

TYPE: PM-DMCM USER MANUAL

INTRODUCTION

Company production requirements of today are being fulfilled by the use of existing machineries and equipments while on the other side an intensive effort to reduce production and operation costs is vitally necessary. Some of the most common and cost effective expenditures are those being resulted with the consequences of “unplanned organizations and operations” and they’re of the maintenances. Only way to minimize such costs and expenses or to prevent them happening is mainly based on detecting mechanical and electrical failures at their very early stages.

PM-DMCM is a micro-process controller monitoring and measuring frequency of line current and voltage values of three phase systems.

State of the art micro-processing technology built in Detective Multimeter (PM-DMCM) is designed to sense, detect and inform impending mechanical and electrical failures in 3 phase Low Voltage motors and motor run – operating systems at the early stages of fault occurrence while its panel multimeter function enables 3 phase current readings, phase to phase voltage and frequency readings.

3 phase currents and voltages are the only measurements used by the technology within the framework of “Model Based Fault Detection Logic”. Thanking to power of Detective Multimeter Technology with the capability of fault detection at early stage, which provides an excellently reliable system monitoring advantages, a remarkable productivity of quality production, minimized maintenance and repair costs and extended life of machinery and equipment in use.

Here are some of the electrical and mechanical breakdowns / faults that PM-DMCM can determine / detect

- Mill & Bearing Problems
- Misalignment Errors
- Imbalance Problems
- Isolation Problems (Rotor and Stator faults)
- Unbalanced Power
- Driven Equipment Problems (Pump, Compressor, Gear Box, Fan)

The measured max / min current values are saved in memory and can be displayed upon request. Moreover, Detective Multimeter Type PM-DMCM has features of adjustable over/under current and voltage protection limits with adjustable time delay settings prior to producing contact output for alert.

OPERATIONAL SET UP AND ADJUSTMENTS

Connection must be performed due to wiring diagram (Please see Figure 1). After having the connection of and energizing the device completed, PM-DMCM learning process onto some certain characteristics/data of the system in where used is proceeded. For this reason, once the device energized, the measured values are displayed via on LEDs while on the other side, the required data and information about the system are received. PM-DMCM determines the status of learning by checking whether the received and then the saved data on system would be enough or not before proceeding into a very next step at each time of energizing. User can monitor the status of device the 7th menu. A current reading should be displayed first once the device energized. The CT ratio and the required settings should be correctly entered in order to obtain a reliable reading.

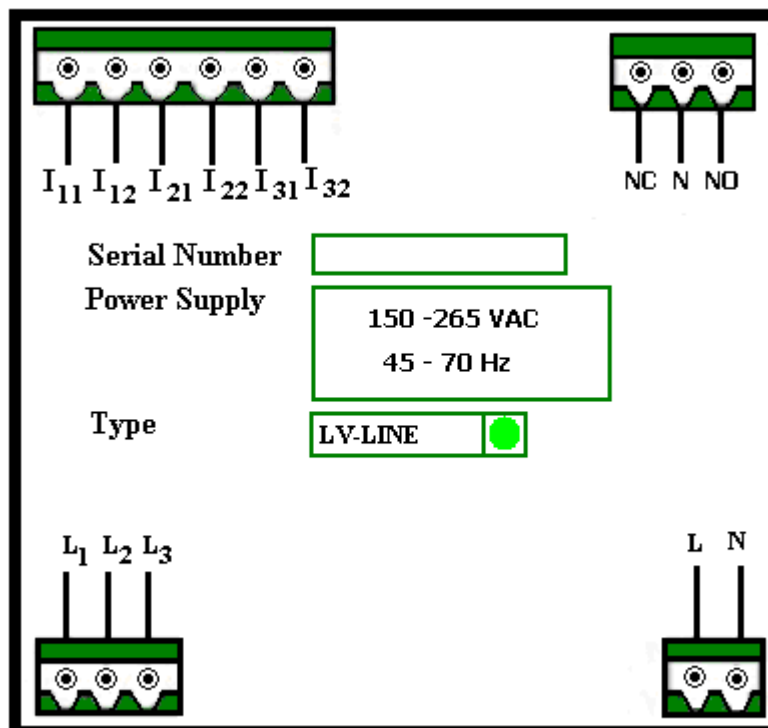


Figure 1. Back Panel of Dedektif Multimeter – Connection Diagram

L₁, L₂, L₃ indicate 3 phase voltage connections. Outer terminals of the main CT should be connected into I₁₁-I₁₂, I₂₁-I₂₂ and I₃₁-I₃₂.

SETTING CURRENT TRANSFORMER RATIO

Press SET button, “CTR” and “ENTER” will be displayed on the lower side of display consequently. Press, “ENTER” button again. The lowest display will show current CTR value (default is 5) Pressing “UP” or “DOWN” buttons enable user to adjust the desired CTR value. Once “ENTER” button is pressed again the adjusted value will be saved in non-volatile memory.

Press “UP” button until “ESC” appears on the lowest display. Press, “ENTER” button again. After a short time device will start displaying current, voltage and frequency values on display.

SETTING OVER VOLTAGE PROTECTION LEVEL

Press, “ENTER” button. Press “UP” button until “UuL” “SET” appears on display. Pressing “ENTER” button again will indicate “Over Voltage Limit” on the lowest display adjust the desired value and press “ENTER” button to save. Press “UP” button until “ESC” appears on lowest display. Press “ENTER” button to Escape. After a short time device will start displaying current, voltage and frequency values on display.

SETTING UNDER VOLTAGE PROTECTION LEVEL

Press “ENTER” button. Press “UP” button until “UdL” “ENTER” appears on display. Pressing “ENTER” button again will indicate “Under Voltage Limit” on the lowest display Adjust the desired value and press “ENTER” button to save. Press “UP” button until “ESC” appears on lowest display. Press “ENTER” button to Escape. After a short time device will start displaying current, voltage and frequency values on display.

SETTING OVER CURRENT PROTECTION LEVEL

Press, “ENTER” button. Press “UP” button until “IuL” “SET” appears on display. Press “ENTER” button again the lowest display will show “ Over Current Limit ” Adjust the desired value and then press “ENTER” button to save. Press “UP” button until “ESC” appears on lowest display. Press “ENTER” button to Escape. After a short time device will start displaying current, voltage and frequency values on display.

SETTING UNDER CURRENT PROTECTION LEVEL

Press, “ENTER” button. Keep pressed until “IdL” “SET” texts are displayed. Under Current Protection values can be seen on the bottom LED once “ENTER” pressed. Set the protection value of request and save it by pressing, “ENTER”. Press “UP” button until “ESC” appears on lowest display. Press “ENTER” button to Escape.

SETTING TIME DELAY

Press, “ENTER” button. Press “UP” button until “dEt” “SET” appears on display. By pressing, “ENTER” button again the lowest display will show the delay time of contact output for both current and voltage. Adjust the desired value and press, “ENTER” button again. Adjusted value will be stored into memory. Press “UP” button until “ESC” appears on lowest display. Press “ENTER” button to escape. After a short time device will start displaying current, voltage and frequency values on display. Delay time will be activated prior to switching the relay on but in time of current/voltage failure occurrence.

RESET / UPDATE OPERATION MODE

Press, “ENTER” button, keep “UP” button pressed until “ISP” “UPP” and “SET” texts are displayed. After having “ENTER” button pressed again, “k” LED on the left corner of “RESET” command is turned on by indicating that the device is in “RESET” mode. With the use of “UP” button, update operation can be performed within active “UPA” or passive “Rsp” position. Hence, the device can be resetted. Pressing “ENTER” button one more time “RESET” can be activated or passivated while the Led “k” is turned on at a second time of which shall indicate that the device is in update mode. With the use of update button, update operation can be performed within active “uPA” or passive “uPP” position. Hence the device can be resetted respectively. Make sure that the device should be at “St4” position in order to activate an update operation. Once the activated commands are processed, all will shift into passive position accordingly. After the completion of the required adjustments, hold “UP” button pressed until the “ESC” text is displayed on the lower LED. Pressing, “ENTER” should revert the program back to the menu on where the last measurement executed.

Reset Command; shall be used for a radical or substantial change on the operating system of the network. Using “RESET” button will clear / delete all the formerly saved information and then, will shift into learning mode in such a way to start learning and saving from the very beginning (From “St1” to “St4”).

Update Command; is a short time based learning mode and shall be used for to let the system or network changes be introduced into the device. Once “UPDATE” command activated, data changes pertained on the system shall be sensed and gathered at “St5” mode and then the device will revert back to “St4” mode to proceed the operation.

DISPLAY OF CURRENT READING

Current values of 3 phase are displayed simultaneously with an amp rating up to 10000 A. If current readings of phases exceed 1000A a point after number is companied as of “x1000” of which shall be symbolized by the Led “k” is on. A direct connection of up to 5A can be performed while a CT shall be needed above 5 Amp. “I (A)” on the front top indicate this reading.

PHASE – NEUTRAL VOLTAGE READING

Pressing “UP” button in time of displaying current reading, phase–neutral voltage readings of phases are displayed simultaneously within the range of 0 -280 V “V L-N (V)” indicates this reading.

PHASE –PHASE VOLTAGE READING

Pressing “UP” button in time of displaying phase neutral voltage reading phase – phase voltage reading are displayed simultaneously within the range of 0-450 V “ V L-L (V)” indicates this reading.

FREQUENCY READING

Pressing “UP” button in time of phase-phase voltage reading the frequency of phase being connected into terminal “R” is displayed within the range of 45-70 Hz. “FRQ (Hz)” indicates this reading.

MINIMUM AND MAXIMUM DEMANDS

Press “SET” button when device is in normal operation mode. Press “UP” button until “LHI” appears on the lowest display. At this time first three displays give information about maximum reading of current of three phases. The fourth display shows maximum reading for selected voltage line. Line selection is done by “ENTER” button within this operation status. Each pressing of “ENTER” button will change information of fourth display as well as its LED status.

If the user continues pressing “UP” button until lowest display shows “LLO” the first three displays will give information about minimum reading of current of three phase. Hence, fourth display will show the minimum value of voltage for the selected line. Selection can be done by “ENTER” button.

Keep pressing “UP” button until the lowest display shows “ESC” and then “ENTER” is pressed to escape. Consequently this will shift the device into its normal operation status by which it gives information about voltage, current and frequency values.

CONTACT POSITION ACCORDING TO THE FAILURE

Protection relay (NC, C, NO) will be non-energized if provided that the current and voltage values of all phase are in between adjusted protection limit at a time of initial energizing.

Voltage protection relay will be energized and its relay contact will change the position at the end of the adjusted time delay if one of the measured values of voltage goes over or under the voltage protection limit. Current protection relay will be energized and its relay contact will change the position at the end of the adjusted delay time if one of the measured values of current goes over or under the current protection limit. Current and voltage protection relays are independently switched on/off. As shown on Figure 1, NC, C, NO indicate relay contacts aimed for the display of current/ voltage failures. Alarm LED indicates relay output position.

DEVICE STATUS INDICATION

It is a menu giving information about the operational status of device. Each stage of the below given demonstrates system / network information and their updates

- “St1” Control Mode (**Check Mode**): Used for the verification of terminal connections and application correctness at an initial period of operation or in following to “RESET” application.
- “St2” (**Learning Mode**): Used for collection of data (information) for the system recognition by learning. This application is a composition of ever-repeated number of signal measuring operations and their cyclic analysis. After the completion of this stage, a database containing typical characteristic of system in use is formed by the consequences of analytical process.
- “St3” (**Improve Mode**): After “Learning Stage” completed, device shall automatically start trying to improve the system relevant to modeling. All information and data are processed so as to be used for making decision on system. The main difference in between this operation and learning mode is that of the system status evaluation within the mode of improvement.
- “St4” (**Monitor Mode**): After “Improving Stage” completed, monitoring mode is auto shifted. As it would already known, information and data were received, processed and the parameters to be required were determined. At monitoring stage, system should be monitored and input data be tested via the receipt of current and voltage signals.
- “St5”(Update Mode): While the changes on system are on stage of re-introduction, update mode is activated. Update activation is recommended in every after maintenance for better performance. At the end of update stage. Monitoring will be followed in “St4” mode.

ERROR INDICATION

Faults indication with the LEDs built on the front right corner are displayed under a real time-clock precision. LEDs status is here below explained as.

- “**NORMAL**” Led “ON” indicates system works OK and matches data as per the referred model.
- “**WATCH LINE**” Led “ON,” indicates a difference in between data being obtained and the referred model. Hence a variation probability on the system network line in use may be possible and this may be not introduced to the device.
- “**WATCH LOAD**” Led “ON,” indicates a substantial difference in between data being obtained and the referred model. Hence a variation probability on the system load in use may be considered and this may be not introduced to the device. The are also temporary in nature but they should treated more carefully than line changes, as

some faults developing in motor based system can cause changes in the loading conditions. For instance, leakages from pump seals can cause pressure drops, which will be interpreted by Detective Multimetre as changes in the loading conditions. Similarly, clogging in the pipe or membrane or an increase in the friction of moving parts will be detected as changes in the apparent load. It is, therefore, important to assess the root cause of the load change. In certain cases, (for instance, closing or opening a valve or changing a pipe), the changes in the loading conditions are intentional and should already be known by the user. In such cases, the user should send Detective Multimetre to the UPDATE mode so that it will learn the new loading conditions. When no obvious cause can be found, it is likely that a faults is indeed developing and the situation should be monitored **MORE CAREFULLY**.

- **“PERFORM MAINTENANCE”** The motor is behaving in a manner different significantly from the learned reference model, due to a fault developing in the motor and /or the system connected to the motor.
- **“STOP”** Led “ON” indicates a severe difference in between the data being obtained and the referred model due to development of a serious error occurrence. System should have to be stopped.
- None of any Led “ON” indicates no sufficient data’s been received. In case of continuity of problem, getting in contact with the manufacturer is essential.

Connection Diagrams

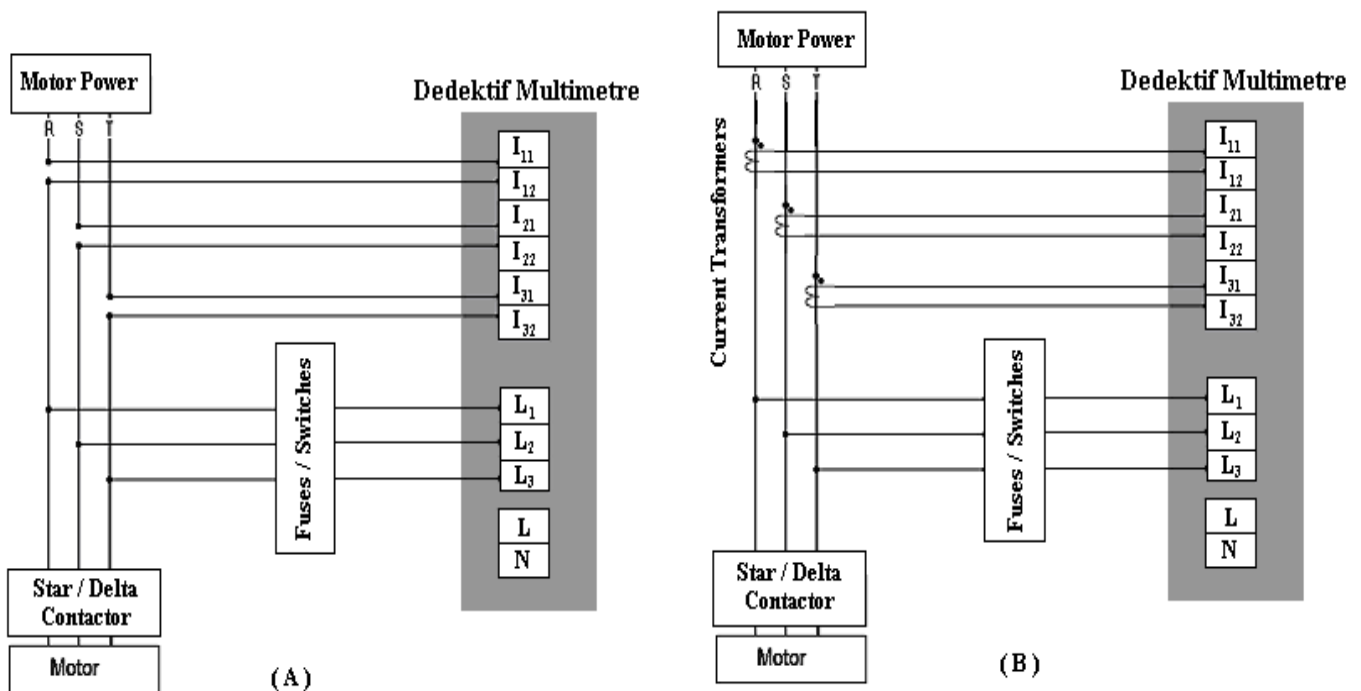


Figure – 2. Connection Diagram