

# Starting-Unit for a Motor-Generator-Set

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In many countries Generator-Sets are widely used due to a weak Electrical Power-Supply or no Electrical Grid. With this Software you can Start and Stop a Generator-Set and you have a lot of additional features. You can easily combine the generator with a Solar-System to get a cost efficient System with Electricity in any case.

## ***Manual Generator Start/Stop***

See Wiring-Diagram for electrical connection

If you set Parameter 20 in Menu 8 (Generator present) active ("1") then Menu 2 will change and you can manage the Generator-functions from here

**Principle:** The generator can be started Manual (Menu 2 Line 1 press "1") or by Battery empty (Value from Menu 8, Parameter 1: Switch off Load 1) or by Timer (Programmed in Menu 4). There are three Start-Trials and then you will have a Alarm-Message. You confirm all messages with Key "0".

If the Feedback of the Generator will be ok, the Generator runs until he is Manually stopped (Menu 2 Line 1 press "0") or if the Battery is full (Value from Menu 8, Parameter 7: Cycle Charge Lead) or by Timer (Menu 4) or if max. Time running is finished (Menu 2 Parameter 4 Max. Time on).

To protect the Motor the Load is switched on delayed after Start Motor (when the Motor is warm). And the Load is switched off some time before the Motor is shut down (for cooling of the Motor without Load). This increases the Life-time of the engine.

You can also Start and Stop the Generator from external Switches (Stop can also be a Alarm-Signal like no-Oil-Alarm etc.). See Wiring-Diagram for according electrical connection

## ***Menu 1: Programming the Timer***

You can program a Timer to Start and Stop the generator. First you give the Start-Time (hour and minute). And at "for" you give a Time how long the generator should be switched on.

If you enter the value from 1-100 "for..." will be in second. If you enter the time from 101-200 the value "for..." will be in minutes. That means 105 means for example 5 minutes. If you enter the time from 201-224 the value "for..." will be in hours. That means if you enter 204 for example the device will be on for 4 hours.

Should the Generator not be switched on by Timer, you enter "0" at "for...".

## ***Menu 2: Functions and Settings:***

You have the following Functions in Menu 2:

*Generator on/off:* With Key "1" you can manually Start the Generator. As long as there is no feedback from the Generator "on" will be flashing. With "0" you stop the Generator

*Run Time 1/2/3: xx hrs:* You have three Counters for the running time of the Generator and each one generates an Alarm. These could be used for Maintenance-Purpose etc. You can select each Counter if you press key "#" to jump to the according field and then enter 1 or 2 or 3.

If you press "#" again to jump to the next field you can Reset the according hrs with "0".

If you press "#" again you have another Menu (Parameters):

*Parameter 1: Limit 1: 100hr:* Here you give the Setpoint for the Alarm 1 after xxx hrs Generator running time

*Parameter 2: Limit 2: 1000hr:* Here you give the Setpoint for the Alarm 2 after xxx hrs Generator running time

*Parameter 3: Limit 3: 2000hr:* Here you give the Setpoint for the Alarm 3 after xxx hrs Generator running time

*Parameter 4: Max.Time on:* Here you give the Setpoint for the max. Running-Time of the Generator after one Start. If you do not need this function, set this value to "0"

*Parameter 5: Start U min?:1/0:* Here you select whether the Generator should Start Automatic when the Battery is empty ("1").

*Parameter 6: Timer Start?:1/0:* Here you select whether the Generator should Start by Timer (Menu 4) Automatic.

*Parameter 7: No Restart:* Here you disable the Restart of the Generator for x hrs. .

*Parameter 8: Delay Mains:* Here you can set a time for the switch-over to Mains and to the Power-Supply by Generator, after a Power-cut. If this value is set to "0", the Mains-Relay is not activated.

### ***Menu 4: Input and Test of Telephone-numbers***

You can enter two telephone-numbers in here. These numbers are dialed if there is a Alarm.

First you select which Telephone number you want to Input (1-2). Press "#" to jump to the Input-field of the Telephone-number. You can enter a 12 digit number now. If you want to enter the next number press "#" again, select Nr.2, press "#" and enter the number in the Input-field.

If you want to Test it, press "#" and select "1" at the Test-field.

If you want to have all numbers being dialed subsequently enter "0" for the Number-Selection and leave the Sub-Menu. If you want to have only one specific number being dialed, enter the desired number (1-2) in the field for the Number-Selection and leave the Sub-Menu. That means always the according number of the field Number-Selection is dialed (0 = all numbers). To cancel a call enter the key "\*".

### ***Menu 7a: Input of Date and Time***

For the Protocol, the Timer and the Tracking-Function you have to enter Data and Time in here. The fields are month.day, hour:minutes and you jump from one field to the other with the key "#". **Note that these values are Reset when you switch off the Metamorphosis** and you have to enter them again.

### ***Menu 7b: Output Voltage***

Here you see the Value of the Output-Voltage coming from the integrated Voltage-Regulator. You can adjust this Voltage with the right Regulator next to the Program-Switch. This voltage can be used for to connect small appliances like Walkman, CD-Player etc. to the Metamorphosis. The Output-Range is 3-12V with up to 2A. **Be careful not to change the voltage when a device is already connected. Overvoltage can destroy the Device!** (see the Appendix for the electrical wiring).

### ***Settings in Menu 8:***

In Menu 8 (key 8 in the Basic-Menu), there are some more Parameter which are relevant for the Generator. Some other Parameters refer to the extended Version with integrated Solar-Charge Controller

**Parameter 1: U-min Start Gen:** Setting the voltage for to start the Generator at low Battery. Set this voltage 0 V in order to disable this function.

**Parameter 2: U-max Stop Gen:** Setting the voltage for to Stop the Generator at Battery full. Set this voltage 30 V in order to disable this function.

**Parameter 3: Delay Umax Stop:** Delay-Time for to Stop the Generator by Battery full.

**Parameter 4: Delay Load on:** Delay-Time (in sec) for to Switch on the Load after Starting up the Generator. This feature protects the generator by giving the generator time to get warm. Also at switching off first the Load is switched off and then the generator stopped. It is the same time.

**10: Language;** You can select now between English and German (Enter "1" or "0")

**19: Factory Settings;** If you set this value to "1" the Standard-Values will be loaded

**22: Receive SMS**

You can switch on and off Relays by sending a SMS to the Metamorphosis.

In this Case the Automatic is switched off for this Relay

For to switch you have to Send the following SMS-Text to the Metamorphosis:

Switch on Output 1: Meta11

Switch off Output 1: Meta10

Switch on Relays 2: Meta21

Switch off Relays 2: Meta20

Switch on Relays 3: Meta31

Switch off Relays 3: Meta30

Switch on Relays 4 :Meta41

Switch off Relays 4: Meta40

Switch on Relays 5: Meta51

Switch off Relays 5: Meta50

Switch on Relays 6: Meta61

Switch off Relays 6: Meta60

Switch on Relays 7: Meta71

Switch off Relays 7: Meta70

Activate the Alarm-Sequence (Beep, hear, speak etc) : Meta99

Switch back to Automatic (all by SMS activated Relay are free again for the Automatic): Meta00 (Alarm-System is still active!)

After activation a Relay by SMS you get a SMS for Acknowledge

### ***Menu 9: Manual Mode***

In this Submenu you can see which output is on (■) and which is off (◊); In this case the automatic is still active  
You can also see what the outputs are used.

If you press now key 1 till 8 in this Sub-Menu then you can switch all the Relays manually. In this case the automatic is switched off and manual mode is active. That means that no output is switched on automatically any more.

### ***Alarms***

There are various Alarm-Messages. All are confirmed with Key "0"

### ***Loading of new Software***

To load new Software into the Metamorphosis you have to Start the Program „**BootLoader.exe**“ (on the CD in the Boot-Loader-Folder).

- ➔ Connect Data-cable to Serial Port. If you have no serial Port, install the USB-serial-Adapter first.
  - ➔ Start the Program, Select Options „19200 Baud“ and the according COM-Port.
  - ➔ Then „File“, „Select File“ and navigate to the according \*.bin file.
  - ➔ Then „File“ „Upload“
  - ➔ If only "Sending #123" appears, switch the Metamorphose off and on.
  - ➔ If still no Download-Window is popping up, something with the cable is wrong or with the Metamorphose
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- If you want to make Programm-changes you must install first the Software BASCOM from the CD (you get it with the Metamorphosis). To install it call \BASCOS-AVR\Setup.exe. Install to the folder C:\BASCOS-AVR (and not to C:\Programme\MCS Electronics\BASCOS-AVR as recommended)
  - To make your own programs, install \Bascom\_new\_Version\update.bat as well to get the latest Version of BASCOM
  - After you downloaded the Program-Files from the Internet you have to unpack the files first by double-click on the .exe file. If you get a .zip-file you have to use Win-zip or you can install the Windows-Commander from the CD to unpack it.
  - Now connect the cable (you get with the Metamorphosis) to the parallel Interface of the PC (big plug) and at the appliance (the plug with two cables coming out) and switch it on.
  - Start the Software using the Explorer and Double-Click on C:\BASCOS-AVR\Bascavr.exe. But you can also go to the Start-Button and Programs and \ MCS Electronics\BASCOS-AVR to Start it.
  - Select „Options“, „Programmer“; Select MCS-Bootloader

- Select "File" and "Open" and open the file with the extension .bas (from Floppy or where you have it after downloading and unpacking it from Internet).
- Then select in the Menu "Program", "Send to Chip" or simply press key "F4".
- Then Press button "Chip" and "Autoprogram". The program will be loaded now
- After everything is downloaded, switch off and on again the Metamorphosis. Now the new Software should run
- For additional Testing you can use the internal Terminal-Program (Ctrl + T); Make these adjustments: Go to Options, Communication and set the Baudrate to 19200 and also at Compiler, Chip, Communication, Baudrate

**Note:** If you are using BASCOM frequently you should buy the license for about 80 Euro at

**MCS Electronics:**

[http://www.mcselec.com/index.php?page=shop.product\\_details&flypage=shop.flypage&product\\_id=86&category\\_id=5&option=com\\_phpshop&Itemid=1](http://www.mcselec.com/index.php?page=shop.product_details&flypage=shop.flypage&product_id=86&category_id=5&option=com_phpshop&Itemid=1)

### Problems?

- ✓ The cable is connected in the right way? The Metamorphosis is switched on?
- ✓ For XP install the Software from the CD \Programmer\_XP\ParPort.reg by just clicking on this file
- ✓ The PC must be set top ECP/EPP mode in the BIOS (pops up after start and key F2 or Del or ...?)
- ✓ Optional you can use for Windows 98 from the CD \programmer\_win98\ Charge\_Controller.BAT to download the Software

### *Loading of the measured values on the PC and fully Operating with the PC*

- To load the measured values on the PC you have to install the Software "Dialer" first from the CD. For this call \Dialer\install.bat on the CD.
- If you have **Vista** in order to register the OCX you have do to the following:  
Call Programms, Accessories, Command; right click on that and Select „run as Administrator“; and „continue“; Then navigate in the folder c:\Metamor using  
Cd ..  
Cd ..  
C:  
Cd Metamor  
There call „register“; Finish with „Exit“
- Now connect the metamorphosis with the cable, connect the plug with two cables coming out to the Metamorphosis. Put the other side with the small plug with "PC" written on it (not the big plug you used for downloading Software!) at the serial interface of the PC (small plug at the backside). If there is a modem connected it has to be removed temporarily. **Now you have remove the Parallel-Cable (big Plug) first from the PC if he is connected.**
- Then call the program C:\Meta\Dialer.exe"
- After the start selected the COM-Port. Begin with COM1 and if it doesn't go select COM2
- Now press the button "Upload"; the data will now be loaded and "End" will be displayed when finished.
- Now you can look at the data with the function "Data" and "View uploaded data" you can write comments, print it and import them in Microsoft Word or Excel for example (import to Excel: File, open, Typ "all files", then go to folder C:\Meta\data.txt, then Data is separated by Blank)

### *Hints*

- Wait for Data-Input Menu 8 approx. 20 sec after switch on, because after this time the presetting of Data is finished.
- If you press the key "\*" during Switch on of the Controller you enter the **Simulation-Mode**. With the voltage-regulator at the right side next to the Program-Switch you can simulate now the Battery-Voltage and Current for Testing and Demonstration
- In the Program at Function Menu 7 you can display easily all desired Values
- On the CD you find the Program "Ultraedit" (/Tools). With this you can easy Edit the Program
- The switching Points for the Relays are delayed (about one minute). Keep that in mind if you are testing it!
- **If you are using the Compiler BASCOM frequently, you have to buy a License! The Price is about 80 Euro and you get it at [www.elektronikladen.de](http://www.elektronikladen.de).**

## ***Features***

- Manual Start/Stop of a Generator-Set with the Keyboard or external Push-buttons
- Start by Battery Status low (if it is used as a Stand-alone System), Stop with Battery full
- Start by Mains failure (if you have a Electrical Grid) and Stop if Mains-Supply is coming back
- Start by a Timer. You can give a Start.-and running Time or you can also program “running every second day for 3 hours” etc
- Three Start-Trials and Error-Message if the Unit can not Start (Text and Acoustic Alarm)
- Load is switched on delayed, Generator is switched off delayed (for protection of the Motor)
- Additional Alarm-Inputs for no Oil, Oil-Temperature-Alarm, Water-Temperature-Alarm Overspeed etc. and automatic shut down of the Generator
- Stop by a programmable Max-Time or Emergency-Stop or Switch or Alarm
- Optional: Display of Frequency, Current, Voltage and other necessary values
- Three independent Running-Time counters. Setpoints for Maintenance-Purpose: For example refill Diesel, change of Oil, general Revision, Text and Acoustic Alarm
- Telephone-Notification in case of any Alarm (Tank empty, no Starting etc), three Telephone-numbers can be programmed, all numbers are dialed or only a specific one.
- Fully Remote-Control of the Status of the Unit including Remote-Start/Stop of the Motor by Mobile-Phone and Modem
- Sending SMS in case of Alarm, Start/Stop of the Generator by SMS
- Logging of all Starts and Stops, easy uploading the Protocol to the PC, free Software for the PC
- The Device can be combined with a Solar-Charger (same Device but with modifications) or with a High Current Battery Loading-Device (external).

## ***Contact***

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