

Solar-Dryer-Controller with optional integrated Charge-Controller 15 A and Alarm-System



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Features:

Solar-Dryer

- Temperature-controlled regulation of a Fan for food drying.
- Programmable Temperature for to adjust to your specific product
- Programmable Time for to have a higher Temperature at the beginning of Drying.
- Programmable Time for to have a higher Temperature at the End of Drying.

- Programmable Time to have a Alarm if drying is finished, depending of the hours with the right temperature
- Start-Impulse for the fan to have a save start
- Visual and acoustic Alarm if high Temperature occurs
- Optionally switch on and off a second of a second fan for better controlling of the temperature
- Optionally switch on and off of a Heater temperature-controlled to be independent from critical weather conditions or to dry also at night.
- 12V, 24V and optionally 220V Fans can be connected.
- Manual Mode for all Outputs including regulated Outputs (0-100%)

Solar charge controller

- Up to 15 Amperes Charging Power using POWER-MOFET-Transistors.
- Overcharging-Protection of the Battery by fast Pulse-Wide-Modulation. This Mode gives better charging-results than slow Pulse-charging.
- Additional Input for charging of the Batteries with a 220 V / 12V or 24V Transformer
- Boost-charging from time to time (depending from the discharging level or at least once a month). Boost-charging avoids the degeneration of Liquid-Batteries.
- Applicable for all Types of Lead- Batterys (Gel-Type etc.)
- Applicable for 12V or 24V-Systems. The System-Voltage is verified automatically. If you use the Relays, you have to order a 12V or 24V-Version.
- **Many Safety Precautions:**
 - High Temperature-Protection
 - Reverse-Connection Protection for the Solar-Panels and Battery
 - Automatic Short-circuit Protection for the Load, no more replacement of Fuses are necessary
 - Over-voltage Protection for the Input of the Solar-Panels
 - Protection for "no-Battery"-connection (if only Solar-Panels are connected, the voltage will raise very high)
 - No Reverse-Current to the Panels at night

Alarm-System

- One Major Problem of Solar-Systems is the stealing of the Panels or of the Food in the Dryer. This Device is shipped with a **Theft-protection**.
 - With a Moving-detector: A Loud Alarm can be generated if somebody is coming close to the Solar-System
 - With an external Circuit: A high voltage is activated at the Panels-Frame as soon as somebody is coming close to the Panels. If somebody touches the Solar-Panels, he gets an electrical shock. Of course the voltage can not hurt anybody.

Small Power-Management-Function

- One channel can be switched on by a Moving-Detector or a Switch or a Push-Button. The Delay-off Time can be programmed. With that you optimize your Energy-demand by switching off Devices Automatic if not needed.
- Three LED's for to display Temperature Dryer is high, Solar charging and Battery voltage low
- By a Program-Switch many Functions like Dryer-Temperature, Battery-Type etc. can be programmed. You can also activate a Simulation-Mode for the Battery-Voltage.

- For Data-Logging a PC or Notebook can be connected (via serial cable or USB with Adapter). The Temperature and Battery-Voltage can be logged and evaluated (by Excel for example)
- Easy update of new Software by a small Program and the Data-Cable.
- Optional you can have your own Functions integrated in the Unit. Let us know what you need and we program it. And you can even load another Software for using this Unit for another purpose (for a Irrigation-System or for a Alarm-System for example)

Electrical Wiring

Connect the cable according to the List at the end of the Document and according to the Wiring-Diagram.

How to Start the Drying?

Switch on the Device when you start drying. The drying-time is triggered when the Temperature is within the defined range and gives you an Alarm if it is ready.

Functions of the Program-Switch

- 0: Alarm-System off; Programming-Mode: Activate Manual Mode for Outputs
- 1: Alarm-System active; with Push-Button: Reset drying-Time; Manual Mode: Fan 1 on manually; Programming-Mode: Time Delay off (in minutes) for the Load Output which was activated by Moving-Detector or Switch
- 2: Manual Mode: Fan 2 on manually; Programming-Mode: Lead-Gel-Battery (= 1);
- 3: Manual Mode: Fan 1+2 on manually; Programming-Mode: Start with higher Temperature for x hours
- 4: Manual Mode: Heater on manually; Programming-Mode: Stop with higher Temperature for x hours
- 5: Programming-Mode: Temperature Drying
- 6: Programming-Mode: Time for Drying in hrs * 2
- 7: Programming-Mode: Dryer with the Option Heater
- 8: Programming-Mode: Dryer with a the option second fan
- 9: Programming-Mode: Solar Charge-controller Function on / off
- 10: Programming-Mode: Phase loop control on/off
- 11: Programming-Mode: adjust Speed of the Fan manually

How to Enter the Programming-Mode?

Select Program-Switch at the according Position
 Press Push-Button until LED starts fast flashing.
 Then Program-Switch to Position 0 (off) or Position 1 (on) or any other value
 Save Settings by pressing of the Push-Button until the LED Stops fast flashing

How to Enter the Manual-Mode?

Select Program-Switch at Position "0"
 Press Push-Button until LED starts fast flashing.
 Then Program-Switch to Position 0 (all off) or Position 1-4 for to switch on according Device.
 To disable this function switch off and on the device

How to Reset the Alarm?

Press the Push-button if there is an Alarm

Solar Dryer Controller

This Unit can control two Fans and one Heater in order to get a optimized Temperature-Profile for the Product to be dried. Connect the Fans and Heater according to the Wiring-Plan.

Alarm Temperature maximal

If you have a critical Temperature (Setpoint-Temperature + 4 °C) an Alarm is generated and you should protect the drying Product in order not to have quality loss in color etc. Confirm this Alarm with the Push-Button

Following Parameters can be Setup

3: Programming increase the Temperature at the beginning

Select Program-Switch ***Position 4***

Press Push-Button until LED starts fast flashing.

Then Program-Switch to

Position 0: no increase of the Temperature at the beginning

Position 1: increase of the Temperature for 2 hours at the beginning (Position switch multiplied with 2) until

Position 11: increase of the Temperature for 22 hours at the beginning (Position switch multiplied with 2) and all Positions in between.

Save Settings by pressing of the Push-Button until the LED Stops fast flashing

4: Programming increase the Temperature at the End-Phase

Select Program-Switch ***Position 4***

Press Push-Button until LED starts fast flashing.

Then Program-Switch to

Position 0: no increase of the Temperature at the end

Position 1: increase of the Temperature 2 hours before end (Position switch multiplied with 2) until

Position 11: increase of the Temperature 22 hours before end (Position switch multiplied with 2) and all Positions in between.

Save Settings by pressing of the Push-Button until the LED Stops fast flashing

5: Programming Temperature Drying

Select Program-Switch ***Position 5***

Press Push-Button until LED starts fast flashing.

Then Program-Switch to

Position 0: Low Dryer Temperature: 40 °C

Position 5: Medium Dryer Temperature: 45°C

until

Position 11: High Dryer Temperature: 51°C

and all Positions in between.

Save Settings by pressing of the Push-Button until the LED Stops fast flashing

6: Programming Drying-Time

Select Program-Switch ***Position 6***

Press Push-Button until LED starts fast flashing.

Then Program-Switch to

Position 1: Drying-Time = 2 hrs (Position switch multiplied with 2)

Position 11: Drying-Time = 22 hrs (Position switch multiplied with 2)

and all Positions in between.

How does it work?

Switch the Unit on if you start drying. If the Temperature is ok, the Time starts.

You have an Alarm if the drying-Time is finished.

Press the Push-Button to Reset the Alarm. After switch off and on the Time starts again.

Save Settings by pressing of the Push-Button until the LED Stops fast flashing

7: Programming Dryer with the Option Heater

Select Program-Switch ***Position 7***

Press Push-Button until LED starts fast flashing.

Then Program-Switch to

Position 0: No Heater connected

Position 1: Heater connected

Save Settings by pressing of the Push-Button until the LED Stops fast flashing

8: Programming Dryer with a second fan

Select Program-Switch ***Position 8***

Press Push-Button until LED starts fast flashing.

Then Program-Switch to

Position 0: No second Fan connected

Position 1: second Fan connected

Save Settings by pressing of the Push-Button until the LED Stops fast flashing

9: Programming Solar Charge-controller Function on / off

Select Program-Switch *Position 9*

Press Push-Button until LED starts fast flashing.

Then Program-Switch to

Position 0: No Solar Charge-controller Function

Position 1: Solar Charge-controller Function

Save Settings by pressing of the Push-Button until the LED Stops fast flashing

10: Programming Phase loop control on/off

Here you can select a 220 V Phase-Loop Control Regulation. But you need the according Hardware! Look for the order.

Select Program-Switch *Position 10*

Press Push-Button until LED starts fast flashing.

Then Program-Switch to

Position 0: Phase loop control off, PWM-Controlled Output

Position 1: Phase loop control on

Save Settings by pressing of the Push-Button until the LED Stops fast flashing .

Connect the Device according the wiring-Diagram. Max. Output-Power is 1000 Watt!



Take care! In this mode you work with 110V/220V and it can cause harm! Follow the safety rules!

11: adjust the Speed of the Fan manually

Select Program-Switch *Position 11*

Press Push-Button until LED starts fast flashing.

Then Program-Switch to

Position 0: Low Speed Fan

Position 6: Medium Speed Fan

until

Position 11: High Speed Fan

and all Positions in between.

Return from this Mode by pressing of the Push-Button until the LED Stops fast flashing

Solar Charge Controller

If the battery was relatively empty, the yellow LED for Solar Charging is on, all Energy from the Solar-Panel is transferred to the Battery.

If the Battery gets full, the Charge Controller switches to fast Pulsation-Mode (PWM), the yellow LED starts flashing.

If the Battery is full, the yellow LED is switched off, charging is switched off.

From Time to Time the Battery-Voltage is raised to Boost-Voltage, for to avoid degeneration of the Battery. For this Function the Battery-Type has to be programmed (See Programming of the Battery-Type).

Programming of the Charge-Controller (Optional)

2: Lead (Liquid-Battery) or Lead-Gel-Battery

Select Program-Switch *Position 2*

Press Push-Button until LED starts fast flashing.

Then Program-Switch to

Position 0: Lead (Liquid-Battery)

Position 1: Lead-Gel-Battery

Save Settings by pressing of the Push-Button until the LED Stops fast flashing

Deep-Discharge Protection

If the Battery is almost empty the red LED is flashing.

If the Battery is empty, the Outputs are switched off and the red LED is on.

The Transistor-Outputs are shipped with an automatic Fuse.

The Relay Outputs have no internal Fuse! You have to provide a external Fuse for Safety!

Alarm-System (Optional)

If you have a Alarm-Sensor (Moving-Detector) and a Alarm- Horn connected, you can activate the Alarm-System with the Program-Switch:

Switch Position 0: Alarm-System off

Switch Position 1: Alarm-System on and the Alarm is active after a delay of 30 seconds.

If the Moving-Detector detects Alarm, Relay 1 is switched on delayed, Relay 2 without delay. After a time, the Outputs are switched off again. This time can be programmed if the Programm-Switch is in Position 1.

Programming Time Output active after alarm or activation by Moving-Detector or Switch or Push-Button
Program-Switch at *Position 1*.

Press Push-Button until LED starts fast flashing.

Then Select Position 0-11 which corresponds to the time in minutes how long the Output is active.

Save Settings by pressing the Push-Button until the LED Stops fast flashing

Connect the Hardware according the Wiring-Diagram. It does not matter if it is a contact with normally closed or normally open.

Power-Management (Optional)

Switch in Position 2

Works almost like the Alarm-System. But the Outputs are activated without a delay. This function can be used to save Power by letting devices work only if needed, for example a lamp in a toilette.

Data-Logging:

If a PC or Notebook is connected to the Unit by a Serial-Cable or with a USB to Serial-Adapter, you can log the Battery-Voltage every minute (for example using the Program Hyper-Terminal of Windows)

Fixed Voltage Output (Optional)

If needed, you can have a stabilized fixed Voltage Output (5V or any if ordered).

Connect the cable according to the List at the end of the Document and according to the Wiring-Diagram

You can take max. 1 Amperes from this Output

Loading by a 220V / 12V or 24 V Transformer

You can load the Batteries by a 220V / 12V or 24 V Transformer (up to 2A) as well. Charging is controlled for not overloading the Battery.

Simulations-Mode

If you switch the Push-Button during start-up, you are in Simulation-Mode and you can simulate the Battery-Voltage and the Temperature by the Program-Switch. Using the serial Interface you can monitor the voltage.

Voltage goes from 10.0 V till 15,5 V.

Temperature goes from 40°C till 52 °C (highest position of the Program-Switch)

Monitor Values with LogView

Logview is a excellent Software (Freeware) to Monitor and evaluate Process-Data. This Device sends the Measurement-Values such as the Battery-Voltage and Temperature in the Logview-Format and you can evaluate them.

Short Overview about the Features of Logview

View of Process-Data in Graphic

View of Process-Data in Table-Format

Evaluate the Data in Real-Time

Comparison of Curves

The Design can be changed

Intuitive workaround

Integrated RTF Editor

Graphic-Editor

Export-Funktions:

Table-Format: CSV, ASCII, HTML, RTF und Excel

Graphic-Format: BMP, JPG, GIF und PNG

Installation

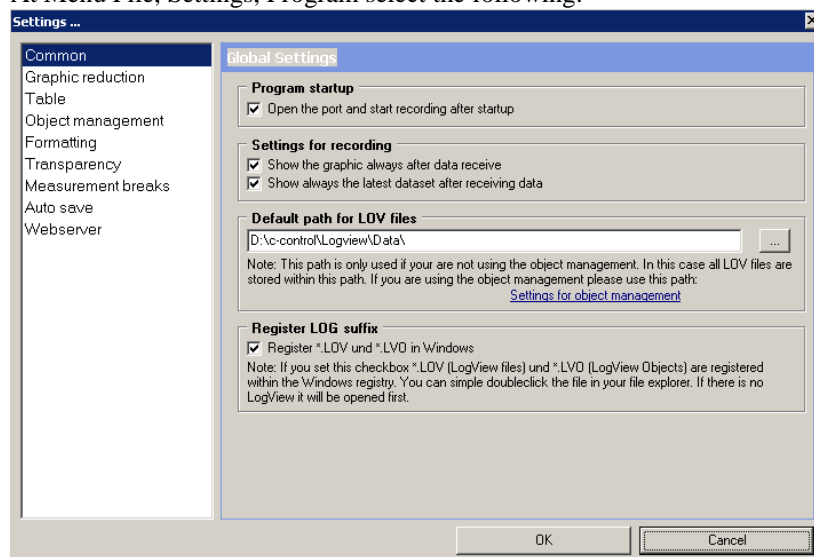
Install Logview with LogViewInstaller from the CD (Folder \LogView) or the latest Version at the Internet: www.logview.info/cms/d_logview-21.phtml

Download the file Metamor_Dryer_Medium_e.ini from the Internet (www.alternative-technology.de and the according Application) and you have to copy it to the folder C:\Documents and Settings\your User-Name\Application Data\LogView\Geraete\OpenFormat\

Start Labview

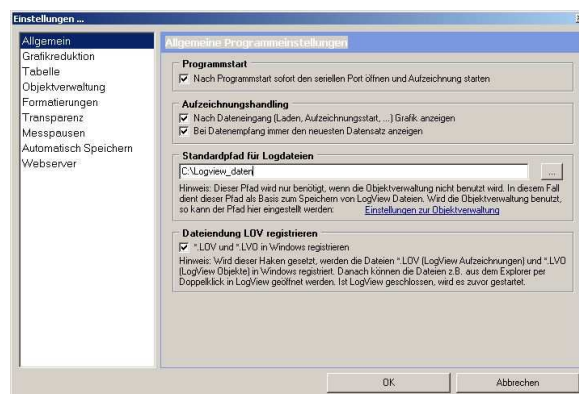
Select Device at Menu „Device, choose Device and Port“ the according Device: Metamor_Dryer_Medium_e
Select according serial COM-Port as well

At Menu File, Settings, Program select the following:



In the Default path for Log-Files the Log-Files are stored. You can modify it. These Files can be checked later on just by double-click

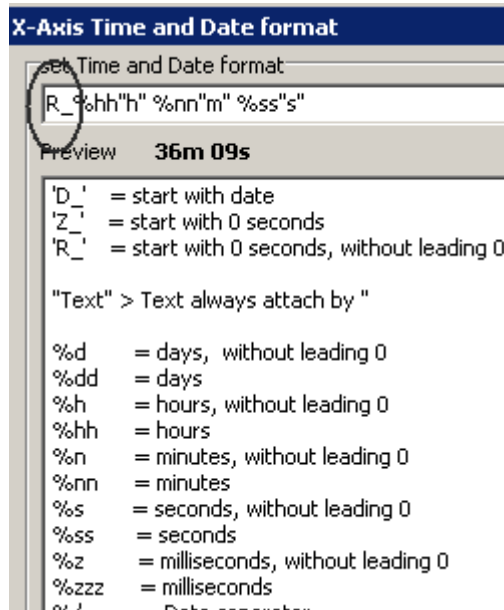
Registrier Log suffix should be checked that you can start Logview by direct clicking the *.lov file.



Then you can start the recording. In the Life-Window Data should come up.

If you want to have the actual Time being displayed in the Curves

Select Menu Grafic, Zeitformat der X Achse, then ontop instead of R_ make D_ and save.



More Infos in the online-Manual of Logview and the Internet under www.logview.info

Specification, Technical Data

Mega168 with 16K Flash-Memory, 512 bytes EEPROM, 1K RAM, 3 timers / Counter, 6 analogously input 10 bits, one serial-Port, I2C-Port,	
Program-Switch	yes
serial port	1
Bootloader, to load new Software by serial-Port	yes
LED-Lamps (Temp.max, Solar charge, Batt empty)	3
free analogue-Inputs	3 (if no Solar-option)
Load-Output	1 with 15A, 12V/24V
Relay-Output	2 for 12V/24V/220V
max.Current Relay-Output	10 A
optional Impulse-Relay (only needs Energy by switching)	yes, optional
Loading lead-batteries by external power adapter	yes, optional
Loading lead-batteries by solar / wind Power until max.	15A
Pulser for lead-batteries to the extend lifetime of the battery	yes, optional
PWM-Output 12V / 24V (Pulse-width-Modulation)	2 (Solar and Load)
Phase-Loop-Control 220V	yes, optional
Data recording by serial interface	yes, battery and NimH-Voltage
Evaluate the data with the software LogView	yes
Output auxiliary-Voltage fixed 10V, 0,5A	yes, optional
Output auxiliary-Voltage variable (by resisitor), 0,5A	yes, optional

Terminals

Terminals left		ext.Wiring	Terminals right		ext.Wiring
1	NimH +	Alarm-Horn +	21	+5V	Signal from Moving-

					Detector
2	NimH -	Alarm-Horn -	22	+5V	NTC-Sensor Temperature Dryer
3	Minus	Power-Supply -	23	12V out	bridge to 28
4	charge 15V+		24	ADC2	NTC-Sensor Temperature Dryer
5	+12V in/Batt+	Power-Supply +	25	ADC3	internal Solar voltage
6	+12V out	bridge to 13 (for Heater)	26	ADC4	Signal from Moving- Detector
7	Micro+		27	Relay 1 NO	Fan 2 +12V
8	Micro+		28	Relay 1 in	bridge to 23
9	Minus		29	Telephone/PWM-	
10	Minus		30	Telephone	
11	Minus	Heater Minus	31	Output D.3	
12	Relay 2 NC		32	LM317/12V+	Moving-Detector +12V
13	Relay 2 in	bridge to 6 (for Heater)	33	Minus	Fan 2 Minus
14	Relay 2 NO	Heater 12V +	34	Minus	Moving-Detector Minus
Terminals Top		ext.Wiring	Terminals Down		ext.Wiring
40	free		61		
41	free		62		
42	free		63		
43	free		64		
44	Solar-		65	Minus	
45	Solar-	Solar Paneel Minus	66		
46	Batt -		67	+5V	
47	Batt -	Battery Minus	68	+5V	
48	Fuse		69	+5V	
49	free				
50	Fuse				
51	Load -	Fan 1 Minus (var. Speed)			
52	Load +	Fan 1 12V + (var. Speed)			
53	Batt +	Battery +12V			
54	Solar +	Solar Paneel +			

Hints

- If you press the Push-Button by mistake and you are in Programming mode, the Mode will be disabled after one minute.
- If you use a 24V-System also the Relay and the Moving-Detector have to be ordered for that voltage. And the fans must be 24V-Version or you put two 12V-Fans in serial.
- If you use the High-Voltage-System as Theft-Protection, you have to mount a Warning-Signal.

Loading of new Software

To load new Software into the Unit you have to Start the Program „**BootLoader.exe**“ (on the CD in the Tools-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 Device off and on (Remove battery cable and reconnect).
- ✓ If still no Download-Window is popping up, something with the cable is wrong or with the Metamorphose

Contact

For Problems, Questions, Suggestions....

Stefan Schraner

Alternative Technologie

Franz-Ludwig-Str.2

97072 Wuerzburg

Tel: +49 (0)931 72353

Mobil: +49 (0)152 54690448

Internet: www.alternative-technologie.de

Email: StefanSchraner@yahoo.de