Installation and Operating Instructions

MICROPROCESSOR-CONTROLLED SYSTEM CONTROL UNIT FOR SOLAR THERMAL SYSTEMS

SOLAREG II

VISION PLUS

IMPORTANT!

Before installing and using this device, you must read through the instructions carefully. Failure to observe the instructions and safety information contained in these installation and operating instructions will void the guarantee for the device described/installed.
Store these instructions in a safe place.

The described appliance has been made and tested in compliance with CE-guidelines.

1 SAFETY INSTRUCTIONS

This control unit must be disconnected from the mains before any installation and wiring work is carried out.
This device may only be opened, connected and commissioned by trained personnel. In so doing, the relevant safety regulations of your country must be adhered to.

- **Prior to any installation or wiring work on the electric motors, always fully disconnect the device from the operating voltage and ensure that the mains supply cannot be reactivated.** Never mix up the connections for the protective safety low voltage area (sensor, flow meter) with the 230 V connections. This could result in damage and hazardous voltages to the device itself and to the attached sensors and devices.
- Solar thermal systems can become very hot. There is a risk of being burnt. Take care when installing the temperature sensor.
- Install the Solareg Vision Plus in such a way that no excessive operating temperatures (>50℃) result, e.g. as a result of heat sources.
- The device is not protected against splashing and dripping. You should therefore install it in a dry location.
- For safety reasons, the system may be manually operated only for test purposes. In this operating mode, there is no monitoring of maximum temperatures or sensor functions.
- If there are signs of damage to the control unit, cables or attached pumps and valves, the systems must not be operated.
- Check whether the materials used for the piping, thermal insulation, pumps and valves are suitable for the temperatures that will occur in the system.

If you have any questions concerning your solar thermal system or your control unit, please contact your installer or supplier for advice.

2 SYMBOLS AND ABBREVIATIONS

Explanation of symbols used in operating instructions:

	Warning! This symbol indicates potential dangers and errors
	Warning: 230 Volts This symbol indicates risk to life through high voltages.
•	List
i	Information on operation/special features
➲	Instructions/procedure
?	Test/check
	Keypad for control unit

Frequently used abbreviations

Abbreviation	Meaning	Abbreviation	Meaning
TColl	Temperature of collector [°C]	Min	Minimum value
TCyl	Temperature of storage cylinder [°C]	Max.	Maximum value
TTh	Temperature for thermostat [°C]	K	Kelvin unit, corresponds to 1 degree temperature difference
TCret	Temperature of collector – return line	°C	Degree Celsius unit
TFrost	Temperature - frost protection	Td	Temperature differential controller
kWh	Energy yield in kWh	%	Percent
xxx	Miscellaneous display value		

Term explanations

Unit	A unit is a component of a system and is responsible for part of its function.
Hysteresis	In control technology, the term hysteresis is used where an upper and lower threshold value is responsible for switching (see Td Start and Td Stop).
Shield	Electrical shields reduce the influence of electrical and magnetic fields on the signals in the cables and wires. Coaxial cables are commonly used for this purpose.
Heat station	Place at which energy is stored or transferred. In solar thermal systems, the storage cylinder is the heat station.

3 DEVICE DESCRIPTION

3.1 Usage

The solar thermal controllers Solareg Vision Plus are high-performance, microprocessor-controlled control devices used to control the function of solar thermal systems.

The control units are suitable for common types of solar thermal systems. See system diagram.

These control units are designed for use in dry rooms, private homes, business and commercial premises.

Alternative use or use beyond this remit is not in accordance with its purpose. Incorrect usage can result in serious injury or death to the user or a third party and can harm the device or system and other material assets. The manufacturer/supplier shall not be liable for any damage arising from such misuse. The risk is borne by the user alone.

3.2 Device features

The Solareg Vision Plus range offers the following features and equipment:

- **Self-explanatory, menu-driven operation**
- **Digitally adjustable control values**
- **System monitoring**
- **Energy yield estimation**
- **Storage of all entered values**
- **Large space for wiring**
- **Supports tube collectors**
- **Backlight display (on demand)**
- **Time counter-operating hours**
- **Diversity system protections**
- **Independent differential controller with three time slots**
- **Third output alternatively for thermostat, cooling function or the independent differential controller**

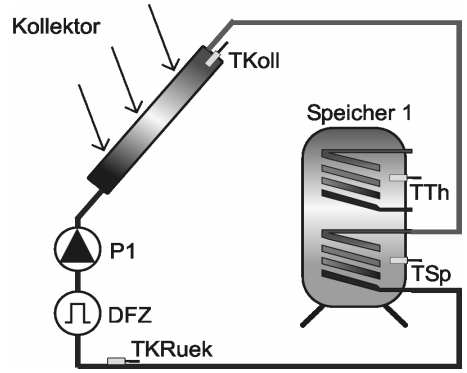
Available accessories:

- Temperature sensor PT1000
- Flow meter

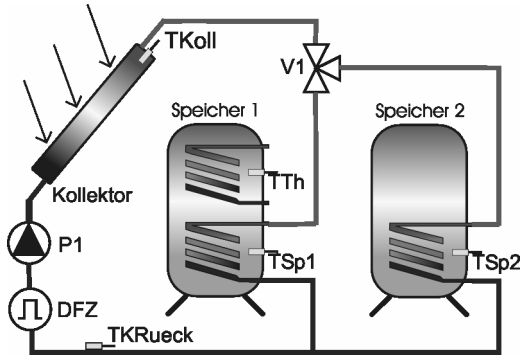
4 SYSTEM DIAGRAMS

i The following system diagrams are not to be understood as complete hydraulic circuit diagrams.

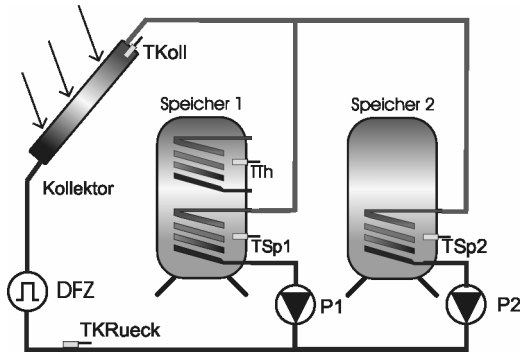
TYPE 0:
1 collector, 1 storage



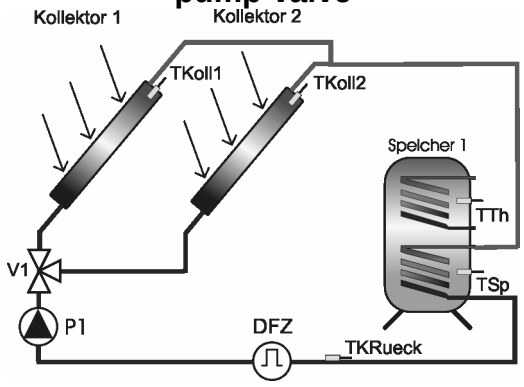
TYPE 1:
1 collector, 2 storages
pump-valve



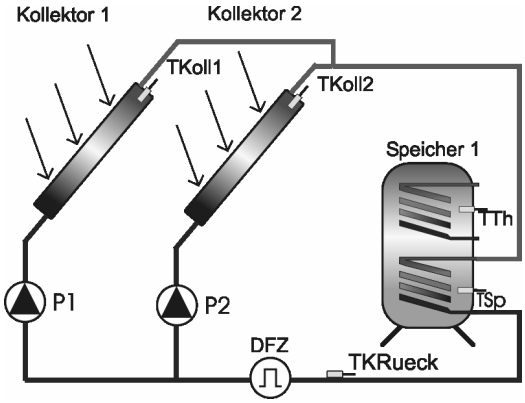
TYPE 2:
1 collector, 2 storages
2 pumps



TYPE 3:
2 collector arrays, 1 storage
pump-valve



TYPE 4:
2 collector arrays, 1 storage
2 pumps



TColl	Measuring point - collector
TCyl	Measuring point - storage cylinder
TCret	Measuring point - collector return line
TTh	Measuring point - thermostat
P	Pump
DFZ	Flow meter

Important notice concerning the valves in diagrams type 1 and type 3:
The system diagrams are propositions.
Regardless of the valve type shown above please follow this instructions:

Type1: one collector, two storages with valve:
- If not powered, the valve should connect the collector array with the storage 1.
- When powered, the valve must connect the collector array with the storage 2.

Type3: two collectors, one storage with valve:
- If not powered, the valve should connect the collector array 1 with the storage.
- When powered, the valve must connect the collector array 2 with the storage.

Prior to switching on or commissioning, you must ensure that the cover is closed properly such that you feel and hear it click into position on both sides.

4.1.1 Over voltage protection

SOLAREG II has integrated over voltage protection on every sensor input. Additional safety measures are usually not required. For the collector sensor an additional protection item is recommended and can be obtained from Prozeda GmbH. External protection devices containing capacitors are not allowed as they will distort the measurement.

5 DEVICE INSTALLATION

This control unit may be installed only in dry rooms where there is no risk of explosion. Installation on a flammable base is not permitted.

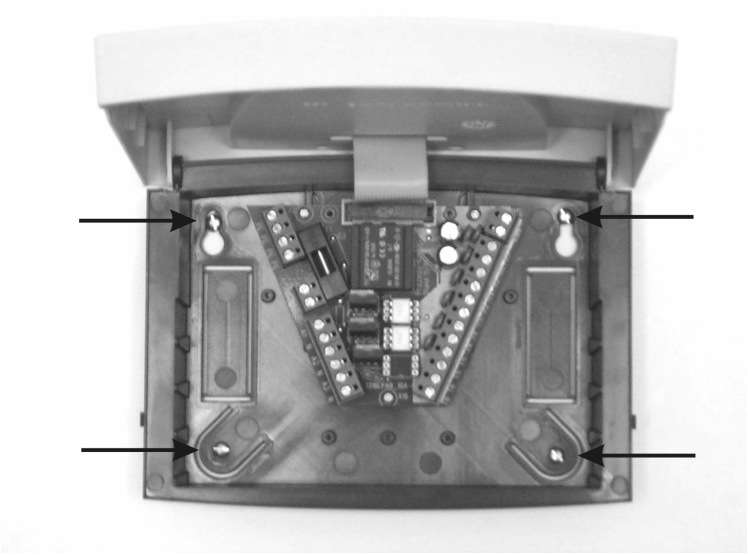
5.1 Opening the device (only by qualified personnel)

No tools are required to open the device. The upper part of the casing is locked to the lower part at two engagement points. The locking forces are such as to prevent the casing from being opened accidentally.

Holding the casing at each side, pull firmly towards you and then raise the top part of the casing until it engages. You can now install and wire up the control unit.

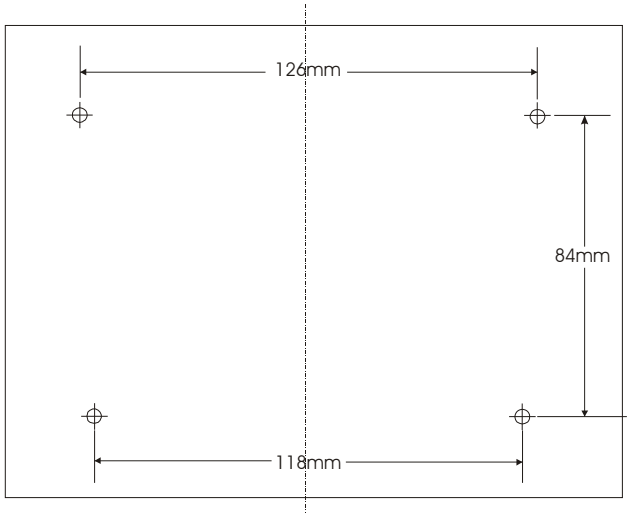
Prior to switching on or commissioning, you must ensure that the cover is closed properly such that you feel and hear it click into position on both sides.

5.2 Wall mounting



When mounting the device on a wall, proceed as follows:

- Drill the fixing holes using the drilling template shown.
- Screw in the two top screws leaving a gap of up to 6 mm.
- Open the device as described and hang it on the two screws. You can now fit the two bottom screws.
- **To avoid damage to the lower part of the casing, do not over tighten any of the screws.**



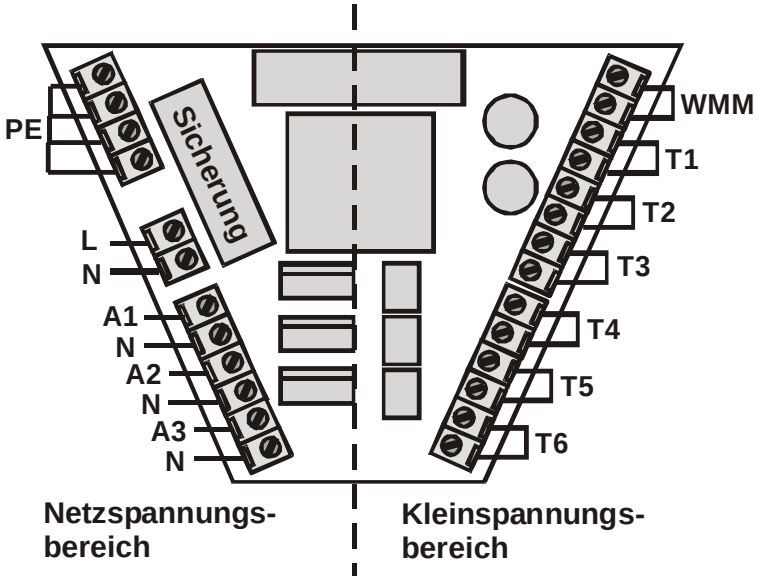
You drill into walls at your own risk. Prior to drilling, please check that there are no cables, pipes or shafts in the wall; contact the property owner if necessary.

6 ELECTRICAL CONNECTION

You must observe the safety instructions in chapter 1

The device may be opened only if it has been properly disconnected from the mains and there is no risk of reconnection.

All electrical cables are connected to the unit in the lower part of the casing. The terminals on the right-hand side are those for the (low voltage) connections for sensor and flow meter. The 230 V connections are located on the left-hand side. The figure below shows the terminal field for the Solareg Vision Plus.



PE	Earth wire	WMM	Flow meter
L	Phase mains	T1	Temperature sensor for collector 1
N	Neutral cable for mains	T2	Temperature sensor for storage 1
A1	Phase switching output 1	T3	Temperature sensor for collector 2 / storage 2
A3	Phase switching output 2	T4	Temperature sensor for collector return line
		T5	Temperature sensor for heating / cooling* or temperature differential controller - source
		T6	Temperature sensor for frost protection* or temperature differential controller – target or common measuring point (autom. deactivated if not connected

* - free choice T1…T6

General attachment regulations:

For all attachment wires, cut the wire sheath to a length of approx. 6 – 8 cm and unisolate the wires by approx. 10 mm from the ends.

- In the case of flexible cables, provision must be made inside or outside the device for strain relief. The wire ends must be fitted with wire-end sleeves. If necessary, PG9 screw fittings can be used for the feedthrough on the 230 V side.
- The wires are fed into the device through the designated openings.
- All earth wires must be fixed in the terminals indicated with “PE” (Earth potential).

6.1 230 V connections

The following points must be observed for the 230 V connections:

- Where there is a fixed mains connection, it must be possible to interrupt the mains supply to the control unit outside the control unit by means of a switch.
  Where the mains connection is effected by means of wire and plug with earthing contact, this switch may be dispensed with.
- The control units are designed for operation with a 230 V /50 Hz mains supply. The pumps and valves to be connected must be designed for this voltage.
- All earth wires must be connected to the terminals marked PE.

i The neutral terminals (N) are electrically connected and are not switched.

i The switching outputs (A1/A3) are 230 V closers.

6.1.1 Overview: 230 V connections for Solareg Vision Plus

The table below shows the allocation of switching outputs for the different system types. The fields with a grey background are essential to the basic functions of the system. The white fields are designed for optional additional functions:

Systems		Outputs		
Type	Description	A1	A2	A3
0	1 collector array, 1 storage cylinder	P1	-	Cooling or thermostat or diff. controller
1	1 collector array, 2 storage cylinder (pump-valve)	P1	V1	Cooling or thermostat or diff. controller
2	1 collector array, 2 storage cylinder (pump-pump)	P1	P2	Cooling or thermostat or diff. controller
3	2 collector array, 1 storage cylinder (pump-valve)	P1	V1	Cooling or thermostat or diff. controller
4	2 collector array, 1 storage cylinder (pump-pump)	P1	P2	Cooling or thermostat or diff. controller

6.2 Attachment of temperature sensor

The Solareg Vision Plus devices work with precise platinum temperature sensors of type PT1000. Between 3 and 4 sensors are required, depending on the scope of function.

Installation/wiring of temperature sensor:

- ➲ Install the sensors at the requisite places on the collector and the storage cylinder. In so doing, ensure good temperature transmission and, if necessary, use a thermally conductive paste.
- ➲ The cables of the temperature sensors can be extended. For lengths up to 15 m, a cross-section of 2 x 0.5 mm² is required; for lengths up to 50 m, a cross-section of 2 x 0.75 mm² is necessary. In the case of long connections (collector), shielded extension cables must be used. Do not attach the shield on the sensor side; instead cut it to length and insulate it.
- ➲ To protect the collector sensor within the control unit, the use of a lightning protection device (accessories) is recommended.
- ➲ The temperature sensors are connected in accordance with the system diagram. In the case of temperature sensors, there is no need to observe the polarity of the two wires.
- ➲ To protect the collector sensor within the control unit, the use of a lightning protection device (accessories) is recommended.
- ⚠ Sensor wiring must be laid separately from 230 V wires.

System		Inscription on the controller					
Type	Description	T1	T2	T3	T4	T5	T6
0	1 collector array, 1 storage cylinder	TColl1	TCyl1	-	TCret	TTh Td1	TFrost Td2
1	1 collector array, 2 storage cylinder (pump-valve)	TColl1	TCyl1	TCyl2	TCret	TTh Td1	TFrost Td2
2	1 collector array, 2 storage cylinder (pump-pump)	TColl1	TCyl1	TCyl2	TCret	TTh Td1	TFrost Td2
3	2 collector array, 1 storage cylinder (pump-valve)	TColl1	TCyl1	TColl2	TCret	TTh Td1	TFrost Td2
4	2 collector array, 1 storage cylinder (pump-pump)	TColl1	TCyl1	TColl2	TCret	TTh Td1	TFrost Td2

The sensors TTh, Td1 and TFrost can be freely assigned in the „Basic settings“ menu.

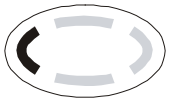
7 OPERATION / INDICATORS

7.1 Overview of displays and operating controls

The Solareg Vision Plus control unit is operated comfortably and simply by means of 4 buttons. The operating buttons allow you to:

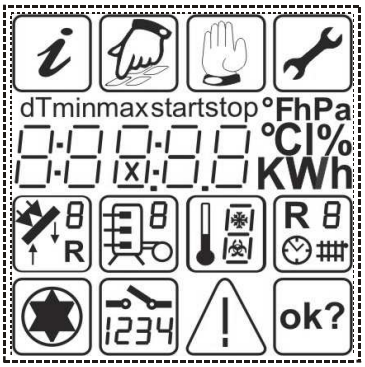
- Access display values
- Enter device settings

The graphic symbols on the display unit lead you simply through the operating structure and provide a clear overview of the current menu options, display values and parameters.

Description		
	"Up" „+"	• Upwards menu item • Change value: increase the displayed value by 1; press and hold the button to increase the values continuously
	"Access" "Down" „-"	• Access a main menu, downwards menu item • Change value: lower the displayed value by 1; press and hold the button to decrease the values continuously
	"Scroll left" "Exit" "Cancel" "ESC"	• Scroll to the left on the main menu • Exit a menu • Exit a menu item • Cancel a change to a value without saving
	"Scroll right" "Select" "OK"	• Scroll to the right on the main menu • Select a menu item • Confirm a change to a value by saving

7.2 Display – maximum display

In the following graphic, all symbols that can appear on the display during operation are displayed simultaneously. In real-time operation, depending on the menu position, only some of these symbols will appear.



Main menu

Display values

Allocation of measuring points

Status display

7.3 Explanation of graphic symbols

The meaning of the individual symbols is given in the table below.

Graphic symbol	Description	Display during operation
Main menu		
	"Info" menu	Symbol flashes if it can be selected **13:21**
	"Program" menu	
	"Manual operation" menu	
	"Basic settings" menu	

During selection, the active symbol flashes. If the menu is selected using the  button, the corresponding symbol is displayed permanently. All others are hidden.

Graphic symbol	Description	Display during operation
Display values		
Td	Temperature difference	
min	Min. value	Appears when minimum values are displayed
max	Max. value	Appears when maximum values are displayed
min **0:00** **1**	Timeframe 1 start	Appears when the differential controller is active (timeframe 1-3) or tube collector is active (timeframe 4)
Max **23:59** **1**	Timeframe 1 stop	Appears when the differential controller is active (timeframe 1-3) or tube collector is active (timeframe 4)
88.8.8	5 x 7 segment display Display of numbers 00000 to 99999	Display of all numeric values, display flashes if value is changed
°C	Temperature in degrees Celsius	
K	Temperature difference in Kelvin	
h	Operating hours	
kWh	Display yield in kWh.	

Position of sensors		
	Collector array 1	
	Collector array 2	
	Bottom of storage cylinder 2	
	Bottom of storage cylinder 1	
	Sensor in return line if there is a return line monitor	
	Heating – cooling – diff. controller. Temperature source (displays the chosen sensor)	
	Frost protection, universal measuring point / Temp. diff. controller, temperature target	

Status display		
	Solar circuit pump	Symbol rotates when the solar circuit pump is switched on
	Switching output 1 is active	Appears if switching output 1 is active (on).
	Switching output 2 is active	Appears if switching output 2 is active (on).
	Switching output 3 is active	Appears if switching output 3 is active (on).
	Indicates a system error or incorrect code entry	Display flashes if an error occurs in the system. Lights up if the wrong code is entered.
	Safety question for value changes with save facility	Value input can be refused  or accepted  .
	Operating hours, yield for storage cylinder	Appears together with operating hours or yield

7.4 Example of device operation

Once you have familiarised yourself with the menu descriptions as described in the “Operating menus“ chapter, you can practice by carrying out the operating steps. An operational example is illustrated below.

The starting point is the current collector temperature on the “Info” menu. Aim: Change to “Solar circuit Td stop” circuit from 3K to 4K in “Program” menu

 White: symbol lights up continuously

 Grey: symbol flashes

Button	Function	Graphic display following operational step				Description
	“Exit“					Exit the “Info” menu
	“Scroll right“					Selection of “Programming” menu
	“Access”		**max 65℃**			Access of “Programming” menu; the first menu item appears
	“Down”		**Td min 3 K**			Keep pressing until the menu item “S1 Td min” appears
	“Select”		**Td min 3 K**			Select the parameter shown
	“Up”		**Td min 4 K**			Increase the parameter value from 3K to 4K
	“Confirm ”		**Td min 4 K**		**ok?**	Confirm the parameter
	“Confirm ”		**Td min 4 K**			Store the parameter
	“Exit“					Exit “Programming” menu
	“Scroll left“					Select the “Info” menu
	“Access”		**60℃**			Access of “Info” menu

8 MENU STRUCTURE

To facilitate simple operation of the device, the device, operating and display functions are combined into 4 groups (= main menu).
The four menus

- Information
- Program
- Manual operation
- Basic setting

provide information on your solar thermal system.
The currently active menu is displayed by means of the relevant graphic symbol in the top row of the display.

Menu	Overview of functions contained
Information 	Main menu for the automatic control of the solar system. • Display of current measured values • Display of system status • Display of error messages • Display of energy yield (if existing)
Program 	Change and set the programmable setting values (parameters) **Note:** Changes can impede system functions
Manual operation 	Switching the connected pumps/valves on and off manually
Basic setting 	Information on the basic settings for the system function. **Note:** Settings and changes may only be carried out by trained personnel.

8.1 Overview

The diagram shows the entire menu structure of the Solareg Vision Plus.

i **Only the configuration-specific symbols are displayed.**

			
Info	Program	Manual operation	Basic setting
Current collector temperature / Collector 1	Maximum temperature of storage cylinder1	Pump1 off/on	Collector protection function off/on
Minimum collector temperature / Collector 1	Storage cylinder1 Tdmax (Td on)	Pump2 / Valve1 off/on	Collector protection temperature
Maximum collector temperature / Collector 1	Storage cylinder1 Tdmin (Td off)	Heating / Cooling / Temperature differential controller off/on	Re-cooling off/on
Current storage cylinder temperature / storage1 at bottom	Maximum temperature of storage cylinder2		Re-cooling temperature
Minimum storage cylinder temperature / storage1 at bottom	Storage cylinder2 Tdmax (Td on)		Tube collector- off/on
Maximum storage cylinder temperature / storage1 at bottom	Storage cylinder2 Tdmin (Td off)		Yield estimation off/on
Current storage cylinder temperature storage2 at bottom / collector2	Minimum pump rotating speed in %		Glycol type
Minimum storage cylinder temperature storage2 at bottom / collector2	Start temperature Heating / cooling		Glycol percentage
Maximum storage cylinder temperature storage2 at bottom / collector2	Hysteresis temperature Heating / cooling Td		Volume flow
Current collector temperature - return line	Temperature differential controller: Maximum temperature of the heating target Tmax		Controlling time in seconds
Current temperature heating / cooling / differential controller heating source	Temperature differential controller: Minimum temperature of the heating source Tmin		Storage cylinder priority
Current temperature frost protection sensor / differential controller heating target / univ. measuring point T6	Temperature differential controller: Hysteresis Tdmax		Frost protection off/on
Operating hours – pump1	Temperature differential controller: Hysteresis Tdmin		Frost protection sensor assignment
Yield storage1	Timeframe start 1,2,3 for the independent controller, 4 for the tube collector function		Frost protection: start temperature
Operating hours – pump2	Timeframe stop 1,2,3 for the independent controller, 4 for the tube collector function		Independent controller assignment: Cooling, heating, temperature differential controller
Yield storage2	Set time		Sensor assignment for the independent controller
			Select basic configuration

8.2 *"Info" menu*

In this operating mode, all measured values and operating states are displayed.

i **Only the configuration-specific symbols are displayed.**

Resettable values such as minimum and maximum temperatures, daily yield and overall yield can be reset as follows:

➲ Select value using  and  buttons

➲ Reset value using the  button

➲ Confirm "OK?" message with  = no or  = yes

Display e.g.	*i*	Description	Resetable
75 °C		Current collector(1/2) temperature	no
min 12 °C		Minimum collector(1/2) temperature Resetable to the current temperature	yes
max 105 °C		Maximum collector(1/2) temperature Resetable to the current temperature	yes
52 °C		Current storage(1/2) temperature	no
min 40 °C		Minimum storage(1/2) temperature Resetable to the current temperature	yes
max 67 °C		Maximum storage(1/2) temperature Resetable to the current temperature	yes
60 °C		Current collector-return line temperature	no
60 °C		Heating, cooling, temperature differential controller heat source Sensor T1...T6	no
35 °C		Temperature differential controller heat target	no
25 °C		Frost protection sensor (T1...T6) Displays the measuring point (T6) (not visible if not connected)	no
1234 h		Operating hours storage load Resetable to 0 h	yes
927 kWh		Yield storage Resetable to 0 kWh	yes

8.3 "Program" menu

All changeable parameters can be checked in this menu and changed if necessary. Common values are set at the factory, which will generally ensure that the system functions correctly.

The number of displayed values depends on the type of controller and the additional functions set. Only the values required in each case are displayed.

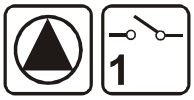
i **Only the configuration-specific symbols are displayed**

Display e.g.		Meaning	Value range	Defaults
max 65 ℃		Storage 1/2: Maximum temperature	15..95℃	65℃
dT max 7 K		Storage 1/2: Hysteresis (Tdon)	3..40K	7K
dT min 3 K		Storage 1/2: Hysteresis (Tdoff)	2..35K	3K
min 100	1 2	Setting the speed control of the pump 100% = speed control off	30%..100%	100%
13:21		Clock	0:00...23:59	12:00
min 40 ℃	R 2	Temperature start for the function heating / cooling	20..90℃	40℃
dT 10 K	R 2	Hysteresis heating / cooling	1..30K	10K
max 65 ℃	R 2	Differential controller: Maximum temperature of the heat target Tmax	15..95℃	65℃
min 15 ℃	R 2	Differential controller: Maximum temperature of the heat source Tmin	0..95℃	15℃
dT max 7 K	R 2	Temperature differential controller: Hysteresis Tdmax	3..40K	7K
dT min 3 K	R 2	Temperature differential controller: Hysteresis Tdmin	2..35K	3K
min 0:00 1(2,3)		Timeframe 1(2,3): Start for the independant controller	0:00... 23:59	0:00
max 23:59 1(2,3)		Timeframe 1(2,3): Stop for the independant controller	0:00... 23:59	23:59

min **6:00** **4**		Timeframe 1(2,3): Start für the tube collector function	0:00... 23:59	6:00
max **20:00** **4**		Timeframe 1(2,3): Stop für the tube collector function	0:00... 23:59	20:00

8.4 "Manual operation" menu

For the purposes of servicing and testing, the solar thermal system can be operated manually. To facilitate this, the 230 V or switching outputs or the potential-free output can be switched on and off. During manual operation, there is no automatic control of the system. In order to prevent improper operating conditions, after approximately 8 hours of this type of operation, the program switches automatically to "Display" and automatic control is reactivated.

Display	Meaning	Value range
	Switching the switching output A1 (solar circuit pump) on or off manually	0 = off 1 = on
	Switching the switching output A2 (pump2 or valve2) on or off manually	0 = off 1 = on
	Switching the switching output A3 (pump3 or valve3) on or off manually	0 = off 1 = on

8.5 "Basic settings" menu

Settings and changes in this menu may only be made by the installer or trained personnel. Incorrect settings can impair the function of the control unit and the solar thermal system.

To prevent accidental changes in the "Basic settings" menu, it cannot be edited under normal operation; the data can be displayed only. **To be able to carry out changes, the activation code must be entered.** You are then able to edit data for an unlimited period. **This facility to edit is blocked once you exit the basic settings menu and can only be reactivated one you have entered the relevant code.**

i **Only the configuration-specific symbols are displayed!**

Display Parameter -- Value	Meaning	Value range	Factory setting
0 -- 0	Collector protection	0 = off 1 = on	0 = off
1 -- 120 ℃	Start temperature for the collector protection	110..150℃	120℃
2 -- 0	Re-cooling function (only when collector protection is on)	0 = aus 1 = ein	0 = aus
3 -- 40 ℃	Target temperature for the storage after collector protection activity	30..90℃	40℃
4 -- 0	Time controlled circulation with tube collectors	0 = aus 1 = ein	0 = aus
5 -- 0	Yield estimation off/on	0 = aus 1 = ein	0 = aus
6 -- 0	Glycol type	0...10	0
7 -- 50	Glycol percentage	0 ... 100% 5% - Schritte	50
8 -- 1,0	Volume flow: Litter per impulse - flow meter	0,5 … 25 l/l 0,5l - Schritte	1,0
9 -- 240	Time controlling in s	30...480	240
10 -- 1	Storage priority	1...2	1
11 -- 0	Frost protection on/off	0 = off 1 = on	0
12 -- 6	Sensor assignment – Frost protection	1...6	6
13 -- 3	Start temperature for the frost protection function	-20 ℃ ... +7 ℃	3
14 -- 0	Select cooling thermostat or temperature differential controller	0 = aus 1 = cooling 2 = heating 3 = temperature differential controller	0
15 -- 5	Sensor assignment for the independent controller (source)	1...6	5
16 -- 0	Select configuration	0...4	0

Glykol types (point 6):

0	Anro	6	Tyfocor L5.5
1	Ilexan E, Glythermin	7	Dowcal 10
2	Antifrogen L	8	Dowcal 20
3	Antifrogen N	9	Dowcal N
4	Ilexan E	10	Tyfocor LS
5	Ilexan P		

9 CONTROLLER FUNCTIONS

The Solareg Vision Plus controllers include comprehensive functions for controlling and monitoring the solar thermal system. A basic distinction is made between:

- Control functions for loading the storage cylinder
- Functions for system protection and system monitoring
- Additional functions

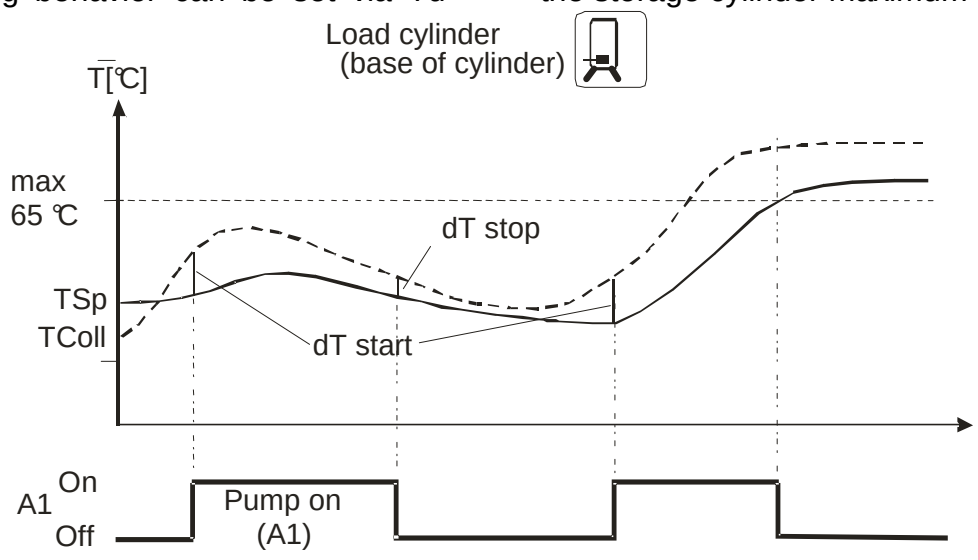
9.1 General control functions

The control unit records the temperatures from the various measuring points and calculates the correct time to load the storage cylinders, based on the programmed (additional) functions and control parameters. To prevent the pump from switching on and off due to only minimal differences in temperature, a switch-on hysteresis, e.g. 7K and switch-off hysteresis, e.g. 3K is preset.

9.1.1 Load storage cylinder

	Relevant values in menu	
	"Basic setting"	"Program"
	---	Maximum temperature
	---	Td start Switch-on temperature difference
	---	Td stop Switch-off temperature difference

The storage cylinder is loaded to the specified maximum temperature via the pump on output A1, provided the collector temperature is a certain amount higher than that of the storage cylinder temperature. The switching behavior can be set via Td start and Td stop, whereby the value for Td start cannot be lower than that for Td stop + 1. To prevent the pump from switching on and off due to only minimal differences in temperature, a hysteresis of 5K is preset as the storage cylinder maximum temperature.



9.1.2 Systems with two storages

For systems with more then one storage (type1 and type2) the loading can be optimized, depending on the energy supply. Generally, storage with lower priority has much lower temperature as the high priority storage. Redirecting the energy to low-priority storage will pull down the temperature in the collector array, and thus even the sunshine activity rises, this storage will not reach the temperature level of the high-priority one.
To “reinforce” the collector temperature, the loading of the low-priority storage will be interrupted shortly at fixed intervals. If the loading criteria for the high priority storage are fulfilled, then the high-priority storage is loaded. Further conditions for the loading pauses are: the collector temperature rises with certain degrees during the loading of the low-priority storage; respectively the high-priority storage temperature sinks with certain degrees, during this modus.
The higher priority storage can be set in the “Basic settings” menu, point 10. Point 9 concerns the loading pause.

9.1.3 Rotating speed controller

Relevant values in menu	
“Basic setting”:	„Program“
---	Drehzahl min <100%

The solar pumps connected on the outputs A1 and A2 can be simply switched on and off by the controller, or can be driven with specific rotating speed.
If this function is activated (min < 100%), the pump power will be automatically regulated by the controller, in order to keep the storage temperature level constant. If the storage temperature falls below the „*Storage Tdmax*“, the controller will spin down the pump power until the stop hysteresis is reached.

9.1.4 Independent controller

The independent controller can be used for thermostat (cooling or heating) and temperature difference controller. These functions can be overlaid by timeframes and thus only active for certain periods of time. The start and stop times can be adjusted in the “Program” menu. A temperature sensor (T1-T6) can be chosen freely in the „Basic settings“ menu point 15.
In the case of temperature difference controller, this is the sensor for the heating source. The sensor for the heating target is fixed (T6).

9.1.5 Thermostat (cooling)

Relevant values in menu	
“Basic setting”:	„Program“
14 -- 1	Start temperature max (°C)
15 -- 5	Hysteresis Td in K
	Timeframe (1...3) Start: min time
	Timeframe (1...3) Stop: max time

In order to optimise the energy yield, it could be useful to „redirect“ the solar energy, or to take it away from the storage when the storage temperature reaches a certain level.

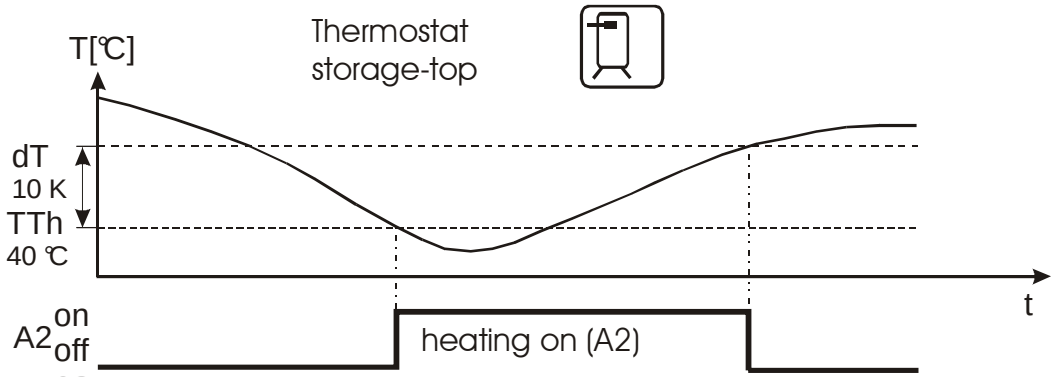
When the sensor reaches the start temperature, output A3 will be switched on. When the temperature level falls below the start temperature hysteresis, the output A3 will be switched off.

9.1.6 Thermostat (heating)

Relevant values in menu	
“Basic setting”:	„Program“
14 -- 2	Start temperature max (°C)
15 -- 5	Hysteresis Td in K
	Timeframe (1...3) Start: min time
	Timeframe (1...3) Stop: max time

The thermostat is a control circuit that’s independent from the storage loading. Thus an auxiliary heating in the top area of the storage cylinder is made possible.
The output A3 will be:

- Switched on, when the temperature falls below the adjusted start level
- Switched off, when the temperature reaches the adjusted start level + hysteresis.



9.1.7 Temperature difference control

Relevant values in menu	
“Basic setting”:	„Program“
14 -- 3	Maximum temperature heating target max (°C)
15 -- 5	Minimum temperature heating source min (°C)
	Hysteresis Td max in K
	Hysteresis Td min in K
	Timeframe (1...3) Start: min time
	Timeframe (1...3) Stop: max time

The temperature difference control manages an output according adjustable temperature differential criteria. The function is independent from all the other functions. TDiff1 is the temperature of the heating source and TDiff2 of the heating target. Output A3 will be switched on regarding the conditions below, when a timeframe is active.

A3 on	TDiff1 >= TDiff2 + Diff.Tdmax and TDiff2 < Diff.Tmax – 1 and TDiff1 >= Diff.Tmin + 1
A3 off	TDiff1 < TDiff2 + Diff.Tdmin or TDiff2 >= Diff.Tmax or TDiff1 < Diff.Tmin

9.1.8 Tube collector

Relevant values in menu	
“Basic setting”:	„Program“
4 -- 1	Timeframe (4) Start: min time
	Timeframe (4) Stop: max time

The function „tube collector“ can be switched off/on in the „Basic setting“ menu - point 4. The timeframe 4 in the „Program“ menu makes possible to activate this function only for a certain period of time (Sunshine period). When activated, the solar pump will be switched on every 30 minutes for a period of 30 seconds. This is necessary, to measure a temperature change in the collector, if there was no circulating for a long period of time.

9.2 System monitoring

If an error occurs, the ⚠ symbol will always flash.

Display	Meaning
	Short circuit of temperature sensor for current measuring point
	Interruption to temperature sensor of current measuring point, circulation error if energy yield estimation is activated

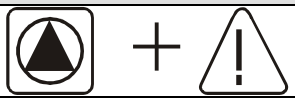
9.2.1 Sensor monitoring

The sensors required for the control functions and their connection cables are monitored for breakage and short circuit. If a defective sensor is recognised by the software, the ⚠ symbol is displayed. The source of the error can be found by scrolling.

Important:

The use of incorrect temperature sensors can therefore also lead to one of the error messages.

9.2.2 Flow monitoring

Display	Meaning
	No circulation in solar circuit

In the case of the controller Solareg Vision Plus, the temperature difference between the collector and the storage cylinder is checked. If this exceeds the amount of (60K + Td start), this is interpreted as an error because such large differences should not arise given normal system dimensions and assuming that the pump is switched on.

In the case of the Solareg Vision Plus control unit, the flow quantity is checked when the pump is switched on. If, for a period of approx. 30 minutes, no flow is detected, this is interpreted as an error.
The error message is automatically reset once the fault has been removed.

9.2.3 Collector protection / Re-cooling

Relevant values in menu	
“Basic setting”:	„Program“
0 -- 1 1 -- 120 °C 2 -- 1 3 -- 40 °C (siehe 7.5)	---

This function can be switched on/off in the „basic settings“ menu.
High temperatures can destroy antifreeze liquids. Therefore, the maximum collector temperature should be restricted.
When all storages have been loaded to the limit, the solar pump is switched off. If the collector temperature rises above “T collector max”, the solar pump is switched on, until the collector temperature drops with 10K. Part of the energy is lost in the pipes; the rest is loaded in the storage, which results in increasing the storage temperature above the adjusted maximum storage temperature. For security reasons the function will be interrupted if the storage temperature reaches 95°C.
If the storage temperature is bigger TStmax+2K and the collector temperature is 10K below TSt, then the re-cooling function is activated. The redundant storage energy will be released through the collector in order to assure reserves for the next loading cycle.
The re-cooling ends when TSt drops below the value “re-cooling till…” in the “basic settings” menu, point 3, or when the collector temperature >= the storage temperature-2K.
The re-cooling function can be active only when the collector protection function is on.

9.2.4 System protection function

The system protection function switches the system off if the “maximum collector temperature” is exceeded with 10K. As soon as the temperature drops below the “maximum collector temperature”, the system is started up again. This function has higher priority and is always active, regardless of whether the collector protection is on or off.

9.2.5 Frost protection

This function can be switched on/off in the „Basic settings“ menu, point 11 and the start temperature can be adjusted in point 13. Further on, a frost protection sensor can be selected (T1-T6, point 12).
For systems driven without or very low amount of antifreeze, the pipes and the collector have to be protected from freezing. For that purpose, the selected frost protection sensor measures the temperature at an exposed place, e.g. blank pipe before the collector. If the measured value is lower than the start temperature, the solar pump is activated until the adjusted frost protection start temperature+5K is reached. The minimum runtime of the pump is 5 minutes.
For security reasons the function is deactivated if the temperature of the priority storage falls below 5°C.

9.3 Additional functions

9.3.1 Yield estimation / yield metering

Relevant values in menu		
“Basic setting”:	„Program“	„Info“
5 -- 1	---	xxxx kWh

For the purposes of yield estimation (heat quantity), a sensor on the collector return line and a flow meter are required. The yield value is calculated from the values of the temperature difference collector-collector return line and the value measured by the flow meter. This function is switched on and off in the “basic settings” menu.

9.3.2 Engine-hour meter

Relevant values in menu	
„Program“	„Info“
---	xxxx h

As soon as a storage is loaded, there is a engine-hour meter running with the pump.

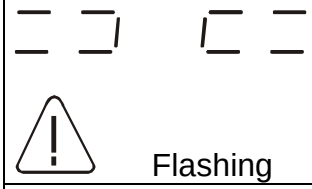
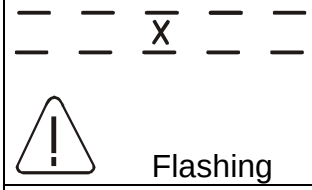
The operating hours can be seen in the “Info” menu and can be reset to 0 for every pump.

10 RECTIFICATION OF FAULTS

There are basically two kinds of system fault:

- Faults that are recognised by the control unit and which it can therefore indicate
- Faults that cannot be indicated by the control unit

10.1 Faults with error message

Error display	Possible causes	Action
 Flashing	• Sensor cable interrupted • Sensor defective	➲ Check cables ➲ Check sensor resistance value, replace sensor if necessary
 Flashing	• Short circuit in sensor wiring • Sensor defective	➲ Check cables ➲ Check sensor resistance value, replace if necessary
Circulation error: no flow rate  Flashing Additionally in the case of energy yield estimation: 	• Error in pump connection • Pump defective • Air in the system • Flow rate counter defective • Connection to flow rate meter defective • Sensor cable interrupted • Sensor defective	➲ Check cabling ➲ Replace pump ➲ Bleed system ➲ Check whether, when the system is running, the impeller wheel of the meter moves (if visible) ➲ Check cables ➲ Check cables ➲ Check sensor resistance value, replace sensor if necessary

10.2 Faults without error message

Faults and errors that are not displayed can be checked against the following table and possible causes and sources of error identified. If, based on the description, fault rectification is not possible, you will need to contact the supplier or installer of the system.

	**Errors relating to the 230 V AC voltage supply may only be rectified by trained personnel**

Error	Possible causes	Action
No display function  	• No 230 V power supply	➲ Switch on or connect the control unit ➲ Check domestic fuse box for connection
	• Fuse within device is defective	➲ Test fuse, replace with new, type 2A/T fuse if necessary. ➲ Test 230 V components for short circuit
	• Device defective	➲ Contact the supplier
Control unit does not work	• Control unit is in manual mode • Switch-on condition not met	➲ Exit “manual” menu. ➲ Wait until the switch-on condition is met
“Pump” symbol rotates, but pump does not work 	• Connection to pump interrupted. • Pump has seized. • No power to switching output.	➲ Test cable to pump ➲ Ensure the pump is running ➲ Contact supplier.
Displayed temperature fluctuates strongly at rapid intervals	• Sensor wires are positioned close to 230 V cables • Long sensor wires extended without shielding • Device defective	➲ Lay sensor wires in a different way shield sensor wires ➲ Shield sensor wires ➲ Contact the supplier

11 TECHNICAL DATA

Housing	
Material	100% recyclable ABS casing for wall-mounted installation
Dimensions (H x W x D) in mm, weight	175 x 134 x 56; approx. 360 g
Protection class	IP40 in accordance with VDE 0470
Electrical values	
Operating voltage	AC 230 Volt, 50 Hz, -10...+15%
Radio interference level	N in accordance with VDE 0875
Maximum cable cross-section 230 V connections	2.5 mm² fine-strand/single-strand
Temperature sensor / temperature range	PTF6 - 25℃ - 200℃ PT1000, 1.000 kΩ at 0℃
Testing voltage	4 kV 1 min in accordance with VDE 0631
Switching output Output depending on switching output Total output for all outputs	230 V~ / 1 A / approx. 230 VA for cos φ = 0.7-1.0 2A/ approx. 460 VA
Fuse protection	Micro-fuse 5 x 20 mm, 2 A/T (2 amp, fine-wire)
Other	
Recommended flow meter	PVM 1,5/90 1500l/h, Tmax >=90℃, 1l/Impuls
Operating temperature	0 ... + 50℃, max. humidity 9 5%, non-condensing
Storage temperature	-10 ... + 65℃

12 RESISTANCE TABLE PT1000

The correct function of the temperature sensor can be checked against the following temperature resistance table, using a resistance measurement device:

Temperature in ℃	Resistance (Ohms)	Temperature in ℃	Resistance (Ohms)
-30	882	60	1232
-20	921	70	1271
-10	960	80	1309
0	1000	90	1347
10	1039	100	1385
20	1077	120	1461
30	1116	140	1535
40	1155	200	1758
50	1194		

13 LIMITED WARRANTY

Prozeda GmbH warrants the Solareg II device to be free from malfunctions and defects in both materials and workmanship for two years from the date of purchase. Retain the original sales receipt; dated proof of purchase is required for warranty coverage.

THIS WARRANTY APPLIES ONLY TO EQUIPMENT PURCHASED IN GERMANY.

Limited Warranty Coverage

This warranty will be honored within the geographical location that the product was purchased.

Prozeda GmbH will replace the device if it fails to function properly during the warranty period, subject to any conditions and/or limitations stated herein. Such replacement is the sole remedy under this warranty. If it is necessary to replace the entire product, it may be replaced with a remanufactured product.

Limitations

Warranty service will not be provided without dated proof of purchase, such as a copy of the original dated sales receipt.

This warranty does not cover circumstances beyond Prozeda's control, nor problems caused by failure to follow the operating instructions in the user's guide. THIS WARRANTY DOES NOT APPLY WHEN FAILURE IS DUE TO SHIPPING DAMAGE, ACCIDENT, ALTERATION, MODIFICATION, UNAUTHORIZED SERVICE, MISUSE, ABUSE, USE WITH INCOMPATIBLE ACCESSORIES OR ATTACHMENTS, FAILURE TO USE ITEMS SUPPLIED BY Prozeda (SUCH AS SENSORS AND FLOW METERS), OR CLAIMS MADE AFTER THE DURATION OF THIS WARRANTY.

Prozeda makes no other express or implied warranty for this product. In the event that the exclusion of any implied warranty is ineffective under the law, the duration of the implied warranty will be two years from the purchase date. The option of replacement is Prozeda's only obligation. Prozeda will not be responsible for any special, consequential or incidental damages resulting from the sale, purchase, or use of this product, regardless of the cause. Liability for any special, consequential or incidental damages (including but not limited to loss of revenue or profit, downtime costs, loss of the use of the equipment, cost of substitute equipment, facilities or services, or claims of your customers for such damages resulting from the purchase, use or failure of the product), regardless of cause or for breach of any written or implied warranty is expressly disclaimed and excluded herefrom.

Your Rights

Some states or jurisdictions do not allow exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you.

Some states or jurisdictions do not allow limitations on how long an implied warranty lasts, so the above limitation may not apply to you. This warranty gives you specific rights; you may have other rights, which vary from state to state or by jurisdiction.