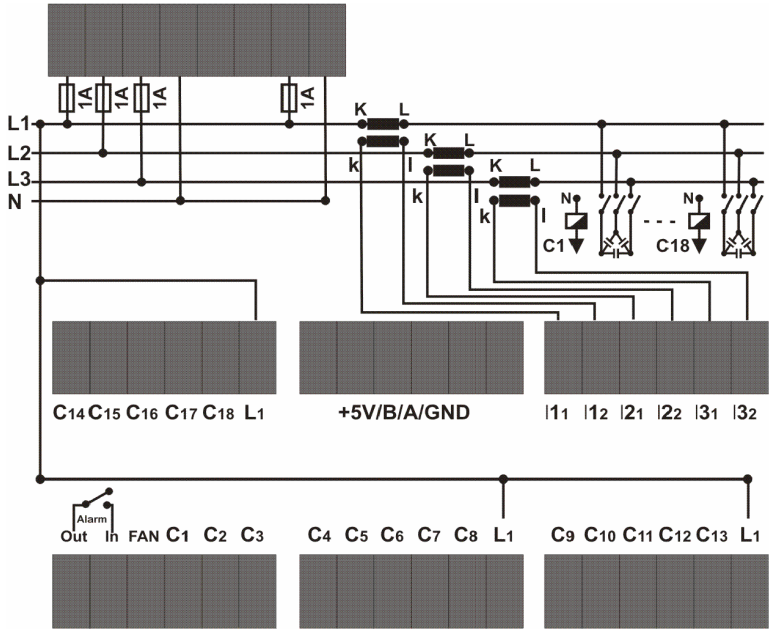
TFJA-08

HU – Fázisjavító automatika

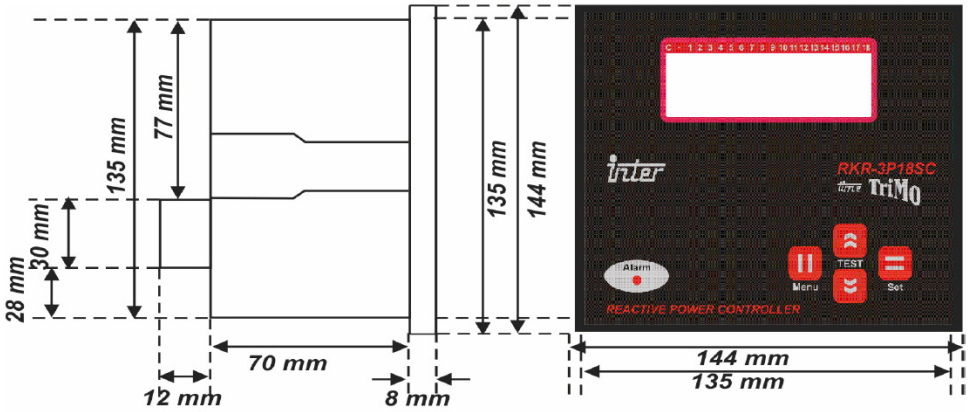
EN – Phase compensation systems

SK – Regulátor jalového výkonu

Kapcsolási rajz



Méretek



1., Bevezetés

A TFJA-08 egy háromfázisú, fázisonkénti kompenzálásra alkalmas eszköz. Hasznos olyan helyeken, ahol a hálózati terhelés jelentős aszimmetriát mutat.

Műszaki adatok:

- LCD kijelző kijelző 4 soros, soronként 20 karakter
- Kézi/Automatikus üzemmód
- Beállítási tartomány: cosfi 0,8 ind-0,8 cap
- Állítható túlmelegedés védelem
- Állítható felharmonikus védelem
- Feszültség és árammérés a 21-ik felharmonikusig
- Riasztások, riasztási kimenettel
- 3f fázisonkénti szabályozás
- Automatikus terhelési jelleg felismerés
- Késleltetett Be/Ki kapcsolás
- Állítható túlfeszültség védelem
- Teljes felharmonikus kijelzés
- Feszültség, áram és teljesítmények kijelzése
- Jelszavas védelem

2., Programozás:

2.1 Üzemmód: Automatikus/Kézi

Menu → OPERATION MODE → Set → Set → Down/Up → Set → Menu → Menu

====== MENU ======	OPERATION MODE
→OPERATION MODE	→: Auto
PARAMETERS	OPERATION MODE
HARMONICS	→: Manual

2.2 Paraméterek

Az összes paramétert a 4 db előlapi gomb segítségével lehet beállítani.

Menu → Down / Up → PARAMETERS → Set → Down / Up → Set → Down / Up → Set → Menu → Menu

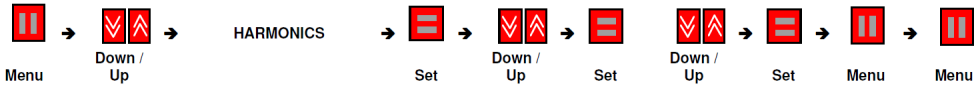
====== MENU ======	PARAMETERS
OPERATION MODE	→Cos : 1.00i
→PARAMETERS	ton : 5 sec
HARMONICS	toff : 5 sec
CAPACITOR POWERS	Uprim : 230 VAC
COMMUNICATION PORT	Usec : 230 VAC
About...	Kctr : 5 / 5A
	Uov : 260 VAC
	Tov : 55 °C
	Acc.Code : Off

Parameter	Default Value	Range	Description
Cosφ	1.00i	0.80 ind-0.80 cap	Target
ton	5 sec.	1-120 sec.	Capacitor Switch on Time
toff	5 sec.	1-120 sec.	Capacitor Switch off Time
Uprim	230 VAC	100000 VAC	Voltage Transformer Primary Voltage
Usec	230VAC	100000 VAC	Voltage Transformer Secondary Voltage
Kctr	5/5A	5/5 – 5000/5	Current Transformer Ratio
Uov	260 VAC	200-300V	Overvoltage Alarm Limit
Tov	50°C	30°C-80°C	Over temperature Alarm Limit
Acc.Code	OFF	ON – OFF	Menu Input Password Protection Selection

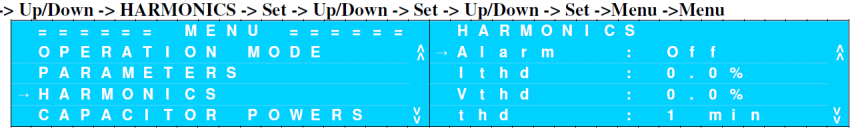
Cosφ: az elérni kívánt fázisszög
t_{on}: bekapcsolási időkésleltetés
t_{off}: kikapcsolási időkésleltetés
U_{prim}: feszültségváltó primer értéke, a hálózati feszültség névleges értéke
U_{sec}: a feszültségváltó szekunder értéke
K_{ctr}: áramváltó áttétele
U_{ov}: túlfeszültség riasztási érték
T_{ov}: hőmérséklet riasztási érték
A_{cc}.Code: jelszavas védelem engedélyezése

2.3 Felharmonikus

A műszer méri a feszültség és az áram felharmonikus tartalmát. A magas felharmonikus tartalom károsodást okozhat.



Menu -> Up/Down -> HARMONICS -> Set -> Up/Down -> Set -> Up/Down -> Set ->Menu ->Menu

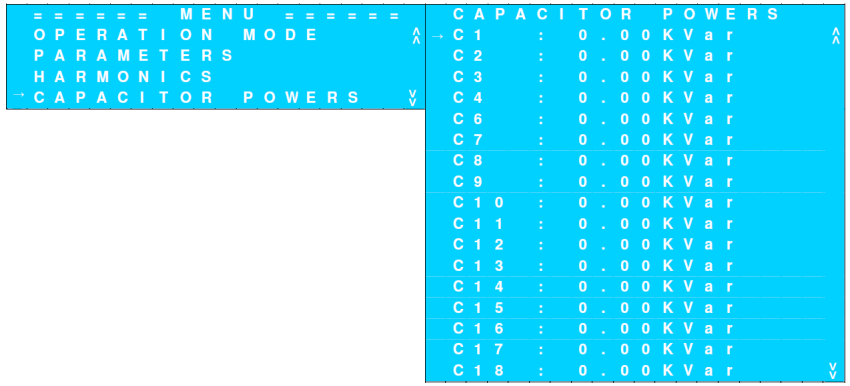


Parameter	Default Value	Range	Description
Alarm	Off	Off – On	Enable Harmonic Protection
Ithd	0.0%	0.0% - 50.0%	Current Total Harmonic Distortion Percentage
Vthd	0.0%	0.0% - 50.0%	Voltage Total Harmonic Distortion Percentage
thd	1 min	30 min	Delay Time Before Normal Operation.

Alarm: védelem be/ki kapcsolása
Ithd: áram teljes felharmonikus tartalma
Vthd: feszültség teljes felharmonikus tartalma
thd: riasztás késleltetés

2.4 Fázisjavító fokozatok teljesítménye

Menu->Up/Down->CAPACITOR POWERS->Set->Up/Down-> Set->Up/Down-> Set-> Up/Down->Set->Menu ->Menu

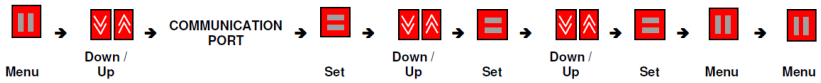


Parameter	Default Value	Range	Connection Type	Description
C1	0 KVar	Kctr<100/5A 0.01-60.0 KVar Kctr<1000/5A 0.1-600 KVar Kctr≥1000/5A 1-6000 KVar	* * * 3 Phase Cap. * - - 1 Phase Cap. (L1) - * - 1 Phase Cap. (L2) - - * 1 Phase Cap. (L3) * * - 2 Phase Cap. (L1-L2) * - * 2 Phase Cap. (L1-L3) - * * 2 Phase Cap. (L2-L3) **Note:** Sequence is from lef to right L1-L2-L3. '*' means, capacitor present, '-' means not present. During manual adjustment, first capacitor power then connection type must be entered.	1. Capacitor Power
C2	0 KVar			2. Capacitor Power
C3	0 KVar			3. Capacitor Power
C4	0 KVar			4. Capacitor Power
C5	0 KVar			5. Capacitor Power
C6	0 KVar			6. Capacitor Power
C7	0 KVar			7. Capacitor Power
C8	0 KVar			8. Capacitor Power
C9	0 KVar			9. Capacitor Power
C10	0 KVar			10. Capacitor Power
C11	0 KVar			11. Capacitor Power
C12	0 KVar			12. Capacitor Power
C13	0 KVar			13. Capacitor Power
C14	0 KVar			14. Capacitor Power
C15	0 KVar			15. Capacitor Power
C16	0 KVar			16. Capacitor Power
C17	0 KVar			17. Capacitor Power
C18	0 KVar			18. Capacitor Power

Capacitor Power	L1 L2 L3 3 Phase	L1 N Phase to Neutral	L1 N Phase to Neutral	L1 L2 Phase to Phase	L1 L2 Phase to Phase
0,5 KVAR	0,16 KVAR	0,08 KVAR	0,11 KVAR	0,12 KVAR	0,16 KVAR
1 KVAR	0,33 KVAR	0,16 KVAR	0,22 KVAR	0,25 KVAR	0,33 KVAR
1,5 KVAR	0,5 KVAR	0,25 KVAR	0,33 KVAR	0,37 KVAR	0,5 KVAR
2,5 KVAR	0,83 KVAR	0,41 KVAR	0,55 KVAR	0,62 KVAR	0,83 KVAR
5 KVAR	1,66 KVAR	0,83 KVAR	1,11 KVAR	1,25 KVAR	1,66 KVAR
7,5 KVAR	2,5 KVAR	1,25 KVAR	1,66 KVAR	1,87 KVAR	2,5 KVAR
10 KVAR	3,33 KVAR	1,66 KVAR	2,22 KVAR	2,5 KVAR	3,33 KVAR

2.5 Kommunikációs port

A megfelelő adapter (TFJA-08-RS485) segítségével képes számítógéppel kommunikálni MODBUS protokolon. (Kérje számítógépes szakember segítségét!)



Parameter	Default Value	Range	Description
Sl.Addr	1	1 - 247	Device Address
Speed	9.6 Kbps	4.8 – 38.4 Kbps	Communication Speed
Stop Bits	1	1 - 2	Stop Bits

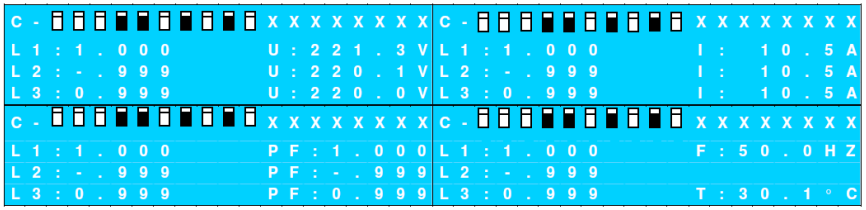
3., Meddő teljesítmény szabályzó

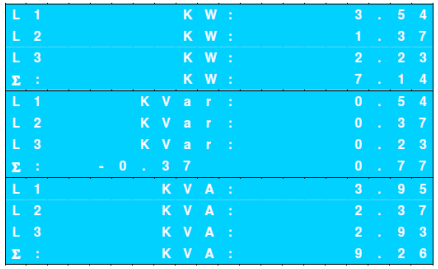
Kösse be a szabályzót, és állítsa be a paramétereket. Amennyiben mindet rendben talált végezze el a teszt folyamatot. A folyamat befejeztével ha meg akarja akadályozni az idegen személyek hozzáférését, változtassa meg a jelszót. Mikor a Vezérlő kéri a kódot ki fogja jelezni: Acces Code XX:YY. Az XX egy generált szám 0-99 között. Az YY értéke változtatható 0-99 között. Ezt az értéket a felhasználónak meg kell változtatni.
Ez lesz a jelszó.

Example: Access Code 25:25 ➔ Down/Up Buttons ➔ Access Code 25:74 ➔ Menu (OPERATION MODE)

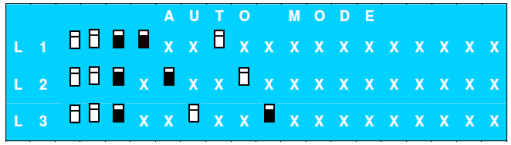
4., Mért értékek megfigyelése

A szabályzó méri és kijelzi a feszültséget, áramot teljesítmény tényezőt, látszólagos teljesítményt, hatásos teljesítményt, meddő teljesítményt és a frekvenciát minden fázisban, és a szabályzó belső hőmérsékletét. Az előlapi négy gombbal lehet a kijelző értékeit változtatni.
A fel/le gombokkal lépkedhet a kijelzőn fel-le az értékek megjelenítéséhez.

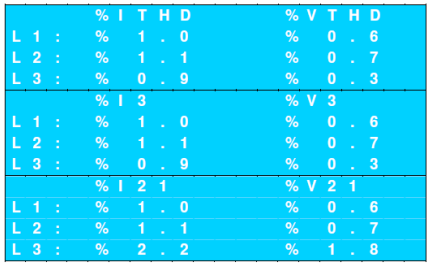




Mikor a vezérlő megjeleníti a kondenzátor szimbólumokat legfelső sorban nyomja meg a „SET” gombot, táblázatosan megjeleníti a képernyőn, amely kondenzátorok vannak bekapcsolva. Menü gombbal léphet vissza.



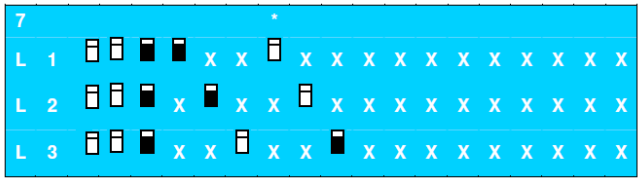
Mikor a kijelző az IHTD% és a VTHD% értéket mutatja, a SET gomb megnyomásával átválthat a felharmonikus tartalom kijelzésére. A fel/le gombokkal lehet a 21 felharmonikust megjeleníteni. Menü gombbal léphet vissza.



A le/fel gombokkal juthat el az AVTIV RIASZTÁS képernyőre. A SET gomb megnyomásával megnézheti mely riasztások aktívak. Menü gombbal léphet vissza.

5. Manuál mód

Manual módban a fokozatok kézzel kapcsolhatóak. Fel/le gombbal lehet kiválasztani a kondenzátor telepet, és a SET gombbal bekapcsolni. Menü gombbal léphet vissza.



6. Riasztás

Parameter	Default Value	Range	Tanım
Over Temperature	50°C	50°C-80°C	If internal temperature of controller is over Tov fan output of controller is activated.
Under Compensation	-	-	If target Cosφ value is not reachable with presented capacitor banks Under Compensation Alarm occurs.
Over Compensation	-	-	While all capacitors are switched off if system is still capacitive Over Compensation Alarm occurs.
Compensation Err.	-	-	If target Cosφ value is not reachable with presented capacitor banks Compensation Error occurs.
Low Frequency	F<20Hz	Fixed	If line frequency drops below 20 Hz Low Frequency alarm occurs.
High Frequency	F>62Hz		If line frequency increases over 62 Hz High Frequency alarm occurs.
Calibration Error	-	-	If calibration data is corrupted Calibration Error alarm occurs.
L1-Under Voltage	U1<15V	Fixed	If one of the inputs drop below 15V Under Voltage alarm ocurrs.
L2-Under Voltage			
L3-Under Voltage			
L1-Over Voltage	260 VAC	200-300VAC	If one of the phase voltages increase above Uov value Over Voltage alarm occurs.
L2-Over Voltage			
L3-Over Voltage			
L1-Over Current	5.5A	Sabit	If current of one of the current inputs increases above 5.5A Over Current alarm occurs.
L2-Over Current			
L3-Over Current			
L1-VTHD Harmonic	0.0%	0.0% - 50.0%	If measured VTHD% or ITHD% values increase above set ITHD% or VTHD% limits, Harmonic alarm occurs.
L2-VTHD Harmonic	0.0%	0.0% - 50.0%	
L3-VTHD Harmonic	0.0%	0.0% - 50.0%	
L1-ITHD Harmonic	0.0%	0.0% - 50.0%	
L2-ITHD Harmonic	0.0%	0.0% - 50.0%	
L3-ITHD Harmonic	0.0%	0.0% - 50.0%	

7. Technikai adatok

Operating Temperature	-25°C… + 65 °C	**Current Transformer Direction**	Otomatik
Max. Relative Humidity	% 90	**Capacitor Bank Stages**	8/13/18
Power Consumption	<10VA	**Output Contact**	250V/3A AC
Supply Voltage(Un)	230VAC ±10%	**Alarm Contact**	250V/3A AC
Supply Frequency	50 Hz / 60 Hz	**Fan Contact**	250V/3A AC
Current Inputs	……/5A	**Cables**	AWG12-16
Current Range	0.02A – 5.5A	**Front Panel Dimensions**	144mm x 144mm (DIM43 700)
LCD Display	4x20	**Dimensions**	144x144x70
CTR	5/5A – 5000/5A	**Weight**	1030 gr.

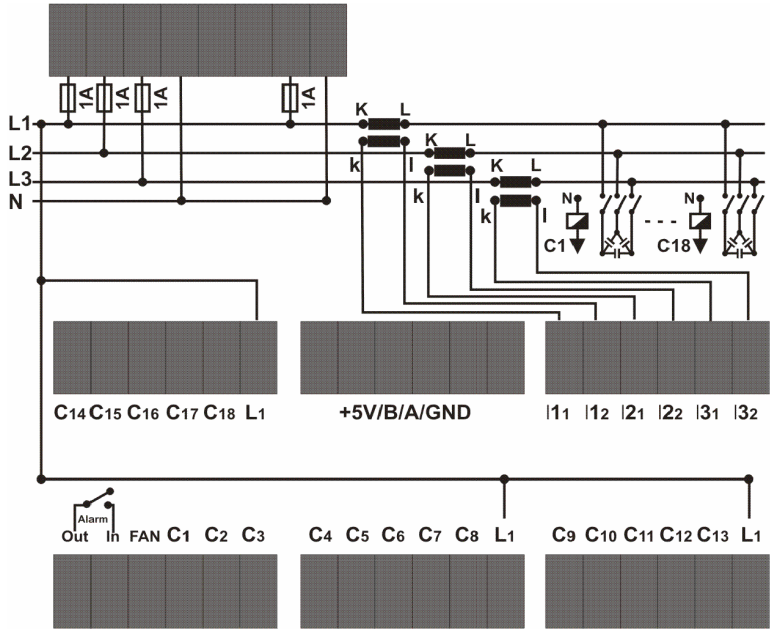
8. Biztonsági előírások

Ez a dokumentum előzetes bejelentés nélkül megváltozhat! Naprakész információk a honlapon!
Hibás egységet csak engedéllyel rendelkező szakember telepítheti, javíthatja.

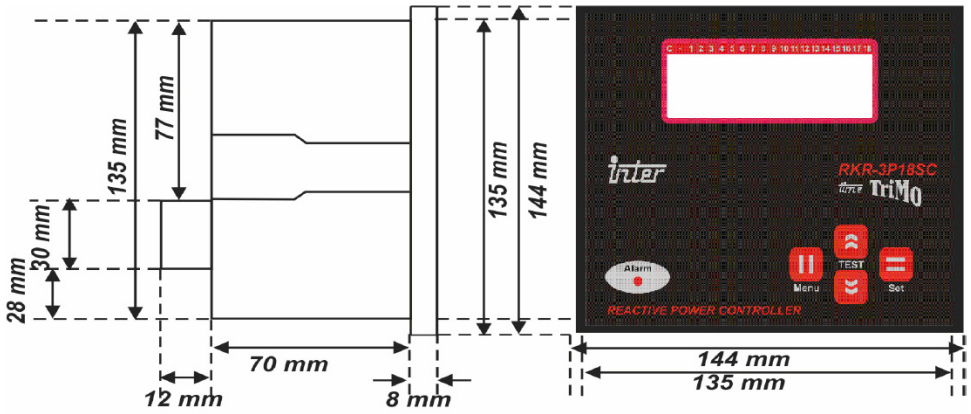
Csak feszültségmentes állapotban telepítse.
A szabályzót, csak szakképzett személy használhatja.
Csak sérülésmentes műszert használjon.
Ne tisztítsa vezérlőt oldószerrel.
Tűz- és robbanásveszélyes környezetben ne használja.
Ellenőrizze a bekötést a kapcsolási rajz szerint.
A szabályzó megfelel az MSZ EN 61010-1 előírásainak

TFJA-08
Phase compensation systems

Connection schematic



DIMENSIONS



1., INTRODUCTION

Mono phase compensation systems are not useful in plants where unbalanced loads exist. In such plants compensation has to be done by measuring all 3 phase parameters individually. Devices, capable of measuring and compensating Cos of each phase individually are developed. Such devices are able to correct Cos for each phase either with mono phase or 3 phase capacitors.

Tri-Mo series of Reactive Power Controllers are developed in order to obtain maximum efficiency in plants where balanced and unbalanced loads exist. They are manufactured with 8, 13 and 18 steps and either with communication or without communication.

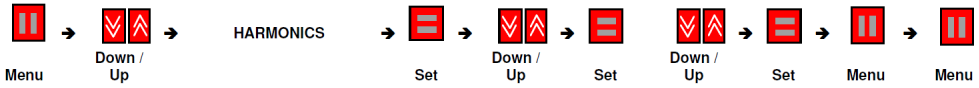
FEATURES

- 4 lines 20 character LCD display.
- 8-13-18 flexible steps that do not require sequencing.
- Mono phase or 3 phase capacitors connection capability.
- Automatic detection of current flow direction.
- Adjustable capacitor switches on/off delay time.
- Adjustable over temperature protection limit and fan output.
- Adjustable overvoltage protection limit.
- Automatic/Manual Operating Modes.
- Manual entrance capability of capacitor powers.
- Adjustable target Cos value (0.8 ind – 0.8 cap).
- 22 alarm sources an done alarm contact output.
- Password protection.
- Automatic detection and display of capacitor powers. Automatic detection of line to which capacitor is connected.
- Adjustable high harmonic protection limits (VTHD % and ITHD %).
- Measurement and display capability of current and voltage THD values for each phase.
- Measurement and display capability of up to 21th harmonic both for voltages and currents for each phase.
- Measurement and display capability of V, I, PF, F values for each phase.
- Measurement and display capability of kW, kVAR and kVA values for each phase.
- Measurement and display capability of total kW, kVAR and kVA values for each phase.

2., PROGRAMMING

2.1. OPERATION MODE

Device can operate either in automatic or manual modes. While in automatic mode, capacitors are switched on and off according to parameters set and measured values. In manual mode capacitors are defined by user and are also switched on and off by user. Automatic/Manual modes can be selected according to sequence showed below.



Menu -> Up/Down -> HARMONICS -> Set -> Up/Down -> Set -> Up/Down -> Set ->Menu ->Menu

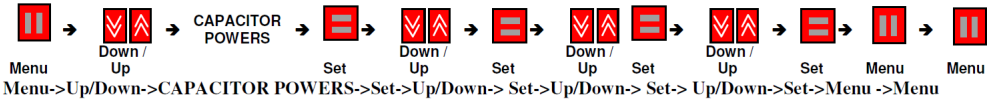
2.1.1. Automatic/Manual Mode Selection

Press “Menu” button and scroll to OPERATION MODE. Press “Set” to display current setting. Press “Set” again to edit value (display is blinking). Scroll between Auto-Manual, press “Set” again to save selected value. Press “Menu” button to exit programming mode.

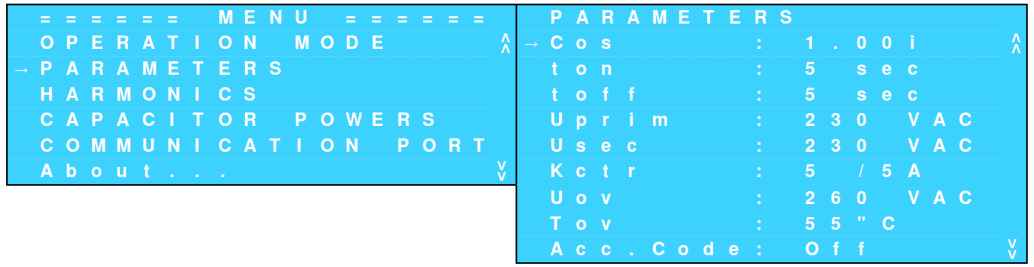
Manual mode is only useful for testing purposes. If manual mode is leaved active device will switch to Automatic Mode after 30 minutes.

2.2. PARAMETERS

This menu includes all the parameters that effect performance of the device. All these parameters have to be adjusted according to the plant and have to be readjusted if any changes occur on the plant. All the changes made in programming mode effect performance of the controller. Parameter settings are done by using 4 front panel buttons in the order listed below.



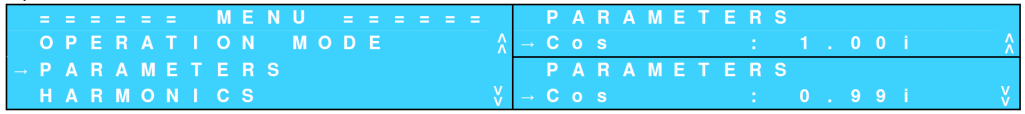
Menu->Up/Down->CAPACITOR POWERS->Set->Up/Down-> Set->Up/Down-> Set-> Up/Down->Set->Menu ->Menu



Parameter	Default Value	Range	Connection Type	Description
C1	0 KVar	Kctr<100/5A 0.01-60.0 KVar Kctr<1000/5A 0.1-600 KVar Kctr≥1000/5A 1-6000 KVar	*** 3 Phase Cap. *-- 1 Phase Cap. (L1) -*- 1 Phase Cap. (L2) --* 1 Phase Cap. (L3) **- 2 Phase Cap. (L1-L2) *-* 2 Phase Cap. (L1-L3) -** 2 Phase Cap. (L2-L3) **Note:** Sequence is from lef to right L1-L2-L3. ‘*’ means, capacitor present, ‘-‘ means not present. During manual adjustment, first capacitor power then connection type must be entered.	1. Capacitor Power
C2	0 KVar			2. Capacitor Power
C3	0 KVar			3. Capacitor Power
C4	0 KVar			4. Capacitor Power
C5	0 KVar			5. Capacitor Power
C6	0 KVar			6. Capacitor Power
C7	0 KVar			7. Capacitor Power
C8	0 KVar			8. Capacitor Power
C9	0 KVar			9. Capacitor Power
C10	0 KVar			10. Capacitor Power
C11	0 KVar			11. Capacitor Power
C12	0 KVar			12. Capacitor Power
C13	0 KVar			13. Capacitor Power
C14	0 KVar			14. Capacitor Power
C15	0 KVar			15. Capacitor Power
C16	0 KVar			16. Capacitor Power
C17	0 KVar			17. Capacitor Power
C18	0 KVar			18. Capacitor Power

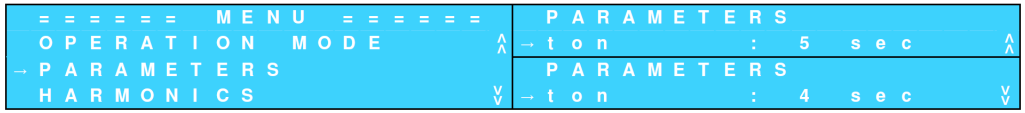
2.2.1. Target (Cos)

Select Cos sub menu from PARAMETERS main menu. Press “Set” button to edit value (current value is blinking). While value is blinking using Down/Up keys adjust the desired target Cos value (0.80i-0.80c). Press “Set” button again to save adjusted value. Press “Menu” button to exit menu.



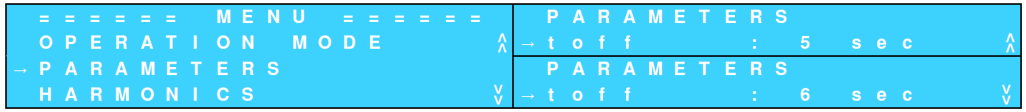
2.2.2. Capacitor Switch On Time Delay (ton)

Select ton sub menu from PARAMETERS main menu. Press “Set” button to edit value (current value is blinking). While value is blinking using Down/Up keys adjust the desired ton time (1-120 sec.). Press “Set” button again to save adjusted value. Press “Menu” button to exit menu.



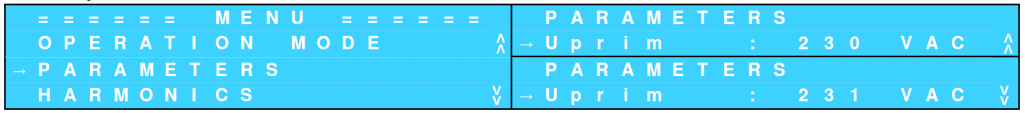
2.2.3. Capacitor Switch Off Time Delay (toff)

Select toff sub menu from PARAMETERS main menu. Press “Set” button to edit value (current value is blinking). While value is blinking using Down/Up keys adjust the desired toff time (1-120 sec.). Press “Set” button again to save adjusted value. Press “Menu” button to exit menu.



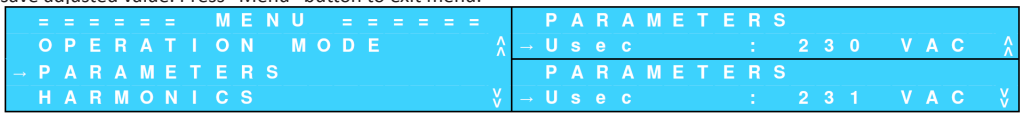
2.2.4. Voltage Transformer Primary Voltage (Uprim)

Select Uprim sub menu from PARAMETERS main menu. Press “Set” button to edit value (current value is blinking). While value is blinking using Down/Up keys adjust the desired Uprim value (20-100000 volts). Press “Set” button again to save adjusted value. Press “Menu” button to exit menu.



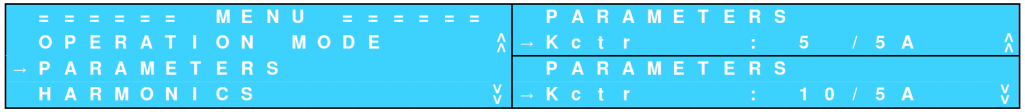
2.2.5. Voltage Transformer Secondary Voltage (Usec)

Select Usec sub menu from PARAMETERS main menu. Press “Set” button to edit value (current value is blinking). While value is blinking using Down/Up keys adjust the desired Usec value (20-100000 volts). Press “Set” button again to save adjusted value. Press “Menu” button to exit menu.



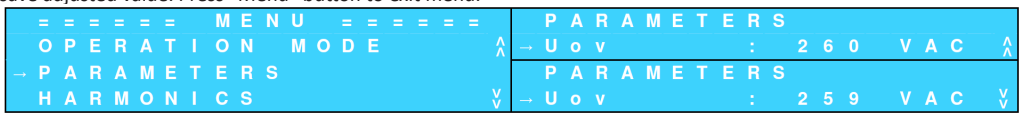
2.2.6. Current Transformer Ratio (Kctr)

Select Kctr sub menu from PARAMETERS main menu. Press “Set” button to edit value (current value is blinking). While value is blinking using Down/Up keys adjust the desired Kctr value (5/5-5000/5). Press “Set” button again to save adjusted value. Press “Menu” button to exit menu.



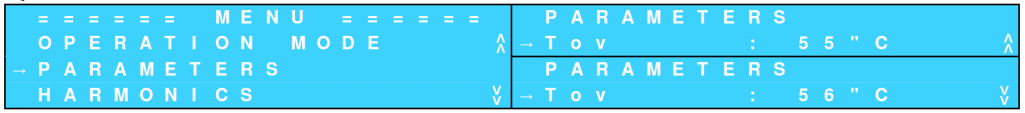
2.2.7. Overvoltage Alarm Limit (Uov)

Select Uov sub menu from PARAMETERS main menu. Press “Set” button to edit value (current value is blinking). While value is blinking using Down/Up keys adjust the desired Uov value (200-300 volts). Press “Set” button again to save adjusted value. Press “Menu” button to exit menu.



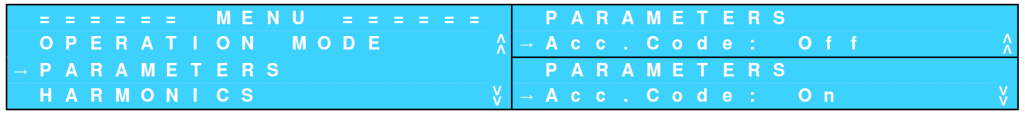
2.2.8. Over Temperature Alarm (Tov)

Select Tov sub menu from PARAMETERS main menu. Press “Set” button to edit value (current value is blinking). While value is blinking using Down/Up keys adjust the desired Tov value (50C-85C). Press “Set” button again to save adjusted value. Press “Menu” button to exit menu.



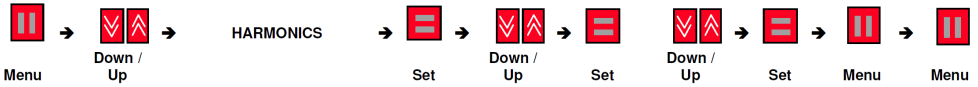
2.2.9. Password Protection Enable (Acc.Code)

Select Acc.Code sub menu from PARAMETERS main menu. Press “Set” button to edit value (current value is blinking). While value is blinking using Down/Up keys adjust the desired Acc.Code value (ON/OFF). Press “Set” button again to save adjusted value. Press “Menu” button to exit menu.

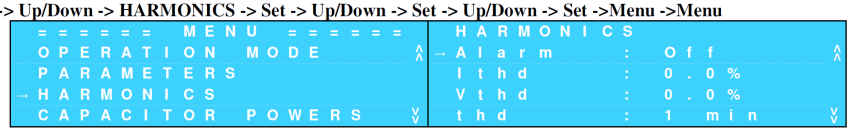


2.3. HARMONICS

Controller is capable of measuring and displaying harmonics of 3 phase for current and voltage. High harmonics may damage system. In order to protect system from harmonics user can set alarm level for harmonics in order to switch off compensation system. Harmonic protection can be set as follows.



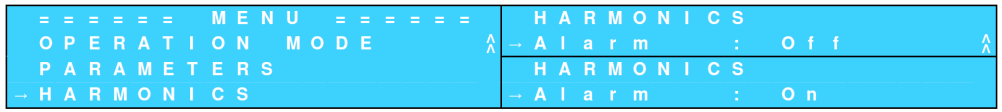
Menu -> Up/Down -> HARMONICS -> Set -> Up/Down -> Set -> Up/Down -> Set ->Menu ->Menu



Parameter	Default Value	Range	Description
Alarm	Off	Off – On	Enable Harmonic Protection
Ithd	0.0%	0.0% - 50.0%	Current Total Harmonic Distortion Percentage
Vthd	0.0%	0.0% - 50.0%	Voltage Total Harmonic Distortion Percentage
thd	1 min	30 min	Delay Time Before Normal Operation.

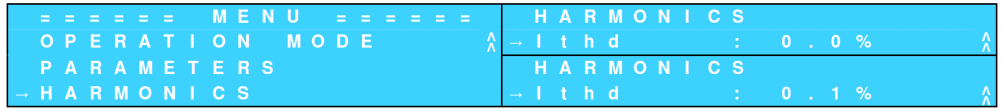
2.3.1. Harmonic Protection Activation (Alarm)

Select Alarm sub menu from HARMONICS main menu. Press “Set” button to edit value (current value is blinking). While value is blinking using Down/Up keys adjust the desired Alarm value (ON/OFF). Press “Set” button again to save adjusted value. Press “Menu” button to exit menu.



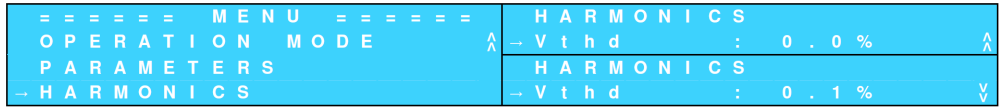
2.3.2. Current THD Over Limit (Ithd)

Select Ithd sub menu from HARMONICS main menu. Press “Set” button to edit value (current value is blinking). While value is blinking using Down/Up keys adjust the desired Ithd value (0.0%-50.0%). Press “Set” button again to save adjusted value. Press “Menu” button to exit menu.



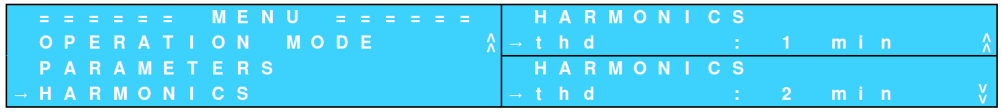
2.3.3. Voltage THD Over limit (Vthd)

Select Vthd sub menu from HARMONICS main menu. Press “Set” button to edit value (current value is blinking). While value is blinking using Down/Up keys adjust the desired Vthd value (0.0%-50.0%). Press “Set” button again to save adjusted value. Press “Menu” button to exit menu.



2.3.4. Harmonics Alarm Delay Time (thd)

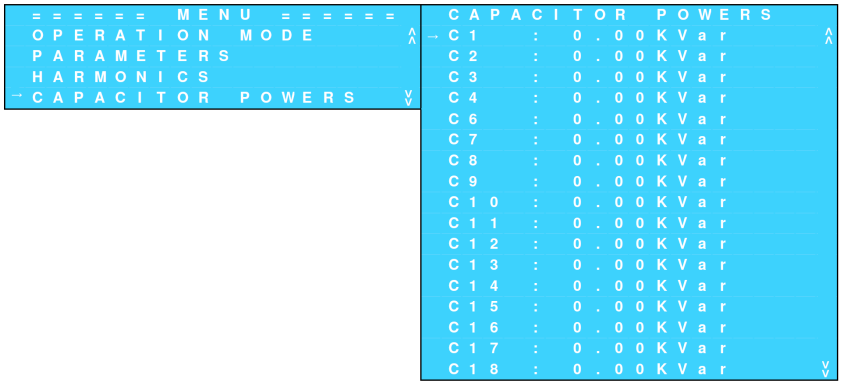
Select thd sub menu from HARMONICS main menu. Press “Set” button to edit value (current value is blinking). While value is blinking using Down/Up keys adjust the desired thd value (1 min – 30 min). Press “Set” button again to save adjusted value. Press “Menu” button to exit menu. When THD value drops below set alarm limit, device waits for adjusted thd value before switches to normal operation mode.



2.4. CAPACITOR POWERS

Capacitor values connected in the system can be observed or manual entrance can be made within this menu. Connection type (1, 2, 3 phase) and power of each capacitor bank can be done individually. Capacitor values are adjusted inside CAPACITOR POWERS menu as described below via 4 front panel buttons.

Menu->Up/Down->CAPACITOR POWERS->Set->Up/Down-> Set->Up/Down-> Set-> Up/Down->Set->Menu ->Menu

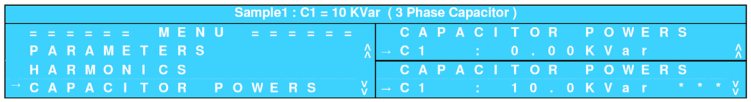


Parameter	Default Value	Range	Connection Type	Description
C1	0 KVar	Kctr<100/5A 0.01-60.0 KVar Kctr<1000/5A 0.1-600 KVar Kctr≥1000/5A 1-6000 KVar	* * * 3 Phase Cap. * - - 1 Phase Cap. (L1) - * - 1 Phase Cap. (L2) - - * 1 Phase Cap. (L3) * * - 2 Phase Cap. (L1-L2) * - * 2 Phase Cap. (L1-L3) - * * 2 Phase Cap. (L2-L3) **Note:** Sequence is from lef to right L1-L2-L3. '*' means, capacitor present, '-' means not present. During manual adjustment, first capacitor power then connection type must be entered.	1. Capacitor Power
C2	0 KVar			2. Capacitor Power
C3	0 KVar			3. Capacitor Power
C4	0 KVar			4. Capacitor Power
C5	0 KVar			5. Capacitor Power
C6	0 KVar			6. Capacitor Power
C7	0 KVar			7. Capacitor Power
C8	0 KVar			8. Capacitor Power
C9	0 KVar			9. Capacitor Power
C10	0 KVar			10. Capacitor Power
C11	0 KVar			11. Capacitor Power
C12	0 KVar			12. Capacitor Power
C13	0 KVar			13. Capacitor Power
C14	0 KVar			14. Capacitor Power
C15	0 KVar			15. Capacitor Power
C16	0 KVar			16. Capacitor Power
C17	0 KVar			17. Capacitor Power
C18	0 KVar			18. Capacitor Power

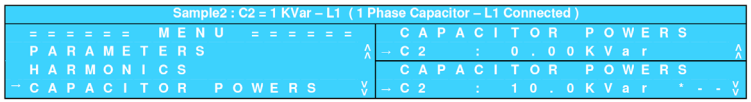
2.4.1 Manual Capacitor Power Entrance (C1 ..... C18)

Capacitor stage that is going to be adjusted is selected from CAPACITOR POWERS menu. Press "Set" in order to edit value. While value is blinking, desired capacitor power is adjusted by Down/Up buttons. Press "Set" button to save value, Now display shows blinking "*" and/or "-"symbols representing connection type of capacitor. Select correct connection type of capacitor by Down/Up buttons and press "Set" button to save value. Press "Menu" button to exit menu. All capacitors (C1...C18) are adjusted as explained above.

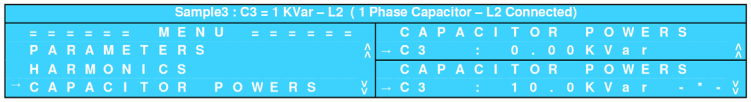
Sample1 : C1 = 10 KVar (3 Phase Capacitor)



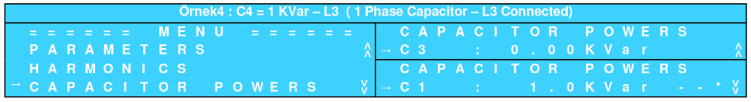
Sample2 : C2 = 1 KVar – L1 (1 Phase Capacitor – L1 Connected)



Sample3 : C3 = 1 KVar – L2 (1 Phase Capacitor – L2 Connected)



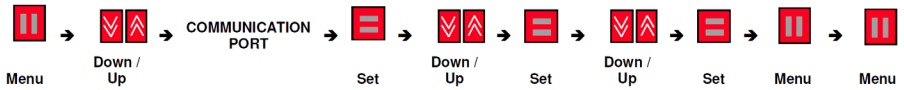
Ornek4 : C4 = 1 KVar – L3 (1 Phase Capacitor – L3 Connected)

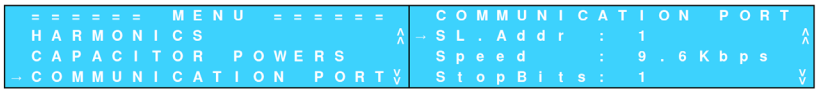


Capacitor Power	L1 L2 L3 3 Phase	L1 N Phase to Neutral	L1 N Phase to Neutral	L1 L2 Phase to Phase	L1 L2 Phase to Phase
0,5 KVAR	0,16 KVAR	0,08 KVAR	0,11 KVAR	0,12 KVAR	0,16 KVAR
1 KVAR	0,33 KVAR	0,16 KVAR	0,22 KVAR	0,25 KVAR	0,33 KVAR
1,5 KVAR	0,5 KVAR	0,25 KVAR	0,33 KVAR	0,37 KVAR	0,5 KVAR
2,5 KVAR	0,83 KVAR	0,41 KVAR	0,55 KVAR	0,62 KVAR	0,83 KVAR
5 KVAR	1,66 KVAR	0,83 KVAR	1,11 KVAR	1,25 KVAR	1,66 KVAR
7,5 KVAR	2,5 KVAR	1,25 KVAR	1,66 KVAR	1,87 KVAR	2,5 KVAR
10 KVAR	3,33 KVAR	1,66 KVAR	2,22 KVAR	2,5 KVAR	3,33 KVAR

2.5. COMMUNICATION PORT

All the measurements made by device can be monitored by suitable PC software over MODBUS RTU protocol. If necessary, device parameters can be set over communication port. For proper communication PC side and controller side adjustments have to be done. All adjustments are done inside COMMUNICATION PORT menu via four front panel buttons as described below.

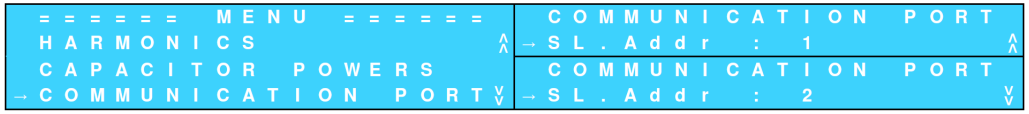




Parameter	Default Value	Range	Description
Sl.Addr	1	1 - 247	Device Address
Speed	9.6 Kbps	4.8 – 38.4 Kbps	Communication Speed
Stop Bits	1	1 - 2	Stop Bits

2.5.1. Address Adjustment (Sl.Addr)

Select Sl.Addr sub menu from COMMUNICATION PORT main menu. Press “Set” button to edit value (current value is blinking). While value is blinking using Down/Up keys adjust the desired Sl.Addr value (1-247). Press “Set” button again to save adjusted value. Press “Menu” button to exit menu.

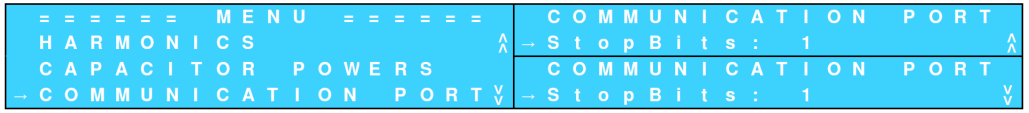


2.5.2. Communication Speed Adjustment (Speed)

Select Speed sub menu from COMMUNICATION PORT main menu. Press “Set” button to edit value (current value is blinking). While value is blinking using Down/Up keys adjust the desired Speed value (4.8 Kbps – 38.4 Kbps). Press “Set” button again to save adjusted value. Press “Menu” button to exit menu.

2.5.3. Stop Bits Adjustment (StopBits)

Select StopBits sub menu from COMMUNICATION PORT main menu. Press “Set” button to edit value (current value is blinking). While value is blinking using Down/Up keys adjust the desired StopBits value (1 –2). Press “Set” button again to save adjusted value. Press “Menu” button to exit menu.



3. POWERING CONTROLLER

Install controller according to connection schematic and installation guidance and apply power. Adjust Kctr value first and then Press Down and Up buttons at the same time in order to start “T E S T” procedure. During this procedure current flow directions and capacitor powers are measured and determined. At the end of the “T E S T” device is ready for normal operation.

User should check and adjust required parameters from PARAMETERS menu in order to get optimum performance within specified plant.

While performing “T E S T” procedure user should consider following points.

- Severe changing loads negatively affect TEST procedure; these loads should be kept off during TEST.
- During TEST all 3 phases should supply current and system should be inductive.
- If controller could not detect current flow directions, displays, UNDETIRMINED CURRENT DIRECTION for short duration, if this is seen 3 phase load should be increased and TEST should be restarted.
- Installation must be done according to installation schematic.
- If capacitors, fuses, contactors have faults, after correction TEST must be restarted.
- If external CT is not appropriately selected (too high or too low turns ratio) controller may not perform successful TEST procedure.

If there are capacitors that controller cannot determine during TEST procedure, user should enter these capacitors manually by using CAPACITOR POWERS menu.

When device is installed properly user should set password in order to eliminate parameter change by unauthorized staff.. Password protection is activated via PARAMETERS menu. While password protection is activated each time user tries to enter menu or tries to perform TEST controller asks for correct password.

When controller asks for password display shows Access Code XX: YY. Here “XX” is fixed random number in the range of 0 – 99. “YY” is number between 0 – 99 and the value is changeable via Down/Up buttons. **User must adjust YY to the value that completes XX to 99. This is the password.**

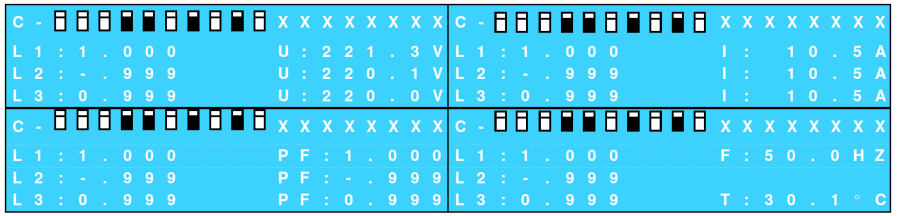
Example: Access Code 25:25 ➔ Down/Up Buttons ➔ Access Code 25:74 ➔ Menu (OPERATION MODE)

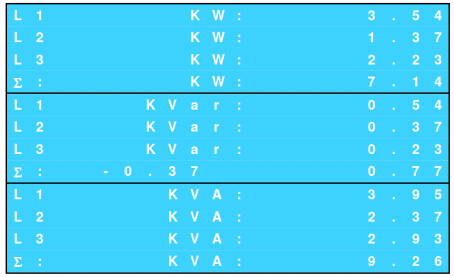
As can be seen in example here YY value is adjusted to 74 to complete 25 to 99. If different value is entered controller rejects entrance to menu or TEST action.

4. OBSERVATION OF MEASURED VALUES

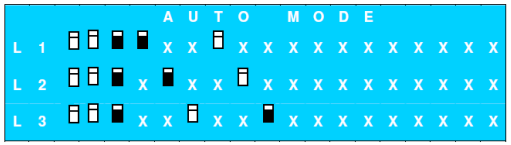
Controller is capable of measuring and display of Voltage, Current, Power Factor, Active Power, Reactive Power, Apparent Power and Frequency of 3 phases and internal temperature of the controller. Controller also displays Alarm Status, Capacitor Status and how they are connected to phases. 4 lines 20 character LCD and 4 buttons make it easy to observe and control information.

When controller is powered main screen displays capacitor status, Cos and voltages of 3 phases. Using Down/Up buttons user can scroll between all measured values.

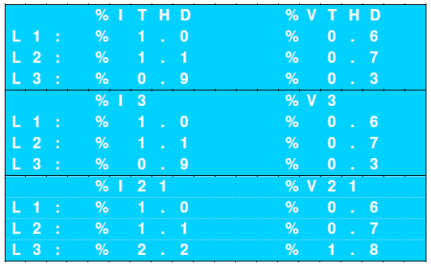




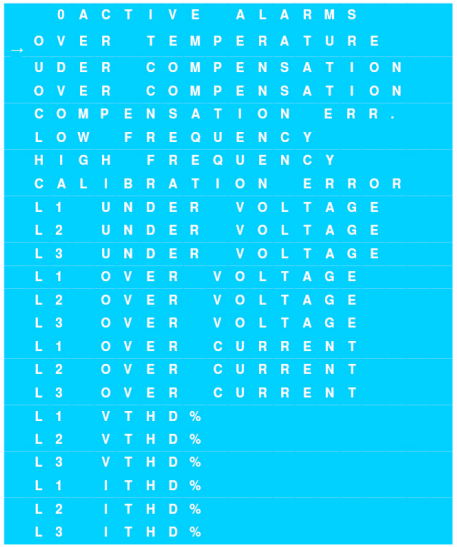
While controller displays capacitor symbols on uppermost line pressing “SET” button brings table on the screen which shows capacitors on each phase. “Menu” button cancels this screen.



While controller displays ITHD% and VTHD% values if “SET” button is pressed controller brings table which shows 3rd harmonic values. Using Down/Up buttons user can observe all the harmonics up to 21st. User can exit table by pressing “Menu” button.



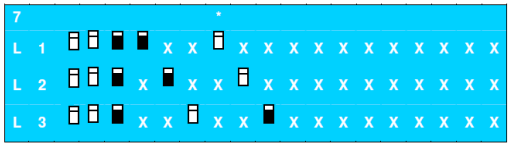
When alarm condition occurred using Down/Up buttons enters controller to XX ACTIVE ALARMS screen. Active alarms number is observed in this screen. User can observe which alarm is active by pressing “SET” button. If more than one alarm exist user can scroll between alarms via Down/Up buttons. Pressing “Menu” buttons returns to previous screen



5. MANUAL MODE

If Manual Mode is selected all measurements can be observed as in Automatic Mode except that device never switches on or off capacitor banks. If user needs to switch on or off one of the capacitor banks, while capacitor status are observed on the screen “SET” button is pressed. In this case display shows MANUAL MODE and capacitor table. Using Down/Up buttons capacitor banks is selected. The uppermost line displays moving arrow and bank number to help user select correct capacitor bank. When correct bank is selected pressing “SET” button switches on or off capacitor. Pressing “Menu” button returns to previous screen.

If any function is not used for 30 minutes while in MANUAL MODE, controller switches to AUTOMATIC MODE.



6. ALARMS

Parameter	Default Value	Range	Tanım
Over Temperature	50°C	50°C-80°C	If internal temperature of controller is over Tov fan output of controller is activated.
Under Compensation	-	-	If target Cosφ value is not reachable with presented capacitor banks Under Compensation Alarm occurs.
Over Compensation	-	-	While all capacitors are switched off if system is still capacitive Over Compensation Alarm occurs.
Compensation Err.	-	-	If target Cosφ value is not reachable with presented capacitor banks Compensation Error occurs.
Low Frequency	F<20Hz	Fixed	If line frequency drops below 20 Hz Low Frequency alarm occurs.
High Frequency	F>62Hz		If line frequency increases over 62 Hz High Frequency alarm occurs.
Calibration Error	-	-	If calibration data is corrupted Calibration Error alarm occurs.
L1-Under Voltage	U1<15V	Fixed	If one of the inputs drop below 15V Under Voltage alarm ocurrs.
L2-Under Voltage			
L3-Under Voltage			
L1-Over Voltage	260 VAC	200-300VAC	If one of the phase voltages increase above Uov value Over Voltage alarm occurs.
L2-Over Voltage			
L3-Over Voltage			
L1-Over Current	5.5A	Sabit	If current of one of the current inputs increases above 5.5A Over Current alarm occurs.
L2-Over Current			
L3-Over Current			
L1-VTHD Harmonic	0.0%	0.0% - 50.0%	If measured VTHD% or ITHD% values increase above set ITHD% or VTHD% limits, Harmonic alarm occurs.
L2-VTHD Harmonic	0.0%	0.0% - 50.0%	
L3-VTHD Harmonic	0.0%	0.0% - 50.0%	
L1-ITHD Harmonic	0.0%	0.0% - 50.0%	
L2-ITHD Harmonic	0.0%	0.0% - 50.0%	
L3-ITHD Harmonic	0.0%	0.0% - 50.0%	

7. TECHNICAL SPECIFICATIONS

Operating Temperature	-25°C… + 65 °C	**Current Transformer Direction**	Otomatik
Max. Relative Humidity	% 90	**Capacitor Bank Stages**	8/13/18
Power Consumption	<10VA	**Output Contact**	250V/3A AC
Supply Voltage(Un)	230VAC ±10%	**Alarm Contact**	250V/3A AC
Supply Frequency	50 Hz / 60 Hz	**Fan Contact**	250V/3A AC
Current Inputs	……/5A	**Cables**	AWG12-16
Current Range	0.02A – 5.5A	**Front Panel Dimensions**	144mm x 144mm (DIM43 700)
LCD Display	4x20	**Dimensions**	144x144x70
CTR	5/5A – 5000/5A	**Weight**	1030 gr.

8. USAGE AND SAFETY INSTRUCTIONS

User must consider the fallowing points for safe and correct usage.

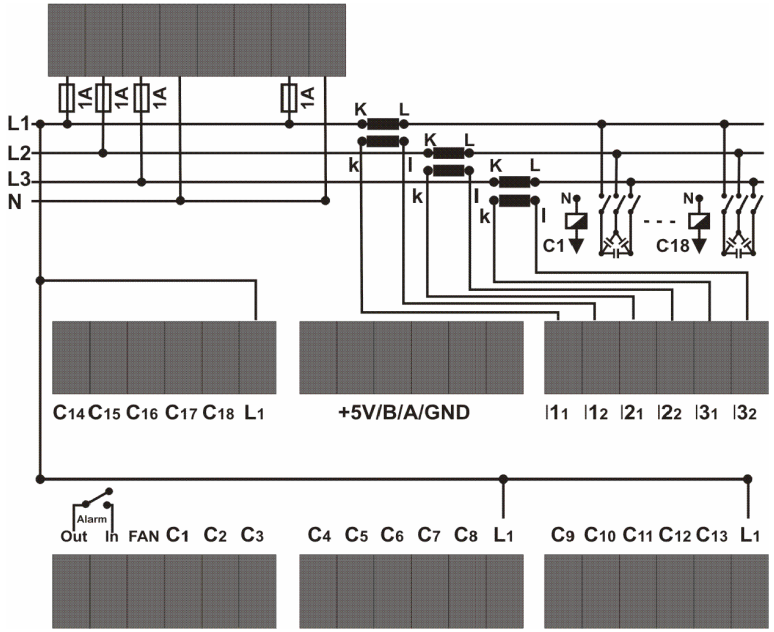
- Switch off voltages during installation.
- Do not clean controller with any solvent.
- Please check all the connections according to connection schematic.
- Faulty units must be repaired only by authorized technical staff.

Deviation of above instruction may cause serious injury or death.

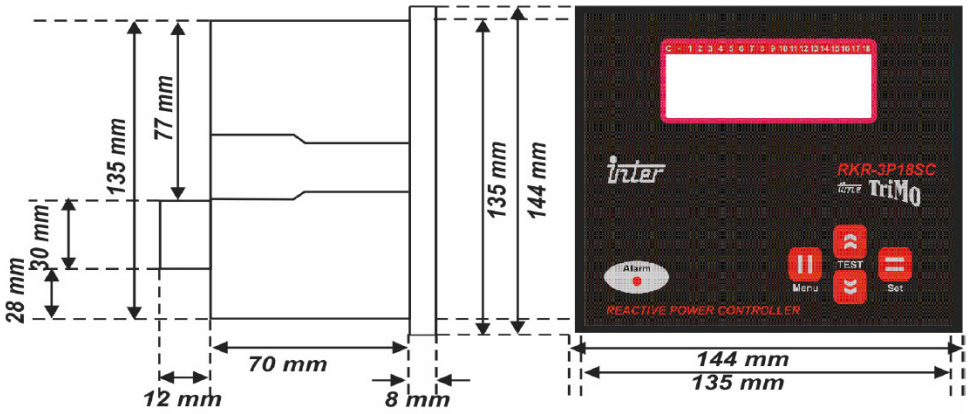
Manufacturer or Reseller is not responsible from the results that may occur in the case of deviation of above instructions.

TFJA-08
Regulátor jalového výkonu

Schéma zapojenia



Rozmery



1., Úvod

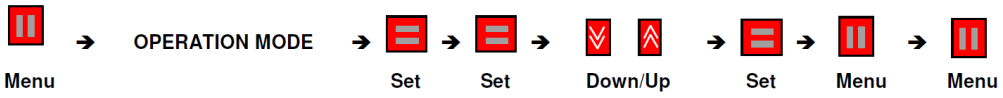
TFJA-08 je trojfázový regulátor jalového výkonu, ktorý umožňuje kompenzáciu jalového výkonu po fázach. Jeho používanie je účelné tam, kde záťaž pripojená na sieť vykazuje veľkú mieru asymetrie.

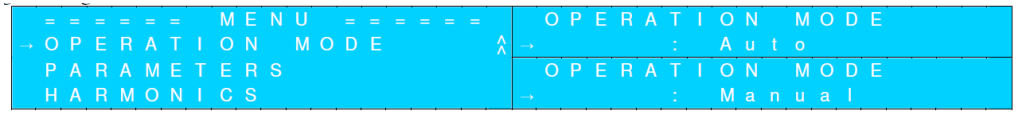
Technické údaje:

- 4-radový zobrazovač LCD, 20 znakov v každom riadku
- Ručný/Automatický režim
- Rozsah nastavenia: cos fi: 0,8 ind. - 0,8 cap.
- Nastaviteľný alarm pri prehriatí
- Nastaviteľný alarm pri výskyte vyšších harmonických
- Meranie napätí a prúdov do 21. harmonickej
- Alarmy, alarmový výstup
- 3-fázový typ, regulácia po fázach
- Automatické rozpoznanie charakteru záťaže
- Oneskorené Zapínanie /Vypínanie
- Nastaviteľný alarm pri prepätí
- Zobrazenie všetkých harmonických
- Zobrazenie napätí, prúdov a výkonov
- Ochrana heslom

2., Programovanie:

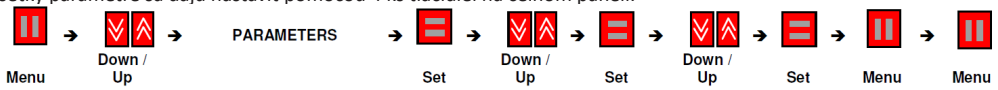
2.1 Režim: Automatický/Ručný

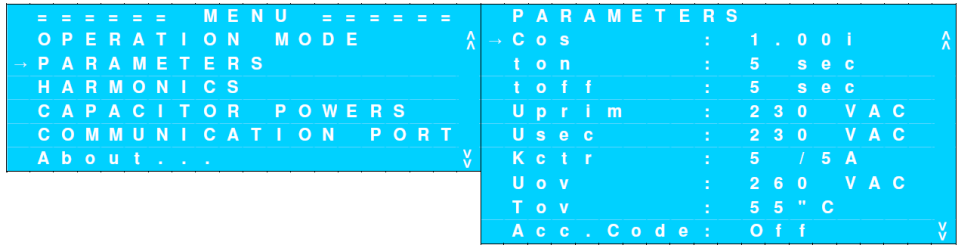




2.2 Parametre

Všetky parametre sa dajú nastaviť pomocou 4 ks tlačidiel na čelnom paneli.



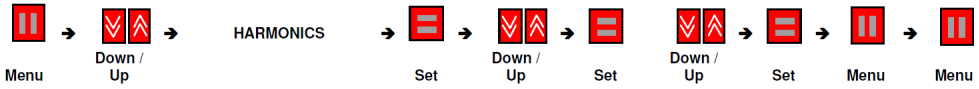


Parameter	Default Value	Range	Description
Cosφ	1.00i	0.80 ind-0.80 cap	Target
ton	5 sec.	1-120 sec.	Capacitor Switch on Time
toff	5 sec.	1-120 sec.	Capacitor Switch off Time
Uprim	230 VAC	100000 VAC	Voltage Transformer Primary Voltage
Usec	230VAC	100000 VAC	Voltage Transformer Secondary Voltage
Kctr	5/5A	5/5 – 5000/5	Current Transformer Ratio
Uov	260 VAC	200-300V	Overvoltage Alarm Limit
Tov	50°C	30°C-80°C	Over temperature Alarm Limit
Acc.Code	OFF	ON – OFF	Menu Input Password Protection Selection

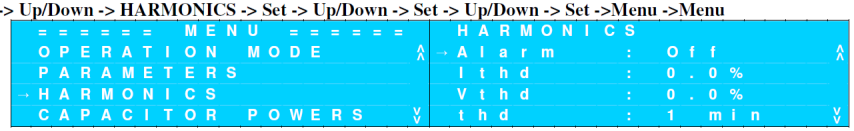
Cosφ: Cieľová hodnota účinníka
t_{on}: Nastaviteľné časové oneskorenie zapínania kondenzátorov
t_{off}: Nastaviteľné časové oneskorenie vypínania kondenzátorov
U_{prim}: Primárne napätia meracieho transformátora napätia, menovitá hodnota sieťového napätia
U_{sec}: Sekundárne napätie meracieho transformátora napätia
K_{ctr}: Prevod meracieho transformátora prúdu
U_{ov}: Alarmová hodnota pri prepätí
T_{ov}: Alarmová hodnota pri prehriatí
A_{cc}.Code: Povolenie ochrany heslom

2.3 Vyššie harmonické

Prístroj meria obsah harmonických napätí a prúdov. Vysoký obsah vyšších harmonických môže spôsobiť poškodenie.



Menu -> Up/Down -> HARMONICS -> Set -> Up/Down -> Set -> Up/Down -> Set ->Menu ->Menu

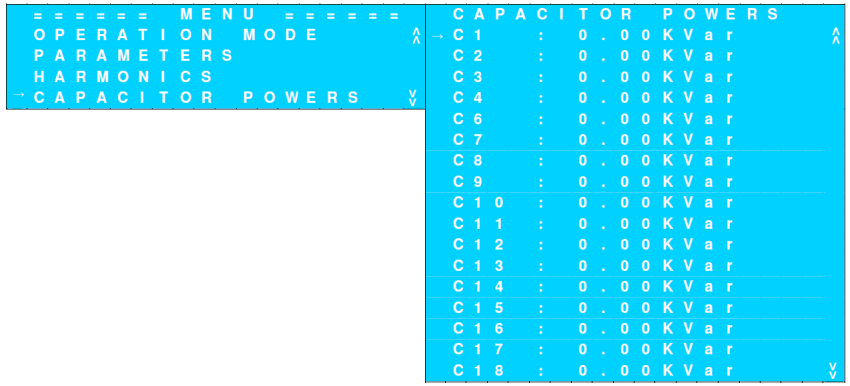


Parameter	Default Value	Range	Description
Alarm	Off	Off – On	Enable Harmonic Protection
Ithd	0.0%	0.0% - 50.0%	Current Total Harmonic Distortion Percentage
Vthd	0.0%	0.0% - 50.0%	Voltage Total Harmonic Distortion Percentage
thd	1 min	30 min	Delay Time Before Normal Operation.

Alarm: Zapnutie/Vypnutie ochrany
Ithd: Celkové harmonické skreslenie prúdu
Vthd: Celkové harmonické skreslenie napätia
thd: Oneskorenie alarmu

2.4 Výkon kompenzačných stupňov

Menu->Up/Down->CAPACITOR POWERS->Set->Up/Down-> Set->Up/Down-> Set-> Up/Down->Set->Menu ->Menu

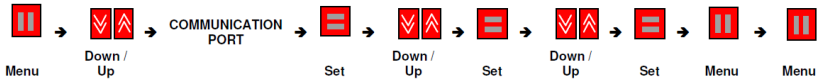


Parameter	Default Value	Range	Connection Type	Description
C1	0 KVar	Kctr<100/5A 0.01-60.0 KVar Kctr<1000/5A 0.1-600 KVar Kctr≥1000/5A 1-6000 KVar	* * * 3 Phase Cap. * - - 1 Phase Cap. (L1) - * - 1 Phase Cap. (L2) - - * 1 Phase Cap. (L3) * * - 2 Phase Cap. (L1-L2) * - * 2 Phase Cap. (L1-L3) - * * 2 Phase Cap. (L2-L3) **Note:** Sequence is from lef to right L1-L2-L3. '*' means, capacitor present, '-' means not present. During manual adjustment, first capacitor power then connection type must be entered.	1. Capacitor Power
C2	0 KVar			2. Capacitor Power
C3	0 KVar			3. Capacitor Power
C4	0 KVar			4. Capacitor Power
C5	0 KVar			5. Capacitor Power
C6	0 KVar			6. Capacitor Power
C7	0 KVar			7. Capacitor Power
C8	0 KVar			8. Capacitor Power
C9	0 KVar			9. Capacitor Power
C10	0 KVar			10. Capacitor Power
C11	0 KVar			11. Capacitor Power
C12	0 KVar			12. Capacitor Power
C13	0 KVar			13. Capacitor Power
C14	0 KVar			14. Capacitor Power
C15	0 KVar			15. Capacitor Power
C16	0 KVar			16. Capacitor Power
C17	0 KVar			17. Capacitor Power
C18	0 KVar			18. Capacitor Power

Capacitor Power	L1 L2 L3 3 Phase	L1 N Phase to Neutral	L1 N Phase to Neutral	L1 L2 Phase to Phase	L1 L2 Phase to Phase
0,5 KVAR	0,16 KVAR	0,08 KVAR	0,11 KVAR	0,12 KVAR	0,16 KVAR
1 KVAR	0,33 KVAR	0,16 KVAR	0,22 KVAR	0,25 KVAR	0,33 KVAR
1,5 KVAR	0,5 KVAR	0,25 KVAR	0,33 KVAR	0,37 KVAR	0,5 KVAR
2,5 KVAR	0,83 KVAR	0,41 KVAR	0,55 KVAR	0,62 KVAR	0,83 KVAR
5 KVAR	1,66 KVAR	0,83 KVAR	1,11 KVAR	1,25 KVAR	1,66 KVAR
7,5 KVAR	2,5 KVAR	1,25 KVAR	1,66 KVAR	1,87 KVAR	2,5 KVAR
10 KVAR	3,33 KVAR	1,66 KVAR	2,22 KVAR	2,5 KVAR	3,33 KVAR

2.5 Kommunikációs port

Prístroj pomocou vhodného adaptéra (TFJA-08-RS485) umožňuje komunikáciu cez protokol MODBUS.



Parameter	Default Value	Range	Description
Sl.Addr	1	1 - 247	Device Address
Speed	9.6 Kbps	4.8 – 38.4 Kbps	Communication Speed
Stop Bits	1	1 - 2	Stop Bits

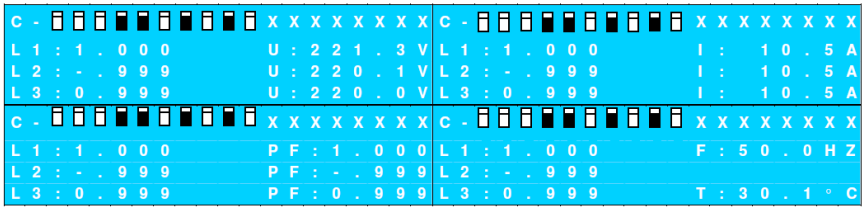
3., Regulátor jalového výkonu

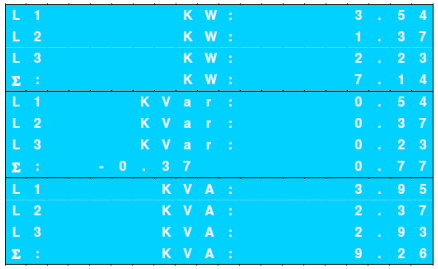
Zapojte regulátor a nastavte jeho parametre. Ak je všetko správne, preveďte funkciu test. Po skončení funkcie test, ak si želáte zabrániť prístupu cudzím osobám, zmeňte heslo. Regulátor bude žiadať: Acces Code XX:YY, kde XX je generované číslo v intervale 0-99. Hodnota YY je nastaviteľná medzi 0-99. Túto hodnotu je potrebné zmeniť užívateľom. Toto bude heslo.

Example: Access Code 25:25 ➔ Down/Up Buttons ➔ Access Code 25:74 ➔ Menu (OPERATION MODE)

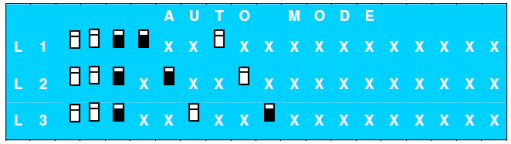
4., Zobrazovanie meraných veličín

Regulátor meria a zobrazuje napätie, prúd, účinník, zdanlivý výkon, činný výkon, jalový výkon a frekvenciu v každej fáze a vnútornú teplotu regulátora. Štyrmi tlačidlami nachádzajúcimi sa na čelnom paneli je možné zmeniť hodnoty displeja. Pomocou tlačidiel Hore/Dole je možné sa pohybovať vyššie alebo nižšie na displeji k zobrazeniu hodnôt.

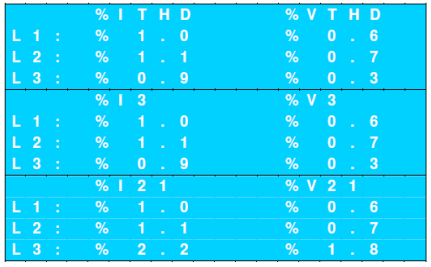




Ak regulátor zobrazuje symboly kondenzátorov v hornom riadku, stlačte tlačidlo „SET", zobrazí sa tabuľka na displeji zobrazujúca, ktoré kondenzátory sú zapnuté. Pomocou tlačidla Menu je možné ísť späť.



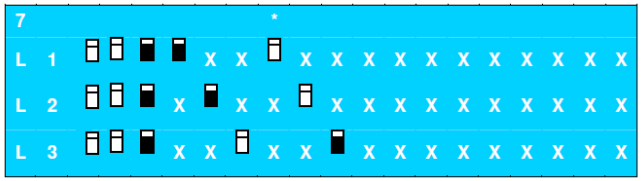
Ak displej zobrazuje hodnoty IHTD% a VTHD%, pomocou tlačidla SET je možné prepnúť na zobrazenie vyšších harmonických. Pomocou tlačidiel Hore/Dole je možné zobraziť hodnoty 21 vyšších harmonických. Pomocou tlačidla Menu je možné sa vrátiť späť.



Pomocou tlačidiel Hore/Dole je možné sa dostať na zobrazenie stavu AKTÍVNE ALARMY. Pomocou tlačidla SET je možné sa pozrieť, ktoré alarmy sú aktívne. Pomocou tlačidla Menu je možné sa vrátiť späť.

5. Manuálny režim

V manuálnom režime je možné ručné zapínať jednotlivé stupne. Kondenzátorovú batériu je možné si zvoliť tlačidlami Hore/Dole a zapnúť pomocou tlačidla SET. Operáciu Späť je možné uskutočniť pomocou tlačidla Menu.



6. Alarmy

Parameter	Default Value	Range	Tanım
Over Temperature	50°C	50°C-80°C	If internal temperature of controller is over Tov fan output of controller is activated.
Under Compensation	-	-	If target Cosφ value is not reachable with presented capacitor banks Under Compensation Alarm occurs.
Over Compensation	-	-	While all capacitors are switched off if system is still capacitive Over Compensation Alarm occurs.
Compensation Err.	-	-	If target Cosφ value is not reachable with presented capacitor banks Compensation Error occurs.
Low Frequency	F<20Hz	Fixed	If line frequency drops below 20 Hz Low Frequency alarm occurs.
High Frequency	F>62Hz		If line frequency increases over 62 Hz High Frequency alarm occurs.
Calibration Error	-	-	If calibration data is corrupted Calibration Error alarm occurs.
L1-Under Voltage	U1<15V	Fixed	If one of the inputs drop below 15V Under Voltage alarm ocurrs.
L2-Under Voltage			
L3-Under Voltage			
L1-Over Voltage	260 VAC	200-300VAC	If one of the phase voltages increase above Uov value Over Voltage alarm occurs.
L2-Over Voltage			
L3-Over Voltage			
L1-Over Current	5.5A	Sabit	If current of one of the current inputs increases above 5.5A Over Current alarm occurs.
L2-Over Current			
L3-Over Current			
L1-VTHD Harmonic	0.0%	0.0% - 50.0%	If measured VTHD% or ITHD% values increase above set ITHD% or VTHD% limits, Harmonic alarm occurs.
L2-VTHD Harmonic	0.0%	0.0% - 50.0%	
L3-VTHD Harmonic	0.0%	0.0% - 50.0%	
L1-ITHD Harmonic	0.0%	0.0% - 50.0%	
L2-ITHD Harmonic	0.0%	0.0% - 50.0%	
L3-ITHD Harmonic	0.0%	0.0% - 50.0%	

7. Technické údaje

Operating Temperature	-25°C… + 65 °C	**Current Transformer Direction**	Otomatik
Max. Relative Humidity	% 90	**Capacitor Bank Stages**	8/13/18
Power Consumption	<10VA	**Output Contact**	250V/3A AC
Supply Voltage(Un)	230VAC ±10%	**Alarm Contact**	250V/3A AC
Supply Frequency	50 Hz / 60 Hz	**Fan Contact**	250V/3A AC
Current Inputs	……/5A	**Cables**	AWG12-16
Current Range	0.02A – 5.5A	**Front Panel Dimensions**	144mm x 144mm (DIM43 700)
LCD Display	4x20	**Dimensions**	144x144x70
CTR	5/5A – 5000/5A	**Weight**	1030 gr.

8. Upozornenie

Vypnite napätie pri inštalovaní prístroja.
Nepoužívajte rozpúšťadlá na čistenie regulátora.
Prosím, skontrolujte si zapojenie podľa schémy zapojenia.
Opravu prístroja môže vykonávať iba odborná osoba s príslušnou elektrotechnickou kvalifikáciou.