

PM-DM/DMR / PM-2DM/2DMR

DIGITAL MULTIMETERS

1. INTRODUCTION

PM-DM/PM-DMR / PM-2DM/PM-2DMR is a microcontroller based device designed to measure current and voltage of three phases and frequency of the system. Device also stores minimum and maximum demands for both current and voltage and is capable to show these values to the user when desired. PM-DMR/PM-2DMR also has programmable under and over voltage limits, under and over current protection and delay time setting with contact output. PM-DMR/PM-2DMR has two different contact outputs for O/U Current and Voltage conditions. Contact output availability is optional. PM-DMR/PM-2DMR comes with the relay output whereas PM-DM/PM-2DM does not.

2. USAGE OF PM-DM/DMR / PM-2DM/2DMR

All connections have to be done according to connection diagramme (Figure-1). When power is applied for the first time in order to see the current levels, the CT Ratio should have to be set correctly. Device will start displaying correct values. L1, L2, L3 lines refer three phases where N to neutral connection. Outputs of main current transformers have to be connected to I₁₁-I₁₂, I₂₁-I₂₂, I₃₁-I₃₂ input terminals successively. On the other word it means that "IX₁-IX₂" pins of CTs have to be connected separately.

2.1. Password Access (Optional)

Press "ENTER" button for 3 sec. "Ctr" and "Set" texts are displayed subsequently if password option is not selected. "Scr" is displayed for the user to enter the password given by the manufacturer if provided that the password option is already selected by the user. A wrong password access will cause to return back to main menu whereas a verified/successful access enable "Ctr" and "Set" texts be displayed subsequently. Password is 015 and can not be changed.

2.2. Setting Current Transformer Ratio

Press ENTER button for 3 seconds. On the bottom display "Ctr" and "Set" are displayed alternately. Press "ENTER" button again to display the CT Ratio (CTR). CTR (default is 5) value can be adjustable between 5 and 9500. When the adjusted value exceeds 1000, "k" (kilos) LEDs will be on and the value of the CTR will be shown along with "."dot within kA. Pressing "UP" or "DOWN" buttons enables the user adjust the desired CTR value. Pressing "ENTER" button again is needed to save it in non-volatile memory. Press "UP" button until "ESC" appears on lowest display. Press "ENTER" button again to enable the device display current, voltage and frequency readouts on the display screen.

2.3. Setting Over Voltage Level

(For PM-DMR/PM-2DMR)

Press "ENTER" button for 3 seconds. Press "UP" button until "UuL" and "Set" appear on the display. By pressing "ENTER" button again, the lowest display will indicate existing over voltage limit. Enter the desired value and save via "ENTER" button. Press "UP" button until "ESC" appears on lowest display. Press "ENTER" button to start displaying of current, voltage and frequency.

2.4. Setting Under Voltage Level

(For PM-DMR/PM-2DMR)

Press "ENTER" button for 3 seconds. Press "UP" button until "UdL" and "Set" appear on the display. By pressing "ENTER" button again, the lowest display will indicate existing under voltage limit. Enter the desired value and save via "ENTER" button. Press "UP" button until "ESC" appears on lowest display. Press "ENTER" button to start displaying of current, voltage and frequency.

2.5. Setting Over Current Value

(For PM-DMR/PM-2DMR)

Press "ENTER" button for 3 seconds. Press "UP" button until "IuL" and "Set" appear. Press "ENTER" button again for the lowest display to indicate existing over current limit. Enter the desired value and save via "ENTER" button. Press "UP" button until "ESC" appears on lowest display. Press "ENTER" button to start displaying of current, voltage and frequency.

2.6. Setting Under Current Value

(For PM-DMR/PM-2DMR)

Press "ENTER" button for 3 seconds. Press "UP" button until "IdL" and "Set" appear on display. Press "ENTER" button again for the lowest display to indicate existing under current limit. Enter the desired value and save via "ENTER" button. Press "UP" button until "ESC" appears on lowest display. Press "ENTER" to start displaying of current, voltage and frequency.

2.7. Setting Time Delay

(For PM-DMR/PM-2DMR)

Press "ENTER" button for 3 seconds. Press "UP" button until "dEt" and "Set" appear. Press "ENTER" button again for the lowest display to indicate existing delay time. Enter the desired value and save via "ENTER".

2.8. Password Entry

Keep pressing "UP" button until "Scr" and "Set" texts are displayed. Press "ENTER" button to see password status option on the bottom LED. "S-A" is chosen to activate the password option whereas "S-P" chosen to deactivate, by using "UP" or "DOWN" button. Press "ENTER" to accept and save. Hold pressed "UP" button until reaching "ESC" to ENTER for displaying of Hz, U, I.

2.9. Monitoring Current, Voltage and Frequency

Current of three phases are displayed simultaneously on the first three display. If the read value of current exceeds 1000A, device will light "k" (kilos) LED and show the value with dot within kA.

Fourth display indicates voltage of one phase whereas the LEDs on left side refer each subsequent line. Thus, pressing "UP" or "Down" enables the user to read L-L and L-N values. The frequency (Hz) is displayed on the fifth display.

2.10. Viewing Current, Voltage, Frequency and Power Factor

(For PM-2DM/PM-2DMR)

In normal operation device shows current of three phases at the same time on first three displays. If read value of current exceeds 1000A, device will lights "k" (kilos) LEDs and show the value with dot.

Fourth display shows the voltage of one phase or phase to phase voltage or power factor (Cos ϕ) of the phase according to the user's selection the three LEDs on left side of the display lights indicates which line's voltage or cos ϕ is being displayed currently. Pressing "UP" or "DOWN" buttons will change the current information of fourth display. User can see voltage levels of three phases to neutral or phase to phase voltages or power factor (Cos ϕ) of each phase by pressing one of this buttons sequentially. Each pressing of the buttons will update the status of LEDs on left side of fourth display giving information to user which quantity is being displayed.

Fifth display gives information about line frequency in normal operation. When the fourth display shows cos ϕ value of the phases, fifth display shows the situation of the cos ϕ value. If the value is capacitive "Cap" text will appear on the fifth display. If the value is inductive "Ind" text will appear on the fifth display. If there is no one of the current and voltage signals, "noS" text will appear on the fifth display.

To measure the right power factor value, Voltage and Current signals of the phases must match each other.

2.11. Maximum and Minimum Demands

Press "ENTER" button for 3 seconds when device is in normal operation mode. Press "UP" button until "LHi" appears on lowest display. At this time first three displays give information about maximum read value of currents for three phases. The fourth display shows the maximum read value for selected line's voltage. Line selection is done by "ENTER" button in this operation status. Each press of "ENTER" button will change information of fourth display and LED status, as well. If user continues pressing "UP" button until lowest display shows "LLO" first three displays will give information about minimum read values of currents of three phases and fourth display will show the minimum value of voltage for the selected line. Selection can be done by "ENTER" button in this case. These maximum and minimum values are stored in memory of the devices. Even if the power cut off these values will not be erased from the memory. So the user can see the last max. and min. values of currents and voltages. If "UP" and "DOWN" button are pushed at the same time the devices will reset the max. and min. values. When the device is reset, min. current values will be set to 9500A and min. voltage values will be set to 500V and Max. current and voltage values will be set to 0 value. When the device turns back to normal operation, these values will be updated immediately. Press "UP" button until lowest display shows "ESC" and press "ENTER". K LED on the left of the "Current" LED is highlighted when the current is 1000A or above, but be retrieved as in kA value.

2.12. Contact Position According to the Failure (For PM-DMR/PM-2DMR)

The voltage protection relay (NC2, C2, NO2) will be energized and current protection relay (NC1, C1, NO1) will not be energized if current and voltage of whole phases are measured at the adjusted current and voltage levels. When one of the phase voltage goes under the adjusted Under Voltage Protection Level and/or above the adjusted Over Voltage Protection Level, the energy of the voltage protection relay (NC2, C2, NO2) will be cut and the relay will change its contact position at the end of the adjusted delay time. The same mentioned above is followed for the Over Current Protection. Over Current and Voltage Protection Relays are activated independently as shown on Figure-1, NC1, C1, NO1 for over current failure and NC2, C2, NO2 for over voltage failure.

3. CONNECTION DIAGRAM

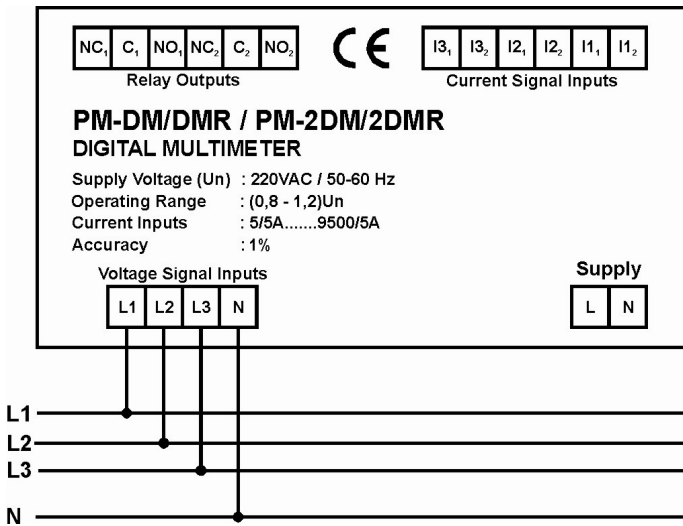


Figure-1 Connection Diagram

Important Note: We highly recommend the user press "up and down buttons" at the same time to reset the stored max. and min. demand values when current input and voltage input are connected first time.

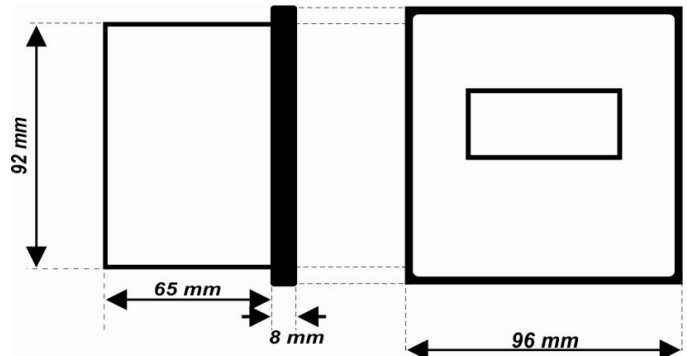
4. TECHNICAL SPECIFICATIONS

Operating Voltage (Un)	220VAC, 120VAC \pm %20 (L-N) (Operating voltage can be changed by the vendor)
Operating Range	(0,8-1,2)xUn
Operating Frequency	50/60 Hz
Power Consumption	< 4VA
Input Power Consumption	< 1VA
Voltage Inputs Range	0-300VAC (L-N) 0-500VAC (L-L)
Current Transformer Ratio	5/5A.....9500/5A
Current Input	5A max.
Frequency Measuring Range	40-99.9 Hz
Accuracy	\pm 1%
Relay Outputs	250VAC/5A (Two relays for PM-DMR/2DMR)
Display Type	7 Segment, Red light, 5 lines
Mounting Type	Panel Mounted
Dimensions	96x96 mm
Protection Class	IP 20
Plastic Material	V0 Nonflammable
Terminal cable thickness	2.5 mm ²
Operating Temperature	-25°C ... +65°C
Weight	PM-DM/PM-2DM: 470 gr., PM-DMR/PM-2DMR: 515 gr.

5. SAFETY & WARNING INSTRUCTIONS

- Turn off power during connection/wiring.
- Check correct mains voltage/wiring terminal.
- Installation shall only be performed by qualified personnel.
- Do not use any solvent or alike for cleaning.

6. MECHANICAL DIMENSIONS



HANEL ELEKTRONIK SAN. VE TIC.

Merkez Mah. Hakimiyet Cad. 122. Sk. No:14/A-B Yakuplu Beylikduzu – ISTANBUL/TURKEY

Phone: +90 212 879 07 74 Fax: +90 212 879 07 78

web: www.hanel.com.tr e-mail : hanel@hanel.com.tr