

(PRODUCT CODE: PLCMT-A1)

(PRODUCT CODE: PCST-14A-I)

The **CUSTOMIZED PROCESS UNIT TRAINER (PLCMT-A1) WITH CUSTOMIZED PLC HMI VFD SET UP (PCST-14A-I)** outlines the basics of the Flow control, Level control, Temperature control, Pressure control, etc. and other aspects related to PLC Control/DCS control. It is used for operator training in Industrial environment related to different sensors, transmitters, controllers, actuators & final control elements.

**Key Words: -**

- Feedback Control.
- Feedback Level Control.
- Feedback Pressure Control.
- Feedback Flow Control.

- Feedback Temperature Control.
- Cascade Control (Level + Flow, Pressure + Flow).
- ON-OFF Control.
- Feed forward control
- Industrial IoT Gateway (optional)

### TECHNICAL SPECIFICATIONS OF CUSTOMIZED PROCESS UNIT TRAINER (PRODUCT CODE: PLCMT-A1):

No.	Item Name	Technical Specifications
1	Sump tank-	<b>Qty: 01 No.</b> , Material: Stainless Steel 1.5 mm thick/ P.P.5mm thick, Capacity: 30 liters, with top cover, Dimension: 12" (L) × 24" (W) × 16" (H).
2	Level Tank-	<b>Qty: 01 No.</b> , Material: acrylic/ P.P. 5 mm thick, Dimension: 150(L) mm× 150(W) mm× 600(H) mm
3	Centrifugal Pump-	<b>Qty: 02 Nos.</b> ½" H.P., 1ϕ 230 V AC supply, Thermal overload protection; Surface mounting.
4	Temperature Cabinet / GEYZER	<b>Qty: 01 No.</b> , Heater: 3 KW. Dimension: 1.25ft (L) ×1.25ft (W) ×1.25 ft (H). Heating Range: 0 to 100°C
5	Pressure vessel-	<b>Qty: 01 No.</b> , Shape: Cylindrical, Material: CRCC/SS 304, Diameter: 150 mm, Length: 300 mm, Capacity: 15 Kg/cm <sup>2</sup> , with 1/2" BSP connection for Pressure Gauge, Pressure Transmitter, Inlet & Drain facility.
6	Piping-	½" GI, Class B/SS Piping (Optional), with ½" SS ball valves: 18 no.
7	Flow meter-	<b>Qty: 02 Nos.</b> Size: ½", Turbine type/WFM type; Range: 0-1000 LPH, Supply: 24 V DC, 100 mA. Output: 4-20 mA, Type: 3-wire type/2-wire type. Mounting: Horizontal, Connection: ½"
8	Level Transmitter-	<b>Qty: 01 No.</b> , Input: 0-500 mm, Output: 4-20 mA, supply: 24V DC, 100mA. Type: 2-wire Resistive type/capacitance type, Mounting: Top 2" screwed connection.
9	Pressure Transmitter -	<b>Qty: 01 No.</b> , Input: 0-2.5 Kg/cm <sup>2</sup> or 0-4 Kg/cm <sup>2</sup> , Output: 4-20 mA, supply: 24 V DC, 50 mA. Type: 2-wire Piezo-resistive type, Medium: Water Pressure, Mounting: Top ½" BSP connection.
10	Temperature Transmitter-	<b>Qty: 01 No.</b> , Input: RTD, Output: 4-20 mA, Type: 2-wire type, Sensor Length: 100 mm, DC Supply 24V, 50mA Range: 0-100°C / 0-200°C
11	Thyristerized Phase Angle Control Card-	<b>Qty: 01 No.</b> , Input: 4-20 mA, Output: 0-230 VAC variable, 10 A Max.
12	Pneumatic Control Valve-	<b>Qty: 01 No.</b> Size: ½", Characteristics: Equal percentage. Type: Two way Globe type with Valve Positioner (Air to Close), Cv: 5 US GPM, with diaphragm actuator. Flange connection: PCD: 80 mm, ID: 26 mm, OD: 110 mm. Positioner Action: 0.2 to 1.0 Kg/cm <sup>2</sup> (with Bypass), Action: Direct / Reverse, Pneumatic Input Signal: 0.2 to 1.0 Kg/cm <sup>2</sup> (Without Bypass)
13	Rotameter-	<b>Qty: 01 No.</b> Range: 0-1000 / 0-2000 LPH, Glass tube type/ Acrylic body. Connection: ½", Mounting: Inlet- Bottom, Outlet- Top.
14	A.F.R. / F.R.L. Unit-	<b>Qty: 01 No.</b> , Air Filter, Regulator, Lubricator, ¼" connection. Range: 0-10Kg/cm <sup>2</sup> with Pressure Gauge.
15	E/P Converter -	<b>Qty: 01 No.</b> , Input: 4-20 mA, Output: 3-15 psi, Connection ¼" NPT / BSP, Supply: 1.4 Kg/cm <sup>2</sup> .
16	Level Switch-	<b>Qty: 01 No.</b> , Float operated, Float Material: pp, Switching voltage: 24 VDC Switching Current: 0.5A, Switch Action: Reversible, Weight: 315 Grams.

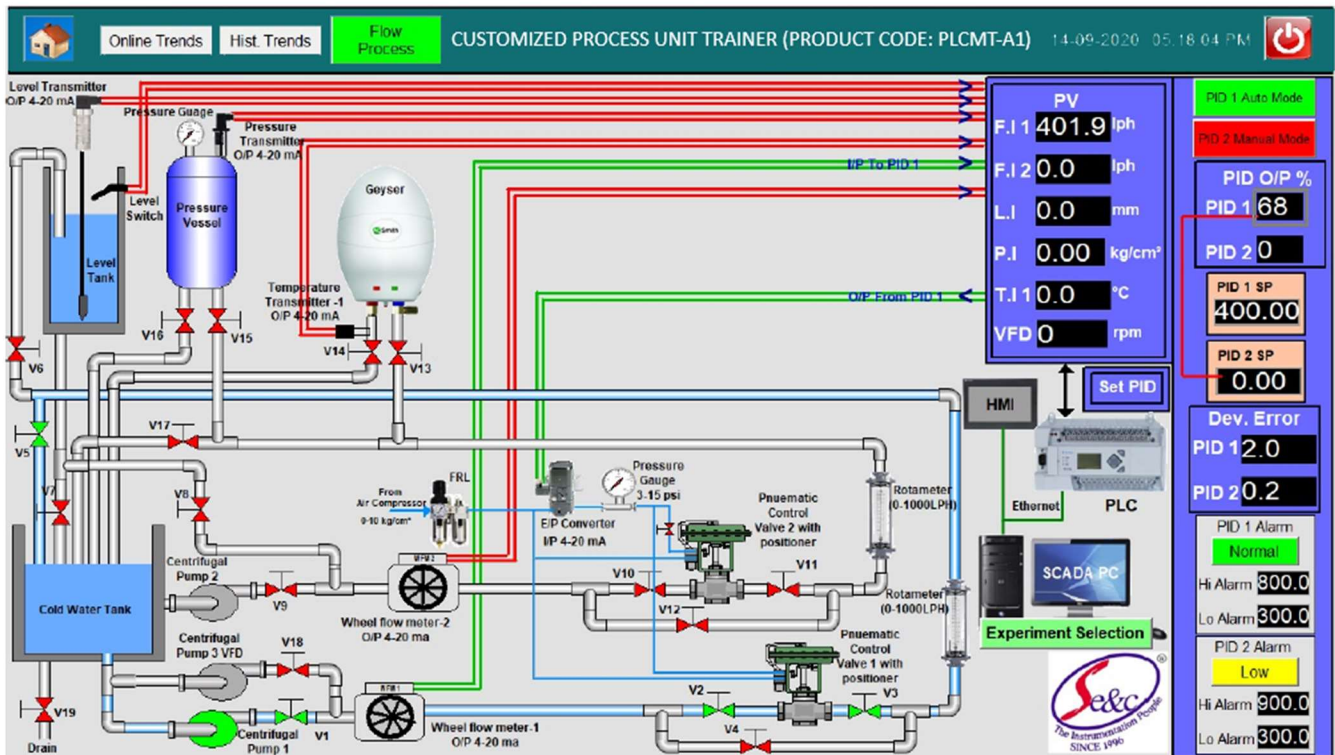
17	Digital Panel Meters-	<b>Qty: 07 Nos.</b> A] <b>Level Indicator</b> - 1no. Input Current- 4-20mA, Output Level- 0-500mm B] <b>Pressure Indicator</b> - 1no., Input Current- 4-20mA, Output Pressure-0-2.5Kg/cm <sup>2</sup> C] <b>Flow Indicators</b> - 2nos., Input Current- 4-20mA, Output Flow- 0-1000 LPH D] <b>Temperature Indicator</b> - 1no, Input Current- 4-20mA, Output Temp.- 0-100°C E] <b>Current Indicators</b> - 2nos. Range- 4-20mA For PLC Output.
18	Isolator-	<b>Qty: 07 Nos.</b> Signal Isolators, Input: 4-20 mA, Output: 0 to 10VDC and Input: 4 to 20 mA, Output: 0-20 mA, Supply: 24 V DC.
19	MCB-	<b>Qty: 01 No.,</b> 16A, 1 $\phi$ 230 VAC, L&T/ Standard Equivalent
20	Relay Module	<b>24VDC, 2C/O,</b> DIN Rail Mounting- <b>Qty: 6 Channel</b> <b>5VDC, 2C/O,</b> DIN Rail Mounting- <b>Qty: 6 Channel</b> <b>5-24VDC, 1C/O,</b> DIN Rail Mounting- <b>Qty: 4 Channel</b>
21	Power Supply-	<b>Qty: 01 No.,</b> 24 V DC, 5 A, Size: 48mm $\times$ 126mm $\times$ 68mm.
22	Electrical Control Panel: -	MS Powder coated panel with switches, indicator, Test Points, Terminal connectors mounted on DIN rail channel, Use of Multistrand wire with proper insulated Lugs, Ferruling & neat wire dressing & clamping wires & power cables are seated through 1" $\times$ 1" PVC cable tray.
23	SCADA Software (Optional)	<b>Qty: 01 No., Make: Siemens WinCC Basic/G.E. Proficy iFix RT /Eqvt.</b> SCADA S/W, PID control setting (P, PI, PD and PID mode), Auto/Manual Tuning of PID, Data Storage, Off Line analysis, Online Data Acquisition, Simulation and Printing of data in Graphical and tabular form. Interactive Graphical User Interface (GUI) included.
24	Air Compressor (Optional)-	<b>Qty: 01 No.,</b> Tank capacity: 20/24 Liters, Discharge: 2 CFM Motor: 1 H.P./2 H.P, 1 $\phi$ , 230 V AC Operated, Working pressure: 5-6 kg/cm <sup>2</sup>
25	Computer (Optional)-	<b>Qty: 01 No.,</b> PC with color monitor: 18.5", Intel Core i3/i5, 500 GB HDD, 4GB RAM, Keyboard & Mouse, DVD Writer, With supporting OS and Communication port.
26	System Dimensions & Weight	<b>56" (L) X 26" (W) X 65" (H)</b> <b>Approx.: 200 Kg</b>

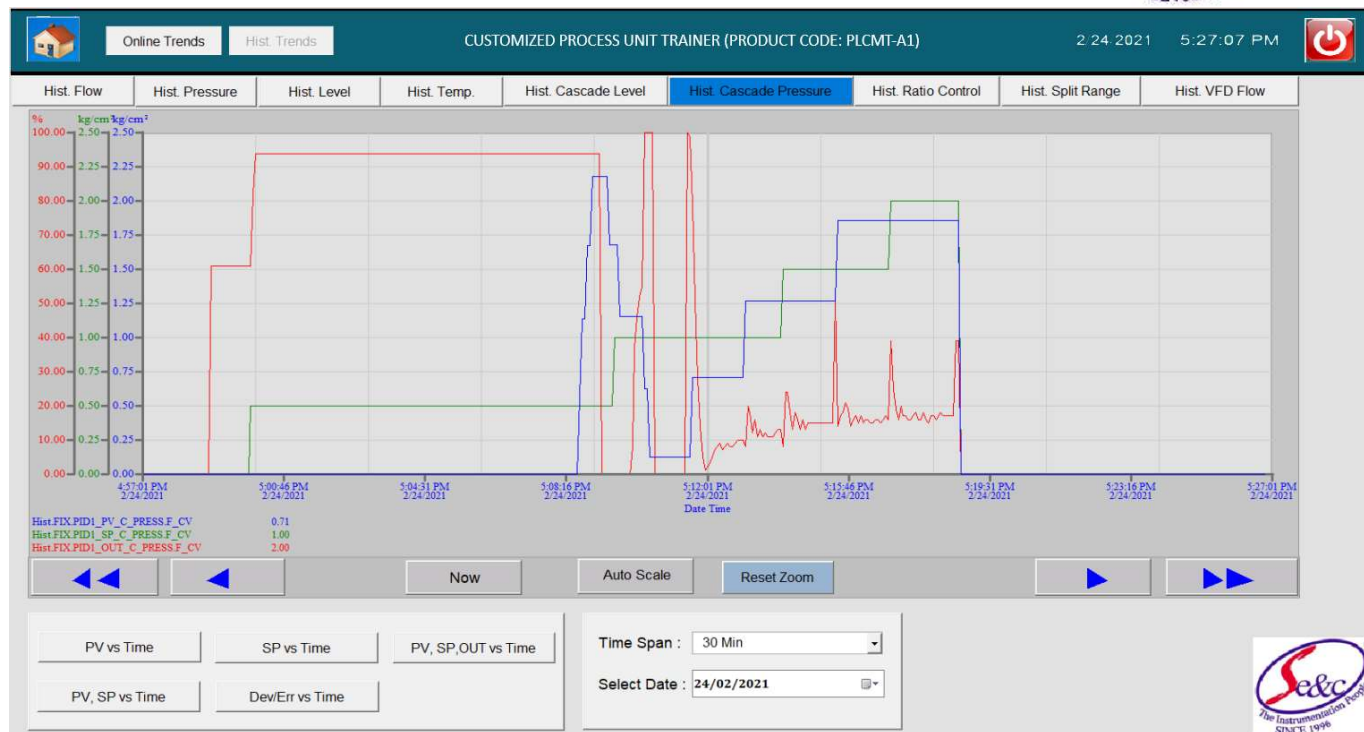
**TECHNICAL SPECIFICATIONS OF CUSTOMIZED PLC HMI VFD SET UP/UNIT (PRODUCT CODE: PCST-14A-I):**

No.	Item Name	Technical Specifications
1	PLC-	<b>Qty: 01 No., Allen-Bradley MicroLogix 1400 /Siemens S7-1200/Equivalent.</b> Digital Inputs- <b>20</b> (For M.L. 1400), <b>14</b> (For Siemens S7 1200) Digital Outputs- <b>12</b> (For ML 1400)/ <b>10</b> (For Siemens S7 1200), Analogue input- <b>4</b> (For ML 1400)/ <b>2</b> (For Siemens S7 1200), Analogue output- <b>2</b>
2	MCB-	<b>Qty: 01 No.,</b> 6A, 1 $\phi$ 230 VAC, L&T/ Standard Equivalent
3	Relay-	<b>Qty: 01 No.,</b> 24V DC operated
4	Power Supply-	<b>Qty: 01 No.,</b> 24 V DC, 5 A, Size: 48mm $\times$ 126mm $\times$ 68mm.
5	Human Machine Interface (HMI)-	<b>Qty: 01 No.,</b> Size: 4"/7" Color Display Make: Omron/Wecon/Mitsubishi/Siemens/ /Schneider/Eqvt.
6	VFD	<b>Qty: 01 No.,</b> Make: Siemens/Allen Bradley/ LS / DELTA/EQVT. Model Name: Sinamics V20 / EQVT. I/P: 1 $\phi$ 230 VAC, O/P: 3 $\phi$ 230 VAC With 1HP 3 $\phi$ AC Motor (For Feedforward Flow control)
7	HMI with a Built-In IoT Gateway	<b>Qty: 01 No.,</b> Make: Wecon, Model No.: PI3070ig, CPU A35 1.2GHz, 128M Flash, 128M DDRAM, Display:7" Resolution: 800*480; Interfaces: a serial port. COM1: RS232, RS422

	<b>(Optional)</b>	or RS485(choose one of two), Ethernet., USB interfaces: USB Host/USB Client, Remote monitoring and WVPN pass-through download., 3070ig-C supports related functions of V-NET, Wi-Fi/Ethernet pass-through download and sync data to cloud., 24V DC Operated <b>Note: You have the option to select either a Separate HMI (Make: Omron/ Wecon/Mitsubishi/Siemens/Schneider/equivalent) or a Wecon-make HMI with a built-in IoT Gateway.</b>
<b>8</b>	<b>Electrical Control Panel: -</b>  <b>Panel Dimensions &amp; Weight</b>	MS Powder coated panel with switches, indicator, Test Points, Terminal connectors mounted on DIN rail channel, Use of Multistrand wire with proper insulated Lugs, Ferruling & neat wire dressing & clamping wires & power cables are seated through 1" x1" PVC cable tray.  <b>24" (L) X 14" (W) X 20" (H)</b> <b>Approx.: 31 Kg.</b>
<b>9</b>	<b>Stand Dimensions</b>	<b>Aluminium profile stand: Size: 40 x 40 (mm)</b> <b>25" (L) X 15" (W) X 22" (H)</b>

SCADA Screen (Optional):





### Range of experiments-

- ❖ Study of PLC & HMI.
- ❖ Study of PLC based control of Multi Process systems.
- ❖ Study of data logging system.
- ❖ Study of feedback, cascade, on-off control systems.
- ❖ Calibration of Various Sensors, Transmitters like Pressure, Level, Flow, Temperature, Control Valve, Rotameter, E/P, etc.
- ❖ Feedback control: Flow, Level, Pressure, Temperature
- ❖ Cascade Control: Flow-Level, Flow-Pressure.
- ❖ ON-OFF control: Level, Pressure, and Temperature.
- ❖ Study of implementation of Feed-forward Control using VFD based flow control.
- ❖ Study of SCADA Application Software/ Computerized Control of Customized Process Unit Trainer (PRODUCT CODE: PLCMT-A1) (optional).
- ❖ Study of Industrial IoT Gateway Web Based SCADA (optional).

### Features-

- ❖ Provision to interface the unit with external controller/DCS Controller/PLC Controller & HMI using I/O connection points.
- ❖ The control signals are all mounted on the control cabinet to banana sockets to be controlled by different external units.
- ❖ Junction box with test points provided for modular sensor assembly.
- ❖ Provides actuator testing facility i.e. Pneumatic control valve/Power control card.
- ❖ Audio-visual Annunciator/Warning lamp with 3 color indicators with buzzer.
- ❖ Compact Ergonomic Design.
- ❖ User-Friendly, Self-Explanatory Systems.
- ❖ Leak proof Safety Measures, sturdy piping.
- ❖ Enhanced Electrical Safety Considerations.
- ❖ Training Manuals Mimic Charts for Operation Ease.

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- ❖ System Frame with Caster Wheel Arrangement for ease in movement.
- ❖ M.S. powder coated cubical plant with standard Instrument Mountings.
- ❖ Inbuilt Safety Measures to avoid improper usage.
- ❖ Computer Interface (Optional).
- ❖ Caster wheel mounted movable frame

**Services Required:**

- ❖ Electrical supply of 1 $\phi$  230V AC, 16A, 50Hz.
- ❖ Water supply and drainage arrangement.
- ❖ Clean, dry, compressed air supply at 2.1 kg/ cm<sup>2</sup>.
- ❖ Laptop/Desktop computer (FOR SCADA)

**Note:**

All descriptive matter and illustrations are intended to give only a general idea of the equipment detailed specifications may be altered at the company's discretion without any notice.

