The Metamorphosis as a Irrigation-Controller with many Options
The Solar Water-Pump

(Your Case may be different. Depends from the order)

Changes

Datum	Changes	Chapter	Page
10.6.09	Universal-Module	Universal-Modul	3

Content:

Remarks:

We do not say that everything of the Metamorphosis is already perfect. But we appreciate all hints and remarks to improve the Hardware (Case) and Software. "The Software is alive" and also your ideas and proposals can be implemented and transferred to you. You find the last Version of the Software in the Internet. (see Chapter "Loading of new Software"). Contact me if you have questions. The Address is at the end of the Document.

Not all Functions are realized in every Unit. Look for your Order what is implemented in your Unit

Quick Start

➢ See the appendix for the electrical wiring. Keep in mind that external Sensors should have a shielded cable in order to get more accurate measuring. Shield has to be connected to Minus or +5V.
➢ Switch on the device and go to Menu 7 (press "7" in the Ground-Menu after switch on); Input the actual Time in there (if one value is o.k. go with "#" to the next value); Return from this menu by pressing "*"
➢ Go to Menu 1 (press "1" in the Ground-Menu) and input the hour, minute and irrigation-time ("for"); Go to the next value with key "#". See description for Menu 1 for Details.
➢ Optional you can enter a set-value for the humid (go there by pressing several times "#"), the start of the pump from the time-program is disabled when the humid is too high.
➢ If you switch the Program-Switch (in the middle of the Unit) from Position 1 (which means "all off") to Position "2" then the irrigation-Program Starts according to the defined Program.
➢ To get the Pumps on manually, press "9" and then the according Pump-Nr (3 for example).
➢ Activate in Menu 8 Parameter 25 the Function "detect Sensor-Fault" if all Sensors are wired and have a Signal.
➢ If you install the Software Dialer from the CD (Folder \PC_Remote_Control_by_Dialer) you have an easy access to all Documents and Parameters.
➢ What to do next? You can navigate through the different functions to verify what is relevant for you. In the Feature-List at the end you find a short overview about the different Possibilities.

Keyboard-Functions

In the Basic-Menu when a message is displayed, you can acknowledge this message and switch off the horn by pressing any key.
From the Basic-Menu (the menu on the display after being switch on) you can select different **Sub-Menus** by pressing the key 1 to 9. In the Sub-Menus you can jump from one value to the other by pressing "#". The flashing Cursor indicates which value is active for Input. So if you input wrong data, press "#" several times until you come again to the desired value. In Menu 1 (Universal-channel) you can go back one Input-field also by key "*".
If you changed the value you can go directly back to Basic-Menu without pressing "#"
Go back or return from the Submenu by pressing "*". From Menu 1 (Universal-channel) you return by pressing "*" twice.

Overview over the different Functions of the Metamorphosis

As a Time-Controlled Irrigation

In Menu 1: Input hour and minute and on-time. The rest should be set to "0"; Select the according Output in the subsequent Parameter

Irrigate just once for a defined time

In Menu 1: Select one channel (1-20). Define the running time at on-time. The rest should be set to "0". Select the according Output in the subsequent Parameter

Switch on the Output for x min all x min/hr

Input hour and minute and on-time and the "on all"-time. The Set-value should be set to "0". In this way you can realize a kind of Trickle-Irrigation (for example Irrigate 30 second every 5 minute).
For **"on-time"** value 1-99 is seconds
1.01-1.99 means minutes, that means 1.01 is one minute, 1.05 5 minutes etc
2.01-2.55 means hour

For **"on all"** value 1-99 is minutes
1.01-1.99 means hours, that means 1.01 is all hour, 1.05 all 5 hours
2.01-2.55 means day, that means 2.02 is all second day

For example you can activate Irrigation only every second day etc. (Type 202 at "on all" for every second day)

As a timer combined with a Analogue input (Humid-Measurement for example)

Input hour and minute and on-time and optional "on all".
Input the Set value in the next Menu. You should define a Hysteresis (for example 2.0) for not have the Output switched too often
If the Timer is active and the actual-value is below the Set-Value the Output of the according channel (next Menus) will be activated.

Irrigation only if Humidity is less than x (a switch depending from a Analogue input)

This Program can also have a Time-grid to work. Define it in the first menu. Define a Set-point for to Start Irrigation. You should define a Hysteresis (for example 2.0) for not have the Output switched too often. You can switch "<" to ">" with key 1/0 if needed. With ">" the Output switches on, if the Actual Value is more than the Set-value (Cooling). Use "<" for Heating.

    Parameters for the Channel in Menu 1:

Irrigation

Time-module	Pulses (all min/hr/day)	Act.value Input 1	Act.value > / < Setpoint	Setpoint	Hysteresis	Type:0=%, 1 = °C, 2 = level, > 9=Alarm
Time-Prog?	Time-Prog?	Humidity (Display)	>	Setpoint x %	1,0 %	1
Delay on (s)	**Delay off (s / m / h)**	**Input 1 (1-16,101-108)**	**Output 1 (1-20)**	**Input 2 (1-20,51..,101..)**	**Output 2 (1-20)**	**Wait-T after alarm (min)**
10 s	optional 10s	3=Measurement Input 3	f.e.6 = Relay 6	0	0	0

If you want to have the device being switched depending from a Analogue input only for a specific time

Enter only the time at "for" and the Humid / Temperature-Set-point. In this case the device will be switched on only for this time and if the actual-value is lower / higher than the Set-value.

If you want to have several start-times a day for one Pump

One way: Select the Time-Program and define "on all" for example 1.02, that means all 2. hour start Time-Program.
Or define several Channels in Menu 1 for the same Pump (same Output). The channels work parallel on the same Output.

If you want to have trickle-irrigation only at night

Give the Start-Time (only the hour) for this at "hour", and the Stop-Time (on the hour) at minute; In this case the minute-value will be the stop time for the irrigation. Then you give the on-Time and the cycle-time "all ...". The irrigation system is active now only between this two hour-values.

If you want to have a anti-frost irrigation (Temperature < x °C)

You define your Irrigation-Channels in Menu 1 (see below)
Select in Menu 2 "Temp do Irrigate"
You define in the next Menu (key "#") the Temperature for to Start Irrigation (Temp Min)

If you want to have no Irrigation if the Temperature is < x °C

You define your Irrigation-Channels in Menu 1 (see below)
Select in Menu 2 "Temp no Irrigate"
You define in the next Menu (key "#") the Temperature for to Stop Irrigation (Temp Min)

If you want to have no Irrigation if the Temperature is > x °C

You define your Irrigation-Channels in Menu 1 (see below)
Select in Menu 2 "Temp no Irrigate"
You define in the next Menu (key "#") the Temperature for to Stop Irrigation (Temp Max)

If you want to cool or heat (a glass-house for example)

You can use this device not only for irrigation, but also for to switch on and off a fan for cooling or a motor or a heater.
Go to Menu 1 and set up the according Parameters.
For **Heating**: Select "<" at Setpoint and as a Set-value 38 °C for example; Set the Hysteresis to 2.0 °C for example. Select as Type "1".
It means the Controller starts **heating** if the temperature is less then 38 °C and stops at 40 °C.
For **Cooling**: Select ">" at Setpoint and as a Set-value 20 °C for example; Set the Hysteresis to 2.0 °C for example. Select as Type "1".
It means that the controller starts **cooling** if the temperature is more then 20 °C and stops at 18 °C.

Cooling

Time-module	Pulses (all min/hr/day)	Actual value Input 1	Act.value > / < Setpoint	Setpoint	Hysteresis	Type:0=V, 1 = °C, 2 = level, >9=Alarm
Time-Prog?		Temperatur	>	Setpoint x °C	1,0 °C	1
Delay on (s)	**Delay off (s / m / h)**	**Input 1 (1-16,101-108)**	**Output 1 (1-20)**	**Input 2 (1-20,51..,101..)**	**Output 2 (1-20)**	**Wait-T after alarm (min)**
10 s	optional 10s	1=Meas-Input 1 (Temp)	f.e.6 = Relay 6	0	0	0

Heating

Time-module	Pulses (all min/hr/day)	Act.value Input 1	Act.value > / < Setpoint	Setpoint	Hysteresis	Type:0=V, 1 = °C, 2 = level, >9=Alarm
Time-Prog?		Temperature	<	Setpoint Temp. X °C	1,0 °C	1
Delay on (s)	**Delay off (s / m / h)**	**Input 1 (1-16,101-108)**	**Output 1 (1-20)**	**Input 2 (1-20,51..,101..)**	**Output 2 (1-20)**	**Wait-T after alarm (min)**
10 s	optional 10s	1=Meas-Input 1 (Temp)	f.e.7 = Relay 7	0	0	0

Automatic fill up of the Water-Tank with Analog-Sensor (0-100%)

For this you can use the Channels in Menu 1; Select your Analogue Sensor for Input in Menu 1 and the Output for the Pump or Valve.
Then you can Setup a Setpoint, a Hysteresis and a Output for one Channel.
Example: Start Pump if the level is 10% and Stop if it is 95%; you set a Setpoint of 10%, a Hysteresis of 85% and Process should start if actual is less (Input "<") then Setpoint. A Delay on and Delay off with 20 sec is recommended.
   Parameters for the Channel in Menu 1:

Level-regulation with a level-measurement Unit

Time-module	Pulses (all min/hr/day)	Indication Act.Value Input 1	Act.value > / < Setpoint	Setpoint	Hysteresis	Type:0=V, 1 = °C, 2 = level, >9=Alarm
Time-Prog?		Indication level	<	Setpoint level 90%	1,0%	2
Delay on (s)	**Delay off (s / m / h)**	**Input 1 (1-16, 101-108)**	**Output 1 (1-20)**	**Input 2 (1-20,51..,101..)**	**Output 2 (1-20)**	**Wait-T after alarm (min)**
10 s	0	2=Meas-Input 2 (Niv)	f.e.7 = Relay 7	0	0	0

Automatic fill up of the Water-Tank with one Digital-Sensor (Empty)

The easiest way you select Menu 3. Select Delay on-Time (may be 5 seconds), The Delay-off time is the time to switch of the Pump after activation. Then select one Input and Output. In the first Menu you have to activate the Function. Loot at chapter Menu 3 for more information.

For this you can use the Channels in Menu 1; Select the according Input of the Digital Sensor. Depending of the Type of Sensor (normally open or normally closed) you have to Setup "<" at Setpoint for a Sensor who has "0"-Signal if it is empty.

For a Sensor who has "1"-Signal if it is empty you select ">" at Setpoint

Then select the Output for the Pump or Valve.

Then you define a Setpoint of 50.0%, no Hysteresis and a Delay-on Time of about 10 seconds. The Delay-off-Time is the time the Pump needs to fill up the tank (a bit less because of the Hysteresis of the Sensor).

Parameters for the Channel in Menu 1:

Level-regulation with only one empty-probe

Time-module	Pulses (all min/hr/day)	Indication Act.Value Input 1	Act.value > / < Setpoint	Setpoint 50.0 (digital Input)	Hysteresis	Type:0=V, 1 = °C, 2=Niveau, >9=Alarm
Time-Prog?		empty=0; Full=99	<	50	0	2
Delay on (s)	**Delay off (s / m / h)**	**Input 1 (1-16,101-108)**	**Output 1 (1-20)**	**Input 2 (1-20,51..,101..)**	**Output 2 (1-20)**	**Wait-T after alarm (min)**
10 s	filling-time 1.20 = 20-min	101=Drain Input 1	f.e.7 = Relay 7	0	0	0

Reference: filling time is defined at Delay off

Automatic fill up of the Water-Tank with two Digital-Sensors (Empty and Full)

For this you can use the Channels in Menu 1; Select the according Input for Empty. The Input for full has to be selected for Input 2.

Depending of the Type of Sensor (normally open or normally closed) you have to Setup

"<" at Setpoint for a Empty-Sensor who has "0"-Signal if it is empty.

For a Empty-Sensor who has "1"-Signal if it is empty you select ">" at Setpoint

For a Full-Sensor who has "0"-Signal if it is full you select "Input 2 ok = "1""

For a Full-Sensor who has "1"-Signal if it is full you select "Input 2 ok = "0""

Then select the Output for the Pump or Valve.

Then you define a Setpoint of 50.0%, no Hysteresis and a Delay-on Time of about 10 seconds. The Delay-off-Time could be about 10 seconds.

For safety (Sensor-cable is broken) you can define a Max-Time in this Menu to force the Pump to stop although full Signal is not coming.

Level-regulation (Filling) with full and empty-probe

Parameters for the Channel in Menu 1:

Time-module	Pulses (all min/hr/day)	Indication Act.Value Input 1	Act.value > / < Setpoint	Setpoint	Hysteresis	Type:0=V, 1 = °C, 2 = Level, >9=Alarm
Time-Prog?		empty=0; Full=99	<	50	0	2
Delay on (s)	**Delay off (s / m / h), 10 min =1.10)**	**Input 1 (1-16,101-108)**	**Output 1 (1-20)**	**Input 2 (1-20,51..,101..)**	**Output 2 (1-20)**	**Wait-T after alarm (min)**
10 s	Max-time filling	101=empty-Input 1	f.e.7 = Relay 7, f.e.Pump	102=Full-Input 2	0	0

at Delay off you must Input the maximum Filling-Time, if the second sensor (Max) should be defective

Level-regulation (Emptying) with full and empty-probe

Parameters for the Channel in Menu 1:

Level-regulation with full and empty-probe

Time-module	Pulses (all min/hr/day)	Indication Act.Value Input 1	Act.value > / < Setpoint	Setpoint	Hysteresis	Type:0=V, 1 = °C, 2 = Level, >9=Alarm
Time-Prog?		empty=0; Full=99	<	50	0	2
Delay on (s)	**Delay off (s / m / h), 10 min =1.10)**	**Input 1 (1-16,101-108)**	**Output 1 (1-20)**	**Input 2 (1-20,51..,101..)**	**Output 2 (1-20)**	**Wait-T after alarm (min)**

			f.e.6 = Relay 6			
10 s	Empty Max-time	101=Full-Input 1	f.e.Valve	102=empty-Input 2	0	0

at Delay off you must Input the maximum Emptying-Time, if the second sensor (min) should be defective

Alarm when the Water-Tank is empty

You can have an Alarm when the Tank is empty or at any other condition. You have to define one channel with Type "3". And like above you define the Input and the Setpoint (for Digital Sensors it is 50%). But you don't need a Output. In Case of Alarm you have a Message-Text, and a Beep (if it is integrated in the Unit).

If you want to have a Telephone-notification or SMS in case of Alarm

If there is a Telephone-number defined and selected in Menu 4, you can also have a Telephone-call by Mobile-Phone or by Telephone-Line.
In the Channels in Menu 1 you have to select Output "16" as Output in order to initiate the Telephone-Call.
To interrupt the Telephone-call press the key "*".
If in Menu 8, Parameter 23 "Send SMS" is selected, you will have a SMS generated in case of Alarm

Switch off the Pumps when the Water-Tank is empty by Level-Senor

Pumps can be destroyed if they run longer without water. To have a monitoring for that you need to put a Empty-level Indication in the water-Tank. See Appendix on how to connect the Empty-level Sensor. You define your Irrigation-Parameters in Menu 1 (Time and Setpoint etc) and for Input 2 you select the Input for the Empty-Level Probe.

Switch off the Pumps when there is no flow (no change in actual Value)

There is also an automatic Alarm-Detection if the Sensor-Value does not change after Start Irrigation (in Menu 1). In this case the Output is switched off until you confirm it.
For to use this Function activate the Switch "Sensor-Alarm" in the Channels. If the Pump is and after a certain time there is no change in the actual value the Output is deactivated.
But the more reliable is the solution is with the external Sensor

If you want to have two ore more Outputs started in combination (Irrigation and Dosing of Agents)

In each channel you can have two Outputs (for example Irrigation and Dosing).
If that is not enough you can have another channel with the same conditions and another two outputs.
Define the Input, Setpoint and also whether it is a pulsed output (on all…) or not. In this case the dosing Pump is only active if the Irrigation-Pump is on

Parameters for the Channel in Menu 1:

Two Output, Dosing-Pump pulsed

Time-module	Pulses (all min/hr/day)	Act.value Input 1	Act.value > / < Setpoint	Setpoint	Hysteresis	Type:0=%, 1= °C, 2 = Level, 3=V, 4=%; >20=Interlock
Time-Prog?	Pulses pump	xx	>	50%	0,0	4
Delay on (s)	**Delay off (s / m / h)**	**Input 1 (1-16,101-108)**	**Output 1 (1-20)**	**Input 2 (1-20,51..,101..)**	**Output 2 (1-20)**	**Wait-T after alarm (min)**
0 s	0s	0	6=Dosing-Pump Relay 6	7=Pump on Relay 7	0	0

If you want to have two Outputs started in combination (Irrigation and Dosing of Agents) and Dosing should be pulsed

You define one channel for the Pump and another channel for Dosing. Here you define the Pulses for the Dosing. Then you select at the Dosing-Channel for Input 2 the Output of the Irrigation-channel. Then Dosing is activated only if the Irrigation is active and Dosing is pulsed.

If you want to have one Outputs started with two Sensors-Setpoint (Humid-Sensor and Rain-Sensor)

You define two Channels in Menu 1 for the Humid-Sensor and for the Rain-Sensor with Setpoints, Input and Output.
But for the Rain-Sensor you select as Output 20 (Output 17-20 are virtual Outputs, that means no Hardware is available).
For the Humid-Sensor you select for Input 2 the Output 20 and for Output 1 the real Output for the pump etc.
That means the Channel for the Humid-Sensor is only activated when the Rain-Sensor-condition is ok.

Using Pulse-Valves (one Pulse for on, one Pulse for off)

Look at Menu 9, Parameter 59-66. There you can define which Outputs should only be pulsed.

Anti-Blocking-System

For to prevent blocking of the Pump if it was not activated for longer. See Parameter 67-71 at Menu 8 for the according Outputs.

Alarm-Channels

In Menu 3 you can define up to 5 Alarm-Channels from the Analogue and Digital Inputs with delay on and delay off. That can be Moving-Detectors or a door switch or Temperature-Alarm etc.
And you can decide whether it is only a Alarm or a Telephone-call should be triggered. In the first Menu you have to activate the Function.
This Function can be used for a Level-Control as well.
Loot at chapter Menu 3 for more information.

Alarm if the temperature > x °C. (Can be as well Level, Voltage etc)
Parameters for the Channel in Menu 1:

Alarm-system with analogue Input and Relay-Output

Time-module	Pulses (all min/hr/day)	Act.value Input 1	Act.value > / < Setpoint	Setpoint	Hysteresis	Type:0=%, 1= °C, 2 = Level, 3=V, 9=no Unit; >9=Alarm
Time-Prog?		Act.value	>	X °C	1.0 °C	11=°C, 12=%
Delay on (s)	**Delay off (s / m / h)**	**Input 1 (1-16,101-108)**	**Output 1 (1-20)**	**Input 2 (1-20,51..,101..)**	**Output 2 (1-20)**	**Wait-T after alarm (min)**
20	20	2=Meas-Input 2 (Level)	7=Relay 7	0	30 (Alarm-text)	10

Reference: Output 1 or 2 with value 30 generates a Alarm-Text on the LCD

Parameters for the Channel in Menu 1:

Alarm-system with digital Input and Relay-Output

Time-module	Pulses (all min/hr/day)	Act.value Input 1	Act.value > / < Setpoint	Setpoint 50.0 (digital input)	Hysteresis	Type:0=%, 1= °C, 2 = Level, 3=V, 9=no Unit; >9=Alarm
Time-Prog?		Status (0=off ,99 = on)	>	50	0	10
Delay on (s)	**Delay off (s / m / h)**	**Input 1 (1-16,101-108)**	**Output 1 (1-20)**	**Input 2 (1-20,51..,101..)**	**Output 2 (1-20)**	**Wait-T after alarm (min)**
20	20	101=Input 1	7=Relay 7	0	0	10

Reference: Output 1 or 2 with value 30 generates a Alarm-Text on the LCD

Interlocks with another Output

(f.e. if the Dosing-Pump should run only if the irrigation pump is active).
If the condition is fulfilled, the Output 1 and 2 is locked.
At Input 2 you have to select the according Output 1...20, who generates the Interlock.
Example: Relay 7 only active if the Relay 5 is active
Parameters for the Channel in Menu 1:

Interlock of an Output with another Output

Time-module	Pulses (all min/hr/day)	Act.value Input 1	Act.value > / < Setpoint	Setpoint 50.0 (digital Input)	Hysteresis	Type:0=%, 1= °C, 2 = Level, 3=V, 9=no Unit; >9=Alarm

0	0	Act.value	>	Setpoint	1,0	23= Interlock Level
Delay on (s)	**Delay off (s / m / h)**	**Input 1 (1-16,101..**	**Output 1 (1-20)**	**Input 2 (1-20,51..,101..)**	**check for =1/0**	**Output 2 (1-20)**
0	0	0	7=Output Relay 7	5 = Relay 5 (Interlock-Producer)	0	0

Reference: Output 2 blocks the Output 1 if it is 0

Reset (interlocking) of an Output with activation by another universal-module
Input type 20 -24: like type 0-4 but the Output is only Reset in this mode
If the conditions of the channel are fulfilled (Conditions from Input 1 and 2), the Output 1 of this channel is Reset. The Output has to be activated by another channel; it is only Reset by this function.
Example:
Interlock of the Output with a maximum temperature
Interlock of the Output with a Full-Probe
Interlock of a pump with an empty-probe

   Parameters for the Channel in Menu 1:

Reset of an Output if the condition is fulfilled

Time-module	Pulses (all min/hr/day)	Act.value Input 1	Act.value > / < Setpoint	Setpoint	Hysteresis	Type:0=%, 1= °C, 2 = Level, 3=V, 9=no Unit; >9=Alarm
0	0	Act.value	>	Setpoint (for, locking)	1,0	23=Interlock Unit °C
Delay on (s)	**Delay off (s / m / h)**	**Input 1 (1-16,101-108)**	**Output 1, 1 - 20)**	**Input 2, 1-20,51..,101..)**	**check for =1/0**	**Output 2 (1-20)**
0	0	3 = Temperature	7=Reset Output.7	0	0	0

  Reference: Also digital Input can be used for interlock

Interlock with a digital Input
If the conditions of the channel are fulfilled. the Output 1 and 2 is locked
Example: Output active only if no Full-Signal (full = 1-signal)
   Parameters for the Channel in Menu 1:

Interlock of an Output with an Input

Time-module	Pulses (all min/hr/day)	Act.value Input 1	Act.value > / < Setpoint	Setpoint	Hysteresis	Type:0=%, 1= °C, 2 = Level, 3=V, 9=no Unit; > 20=Interlock
0	0	Act.value	>	Setpoint	1,0	23= Interlock
Delay on (s)	**Delay off (s / m / h)**	**Input 1 (1-16,101-108)**	**Output 1 (1-20)**	**Input 2 (1-20)51..,101..)**	**check for =1/0**	**Output 2 (1-20)**
0	0	0	7=Output Relay 7	101 (Input 1 Interlock)	0	0

Reference: Input 2 blocks the Output if he is 0

Switching of an Output for a certain time (Pulse) after activation
If the condition are fulfilled (Analogue or digital), the Output 1 and 3 are activated for the time defined in delay on
Example: Start of a Pump for a certain time after activation by switch
   Parameters for the Channel in Menu 1:

Output-impulse after capitalization

Time-module	Pulses (all min/hr/day)	Act.value Input 1	Act.value > / < Setpoint	Setpoint	Hysteresis	Type:0=%, 1= °C, 2 = Level, 3=V, 9=no Unit; >9=Alarm
0	0	Act.value	>	Setpoint	1,0	30= Impuls Unit %
Delay on (s)	**Delay off (s / m / h)**	**Input 1 (1-16,101-108)**	**Output 1 (1-20)**	**Input 2 (1-20)51..,101..)**	**check for =1/0**	**Output 2 (1-20)**
30 s= Impuls-Time	0	Start x by Analogue Input	7=Output Relay 7	Or start by digital Input (101...)	0	0

Auto-Time by a light sensitive Sensor (LDR)

By using this Function the time is setup automatic by a light sensitive Sensor. This must be mounted outdoor.

If you activate this function the start time of channel 1 to 5 is set to 4 o'clock in the night.

Auto-Setpoint Irrigation-Time

In order to have optimized Irrigation-hours depending from the Soil humidity, you can activate a Auto-Setpoint Irrigation-Time in Menu 1.
It works in this way:
 ➢ You set-up a maximum running Time for the Pump at Menu 1 at the at "on for.."-Value
 ➢ You activate the "Auto"-Switch in one of the following Menus.
 ➢ You can see next to "Auto" at "Act" the Time the System calculates for the Irrigation-Time according to the minimum Humidity (0 min Pump on) and the maximum Humidity (max. Time Pump on).
 ➢ If the minimum Humidity and the maximum Humidity is not yet calibrated, the System works with 50% of max. Time Pump on.
 ➢ The detection of the minimum Humidity and the maximum Humidity is done every night at 3 o'clock.
 ➢ Use next Function for to speed up the detection of minimum and maximum humidity

Automatic detection of minimum and maximum humidity

You can use this function to detect faster the Minimal and Maximal Humidity of the soil. This is the base for the calculation of the Auto Setpoint Irrigation-Time in Menu 1.
This function is activated in Menu 8 at Parameter 26.
If this function is activated, the first night there will be maximum Irrigation (according to on- Time set in the according channel). Then there will be some days no Irrigation (the number of days are defined in Menu 8 Parameter 3). From this values the minimum and maximum humidity will be verified. Of course it does not work if there is a rain shower in that time.
They minimum and maximum humidity can be verified and changed in the Menu 1 the last Parameter.

Production if potable water by heating the water

Potable water is a serious problem in many countries! This Unit has a integrated Pasteurization-Function for to clean water from bacteria and microbes in order to get potable water. The System works by heating the water with sun or by other means and measuring the Temperature and Time. When it satisfies the requirement a Pump is switched on to get the next batch of water. This can be realized in a Solar Cooker for example. How to activate this function? Go to Menu 1 and select as Typ 4.
The Setpoint represents the Pasteurization-value, that means how long the water will be heated to what temperature.
The Max-Time in the following menu represents the Max-Time the pump is on until the heating unit (for example a pipe from copper) is completely replaced by new water.
Here you find some more Information and Photos about that:
www.alternative-technology.de\Solar-Cooker\solar-cooker.html
Contact us for to get more information about that.

Difference-temperature-regulation (f.e. for a solar thermal-System),
Two Analogue Inputs are compared and according to that an Output is switched. For a Solar thermal System this would be the Temperature in the storage-Tank and the Temperature in the solar-collector. But any Measurement can be compared and it can also be an external Setpoint-Device.
 Parameters for the Channel in Menu 1:

Difference-temperature-regulation (Solar thermal-System)

Time-module	Pulses (all min/hr/day)	Act.value Input 1	Act.value > / < Setpoint	Setpoint	Hysteresis	Type:0=%, 1= °C, 2 = Level, 3=V, 9=no Unit; >9=Alarm
Time-Prog?		Act.value Temp.1	>	Act.value Temp.2	1.0	1
Delay on (s)	Delay off (s / m / h)	Input 1 (1-16,101-108)	Output 1 (1-20)	Input 2 (1-20,51..,101..)	Output 2 (1-20)	Wait-T after alarm (min)
20	20	1=Meas.1	2=Rel.2=Pump	52=Meas.2	0	0

Light / Device delayed off after activating by Switch or Moving-Detektor
For to save Power for example you can switch of Devices delayed after activation by this function.
 Parameters for the Channel in Menu 1:

Time-module	Pulses (all min/hr/day)	Act.value Input 1	Act.value > / < Setpoint	Setpoint 50.0 (for digital Input)	Hysteresis	Type:0=%, 1= °C, 2 = Level, 3=V, 9=no Unit; >9=Alarm
Time-Prog?		Status (99=on)	>	50	0	9=no Unit

Delay on (s)	Delay off (s / m / h)	Input 1 (1-16,101-108)	Output 1 (1-20)	Input 2 (1-20,51..,101..)	Output 2 (1-20)	Wait-T after alarm (min)
0 s	1.05 (= 5-min)	101=Input 1	7=Relay 7	0	0	0

Solar charge-Controller

The Irrigation-Controller can be shipped with a high grad Solar-charge controller with many Options. Multiple Step Load Shedding, Boost-charging, Full-charge and Equalization-charge Modes. And a PWM-Charging for a smooth fill up of the Battery. Optional you have High-Current pulses for to extend the life-time of the batteries. In Menu 8, Parameter 30 you switch on the Solar-Charger

Load Shedding

In Menu 6 you can define up to 5 Load-channels and cascade the voltage to switch off the Load. In this way you can define more or less important Units to be switched off. Go to chapter Menu 6 for more information
Following Parameters correspond to Load Shedding:
47: Load 1 Select Output
48: Load 2 Select Output
49: Load 3 Select Output
50: Load 4 Select Output
51: Load 5 Select Output

Radio-Sensors

For the Radio-Sensors you need a Receiver-Modul. You have to plug it in the Plug at the Box.
All Radio-Transmitter (Wind-Sensor, Rain etc) can work on the same Receiver.
If you switch with the Program-Selector to Position 12 (last Position) then you will have after some time the data of the Radio-Transmitters.
If no Data is coming, the Transmitter or the Receiver has a fault.
These Data can be logged now. For this you have to Setup the Number of Scans in Menu 8, Parameter 44
Or you have a dedicated reaction on each Sensor if you use the Universal-Modul and you select 201…204 as Input.
201 = Wind Speed
202 = Radio Temperature
203 = Radio Humidity
204 = Radio Rain

Keep in mind that if you have many Actual Values to Scan at a high rate, the Memory can be filled up fast.

Furthermore you can use the Raadio-Sensors for the channels and switch anything with it. Or you can generate a Alarm
For this in Menu 1 the following has to be defined for Input 1:

- 201 = ELV Radio-Sensor 1 Wind Velocity
- 202 = ELV Radio-Sensor 3 Temperature
- 203 = ELV Radio-Sensor 4 Humidity
- 204 = ELV Radio-Sensor 5 Rain

Then you have to define the according Output and Setpoint.

USB-Adapter

If you do not have a serial Port, then you can use a USB-Adapter. For this install the driver from the CD first and then Plug in the USB-cable and connect the serial cable with the Adapter and the Metamorphosis.

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

  If there was another Software in the Unit before (Solar charge controller for example), then reset all Parameters first by Menu 8, Parameter 19

Installing of the Compiler BASCOM
- ✓ 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 \BASCOM-AVR\Setup.exe. Install to the folder C:\BASCOM-AVR **(and not to C:\Programme\MCS Electronics\BASCOM-AVR as recommended**)
- ✓ But you have to take care not to put to much code in the Chip and not exceed 128 000 Byte. Otherwise it would overwrite the Bootloader and you can not load programs any more. From 2.2009 on with the new M256-chip this problem does not appear any more.
- ✓ 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:\BASCOM-AVR\Bascavr.exe. But you can also go to the Start-Button and Programs and \ MCS Electronics\BASCOM-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

- ✓ 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

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

Program-Switch

(Located in the middle of the Case)

1 = Off (all is switched off); Display of time, ext.Temperature, Battery-Voltage
If you want to have all Outputs being switched off, put the Program-switch in the middle to the position 1. Only Solar charging is active
2 = Display Channel 1-3 Pumps and actual values; according number are flashing if the Pump is running;
3 = Display Channel 4-6 Pumps and actual values; according number are flashing if the Pump is running;
4 = Display Channel 7-9 Pumps and actual values; according number are flashing if the Pump is running;
5 = Display Solar Voltage, Solar Current, Solar Power, Load Current,
6 = Display Wh Solar, Wh Solar / day
7 = Display Wh Load, Wh Load / day
8 = Display Ah Solar, Ah Solar/day
9 = Display Ah Load, Ah Load/day

10 = Display U Max, U Min
11 = Display internal Temperature, Time, Solar loading
12 = Display of values Radio-Sensors if they exist

The Basic-Menu

The Basic-Menu is on the LCD-Display after switching on.
The actual-value of the four humid-sensors are shown in this menu
In the Ground-Menu when a message is displayed, you can acknowledge this message by pressing any key
You can switch of the horn in the same way.
From the Ground-Menu (the menu on the display after being switch on) you can select different **Sub-Menus** by pressing the key 1 to 9. In the Sub-Menus you can jump from one value to the other by pressing "#". So if you input wrong data, press "#" several times until you come again to the value. Return from the Submenu by pressing "*"

Menu 1 = Universal Channels 1-20

Here you can program 20 Channels for Irrigation and many other Functions.

Overview of the functions of the Universal module

Timer: Device switched Time-controlled (f.e. fridge only at daytime, light only at night etc).

Start once for a defined Time: You just setup the running-time of the Timer and then switch the channel on. The Output is active just once for the defined time. After that the channel is switched off.

Pulses: Device switched with Pulses. Every minute for 10 seconds or every Monday for 3 hours etc. For example for a generator start etc.

The above Time -Function can be combined with all other functions.

Simulation of absence: Often Solar-Systems are installed where people are often absent. You can program a Timer to switch on lights for to simulate the Presence of somebody

Load-shedding: Different Loads can be switched off depending from the Battery-Level. With delay switch on and delay switch off (minimum run-time). With Hysteresis (Difference-value between on and off).This can be used for Load-shedding of the Devices connected. First the less important, then the critical ones.

Voltage-Control: Switch on devices if the battery is full etc. For example for to use all Power of the Solar-Panels to switch a Water-Pump etc. With delay on/off and Hysteresis.

Output Delayed off: for example to switch on a light by a switch and turn off automatic to save Power. The Start can be by a Push-Button or a Switch.

Alarm-Messages and Action: For example if any Value (Voltage, Temperature) is inside a critical range a Alarm can be activated and / or a Telephone-call, SMS etc.

Alarm-System: Using moving-Detectors etc. or door-switches (in the cabinet etc) you can build up a Alarm-System for to protect your equipment. Alarm can be by a Siren or a Telephone-call or a SMS if you have a Mobile-Phone connected.

Cooling: For example the solar panel. You can Input the Temperature-Setpoint with Hysteresis and Pulses for the cooling-pump.

Heating: For example a glass-house if it may not get too cold. With Temperature-Setpoint and Hysteresis.

Level-Control with analog Sensors: for example for the Tank of the cooling water.

Level-Control with 1 or 2 digital Sensors: for example refill for a certain time if the empty Level is coming.

Interlock with an Input: Pump only active if no empty-Level.

Interlock with an Output: Dosing only active if the Pump is running.

Difference-Regulation: For example for Solar-thermal Systems for the Temperature-Difference-Regulation

Activating Channel by SMS
If you send a SMS with the Text Meta81 or Meta91 to the Metamorphosis, you can activate a Universal-channel by selecting Input 81 (for SMS with the Text Meta81) or 91 (for SMS with the Text Meta91). If all conditions are ok and you send the SMS the output will be switched on. By Sending the SMS with the Text Meta80 or Meta90 the Module is deactivated again

In each Module you can define two Inputs and two Outputs. Inputs can be analog or digital, Outputs Relais or Transistor or virtual, to be used in other Modules. Or it can be a Telephone-notification.

How to Program the Channels?

In Menu 8 Parameter 13 you setup the number of used Channels. This value should correspond to the number of values you are using!

With key "1" from the Basic-Menu you select the Universal channels.

In the Menu Universal Modules you can jump one Input-field back with key „*". If you wait a little bit and press „*" again, then jump to the next field back. Two times key „*" (without break) jumps back to the main Menu.

Display: **P1 on for /all**
          00:00 00s 00min
If you select Nr. 1 from the Ground-Menu, you can first input for which Channel (1-20) you want to set the Data. With "#" you jump to the next Input-Field. If you made an Error, press "*" to jump back to the last field. Press twice "*" to go the Basic-Menu again.
First you select the according Channel-Nr 1-20.
Then you can switch the Channel on and off
Next to this you see the actual Status of the Channel (on or off)

Here you can enter the Start-Time for Pump 1 (or device 1). First you enter the hour (0-23) for Start of the pump. Then press "#" and you can input the minute you want to have the pump been started.
With the next "#" you can say how long you want to have the pump running:
If you enter "0" then the pump will be started only depending from the Set-value you give in the next menu;
If you enter a value from 1-60 then the unit is seconds.
If you enter a value from 101-160 then the Unit will be minutes. For example value 102 means 2 minutes.
If you enter a value from 201-224 then the Unit will be hours. For example value 203 means 3 hours.

If you press "#" again you can realize now a kind of Trip-Irrigation.
If you enter 1-60 for "all.." it means that every 1-60 minutes the pump will run as long as you wrote in "for...";
One Example: If you want to have the pump on all ten minutes and for 30 Seconds on: You input 30 (Second) at "for" and 10 (minutes) at "all";
If you input 101 -124 for "all.. " that means 1-24 hours the pump is switched on;
One Example: every third hour for 10 minute: Input of 10 at "for" and 103 for "all"
If you input 201-207 for "all.. " that means every 1-7 day the pump is on for the time you wrote in "on...";

Note: if you use the Function **"on all"**, "hour" and "minute" they have a different meaning; The fist value is the Start-hour, the second value the Stop hour. If the hour-value is "0" then the Irrigation runs continuously with the defined Parameters.

Actual Value, Setpoint, Hysteresis, Type
If you press "#" again you have the next **Menu 2** for to define the **Setpoints**
Display: **1:99.9%>SP:99.9%**
1 The first character indicates the Channel-Number
Then you see the **Actual Value**, you can not change. Note that the value is actualized only every minute.
</> allows you to define whether the Output should be active if the Actual Value (for example Humidity) is less then the Setpoint (< = Input "0") or if the Actual Value is higher then the Setpoint (for example Cooling the glass-house). (> = Input "1").

SP: Here you define the **Setpoint** (0..100.0) . The Unit depends from the Type in the next Menu.

If you enter "0" then the Function "Analogue Sensors" is disabled and is only Time-Controlled or by Level-Switches..
Display: **Hys:9.9% Typ:1(0=%;1=°C)**

Hys: For the Setpoint you can define a **Hysteresis** for the Switch Back-Point. For example you define Start Cooling at 40 °C. With a Hysteresis of 5.0 the Output is switched on at 40°C and off at 35°C. If you make a small Hysteresis the Output is switched frequently.

Typ: With Type you define whether it is a
0: Irrigation-channel , Unit %
1: Temperature-Control, Unit °C; Telephone-Notification like Typ 0
2: Level-Control or Dosing, Unit % Telephone-Notification like Typ 0
3: Voltage, Unit V
4: Pasteurization-Function for the Water. Unit PA
6: Ampere (A)
9: no Unit

Type 10-13: same like channel 0-3 but act as **Alarm-channels**
That means once it has been activated by an Analogue or digital Input a Timer is started (defined in "Delay on").
Now the Alarm can be reset by the Program-Switch at Position "1".
If not, an Alarm is generated with a Message-Text for the Time defined in "delay off".
With Telephone-Notification? Then set the Output 1 or 2 to 16 and Input a Telephone-Number in Menu 4
After an Alarm a Break-Time (Delay_off-Time in Minutes) is started in order not to generate too many Alarms subsequently.
Type 20-23: Interlock
In this Case the Output is only reset by the defined conditions and has to be set by another Channel.
For example: switch off the Pump if the Temperature is more than 85 °C

Delay on/off
If you press "#" again you have the next **Menu Delay on/off:**
Here you can define a **Delay-on** Time in seconds for to Start the Output. This is interesting if the Actual-Value is very unstable. You can also see the actual value for Delay on in here. Disable this function with Value "0".

Here you can define a **Delay-off** Time in seconds for to Stop the Output delayed. This is interesting if the Actual-Value is very unstable and you want to have the Output on at least for a certain time.
For "Delay on" and „Delay off" the value can be defined in seconds (Input 1-99), Minutes (Input 1.01-1.99) or hours (Input 2.01-2.99). 1.07 means 7 Minutes for example.

In case of Alarm this is the Time how long the Alarm-horn is active

You can also see the actual value for the Delay in here.

Disable this function with Value "0".

Input 1
If you press "#" again you have the next **Menu Input/Output:**
Display: **Input:101 (33+44) Range: 1-204**
          Output:1 (35+36) Range: 1-20
Here you select the according **Input**
Analogue Input (1-15)
SMS-Input: Input 81 and 91
Digital Input (101-108)
Radio-Sensor (201-216)

See Appendix for the List of Inputs

Output 1
In Line 2 you select the according **Output** (1-20)
Output 1 and 8-15 is Transistor-Output (only 12/24 V)
Output 2-7 is a Relay-Output (also 220V/380V)
Output 16 initiates a **Telephone-call**. The Telephone-number defined in Menu 4 is called. This works also if the Alarms are not activated by the Program-Switch

Output 17-20 are virtual Outputs, that means they can be used for to combine two channels together. There is no Hardware for that but if you select this Output, you can check for this Output in another Channel as Input 2 condition.
Output 30 activated a Message-Text on the display
In ( ) you see the Terminals where you have to connect your wires.

See Appendix for the List of Outputs

Input 2
If you press "#" again you have the next Menu **additional Input**
Display: **In2:1/101 (33+44)**; (33+44 = Terminal-Number)
Range:
Interlock by Digital Output: 1-20
Another Analogue Input: 51-66
SMS-Input: Input 81 and 91
Activation by Digital Input: 101-108
Activation by Radio-Sensors: 201-204

See Appendix for the List of Inputs

If you have two Digital Sensors (two Level-Sensors) you can select the according Digital Input (101-108) or Radio-Sensor (201-204) in here.
For example for a Level-Control: Input 1 switches the Output on, Input 2 switches it off.
The actual Status for the Input 2 is Displayed after ":" (1 in this example).

Input 2 can also be a **Interlock or Enable-Signal** by an Output from another channel. In this way you can combine different channels.
Select 1-20 for the according Output (17-20 are virtual Outputs, no Hardware for that).
Example 1: no Irrigation if Rain-Sensor of Channel 6 is more than xy and Humidity of channel 1 is more than 50 %.
For that you select in Menu 1 Channel 6 (Channel for the Rain-Sensor) as Output Nr 17.
In Menu 1 Channel 1 (Humid-Channel) you select this Output 16 as Input 2 (additional Start-condition).
Example 2: If you want to have a **Dosing-Channel** you can define here which other Output (Irrigation-Output) must be on during Dosing.

Input 2 can also be a second Analogue Input. In this way you can compare two Analog-Values and the Setpoint will be replaced by the external Analog-Value.
Example: Irrigate if Temperature-Difference of water to ambient-Temperature is less than 15 °C

Input 2 can also be a **Interlock or Enable-Signal** by a Input. (no Irrigation if Level min). Select 101-108 for the according Digital Input or 201-204 for Radio-Sensors.

If you want to use only Input 2, Set Input 1 to "0"

With this Settings you can have **the following Options**:
Input 1 < 100 and Input 2 = 0: Analogue Switch
Input 1 > 100 and Input 2 = 0: Digital Switch with one Sensor
Input 1 > 100 and Input 2 > 100 : Digital Switch with 2 Sensors
Input 1 < 100 and Input 2 < 100: Analogue Switch with Enable by Channel 1-15
Input 1 < 100 and Input 2 > 100: Analogue Switch with Enable by Digital Input 1-8 (101-108)

In ( ) you see the Terminals where you have to connect your wires.

Display: **Input ok = 0/1?**
Here you can define whether the Channel should be active (Output = 1) if Sensor Input = 1 or if the Sensor Input = 0. This depends from the Type of Sensor or if you want to have an Interlock or Enable-Function by Input 2.

Sensor Alarm
With this function you can have an easy Pump protection against running dry. But this Function only makes sense if the actual value is really changing after activation.
Here you define the Time in minutes when there should be a change in the actual value after activation (for example the Irrigation-Pumps started). If there is no change in the Output a Alarm-Signal is generated. Disable this function with Value "0".

Max-Time:
Here you can define the Maximal Time the Output should be activated. This can be set for safety that the Output (Pump) is not running too long in case of Sensor-Failure. Disable this function with Value "0".

Automatik Setpoint-Detection:
Display: **Auto: 1 / 22 sec; (Input: 0 or 1)**
If you select Auto = 1 in this Menu then the Time for Irrigation is calculated automatic according to the Measured Humidity of the ground: (Min-Value + Max-Value Humidity) / 2 + Factor
In this Mode you should set the maximal Irrigation-Time in the first Menu at "on for". This Time is the running time of the pump in case of absolutely dry soil.
The calculated Irrigation-Time is displayed in the 2. Line.
Disable this function with Value "0".

Minimal / Maximal Humidity values
Here you can see and modify the minimal and maximal Humidity values. They are detected automatic but can be modified manually as well. They are the Basis for the Automatic Irrigation-Time calculation. To have this values detected fast by full Irrigation first and then for some days no irrigation enable the function in Menu 8 at Parameter 26.

How to get a reasonable Set-point for Start Irrigation?
Look for the Humidity of the Soil when it is dry enough that it should start to irrigate. Look for the according Actual value in the Basic-Menu and enter a this Setpoint in Menu 1 (Start-value for Irrigation).

Output 2
Here you can define another Output to get two devices being switched on by one channel. For example the Irrigation-Valve and a Booster-Pump. But you can also select virtual Outputs 16-20 in here and check at another channel at Input 2 about the Status. In this way you can combine different channels.
Example: Channel 1-5 are Irrigation-channels with a valve. If any of this channels is active, the Booster-Pump should be on. Set for each channel as Output 2 the Booster-Pump. Channels can work in parallel on the same output.

See Appendix for the List of Outputs

Next Alarm in x min
Here you define a Time in min for the next Alarm being generated in order for not to have always an Alarm.
Set this value to "0" if you use channel-Type 10-20 for a Switch-Button to activate a light for example.

Return from all sub-menu by pressing "*"

> **Hints**:
> With the Input of „0" at the Timers (first Display), the Timer-Function is deactivated. In this case the Output is activated only by the Setpoint of the Analog-Function-Modul
> - With the Input of „0" at the Setpoint, the Analog-Function is deactivated. In this case the Output is activated only by Time.
> - If you have selected as Output 1 „16", then a Telephone-Notification / SMS will be activated. After the Activation the "Delay-off"-Time is activated and Resets the Output again. Take care of the time "next Alarm in" that not too many Alarm are generated subsequently (if conditions are fulfilled).

If the channel does not switch on although the conditions are ok check
> - If the actual Sensor Value is 0 then for safety the Pump is not switch on (no Sensor is connected)
> - Parameters in Menu 2 can disable the Pump to Start. Verify that this function is off if you don't need it
> - Don't forget to input the time in Menu 7 after the Device has being switched off

Presetting of the channels:

Overview Universal Channels 1-20 in Menu 1

Pre-Setting			Time-Module					Analogue-Values					Type		Delay	
Cha nnel-Nr	Type/ Describiti on	On/ Off	hr	min	for	sec/ min /hr	min/ hr/d ay all	Act </> Set	Set poi nt	Unit	Hyst eresi s		Type		Delay on	Delay off
1	Irrigation 1	On	4	0	30	min	0	<	50	%	2	%	0	Irrigate	10 s	10 s
2	Irrigation 2	On	4	30	30	min	0	<	50	%	2	%	0	Irrigate	10 s	10 s
3	Irrigation 3	On	5	0	30	min	0	<	50	%	2	%	0	Irrigate	10 s	10 s
4	Irrigation 4	On	5	30	30	min	0	<	50	%	2	%	0	Irrigate	10 s	10 s
5	Irrigation 5	On	6	0	30	min	0	<	50	%	2	%	0	Irrigate	10 s	10 s
6		Off	0	0	0		0	<	50	%	2	%	0		10 s	10 s
7		Off	0	0	0		0	<	50	%	2	%	0		10 s	10 s
8		Off	0	0	0		0	<	50	%	2	%	0		10 s	10 s
9		Off	0	0	0		0	<	50	%	2	%	0		10 s	10 s
10		Off	0	0	0		0	<	50	%	2	%	0		10 s	10 s

Hardware   2.Digital Input

Input 1		Output 1		Input 2	"=1/=0	Max-Time	Auto-Setp.	Sen sor-Alarm	Output 2
3	Analog 3	3	Relais 3	0	0	0	0	0	0
4	Analog 4	4	Relais 4	0	0	0	0	0	0
5	Analog 5	5	Relais 5	0	0	0	0	0	0
6	Analog 6	6	Relais 6	0	0	0	0	0	0
7	Analog 7	7	Relais 7	0	0	0	0	0	0
0		0		0	0	0	0	0	0
0		0		0	0	0	0	0	0
0		0		0	0	0	0	0	0
0		0		0	0	0	0	0	0
0		0		0	0	0	0	0	0

Menu 2 = Temperature-Controlled Irrigation (Antifrost-Irrigation etc)

In the first line you see the actual external Temperature, suppose you have a Temperature-Sensor connected.

In the second line you can select with key "1" whether Irrigation is suppressed if Temperature is above Max.-Temp or below Min-Temp (Values in the following Menu)

With key "2" you activate Irrigation if Temperature is below Min-Temp (Anti-Frost Irrigation). The Time for Antifrost-Irrigation is defined in Menu 8 Parameter 37 (in min). The Antifrost-Irrigation is proceeded just once a day.

With key "#" you select the Menu for the Temperature Min.- and Max-Values

Disable the Function for the Temperature max with "0" for the Setpoint Max.

Disable the Function complete with "0" (off) in the first Menu

Menu 3 = Alarm by Sensors, Theft-Protection

Here you can define up to 5 Sensors for Alarm (for example with a moving detector or with a cabinet-switch etc)

Connect Lamp / Horn and Moving-Detector according appendix "electrical wiring".

Instead of the Lamp there can be the high-voltage-Generator as well, to protect the Solar-Panels.

First Select Channel 1-5

Then you can activate (Input 1) or deactivate (Input 0) the channel

Delay on: Here you define the Time until the Alarm-Channel is active

If you enter a value from 1-100 then the unit is seconds.

If you enter a value from 101-200 then the unit will be minutes. For example value 102 means 2 minutes.

If you enter a value from 201-224 then the unit will be hours. For example value 203 means 3 hours.

Delay off: Here you define the Time how long the Alarm-Channel is active (Horn is on etc)

Time grid like "Delay on"

Input: Here you select the according Alarm-Input
Analogue Input (1-15)
Digital Input (101-108)
Radio-Sensor (201-204)
8 In ( ) you see the Terminals where you have to connect your wires.

Output: Here you select the according Alarm-Output 1-15
2-7 are Relay-Output, the Rest are Transistor-Output (max. 24 V)
In ( ) you see the Terminals where you have to connect your wires.

Type: Here you select
0 = only Switch Output
1 = Alarm-Message with Horn
2 = Alarm-Message with Horn and Telephone-Call

To activate the Alarm (Door-Switch, other Inputs and Moving-Detector) switch to "On" in the first Menu. After the Delay-Time the Alarm is active.
You can connect a loud external horn to the Metamorphosis and it will be activated.
If you have a telephone-line connected, the Preset Telephone-Numbers will be dialed.
If you have a Mobile-Phone connected, a Alarm-SMS will be send or just a phone-number is dialed up. Im Menu 8 Parameter 23 you can define this.
(see Appendix for how to connect all this devices)

Menu 4 = Input and Test of Telephone-Numbers

For to use this function you need to have a GSM-Modem or a Mobile phone connected.
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 the number being dialed, enter the desired number (1-2) in the field for the Number-Selection.
If you want to have all numbers being dialed subsequently enter "12" for the Number-Selection.
If you want to have no number dialed, enter "0" for the number-selection.
Depending of Parameter 23 in Menu 8 a Telephone-call is initiated or a SMS is activated,

Menu 5 = internal, external Temperature

Here you can monitor the internal, external Temperature.

Menu 6 = Settings of Parameter for additional Outputs 1-5 (Load Shedding)

This Feature is only available if you have the Solar Charge-Controller Option
Timer 1-5: This Timers correspond to the Load-Outputs 1-5;
First you can set the *Switch-off Voltage* for each Channel. Be aware that to low values can reduce the life-time of the battery. There is a delay for switch off and a Hysteresis (Hysteresis Menu 8 Parameter 5), and delay for to switch on again.
Then you can additionally program Times, when the output could be switched on, for example to have light only in the evenings. If you do not want these functions, set the Timer-Values to "0". The Values are Start-Time (hour/minute) and running-Time.
If you enter a value from 1-100 then the unit is seconds.
If you enter a value from 101-200 then the unit will be minutes. For example value 102 means 2 minutes.
If you enter a value from 201-224 then the unit will be hours. For example value 203 means 3 hours.
If the battery is empty the Output will be switched off in any case!
For to have this functions active, switch with key 1 to "On", for to deactivate it to "Off".

Deactivate Deep-Discharge-Protection temporally: In order to have emergency-light although the batteries are empty, set the Start-Time (hour/minute) to "0" and select only the running time. If you switch this channel to "On" now, the Output will be active for the programmed time, although the battery is almost empty. For Load-Channel 1 this can be activated by an external Switch as well.

For using this function, you have to enter the actual Time first in Submenu 7.

Menu 7 = Input of Date and Time / Auto-Time/ Display of Output-voltage

If you select Nr. 7 from the Ground-Menu, then you can Input the Date and the Actual Time. First enter the month, then day, hour (0 to 23) and minute. Press "#" to jump from one field to the other. After the voltage has been completely off, you have to Input the time again. Return from the sub-menu by pressing "*";

In the second line you can select **Auto Time** on or off. In this way the Time is generated automatic by a light-sensitive Sensor (LDR) at channel 4 (Terminal 86 and 87). This is interesting for countries with frequent Power-failures or for to make the System more simple for the User. But not in all cases you do have this Sensor. Look for the order!

Here you also see the Value of the **Output-Voltage** coming from the integrated optional 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).

Menu 8 = Settings

In this Submenu you can change a lot of different parameters and values if you are not satisfied with the Pre-settings.

First you select the Number of the Value (see list below). Then you press "#" and you can enter the according value. The next value is selected by simply pressing "0" (if Parameter is > 10) in the field of the Parameter-Number or by entering the desired Parameter-number. That means with just pressing "0" at Parameter-Nr you can scroll through all the values.

Following Parameters can be changed:

1: Correction cable length (only for Solar charge controller)

In order to have a more accurate Battery-voltage with long cable (more than 5m), you can input the cable lengths from the Solar Charge-Controller to the Battery in here. With 0 you deactivate the Function.

2: Correction Cable Area (only for Solar charge controller)

Here your input the Cable Area (in mm^2) for the correction of the battery voltage. With 0 you deactivate the Function.

3: Days without watering

For the better development of the roots it is good to have a couple of days without irrigation from time to time Here you can enter how many days (0-9) you want to have no irrigation per month.

4: Voltage for Pre-warning (only for Solar charge controller)

If the voltage drops below that value, a acoustic signal is given, a message is displayed and the outputs (Lights) are switched off for a short time as a Pre-Warning (Presetting 11,7V).

5: Hysteresis (only for Solar charge controller)

Switch back; This voltage indicates when the load gets switched on again. If the Hysteresis is 1 V for example and the Switch off value was 11,5 V then the switch back voltage will be 12,5V (Presetting 1,0V)

6: Voltage for Battery full (only for Solar charge controller)

At this voltage charging is normally finished (Presetting 13,8V)

7: Cycle Loading Gel-Battery (only for Solar charge controller)

To this voltage the battery is charged from time to time (Boost-charging) to improve the Performance of the Gel-battery (Presetting 14,4V)

8: Cycle Loading Lead-Acid-Battery (only for Solar charge controller)

To this voltage the battery is charged from time to time (Boost-charging) to improve the Performance of the Acid-battery (Presetting 14,7V)

9: Maximum Voltage (only for Solar charge controller)

At this voltage charging is switched off in any case (Presetting 15,0V)

10: Language

You can select now between English and German (Enter "1" or "0")

11: Battery-Type Gel or not (only for Solar charge controller)

Select with key "0" for Gel-Type batteries
or "1" for Liquid Lead-Acid-Batteries.
If the Battery-Type is changed, all standard-Settings will be loaded for this Type!

12: Irrigation: Average-Calculation

If you set this Value to 1-4 then there is a average-calculation of the up to four Sensors for the Humidity. If it is "0" each channel has its own Humidity-Sensor.

13: Number of Channels

Here you can define the active number of channels in Menu 1. Maximal is 20. Good option to for testing just one channel.

14: Correction Time

Here you can Input a correction-value for the Time in second if necessary. This value will be corrected once a day at midnight.

15: Sensor-Type

This depends from the Type of Sensors you are using at each Analogue Input.
Type 0: Voltage (Battery-Voltage or internal Voltage regulator)
Type 1: 10 K NTC Temperature-Sensor (used for Temperature-Measuring normally)
Type 2: 4,7 K NTC Temperature-Sensor
Type 3: linear; used for Humidiy-Measuring
Type 4: free Range defined by Parameter 52-55
Type 5: internal NimH-Measuring
In Parameter 16 and 17 you find more ways for adjustment

16: Analogue Correction +/-

Here you can define a value for each Analog-Input which will be added to the Displayed value; Preset-Value is 0
For example if you have a Display of 12,7 Volts and correct is 12,9V. If you enter 2 in here and the value should be correct
Another Example for negative Correction:
If you have 12,7 Volts and correct is 12,5V you enter first the "*"-key for minus and then 2 in here and the value should be correct

17: Analogue Correction x

Here you can define a Multiplying-Factor for each Analogue Input if the value is at low values correct but not at high values. Preset-Value is 1,00
One example: The current shows 4,0 A, in reality it is 6,0A
The correction-Factor therefore is 6,0 / 4,0 is 1,50

18: Sending of logged Data to LogView

Logged Data from Analog-Inputs can be uploaded to Logview. Switch this value to „1" to upload. After Transfer of all data this value is again „0". Of course LogView has to be started and as Device Metamor_Solar_Flash has to be selected.
Before that the Device „Metamor_Bew_Flash" has to be selected in Logview.
The prepared File Metamor_Bew_Flash works with only 4 Measurement-values to be logged (Parameter 45). If more are needed, the file must be adapted accordingly. This can be done by the PC-Function „"C:\Program Files\LogView 2\OpenFormat\OpenFormatEditor.exe".

19: Factory Settings

If you set this value to "1" the Standard-Values will be loaded. Your specific settings will be overwritten! So use this Function only if needed.

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

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.

Using this option you need a Siemens Mobile-Phone with Modem (S25, S35, C35 etc). And you need to activate in Settings "FAX-Data-Mode receive" and "SP/Data-Mode send". And also deactivate IrDa and "Sprechgarnitur". No other communication (to Logview etc) may be active on the serial Port of the Metamorphosis. For to be sure switch off and on the Unit.

23: Send SMS

Here you can activate the Function to send a SMS in case of Alarm (by the Universal-Module with Output 16 for example). After an Alarm you have a break-time which is defined in the according channel (about 3 min)

23: Country Code for SMS

For SMS sending you need the correct Telephone-country-Code of your country in here. If it is 49 then you have to enter 94 in here.

25: Alarm at Cable-Break

If you activate this function and there is a cable-break (no Signal from the Analog-Input) you get a Message and a Alarm and all Outputs are deactivated. After a Acknowledge the Outputs are switched on again for 10 minutes. And then there is again a Alarm. That you have no false Alarm, you have to set all Inputs of the Universal modules you don't use to "0".

26: Auto-Detect Min/Max Humidity;

You can speed up the minimum and maximum humidity-Detection for the Auto Setpoint Irrigation-Time.
If this function is activated, the first night there will be maximum Irrigation (according to on-Time set in the according channel). Then there will be some days no Irrigation (the number of days are defined in Menu 8 Parameter 3). After that the normal Irrigation continues. But the values for minimum and maximum humidity are detected.

27: Type of Radio-Sensor

For the 433 Mhz Radio-Sensors there must be „0" in here, for the 868 Mhz Sensors "1"

28: Number of NiCd/NimH / on/off

If you enter a Voltage <> 0 in here you can activate the Function "Charging of NiCd/NimH". Set the according

Voltage of all cells connected (2.4 Volt for two NiCd/NimH and 3V for two Alkaline-Batteries, 3,6 Volt for three NiCd/NimH and 4,5V for three Alkaline-Batteries etc). See Parameter 29 for additional Inputs.

29: NiCd/NimH Capacity

Here you Input the "mAh-Value" of **one** cell of the NiCd/NimH-cells you want to load. You find it printed on the batteries. But if two cells are Parallel then you have to enter two times the Capacity. (f.e. 2*2300 mAh = 4600 mAh)

30: Solar-Charger active (only for Solar charge controller)

Should the Solar-Charger-Function be active? (1=Yes)

31: Scan-Time Data-Logging

Here you can enter the time, how often the desired measurement-values are written in the internal Memory.
If you enter a value from 1-100 then the unit is seconds.
If you enter a value from 101-200 then the unit will be minutes. For example value 102 means 2 minutes.
If you enter a value from 201-224 then the unit will be hours. For example value 203 means 3 hours.
For example: If you enter 120 you have a log-entry every 20 minutes
The quantity of values stored in the Metamorphosis is limited to 7600.

34: Solar I Correction for to adjust the Solar Current (only for Solar charge controller)

Setpoint for an Offset for Correct Solar-Current measuring; You can re-adjust this value if you disconnect the Solar-Panels and you press Enter ("#") in this Menu. The new actual value is Set (about 320…)

35: Temp-Correction U Battery (only for Solar charge controller)

If no Temperature-Sensor is connected and the Analog-Input should be used in another way, this Parameter can be set to "0"

36: PWM-charging (only for Solar charge controller)

If you set this value to "1", you will have a fast PWM-Charging mode. Setting this value to 0 enables the slow pulsation-mode. If you have the Relay-Version it has to be set to "0"

37: Max.Time for Anti-Frost-Irrigation

When you have the Anti-Frost-Irrigation activated in Menu 2, you can define the Time for the Irrigation-Pulse in here (in minutes). After this time the Pumps are switched off. The next day the Anti-Frost-Irrigation will start again if there is the according low temperature.

39: Correction Counter (f.e. KWh-Counter)

If the value for the (KWh)-Counter is not correct, you can set a correction-Factor in here (0,1…9,9). Pres-Setting 1,0

41: Hardware-Version

This value is Preset and corresponds to the Hardware of your board. Do not change!

43: Start/Stop Boost-charge (only for Solar charge controller)

Here you can monitor if a Boost-charge is active (=1). But you can also Set or Reset the Boost-charging manually.
Boost-charging is proceeded from time to time and the Battery will be charged to 14,4V for 1 hour instead of 13,8V. This extends the lifetime of the Battery

44: with SD-Card (0/1)

If a MMC or SD Memory Card is present for long-Term Data-Archive, set this Parameter to "1"

45: Number of Scans Analogue Inputs (0-15)

Number of Analogue-Channels to be logged. Preset: 2
If the number has been changed, a restart of the Unit is necessary

Overview:

1 Value Channel 1 (depending for what the channel is defined)
2 Value Channel 2
3 Value Channel 3
4 Value Channel 4
5 Value Channel 5
6 Value Channel 6
7 Battery-Voltage in V
8 Solar-Current in A
9 ELV Radio-Sensor Wind Speed
10 ELV Radio-Sensor Temperature
11 ELV Radio-Sensor Humidity
12 ELV Radio-Sensor Rain
13 KWH-Counter or any other Counter

Keep in mind that if you have many Actual Values to Scan at a high rate, the Memory can be filled up fast and the Performance can go down.

46: SD-Chip Block-Nr
internal Value for Display of Block-Nr written on the SD-Memory Chip

47: Load 1 Select Output
Here you can select the according Output (1-15) Relay or MOSFET.
See Appendix for the relevant Outputs

48: Load 2 Select Output
Here you can select the according Output (1-15) Relay or MOSFET
See Appendix for the relevant Outputs

49: Load 3 Select Output
Here you can select the according Output (1-15) Relay or MOSFET
See Appendix for the relevant Outputs

50: Load 4 Select Output
Here you can select the according Output (1-15) Relay or MOSFET
See Appendix for the relevant Outputs

51: Load 5 Select Output
Here you can select the according Output (1-15) Relay or MOSFET
See Appendix for the relevant Outputs

52 Analogue Range Start
If you select Type 4 in Parameter 15 you can setup the Range by Parameter 52-55.
You can do this if you measure two Input-values (Analogue Range Start and End) and look at the according values in the Menu 8 Analogue in.
At Parameter 52 you enter the Start-value

53 Analogue Range End
Here you enter the End-value

54 Analogue Raw Start
Raw-Value Start reads the value in Menu 8 Analogue for the according Start-Value of the channel

55 Analogue Raw End
Raw-Value End reads the value in Menu 8 Analogue for the according End-Value of the channel

56: Parameter-Number for Simu
Here you can select any Input for to Setup a Simulation-Value in Parameter 57. The Input can be Analogue (1-15) or Digital (101-108) with "0" or "1" or Radio-Sensor (201-206)

57: Simu-Value

Here you Set the Simu-Value of the Input selected in Parameter 56

58: Simulation by Regulator

Her you can set up a factor for the Simulation with the regulator on the device

59/61/63/65: Pulsed Output: on-Pulse

Her you can give number of an Output where a Pulsed Valve is connected. That means in case of activation of the Output just one 3 second Pulses is transferred to the Output. These kind of valves reduce the Power-Consumption a lot. You can define four Pulsed Output Valves in here.
See Appendix for the relevant Outputs

60/62/64/66: Pulsed Output: off-Pulse

Her you can give number of an Output (see Appendix for number) where a Pulsed Valve is connected. In case of Deactivation there is just one 3 second Pulses transferred to the Output. You have four Pulsed Output with off-Pulse.
When the System is started up, first a off-Pulse is activated.

67-71: Antiblocking-System

Anti-Blocking-System for to prevent blocking of the Pump if it was not activated for longer. That means the Output will be switched on daily for some seconds, if there was no automatic Start.
Here you Input the according Output-Number. With "0" this Channel is off

72: Minimum-Value Analog-Input

Here you can give the number of an Analog-Input for to detect and Display the Minimal-Value. For example the Minimum Temperature of the Water. Here you also can see the Minimal-value.
Reset the Value with key "0" if the value is displayed
This value can be processed in the Universal-Channels for having an Alarm or any other Action. Use Input 16 for the Minimum-Value.

73: Maximal-Value Analog-Input

Here you can give the number of an Analog-Input for to detect and Display the maximal-Value. For example the Maximal Temperature of the Water. Here you also can see the maximal-value.
Reset the Value with key "0" if the value is displayed.
This value can be processed in the Universal-Channels for having an Alarm or any other Action. Use Input 17 for the Maximum-Value.

74: Running-Time Output x

Here you can give the number of an Output for to detect and Display the Running-Time of the according Output. For example the Time how long a Pump was on for Maintenance-Purpose.
This value can be processed in the Universal-Channels for having an Alarm or any other Action. Use Input 18 for the Runtime-Value.

Menu 9 = Status of output and manual mode

If you select Nr. 9 from the Ground-Menu, then you see which output is on (1) and which is off (0); In this case the automatic is still active

Output Group 1:
1= (Bo) Load 1 (Transistor)
2= (P6) Relais 2
3= (P1) Relais 3
4= (P2) Relais 4
5= (P3) Relais 5
6= (P4) Relais 6
7= (P5) Relais 7
8= internal Beeper

Output Group 2:
1: PWM-Output: Solar charge (Transistor)
2: NiCd Charging (1 A Relay)
3: Load 2 (Transistor)
4: Load 3 (Transistor)
5: Load 4 (Transistor)
6: Load 5 (Transistor)
7: Load 6 (Transistor)
8: Load 7 (Transistor)

Analogue Group 1:
1: Sensor_batt = Battery voltage
2: U Out = Output voltage
3: Sensor 3
4: Sensor 4
5: Sensor 5
6: Sensor 6
7: Sensor 7
8: Program-Selector

Analogue Group 2:
9 = LDR (Light-Sensor)
10= internal Temperature-Sensor
11= external Temperature-Sensor
12= Load-Current 2
13= Load-Current 1
14= Solar-current
15= Voltage NiCd / NimH

If you press 1 till 7 then you manually can switch on and off the output and the manual mode is active. That means that no more output is switched on automatically

Counter

You can also count Pulses, for a example of a Flow-Counter. The value can be processed in the Universal-Module.
Counter 1: Terminal 84 und 86; Parameter 57 Menu 8: Set Input to 21.
For Reset define Conditions in a channel of the Universal-Module and set Output to 21

Counter 2: Terminal 85 und 86; Parameter 57 Menu 8 Set Input to 22.
For Reset define Conditions in a channel of the Universal-Module and set Output to 22

Problems starting a Pump:

If the channel does not switch on although the conditions are ok check
  ➢ If the actual Sensor Value is 0 then for safety the Pump is not switch on (no Sensor is connected)

  ➢ Parameters in Menu 2 can disables the Pump to Start. Verify that this function is off if you don't need it

  ➢ don't forget to input the time in Menu 7 after the Device has being switched off

  ➢ - the output is set in Sub-Menu 9?; Test to start the Pump manually!

Overview Functions by the PC-Software Dialer

  ➢ Select the according serial COM-Port. If you use a USB-Adapter the according COM-Port has to be selected.
  ➢ Select the according Software and you have access to all documents and Plans by the Menu „Software and „Doku".
  ➢ Monitoring and fully control of the Metamorphosis (changing of all Parameter etc). This can be realized also by modem and Mobile-Phone. You can press the keys with the mouse or with the key Alt + Number.

- ➢ Loading of the stored Measurement-Values in a Text-File pressing the key „Load Data to PC"
- ➢ Open this file with Measurement-values by the Menu "Data, View Uploaded Data"
- ➢ Loading of a new Program; Start the „Bootloader"-Software from the Menu. In there you have to select the serial COM-Port and the according Program.
- ➢ If you have a Modem connected then you can dial with „Telephone" the according number. In this Menu you can also disconnect the connection.
- ➢ The connection can be established by Mobile phone as well.
- ➢ Activation of the Sending of Data to Logview or any other Program by the Menu Data, „Data, Send Data for Logging (LogView)". After activation Stop the Dialer and Start Logview. And select as Device "Metamorphose_Solar_e". Refer to Document "Logview-Info" for more Information.
- ➢ All Parameters which are Setup in Menu 8 can be uploaded to a Text-File by the Menu "Data, Get Parameters".
- ➢ They can be modified in the Text-File. Select the File by Menu Data, change Parameters. Then they can be loaded again to the Metamorphosis by Menu "Data, Send Parameter". By that you have more Information on each Parameter and a backup of your Data is possible.
- ➢ All Parameters which are Setup in the Universal-Module can be uploaded to a Text-File by the Menu "Data, Get Data Universal-Module".
- ➢ They can be modified in the Text-File. Select the File by Menu Data, change Parameters. Then they can be loaded again to the Metamorphosis by Menu "Data, Send Data Universal-Module". By that you have more Information on each Parameter and a backup of your Data is also possible.
- ➢ By the Button „Display all Data" you can enlarge the Display and more Data are shown. But for the Input of Data it is better to press the Button "Stop Display for Input of Data" temporarily.
- ➢ By the key "Simulation" a Simulation-Value for testing can be Setup
- ➢ In Menu "Data, Edit Input/Output-List" the Name of all Inputs and Outputs can be Setup for Documentation.

Installation of the PC-Software Dialer

This Software is for Loading of the measured values on the PC and fully Operating the Metamorphosis with the PC

Installation
On the CD you find the Software „Dialer". How to install?

- ➢ For this call \Dialer\install.bat on the CD.
  If you have Vista register the OCX in this way:
  Call Programs, Accessoires, command prompt; Then right click „run as Administrator"; and „continue";
  Then navigate to the folder c:\Metamor by
  C:
  Cd Metamor
  Then enter "register" and „exit"

- ➢ Now connect the metamorphosis with the cable you get to the serial interface of the PC
- ➢ 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

Loading of the Logged Data to the PC
- ➢ 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)

Monitor Values with LogView

Logview is a excellent Software (Freeware) to Monitor and evaluate Process-Data

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

Installation

For to let the Metamorphose send Data to Logview start the Dialer and select Menu „Data, Send Data for Logging".
Then finish the Dialer and Start LogView. Now all relevant Data are send cyclic.

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

After the Installation of the Software copy from the CD \LogView\OpenFormat\ all files to
C:\Documents and Settings\your User-Name\Application Data\LogView\Geraete\OpenFormat\

Start Logview
Select Device at Menu „Device, choose Device and Port" the according Device:

Irrigation-System Cycle Data: Metamor_Irrigate
Irrigation-System Flash Data: Metamor_Irrigate_flash

Select according serial COM-Port as well

At Menu File, Settings, Program select the following:
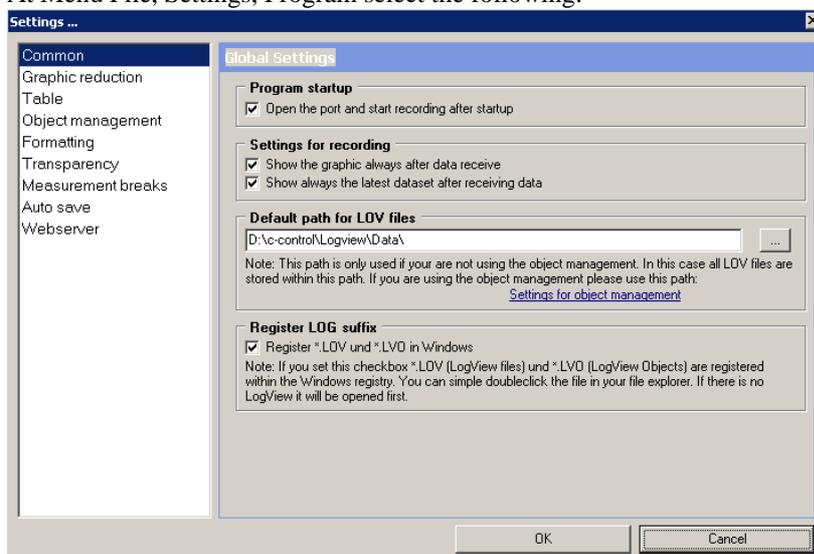
In the Default path for Log-Files the Log-Files are stored. You can modify it. These Files can be checked later on just by double-click

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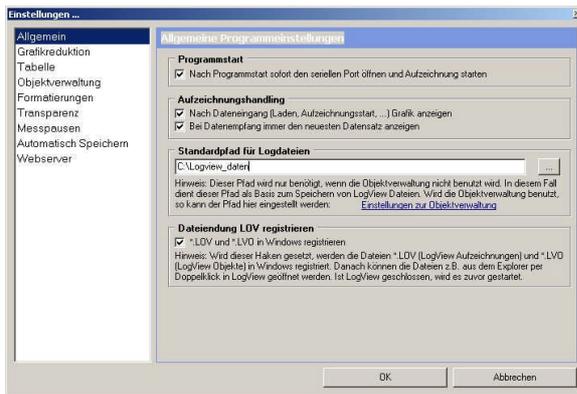
Then you can start the recording. In the Life-Window Data should come up.

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.
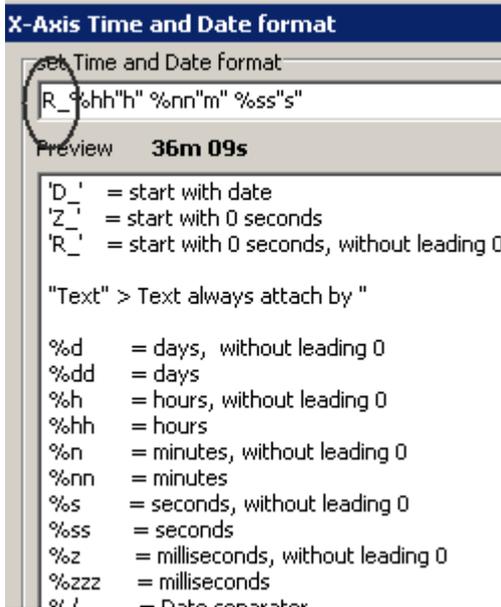
Sending of logged Data to LogView

Logged Data stored in the Flash-Memory from Analog-Inputs can be uploaded to Logview. Switch in Menu 8, Parameter 18 to „1" to upload. After Transfer of all data this value is again „0". Of course LogView has to be started and as Device Metamor_Solar_Flash has to be selected.
See Parameter 18 for more Info about that.

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

Hints

> If there are wired symbols on the LCD-Display you can reset the Display (without need to Restart the Unit) by pressing the key „0" twice.
> The Sensors could be of copper or copper with pewter or high-grade steel-Wires
> Humidity-Sensors should be wired via Terminal 98 in order to prevent electro-chemical corrosion. The humid-values are read only every minute for some Milliseconds. If you want to see the actual values, press "*" in the ground-menu.
> For to make the sensor by yourself you can use two pieces of aluminum or stainless steel. Stainless steel is for example a spoon etc. Drill two holes in it and fix the cable with a screw to it. At the end isolate the electrical connection with any kind of adhesive or glue.
> If you press key "*" during Switch on then you are in the **Simulation-Mode** and you simulate the Analogue Inputs with the Adjustable Button on the right side. But there is also a Simulation by Menu 8 Parameter 18 and 19.

> If the input of the keyboard is not taking effect, press the key another time and longer
> To reset the horn press any key
> You can use this functions not only for a irrigation-system. It could also be used as a four-channel programmable Timer (with optional a Sensor at each channel).In this way you can switch on and off all connected devices at a programmable time-program;
> You can connect 12V and 220V and 380V-Pumps, with max. 2500 Watt. But 380V Pumps should be connected by a external Power-Relay.
> For all pumps you have to set a motor protection switch.
> The cables to the sensors should have a shield and this shield has to go to "+5V". The cables to the pumps should have the correct diameter according to the Power
> If the Battery-Type (Lead/Gel) is changed, all standard-Settings will be loaded for this Type!
> If you removed the cable inside: To plug it in the right direction look at the black sign at the cable and the board. This has to be right (direction Relay) and down (Terminal 1,2,3). See Picture
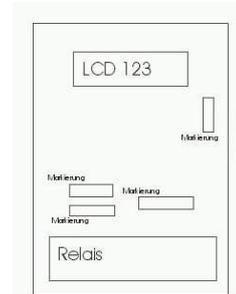
Links and interesting external Products

> Links: You find good Equipment at www.autorain.de
> Cheap 12V Water-Valves you find at www.virtualvillage.de:
> Magnet-Valve for Water 12V 0- 5 bar

http://www.virtualvillage.de/Items/001540-024?&caSKU=001540-024&caTitle=Magnetventil%20Wasserventil%20f.Fl%C3%BCssigkeit%2012V%200-%205%20bar

> Also very interesting: a simple Multiple water-Distributor from Gardena:
> www.gardena.com/servlet/ProductDisplay?catalogId=10051&storeId=10051&productId=14042&langId=-3&parent_category_rn=12862

Electrical connections

Where to put the devices?

> The control-unit with the LCD-Display should only be outside if you have the Version with a high IP-grade.
> LCD-Displays are a little bit fragile for direct sunlight for a longer time
> The Sensor-end should be in the altitude of the roots

Appendix

Overview of the Features

A lot of precious water is wasted due to unprofessional irrigation worldwide. This Device is reducing the water demand by exactly detection the water demand and Time. And you can have a kind of Trickle-Irrigation-System without having the high cost for it.

→ Programmable Irrigation-Times for **20 independent Channels**; The Irrigation-Time ranges from one second up to days (every second day for example)

→ Additionally you can have up to four different on/off-times programmed one day for one Output

→ The Irrigation-program can be controlled any Type of **Irrigation-Sensors** which is available at the market (Tensiometer etc). Each sensor belongs to one channel or you can have an average-calculation of the Sensors. There is one simple but effective Sensor available from Alternative Technology based on Conductivity with Temperature-Compensation

→ Automatic Irrigation-Time calculation, to have optimized Irrigation depending from the Humidity of the ground.

→ Automatic Detection for the best Start-Time for Irrigation (at night). You only have to program how long the Irrigation should last

→ There is a integrated **anti-corrosion protection** for the sensors and a **temperature-compensation** for a more accurate measuring.

→ You can use **Pulsed Valves**, that means they only need a Pulse for to switch on and off.

→ **Anti-Blocking-System** for to prevent blocking of the Pump if it was not activated for longer. That means the Output will be switched on daily for some seconds, if there was no automatic start.

→ In order to get widespread roots on the plant you can have a programmed **suppress of irrigation** every month for 2, 3, 4 or more days.

→ You can connect 12V, 24V, 220V-Pumps and even 380V three-phase Pumps with **up to 3000 Watt**!

→ The device can be shipped with a high grade **Solar Charge-Controller** for a Solar-Water Pump. You can connect solar-panels (up to 35A!) and batteries. You have up to five Load-Output channels. Each can be programmed individually by Voltage, Time and optional additional Sensor-Inputs. Boost-charging, Full-charge and Equalization-charge Modes. PWM-Charging for a smooth fill up of the Battery. Optional you have High-Current pulses for to extend the life-time of the batteries. All essential Parameters can be programmed.

→ Irrigation-System and Solar-Panels are outside and often there are Problems with thieves. With the Metamorphosis you can build up a sophisticated Alarm-System:

   - there is an alarm if the door of the switch box is opened
   - With a Moving-detector: Alarm if somebody is coming near the System
   - With a external Circuit: A high voltage is activated at the Panels-Frame or Pump, as soon as somebody is coming to the System. Of course the voltage can not hurt anybody
   - Up to three additional Alarm-Inputs can be programmed
   - The Alarm can generate a Telephone-notification or SMS and a loud Alarm-Horn can be connected

→ In order to get information about the quality of the water you can connect a **conductivity-sensor** and the relatively conductivity of the water will be displayed which is a good parameter for the quantity of minerals in the water

→ If you are not using all four humid-sensors (in most cases one sensor is enough) you can connect **temperature-sensors** as well and the value will be displayed.

→ With the temperature-sensors you can check the water-temperature (best is 25 degrees; min. is 15 degrees, max is 35 degrees) for example

→ On the other side the temperature-sensors could be used for heating or cooling (a glass-house) as well. With the temperature-sensors you can have up to four temperature (and time) controlled outputs.

→ With the system you can also program a **frost-protection irrigation**. If the temperature is below a Set-point, a frost-protection irrigation starts. Temperature-Controlled-irrigation is also a good way to smoothen the extreme temperatures. This can be easily realized by the Metamorphosis.

→ You can connect a **level-sensor** in the water-vessel for that the pumps do not run without water. It doesn't matter whether the switch opens or closes if it is empty.

→ even if you don't have a level-switch there is a integrated automatic supervision of the water-flow

→ Automatic **fill up of the storage-tank** with a additional pump (with the internal relays max. 16A) using the level-sensor. You can input a fill-up-time for the pump (1-255min). After this time the pump is switched off or you have a second full-sensor.

→ Integrated Pasteurization-Function for to clean water from bacteria and microbes in order to get potable water. Potable water is a serious problem in many countries! The System works by measuring the Temperature and Time and when satisfies the requirement a Pump is switched on to get the next Batch of water.

→ There is a **Manual-mode** for all connected devices likes Pumps, Fan etc. And you can switch the devices

also from remote using a Modem, Mobile-Phone or Network (Internet) connection (For example Siemens S35).

→ Up to 4500 (2500 for the M128) analog values (humidity, temperature ...) will be **stored** in the Metamorphosis. In case of power-failure the data will not get lost! This Data can be uploaded at any time by a PC/Laptop with a cable, a Modem , GSM Mobile-phone or Network (Internet).

→ Radio-Sensors can be connected and logged (Optional). There are a number of Sensors (from ELV) available: Temperature, Wind, Humidity and Rain. In this way the Charge-Controller can be extended to a Weather-Station.

→ Optional: One regulated Outputs-voltage with 3V – 12V / 1 Amperes with over-temperature and short-circuit protection for to connect small appliances like CD-Player, Walkman etc.

→ One fixed output-voltage of 5 V and optional one more fixed User-voltage (3-22V).

→ You can fully **remote control** the System by a PC/Laptop via a Modem, Mobile-phone or Network (Internet). Change all parameters, switch on and off the Pumps and supervise the measured values. You get a additional Software on CD running on Windows 95/98/ME/2000/XP to upload the data in a file and to remote-control the Metamorphosis.

→ Additionally you can switch on and off the Pumps by sending a **SMS** to the Metamorphosis

→ It is no problem to connect lamps or any other device (up to max. 10 A each channel) to the Metamorphosis and program on / off times for them (glass-house illumination)

→ You do not need external Power-Switches. You can connect four 12V or 110V/220V Pumps or Motors with max. 3000 Watt (1000 Watt per channel). On the other side all 12V, 24V, AC or DC-Valves can be connected

→ You can connect at the internal relays one three-phase 380V Water-Pump as well (max. 3000 Watt)

→ A main aspect of the Device is a very **simple Programming** of all the features. For example to have several start-programs a day you simply program "irrigate all 2 hours, starting from 20 o'clock till 6 o'clock", that's it!

→ Anyway, these are some options you have with the device. But you can have your own features. Say what you want and we program it. For example why not combining a irrigation-System with a Alarm-System. Solar-Panels are not cheap and get stolen frequently. You can download new versions via the Internet. You get all necessary cable for to download it to the Metamorphosis.

→ It is an **Open System** which can be assembled according to your specific demand. You can select of a range of the ELV Radio-Sensors (Temperature, Humidity, Wind, Rain). You have many Cable-Sensors for Temperature, Pressure, Brightness, Alarm-Switches, Motion-Detectors, Counter etc). There is a Interface to the wonderful Software LogView (Freeware) for to display Process-Data. You get the Open Source-Software Dialer for to Monitor and Control the Unit. You can program and download your own Programms (The Basic-Compiler is free for small Programs).

Parameter Overview and Pre-Settings

Nr
1: Correction cable length (only for Solar charge controller)   : 0
2 Correction Cable Area (only for Solar charge controller)   : 0
3 Days without watering   : 0
4 Voltage for Pre-warning (only for Solar charge controller) : 117
5 Hysteresis (only for Solar charge controller)   : 10
6 Voltage for Battery full (only for Solar charge controller)   : 138
7 Cycle Loading Gel-Battery (only for Solar charge controller)   : 144
8 Cycle Loading Lead-Acid-Battery (only for Solar charge controller) : 147
9 Maximum Voltage (only for Solar charge controller)   : 150
10 Language   : 0
11 Battery-Type Gel or not (only for Solar charge controller) : 1

12 Irrigation Average-Calculation : 0
13 Number of Channels : 10
14 Correction Time : 0
15 Sensor-Type : 0
16 Analogue Correction +/- : 0
17 Analogue Correction x : 0
19 Factory Settings : 0
20: 0
21: 0
22 Receive SMS : 5
23 Send SMS : 0
23 Country Code for SMS: 0
24: 94
25 Alarm at Cable-Break : 0
26 Auto-Detect Min/Max Humidity; : 0
27 Type of Radio-Sensor : 0
28 Number of NiCd/NimH / on/off : 0
29 NiCd/NimH Capacity : 0
30 Solar-Charger active (only for Solar charge controller) : 1
31 Scan-Time Data-Logging : 2
32: 0
33: 0
34 Solar I Correction for to adjust the Solar Current (only for Solar charge controller) 24: 563
35 Temp-Correction U Battery (only for Solar charge controller) : 1
36 PWM-charging (only for Solar charge controller) : 1
37 Max.Time for Anti-Frost-Irrigation : 30
38: 0
39 Correction Counter (f.e. KWh-Counter) : 0
40: 0
41 Hardware-Version : 0
42: 0
43 Start/Stop Boost-charge (only for Solar charge controller) : 0
44 with SD-Card (0/1) : 0
45 Number of Scans Analogue Inputs (0-15) : 4
46: 0
47 Load 1 Select Output : 1
48 Load 2 Select Output : 9
49 Load 3 Select Output : 10
50 Load 4 Select Output : 11
51 Load 5 Select Output : 12
52 Analogue Range Start : 0
53 Analogue Range End : 999
54 Analogue Raw Start : 0
55 Analogue Raw End : 1024
56 Parameter-Number for Simu : 0
57 Simu-Value : 0
58 Simulation by Regulator : 1
59 Pulsed Output on-Pulse : 0
60 Pulsed Output off-Pulse : 0
61 Pulsed Output on-Pulse : 0
62 Pulsed Output off-Pulse : 0
63 Pulsed Output on-Pulse : 0
64 Pulsed Output off-Pulse : 0
65 Pulsed Output on-Pulse : 0
66 Pulsed Output off-Pulse : 0
67 Antiblocking-System Output x: 0
68 Antiblocking-System Output x: 0
69 Antiblocking-System Output x: 0
70 Antiblocking-System Output x: 0
71 Antiblocking-System Output x: 0
72 Minimum-Value Analog-Input : 0
73 Maximal-Value Analog-Input : 0
74 Running-Time Output x : 0

Digital Output:

If you select the Output-Number > 100 then the Output is switched Reverse, what means Output is not activated if the channel is active and reverse
See below for Input- Output- Terminals

1 = MOSFET-Output: Load 1 (external Terminal); Max. 10A

2 = Relay-Output 2
3 = Relay-Output 3
4 = Relay-Output 4
Relay 3 + 4 could not be used with different voltages.
5 = Relay-Output 5
6 = Relay-Output 6
Relay 3 + 4 could not be used with different voltages.
7 = Relay-Output 7

All Relay maximal 16A, 220 V
8 = Beeper (intern); not wired for Solar charge-Controller
9 = MOSFET-Output: Load 2 (external Terminal); max. 10A
10 = MOSFET-Output: Load 3 (external Terminal); max. 10A
11 = MOSFET-Output: Load 4 (external Terminal); max. 10A
12 = MOSFET-Output: Load 5 (external Terminal); max. 10A
13 = MOSFET-Output: Load 6 Terminal 211 (+), 212(-) (interne Terminal)
14 = MOSFET-Output: Load 7 Terminal 110 (+), 111(-) (interne Terminal)
15 = internal NiCd-Relay (1A)

16 = Telephone-Call: internal Relay

17 = Virtual Output (for use in other Modules)
18 = Virtual Output (for use in other Modules)
19 = Virtual Output (for use in other Modules)
20 = Virtual Output (for use in other Modules)

21 = Reset Counter 1
22 = Reset Counter 2

30 = Output Text only for Message

302 = Relay 2 and Relay 3 and Relay 4
303 = Relay 3 and Relay 4 and Relay 5
304 = Relay 4 and Relay 5 and Relay 6
305 = Relay 5 and Relay 6 and Relay 7

Analogue Inputs

(Reference to the Number 1-15, Resolution10 bit)

1 =   Battery Voltage (internal)
2 =   Output-Voltage (Plus at Terminal 43, Minus at 44)
3 =   Humidity 1 (Signal Plus 5V from Terminal 59, Signal at Terminal 61)
4 =   Humidity 2 (Plus from Terminal 62, Signal at Terminal 63)
5 =   Humidity 3 (Sensor at Terminal 62 and 64)
6 =   Humidity 4: Temperature Compensation Ambient Temperature (internal; if external then Signal at Terminal 71 and 72)
7 =   Humidity 5
8 =   Program-Switch (internal)
9 =   Light Sensitive Senor (LDR) Measuring at Terminal 74+75
10 =   internal Sensor Temperature (for Humid-Sensors): Measuring at Terminal 74+76
11 =   external Sensor Temperature. Terminal 77 and 78
12 =   Load-Current 2 Out put 1+2
13 =   Load-Current 1 Output 3-5
14 =   Solar- Current

15 =   Voltage NiCd / NimH

16 =   Minimal-Value Analog-Input
17 =   Maximal-Value Analog-Input
18 =   Runtime-Value Output

21 =   Counter 1 (Input 84 + 86)
22 =   Counter 2 (Input 85 + 86)

Digital Inputs

(Reference to the Number 101-108, all Potential free)

101 = Digital-Input 1 (Terminal 47+48) Empty Alarm,
102 = Digital-Input 2 (Terminal 47+49) Empty Pump on
103 = Digital-Input 3 (Terminal 50+51) Container full
104 = Digital-Input 4 (Terminal 50+52)
105 = Digital-Input 5 (Terminal 53+54)
106 = Digital-Input 6 (Terminal 53+55)
107 = Digital-Input 7 (Terminal 56+57)
108 = Digital-Input 8 (Terminal 56+58)

ELV-Radio-Sensors

(Reference to the Number 201-216, ELV Receiver needed)

201 = ELV Radio-Sensor 1 Wind Speed
202 = ELV Radio-Sensor 3 Temperature
203 = ELV Radio-Sensor 4 Humidity
204 = ELV Radio-Sensor 5 Rain

211 = ELV Radio-Sensor Humidity 1
212 = ELV Radio-Sensor Humidity 2
213 = ELV Radio-Sensor Humidity 3
214 = ELV Radio-Sensor Humidity 4
215 = ELV Radio-Sensor Humidity 5
216 = ELV Radio-Sensor Humidity 6

Input/Output-Mapping

Input-Nr	used for	Terminal	Type	Universal-Channels	Function
1	Battery-Voltage	59+60	Analogue 1/U_Batt	1	Irrigation 1
2	Output voltage	45+46	Analogue 2	2	Irrigation 2
3	Humid Sensor 1	59+61	Analogue 3	3	Irrigation 3
4	Humid Sensor 2	62+63	Analogue 4	4	Irrigation 4
5	Humid Sensor 3	62+64	Analogue 5	5	Irrigation 5
6	Humid Sensor 4	71+72	Analogue 6	6	
7	Humid Sensor 5	71+73	Analogue 7	7	
8		internal	Analogue 8 (Prog-Switch)	8	
9	LDR	74+75	Analogue 9	9	
10	internal Temperature	74+76	Analogue 10	10	
11	ambient Temperature	77+78	Analogue 11	11	
12	Load Group 2	77+79	Analogue 12	12	
13	Load Group 1	80+81	Analogue 13	13	
14	Solar current	80+82	Analogue 14	14	
15	NiCd-Charger	internal	Analogue 15 (NimH)	15	
				16	

101		47+48	Digital 1	17	
102		47+49	Digital 2	18	
103		50+51	Digital 3	19	
104		50+52	Digital 4	20	
105		53+54	Digital 5		
106		53+55	Digital 6		
107		56+57	Digital 7		
108		56+58	Digital 8		
201		Radio-Modul	Radiosensor 1		
202		Radio-Modul	Radiosensor 2		
203		Radio-Modul	Radiosensor 3		
204		Radio-Modul	Radiosensor 4		
Output	used for	Terminals 12V normally open	Terminals 12V normally closed	Terminals 220V *	Type
1	Load 1	35+ / 36-			Transistor 1
2	Pump 6	30+/34-;Bridge 31-35	32+/34-;Bridge 31-35	30+31	Relay 2
3	Pump 1	24+/25-;Bridge 21-22		22+24	Relay 3
4	Pump 2	23+/25-;Bridge 21-22		22+23	Relay 4
5	Pump 3	8+ / 9-; Bridge 11-12		8+12	Relay 5
6	Pump 4	7+ / 9-; Bridge 11-12		7+12	Relay 6
7	Pump 5	2+ / 4-; Bridge 1-3	5+/4-; Bridge 1-3	2+3	Relay 7
8		internal			Beeper
9	Load 2	Load 2			Transistor/Load 2
10	Load 3	Load 3			Transistor/Load 3
11	Load 4	Load 4			Transistor/Load 4
12	Load 5	Load 5			Transistor/Load 5
13		Load 6			Transistor/Load 6
14		Load 7			Transistor/Load 7
15		internal			NimH-Relay 1A

 * the other wires direct to the device

Contact

Stefan Schranner
Franz-Ludwig-Str.2
97072 Würzburg
Tel.: 0049 931 72353
Email: StefanSchranner(at)yahoo.de
Internet: www.alternative-technology.de