- COFMOW/IR/S/P- I/OP-406772 Dated 24.08.2021

Table of Contents

Sr. No.	Description	Page No
1	Neometrix Engineering Introduction	5-7
2	Introduction of the System	8-9
3	System Specifications	10
4	Do's & Don'ts for the System	11-12
5	Starting of the System	13-14
6	Working of the System	14-15
7	Automatic Mode Working	16-18
8	Manual Mode Working	19-20
9	Maintenance	21-22
10	Reports	23-25
11	Sample Graph	26
12	Panel Mimic	27

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Page 4 of 35	Document Name: A2674-PED- OPERATIONAL AND MAINTENANCE MANUAL- CCUBTB-REV-00	20 th MAY,2022
--------------	--	---------------------------

End Customer Details	User Manual For	Enquiry Details
METRO RAIL, KOLKATA	Computerized Control Universal Brake Test Bench	COMOW Order No:- COFMOW/IR/S/P-I/OP-406772 Dated 24.08.2021

13	Electrical Control Panel	28
14	GA Drawing	29
15	Pneumatic Circuit Diagram	30-36
16	Bill Of Material	37-43

1. Neometrix Engineering Introduction:

Neometrix Engineering Pvt. Ltd. is a complete engineering solutions company based in New Delhi/ Noida.

We specialize in CUSTOM BUILT Turnkey Engineering Solutions.

We have expertise in various engineering domains like Hydraulics, Servo Hydraulics, ATF (Fuel), Mechanical, Pneumatic, Oxygen/ Helium (High Purity

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Page 5 of 35	Document Name: A2674-PED-OPERATIONAL AND MAINTENANCE MANUAL-CCUBTB-REV-00	20 th MAY,2022

NEOMETRIX

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End Customer Details	User Manual For	Enquiry Details
METRO RAIL, KOLKATA	Computerized Control Universal Brake Test Bench	COMOW Order No:- COFMOW/IR/S/P- I/OP-406772 Dated 24.08.2021

Gases), Electronics/ Electrical Test Benches, and Complete PC Based Automation Solutions.

We have experts in Mechanical Engineering, Chemical Engineering, Electrical/ Instrumentation Engineering, Software, Civil Engineering, Aeronautical engineering and other engineering fields.

The company has a team of ~30 highly qualified engineers and has an experience of more than 75 successfully delivered projects. We are very closely working with **HAL, RDSO, Railways, Defense Establishments, Labs and Private Industries.**

The founders are graduates from IIT Kanpur and the company remains very closely linked with IITs. We utilize the expertise available there as and when required.

We have an exclusive relationship with Parker USA (www.parker.com) for supplying Hydraulic Systems to HAL. Parker is world leader in Hydraulics (Fluid Motion & Control).

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Page 6 of 35	Document Name: A2674-PED- OPERATIONAL AND MAINTENANCE MANUAL- CCUBTB-REV-00	20 th MAY,2022

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Tel: +91-120-4500800, Fax: +91-120-4500888, contact@neometrix.in

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An ISO 9001 2008 Company

End Customer Details	User Manual For	Enquiry Details
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We have an exclusive relationship with Haskel USA (www.haskel.com) for supplying very high pressure systems. Haskel is world leader in very High Pressure products.

We are alliance partners of **National Instruments USA** (www.ni.com), world leader in PC Based Test Measurement and Automation.

With such alliances and our own engineering capabilities, we are in a position to deliver you state of the art world class Test Rig.

Neometrix is a member (as Industry Partner with ministry of HRD & Ministry of Railways) of TMRS (TECHNOLOGY MISSION FOR RAILWAY SAFETY) and we are working on several Railway Safety projects with IIT Kanpur & RDSO.

Neometrix values its association with RDSO and wishes to become its most preferred partner for such services.

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Page 7 of 35	Document Name: A2674-PED- OPERATIONAL AND MAINTENANCE MANUAL- CCUBTB-REV-00	20 th MAY,2022

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End Customer Details	User Manual For	Enquiry Details
METRO RAIL, KOLKATA	Computerized Control Universal Brake Test Bench	COMOW Order No:- COFMOW/IR/S/P- I/OP-406772 Dated 24.08.2021

We are working very closely with Research Designs & Standards Organization (RDSO).

2. Introduction of the System:

The system is designed to test the performance/Functional testing of the following 27 types of pneumatic valves of AC Brake system of AC Rake for Metro Rail.

The system is consisting Brake Pipe, Auxiliary Reservoir, Brake Cylinder Reservoir and Control Reservoir.

The system has Dew point sensor, Noise level transmitter.

The test stand have a structure composed of Aluminum –Section with pressure gauges construction housing with digital pressure gauges at front of the stand.

The right and left side and the rear side of the test stand is provided with detachable covers and doors. All the air reservoirs and pneumatic piping are accommodated inside of the test stand.

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Page 8 of 35	Document Name: A2674-PED- OPERATIONAL AND MAINTENANCE MANUAL- CCUBTB-REV-00	20 th MAY,2022

End Customer Details	User Manual For	Enquiry Details
METRO RAIL, KOLKATA	Computerized Control Universal Brake Test Bench	COMOW Order No:- COFMOW/IR/S/P- I/OP-406772 Dated 24.08.2021

The test stand operation is controlled by the computer system by means of predefined software.

The Universal Test Bench Test the following Valves one by one :

1	Air Dryer Unit	10	Emergency Brake Valve	19	Piston Valve
2	Anti-Skid Valve	11	Impulse Valve	20	Pressure Reducer Valve
3	Distributor Valve	12	Leveling Valve	21	Relay Valve
4	Double Valve	13	Load Dependent Relay valve	22	Brake Control Unit
5	Drive Brake Valve	14	Magnet Valve	23	Ball Cock

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Page 9 of 35	Document Name: A2674-PED- OPERATIONAL AND MAINTENANCE MANUAL- CCUBTB-REV-00	20 th MAY,2022
--------------	--	---------------------------

End Customer Details	User Manual For	Enquiry Details
METRO RAIL, KOLKATA	Computerized Control Universal Brake Test Bench	COMOW Order No:- COFMOW/IR/S/P- I/OP-406772 Dated 24.08.2021

6	Duplex Check Valve	15	Mean Pressure Valve	24	Check Valve
7	Drain Valve	16	Overflow Valve	25	Double Check Valve
8	Anti-Skid Valve	17	Pressure Governor	26	Pressure Sensor
9	Safety Valve	18	Test Fitting	27	Tyfon

The system works on a predefined Test Sequence with an option to test the particular test.

3. System Major Specifications

Medium = Compressed Air

Pressure Rating = 10.5 Kg/cm²

Air supply Pressure Range = 8-10 Kg/cm²

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Page 10 of 35	Document Name: A2674-PED- OPERATIONAL AND MAINTENANCE MANUAL- CCUBTB-REV-00	20 th MAY,2022

End Customer Details	User Manual For	Enquiry Details
METRO RAIL, KOLKATA	Computerized Control Universal Brake Test Bench	COMOW Order No:- COFMOW/IR/S/P- I/OP-406772 Dated 24.08.2021

Flow Rate	=	2400 LPM
Temperature Range	=	Ambient up to 48°C
Power Supply	=	230V + 10% -20%, Single Phase, 50Hz

Contents:

The Computerized control Universal Control Brake Test Bench Consist of:

- Test Bench stand including Air reservoirs and pneumatic piping
- Measuring System (DAQ Panel)
- Computer
- Printer
- UPS
- Control Panel

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Page 11 of 35	Document Name: A2674-PED- OPERATIONAL AND MAINTENANCE MANUAL- CCUBTB-REV-00	20 th MAY,2022

End Customer Details	User Manual For	Enquiry Details
METRO RAIL, KOLKATA	Computerized Control Universal Brake Test Bench	COMOW Order No:- COFMOW/IR/S/P- I/OP-406772 Dated 24.08.2021

- PLC Panel
- Air Dryer

4. Do's & Don'ts for the System

Do's:

1. Read the User Manual fully before operating the System.
2. Read the Pneumatic Circuit and understand which Valve/ Component on Panel do what.
3. Check the proper closing of the Supply Valve of the system when it is not in operation.
4. Check the Source Pressure before operation.

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Page 12 of 35	Document Name: A2674-PED- OPERATIONAL AND MAINTENANCE MANUAL- CCUBTB-REV-00	20 th MAY,2022

End Customer Details	User Manual For	Enquiry Details
METRO RAIL, KOLKATA	Computerized Control Universal Brake Test Bench	COMOW Order No:- COFMOW/IR/S/P- I/OP-406772 Dated 24.08.2021

Don't:

1. Never touch the sensors or their mountings.
2. Touch any circuitry inside the panel.
3. "ON" the MCB before starting the computer.

5. Starting Of The System:

- Give the DAQ panel UPS to Power Supply 230V, Single Phase, 50 Hz.
- Turn ON the Computer CPU and Monitor
- Turn on the PLC panel on/off switch at "ON" Position.

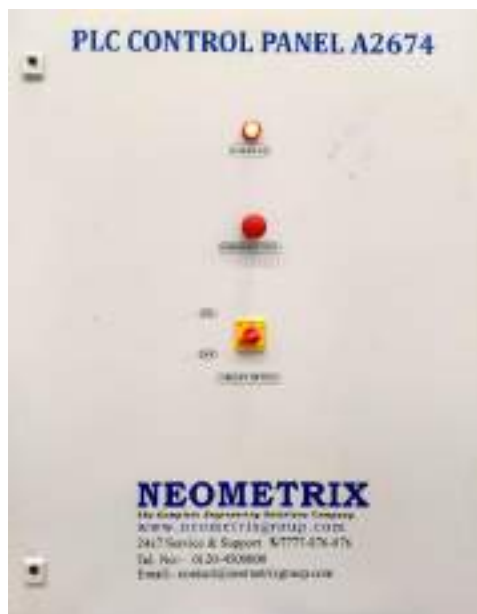
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Page 13 of 35	Document Name: A2674-PED- OPERATIONAL AND MAINTENANCE MANUAL- CCUBTB-REV-00	20 th MAY,2022

NEOMETRIX

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End Customer Details	User Manual For	Enquiry Details
METRO RAIL, KOLKATA	Computerized Control Universal Brake Test Bench	COMOW Order No:- COFMOW/IR/S/P-I/OP-406772 Dated 24.08.2021



- Turn “ON” the Main switch of control panel at DAQ panel.

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Page 14 of 35	Document Name: A2674-PED-OPERATIONAL AND MAINTENANCE MANUAL-CCUBTB-REV-00	20 th MAY,2022

NEOMETRIX

Complete Engineering Solutions Company

An ISO 9001 2008 Company

End Customer Details	User Manual For	Enquiry Details
METRO RAIL, KOLKATA	Computerized Control Universal Brake Test Bench	COMOW Order No:- COFMOW/IR/S/P-I/OP-406772 Dated 24.08.2021



- Connect the compressed air inlet line to the air dryer inlet line and open the inlet ball valve of air dryer and test bench.
- Give Power Supply 230V, Single Phase, 50 Hz.

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Page 15 of 35

Document Name: A2674-PED-
OPERATIONAL AND
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CCUBTB-REV-00

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METRO RAIL, KOLKATA	Computerized Control Universal Brake Test Bench	COMOW Order No:- COFMOW/IR/S/P- I/OP-406772 Dated 24.08.2021

to the Air dryer

6. Working Of The System:

The System is consisting dual working mode i.e. Automatic and manual

In Automatic mode the Test will be perform according to the predefined sequence automatically and also with an option for a particular test according to the requirement.

In manual mode the test will be done with control Panel and Toggles Switch.

Mode Selection- The mode selection can be done with the Mode Selector with an option-

- 1- Automatic Mode.
- 2- Manual Mode.

Automatic Mode-This mode can be selected from the Control Panel Selector Switch.

To start the testing follow following steps:

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Page 16 of 35	Document Name: A2674-PED- OPERATIONAL AND MAINTENANCE MANUAL- CCUBTB-REV-00	20 th MAY,2022

End Customer Details	User Manual For	Enquiry Details
METRO RAIL, KOLKATA	Computerized Control Universal Brake Test Bench	COMOW Order No:- COFMOW/IR/S/P- I/OP-406772 Dated 24.08.2021

Switch on the computer and open the CCUBTB test Run File from the Desktop the Main Menu Window will appear as show below:

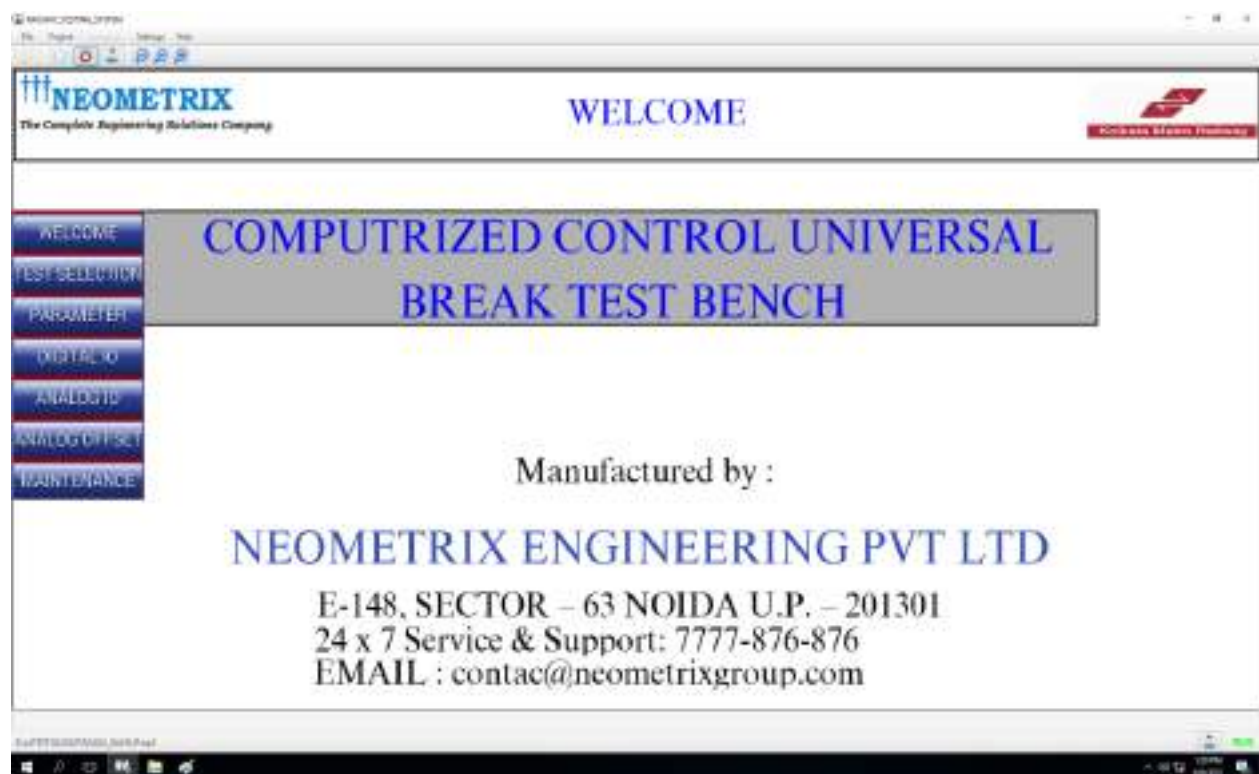


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Page 17 of 35	Document Name: A2674-PED- OPERATIONAL AND MAINTENANCE MANUAL- CCUBTB-REV-00	20 th MAY,2022

End Customer Details	User Manual For	Enquiry Details
METRO RAIL, KOLKATA	Computerized Control Universal Brake Test Bench	COMOW Order No:- COFMOW/IR/S/P-I/OP-406772 Dated 24.08.2021

Note: For first time Run file opening clicking on top left play button as indicated on above screen to run the software.

PARAMETER- To insert the test parameter(if required) click on PARAMETER icon as per below

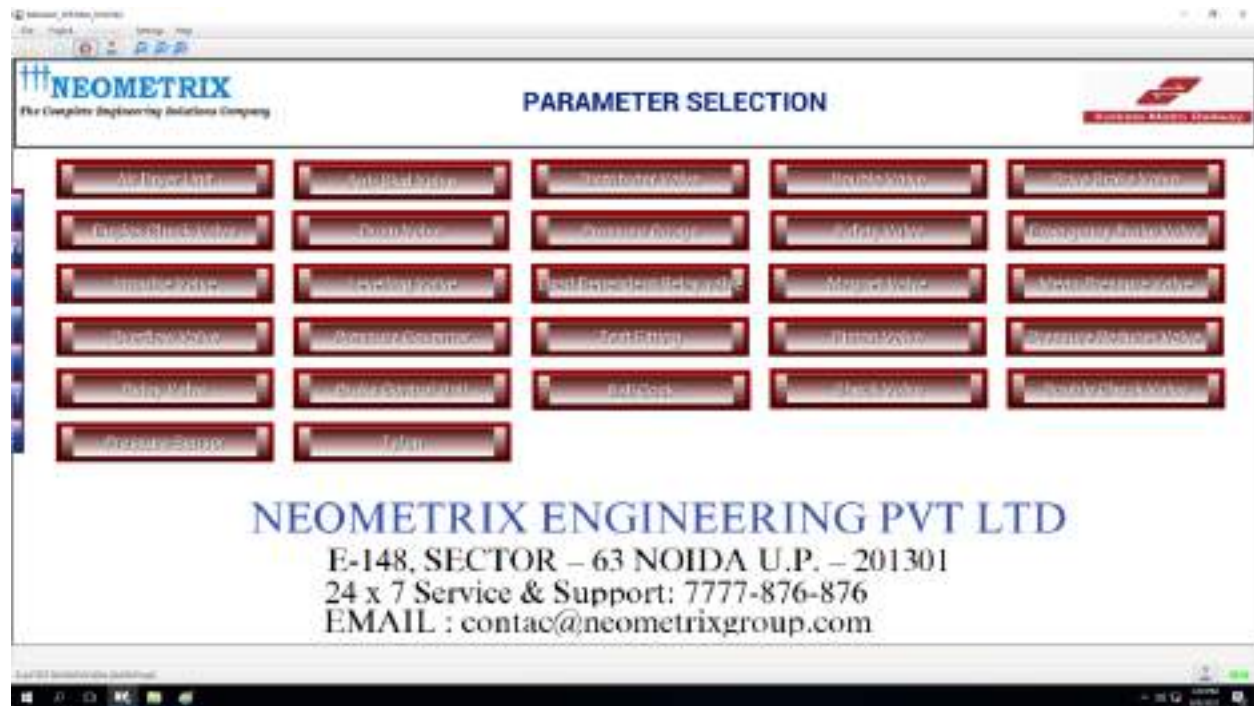


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Page 18 of 35	Document Name: A2674-PED-OPERATIONAL AND MAINTENANCE MANUAL-CCUBTB-REV-00	20 th MAY,2022
---------------	---	---------------------------

End Customer Details	User Manual For	Enquiry Details
METRO RAIL, KOLKATA	Computerized Control Universal Brake Test Bench	COMOW Order No:- COFMOW/IR/S/P-I/OP-406772 Dated 24.08.2021

After clicking the PARAMETER icon the CCUBTB detail window will appear as shown-



Click on Particular Valve for Parameter setting if applicable

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Page 19 of 35	Document Name: A2674-PED-OPERATIONAL AND MAINTENANCE MANUAL-CCUBTB-REV-00	20 th MAY,2022

NEOMETRIX

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End Customer Details	User Manual For	Enquiry Details
METRO RAIL, KOLKATA	Computerized Control Universal Brake Test Bench	COMOW Order No:- COFMOW/IR/S/P- I/OP-406772 Dated 24.08.2021

START TEST: Click on TEST SELECTION from main Menu

After clicking the TEST SELECTION icon the CCUBTB detail window will appear as shown-

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Page 20 of 35	Document Name: A2674-PED- OPERATIONAL AND MAINTENANCE MANUAL- CCUBTB-REV-00	20 th MAY,2022

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End Customer Details	User Manual For	Enquiry Details
METRO RAIL, KOLKATA	Computerized Control Universal Brake Test Bench	COMOW Order No:- COFMOW/IR/S/P-I/OP-406772 Dated 24.08.2021



To start a test click on a particular valve as per test setup ready for testing. Now Test can be started by clicking on START button, Test will automatically run for define time and report will be save in PDF format.

To start the other valve testing follows the same procedure from Test Selection Screen after Test setup.

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Page 21 of 35	Document Name: A2674-PED-OPERATIONAL AND MAINTENANCE MANUAL-CCUBTB-REV-00	20 th MAY,2022

End Customer Details	User Manual For	Enquiry Details
METRO RAIL, KOLKATA	Computerized Control Universal Brake Test Bench	COMOW Order No:- COFMOW/IR/S/P-I/OP-406772 Dated 24.08.2021

Manual Mode-This mode can be selected from the Control Panel Selector Switch. All the operation of valve control will be done by toggle switch as per test requirement of testing units.

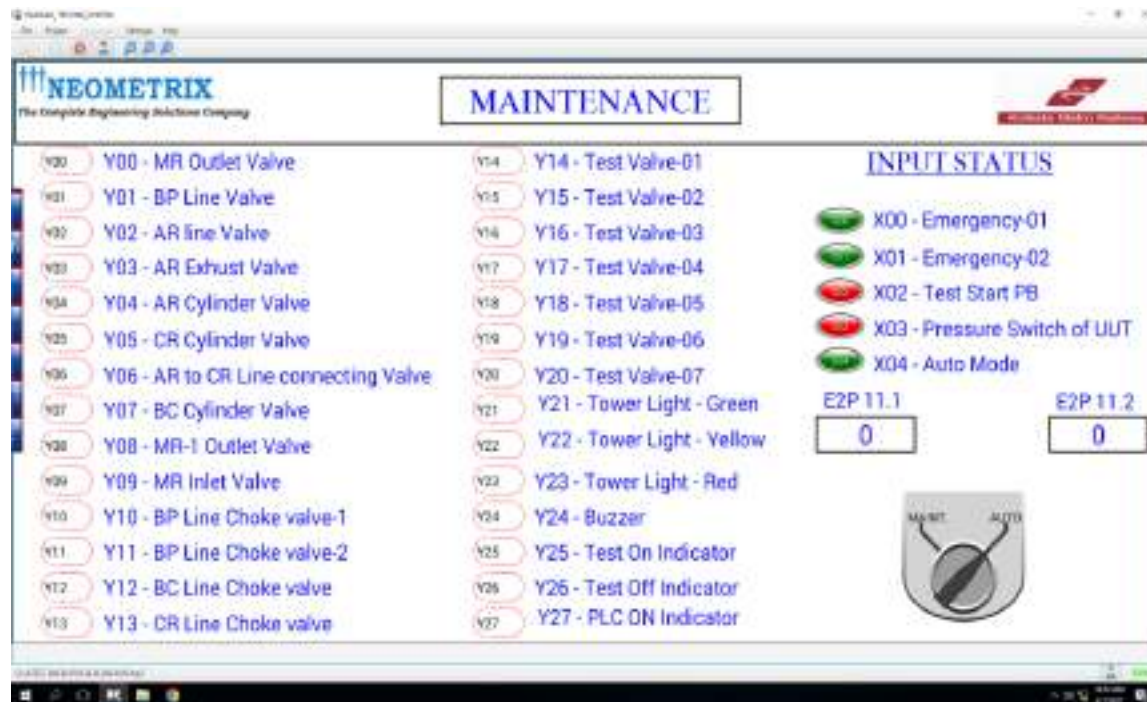


7. Maintenance of the Test Stand

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Page 22 of 35	Document Name: A2674-PED-OPERATIONAL AND MAINTENANCE MANUAL-CCUBTB-REV-00	20 th MAY,2022

End Customer Details	User Manual For	Enquiry Details
METRO RAIL, KOLKATA	Computerized Control Universal Brake Test Bench	COMOW Order No:- COFMOW/IR/S/P-I/OP-406772 Dated 24.08.2021

From the Main menu Click on the MAINTENANCE icon, after clicking on maintenance icon following windows will appear



On above screen select the selector switch on maintenance mode.

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Page 23 of 35	Document Name: A2674-PED-OPERATIONAL AND MAINTENANCE MANUAL-CCUBTB-REV-00	20 th MAY,2022

End Customer Details	User Manual For	Enquiry Details
METRO RAIL, KOLKATA	Computerized Control Universal Brake Test Bench	COMOW Order No:- COFMOW/IR/S/P- I/OP-406772 Dated 24.08.2021

After this particular valve proper functioning can be monitored by switching on from the screen.

- Closed the air dryer inlet and outlet valve.
- Closed the air compressor outlet valve
- Exhaust the air from main reservoir by opening the drain valve of reservoir from inside the test stand panel.
- Now check the seals for fittings if any leakage observed during testing and tight it properly.
- Check the air dryer function as per air dryer maintenance manual.
- Check the Air filter drainage and drain the moisture.
- Check the pressure gauge calibration certificate if the calibration of pressure gauges and pressure transmitter is over dated then remove and do the needful for calibration.
- After calibration of pressure gauges and pressure transmitter mount on its place as per circuit.
- Now closed the main reservoir drain valve
- Open the air dryer inlet valve and outlet valve and supply on compressor air supply line
- Now observed if any leakage on circuit
- If not then click on auto mode from maintenance screen.

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Page 24 of 35	Document Name: A2674-PED- OPERATIONAL AND MAINTENANCE MANUAL- CCUBTB-REV-00	20 th MAY,2022

NEOMETRIX

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End Customer Details	User Manual For	Enquiry Details
METRO RAIL, KOLKATA	Computerized Control Universal Brake Test Bench	COMOW Order No:- COFMOW/IR/S/P- I/OP-406772 Dated 24.08.2021

- Now select on TEST SCREEN icon and do the testing of unit as per requirement.

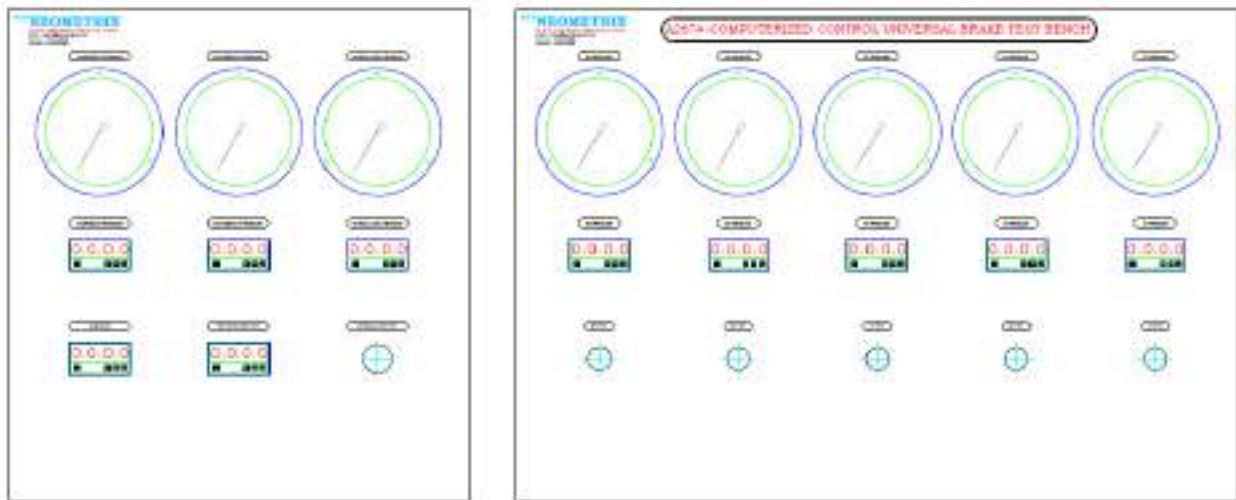
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Page 25 of 35	Document Name: A2674-PED- OPERATIONAL AND MAINTENANCE MANUAL- CCUBTB-REV-00	20 th MAY,2022

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METRO RAIL, KOLKATA	Computerized Control Universal Brake Test Bench	COMOW Order No:- COFMOW/IR/S/P-I/OP-406772 Dated 24.08.2021

8. Panel Mimic of the System



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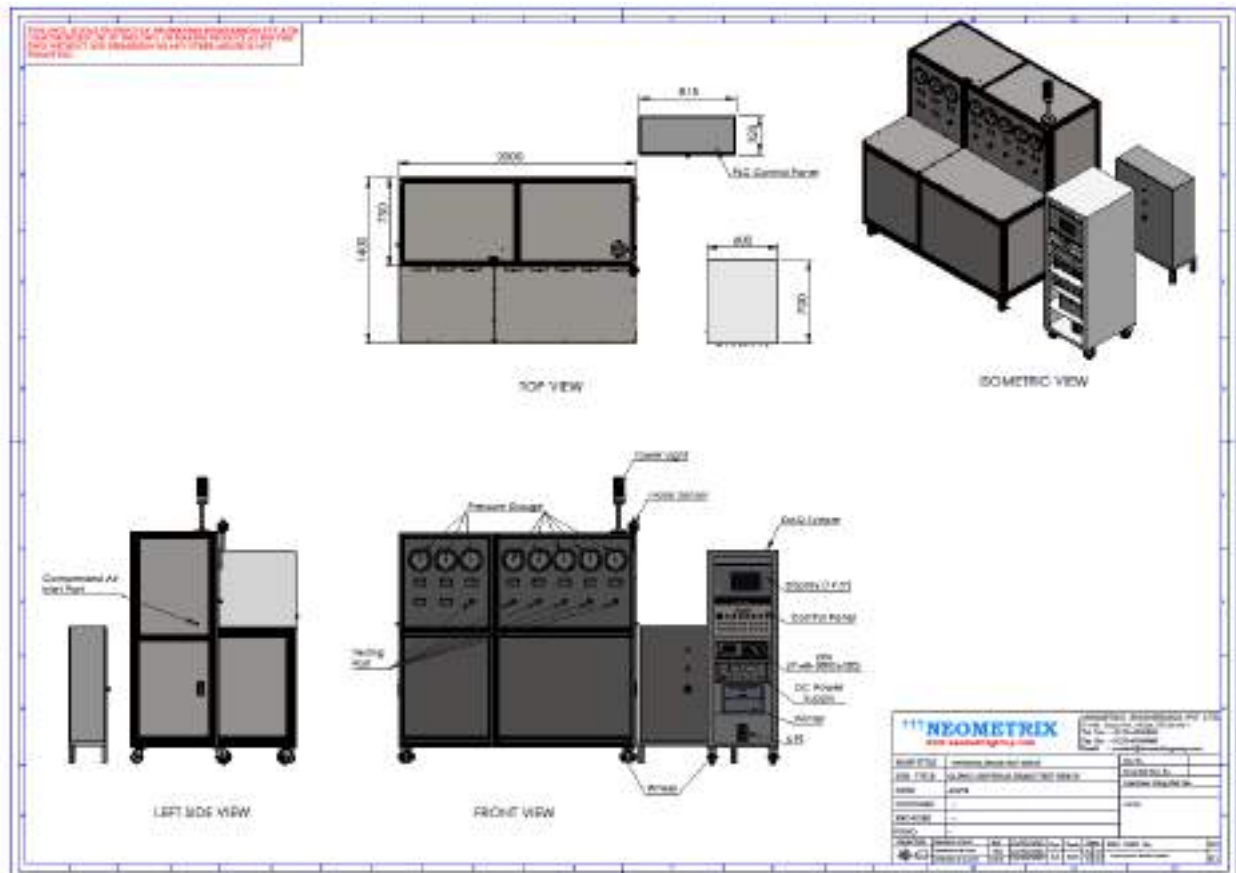
Page 26 of 35

Document Name: A2674-PED-
OPERATIONAL AND
MAINTENANCE MANUAL-
CCUBTB-REV-00

20th MAY,2022

End Customer Details	User Manual For	Enquiry Details
METRO RAIL, KOLKATA	Computerized Control Universal Brake Test Bench	COMOW Order No:- COFMOW/IR/S/P-I/OP-406772 Dated 24.08.2021

9. GA Drawing of Test Stand



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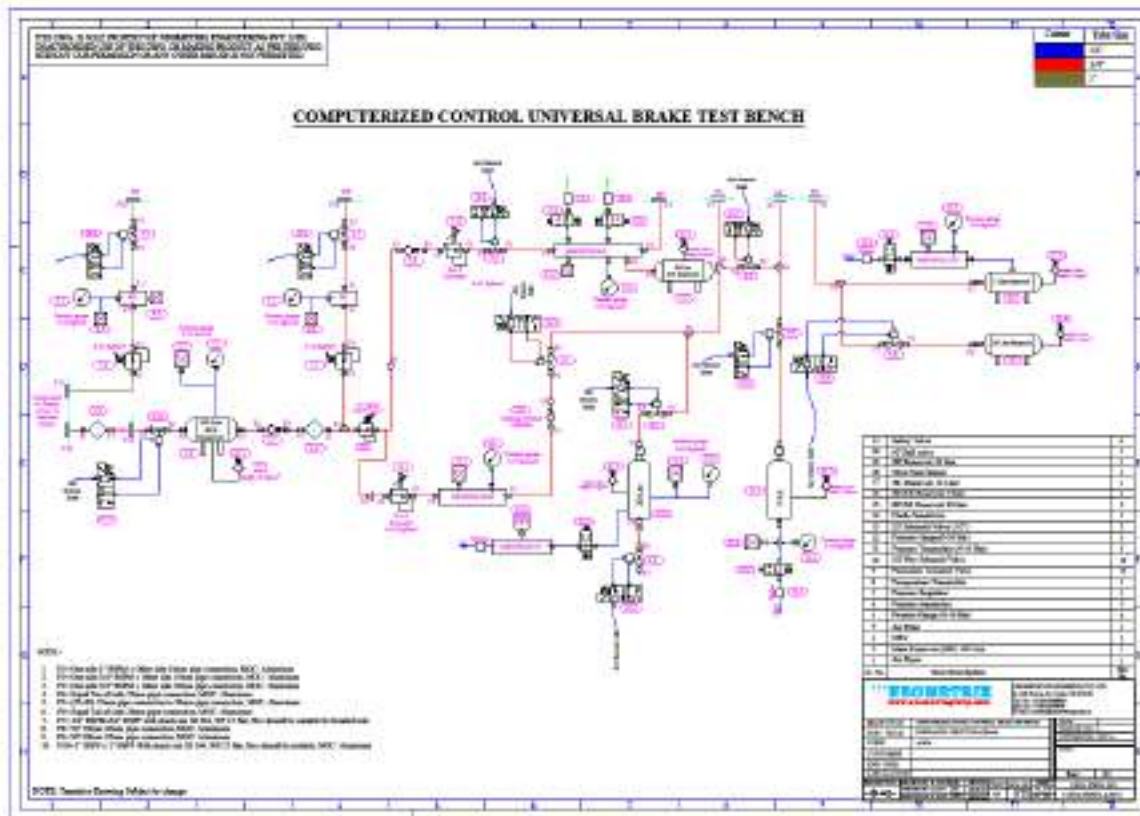
Page 27 of 35

Document Name: A2674-PED-
OPERATIONAL AND
MAINTENANCE MANUAL-
CCUBTB-REV-00

20th MAY,2022

End Customer Details	User Manual For	Enquiry Details
METRO RAIL, KOLKATA	Computerized Control Universal Brake Test Bench	COMOW Order No:- COFMOW/IR/S/P-I/OP-406772 Dated 24.08.2021

10. Pneumatic Circuit diagram



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Page 28 of 35

Document Name: A2674-PED-
OPERATIONAL AND
MAINTENANCE MANUAL-
CCUBTB-REV-00

20th MAY,2022

Neometrix Engineering (P) Limited. E-148,Sec-63 Noida-201301.

Tel: +91-120-4500800, Fax: +91-120-4500888, contact@neometrix.in

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11. PNEUMATIC CKT BOM

T-PED-BOM-A2674-COMPUTERIZED CONTROL UNIVERSAL BRAKE TEST BENCH-REV-00					
S.N	Nx. Part No.	Item	Ckt. Code	Specification	Make
1	2A2674P001	Air Dryer	1	Twin Tower Air Dryer,Flow 2000 LPM , working pressure 12 Kg/cm2	Trident
10	2A2674P002	Pneumatic Actuated Valve	9.1-9.10	Working Pressure=12Bar ,End Connection=3/4"BSPF , Moc: SS 304,	Metal Work
3	2A2674P003	DC Power Supply		To supply 110VDC and 24VDC of testing valves Regulated DC Voltage : 0-128VDC/15A with two digital meter to mointer output voltage and current	Aplab
6	2A2674P004	Pressure Gauge	5.1-5.3	Case:304 Stainless Steel Welded case/socket connection polished, Range: 0-16 kg/cm2, Dial Size 6.0", Back Mounting ,1/2BSP Male, with three screw front flange mounting ,Panel Cutout=100mm,High Accuracy ($\pm 0.5\%$ of full scale) With Least Count=0.1Kg/cm2, Application: compressed Air	wika

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Page 29 of 35	Document Name: A2674-PED-OPERATIONAL AND MAINTENANCE MANUAL-CCUBTB-REV-00	20 th MAY,2022

End Customer Details	User Manual For	Enquiry Details
METRO RAIL, KOLKATA	Computerized Control Universal Brake Test Bench	COMOW Order No:- COFMOW/IR/S/P-I/OP-406772 Dated 24.08.2021

6	2A2674P005	Pressure Gauge	12.1-12.5	Case:304 Stainless Steel Welded case/socket connection polished, Range: 0-10 kg/cm2, Dial Size 6.0", Back Mounting ,1/2BSP Male, with three screw front flange mounting ,Panel Cutout=100mm,High Accuracy ($\pm 0.5\%$ of full scale) With Least Count=0.1Kg/cm2, Application: compressed Air	wika
7	2A2674P006	Pressure Transmitter	6.1-6.3/11.1-11.6	0-16Kgf/cm2, Output Signal 4-20mA, End Connection 1/2" BSPM, Accuracy : $\pm 0.25\%$	Wika
3	2A2674F001	Main Reservoir	2	Capacity: 100L, MOC: SS, WP: 12 Bar	Sakshi Tools /Fabricated
4	2A2674P008	Check Valve	3.1-3.3	Inline, Cracking Pressure 0.02MPa , 3/4" BSPF Port , working pressure 12 Bar	SMC
5	2A2674P009	safety Valve		set@ 12kg/cm3, flow : 40 CFM, 1/2"BSPM	Harsad Engineering
8	2A2674P010	Filter with Semi-Automatic Drain	4	5Micron,0-12 Kgf/cm2 , 1" BSPF Port with mounting bracket.	SMC
36	2A2674P012	Pressure regulator	7.1-7.2	Pressure Working12 bar End connection 3/4 BSPF, Pressure Setting : 0-12 kg/cm3	SMC
37	2A2674P013	Choke		1/4" Metering valve with silensor	SMC

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Page 30 of 35	Document Name: A2674-PED- OPERATIONAL AND MAINTENANCE MANUAL- CCUBTB-REV-00	20 th MAY,2022
---------------	--	---------------------------

End Customer Details	User Manual For	Enquiry Details
METRO RAIL, KOLKATA	Computerized Control Universal Brake Test Bench	COMOW Order No:- COFMOW/IR/S/P-I/OP-406772 Dated 24.08.2021

12	2A2674P014	E-P Regulator	11.1-11.2	Pressure Range 1.0Mpa , Power Supply voltage 24VDC , Input Signal 0-10VDC, Analoge output 0-5VDC , End connection 1/2" BSP female. With 5meter cable connector , pressure display unit kg/cm2 , with L type mounting bracket	Metal Work
11	2A2674P015	Solenoid Valve5/2 with manifold	10.1-10.10	manifold for 12 nos of 5/2 Solenoid valve with single solenoid of 24 V , With all connectors with 2.5m cable. 1/4"BSPF port Size	Festo
13	2A2674F002	AIR Reservoir (CR)	16.1	Control Reservoir , Capacity: 3L, Moc: SS 304, WP: 12 Bar	Sakshi Tools /Fabricated
14	2A2674F003	Air Reservoir (BC)	17	Brake CylinderReservoir , Capacity: 10L, Moc: SS 304, WP: 12 Bar	Sakshi Tools /Fabricated
16	2A2674F004	Air Reservoir (BP)	15.1	Brake Pipe Reservoir, Capacity: 20L MOC: SS, WP: 12 Bar	Sakshi Tools /Fabricated
17	2A2674F005	Air Reservoir (AR)	15.2	Auxilaury Reservoir, Capacity: 20L, MOC: SS, WP: 12 Bar	Sakshi Tools /Fabricated
18	2A2674F006	Air Reservoir (BC1)	16.2	Auxilaury Reservoir, Capacity: 3L, MOC: SS, WP: 12 Bar	Sakshi Tools /Fabricated
19	2A2674P016	Pressure Dew point meter	18	To measure the pressure due point of air dryer outlet under , with display, Dew point range: -40 to 30 ° C	Vaisala
18	2A2674P017	Sound level sensor		to measure horn Sound Intensity : 30 ~130dB (A) sound intensity of horn	KB

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Page 31 of 35	Document Name: A2674-PED-OPERATIONAL AND MAINTENANCE MANUAL-CCUBTB-REV-00	20 th MAY,2022
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End Customer Details	User Manual For	Enquiry Details
METRO RAIL, KOLKATA	Computerized Control Universal Brake Test Bench	COMOW Order No:- COFMOW/IR/S/P-I/OP-406772 Dated 24.08.2021

25	2A2674P018	Quick Coupling & Disconnecting Connector 1"	End connection 1" BSPF QCDC, Moc: SS 304, WP: 12 Bar For Compressed Air, with bulk head for panel mounted	CEJN
26	2A2674P019	Quick Coupling & Disconnecting Connector 3/4"	End Connection 3/4" QCDC, SS 304, WP: 12 Bar, For Compressed Air, with bulk head for panel mounted	CEJN
19	2A2674P020	8mm Pu Pipe	8mm ,Blue Pu Pipe (200 mtr)	Parker
20	2A2674F008	Manifold	PT and pressure gauge manifold, MOC: SS	SS
21	2A2674F009	Aluminium Structure	Heavy 40x40 Profile, 80x40 profile	Aluminium
22	2A2674P021	10mm Pu Pipe	10mm, 100 mtrs.	Parker
23	2A2674P022	1/4"BSPM x 8mm push fitting	1/4"BSPM x 8mm push fitting	Parker
24	2A2674P023	1/2" BSMPx10 mm Push Fitting	1/2" BSMPx10 mm Push Fitting	Parker
25	2A2674P024	DRO	DRO to show pressure readings	Masibus
26	2A2674F010	Network Rack for DAQ panel	Digital series network rack 36U x 600mm(W)x800(D) colour: RAL 7035 MTS infonet	MTS Infonet

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Page 32 of 35	Document Name: A2674-PED-OPERATIONAL AND MAINTENANCE MANUAL-CCUBTB-REV-00	20 th MAY,2022

End Customer Details	User Manual For	Enquiry Details
METRO RAIL, KOLKATA	Computerized Control Universal Brake Test Bench	COMOW Order No:- COFMOW/IR/S/P- I/OP-406772 Dated 24.08.2021

27	2A2674F011	SS 304 2 mm Cover panels		SS 304 2mm thick cover panels with bend (complete set)	Jindal
28	2A2674F012	Top cover 5 mm		workstation top cover plate , SS 304	Jindal
30	2A2674P027	Caster Wheels		For test bench load capacity 700 kg each	Maxima Auto claster Wheel
31	2A2674P028	Silencer		1/2" BSPM, Festo Part No: 2310	Festo
32	2A2674P029	Pre-Filter		Working Media : air , Line Size: 1" , 30 Series, flow 100 CFM , Micron rating 1 micron	Parker
33	2A2674P030	Post-Filter		Working Media : air , Line Size: 1" , 30 Series, flow 233 CFM , Micron rating 1 micron	Parker
34	2A2674P031	Fine Filter		Working Media : air , Line Size: 1" , 30 Series, flow 233 CFM , Micron rating 1 micron	Parker
35	2A2674P032	2/2 Solenoid Valve		2/2 Solenoid Valve, MOC: Brass, 1/2" BSPF, Wporking pressure: 12 bar	Metal Work
36	2A2674P022	1/8"BSPM x 8mm push fitting		1/4"BSPM x 8mm push fitting	festo

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Page 33 of 35	Document Name: A2674-PED- OPERATIONAL AND MAINTENANCE MANUAL- CCUBTB-REV-00	20 th MAY,2022

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37	2A2674P023	Nipple without valve	Part No: 107675200 Connection: 1" BSPF Working Pressure: 16 bar Moc: Brass	CEJN
38	2A2674P029	Nipple without valve	Part No: 106675200 Connection: ¾" BSPF Working Pressure: 16 bar Moc: Brass	CEJN
39	2A2674P030	Push-Fitting	1/4" BSPM x 12 mm pu-pipe	Festo
40	2A2674P031	Push-Fitting	1/8" BSPM x 8 mm pu-pipe	Festo
41	2A2674P032	Silencer	Silencer for Solenoid valve	Festo
	2A2674F013-025	SS 304 Sheets	SS 304 Sheets/Covers/doors, Thickness: 2mm/3mm/5mm	Jindal
	2A2674P034	Flush Pull Handles	For SS doors Handles	Elesa ganter
	2A2674P035-48	Pipe and Fittings	AirPipe Pipe and fittings as per fitting list	Airpipe
	2A2674P050-53	SS Fitting	SS Fittings as per requirement, Tube OD fittings as per fitting List	SS 304
	2A2674F026-030	Manifold	SS manifold and mounting bracket	SS 304

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Page 34 of 35	Document Name: A2674-PED-OPERATIONAL AND MAINTENANCE MANUAL-CCUBTB-REV-00	20 th MAY,2022
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Tel: +91-120-4500800, Fax: +91-120-4500888, contact@neometrix.in

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METRO RAIL, KOLKATA	Computerized Control Universal Brake Test Bench	COMOW Order No:- COFMOW/IR/S/P-I/OP-406772 Dated 24.08.2021

2A2674F031	Electrical Control panel	SS 304 ,Electrical Control Panel , Size : as per drawing, Thickness: 3 mm	Jindal
2A2674P060-62	Hoses	Hose For UUT testings , WP : 16 Bar, For Compressed Air	Gates
2A2674F032-37	SS fittings	SS fitting s for UUT	Global
2A2674F038	Test manifold	SS Manifold for Testing unit	Neometrix

END OF DOCUMENT

THANK YOU

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Page 35 of 35	Document Name: A2674-PED-OPERATIONAL AND MAINTENANCE MANUAL-CCUBTB-REV-00	20 th MAY,2022