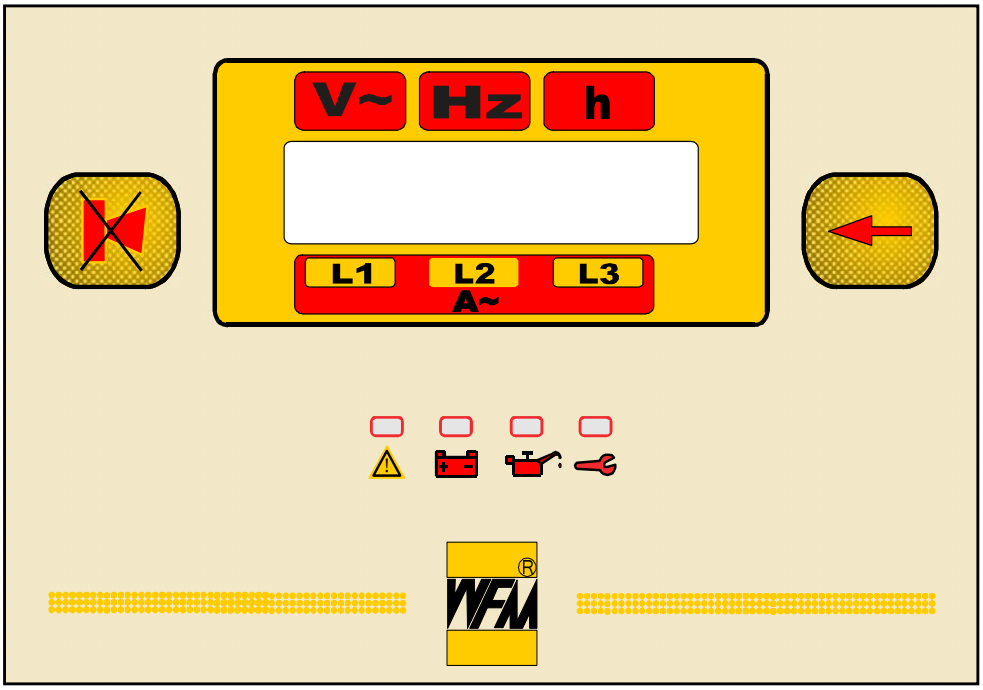
INSTRUCTION AND USER MANUAL

MULTI-INSTRUMENT WITH CONTROL AND PROTECTION DEVICE FOR GENSET UNIT

TYPE **SPG-120/10**



MADE FOR:

PROTECT
genset units with the possibility of indicating

or stopping in case of fault for:

- low oil pressure
- overtemperature
- battery recharge failure (alternator belt breakage)
- minimum fuel level
- low cooling liquid level
- generator overloading (does not replace the thermomagnetic switch)
- generator overfrequency
- generator underfrequency
- generator undervoltage
- battery overvoltage
- battery undervoltage
- exceeding of programmed work time

DISPLAY

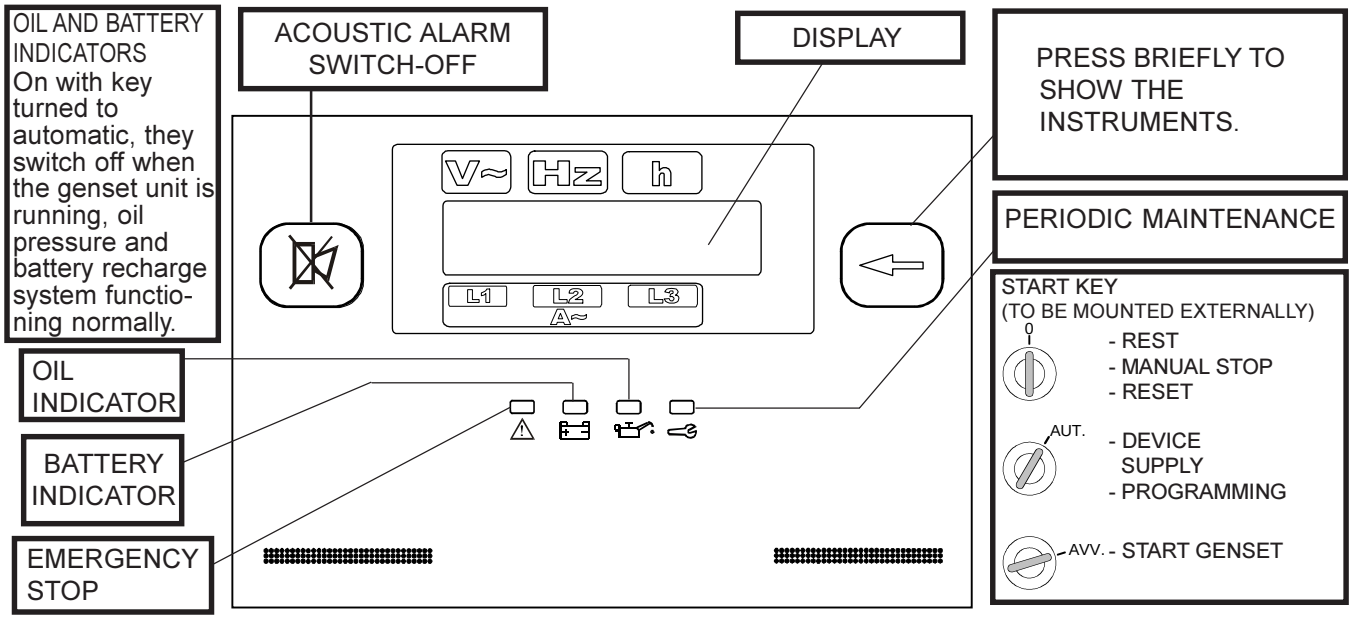
the following functions on the front:

- hour meter
- tachometer
- oil pressure gauge
- water or oil thermometer
- generator voltage
- generator current (3 ammeters)
- generator apparent power
- generator frequency
- battery voltage
- fuel level
- periodic maintenance indication
- oil and battery indicators
- protections intervention

- SMALL DIMENSIONS
- TEXT IN 5 LANGUAGES: ITALIAN, ENGLISH, FRENCH, GERMAN AND SPANISH
- SIMULTANEOUS READING OF 6 INSTRUMENTS
- MOUNTING ALSO ON THE MACHINE
- DEGREE OF PROTECTION ON THE FRONT IP64
- POSSIBILITY OF CONNECTION TO PERSONAL COMPUTER

INSTRUCTIONS IN BRIEF

SPG-120/10 surveys the most important parameters of the engine and of the generator of a single-phase or three-phase genset unit, showing them on the alphanumeric display and stopping the engine if there is an anomaly. An interface cable transmits the data to a personal computer, even at a distance.



INSTRUMENTS

Shows on the alphanumeric display the three mains voltages and the main parameters of the engine and the generator. The data can be transmitted (by cable or GSM modem) to a personal computer.

SIMULTANEOUS READING OF THE INSTRUMENTS
WITH ENGINE RUNNING: GENSET VOLTMETER, FREQUENCY METER, and THREE AMMETERS,HOURMETER

• THREE GENERATOR AMMETERS	Compatible with the amperometric transformers of type 30/5, 40/5, 50/5, 60/5, 80/5, 100/5, 200/5, 250/5, 300/5, 400/5, 500/5, 600/5, 800/5, 1000/5, 1200/5, 1500/5, 2000/5. Maximum reading of 2000A or 110% of the base scale current of the chosen transformer.
• GENERATOR VOLTMETER	For single-phase or two-phase of nominal value up to 500 V~.
• GENERATOR FREQUENCY METER	From 0 Hz to 85 Hz for alternating voltages with amplitude greater than 30 V~.
• VOLTAMMETER	Displays apparent power up to 1500KVA
• FUEL LEVEL INDICATOR	Displays the percentage of fuel present in the tank.
• WATER OR OIL THERMOMETER	Displays engine oil and water temperatures up to 140°C
• OIL PRESSURE GAUGE	Displays engine oil pressure up to 6 bars
• BATTERY VOLTMETER	For voltages between 9 and 38 volt.
• HOUR METER	With four figures and a maximum reading of 9999. The hour meter numbers flash when it is necessary to perform the periodic maintenance operations planned by the manufacturer of the genset unit.
• TACHOMETER	Displays the number of engine revs up to 8500 rpm

TECHNICAL DATA

Battery power supply:	12Vdc and 24Vdc
Voltage supply:	8 ÷ 32V
Suitable for generators with nominal voltage of	220 ÷ 450Vac ±10%; frequency 50 ÷ 60Hz
Consumption with engine stationary:	19mA at 12V 13mA at 24V
Max circuit consumption	170mA at 12V 95mA at 24V
Nominal insulation voltage	
- Terminal board of mains:	380V
- Terminal board of genset:	450V
- Terminal board of battery:	32V
Maximum load on outputs	5 (stopping), 7 (general alarm): 3W
Degree of rear protection:	IP20
Degree of front protection:	IP 64
Temperature range:	-10 ÷ +50 ° C
Weight:	350gr
Dimensions	144x96x49mm
Hole	88x136mm
Hour-meter:	4 digits
Battery voltmeter:	Max 38V, accuracy 2%
Generator voltmeter:	Max 450V, accuracy ±2%
Generator ammeters:	Max 2400A, accuracy ±2%
Frequency meter:	0-85 Hz, accuracy ±0,1 Hz
Tachometer	0-8500 RPM accuracy ±10 RPM
Voltammeter	Max 1500kVA, accuracy ±4%
Accuracy of oil pressure gauge, water thermometer, fuel level indicator	2%
Serial output parameters	9600 baud, 8 bit data, 1 bit stop; no parity

OPERATION

GENSET PROTECTIONS

GENSET PROTECTION ENABLING

The genset unit protections are enabled in three ways:
• Immediately for battery undervoltage or overvoltage, overheating alarm, engine overheating, engine overheating detected by thermostatic switch, all of the fuel control levels generator overfrequency, generator overload alarm, generator overload and low radiator coolant level.
• 10 seconds after the threshold for the generator undervoltage and underfrequency has been reached;
• 20 seconds after the termination of the start-up impulse for the anomaly probes: Low oil pressure warning, low oil pressure, generator overvoltage and recharge alternator fault
The intervention of the fault is displayed; it can cause the engine to be stopped and activates the general alarm.
SEE TABLE on page 5.

FAULT DISPLAY

When the engine is running the generator set instruments are shown.
When there is a fault, instead of the reading, the display shows the intervened fault message.

HOW TO SEE THE INSTRUMENT READINGS AGAIN

The measurements can be read by pressing key  for 1 second.
The display will resume showing the previous fault 20 seconds after the last pressing of the key.

FAULT RESET

The protection devices and all the stopped functions are re-activated by pressing the start key.

ENGINE STOPPAGE

The device commands the stop in three ways:
· By turning the start key onto “ZERO”
· By protections intervention
· By external emergency intervention.
The device adapts to two different stop systems:
· By working the ELECTROMAGNET for 20 seconds which pulls the STOP lever
· By cutting off power to the SOLENOID VALVE shutting off the flow of fuel.

GENERAL ALARM

This is produced by mounting an external optic and/or acoustic signal, linked to the appropriate terminal.

When key  is pressed, the general alarm is silenced.

PREVENTIVE MAINTENANCE

When preventive maintenance operations need to be carried out, the figures of the hour-meter flash while the number of the intervened maintenance appears and LED  lights up.

The timing for the maintenance operations and the procedure for zeroing the time up maintenance indication can be programmed by the manufacturer of the genset unit.

COMMUNICATION PORT
REMOTE DISPLAY (ON REQUEST)

When the special adaptor cable is connected to a personal computer remote display is possible, in various ways, using a program for the Windows operating system.
The instructions for use and loading are on the program disk.

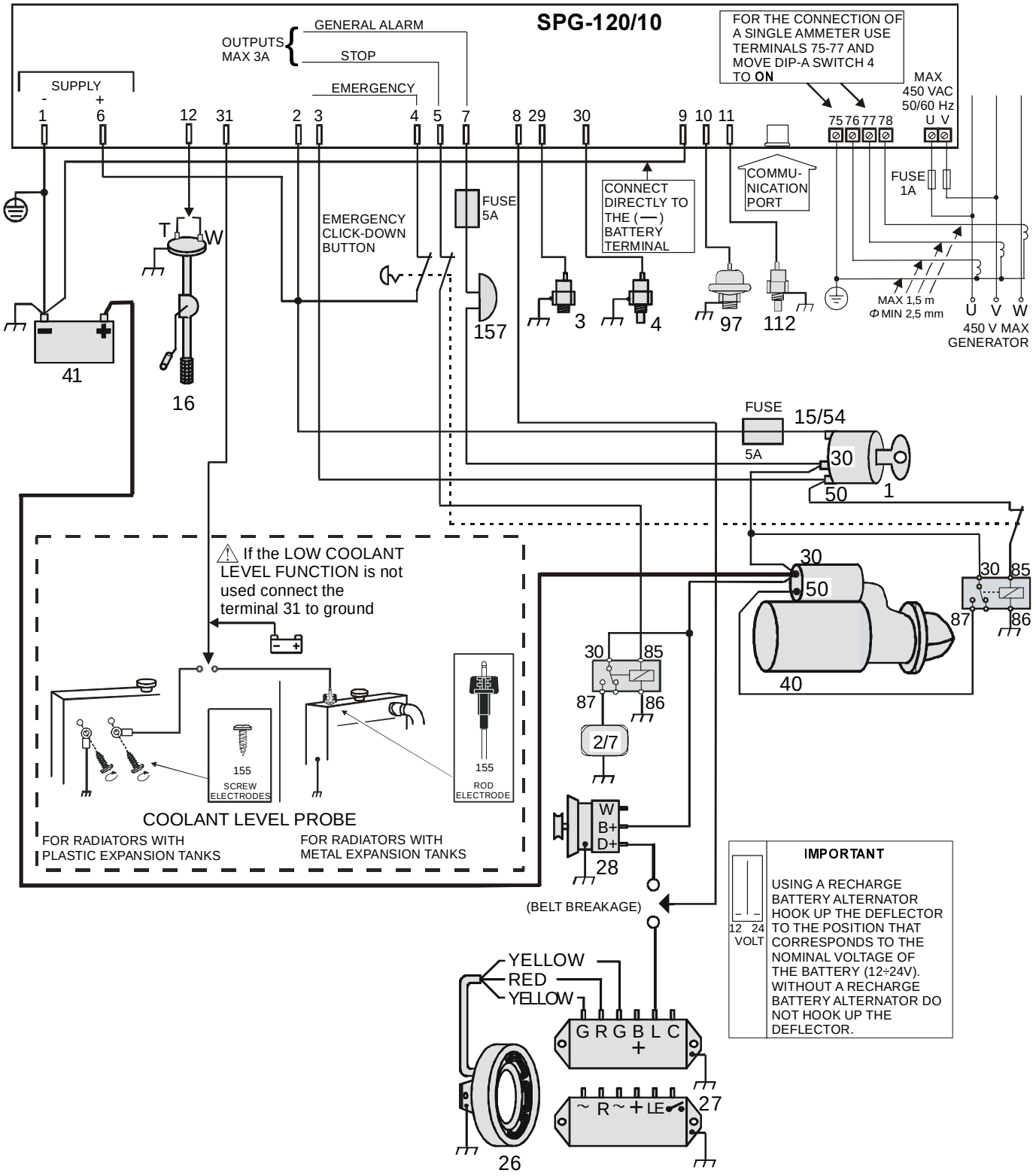
BASIC TABLE

PROGRAMMING

GENERATOR SET PROTECTION (DISPLAY INFORMATION)	INSTANT OF ACTIVATION (SECONDS)	THRESHOLDS		INTERVENTION DELAY		STORES THE FUNCTION	STOP		INTERVENTION OCCURS WHEN:
		REGU-LATION FIELD	FACT-ORY SETTING	ADJUST-MENT RANGE	FACTORY SETTING		PROGRAM-MABLE	FACTORY REGULATION	
				SECONDS					
BATTERY UNDER-VOLTAGE	IMME-DIATE	8÷12 (12V) 16÷24 (24V)	11 (12V) 22 (24 V)	1÷5	2	YES	DOES NOT STOP		Battery voltage remains lower than the programmed threshold for the whole of the intervention delay time
BATTERY OVER-VOLTAGE	"	12÷18 (12V) 24÷36 (24V)	16 (12V) 32 (24V)	=	5	NOT	YES	WITH-OUT STOP	Battery voltage exceeds the programmed threshold for the whole of the intervention time
OVERHEATING WARNING	"	90÷140° C	95° C	=	=	NOT	YES	WITH-OUT STOP	The temperature detected by the transmitter exceeds the set threshold
ENGINE OVERHEATING	"	90÷140° C	100°C	=	=	YES	STOPS		
OVER-TEMPERATURE DETECTED BY THERMOSTATIC SWITCH	"	=	=	=	IMME-DIATE	YES	STOPS		The temperature exceeds the threshold set by the thermostatic switch. No programming is possible.
FUEL RESERVE	"	0÷99	10%	=	=	NOT	DOES NOT STOP		The fuel level controlled by a rheostat float remains lower than the programmed threshold
NO FUEL	"	0÷99%	1%	1÷5	3	YES	YES	WITH STOP	The fuel level remains lower than the programmed threshold for the whole of the intervention delay time
LOW OIL PRESSURE WARNING	20 sec. after the end of the start-up impulse	0÷6 bar	0,5 bar	1÷5	0	NOT	DOES NOT STOP		The pressure detected by the transmitter remains lower than the programmed threshold for the whole of the intervention delay time
LOW OIL PRESSURE	"	=	=	=	IMME-DIATE	YES	STOP		The pressure is lower than the threshold set by the pressure switch.
RECHARGE ALTERNATOR FAULT	20 sec. after the end of the start-up impulse	=	=	=	3	YES	YES	WITH STOP	Alternator does not recharge the battery and the intervention delay time has elapsed.
GENERATOR UNDER-VOLTAGE	10 sec. after the thres-hold is excee-ded	80÷400 V	335V two-phase 193V single-phase	1÷10	3	YES	YES	WITH STOP	Generator voltage remains lower than the programmed threshold for the whole of the intervention delay time.
GENERATOR OVER-VOLTAGE	10 sec. after the end of the start-up impulse	100÷ 500V~	440 V TWO-PHASE 254 V SINGLE-PHASE	0÷10	3	YES	YES	WITH STOP	Generator voltage remains above the programmed threshold for the whole of the delay time.
GENERATOR UNDER-FREQUENCY	10 sec. after the thres-hold is excee-ded	0÷60hz	0 Hz	0÷10	5	YES	YES	WITH STOP	Generator frequency remains lower than the programmed threshold for the whole of the intervention delay time.
GENERATOR OVER-FREQUENCY	IMME-DIATE	51÷85hZ	60 (50Hz) 72 (60Hz)	0÷5	2	YES	STOPS		Generator frequency remains above the programmed threshold for the whole of the intervention delay time
GENERATOR OVERLOAD WARNING	"	0÷120% (MAX 2400A)	47,5A (TA 50/5)	0÷30	20	YES	DOES NOT STOP		Generator current remains above the programmed threshold for the whole of the intervention delay time.
GENERATOR OVERLOAD	"	0÷120% (MAX 2400A)	50A (TA 50/5)	0÷30	10	YES	YES	WITH STOP	
LOW RADIATOR COOLANT LEVEL	IMME-DIATE	=	=	=	5	YES	STOPS		The cooling liquid falls below the electrode and the intervention delay time has elapsed. (No programming is possible)

WIRING DIAGRAM

- TWO-PHASE VOLTMETERIC
- THREE-PHASE AMMETERIC



ACCESSORIES

ON REQUEST

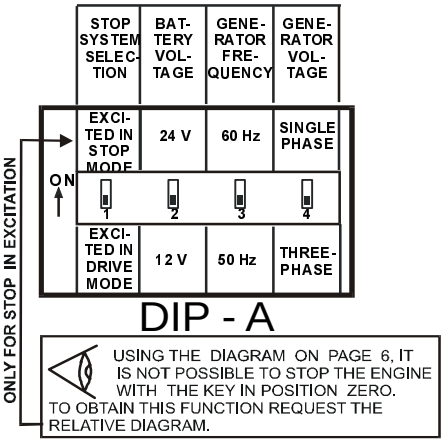
(1) START KEY
(2/7) ELECTROMAGNET OR SOLENOID VALVE
(3) OIL PRESSURE SWITCH
(4) THERMOSTATIC SWITCH
(16) FUEL FLOAT
(97) OIL PRESSURE TRANSMITTER
(112) TEMPERATURE TRANSMITTER
(157) GENERAL ALARM INDICATOR

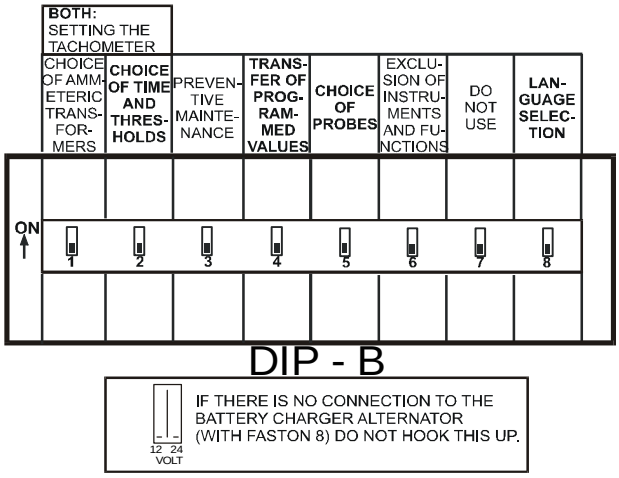
MOUNTED ON ENGINE

(26) PERMANENT MAGNETS CHARGE ALTERNATOR
(27) ALTERNATOR REGULATOR
(28) PRE-EXCITATION CHARGE ALTERNATOR
(40) STARTING MOTOR
(41) BATTERY

PROGRAMMING

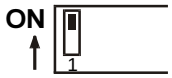
BEFORE ENABLING THE PROGRAMMING OF THE CONTROL PANEL,
CARRY OUT PROGRAMMING WITH THE ENGINE STATIONARY AND START KEY ON AUT (FIRST TRIGGER).
FOR PROGRAMMING ONLY SIMPLY CONNECT FASTONS 1-6-2-9.
(normally it is ready for operation with just the programming of the amperometric transformers)





CHOICE OF AMPEROMETRIC TRANSFORMER

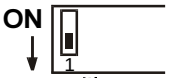
Amperometric transformer can be selected
from 30/5 up to 2000/5



Move DIP-B switch 1 to **ON**

AMP. TRANSFORMER 50/5

Press to choose the value of the amperometric transformer.



Move DIP-B switch 1 to **OFF**

EXAMPLE

AMP. TRANSFORMER 100/5

Press and wait until the writing appears:

PROGRAMMED

GEN. OVERLOAD FAULT
95A

GENERATOR OVERLOAD
100A

AUTOMATIC CALIBRATION (A.C.)

- GENERATOR OVERLOAD FAULT
- GENERATOR OVERLOAD

Once the A.C. has been programmed the thresholds set themselves automatically.
The FAULT threshold is set to 95%, the overload threshold to 100% of the nominal value of the A.C.
To change the thresholds manually see page 17.

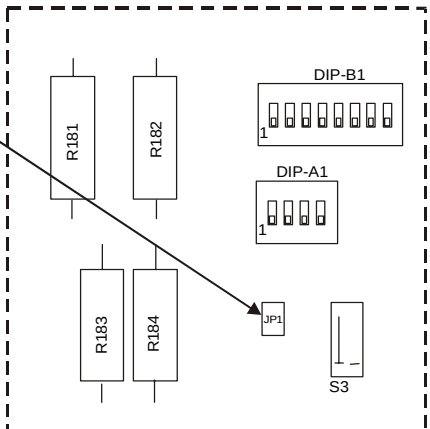
EMERGENCY STOPPAGE

This can be obtained in all operating conditions, by mounting a push-button (release).

EMERGENCY PUSH-BUTTON

Remove the jumper if the emergency button is mounted

Never install the emergency push-button linked to a stop system which is inactive when the unit is running



AUTOMATIC EXIT FROM PROGRAMMING

When 3 minutes have passed during which no switch programmers has been moved and no keys have been pressed, the power unit will exit the programming.

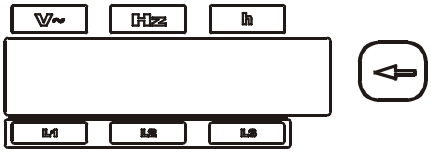
THE POWER UNIT ACCEPTS COMPLETE PROGRAMMING ONLY

To abandon an incomplete programming (without confirmation as shown by the written item “PROGRAMMED”) move all the DIP-B switches to OFF.

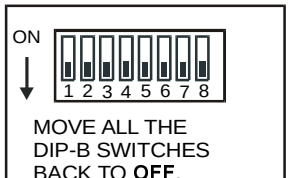
RESTORE TIMES AND THRESHOLDS FACTORY PROGRAMMING

To restore all the factory-set programming:

Move DIP-B switches 1-3-5-7 to **ON**.



Press for at least 1 second, until the writing STANDARD PROGRAMMING appears



MOVE ALL THE DIP-B SWITCHES BACK TO **OFF**.

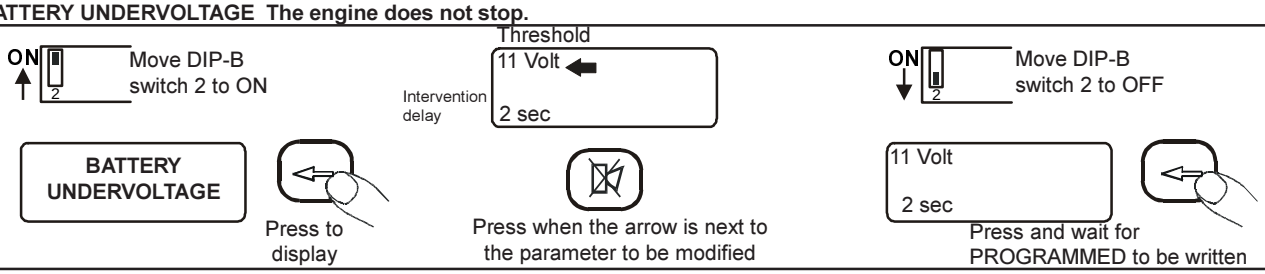
FOLLOWING PROGRAMMING IS NOT RESTORED:
• LANGUAGE • MAINTENANCE • WORKING HOURS PRESSURE AND TEMPERATURE TRANSMITTERS TABLES • FUEL FLOAT CHOICE

LANGUAGE SELECTION

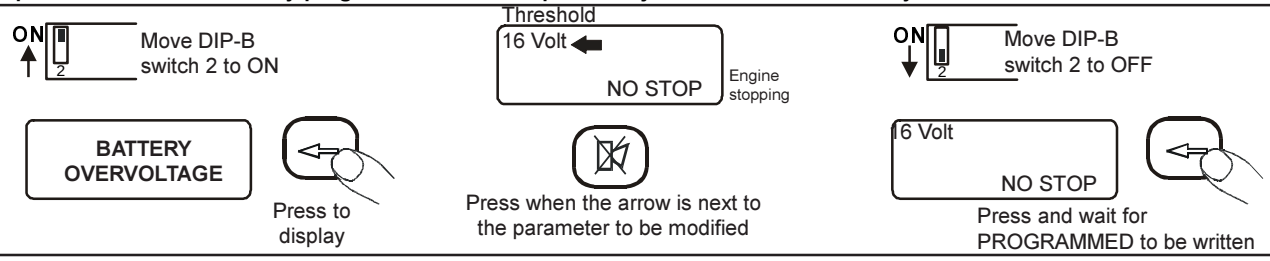
LANGUAGE SELECTION. The language set up in the factory is ITALIAN, the languages that can be selected are: ENGLISH - SPANISH - GERMAN - FRENCH.

ENGINE PROGRAMMING

BATTERY UNDERVOLTAGE The engine does not stop.



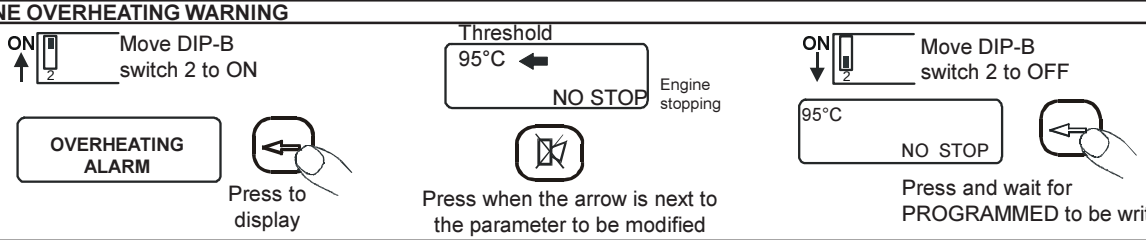
BATTERY OVERVOLTAGE
The protection device is factory-programmed to not stop. Non-adjustable intervention delay of 5 sec.



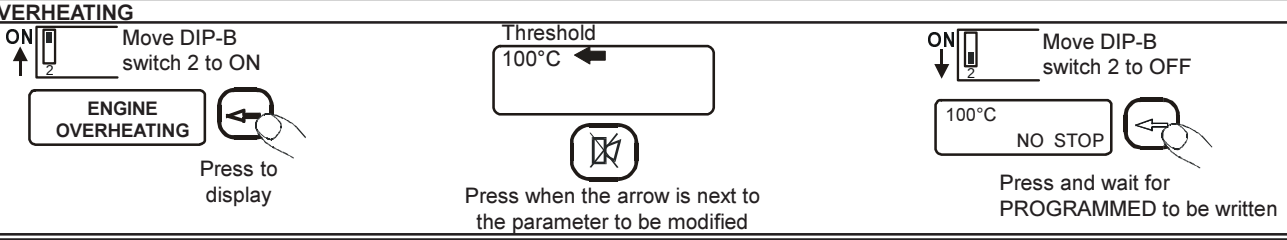
ENGINE OVERTEMPERATURE INTERVENTION

The temperature is detected by the TEMPERATURE TRANSMITTER and is programmable. The protection device can be set on two levels and intervenes when these are exceeded. The warning level is programmed only as a signal; the other level is programmed to stop the engine (the overtemperature is also detected by the thermostatic switch, which always causes the engine to stop).

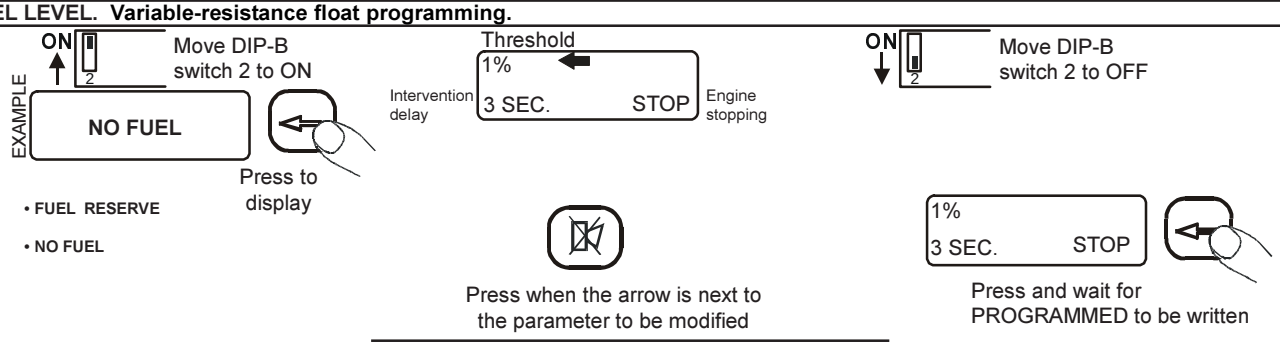
ENGINE OVERHEATING WARNING



OVERHEATING



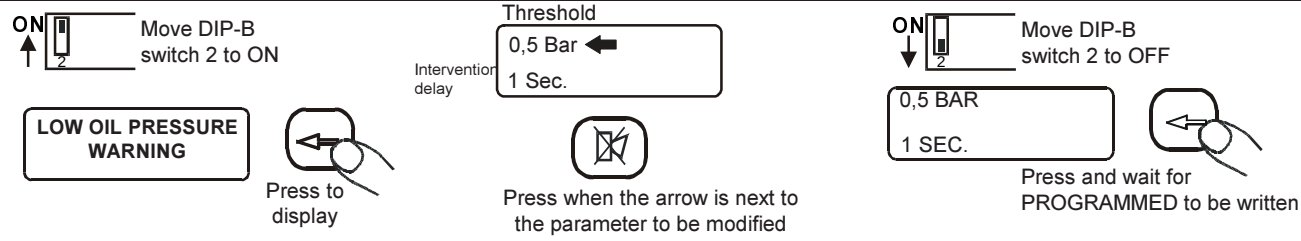
FUEL LEVEL. Variable-resistance float programming.



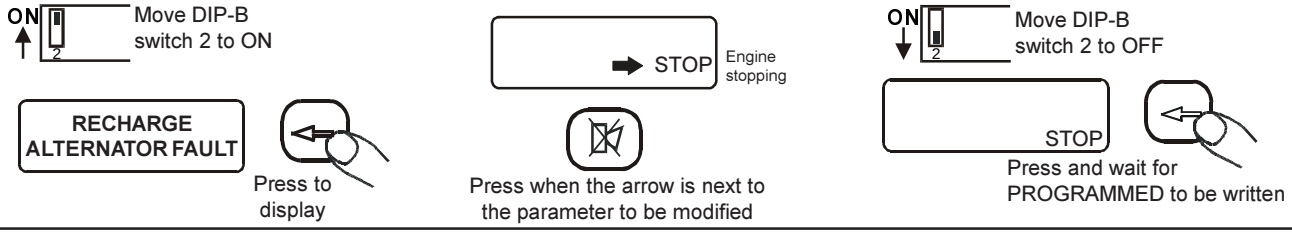
PROGRAMME ONE LEIVEL AT A TIME

ENGINE PROGRAMMING

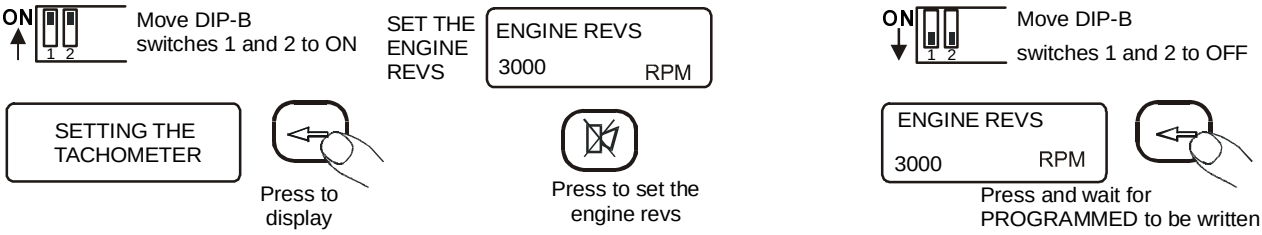
LOW OIL PRESSURE WARNING (the pressure is detected by the pressure transmitter) is programmed as a signal and does not stop the engine. (Low pressure detected by the pressure switch causes the engine to stop).



ALTERNATOR DOES NOT RECHARGE.
It is possible to programme the stop; it is factory-programmed to stop.



SETTING THE TACHOMETER. Do this with the engine running. Bring the engine to constant known revs (for example using a rev counter). In this case the setting is carried out with the engine running.

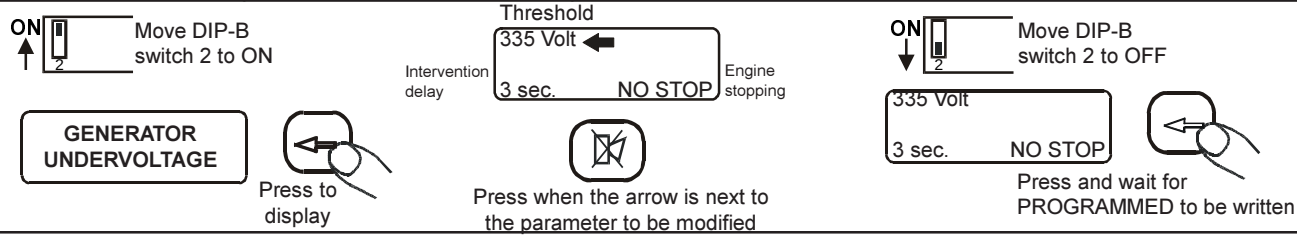


If you do not have a rev counter accelerate the engine until the frequency meter shows 50Hz (60Hz) and calibrate the rev counter to:
3000 RPM (3600 RPM) for engines at 3000 revs/min (3600 revs/min)
1500 RPM (1800 RPM) for engines at 1500 revs/min (1800 revs/min)

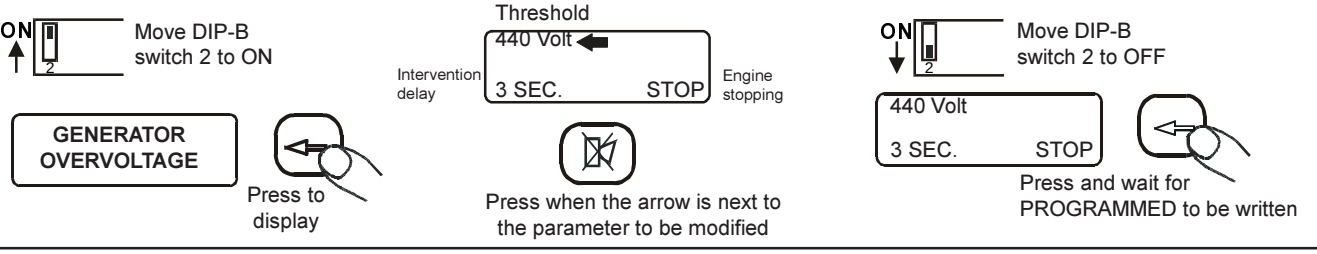
IT IS FACTORY-PROGRAMMED TO: 3000 RPM for gensets at 50 Hz
3600 RPM for gensets at 60 Hz

GENERATOR PROGRAMMING

GENERATOR UNDERVOLTAGE. The protection activates when the generator voltage continues to remain above the programmed value for 10 seconds.
The threshold set in the factory is 335 V with an intervention delay of 3 seconds.

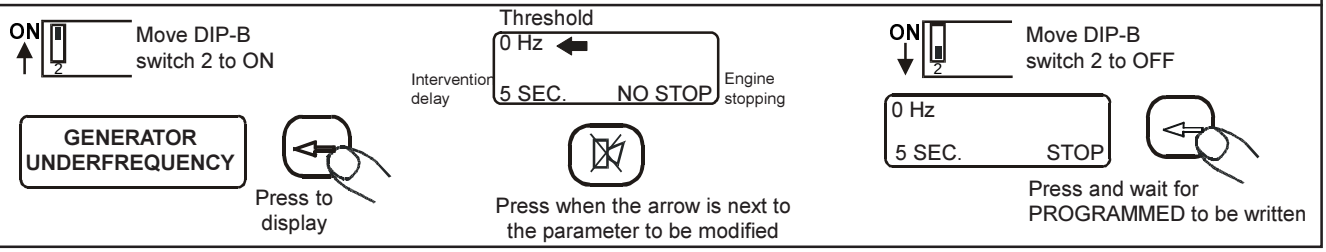


GENERATOR OVERVOLTAGE. It is factory-programmed to stop.

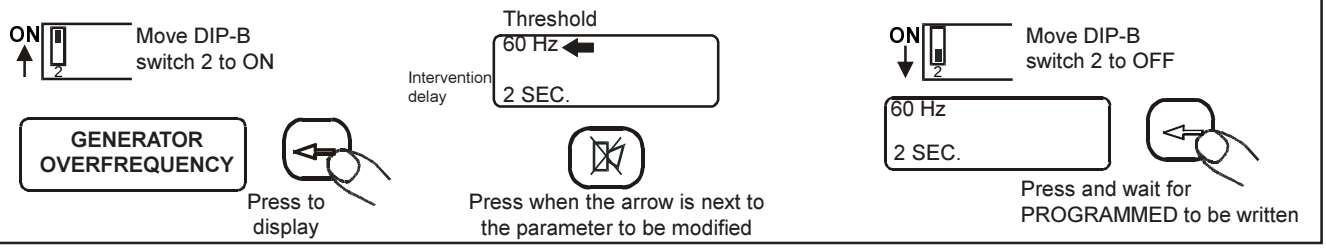


GENERATOR PROGRAMMING

GENERATOR UNDERFREQUENCY. In the factory the protection is excluded. To activate it, it is necessary to programme an intervention frequency other than 0 Hz. The protection activates when the generator frequency remains continuously above the programmed value for 5 seconds.

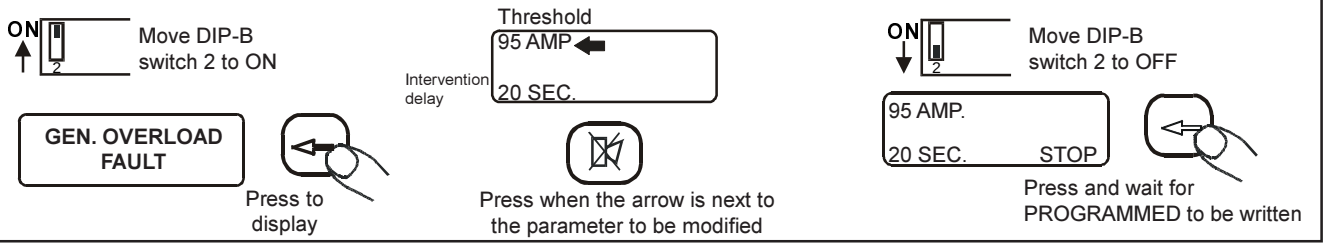


GENERATOR OVERFREQUENCY. The threshold set in the factory is 60 Hz, suitable for plants at 50 Hz. In situations of OVERFREQUENCY the engine is stopped. Non-programmable stoppage.

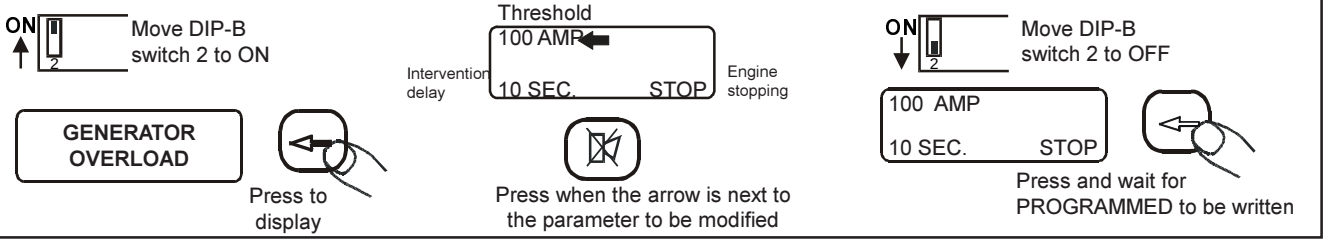


GENERATOR OVERCURRENT . The protection can be regulated at two levels and intervenes when they are exceeded. **Does not replace the overload switch.** The warning level acts only as a signal, while the other level can be programmed to stop the engine. For example, if we choose transformer 100/5 the factory setting of the overcurrent will trigger the intervention at 100 A, but only when the amperometric transformer withstands that current.

GENERATOR OVERLOAD WARNING.



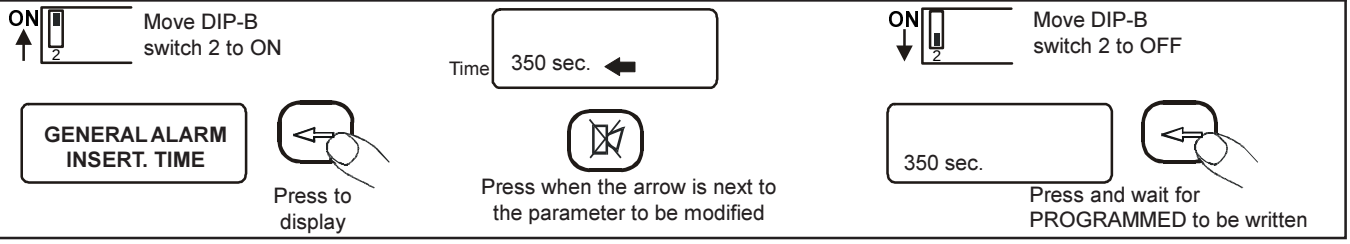
GENERATOR OVERLOAD



PROGRAMMABLE TIME

DESCRIPTION	SECONDS	
	REGULATION RANGE	FACTORY SETTING
GENERAL ALARM INSERTION TIME Number 350 means continual operation without time limits	10÷350	350 (continual operation)

GENERAL ALARM INSERTION TIME.
Number 350 means continual operation without time limits.



NOTICES

Used only to show the principal parameters of a genset unit and to survey it during its operation, commanding its stoppage if there is an anomaly.
Constructed to be installed mounted in dashboards, electric panels ecc.

Warning: Components carrying dangerous voltage levels

Only assigned and suitably trained personnel are allowed access to the instrument. No maintenance operations are permitted unless the plant is disconnected from the mains and the battery. As an additional safety measure, the plant phases should be short-circuited and earthed.

Not withstanding the above, only assigned and trained personnel can perform the following operations with the plant receiving power:
- visual inspection of the instrument connections and markings;
- measurement of the voltage and/or current;
- programming of the functions.

These interventions, however, must be performed using equipment which ensures appropriate levels of electrical protection.

Warning:
Adhere closely to the following advice

- When making connections always follow the instructions and the Wiring Diagram on page 6.
- Any interventions on the unit must be performed with the motor stationary and terminal 50 of the starting motor disconnected.
- Check that the consumption of the connected equipment are compatible with the described technical characteristics.
- Install in such a way that there is always adequate heat disposal.
- Always install under other equipment which produces or spreads heat.
- Where the instrument can receive strong vibrations or knocks.
- Make sure that no copper conductor cuttings or other waste material fall inside the equipment.
- Never disconnect the terminals of the battery with engine running.
- Never use a battery charger for the emergency start-up; the engine could be damaged.
- In order to safeguard people and equipment, before connecting an external battery charger, disconnect the electrical system terminals from the battery poles.

THIS MULTI-INSTRUMENT IS NOT SUITABLE FOR OPERATING IN THE FOLLOWING CONDITIONS:
- Where the environmental temperature is outside the limits indicated in the technical sheet.
- Where the air pressure and temperature variations are so rapid as to produce exceptional condensation.
- Where there are high levels of pollution caused by dust, smoke, vapour, salts and corrosive or radioactive particles.
- Where there are high levels or heat from radiation caused by the sun, ovens or the like.
- Where attacks from mould or small animals are possible.
- Where there is the risk of fire or explosions.
- Where the instrument can receive strong vibrations or knocks.

ELECTROMAGNETIC COMPATIBILITY
This instrument functions correctly only if inserted in plants which conform with the CE marking standards; it meets the exemption requirements of the standard EN50082-2 but it cannot be excluded that malfunctions could occur in extreme cases due to particular situations.

The installer is responsible for checking whether the levels of disturbance are above those consented by the regulations.

CONDUCTION AND MAINTENANCE
The following maintenance operations should be performed every week:
- check that the indicators function;
- check the batteries;
- check that the conductors are tight, check the condition of the terminals.

UNLESS WE MAKE A WRITTEN DECLARATION STATING THE CONTRARY, THIS EQUIPMENT IS NOT SUITABLE FOR USE AS A CRITICAL COMPONENT IN EQUIPMENT OR PLANTS RESPONSIBLE FOR KEEPING PERSONS OR OTHER LIVING BEINGS ALIVE.

YOUR ELECTRICAL TECHNICIAN CAN ASK ANY QUESTIONS ABOUT
THIS INSTRUMENT BY TELEPHONING OUR TECHNICIAN

ACCESSORIES AVAILABLE ON REQUEST

TO READ THE DISPLAY INDICATIONS (SPG-120/10)

ON VIDEO (PC)

- SERIAL CABLE FOR PROGRAMMING TRANSFER TYPE ZC-191 code 07.01.37

DISTANCES UP TO 11 m

KIT VIDEO KPC-120 code 07.01.34

INCLUDING THE FOLLOWING PARTS:
- ADAPTOR CABLE FOR COMPUTER Type ZC-174 code 07.01.25
- SERIAL CABLE Type ZC-175 code 07.01.03
- PROGRAM FOR WINDOWS Type ZW-120 code 07.01.22

DISTANCES UP TO 515 m

REMOTE KIT VIDEO KPC-106 Code 07.01.35

INCLUDING THE FOLLOWING PARTS:
- ADAPTOR CABLE FOR COMPUTER ZC-174 Code 07.01.25
- CONVERTOR TRANSMITTER (COMPLETE WITH POWER PACK) Type ZT-105 Code 07.01.07
- CONVERTOR RECEIVER (COMPLETE WITH POWER PACK) Type ZR-105 Code 07.01.06
- TELEPHONE WALL-SOCKET Type ZP-105 Code 07.01.05
- TELEPHONE CABLE Type ZC-181 Code 07.01.04
- PROGRAM FOR WINDOWS Type ZW-115 Code 07.01.22

FOR THE CONNECTIONS AND THE LENGTH OF THE CABLES SEE PAGE 4

SUPPLIED ACCESSORIES

MOBILE SOCKET
Type PMO180-181-235-246 Code 80.42.84

ORDERING DATA

type **SPG-120/10** code 24.20.07

CONFORMITY DECLARATION

CE

The company Elcos s.r.l. assumes full responsabilty for declaring that the equipment:

type **SPG-120/10** manufactured in the year **2004**

used in the ways and for the purposes described in the enclosed instruction and user manual is in conformity with the following directives:

· 73/23/CEE concerning electrical materials used within certain voltage limits
· 89/336/CEE concerning electromagnetic compatibility

both modified by the directive 93/68/CEE
because it is built and functions in accordance with the harmonized Standards:
- EN 61010-1 safety requirements for electrical measuring and control equipments and for laboratory use
- EN 61326-1 electrical measuring, control and laboratory equipment. Electromagnetic compatibility requirements.

ELCOS S.r.l.

Via Naviglio Alto 24/A - 43100 PARMA

Parma, 20/01/2003
President
Ruggero Lombardo

Ruggero Lombardo