All in one Solar-Dryer-Controller
with optional integrated Solar Charge-Controller
10 A, Alarm-System for to protect the product
and irrigation-system

Quick-Start

- Connect the devices according to your configuration and application based on the Wiring-Diagram
- Switch the device on.

- Turn the Program-switch to position "0" to reset the drying-time (otherwise it will continue with the stored drying time, also if the device was off).
- Switch the Program-switch to position "1" and the drying-Process starts according to the setup-Parameters.
➢ Start the fan with Temperature > 30 °C
➢ Start drying 6 hours with 45 degrees
➢ Then drying 40 hours with 50 degrees
➢ Then drying 6 hours with 55 degrees

At the end the red light "Temperature max" is slow flashing for to indicate that drying is ready. The fans will continue to keep the temperature.

Solar-Dryer

This Unit can control up to 6 Fans and one Heater in order to get an optimized Temperature-Profile for the Product to be dried. More fans can be switched by a relay. See features at the end for more options.

How to Start the Drying?
Connect the Periphery according to the wiring diagram.
Plug in Power-Supply or connect it with a Solar-Panel 12-20 V.
Switch the Program-Selector to 1 or 3, to start drying.
If the Temperature is ok (> 35°C) and the Battery-Voltage is ok (> 10,5 V), the fans starts.

The drying-time is running when the Temperature is within the defined range

Drying-Temperature and Time profile is according Parameters you can modify manually.
Presetting is Start 3 hours with 45 degrees
Then 10 hours with 50 degrees
Then 3 hours with 55 degrees

You have an Alarm if the drying-Time is finished. You can reset this Alarm with the Push-button.

Alarm Temperature maximal
If you have a critical Temperature (Setpoint-Temperature + 6 °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

Modifying of Drying-Parameters for Solar Dryer

How to Enter the Programming-Mode?
Select with the Program-Switch the correct Position 0-11
Press the Push-Button until LED starts fast flashing.
Change the value by turning the Program-Switch in the middle of the Unit to the appropriate value.

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

Programming Temperature Drying: Program-Switch Position 5
Select Program-Switch *Position 5*
Press Push-Button until LED starts fast flashing.
Then Program-Switch to
Position 0 : Dryer Temperature: 37 °C
Position 1 : Dryer Temperature: 40 °C
Position 2 : Dryer Temperature: 43 °C
Position 3 : Dryer Temperature: 46 °C
Position 4 : Dryer Temperature: 49 °C
Position 5 : Dryer Temperature: 52 °C
Position 6 : Dryer Temperature: 55 °C
Position 7 : Dryer Temperature: 58 °C
Position 8 : Dryer Temperature: 63 °C
Position 9: Dryer Temperature: 64 °C
Position 10: Dryer Temperature: 67 °C
Position 11: Dryer Temperature: 70 °C

Save Settings by pressing of the Push-Button until the LED Stops fast flashing
Presetting: 60 °C for fruits (herbs max. 40 °C, mushroom max. 50 °C)

Programming Drying-Time: Program-Switch Position 6

After Drying-Time is finished, an Alarm is generated. This is the complete drying-time.
Select Program-Switch *Position 6*
Press Push-Button until LED starts fast flashing.
Then Program-Switch to
Position 1: Drying-Time = 6 hrs (Position Switch multiplied with 6)
….
Position 11: Drying-Time = 66 hrs (Position Switch multiplied with 6)
and all Positions in between.
Presetting: 40 hours,

Programming decrease the Temperature at the beginning: Program-Switch Position 2
Select Program-Switch *Position 2*
Press Push-Button until LED starts fast flashing.
Then Program-Switch to
Position 0: no decrease of the Temperature at the beginning
Position 1: decrease of the Temperature for 2 hours at the beginning (Position switch multiplied with 2)
until
Position 11: decrease 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.
Presetting: 6 hours, Temperature decrease 5 degrees.

Programming increase the Temperature at the End-Phase: Program-Switch Position 3
Select Program-Switch *Position 3*
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
Presetting: 6 hours, Temperature increase 5 degrees.

Fan always on / additional not regulated fan

In order to have more performance, a second (not regulated) fan can be used for drying. This could be a 12V, 24 V or 110 V or 220 V fan.

Fan always on, Programming Dryer with a second fan: Program-Switch Position 8
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 = Fan always on also at night

Position 2: second Fan connected, Start if Delta-Temp > 2 °C
…
Position 6: second Fan connected, Start if Delta-Temp > 6 °C etc

Save Settings by pressing of the Push-Button until the LED Stops fast flashing
Presetting: No second Fan connected

Increase / decrease Temperature at the Start or End of drying: Program-Switch Position 11
To avoid too rapid drying in the early part of the drying cycle the temperature can be reducing at beginning or the drying.

Here the Temperature for Increase / decrease at the Start or End of drying can be defined

Select Program-Switch *Position 11*
Press Push-Button until LED starts fast flashing.
Then Program-Switch to
Position 1: +/- 1 °C
Position 6: +/- 6 °C
until
Position 11: +/- 11 °C
and all Positions in between.

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

Solar Drying with a Heater Option

If the Temperature cannot be reached by sunshine, it is possible to connect a fan to the Unit to get the correct drying-Temperature. This could also be uses for a glass-house climate control.

Programming Dryer with the Option Heater: Program-Switch Position 7:
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, Start if Delta-Temp > 1 °C
…
Position 6: Heater connected, Start if Delta-Temp > 6 °C etc
Programm 7-11 is used for other purpose (Irrigation)

Position 7: Irrigation active with cycle every day
Position 8: Irrigation active with cycle every 2. day
Position 9: Irrigation active with cycle every 3. day
Position 10: Irrigation active with cycle every 4. day
Position 11: Irrigation active with cycle every 5. day

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

Solar Dryer with Humidity-Sensor

If you have a humidity-Sensor connected, the drying-time can be triggered by the Humidity-Sensor. You can setup a humidity-Setpoint and you have a Alarm if drying is finished.
Take care not to expose the Humidity-Sensor for longer to direct sunlight. It might damage the sensor.

Programming Air-Humidity Sensor no/yes and Setpoint Humidity Drying: Program-Switch Position 4
Select Program-Switch *Position 4*
Press Push-Button until LED starts fast flashing.
Then Program-Switch to

Position 0: no Air-Humidity Sensor
Position 1: 30 % Humidity
Position 2: 35 % Humidity
Position 3: 40 % Humidity
Position 4: 45 % Humidity
Position 5: 50 % Humidity
Position 6: 55 % Humidity
Position 7: 60 % Humidity
Position 8: 65 % Humidity
Position 9: 70 % Humidity
Position 10: 75 % Humidity
Position 11: 80 % Humidity

Presetting: 40 %

Irrigation-System

In order to save water this small Irrigation-function was implemented. You can define the cycle of day to have irrigation (every day or every second etc). And the time how long it should irrigate (5 min to 50 min).
With an irrigation-Sensor connected, it is possible to have no irrigation if the soil is wet enough.
The irrigation time is automatic every night at about 4 o'clock. To have this option of auto-detect time a Solar-cell must be connected or a LDR-Sensor.
The irrigation works always if the Program for irrigation is valid Program-Switch Position 7 and 10
But the irrigation-system can also work exclusive if the programming switch is at
Position 4: only Irrigation-System is active
Position 5: Irrigation system is pulsed, no other function active

Programming cycle for irrigation: Program-Switch Position 7
Select Program-Switch *Position 7*
Press Push-Button until LED starts fast flashing.
Irrigation-System is activated if the Program-Selector is > 6

Then Program-Switch to
Position 7: Irrigation active with cycle every day
Position 8: Irrigation active with cycle every 2. day
Position 9: Irrigation active with cycle every 3. day
Position 10: Irrigation active with cycle every 4. day
Position 11: Irrigation active with cycle every 5. day

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

Irrigation-System is activated if the Program-Selector is > 6 in Programming-Mode Position 6

Programming irrigation-time: Program-Switch Position 10
Select Program-Switch *Position 10*
Press Push-Button until LED starts fast flashing.

Then Program-Switch to
Position 1: Irrigation-time is 1 minute
Position 2: Irrigation time is 2 minutes
Position 3: Irrigation time is 3 minutes
Position 4: Irrigation time is 4 minutes
Position 5: Irrigation time is 5 minutes
Position 6: Irrigation time is 10 minutes
Position 7: Irrigation time is 15 minutes
Position 8: Irrigation time is 20 minutes
Position 9: Irrigation time is 25 minutes
Position 10: Irrigation time is 30 minutes
Position 11: Irrigation time is 35 minutes

Setpoint humidity if a humidity Sensor is connected
The Setpoint for irrigation (if it is less than that value) can be Setup if you look the time when it is necessary to irrigate and program it at that moment. The value depends from many parameters, so this is the most easy way to find a reasonable value.
Select Program-Switch *Position 10*
Press Push-Button until LED starts fast flashing.
The Setpoint is taken from the measured value in this programming mode.

Save Settings of Irrigation-time and Setpoint humidity by pressing the Push-Button until the LED Stops fast flashing.
If no sensor is connected, the function "irrigate only if humidity is less than.." is not active.

Manual-Mode

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.

Position 0: all off
Position 1: Fan 1 on manually
Position 2: Fan 2 on manually
Position 3: Fan 1+2 on manually
Position 4: Heater on manually
Position 5-11: Fan increasing Speed to maximum

To disable this function Press Push-Button until LED stops fast flashing or switch off and on the device.

Solar Charge Controller (Optional)

The unit is shipped optionally with a Solar Charge Controller. Up to 10 Amperes Charging Power and Load-Shedding is integrated. More features see "Features"

If the battery is empty, the yellow LED switches fast and all outputs are off.
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)

activate Solar Charge controller Lead (Liquid-Battery) or Lead-Gel-Battery Program-Switch Position 9:
Select Program-Switch *Position 9*
Press Push-Button until LED starts fast flashing.
Then Program-Switch to
Position 0: no charge-controller-function used
Position 1: charge-controller with Lead (Liquid-Battery)
Position 2: charge-controller with 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, all 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 an external Fuse for Safety!

Alarm-System (Optional)

One Major Problem of a Solar-System is the stealing of the Panels or of the Food in the Dryer. This Device is shipped with a **Theft-protection**.

Activate Alarm-System and Programming Time Output active after alarm or activation by Moving-Detector or Switch or Push-Button. Program-Switch Position 1
Parameter Program-Switch to Position 1
Press Push-Button until LED starts flashing fast.
Then Select Position 1-11 which corresponds to the time in minutes how long the Alarm-Output is active.
Alarm-System is deactivated with "0"
Save Settings by pressing the Push-Button until the LED Stops fast flashing
Presetting: off

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

If you have an Alarm-Sensor (Moving-Detector) and an Alarm- Horn connected, you can activate the Alarm-System with the Program-Switch
Switch Position 0: Alarm-System off
Switch Position = 2: Alarm-System on and Dryer is on. The Alarm is active after a delay of 30 seconds.
Switch Position = 3: 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, After a time, the Output is switched off again.
The Alarm-System can be simulated!

More options

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)

Data-Logging with LogView

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)

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
Evalate 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

Using Logview

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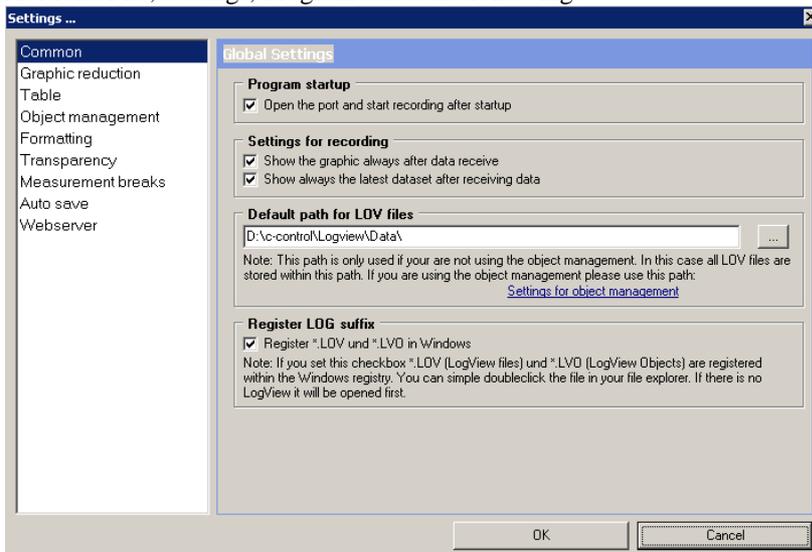
In the Default path for Log-Files the Log-Files are stored. You can modify it. These Files can be checked later on just by double-click

Registrier Log suffix should be checked that you can start Logview by direct clicking the *.lov file.
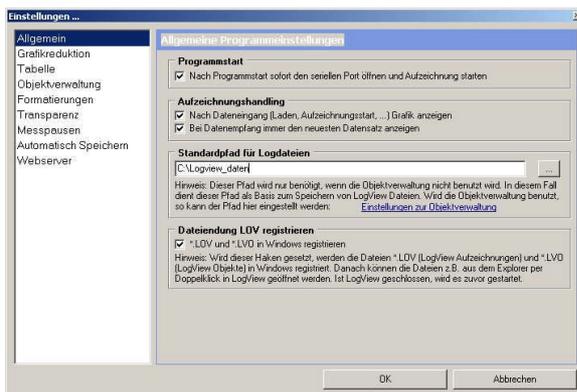
Then you can start the recording. In the Life-Window Data should come up.

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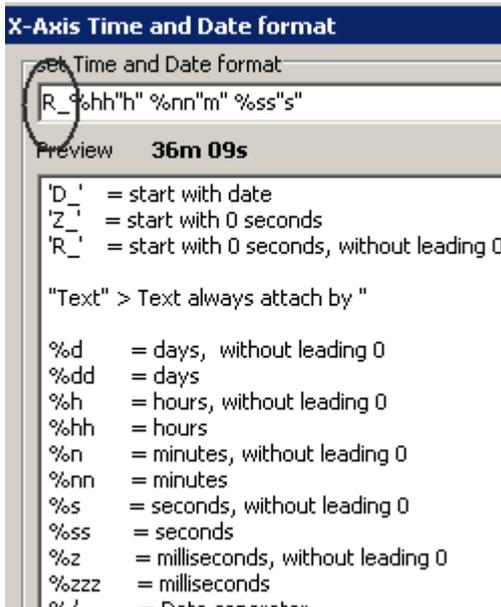
More Infos in the online-Manual of Logview and the Internet under www.logview.info

Hints

- ➢ How to Reset the Alarm? Press the Push-button if there is an Alarm
- ➢ Loading Logging-Temperature-values to a PC: connect the cable to Serial-Port or use a USB-serial-Adapter. Change Program-Selector to Position 11. The data will be transferred. It will take some time. Change Program-Selector back to the old position.
- ➢ If you Press Push-button during Switch on and the Program-Selector is "0" all programmed values will be set to "Presetting"
- ➢ 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 it is a Solar-controller-mode, all Outputs are switched delayed off if the battery is empty.
- ➢ If you Press Push-button during Switch on and the **Program-Selector is 1** the Simulation-Mode is active and Temperature can be simulated by the Program-Switch.
- ➢ If you Press Push-button during Switch on and the **Program-Selector is 2** relevant values for testing are send by the serial Interface like actual-Temperature, Setpoint Temperature, actual Drying-Time etc.
- ➢ If you Press Push-button during Switch on and the **Program-Selector is 3** relevant values for testing are send by the serial Interface and the drying-time is triggered fast for testing of the Profile.

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

Overview Functions of the Program-Switch

Position 0: Alarm-System off; Dryer off
   Programming-Mode: Activate Manual Mode for Outputs

Position 1: Dryer on; Alarm-System off;
   With Push-Button: Send Temperature-values to serial Port
   In Manual Mode: Fan 1 on manually;
   Programming-Mode: Alarm-System on (> 0) and Time Delay off (in minutes) for the Load Output which was activated by Moving-Detector or Switch; (EEPROM=1)

Position 2: Dryer on and Alarm-System active
   Manual Mode: Fan 2 on manually;
   Programming-Mode: Start with lower Temperature for x hours (EEPROM=2)

Position 3: only Alarm-System active
   Manual Mode: Fan 1+2 on manually;
   Programming-Mode: Stop with higher Temperature for x hours (EEPROM=3)

Position 4: only Irrigation-System is active
   Manual Mode: Heater on manually;
   Programming-Mode: Humidity Sensor on/off and Setpoint Humidity (EEPROM=4)

Position 5: Irrigation system is pulsed
Manual Mode: Alarm Output on;
Programming-Mode: Temperature Drying (EEPROM=9)

Position 6: Manual Mode: Fan 1 Speed 16 %;
Programming-Mode: Time for Drying in hrs * 2 (EEPROM=5)

Position 7: Manual Mode: Fan 1 Speed 32 %;
Programming-Mode: Dryer with the Option Heater (1-6), whereas 1-6 = Delta-Temp Start Heater
Irrigation active with cycle x day: 7-11 (EEPROM=6)

Position 8: Manual Mode: Fan 1 Speed 48 %;
Programming-Mode: 1 = Fan always on also at night; 2 = Dryer with the option second fan;
(EEPROM=7)

Position 9: Manual Mode: Fan 1 Speed 64 %;
Programming-Mode: Solar Charge-controller Function on / off and Battery-Type (Lead-Gel-Battery =
1, Gel-Type = 2). (EEPROM=8)

Position 10: Manual Mode: Fan 1 Speed 82 %;
Programming-Mode: Irrigation off / Irrigation-Time in min (EEPROM=10)

Position 11: Manual Mode: Fan 1 Speed 100 %;
Send Temperature-Data to PC by serial cable
Programming-Mode: Increase / decrease Temperature at the Start or End of drying (EEPROM=11)

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 lower Temperature at the beginning of Drying to avoid too rapid 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

➢ Regulation of Dryer for 12 V / 24 V Standard-Fan with up to 6 Fans in parallel.

➢ Regulation of Dryer for 220 V Fan with radio-Switch or integrated Phase-Loop-controller.

➢ Visual and acoustic Alarm if high Temperature occurs

➢ Optionally switch on and off a second fan for better controlling of the temperature

➢ Optionally a Heat-Device can be connected to be independent from critical weather conditions or to dry also at night. It is temperature-controlled by the Device.

➢ Manual Mode for all Outputs including regulated Outputs (0-100%)

➢ Logging of up to 850 Temperature-values in the Unit for upload to a PC.

Solar charge controller

➢ Up to 10 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.

- 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.

- Load-Shedding (switch off Output in case of low battery) to protect the battery.

- Applicable for most Types of Lead-Batteries (Lead, Gel-Type etc.)

- Applicable for 12V or 24V-Systems. n.

- Temperature-compensation for the Battery-voltage

- **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 a Solar-System 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 Device. Relay 1 is switched delayed on for a defined time. Relay 2 is switched on immediately for a defined time.

- **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 all important Parameter 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)

Specification, Technical Data

Mega168 with 16K Flash-Memory, 512 bytes EEPROM, 1K RAM, 3 timers / Counter, 6 analogue input 10 bits, one serial-Port	
Program-Switch	yes
Serial port	1
Bootloader, to load new Software by serial-Port	yes
LED-Lamps (Temp.max, Solar charge, on)	3
Analogue-Inputs	3
Regulated Output for Fan 12V / 24V (Pulse-width-Modulation)	1 Output for up to 6 fans
Max current regulated Output (automatic fuse)	8 A

Relay 1 Output for a second fan	Yes for 12V/24V/220V, max 8 A
Relay 2 Output for a heater if no sun-shine	Yes for 12V/24V/220V, max 8 A
Max current all Relay-Output (automatic fuse for 12V/24V)	8 A
Alarm-System with Moving-Detector	optional
Horn Output (fused by resistor to max. 1 A)	Max 1 A, 12V/24V
Integrated Solar charge controller (Option)	For 12 V or 24 V Systems, automatic adjustment. max. 10 A
Loading lead-batteries by power adapter	Optional, max. 10 A
Integrated irrigation controller	Yes, one channel with automatic time detection, pulsed and continuous irrigation, programmable
Soil-humid-sensor	Yes, analog or capacitive (Impulses, ext. electronique required)
Data recording by serial interface	Yes, all relevant values
Evaluate the data with the software LogView	yes
Output auxiliary-Voltage fixed x V, 0,5A	yes, optional

Terminals

external Terminals	External Wiring	Comment	external Terminals	external Wiring	Comment
40	Sensor out +5V		50	Fan 2 Out (Rel.1) +++	
41	Temp Input or Temp+Humidity	location opposite Fan	51	Fan 2 Out (Rel.1) ---	
42	Alarm Input	From Moving-Detector	52	Fan 1 —- var.Speed	
43	Alarm-Horn +++	12 V or 24 V, max 1A	53	Fan 2 +++ var.Speed	
44	Heater ++ (Rel.2) or Irrgation-Pump	12V, 24V max. 8 A for 220 V change internal wiring	54	Battery / Power-Supply +	
45	Soil-Humidity	Signal	55	Solar Panel +	
46	Solar Panel -	**12-20 V**	56		
47	Heater – (Rel.2) Or Irrigation-Pump		57	Moving-Detector ----	
48	Alarm-Horn --- Humid-Sensor ---	or Temp+Humidity-Sensor ----	58	Moving-Detector Humid-Sens + 12V	Power supply Moving Detector + Humid-Sensor
49	Battery / Power-Supply ----		59		

Modification for 220 V Outputs (red marks)

Internal Terminals		ext.Wiring	Internal Terminals		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 for 12 V Output**
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 / 220 V**
8	Micro+		28	Relay 1 in	**For 220 V remove wire and Input 220 V here**
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	**For 220 V remove wire and Input 220 V here**	33	Minus		**Fan 2 Minus**
14	Relay 2 NO	**Heater 12V / 220 V**	34	Minus		**Moving-Detector Minus**

Appendix

If you press the push-button during start-up and the program-switch is in position "2", then following EEPROM-data are displayed

'EEPROM-Data
'1 = Set Alarm-Time and on/off (Switch Pos 1)
'2 = Start with lower Temperature for x hours (Switch=2)
'3 = Stop with higher Temperature for x hours (Switch=3)
'4 = Setpoint air-Humidity (Switch=4)
'5 = Time for Drying in hrs * 2 (Switch=6)
'6 = Heater-Option + Delta Heater. Cycle for irrigate (Switch=7)
'7 = 1=fan always on; 2 = second fan? (Switch=8)
'8 = Solar charge controller on = 1 Lead-Batt; 2=Gel-Type (Switch=9)
'9 = Temperature Setpoint Dryer (Switch=5)
'10 = Irrigatin-Time (Switch=10)
'11 = increase /decrease Temp start/end (Switch=11)
'12 = Time_temp_ok_hr
'13 = Auto_hour
'14 = Setpoint soil Humidity

Contact

For Problems, Questions, Suggestions….
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