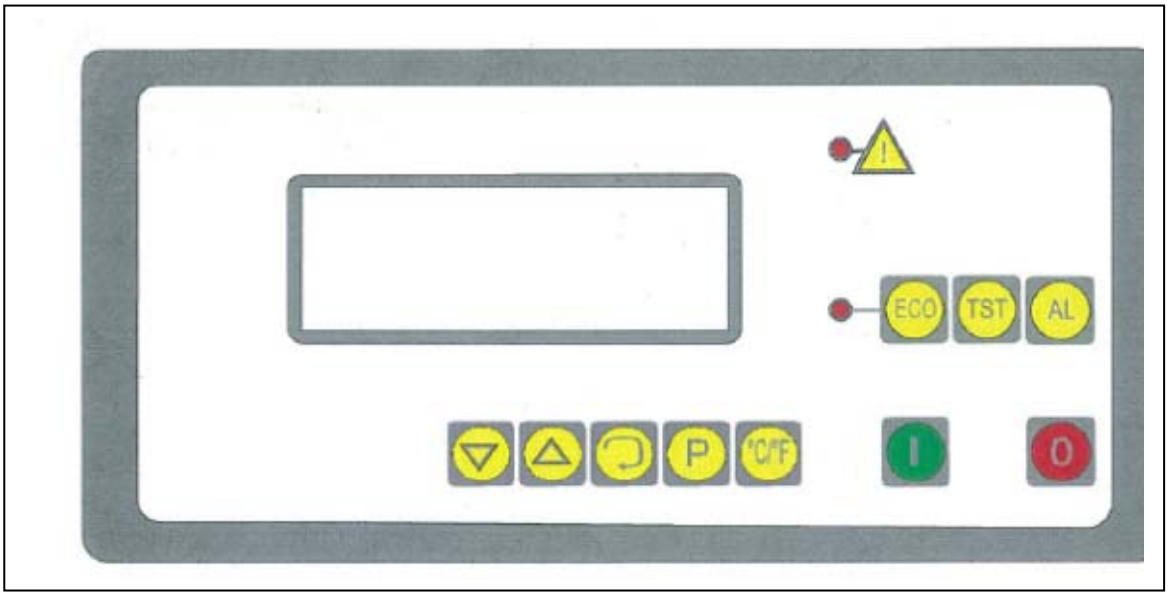
E-680 CONTROLLER MANUAL FOR REFRIGERANT DRYERS



04.30.13 Rev. 0.2

E-680 CONTROLLER FOR REFRIGERANT DRYERS

DESCRIPTION

E-680 is designed as a controller for refrigerant type compressed air dryers. The controller has 8 temperature sensor inputs. Each channel can be configured for type J, type K thermocouple or Pt-100 resistance thermometer. These inputs are used to measure the temperatures at various points in the dryer. The controller has also 8 digital (relay) outputs and 16 digital inputs. The digital outputs are taken through the normally open contacts of the output relays. The contact rating of the output relays are 10A at 250 V AC Digital inputs are activated by 24V DC or AC.

The controller has an RS-485 communication interface that can be used for remotely monitoring channel temperatures, set points, input and output states. Modbus RTU protocol is used for communication.

The front panel of the controller contains a four line 20 character LCD display and 10 buttons that are used in configuration and manual control operations.

The dimensions of the controller are 96 x 192 mm (front panel) with a depth of 110 mm. The panel cutout should be 90x185 mm. The operating voltage of the controller is 20 - 60V AC or 20 - 85V DC.

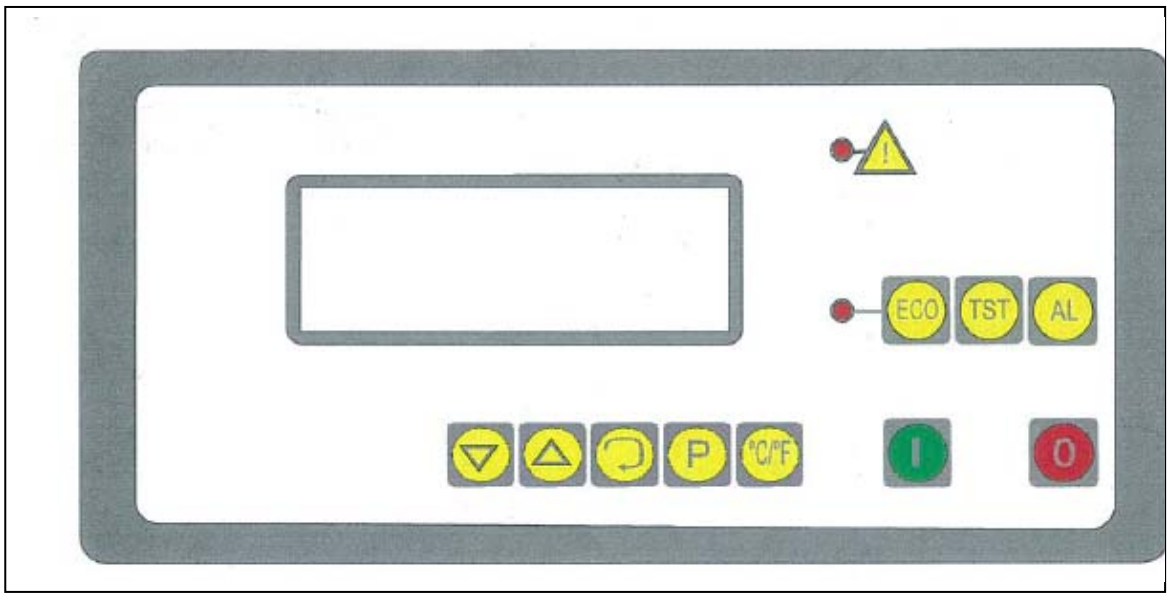


Figure 4-1: The Front Panel View of E-680 Controller

OPERATION

The front panel view of E-680 controller is given in *Figure 4-1*. The front panel of the controller contains a four line 20 character LCD display, 9 buttons and one alarm indicator LED.

The buttons below the LCD display  ,  ,  ,  , and  are used in configuration operations.

 button is used for manual control of the drain output. While in normal operation, the drain output is controlled according to the configured "drain on" and “drain off" periods.

When  button is pressed the drain output is activated even if the dryer is in off state.

The dryer automatically stops if an anomaly is detected. In that case, the alarm output and the alarm indicator LED on the front panel become activated. In order to restart the dryer, alarm should be acknowledged and "restart delay" period should be timed out. Pressing 

button acknowledges the alarm and de-energizes the alarm output and alarm LED.

and 

buttons are used for starting and stopping the dryer respectively. If the dryer is stopped manually, it cannot be started before "restart delay" period is timed out.

EXTERNAL CONNECTIONS

The back panel view and the connection terminals of E-680 controller are given in *Figure 4-2.*

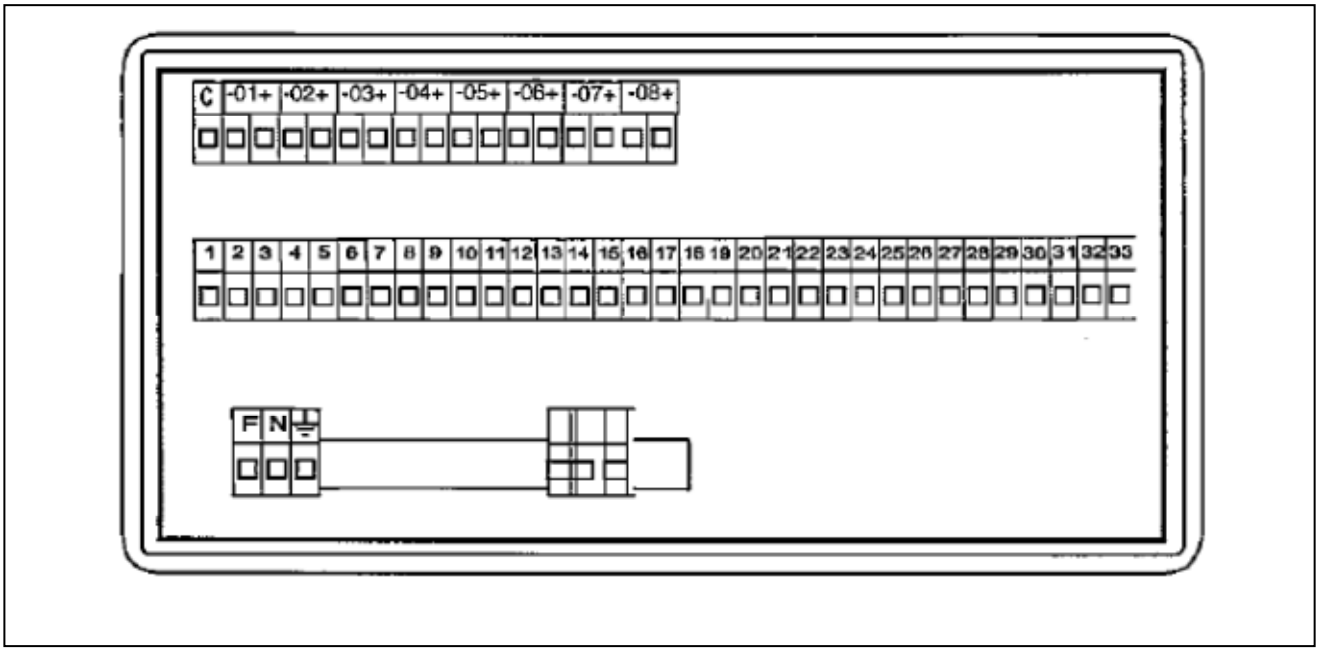


Figure 4-2: The Back panel View of E-680 Controller

Terminals in the Upper Row

These terminals are used for temperature sensors (Pt-100).

01. Inlet Air Temperature.
02. Exchanger Temperature.
03. Low Pressure Line Temperature.
04. High Pressure Line Temperature.
05. Ambient Temperature.
06. Auxiliary Channel Temperature. This temperature can be monitored, but sensor break has no effect on the operation of the controller.
07. Spare Channel 1.
08. Spare Channel 2.

Spare channels are measured by the controller, but cannot be monitored and sensor break for these channels has no effect on the operation of the controller

Terminals in the Middle Row

These terminals are used for digital outputs and digital inputs. The names and the functions in the order of the terminal numbers are given in the following table.

T. No	**Name**	**Function**
1	COMM. For D. Out 1-4	
2	COMM. For D. Out 1-4	
3	D. OUTPUT 1	Compressor Motor
4	D. OUTPUT2	Drain Output (Normal)
5	D. OUTPUT3	Dryer is Running.
6	D. OUTPUT4	Dryer is Stopped. In case of fault, the output flashes.
7	-	
8	COMM. For D. Out 5-8	

T. No	Name	Function
9	COMM. For D. Out 5-8	
10	D. OUTPUTS	Drain Output (Inverted)
11	D. OUTPUTS	**Spare**
12	D. OUTPUT?	**Spare**
13	D. OUTPUTS	Alarm Output (Horn)
14	-	
15	COMM. For D. INPUTS	
16	COMM. For D. INPUTS	
17	COMM. For D. INPUTS	
18	D. INPUT 1	**Remote Start (Press and** Release)
19	D. INPUT2	**Remote Stop (Press and** Release)
20	D. INPUT3	**Compressor Fault**
21	D. INPUT4	**Compressor Overload**
22	D. INPUTS	**Fan Fault**
23	D. INPUT6	**Fan Overload**
24	D. INPUT7	**Phase Sequence Error**
25	D. INPUTB	**Remote Disable**
26	D. INPUT9	**Fan Motor is On**
27	D. INPUT10	**Configuration Enable**
28	D. INPUT 11	**Spare**
29	D. INPUT12	**Spare**
30	D. INPUT13	**Spare**
31	D. INPUT14	**Spare**
32	D. INPUT 15	**Spare**
33	D. INPUT16	**Spare**

The contact rating of each output relay is 10A at 250 VAC.

Digital inputs are activated by 24V DC or AC.

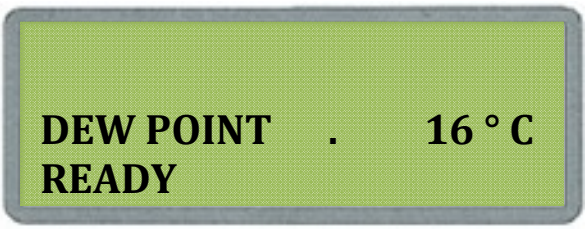
Terminals in the Middle Row

The first 3 terminals are for operating voltage. (Phase, Neutral and Ground) The ground terminal should be connected to the chassis of the dryer.

The last 3 terminals are for RS-465 communication line.

NORMAL OPERATION

When the controller is powered on it displays the type and version message and then normal operation screen is displayed as shown below.



The exchanger temperature and operation state of the dryer is displayed in this screen. Sequentially pressing  button displays other info related to the dryer in 8 different screens. While one screen is displayed, pressing  button reverts to the normal operation screen. The views of the screens in sequence are shown below.

In the first 3 screens, the sensor temperatures are displayed. If the measured temperatures are between their low and high limits, only the temperature value is displayed, otherwise 'LOW' or 'HIGH' message is added in the end of the line. In case of faulty sensor, only 'SENSOR BREAK' message is displayed.

The fourth screen displays the status of the compressor motor, fan motor, the phase sequence and remote disable. This information is compiled from the digital inputs. (Digital Inputs 3 to 8)

In the first two line of the fifth screen the total and ECO operation durations of the dryer are displayed. These values cannot be reset. The third line displays the run time since the last maintenance. The fourth line indicates the filter usage time. If these times exceed their set values (see section 2.3.3.), i.e. general maintenance period and filter change period, a flashing warning with a message 'MAINTENANCE' or 'REPLACE FILTER' is displayed in the fourth line of the display.

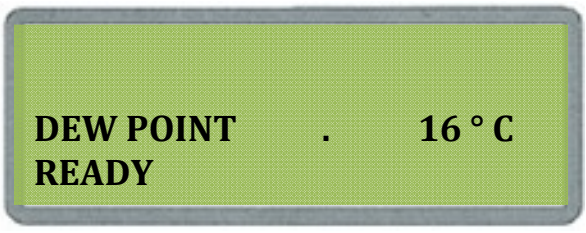
The sixth screen displays the last four events that caused the dryer to be stopped automatically.

The seventh screen displays the date and time.

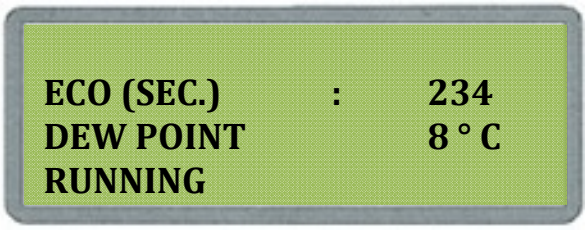
The eighth screen displays the status of the digital inputs and digital outputs. The letters 'L' and 'H' stands for 'not activated' and 'activated' states respectively.

In order to start the dryer, all the temperatures except the exchanger temperature must be between their low and high limits. The low pressure line temperature can be 'HIGH'. Digital inputs 3 to 8 should not be activated. If this is not the case, instead of 'READY' message, 'DISABLED' message is displayed in the normal operation screen.

When the dryer is started, the normal operation screen is displayed as shown below.



If the drain output is activated, 'DRAIN ON' message is displayed at the end of the last line. While the fan motor is running, 'FAN MOTOR IS ON' message is displayed in the second line. In ECO mode the appearance of the display is given below.



The value at the end of the second row indicates the time in seconds since beginning of the ECO mode. If the dryer is stopped automatically because of an anomaly, or manually by using 

button, the normal operating screen is displayed as shown below.

The number at the end of the last line indicates the remaining time in seconds from the restart delay. If this number becomes zero and there is no anomaly, the dryer can be restarted.

button is used to change the temperature unit from °C to °F or vice versa. When this button is pressed, the control operation stops about 3 seconds and all the temperature values are converted to the selected unit.

The first line in the normal operation display {MIKROPOR) is user configurable.

CONFIGURATION MODE

In order to enter into configuration mode, P button must be pressed at least 3 second duration. After this operation security code is asked. Enter the security code by ▽ and △ buttons. Once the security code is entered, pressing ↻ button, accesses the "General Parameters Page". Use ▽ and △ buttons to select the other pages. When a page is selected, pressing ↻ button accesses the first parameter in that page. Successively pressing ↻ button displays the other parameters in that page. After the last parameter or pressing button more than two seconds, reverts to the top of that page where a different page can be selected. When a parameter is selected, its value can be edited by ▽ and △ buttons. Anywhere in the configuration pages, pressing P reverts to the normal operation.

If the entered security code is not correct, all the parameters except "Security Code" parameter in the "General Parameters Page" can be accessed but no modification is allowed.

The value of the security code is determined by the parameter "Security Code" in the "General Parameters Page". The factory setting of the security code is "10".

The Configuration Pages and the parameters in the configuration pages are given below.

GENERAL PARAMETERS PAGE

1. Language
2. Communication Address
3. Baud Rate
4. Parity
5. Message Text
6. Security Code

TEMPERATURE SET POINTS PAGE (FACTORY SETTINGS)

1. Inlet Air Temp. / Low Alarm Setpoint (32°F/0°C)
2. Inlet Air Temp. / High Alarm Setpoint (131°F/55°C)
3. Exchanger Temp. / Low Alarm Setpoint (27°F)/-3°C)
4. Exchanger Temp. / High Alarm Setpoint (68°F/20°C)
5. Low Pressure Line Temp./ Low Alarm Setpoint (23°F/-5°C)
6. Low Pressure Line Temp./ High Alarm Setpoint (113°F/45°C)
7. High Pressure Line Temp. / Low Alarm Setpoint (32°F/0°C)
8. High Pressure Line Temp. / High Alarm Setpoint (194°F/90°C)
9. Ambient Temperature / Low Alarm Setpoint (32°F/0°C)
10. Ambient Temperature / High Alarm Setpoint (131°F/55°C)
11. Exchanger Temp. / ECO Start Setpoint (38°F/3°C)
12. Exchanger Temp. / ECO End Setpoint (50°F/ 10°C)
13. Condenser Temp. Diff. Set Point (41°F/5°C)

TIME PARAMETERS PAGE

1. Exchanger Temp. / Alarm Delay (Minute)
2. ECO Start Delay (Minute)
3. Low Pressure Line Temp. / High Alarm Delay (Minute)
4. Restart Delay (Second)
5. Drain Off Time (Minute)
6. Drain On Time (Second)
7. Filter Change Period (Hour)
8. General Maintenance Period (Hour)

DATE-TIME ADJUST PAGE

1. Minutes
2. Hours
3. Date
4. Month
5. Year
6. Confirm (Y/N)

ANALOG INPUT PARAMETERS PAGE

1. 1. Channel Offset
2. 2. Channel Offset