F&F Filipowski sp. j.
ul. Konstantynowska 79/81, 95-200 Pabianice,
tel./fax (+48 42) 215 23 83 / (+48 42) 227 09 71
www.fif.com.pl;
e-mail: biuro@fif.com.pl

DMM-5T-3

Multifunctional 3-phase multimeter with Modbus RTU communication, 4-quadrant electricity measurement

User manual
v. 1.0 (210904)

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Features

» Measures up to voltage harmonics 55th (L-N and L-L);
» Measures up to current harmonics 55th;
» Supports 3P4W connections;
» RS-485 Modbus RTU;
» 71.5×61.5 Custom design glass LCD;
» It shows the powers of each phase and total active (P1, P2, P3, PΣ);
» It shows the powers of each phase and total reactive (Q1, Q2, Q3, QΣ inductive or capacitive);
» It shows the powers of each phase and total apparent (S1, S2, S3, SΣ);
» It shows power factors (PF) and cosΣ values of each phases;
» It shows the minimum, maximum and average values of the phase-to-phase and phase-neutral voltages (V);
» It shows the values of each phase and total current (I1, I2, I3, IΣ);
» It shows total import and export active (ΣkWh) energy;
» It shows total inductive and capacitive reactive (ΣkVArh) energy;
» 2 relay outputs (adjustable), 1 digital input;

» Event logs (high voltage, low voltage, power interruption, voltage irregularity, high current, current irregularity, THDV and THDI limits);
» The date and time can be set;
» Real time clock;
» It shows demands;
» You can delete energies, demand, and event logs;
» The menu is password protected.

1. Connection scheme

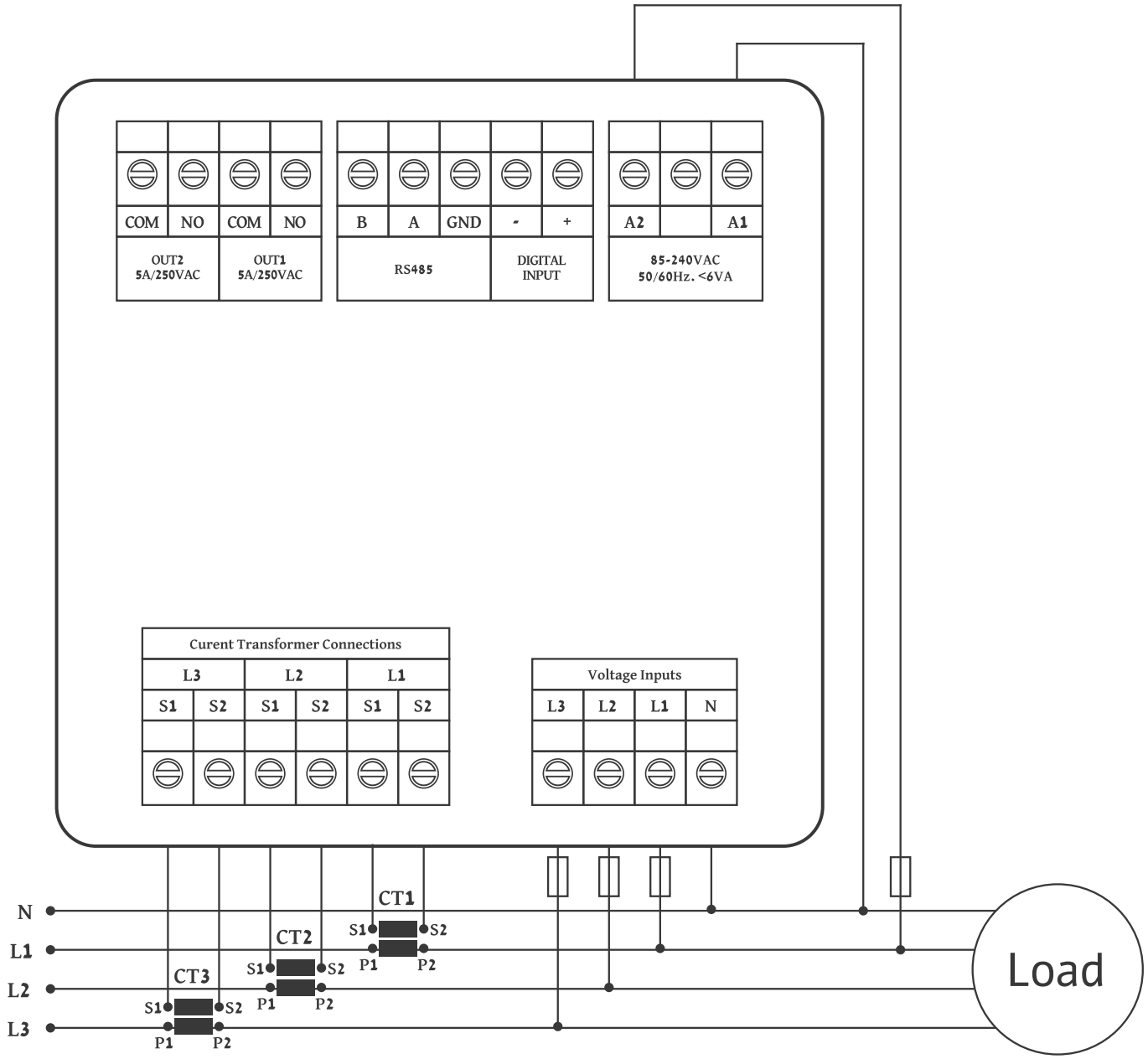


Figure-1: 3P4W connection type: 3 phase current and 3 phase voltage and neutral

2. Matters to be considered in current transformer selection and connection

» Note that the value of current transformer is higher than the maximum current drawn from the system.
» It is advisible that the class of the current transformer (it can be written class, klas, cl, kl) is 0.5.
» To avoid the complexity when connecting the current transformer output terminal use different colour cables or give cable numbers.
» Please spread the cables which are connected to current transformer output terminal from remote high voltage lines.
» Please fix current transformers to bara, cable or rail to avoid rattling.

3. Warnings

» Please use the device properly according to our directions.
» Please protect LCD screen from sun light
» Please take 5 cm space behind the device after the device installation
» Please fix the device front cover panel with the apparatus that comes with it
» Please not use device in the damp board
» Please add a key or circuit breaker to assembly
» Please keep key or circuit breaker close the device or in an easily accessible location by the operator
» There should be no electricity in the connection cables when assembling device
» There should be used shielded or twisted cord cable at the non-network-connected input and output lines. These cables should not be passed near the high power lines and the device.
» Assembling and electrical connections must be done by technical staff according to instruction manuel.
» The feed cables should be suitable for IEC 60227 or IEC 60245 requirements.

4. Device maintenance

Turn off energy of the device and disconnect from connections. Clean the device body by using slightly moist or dry cloth. Do not use conductor or other chemical as a cleaning agent matter which is harmful to device. Make connections after the cleaning of device and give energy to device and make sure that device works properly.

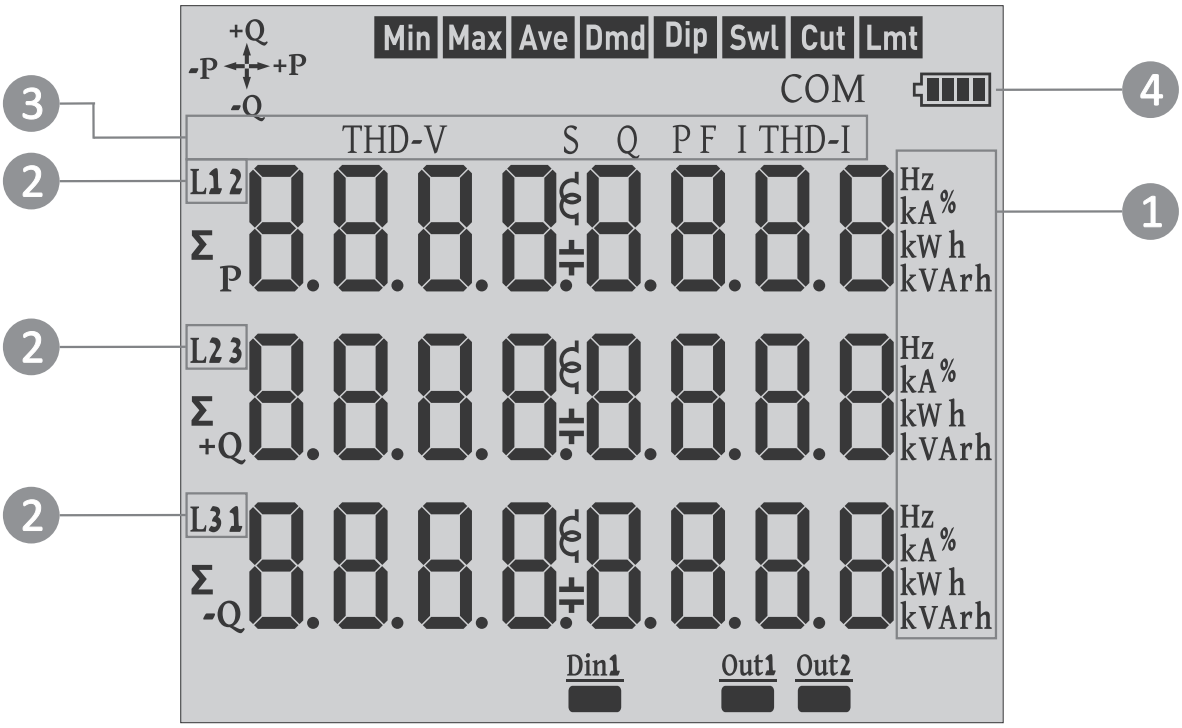
5. General

Energy analyzer measures load or voltage, current, cosϕ, active power, reactive power , minimum and maximum values of the load and also measures demands. It records the events. This analyzer measures current harmonics and voltage harmonics up to 55. harmonics.

6. First operation of the device

Please read the warnings before powering the device. Make connections of the device according to the connection scheme. When the device is first powered up figure-4 displayed on the screen. Firstly enter the current transformer ratio from the settings menu and if the voltage transformer medium voltage is being measured), enter the voltage transformer ratios.

7. Introduction of screen



Number	Description
1	Indicates the unit of the value
2	Indicates which phase the value belongs to
3	Indicates displayed values: V – voltage, I – current, F – frequency, S – apparent power, P – active power, PF – power factor, THD-I – total current harmonics, THD-V – total voltage harmonics, Q – reactive power.
4	Indicates battery level of clock time

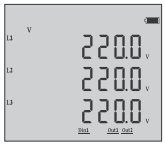
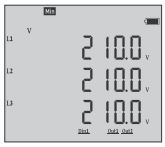
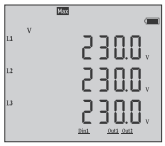
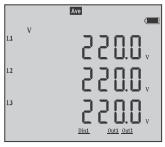
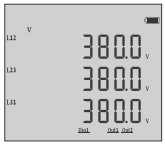
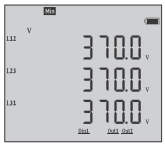
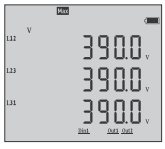
Symbol	Description	Symbol	Description
→+P	Specified that the indicated active energies are imported	ϵ	Specified that the indicated reactive energies are inductive
-P←	Specified that the indicated active energies are exported	⊣⊢	Specified that the indicated reactive power are capacitive
+Q↑	Specified that the indicated reactive energies are inductive	COM	Indicates that communication is done
-Q↓	Specified that the indicated reactive energies are capacitive		

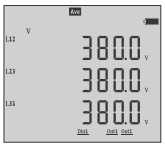
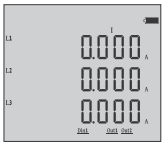
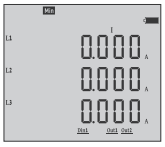
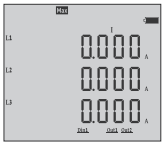
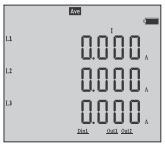
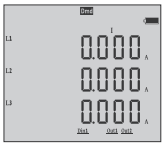
Symbol	Description	Symbol	Description
Min	Indicates that the values shown are minimum	Din1	Din1: There is voltage (1)
Max	Indicates that the values shown are maximum	Din1	Din1: There is no voltage (0)
Ave	Indicates that the values shown are average	Out1	Out1: Relay 1 is pulled (short circuit)
Dmd	Indicates that the values shown are demand	Out1	Out1: Relay 1 is released (open circuit)
Dip	Indicates that the values shown are below 10%	Out2	Out2: Relay 2 is pulled (short circuit)
Swl	Indicates that the values shown are over 10%	Out2	Out2: Relay 2 is released (open circuit)
Cut	Indicates that the values shown are below 40%	Σ_P	Total active energy
Lmt	Indicates that the values shown are over 80% in current and over 20% in harmonics	Σ_{+Q}	Total inductive reactive energy
		Σ_{-Q}	Total capacitive reactive energy

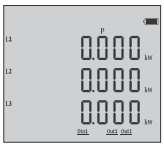
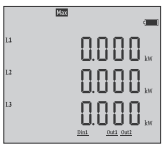
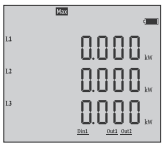
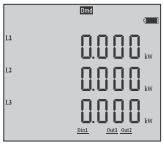
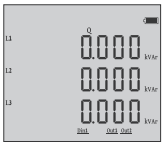
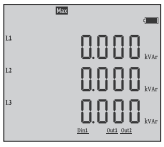
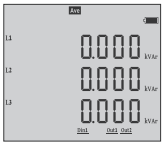
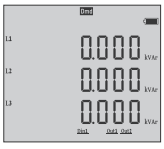
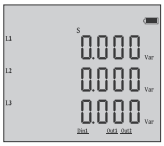
8. Introduction of buttons

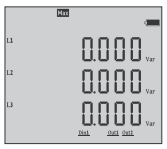
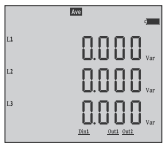
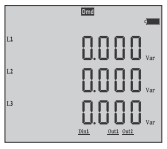
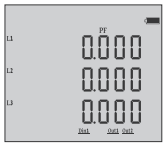
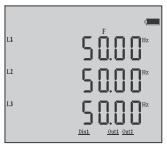
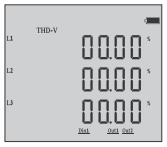
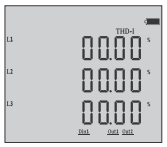
Button	Description
ESC	Press this button while in menu to exit the menu without saving the values. When this key is pressed while not in the menu, the screen always shows Figure-4.
SET	This button enters menu/parameter. It records the changes of parameters and remove from parameter.
DOWN	This button enables to fast progress between the values that are measured out of menu.
RIGHT	This button allows to progress by displaying the measured values outside the menu together with the details. It allows navigation between parameters when pressed in menu. In the parameter, it allows to transition between steps and parameters.

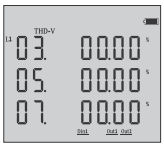
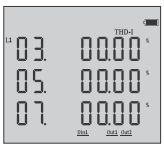
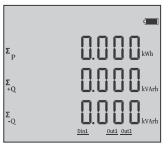
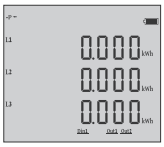
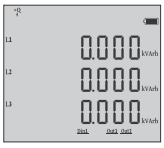
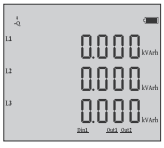
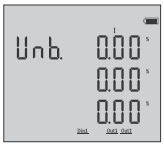
9. Progress on screen information

No.	Screen	Description
Fig. 4.		Indicates phase-neutral voltage. When you press right button, the Figure-5 appears on the screen.
Fig. 5.		Indicates minimum (Min) voltage values of phase-neutral voltage. When you press right button, the Figure-6 appears on the screen.
Fig. 6.		Indicates maximum (Max) voltage values of phase-neutral voltage. When you press right button, the Figure-7 appears on the screen.
Fig. 7.		Indicates average(Ave) voltage values of phase-neutral voltage. When you press right button, the Figure-8 appears on the screen.
Fig. 8.		Illustrates the date and time, in which phase-neutral voltage goes under 90% (<Vtr×230×0.9) of the nominal voltage values (lowest). When you press the right button, values belong to L2 and L3 phases appear on the screen respectively. When you press right button, the Figure-9 appears on the screen.
Fig. 9.		Illustrates the date and time, in which phase-neutral voltage goes above 110% (<Vtr×230×1.1) of the nominal voltage values (swl). When you press the right button, values belong to L2 and L3 phases appear on the screen respectively. When you press right button, the Figure-10 appears on the screen.
Fig. 10.		Illustrates the recorded date and time, in which phase-neutral voltage goes under 40% (<Vtr×230×0.4) of the nominal voltage values (cut), and a blackout occurs. When you press the right button, values belong to L2 and L3 phases appear on the screen respectively. When you press right button, the Figure-11 appears on the screen.
Fig. 11.		Shows the phase-phase voltage values. When you press right button, the Figure-12 appears on the screen.
Fig. 12.		Shows the minimum (Min) values of the phase-phase voltage. When you press right button, the Figure-13 appears on the screen.
Fig. 13.		Shows the maximum (Max) values of the phase-phase voltage. When you press right button, the Figure-14 appears on the screen.

No.	Screen	Description
Fig. 14.		Shows the average (Ave) values of the phase-phase voltage. When you press right button, the Figure-15 appears on the screen.
Fig. 15.		Illustrates the date and time, in which phase-phase voltage goes under 90% (<Vtr×230×0.9) of the nominal voltage values (lowest). When you press the right button, values belong to L23 and L31 phases appear on the screen respectively. When you press right button, the Figure-16 appears on the screen.
Fig. 16.		Illustrates the date and time, in which phase-phase voltage goes above 110% (<Vtr×230×1.1) of the nominal voltage values (swl). When you press the right button, values belong to L23 and L31 phases appear on the screen respectively. When you press right button, the Figure-17 appears on the screen.
Fig. 17.		Illustrates the recorded date and time, in which phase-phase voltage goes under 40% (as a default) (<Vtr×230×0.4) of the nominal voltage values (cut), and a blackout occurs. When you press the right button, values belong to L23 and L31 phases appear on the screen respectively. When you press right button, the Figure-18 appears on the screen.
Fig. 18.		It shows current values of each phase. When you press the right key, the Figure-19 comes to the screen.
Fig. 19.		It shows the minimum (Min) current values of each phase. When you press the right key, the Figure-20 comes to the screen.
Fig. 20.		It shows the maximum (Max) current values of each phase. When you press the right key, the Figure-21 comes to the screen.
Fig. 21.		It shows the average (Ave) current values of each phase. When you press the right key, the Figure-22 comes to the screen.
Fig. 22.		It shows current demand (Dmd) values for each fuse. When you press the right key, the Figure-23 comes to the screen.
Fig. 23.		It shows the time and date of demands which belongs to each phase. When you press the right key ,values which belongs to the L2 and L3 comes to the screen subsequently. When you press the right key, the Figure-24 comes to the screen.
Fig. 24.		It shows the time and date which current limit (>Ctr×0.80) of each phase is exceeded. When you press the right key ,values which belongs to the L2 and L3 comes to the screen subsequently. When you press the right key, the Figure-25 comes to the screen.

No.	Screen	Description
Fig. 25.		It shows the active power (P) values for each zone. When you press the right button, the screen will show Figure-26.
Fig. 26.		It shows the maximum active power (P) values for each zone. When you press the right key, the Figure-27 comes to the screen.
Fig. 27.		It shows average(Ave) active power (P) value of each phase. When you press the right key, the Figure-28 comes to the screen.
Fig. 28.		It shows the active power (P) demand (Dmd) values for each zone. When you press the right key, the Figure-29 comes to the screen.
Fig. 29.		It shows the time and date of active power (P) demands of each phase. When you press the right key ,values which belongs to the L2 and L3 comes to the screen subsequently. When you press the right key, the Figure-30 comes to the screen.
Fig. 30.		It shows the reactive power value (Q) which belongs to each phase. When the right button is pressed, the Figure-31 comes to the screen.
Fig. 31.		It shows the maximum reactive power value (Max) which belongs to each phase. When the right button is pressed, the Figure-32 comes to the screen.
Fig. 32.		It shows average (Ave) reactive power (Q) which belongs to each phase. When the right button is pressed, the Figure-33 comes to the screen.
Fig. 33.		It shows the demand (Dmd) of reactive power (Q) which belongs to each phase. When the right button is pressed, the Figure-34 comes to the screen.
Fig. 34.		It shows the dates and time values of the reactive power(Q)'s demand. When the right botton is pressed values of L2 and L3 phases comes to the screen subsequently. When the right button is pressed, the Figure-35 comes to the screen.
Fig. 35.		It shows apparent power (S) which belongs to each phase. When the right button is pressed, the Figure-36 comes to the screen.

No.	Screen	Description
Fig. 36.		It shows maximum (Max) apparent power (S) value which belongs to each phase. When the right button is pressed, the Figure-37 comes to the screen.
Fig. 37.		It shows average (Ave) apparent power (S) which belongs to each phase. When the right button is pressed, the Figure-38 comes to the screen.
Fig. 38.		It shows the demand (Dmd) of apparent power (S) which belongs to each phase. When the right button is pressed, the Figure-39 comes to the screen.
Fig. 39.		It shows the dates and time values of the apparent power(S)'s demand. When the right button is pressed, the Figure-40 comes to the screen.
Fig. 40.		It shows the power factor value (PF) which belong to each phase. When the right button is pressed, the Figure-41 comes to the screen.
Fig. 41.		It shows time and dates of each phase when the power factor limit (<0.80) of each phase is lowered (Lmt). When the right button is pressed values of L2 and L3 phases comes to the screen subsequently. When the right button is pressed, the Figure-42 comes to the screen.
Fig. 42.		It shows the frequency value of each phase. When the right button is pressed, the Figure-43 comes to the screen.
Fig. 43.		It shows total harmonic distortion value (THD-V) which belongs to voltage of the phase. When the right button is pressed, the Figure-44 comes to the screen.
Fig. 44.		It shows total harmonic distortion value (THD-I) which belongs to current of the phase. When the right button is pressed, the Figure-45 comes to the screen.
Fig. 45.		It shows the date and time of each phase exceeding (>%20) THD-V limit. When you press the right button, the values of the L2 and L3 phases are displayed on the screen respectively. When the right button is pressed, the Figure-46 comes to the screen.
Fig. 46.		It shows the date and time of each phase exceeding (>%20) THD-I limit. When you press the right button, the values of the L2 and L3 phases are displayed on the screen respectively. When the right button is pressed, the Figure-47 comes to the screen.

No.	Screen	Description
Fig. 47.		Voltage harmonics values of up to 55th harmonics are displayed on each screen, with 3 values per screen. . When you press the right button, the values of the L2 and L3 phases are displayed on the screen respectively. When the right button is pressed, the Figure-48 comes to the screen.
Fig. 48.		Current harmonics values of up to 55th harmonics are displayed on each screen, with 3 values per screen. When you press the right button, the values of the L2 and L3 phases are displayed on the screen respectively. When the right button is pressed, the Figure-49 comes to the screen.
Fig. 49.		It shows the import active, inductive reactive and capacitive reactive energy values which belongs to total of the phase. When the right button is pressed, the Figure-50 comes to the screen.
Fig. 50.		It shows the value of import active energy which belongs to each phase. When the right button is pressed, the Figure-51 comes to the screen.
Fig. 51.		It shows the value of export active energy which belongs to each phase. When the right button is pressed, the Figure-52 comes to the screen.
Fig. 52.		It shows the value of inductive reactive energy which belongs to each phase. When the right button is pressed, the Figure-53 comes to the screen.
Fig. 53.		It shows the value of capacitive reactive energy which belongs to each phase. When the right button is pressed, the Figure-54 comes to the screen.
Fig. 54.		It shows the voltage irregularities of the phases with each other. When the right button is pressed, the Figure-55 comes to the screen.
Fig. 55.		It shows the current irregularities of the phases with each other. When the right button is pressed, the Figure-56 comes to the screen.
Fig. 56.		It shows the date and time. When the right button is pressed, the Figure-57 comes to the screen.
Fig. 57.		It is used to make settings related to the device. When you press the right button, the Figure-4 comes to the screen.

10. Fast forwarding of screen information

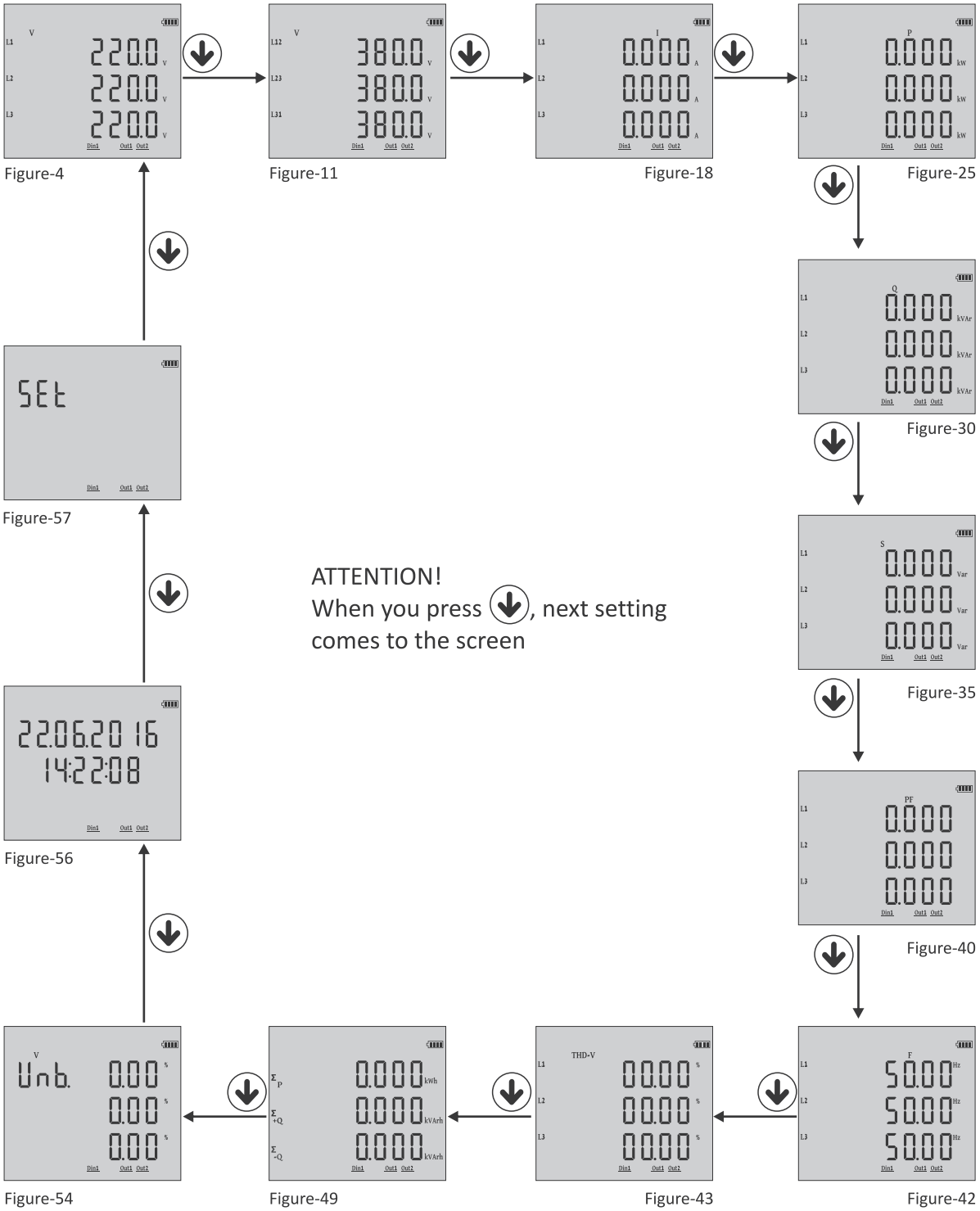
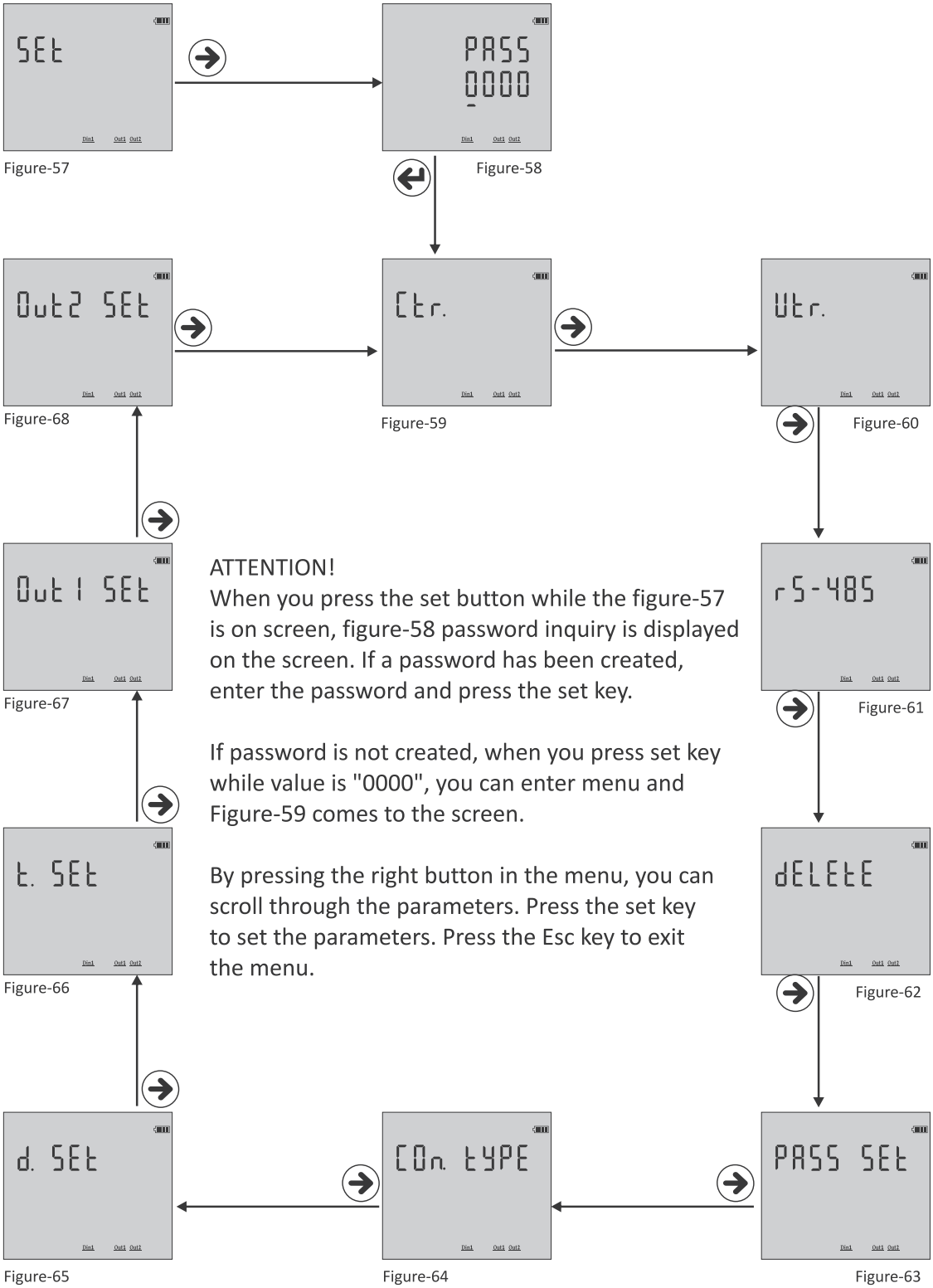


Fig. 4.	Voltage values between phase-neutral	Fig. 42.	Frequency values
Fig. 11.	Phase-to-phase voltage values	Fig. 43.	Total voltage harmonic values
Fig. 18.	Current values	Fig. 49.	Total energy (active and reactive) values
Fig. 25.	Active power (P) values	Fig. 54.	Percentage of voltage imbalance
Fig. 30.	Reactive power (Q) values	Fig. 56.	Date and time
Fig. 35.	Apparent power (S) values	Fig. 57.	Enter the menu
Fig. 40.	Power factor (PF) values		

11. Menu structure



ATTENTION!
When you press the set button while the figure-57 is on screen, figure-58 password inquiry is displayed on the screen. If a password has been created, enter the password and press the set key.

If password is not created, when you press set key while value is "0000", you can enter menu and Figure-59 comes to the screen.

By pressing the right button in the menu, you can scroll through the parameters. Press the set key to set the parameters. Press the Esc key to exit the menu.

Fig. 59.	Enter the current transformer ratio	Fig. 64.	Determine the connection type
Fig. 60.	Enter the voltage transformer ratio	Fig. 65.	Set the date
Fig. 61.	Make communication settings	Fig. 66.	Set the time
Fig. 62.	Delete energy, demand and event records	Fig. 67.	Assign relay 1
Fig. 63.	Set the password	Fig. 68.	Assign relay 2

11.1. Setting the current transformer ratio

To change the current transformer ratio, press the set button while the Figure-58 is on the screen. Figure-69 comes to the screen. Press right button to move between digits. Press the down key to change the value of the digit.
You can change the digit value which is the underline. When you press the set button after entering the ratio, the current transformer ratio is recorded and the screen shows figure-59. You can scroll through the parameters in the menu by pressing the right button or you can exit the menu by pressing the Esc key.

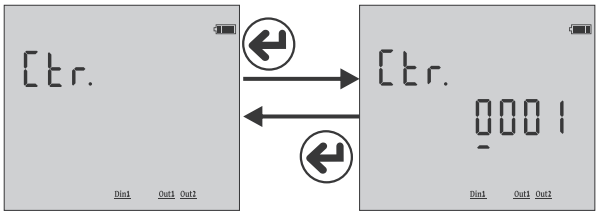


Figure-59 Figure-69

Example: 100 / 5A current transformer ratio (multiplier value) is 20. The CTR value needs to be set to 0020.

11.2. Changing voltage transformer ratio

To change the voltage transformer ratio, press the set button while the Figure-60 is on the screen. Figure-70 comes to the screen. Press right button to move between digits. Press the down key to change the value of the digit. You can change the digit value which is the underline. When you press the set button after entering the ratio, the voltage transformer ratio is recorded and the screen shows figure-60. You can scroll through the parameters in the menu by pressing the right button or you can exit the menu by pressing the Esc key.

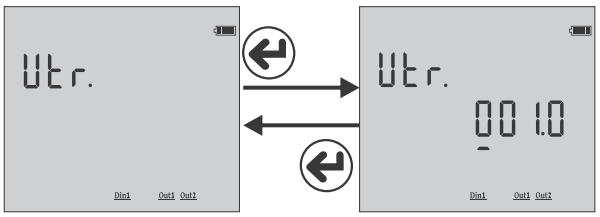


Figure-60 Figure-70

Example: Medium voltage (M.V.) = Enter the ratio of the voltage transformer that converts 34.500 V to 110 V. The ratio (multiplier) is calculated as 34.500/110 = 313.6 voltage transformer ratio. The VTR value must be set to 313.6.

11.3. RS-485 Remote communication settings

To change the RS-485 remote communication settings, press the set button while figure-61 is on the screen. Figure-71 comes to the screen. Two parameters can be set here. Baudrate (br - communication speed) and Modbus ID (Id - the number that identifies the device on the RS-485 line). Press the right button to move the point (.) to the parameter you want to set.
Then change the parameter value by pressing the down key. When you press the Set button, the changes that you made are saved and Figure-61 comes to the screen. You can scroll through the parameters in the menu by pressing the right button or you can exit the menu by pressing the Esc key. Modbus ID (MBID) value; when more than one communication devices connect to a modem, serial number or Modbus address must be different. In such cases, enter a different value from other devices.
Baudrate (br): 1200÷115200 bps, **Modbus ID (Id)**: 1÷247, **Stop bits**: 1, **Party**: none.

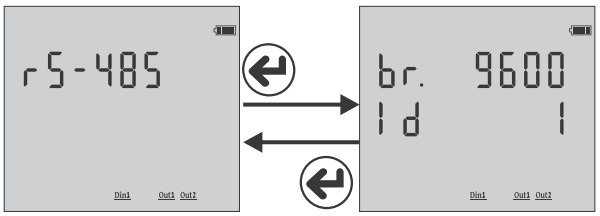


Figure-61 Figure-71

11.4. Deleting energy, demand and event records

To delete the records, press the set key while the screen is shown. Figure-71 comes to the screen. You can delete 3 records here. Energy (En), Demand (dE) and Event logs (LE). Press the right key to move the point (.) to the record which you want to delete. Then press the down key to change the value to "yes". The record value which you do not want to delete must remain in "no".
When you press the Set key, only records with the value "yes" will be deleted and the Figure-62 comes to the screen. You can scroll through the parameters in the menu by pressing the right button or you can exit the menu by pressing the Esc key.

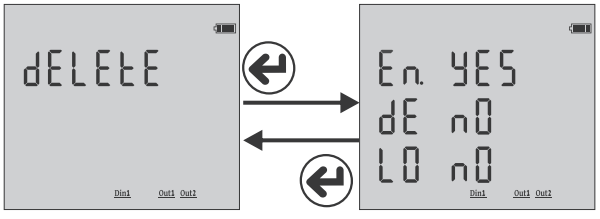


Figure-62 Figure-72

11.5. Enter password value

In order to change password; press set button while Figure-63 is on the screen . The Figure-73 comes to the screen. In order to pass through steps; press the button on the right. In order to change the value of the step press the, "down" button. You can change the step value with underline. If you press the set key after entering the password, the password is saved and the screen comes in Figure-63. Pressing the right key; you can pass through the parameters in the menu or pressing, "Esc" key; you can quit the menu.

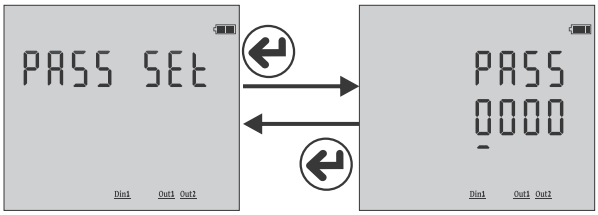


Figure-63 Figure-73

11.6. Changing the connection type

In order to change the connection type; press, "Set" key while the Figure-64 is on the screen. Figure-74 comes to the screen. It supports 2 types of connection like 3P4L (3 phase current 3 phase voltage neutral) and 3P3L (3 phase current 3 phase voltage without neutral). The link that says "Set" is acceptable. Press the right key to change the connection type. After the connection type is selected, When you press the key, it is saved and the screen comes in Figure-64. Pressing the right key; you can pass through the parameters in the menu or pressing, "Esc" key; you can quit the menu.

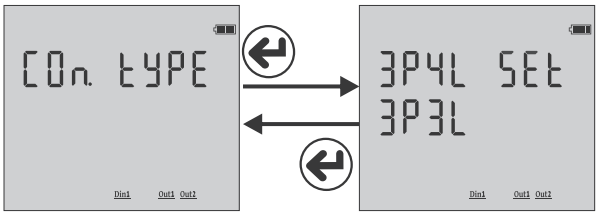


Figure-64 Figure-74

11.7. Setting the date

In order to change the date, press the, "Set" key while the Figure-65 is on the screen. The screen comes in Figure-75. Underline is on the step which ındicate the day. In order to change the day press the, "Down" key. Then if you press the key on the right; underline comes down of the mouth step. Press the, "Down" key in order to change the mouth. Then if you press the key on the right; the underline comes down of the year step. Press the, "Down" key in order to change the year. After the date is updated, when you press the, "Set" key; it is recorded and Figure-65 comes to the screen. Pressing the right key; you can pass through the parameters in the menu or pressing, "Esc" key; you can quit the menu. Date display is organized as day/month/year.

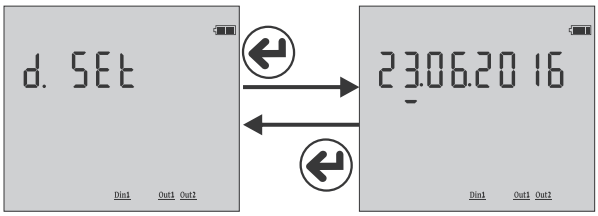


Figure-65 Figure-75

11.8. Setting the time

In order to change the time; press the "Set" key while the Figure-66 is on the screen. The Figure-76 comes to the screen; the underline is on the step which shows the clock. Press the "Down" key in order to change the clock. Then if you press the key on the right, the underline comes down the step of second. Press, "down" key to change the second. After the clock, minute and second is updated, it is recorded when you press the, "Set" key and Figure-66 comes to the screen. Pressing the right key; you can pass through the parameters in the menu or pressing, "Esc" key; you can quit the menu. Time display is organized as 24 hours.

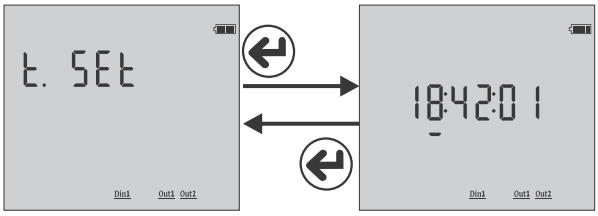


Figure-66 Figure-76

11.9. Task assignment to relay 1 and relay 2

To assign the task to relay 1, press the set key, when Figure-77 is on the screen. There are 3 settings; these are Parameter (PAr), Function (Valued) and Value (VAL).

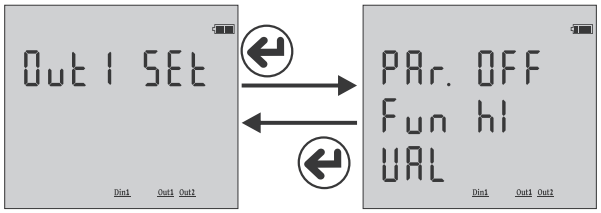
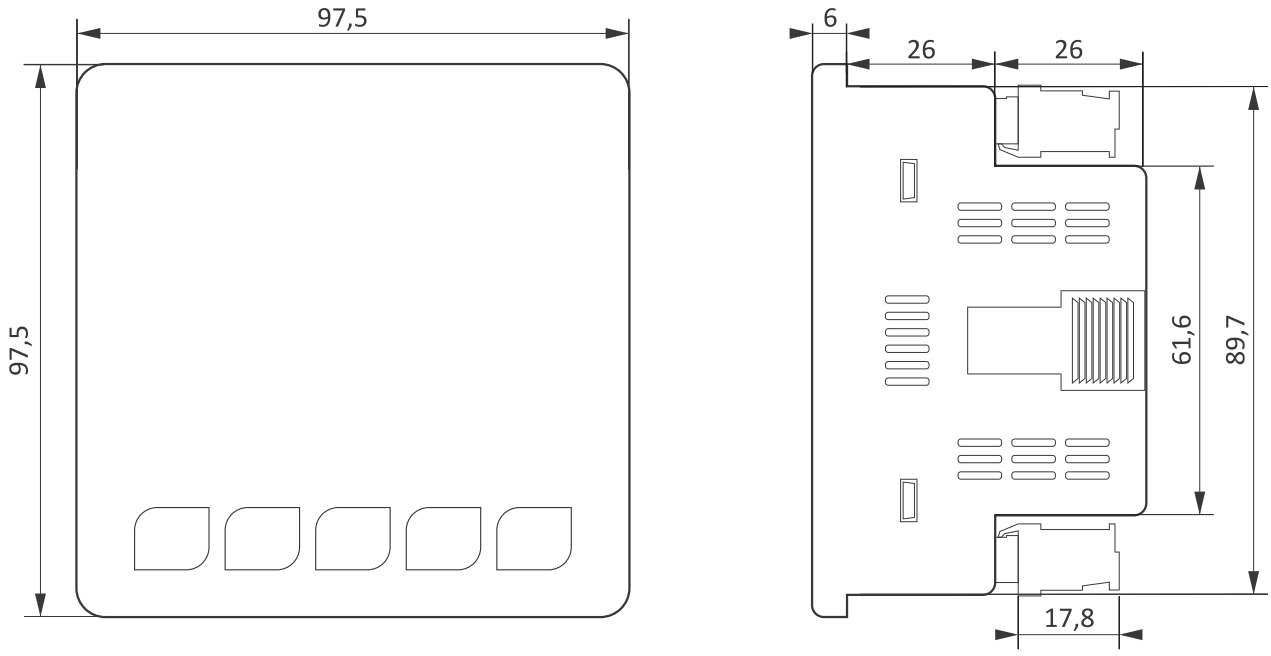


Figure-67 Figure-77

Press the right key to move the point (.) to the parameter. Press the down key to bring up the desired parameter. Then press the right key to move the point (.) to the function. Press the down key to set the function to low or high set. Press the right key to move the point (.) value. Press the down key to enter the desired value. Then when you press the set key, the task will be assigned to relay 1 and Figure-67 comes to screen. You can scroll through the parameters in the menu by pressing the right button or you can exit the menu by pressing the Esc key.

Parameters (PAr): Voltage (**ULn**), current (**ILn**), total current (**ILt**), total harmonic distortion belong to Voltage (**thdV**), total harmonic distortion belong to Current (**thdI**), power factor (**PF**), voltage Unbalance (**U Un**), current Unbalance (**I Un**), digital input (**dIn**) and off (**OFF**).
Function (Fun): Functions to be applied for parameters: if greater than value (**hI**) and smaller than value (**LO**).
Value (Val): The value to be set for the parameters.
Note1: The hysteresis value is fixed at 5%.
Note2: The task assignment of relay 2 is assigned in the same way as relay 1. While in menu for relay 2 assignment, the enterance should be done from the Figure-68.
Note3: To use the digital input parameter, 9÷24 V DC energy should be applied from the enterance of input to the device. In these parameters if the relay is wanted to be pulled HI function; or if it is wanted to be pulled while the energy is not available LO function should be chosen. The change of the voltage at the data input should be minimum at one second (1 Hz).
Example: When the voltage rises above 250 V, switch on relay 1. Parameters **(PAr)= ULn**, function **(fun)= hI** and value **(VAL)= 250 V** should be set. After the relay 1 is set like that; if one of the voltage values rises above 250 V; relay 1 pulls out (The contact leads become short-circuited). When the all values od voltage are below 5% of 250 V; the relay is deactivated (contact leads become open circuit).

12. Dimensions



13. Menu values table

Parameter number	Parameter	Unit	Factory value	Minimum value	Maximum value
Ctr	Current transformer ratio	–	1	1	5000
Vtr	Voltage transformer ratio	–	1.0	0.1	999.9
br	Baudrate	bps	9600	1200	115200
–	Stop bits	–	1	–	–
–	Data bits	–	8	–	–
–	Parity	–	none	–	–
Id	Modbus ID	–	1	1	247
En	Deleting total energy	–	no	yes	no
dE	Deleting demand values	–	no	yes	no
LO	Deleting event records	–	no	yes	no
PASS	Password	–	0	0	9999
Con Type	Connection type	–	3P4L	3P4L	3P4L
Date set	Date	–	–	2000	2100
Time set	Hour	–	–	–	–
Par	Parameter	–	OFF	OFF, Uln, Iln, Ilt, thdU, thdI, PF, U Un, I Un, dI n	
Fun	Function	–	high	high	low
UAL	Uln (voltage)	Volt	vtr×10	vtr×10	vtr×500
	Iln (current)	Amper	(ctr×10)/100	(ctr×10)/100	(ctr×500)/100
	Ilt (total current)	Amper	(ctr×3×10)/100	(ctr×3×10)/100	(ctr×3×500)/100
	thdU (total voltage har.)	%	1	1	50
	thdI (total current har.)	%	1	1	50
	PF (power factor)	%	0.50	0.50	0.99
	U Un (voltage imbalance)	%	1	1	50
	I Un (current imbalance)	%	1	1	50
Dip	Low voltage	%	<Vtr × 230 × 0.90 ve <Vtr × 400 × 0.90		
Swl	High voltage	%	>Vtr × 230 × 1.10 ve >Vtr × 400 × 1.10		
Cut	No voltage	%	<Vtr × 230 × 0.40 ve <Vtr × 400 x 0.40		
Lmt I	Current limit	%	>Ctr × 0.80		
Lmt Thd-V	Thd-V limit	%	>1.20		
Lmt Thd-I	Thd-I limit	%	>1.20		
Lmt PF	Power factor limit	%	<0.80		
Dl n	Data input frequency	Hz	>1 Hz		

14. Technical data

Operating voltage	85÷240 V AC
Operating frequency	50/60 Hz
Operating power	<10 VA
Operating temperature	-20÷55°C
Input voltage	5÷330 V AC
Voltage measuring range	1 V÷600 kV
Input current	1 mA÷5,5 A
Current measuring range	1 mA÷50.000 A
Voltage, current accuracy	±0.2%
Active accuracy	±0.5%
Reactive accuracy	±1%
Supported connection	3P4W
Current transformer ratio	1÷5000
Voltage transformer ratio	1.0÷999.9
Harmonic voltage	3÷55
Harmonic current	3÷55
Real time clock	>5 years
Communication	RS-485 Modbus RTU
Display	71.5×61.5 mm glass LCD
Contact output	2 A/250 V AC (resistive load)
Digital input	9÷24 V DC
Weight	<300 g
Protection class	IP54 (front panel), IP20 (body)
Panel hole measurements	91÷91 mm
Connection type	Plug-in terminal connection
Cable diameter	1,5 mm²
Assembly	Assembly to panel front cover

Warranty

F&F products are covered by a 24-month warranty from the date of purchase.
The warranty is only valid with proof of purchase. Contact your dealer or contact us directly.

CE and MID declaration

F&F Filipowski sp. j. declares that the device is in conformity with the essential requirements of The Low Voltage Directive (LVD) 2014/35/EU and the Electromagnetic Compatibility (EMC) Directive 2014/30/UE.
The MID and CE Declaration of Conformity, along with the references to the standards in relation to which conformity is declared, can be found at www.fif.com.pl on the product page.

Appendix 1

DMM-5T-3: Energy analyser basic data Modbus address							
Address (Dec)	Address (Hex)	Parameter	Data type	Read/ Write	Multiplier	Unit	Real value
4000	FA0	Current transformer ratio	Unsigned 16-bit	R	Data	X	1 .. 5000
4001	FA1	Voltage transformer ratio	Unsigned 16-bit	R	Data * 0.1	V	1,0 .. 4000,0
4002	FA2	L1 voltage	Unsigned 16-bit	R	Data * VT * 0.1	V	0,0 .. Vmax
4003	FA3	L2 voltage	Unsigned 16-bit	R	Data * VT * 0.1	V	0,0 .. Vmax
4004	FA4	L3 voltage	Unsigned 16-bit	R	Data * VT * 0.1	V	0,0 .. Vmax
4005	FA5	L12 voltage	Unsigned 16-bit	R	Data * VT * 0.1	V	0,0 .. Vmax
4006	FA6	L23 voltage	Unsigned 16-bit	R	Data * VT * 0.1	V	0,0 .. Vmax
4007	FA7	L31 voltage	Unsigned 16-bit	R	Data * VT * 0.1	V	0,0 .. Vmax
4008	FA8	L1 current	Unsigned 16-bit	R	Data * CT * 0.001	A	0,000 .. Imax
4009	FA9	L2 current	Unsigned 16-bit	R	Data * CT * 0.001	A	0,000 .. Imax
4010	FAA	L3 current	Unsigned 16-bit	R	Data * CT * 0.001	A	0,000 .. Imax
4012	FAC	L1 frequency	Unsigned 16-bit	R	Data * 0.01	Hz	45,00 .. 65,00
4013	FAD	L2 frequency	Unsigned 16-bit	R	Data * 0.01	Hz	45,00 .. 65,00
4014	FAE	L3 frequency	Unsigned 16-bit	R	Data * 0.01	Hz	45,00 .. 65,00
4015	FAF	L1 active power	Unsigned 16-bit	R	Data * CT * VT	W	0 .. Pmax
4016	FB0	L2 active power	Unsigned 16-bit	R	Data * CT * VT	W	0 .. Pmax
4017	FB1	L3 active power	Unsigned 16-bit	R	Data * CT * VT	W	0 .. Pmax
4018	FB2	Total active power	Unsigned 16-bit	R	Data * CT * VT	W	0 .. Pmax
4019	FB3	L1 reactive power	Unsigned 16-bit	R	Data * CT * VT	Var	0 .. Qmax
4020	FB4	L2 reactive power	Unsigned 16-bit	R	Data * CT * VT	Var	0 .. Qmax
4021	FB5	L3 reactive power	Unsigned 16-bit	R	Data * CT * VT	Var	0 .. Qmax
4022	FB6	Total reactive power	Unsigned 16-bit	R	Data * CT * VT	Var	0 .. Qmax
4023	FB7	L1 apparent power	Unsigned 16-bit	R	Data * CT * VT	VA	0 .. Smax
4024	FB8	L2 apparent power	Unsigned 16-bit	R	Data * CT * VT	VA	0 .. Smax
4025	FB9	L3 apparent power	Unsigned 16-bit	R	Data * CT * VT	VA	0 .. Smax
4026	FBA	Total apparent power	Unsigned 16-bit	R	Data * CT * VT	VA	0 .. Smax
4027	FBB	L1 cosϕ	Signed 16-bit	R	Data * 0.001	X	-1,000 .. 1,000
4028	FBC	L2 cosϕ	Signed 16-bit	R	Data * 0.001	X	-1,000 .. 1,000
4029	FBD	L3 cosϕ	Signed 16-bit	R	Data * 0.001	X	-1,000 .. 1,000
4030	FBE	L1 power factor	Signed 16-bit	R	Data * 0.001	X	-1,000 .. 1,000
4031	FBF	L2 power factor	Signed 16-bit	R	Data * 0.001	X	-1,000 .. 1,000
4032	FC0	L3 power factor	Signed 16-bit	R	Data * 0.001	X	-1,000 .. 1,000
4033	FC1	Total power factor	Signed 16-bit	R	Data	X	-1,000 .. 1,000
4034	FC2	Hour	Unsigned 16-bit	R	Data	X	0 .. 23

Appendix 1 cont.

DMM-5T-3: Energy analyser basic data Modbus address							
Address (Dec)	Address (Hex)	Parameter	Data type	Read/ Write	Multiplier	Unit	Real value
4035	FC3	Minute	Unsigned 16-bit	R	Data	X	0 .. 59
4036	FC4	Second	Unsigned 16-bit	R	Data	X	0 .. 59
4037	FC5	Day	Unsigned 16-bit	R	Data	X	1 .. 31
4038	FC6	Month	Unsigned 16-bit	R	Data	X	1 .. 12
4039	FC7	Year	Unsigned 16-bit	R	Data	X	2000 .. 2099
4040	FC8	L1 active import energy	Unsigned 32-bit	R	Data	Wh	0 .. Max
4041	FC9						
4042	FCA	L2 active import energy	Unsigned 32-bit	R	Data	Wh	0 .. Max
4043	FCB						
4044	FCC	L3 active import energy	Unsigned 32-bit	R	Data	Wh	0 .. Max
4045	FCD						
4046	FCE	Total active import energy	Unsigned 32-bit	R	Data	Wh	0 .. Max
4047	FCF						
4048	FD0	L1 active export energy	Unsigned 32-bit	R	Data	Wh	0 .. Max
4049	FD1						
4050	FD2	L2 active export energy	Unsigned 32-bit	R	Data	Wh	0 .. Max
4051	FD3						
4052	FD4	L3 active export energy	Unsigned 32-bit	R	Data	Wh	0 .. Max
4053	FD5						
4054	FD6	Total active export energy	Unsigned 32-bit	R	Data	Wh	0 .. Max
4055	FD7						
4056	FD8	L1 inductive energy	Unsigned 32-bit	R	Data	Varh	0 .. Max
4057	FD9						
4058	FDA	L2 inductive energy	Unsigned 32-bit	R	Data	Varh	0 .. Max
4059	FDB						
4060	FDC	L3 inductive energy	Unsigned 32-bit	R	Data	Varh	0 .. Max
4061	FDD						
4062	FDE	Total inductive energy	Unsigned 32-bit	R	Data	Varh	0 .. Max
4063	FDF						
4064	FE0	L1 capacitive energy	Unsigned 32-bit	R	Data	Varh	0 .. Max
4065	FE1						
4066	FE2	L2 capacitive energy	Unsigned 32-bit	R	Data	Varh	0 .. Max
4067	FE3						
4068	FE4	L3 capacitive energy	Unsigned 32-bit	R	Data	Varh	0 .. Max
4069	FE5						

Appendix 1 cont.

FF8DMM-5T-3: Energy analyser basic data Modbus address							
Address (Dec)	Address (Hex)	Parameter	Data type	Read/ Write	Multiplier	Unit	Real value
4070	FE6	Total capacitive energy	Unsigned 32-bit	R	Data	Varh	0 .. Max
4071	FE7						
4072	FE8	L1 apparent energy	Unsigned 32-bit	R	Data	Vah	0 .. Max
4073	FE9						
4074	FEA	L2 apparent energy	Unsigned 32-bit	R	Data	Vah	0 .. Max
4075	FEB						
4076	FEC	L3 apparent energy	Unsigned 32-bit	R	Data	Vah	0 .. Max
4077	FED						
4078	FEE	Total apparent energy	Unsigned 32-bit	R	Data	Vah	0 .. Max
4079	FEF						
4080	FF0	L1 THDV	Unsigned 16-bit	R	Data*0.1	%	0,0 ..1000,0
4081	FF1	L2 THDV	Unsigned 16-bit	R	Data*0.1	%	0,0 ..1000,0
4082	FF2	L3 THDV	Unsigned 16-bit	R	Data*0.1	%	0,0 ..1000,0
4083	FF3	3P THDV	Unsigned 16-bit	R	Data*0.1	%	0,0 ..1000,0
4084	FF4	L1 THDI	Unsigned 16-bit	R	Data*0.1	%	0,0 ..1000,0
4085	FF5	L2 THDI	Unsigned 16-bit	R	Data*0.1	%	0,0 ..1000,0
4086	FF6	L3 THDI	Unsigned 16-bit	R	Data*0.1	%	0,0 ..1000,0
4087	FF7	3P THDI	Unsigned 16-bit	R	Data*0.1	%	0,0 ..1000,0

Appendix 2

DMM-5T-3: Energy analyser harmonic data Modbus address							
Address (Dec)	Address (Hex)	Parameter	Data type	Read/ Write	Multiplier	Unit	Real value
2000	7D0	L1 THDV	Unsigned 16-bit	R	Data * 0.1	%	0,0 ..400,0
2001	7D1	L2 THDV	Unsigned 16-bit	R	Data * 0.1	%	0,0 ..400,0
2002	7D2	L3 THDV	Unsigned 16-bit	R	Data * 0.1	%	0,0 ..400,0
2003	7D3	3P THDV	Unsigned 16-bit	R	Data * 0.1	%	0,0 ..400,0
2004	7D4	L1 THDI	Unsigned 16-bit	R	Data * 0.1	%	0,0 ..400,0
2005	7D5	L2 THDI	Unsigned 16-bit	R	Data * 0.1	%	0,0 ..400,0
2006	7D6	L3 THDI	Unsigned 16-bit	R	Data * 0.1	%	0,0 ..400,0
2007	7D7	3P THDI	Unsigned 16-bit	R	Data * 0.1	%	0,0 ..400,0
2011	7DB	VL1 2.Harmonic	Unsigned 16-bit	R	Data * 0.1	%	0,0 ..400,0
2012	7DC	VL1 3.Harmonic	Unsigned 16-bit	R	Data * 0.1	%	0,0 ..400,0
2013	7DD	VL1 4.Harmonic	Unsigned 16-bit	R	Data * 0.1	%	0,0 ..400,0
...	...	...	Unsigned 16-bit	R	Data * 0.1	%	0,0 ..400,0
...	...	...	Unsigned 16-bit	R	Data * 0.1	%	0,0 ..400,0
2072	818	VL1 63.Harmonic	Unsigned 16-bit	R	Data * 0.1	%	0,0 ..400,0
2073	819	VL2 2.Harmonic	Unsigned 16-bit	R	Data * 0.1	%	0,0 ..400,0
2074	81A	VL2 3.Harmonic	Unsigned 16-bit	R	Data * 0.1	%	0,0 ..400,0
2075	81B	VL2 4.Harmonic	Unsigned 16-bit	R	Data * 0.1	%	0,0 ..400,0
...	...	...	Unsigned 16-bit	R	Data * 0.1	%	0,0 ..400,0
...	...	...	Unsigned 16-bit	R	Data * 0.1	%	0,0 ..400,0
2134	856	VL2 63.Harmonic	Unsigned 16-bit	R	Data * 0.1	%	0,0 ..400,0
2135	857	VL3 2.Harmonic	Unsigned 16-bit	R	Data * 0.1	%	0,0 ..400,0
2136	858	VL3 3.Harmonic	Unsigned 16-bit	R	Data * 0.1	%	0,0 ..400,0
2137	859	VL3 4.Harmonic	Unsigned 16-bit	R	Data * 0.1	%	0,0 ..400,0
...	...	...	Unsigned 16-bit	R	Data * 0.1	%	0,0 ..400,0
...	...	...	Unsigned 16-bit	R	Data * 0.1	%	0,0 ..400,0
2196	894	VL3 63.Harmonic	Unsigned 16-bit	R	Data * 0.1	%	0,0 ..400,0
2197	895	IL1 2.Harmonic	Unsigned 16-bit	R	Data * 0.1	%	0,0 ..400,0
2198	896	IL1 3.Harmonic	Unsigned 16-bit	R	Data * 0.1	%	0,0 ..400,0
2199	897	IL1 4.Harmonic	Unsigned 16-bit	R	Data * 0.1	%	0,0 ..400,0
...	...	...	Unsigned 16-bit	R	Data * 0.1	%	0,0 ..400,0
...	...	...	Unsigned 16-bit	R	Data * 0.1	%	0,0 ..400,0
2258	8D2	IL1 63.Harmonic	Unsigned 16-bit	R	Data * 0.1	%	0,0 ..400,0
2259	8D3	IL2 2.Harmonic	Unsigned 16-bit	R	Data * 0.1	%	0,0 ..400,0
2260	8D4	IL2 3.Harmonic	Unsigned 16-bit	R	Data * 0.1	%	0,0 ..400,0
2261	8D5	IL2 4.Harmonic	Unsigned 16-bit	R	Data * 0.1	%	0,0 ..400,0

Appendix 2 cont.

DMM-5T-3: Energy analyser harmonic data Modbus address							
Address (Dec)	Address (Hex)	Parameter	Data type	Read/ Write	Multiplier	Unit	Real value
2320	910	IL2 63.Harmonic	Unsigned 16-bit	R	Data * 0.1	%	0,0 ..400,0
2321	911	IL3 2.Harmonic	Unsigned 16-bit	R	Data * 0.1	%	0,0 ..400,0
2322	912	IL3 3.Harmonic	Unsigned 16-bit	R	Data * 0.1	%	0,0 ..400,0
2323	913	IL3 4.Harmonic	Unsigned 16-bit	R	Data * 0.1	%	0,0 ..400,0
...	...	...	Unsigned 16-bit	R	Data * 0.1	%	0,0 ..400,0
...	...	...	Unsigned 16-bit	R	Data * 0.1	%	0,0 ..400,0
2382	94E	IL3 63.Harmonic	Unsigned 16-bit	R	Data * 0.1	%	0,0 ..400,0


«F&F»