Dimensioni – *Dimensions* – Dimensions - *Abmessungen* - Dimensiones

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3YYYB113 Man. STAR3 DIN I/UK/F/D/E 09/2002

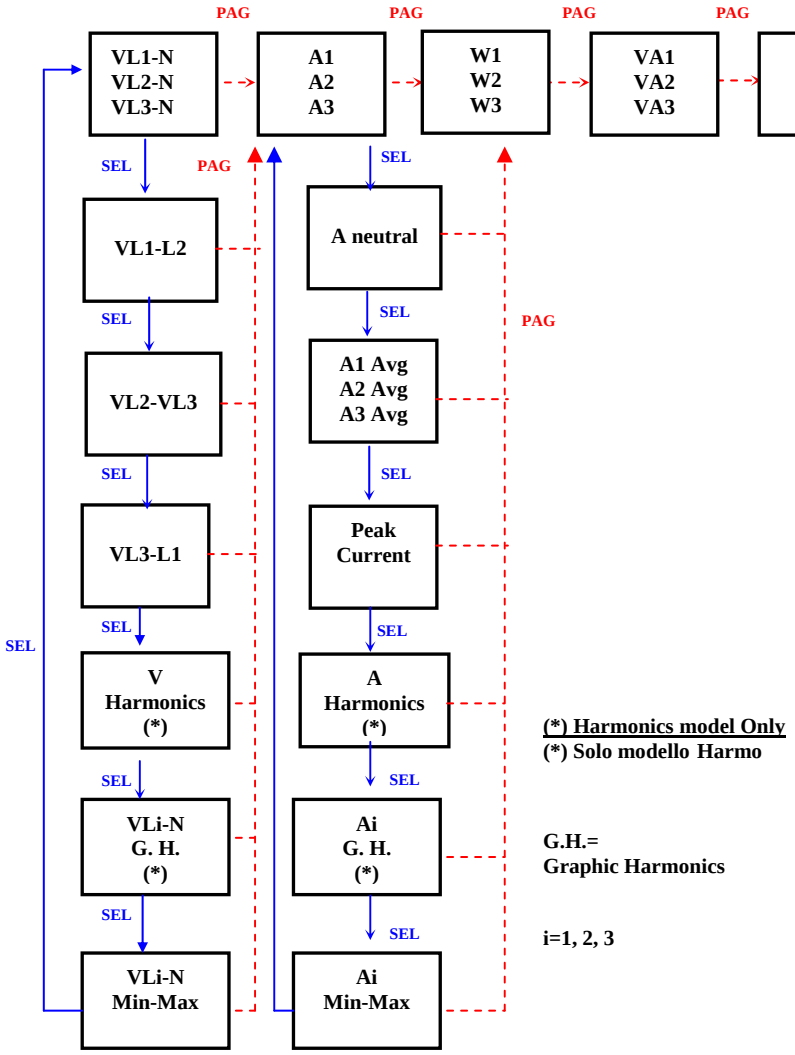
ISO 9001 KEMA

Cert.2007399

STAR3 DIN

Energy & Harmonics Analyser

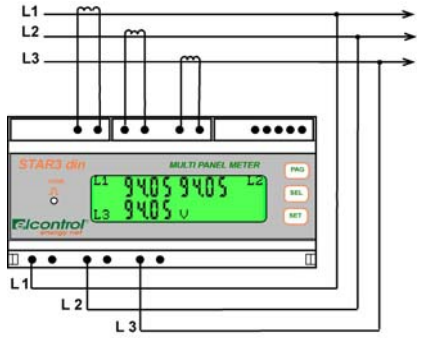
MANUALE D'ISTRUZIONE
USER MANUAL
MODE D'EMPLOI
BEDIENUNGSHANDBUCH
MANUAL DE ISTRUCCIONES



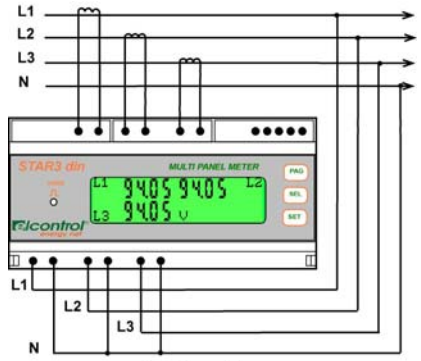
(*) Harmonics model Only
(*) Solo modello Harmo

G.H.=
Graphic Harmonics

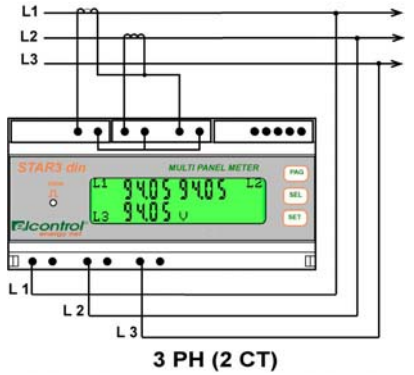
i=1, 2, 3



3 PH



3 PH and n

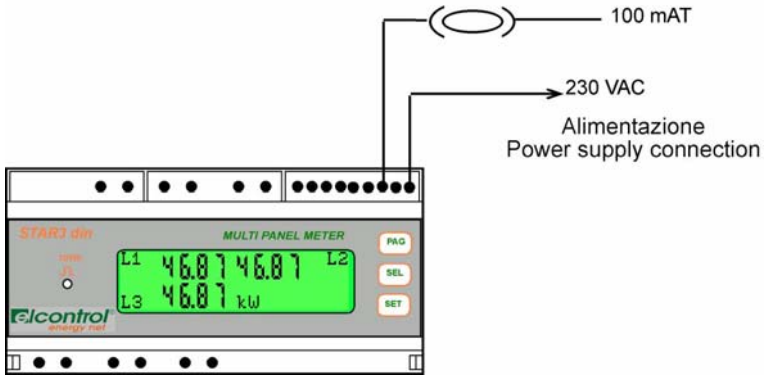


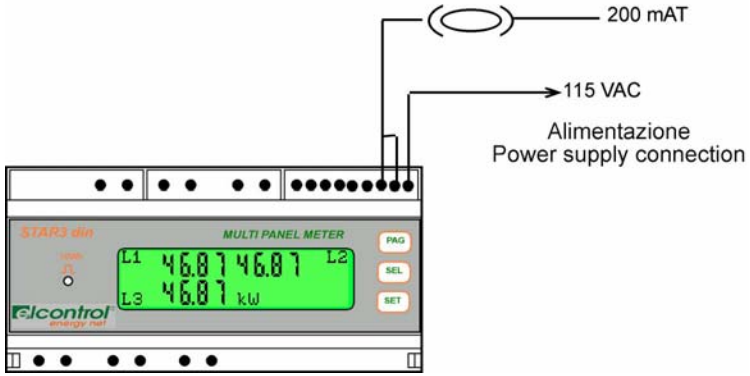
3 PH (2 CT)

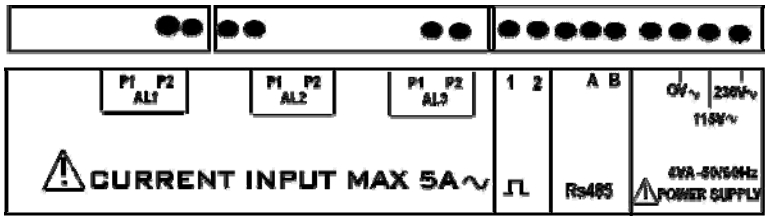
	3 PH TOT	L1	L2	L3	Neutral
Voltage	x	x	x	x	
Phase-phase voltage		V_{L1-L2}	V_{L2-L3}	V_{L3-L1}	
Current	x	x	x	x	x
Power factor	x	x	x	x	
Frequency		x			
Current Avg		x	x	x	
Current maximum demand		x	x	x	
KW	x	x	x	x	
KVAr	x	x	x	x	
kVA	x	x	x	x	
kW Avg	x				
kVAr Avg	x				
kVA Avg	x				
kW maximum demand	x				
kVA maximum demand	x				
KVAr maximum demand	x				
kWh imported +	x				
kWh exported -	x				
kVArh leading +	x				
kVArh lagging -	x				
THD Current	x	x	x	x	
THD Voltage	x	x	x	x	

Model HARMO .(1250Hz max order)

Harmonic order (k=1..25 @ 50Hz - k=1..20 @ 60Hz)	L1	L2	L3
$Vrms_k$	x	x	x
$Irms_k$	x	x	x


100 mAT
230 VAC
Alimentazione
Power supply connection
STAR3 din
MULTI PANEL METER
L1 46.07 46.07 L2
L3 46.07 kW
PAG
SEL
SET
Elcontrol
energy net


200 mAT
115 VAC
Alimentazione
Power supply connection
STAR3 din
MULTI PANEL METER
L1 46.07 46.07 L2
L3 46.07 kW
PAG
SEL
SET
Elcontrol
energy net


P1 P2
AL1
P1 P2
AL2
P1 P2
AL3
1 2
A B
0V
230V
115V
CURRENT INPUT MAX 5A
Rs485
POWER SUPPLY

PASSWORD SETUP PAGES

PAG + SEL (for 30 sec the first time)

Pg. S0
Insert Setup Password

PAG

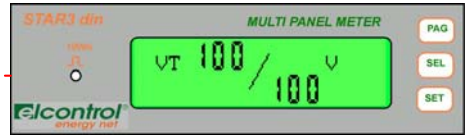
Pg. S0a
Change or confirm Password VA-Var-W

PAG
Go to Setup

SETUP MENU – All models

Pg. S2
CT ratio

PAG



Pg S1
VT ratio

PAG

Pg. S3
Integration period

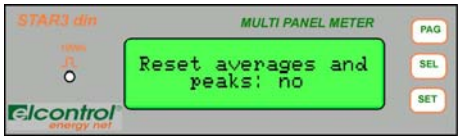
PAG

Pg. S4
Reset Counters

PAG

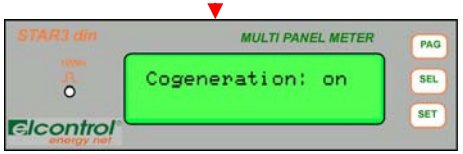
Pg S5

SETUP MENU – All models



Pg. S5
Reset Avg and Peaks

PAG

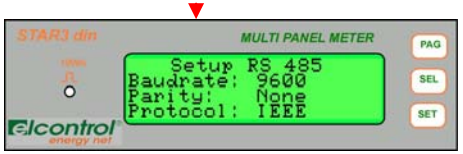


Pg. S6
Cogeneration

PAG

Pg. S7
Connection type

PAG



Pg. S8
Setup Rs485

PAG

Pg. S9
Rs485 Address

PAG

SETUP MENU – Additional pages for models 4-20mA

Pg. S10 4-20mA
Output range

PAG

PAG

Pg. S12 4-20mA
Measure for output 2 selection

Pg. S11 4-20mA
Measure for output 1 selection

PAG

PAG

Pg. S13 4-20mA
Full scale output 1

Pg. S14 4-20mA
Full scale output 2

SETUP MENU – Additional pages for models ALM and HARMO

Pg S12
Relay/Alarm mode

PAG

Pg. S17
Alarm measure selection

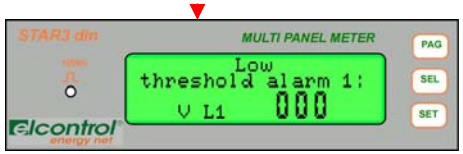
SET

PAG

Pg. S18
Remote Rs485 Relay

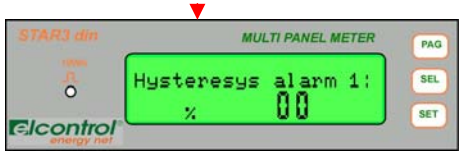
Pg. S19
Alarm 1 High Threshold

PAG



Pg. S20
Alarm 1 Low Threshold

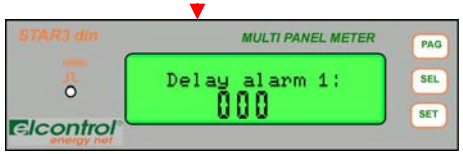
PAG



Pg. S21
Alarm 1 Hysteresys %

PAG

Pg S23....Pg S28
Setup relay 2
similar to 1



Pg. S22
Alarm 1 Delay

4 - MEASUREMENT PAGES

At power on, the STAR3 DIN displays the last page selected before power off.
Use the PAG key to scroll through the different measurement pages and the SEL key to see the details.
The presence of several pages is depending on the connection mode selected into the setup .

3 PH-N: Three phases with neutral, i.e. Star , 4 wires system
3 PH: Three phases without neutral, i.e. Delta, 3 wires system
2 PH: Two phases and neutral
1 PH: Single phase and neutral

- **Page M1** (page and subpages not available in 1PH mode)
  Phase-neutral voltages V_{L1-N}, V_{L2-N}, V_{L3-N} (3 PH-N, 3 PH)
  Phase-neutral voltages V_{L1-N}, V_{L2-N} (2 PH)
  - **Page (M1-S1)-(M1-S8)**
    (page appearing only in 3 PH-N and 2 PH)
    Phase to Phase Voltage V_{L1-L2}
  - **Page (M1-S2)-(M1-S9)**
    (page appearing only in 3 PH-N)
    Phase to Phase Voltage V_{L2-L3}
  - **Page (M1-S3)-(M1-S10)**
    (page appearing only in 3 PH-N)
    Phase to Phase Voltage V_{L3-L1}
  - **Page (M1-S4)-(M1-S5)-(M1-S6)-(M1-S7)**
    (page appearing only in STAR HARMO. VL1 has to be connected)
    Harmonics Voltages $VL1_h$, $VL2_h$, $VL3_h$
    Use the key SEL to scroll all the harmonics orders h .
    The maximum order is depending on the fundamental. It is the 25th at 50 Hz
    The voltage input are not connected the harmonics menu does not appear.
- **Page M2** (page and sub pages not available in 1PH)
  Phase currents A_{L1}, A_{L2}, A_{L3} (3 PH-N, 3 PH)
  Phase currents A_{L1}, A_{L2} (2 PH)
  - **Page (M2-S1)-(M2-S8)**
    (present only in three 3 PH-N; 3 PH)
    Neutral current $A_{neutral}$
  - **Page (M2-S2)-(M2-S9)**
    Average Phase currents $AL1_{Avg}$ $AL2_{Avg}$, $AL3_{Avg}$
    The integration time is the same used for the Average power and it is adjustable into the setup menu.
  - **Page (M2-S3)-(M2-S10)**
    Phase current peaks $AL1_{peak}$, $AL2_{peak}$, $AL3_{peak}$
    maximum average currents.
  - **Page (M2-S4)-(M2-S5)-(M2-S6)-(M2-S7)**
    (Page appearing only in STAR3 DIN HARMO)
    Harmonics Currents $AL1_h$, $AL2_h$, $AL3_h$
    Use the key SEL to scroll all the harmonics orders h .
    The maximum order is depending on the fundamental. It is the 25th at 50 Hz
- **Page M3** (page not available in 1 PH)
  Phase active powers (*kW*) P_{L1}, $P_{L2,}$ P_{L3} (3 PH-N, 3 PH)
  Phase active powers P_{L1}, P_{L2} (2 PH)
- **Page M4** (page not available in 1 PH)
  Phase Apparent powers (*kVA*) S_{L1}, S_{L2}, S_{L3} (3 PH-N, 3 PH)
  Phase apparent powers S_{L1}, S_{L2} (2 PH)
- **Page M5** (not available in 1 PH)
- Phase reactive powers (*kVAr*) Q_{L1}, Q_{L2}, Q_{L3} (3 PH-N, 3 PH)
  Phase reactive powers Q_{L1}, Q_{L2}, (2 PH)
- **Page M6** (not available in 1 PH)
  Phase Power Factor PF_{L1}, PF_{L2}, PF_{L3} (3 PH-N, 3 PH)
  Phase reactive powers PF_{L1}, PF_{L2}, (2 PH)

- **Page M10**
  Total apparent energy counter kVAh
  Total active energy counter kWh
  range 0,000,000.00-99,999,999.9 kWh.
  When the upper limit is reached, the counter restarts from 00,000,000.0 kWh.
  One decimal disappear definitively after the first roll-over. Reset the counter to display it again

- **Page M11**
  Total reactive energy counter kVArh
  Total active energy counter kWh
  range 0,000,000.00-99,999,999.9 kWh.
  When the upper limit is reached, the counter restarts from 00,000,000.0 kWh.
  One decimal disappear definitively after the first roll-over. Reset the counter to display it again

  - **Page M11-S1**
    Cogeneration counters. This page is available only if the COG is enabled into the SETUP.
    Total capacitive reactive energy kVArh
    Total exported active energy kWh
    To measure properly the cogeneration counters it is strictly necessary to connect the CTs oriented in the same direction. This is not required if the Cogeneration is OFF

5 - SETUP PAGES
To access the SETUP open the front door and press the PAG and the SEL keys at the same time:
Use the SEL key to select a digit or a setting. Use the SET key to adjust it.
The setup can be protected with a password (see next chapter)

- **Page S1** Programming the Primary and Secondary ratio of a PT.
  Use a ratio equal to 1 (e.g. 100/100) in case of direct measurement without voltage transformer is not used. Select a digit with the SEL key; change its value using the SET key.
- **Page S2** Programming the Primary and Secondary Windings of a Current Transformer
  Select a digit with the SEL key; change its value with the SET key.
- **Page S3** Integration time for Power and current averages, range 00-99 min.
  Select a digit with the SEL key; change its value with the SET key.
- **Page S4** Reset energy counters.
  If you select Y with the SET key, all the counters will be reset as soon you confirm by pressing the PAG. key.
- **Page S5** Reset Averages and Maximum Demands.
  If you select Y with the SET key, all the Averages and maximum demand values will be reset as soon you confirm by pressing the PAG. key.
- **Page S6** Enable Cogeneration counters.
  Select ON or Off to enable the measures and confirm with PAG
  To measure properly the cogeneration counters it is strictly necessary to connect the CTs oriented in the same direction. This is not required if the Cogeneration is OFF
- **Page S7** Programming connection type
  Select the type of system which you want to measure using the SET key.
  - **Page S7a** 3 PH Three phases without neutral (i.e.Delta)
  - **Page S7b** 3 PH And n Three phases with neutral (i.e.Star)
  - **Page S7c** 2 PH Two-phases with neutral
  - **Page S7d** 1 PH Single phase with neutral
- **Page S8** : Rs485 communication parameters setup
  The value of the Baud Rate can be: 2400, 4800, 9600, 19200 (bps).
- The Parity (central) value can be : None, Odd, Even.
  The type of communication protocol Modbus can be:
  ASCII = Modbus ASCII. This format is limited to simulate the same data frame of the Vip Energy.
  BCD = Modbus BCD. It allows the full control of the instrument
  IEEE = Modbus IEEE standard, INTEL format

- **Page S9**
  Adresses d'instrument Rs485
  L'adresse Modbus de l'instrument peut être sélectionné sur cette page.
  Le champ d'adresses consenti est compris entre 1 et 247.

  La page S9 est la dernière du modèle de base STAR3 DIN.
  D'autres pages sont disponibles pour les modèles avec option HARMO, ALM, 4-20mA.

6 – CODE DE PROTECTION DU SETUP
Par défaut la demande du code d'accès aux pages de configuration (setup) n'est pas activée. Pour l'activer il faut appuyer en même temps sur les touches PAG + SEL pendant 30 sec. Au bout desquels la page d'entrée du code d'accès sera affichée.

- **Pages S0 Entrée du mot de passe configuration**
  À l'aide des touches SEL + SET il faut tout d'abord entrer le code d'accès.
  Par défaut, celui établi à l'usine est toujours 000000. On quitte cette page par la touche PAG.

- **Page S0a – Changement de mot de passe**
  Il apparaît une seconde page (avec «COD» clignotant), identique à la première, sur laquelle, si l'on veut, on peut modifier le code d'accès. En cas de modification du code, il vaut mieux le noter, de façon à pouvoir l'utiliser par la suite. Après sortie de la seconde page, on a accès à la configuration à l'aide la touche PAG.

IMPORTANT: La mise en place d'un mot de passe nécessite par la suite son introduction obligatoire pour avoir accès au programme de SETUP. On conseille donc d'effectuer un essai.

SETUP PASSWORD MEMO	
STAR3 SERIAL #	
INSTALLED AT	
FACTORY PASSWORD	000000
DATE	
NEW PASSWORD	
DATE	
NEW PASSWORD	
DATE	
NEW PASSWORD	

7 – PAGES DE SETUP ADDITIONNELLES POUR LES MODÈLES STAR3 DIN HARMO et ALM
Pour entrer en Mode de Programmation, presser en même temps les touches PAG et SEL : utiliser ensuite la touche SEL pour sélectionner un chiffre et la touche SET pour l'augmenter.
Le SETUP peut être protégé par un mot de passe (voir point 6)

- **Page S10- Impulsions avec durée de 100msec**
  Activation du mode Impulsions : impulsion avec durée de 100 msec
  Presser PAG pour confirmer. Presser SET pour la sélection suivante

- **Page S11 - Impulsions avec durée de 20msec**
  Activation du mode Impulsions : impulsion avec durée de 20 msec .
  Presser PAG pour confirmer. Presser SET pour la sélection suivante (S16)

- **Page S12-ALM**
  La confirmation de cette page comporte l'activation de la commande à distance du relais ou du mode d'alarme.
  Presser PAG pour confirmer
  Presser SET pour passer au mode impulsions (S10).

PULSE OUTPUT

- **Page S13- Measure corresponding to output 1** .
  Pressing the SET key enables to select the measure corresponding to output 1:
  kWh tot
  kWh tot COG
  kVArh tot
  kVArh tot COG
  kVAh tot
- **Page S14 - Measure corresponding to output 2**.
  Pressing the SET key enables to select the measure corresponding to output 2.
  The measure available are the same of page S12 for output 1.
- **Page S15 - Weight of 1 pulse output 1**
  Number of kWh corresponding to 1 pulse.
  E.g.: 1 pulse = 0.01 kWh
  Pressing the SEL key to select the digit to modify.
  Pressing the SET key to adjust the selected digit to modify.
  Pressing the PAG key enables to go to output 2 pulse weight set-up.
- **Page S16 - Weight of 1 pulse output 2**.
  Same as S14 for output 2.
  This is the last page of the setup. Press PAG to return to the measure pages

RELAYS or ALARM OUTPUT

- **Page S17-Measure for Alarm 1**
  Association of the output 1 with a measures for alarm controlling. Press the SET key to choose one the following measures The following list is available in 3 PH-N mode.
  Some of the measures are not carried out in 1 PH, 2 PH and 3 PH mode and therefore can not be found in the setup of the alarm.

V total ;	VL1 ;	VL2 ;	VL3
A total ;	AL1 ;	AL2 ;	AL3
kW total ;	kWL1 ;	kWL2 ;	kWL3
kVA total ;	kVAL1 ;	kVAL2 ;	kVAL3
kVAr total;	kVArL1 ;	kVArL2 ;	kVArL3
PF total ;	PFL1 ;	PFL2 ;	PFL3
THDV tot ;	THDV L1 ;	THDV L2 ;	THDV L3
THD A tot ;	THDA L1 ;	THDA L2 ;	THDA L3

  RLY= relay 1 controlled remotely, via Rs485, instead of locally as an alarm (go to S18)

Pressing the PAG key enables to go to one of the following pages:
set-up of the upper threshold of output 1 if one of the measures has been selected; (S19)
set-up of the relay output 2 if the remote mode has been selected for output 1 (S24)

- **Page M7**
  Facteur Moyen de distorsion harmonique totale
  Avg THDV= $(THDV_{L1}+THDV_{L2}+THDV_{L3})/3$;
  Avg THDA= $(THDA_{L1}+THA_{L2}+THDA_{L3})/3$
  Ces paramètres permettent de déceler tout de suite la présence d'une distorsion de Phase

- **Page M7-S1** (non disponible en mode 1 PH)
  Phase THD V — THDV1, THDV2 ; THDV3 (3 PH-N, 3 PH) — THDV1,THDV2 (2 PH)
  exemple: $THDV1 = \frac{\sqrt{\left(\sum_{h=2}^{25} V1_h^2\right)}}{V1_{rms}} = \frac{\sqrt{(V1_{rms}^2 - V1_{fnd}^2}}{V1_{rms}}$

- **Page M7-S2** (non disponible en mode 1PH)
  Phase THD A — THDA1, THDA2 ; THDA3 (3 PH-N, 3 PH) — THDA1, THDA2 (2 PH)
  exemple: $THDA1 = \frac{\sqrt{\left(\sum_{h=2}^{25} A1_h^2\right)}}{A1_{rms}} = \frac{\sqrt{(A1_{rms}^2 - A1_{fnd}^2}}{A_{rms}}$

- **Page M8**

Tension équivalente triphasée	V =	$(V_{L1-N} + V_{L2-N} + V_{L3-N}) / \sqrt{3}$	(3 PH-N)
Tension équivalente triphasée	V =	$(V_{L1-L2} + V_{L2-L3} + V_{L3-L1}) / 3$	(3 PH)
Tension Phase Phase	V =	$V_{L1-N} + V_{L2-N}$	(2 PH)
Tension Phase Neutre	V=	V_{L1-N}	(1 PH)
Courant équivalent triphasé	A =	$S / (\sqrt{3}\ V)$	(3 PH-N, 3 PH)
	A =	S / V	(2 PH)
	A=	A_{L1}	(1 PH)
Puissance Active totale (*kW*)	P=	$P_{L1} + P_{L2} + P_{L3}$	(3 PH-N, 3 PH)
	P=	$P_{L1} + P_{L2}$	(2 PH)
	P=	P_{L1}	(1 PH)

  Facteur de Puissance P.F. = P / S

- **Page M9**

Puissance Apparente	S=	$\sqrt{(P^2 + Q^2)}$	
Puissance Réactive totale (*kVAr)*	Q=	$Q_{L1} + Q_{L2} + Q_{L3}$	(3 PH-N, 3 PH)
Puissance Réactive totale	Q=	$Q_{L1} + Q_{L2}$	(2 PH)
Puissance Active totale	P=	répétée comme page M8	
Fréquence (of $V_{L1)}$	f (*Hz*)		

- **Page M9-S1**
  1- Puissance Apparente Moyenne S avg
  2- Puissance Réactive Moyenne Q avg
  3- Puissance Active Moyenne P avg
  Le temps d'intégration peut être sélectionné dans le menu SETUP
  Les valeurs moyennes peuvent être remises à zéro dans le menu SETUP

- **Page M9-S2**
  1-Crêtes de Puissance Apparente maximum S peak
  2-Crêtes de Puissance Réactive maximum Q peak
  3-Crêtes de Puissance Active maximum P peak
  Les valeurs de crête peuvent être remises à zéro dans le menu SETUP

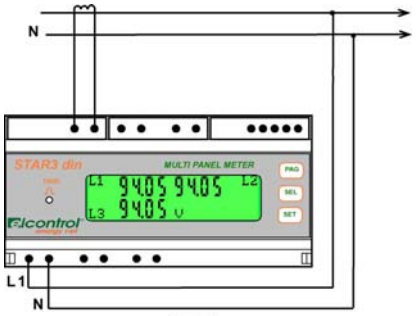
- **Page S11 4-20mA – Measure for output 1**
  Output 1 measure selection
  By pressing the SET key one of the following measures can be selected for output 1:
  V total (3 PH, 2 PH or 1 PH according to the instrument set-up)
  A total (3 PH, 2 PH or 1 PH according to the instrument set-up)
  Hz
  kW total (3 PH, 2 PH or 1 PH according to the instrument set-up)
  kVA total (3 PH, 2 PH or 1 PH according to the instrument set-up)
  kVAr total (3 PH, 2 PH or 1 PH according to the instrument set-up)
  PF total (3 PH, 2 PH or 1 PH according to the instrument set-up)
  Pressing the PAG key enables to go to the measure selection page corresponding to output 2.

- **Page S12 4-20mA – Measure for output 2**
  Similar to the previous page for output 1
  Press PAG to go to the output 1 end value set-up page.

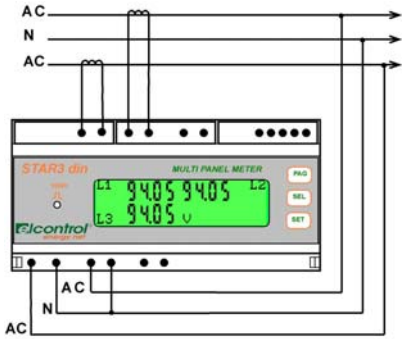
- **Page S13 4-20mA - Output 1 full scale value set-up**
  Press the SEL key to select the exponent or the digit to modify.
  Press the SET key to modify the selected exponent or digit.
  Press the PAG key to go to the output 2 end value set-up page.

- **Page S14 4-20mA - Output 2 full scale value set-up**
  The programming procedure is the same as the output 1 full scale value.
  The PAG key enables to return to the measurement page.

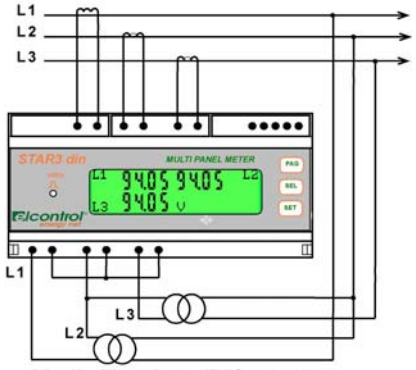
9 - TECHNICAL CHARACTERISTICS
Maximum dimensions (mm): instrument:
Power supply: from network 230 V or 115 V +15%-20% @ 50/60 Hz (4 VA).
Display: dot matrix LCD display
Voltmeter inputs: VL1, VL2, VL3, N up to 430 V phase-neutral, 750 V phase-to-phase, 35÷400 Hz
Voltmeter input impedance: 2 MΩ
Voltage input overload: max 850 V phase-neutral
Current inputs: AL1, AL2, AL3, COM. Consumption 1 VA..3 or 2 external curr.transf 5A required.
Measuring range: 0-120% In
Sensitivity: current 20 mA ; voltage 10 V
Over current: withstand 50 amps for 1 sec..
Number of scales: 1 voltage scale, 2 current scales
Measurements: True R.M.S. up to25th harmonic = 1250Hz with fundamental @50 Hz
Sampling frequency: 2.5 kHz.
Accuracy: < 0.5% for Voltage and current and Power
Connection: Single phase or three phase star, three phase delta, or diphase systems
Weight:
Protection level: instrument IP20, front panel IP40
Temperature range: -10°C ÷ + 50°C
Relative humidity range: (R.H.): from 20% to 90%.
Condensation: non condensing
Relay output: V 250 max 120mA A.C. max



1 PH

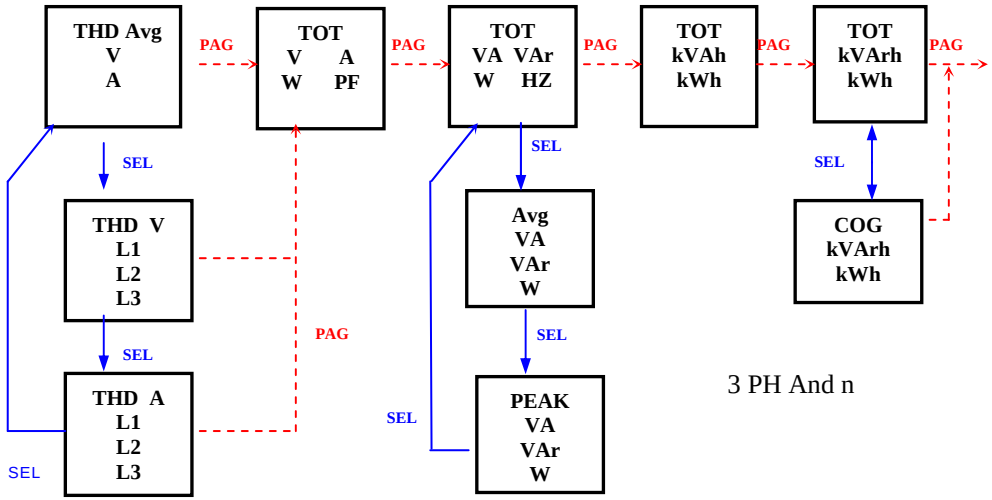


2 PH



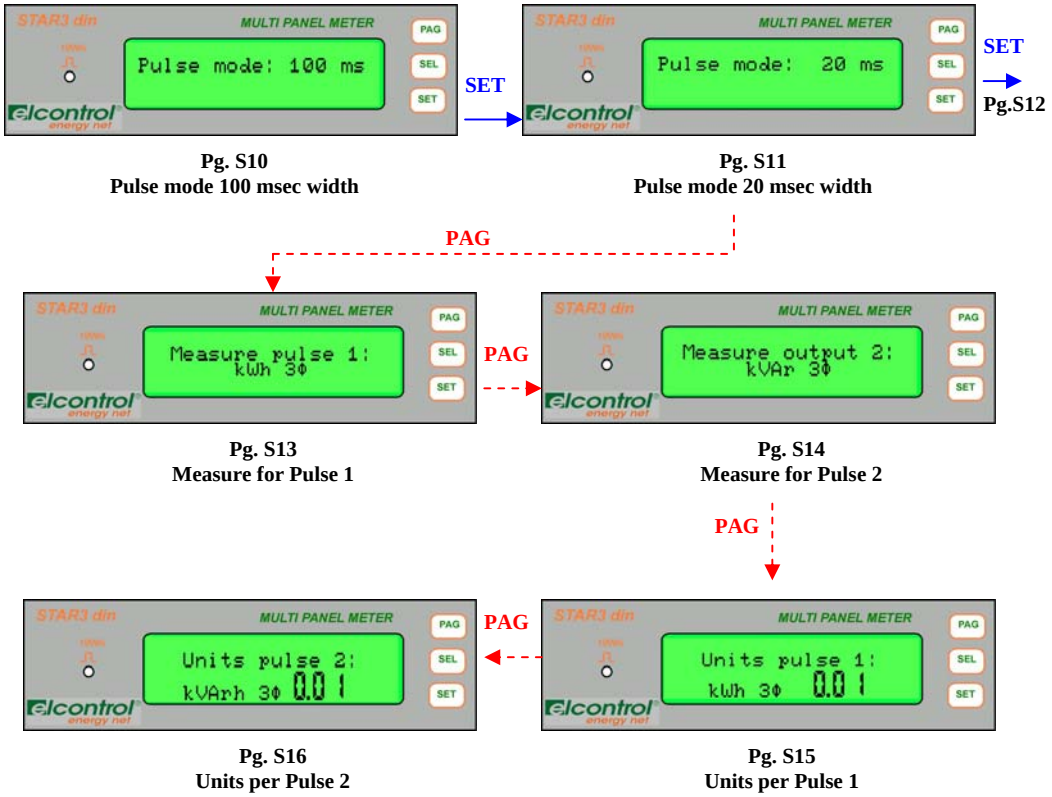
Media Tensione Trifase - 2tv

Medium Voltage 3PH - 2PT



3 PH And n

SETUP MENU – Additional pages for models ALM and HARMO



Pg. S10
Pulse mode 100 msec width

Pg. S11
Pulse mode 20 msec width

Pg. S13
Measure for Pulse 1

Pg. S14
Measure for Pulse 2

Pg. S16
Units per Pulse 2

Pg. S15
Units per Pulse 1

English

1 - STANDARDS and REGULATIONS - CE Conformity declaration
The **STAR3 DIN** conforms to directive IEC 1010-1 430 V for Cat. III and protection level 2 according to IEC 664-664 A. regarding the safety of the operators. It conforms to EN55011 ; EN61000-3-2 ; EN61000-3-3 ; EN61000-4-2 ; EN61000-4-3 ; EN61000-4-4 extension 4kV ; EN61000-4-5 ; EN61000-4-6 ; EN61000-4-8 ; EN61000-4-11 (EMC) .

1.1 - USER SAFETY
In order to preserve these safety conditions and ensure safe operation, the user must observe all instructions and marks specified in this user manual. All maintenance and repair operations requiring the opening of the instrument must be carried out only by suitably qualified and authorised personnel. The instrument was shipped from the manufacturing plant in perfect technical safety conditions.

1.2 - SYMBOLS -
Please read carefully the instructions with this symbol before installing and using the instrument.

1.2 - PRELIMINARY INSPECTIONS
Before installation, check that the instrument is in good conditions and was not damaged during transport. Check that the network voltage and the rated voltage coincide. This instrument does not require an earth connection.

1.3 - PRECAUTIONS IN THE EVENTS OF MALFUNCTIONS
When safe operation is no longer possible, put the instrument out of service and ensure that it cannot be operated accidentally.
Safe operation cannot be guaranteed in the following circumstances:
- When the instrument appears clearly damaged.
- When the instrument no longer works.
- After long storage in unsuitable conditions.
- After being damaged in transit.

2 - POWER SUPPLY
The power supply connections terminals are located on the rear side and are clearly indicated with the label POWER SUPPLY. Use cables having a maximum section of 2.5 mm^2. Earth connection is not required. Follow the connection diagram at the end of the manual.

2.1 - CONNECTING VOLTAGE MEASUREMENT CABLES
These cables, having a maximum section of 2.5 mm^2, are to be connected to the terminals labelled VOLTAGE INPUT as indicated in the diagrams at the end of the manual.

2.2 - CONNECTING CURRENT MEASUREMENT CABLE
Connect the secondary windings of the external CT's to the 2.5 mm^2 terminals labelled CURRENT INPUT as shown in the included diagrams. Use 3 CT's with 5A secondary. Use cables having a section appropriate to the length of the connection and the rated power of the CT's used. Follow the connection diagram at the end of the manual.
NOTE 1: For safety reasons, never leave the CT secondary open.
NOTE 2: To guarantee correct measurements, ensure that the voltage measurement cables and the current measurement cables are connected in the same order of phases

3 - PROGRAMMING THE INSTRUMENT
The instrument can be fully programmed by means of the SETUP menu. Press at the same time the PAG and the SEL keys to enter the SETUP . The complete description of the setup is available at chapter 5.

- **Page M7**
  Average Total Harmonic Distortion Factors
  Avg THDV=($THDV_{L1}$+$THDV_{L2}$+$THDV_{L3}$)/3 ;
  Avg THDA=($THDA_{L1}$+THA_{L2}+$THDA_{L3}$)/3
  These special parameters allow to identify immediately if one of the phases is distorted

  - **Page M7-S1** (not available in 1 PH mode)
    Phase THD V — THDV1, THDV2 ; THDV3 (3 PH-N, 3 PH); THDV1,THDV2 (2 PH)

    E.g.: THDV1 = $\frac{\sqrt{\left(\sum_{h=2}^{25} V1_h^2\right)}}{V1_{rms}} = \frac{\sqrt{(V1_{rms}^2 - V1_{fnd}^2}}{V1_{rms}}$

  - **Page M7-S2** (not available in 1PH mode)
    Phase THD A — THDA1, THDA2 ; THDA3 (3 PH-N, 3 PH); THDA1, THDA2 (2 PH)

    E.g.: THDA1= $\frac{\sqrt{\left(\sum_{h=2}^{25} A1_h^2\right)}}{A1_{rms}} = \frac{\sqrt{(A1_{rms}^2 - A1_{fnd}^2}}{A_{rms}}$

- **Page M8**

Equivalent three-phase voltage V =	(V_{L1-N} + V_{L2-N} + V_{L3-N}) / √3	(3 PH-N)
Equivalent three-phase voltage V =	(V_{L1-L2} + V_{L2-L3} + V_{L3-L1}) / 3	(3 PH)
Phase to phase voltage	V = V_{L1-N} + V_{L2-N}	(2 PH)
Phase-Neutral voltage	V= V_{L1-N}	(1 PH)
Equivalent. three-phase current A =	S / (√3 V)	(3 PH-N, 3 PH)
	A = S / V	(2 PH)
	A= A_{L1}	(1 PH)
Total Active power (*kW*)	P= P_{L1} + P_{L2} + P_{L3}	(3 PH-N, 3 PH)
	P= P_{L1} + P_{L2}	(2 PH)
	P= P_{L1}	(1 PH)
Power factor	P.F. = P / S	

- **Page M9**

Apparent power	S=√(P^2 + Q^2)	
Total Reactive power (*kVAr)*	Q= Q_{L1} + Q_{L2} + Q_{L3}	(3 PH-N, 3 PH)
Total reactive power	Q= Q_{L1} + Q_{L2}	(2 PH)
Total Active Power	P= repeated as page M8	
Frequency (of $V_{L1)}$	f (*Hz*)	

  - **Page M9-S1**
    1- Average apparent power S avg
    2- Average reactive power Q avg
    3- Average active power P avg
    The integration time can be adjusted into the Setup menu
    The average values can be reset into the Setup menu

  - **Page M9-S2**
    1-Maximum demand apparent power S peak
    2-Maximum demand reactive power Q peak
    3-Maximum demand active power P peak
    The peaks values can be reset into the Setup menu

- **Page S9 Rs485 instrument address**
  The Modbus address of the instrument can be set in this page.
  The permitted address field ranges between 1 and 247.

  The page S9 is the last one of the basic model STAR3 DIN.
  Other pages will follow only if the STAR3 DIN is equipped with the options HARMO, ALM, 4-20mA.

6 - SET-UP PAGE PROTECTION CODE

By default, the access code to set-up pages is not enabled. To enable it, keep the PAG + SEL keys pressed simultaneously for 30 sec. The display will show the page on which the access code must be entered.

- **Page S0 enter setup password**
  By means of the SEL + SET keys, every digit can be changed and the code can be entered. The initial factory code , that must be entered the first time is 000000.
  Confirm and exit from this page by pressing the PAG key.

- **Page S0a – modify password**
  Now a second page (with "COD" blinking), identical to the first one, is displayed:
  From this page, the access code can be permanently changed, if wished.
  In this case remember or make a safe note of the new code somewhere you can find it later on.
  To exit from the second page press the PAG key.

  IMPORTANT: After the first access to the password page, the request of the code will become permanent. From that moment on the code must be always entered to access the set-up page.
  Avoid to recall the password page, for test purposes, if the code request is not permanently desired.

SETUP PASSWORD MEMO	
STAR3 SERIAL #	
INSTALLED AT	
FACTORY PASSWORD	000000
DATE	
NEW PASSWORD	
DATE	
NEW PASSWORD	
DATE	
NEW PASSWORD	

7 – ADDITIONAL SETUP PAGES FOR MODELS STAR3 DIN HARMO and ALM

To access Programming Mode, open the front door and press the PAG and the SEL keys at the same time. Use the SEL key to select a digit or a setting. Use the SET key to adjust it.
The setup can be protected with a password (see chapter 6)

- **Page S10- Pulses with length 100msec**
  Enable Pulse mode with pulse length of 100 msec
  Press PAG to confirm . Press SET for selection 20 msec (S11), RLY (S12).

- **Page S11 - Pulses with length 20msec**
  Enable Pulse mode with pulse length of 20 msec .
  Press PAG to confirm. Press SET for the next selection (go to S16)

- **Page S12-ALM**
  The confirmation of this page enable the remote relay control or the alarm mode.
  Press PAG to confirm
  Press SET to go to the pulse mode (go to S10).

- **Page S18-Remote Rs485 relay 1 control**
  If RLY is confirmed in S17 (see above) the position of the relay 1 is decided by the Rs485 master device (PC , PLC, etc) Press PAG to accept the RLY selection and enter the setup of relay 2 (go to S23) Press SET to enable the alarm mode (go to S17).

- **Page S19- Alarm 1 High Threshold**
  Set-up of the upper threshold (H) of the selected measure. When the measure remain above the threshold + hysteresis , for a time longer than the requested delay, the relay 1 is closed range 000-999 x 10^6.
  Press the SEL key to select the digit or exponent to be modified.
  Press the SET key to modify the selected digit or exponent.
  Press the PAG key to go to the output 1 lower threshold set-up page.

- **Page S20- Alarm 1 Low Threshold**
  Set-up of the lower threshold (L) of the selected measure. When the measure remain below the threshold - hysteresis , for a time longer than the requested delay, the relay 1 is closed range 000-999 x 10^6.
  Press the SEL key to select the digit or exponent to be modified.
  Press the SET key to modify the selected digit or exponent.
  Press the PAG key to go to the relay 1 hysteresis set-up page.

- **Page S21 –Alarm 1 Hysteresis**
  A value between 00 and 99 can be set in the 3 bottom digits, expressed as a % (percentage) of the alarm threshold. The alarm condition is acknowledged only if the measure become higher than Threshold*(1+hysteresis%)
  Pressing the SEL key enables to select the digit to modify.
  Pressing the SET key enables to modify the selected digit.
  E.g.: Hysteresis = 02%
  Pressing the PAG key enables to go to the relay 1 operation delay time set-up page.

- **Page S22 Alarm 1 Delay**
  Relay 1 operation delay time set-up
  A delay figure between 000 and 999 can be set in the 3 bottom digits, expressed in seconds.
  The alarm will toggle only if the new alarm condition persist for a time longer than the delay
  Press the SEL key enables to select the digit to modify.
  Press the SET key enables to modify the selected digit.
  Press the PAG key to go to set-up of the output 2

8 – ADDITIONAL SETUP PAGES FOR MODEL STAR3 DIN 4-20mA

To access Programming Mode, open the front door and press the PAG and the SEL keys at the same time. Use the SEL key to select a digit or a setting. Use the SET key to adjust it.
The setup can be protected with a password (see chapter 6)

- **Page S10 4-20mA – Analogue output range**
  By pressing the SET key, the type of output (either 4-20mA or 0-20mA) can be selected.
  Pressing the PAG key enables to go to the measure selection page corresponding to output 1.