

# CONTROL 300

The flexible controller for solar thermal systems



R CONTROL remote control and temperature display



## Technical Document

### Installation and Operating Guide

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## Applications

- Closed-loop control of solar thermal system for hot water, with and without stratified thermal store
- Programmable output for a variety of hydraulic circuits, e.g. backup heating, circulation, cooling, return flow temperature boost, east-west collectors, solid-fuel boiler or swimming pool



## Special benefits



- Closed-loop control for Consolar solar thermal system or other installations
- Open-loop control of a variety of hydraulic circuits
- Automatic function testing with safety shutdown
- Optional use of R-CONTROL remote control unit





# 1 Operation and Menu Structure



## 1.1 Operation

You can use the arrow buttons  and  to navigate around the main menu and submenus.

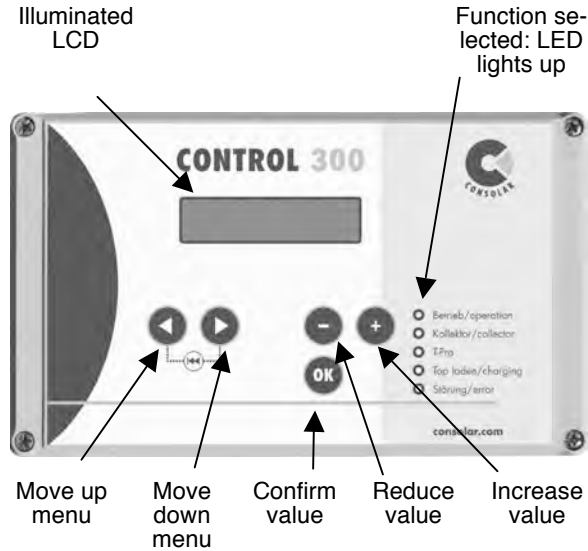
You can always return directly to the main menu by pressing buttons  and  at the same time

You can set values in the input menus with buttons  and .

The setting value always flashes when it is changed.

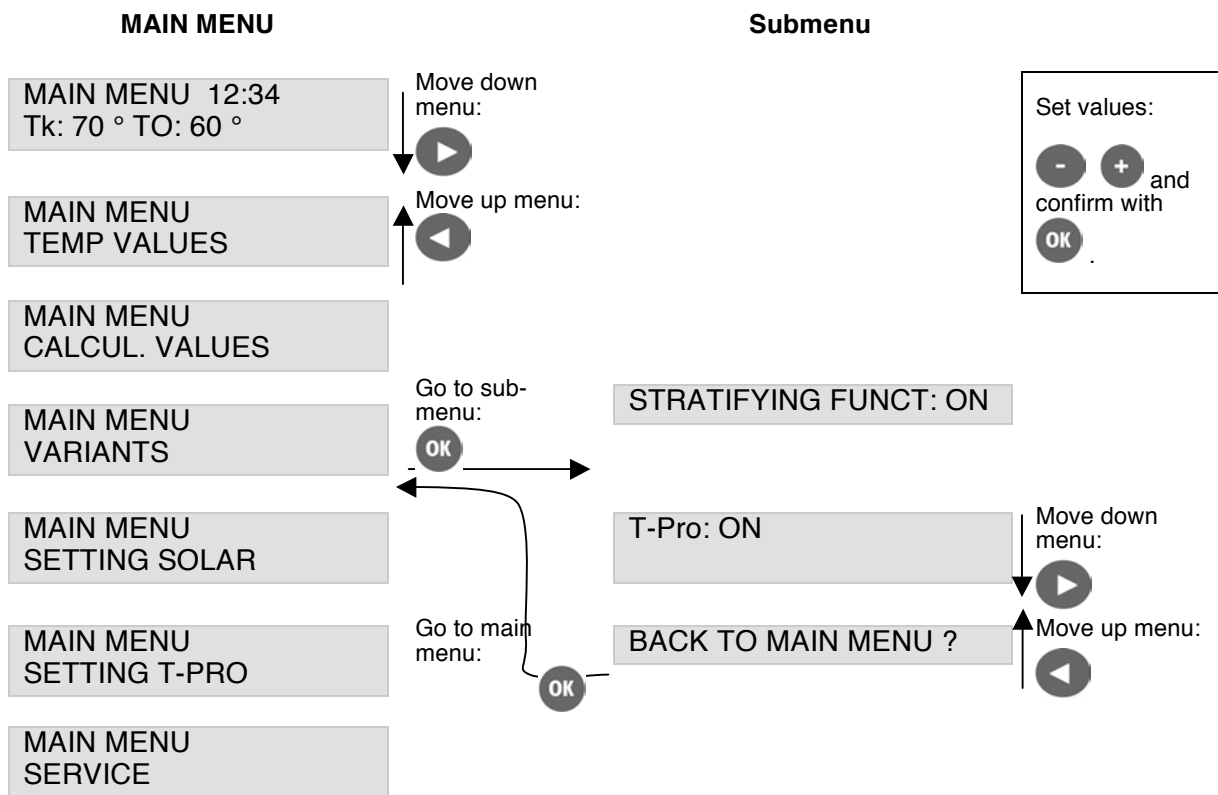
You confirm and store your setting by pressing the  button. To go to the next menu level, you also press the  button when the appropriate prompt is displayed.

If a menu function is selected, the relevant LED lights up.



## 1.2 Menu structure

The menu diagram below illustrates the principle of the menu structure:



## 2 Functions and Settings

### 2.1 Display values (temperature and calculation)

MAIN MENU  
TEMP VALUES

Displays all temperature measurements, for example, collector and thermal store temperatures:

MAIN MENU  
CALCUL. VALUES

Shows the different solar operating hours, i.e. the hours run by the solar pump.

### 2.2 System variants

MAIN MENU  
VARIANTS

STRATIFYING FUNCT:  
ON / OFF

On: Stratification loading function for Consolar thermal store

Off: Simple temperature difference control, e.g. for thermal stores without stratified solar loading.

For an explanation of the stratified loading function, see: "Solar thermal system operating functions".

T-Pro:  
ON / OFF

You can activate this function. If it is not required, "Off" must be selected to prevent display of a sensor malfunction warning. See also "Controller connection information".

### 2.3 Solar thermal system operating functions (setting solar)

MAIN MENU  
SETTING SOLAR

The microprocessor-based CONTROL 300 controller has been developed to ensure optimum performance and operational safety of Consolar thermal stores. The CONTROL 300 is also suitable for solar thermal systems with other types of thermal store. The controller permits the intelligent utilization of different insolation and weather conditions by automatically switching between two operating states depending on the level of solar loading.

Top loading: In good weather conditions, the full volume of the solar circuit water is circulated continuously only when the collector minimum temperature (top loading temperature) has been reached. In Consolar thermal

stores, the hot water is then stratified loaded at the top at a temperature of 2 to 5 K cooler.

Intermittent operation: If the solar insolation is not sufficient to heat the collector to the top loading temperature, the controller switches over to intermittent operation. This means that the CONTROL 300 waits a specific period for the collector to warm up (see table on right). Provided that the top loading temperature is not reached in the meantime, causing the solar pump to start, the controller will switch on the solar pump when the collector warm-up period expires. The intermittent pump running time is calculated to ensure that the collector contents are circulated approximately once. The preheated water is automatically stored in either the middle or lower stratified region of the Consolar thermal stores. Useful water temperatures for immediate use can be achieved more quickly with intermittent pump operation than by pure temperature difference control. The need for backup water heating using the boiler is therefore reduced in summer.

TEMPERATURE-TOP:  
30 ... 80 °C

This is the setting for the collector target temperature. In order to ensure that the temperature in the upper stratified region of the thermal store is sufficiently high to supply hot water, the top loading temperature must be set to between approximately 57 °C and 62 °C on Consolar thermal stores.

The top loading temperature for conventional drinking water stores should be set only marginally higher than the hot water temperature required by the household.

HYST.TOPCHARGE:  
2 ... 6 K

The switching hysteresis for top loading can be set here. To prevent the solar pump from starting and stopping continuously, a selectable temperature range (hysteresis) is provided for the top loading function.

If, for example, you set a top loading temperature of 60 °C and a hysteresis of 2 K, the solar pump switches on at 60 °C and off again at 58 °C.

COLLECTOR TYPE :  
1 / 2 / 3 / VARIABLE

In order to adapt the runtime/stop time ratio (solar pump runtime/solar pump stop time) to the thermal inertia of the collector (quick/medium/slow), the collector type must be set as shown below:

Setting	Water content in collector	Pump stop time in minutes	Pump runtime in minutes
1	≤ 1 litre/m <sup>2</sup>	12	4
2	≤ 2 litre/m <sup>2</sup>	24	8
3	> 2 litre/m <sup>2</sup>	36	12
Variable	Special collectors	Freely selectable	Freely selectable

The "Collector type settings table" on page 13 specifies the correct settings for different makes and models of collector.

**TEMP MAX STORE**

50... 90 °C

When the upper thermal store sensor reaches the programmed temperature, the solar pump is switched off. In some cases (e.g. during holidays), it can be useful to reduce the maximum store temperature to lower than 90 °C in order to protect the system components.

**COLLECTOR max**

100 ... 110 °C

This is the setting for the maximum permissible collector temperature which may enter the thermal store depending on the lower store temperature.

**DIFF MIN SOLAR:**

2 ... 12 K

The "Diff Min Solar" function sets the minimum permissible difference by which the collector sensor temperature must exceed the lower thermal store temperature to allow solar loading of the store. A lower value can be set for small pipe diameters and efficient thermal insulation. Long pipe runs, larger diameter pipework, poor insulation or unfavourable sensor positioning require a higher temperature difference.

**EXAMPLE:**

The value can be set to 6 K for systems with 15 mm diameter pipes, a 20 m pipe run, an electrically economic pump and good pipe insulation. With a setting of 6 K, the solar pump switches on when the collector sensor temperature is at least 6 K higher than the lower thermal store temperature. The solar pump will switch off when the temperature difference between the collector and the lower thermal store drops below 4 K (default hysteresis setting of 2 K).

**Solar pump: Assignment input - function - output**

Input	Function
Collector sensor (in delivery package)	Top loading Diff Min Solar
Lower thermal store sensor (in delivery package)	Diff Min Solar
Upper thermal store sensor (in delivery package)	Temp Max Store
<b>Output: Solar pump</b>	

**NOTE:**

**It is absolutely essential to follow the instructions in the installation guide for the collector sensor.**

**2.4 T-Pro controller**

**MAIN MENU  
SETTING T-PRO**

The CONTROL 300 features an all-purpose, closed-loop temperature difference control suitable for use with a very wide variety of circuits.

**T-PRO SENSOR 2 :  
YES / NO**

Setting "Temperature sensor 2: Yes" activates the temperature difference controller, i.e. temperatures T1 and T2 are compared.

Setting "Temperature sensor 2: No" activates the temperature switch (thermostat).

**DIFFERENCE  
T-PRO: 0...30 K**

This function sets the minimum permissible difference by which the temperature at sensor T1 must exceed the temperature at sensor T2 in order to activate the "T-Pro" function. (Only with setting "Temperature sensor 2: = Yes".)

**HYSTERESIS T-PRO:  
0 ... 30 K**

A switching hysteresis can be set here in order to prevent continuous closing and opening of the contact.

**TEMPERATURE  
MIN: 0 ... 100 °C**

**TEMPERATURE  
MAX: 0 ... 140 °C**

A minimum or maximum value can be programmed here for both temperature sensors (T1 and T2).

**"Temperature sensor 2: Yes":** The contact opens when the temperature at sensor T1 or T2 exceeds the maximum setting or drops below the minimum setting.

**"Temperature sensor 2: No":** The contact opens when the temperature at sensor T1 exceeds the maximum setting. The contact closes when the temperature at sensor T1 drops below the minimum setting.

**RUNTIME  
T-PRO: 0 ... 60 Min.**

Outputs A2 (230 V) and S1 (isolated) are disabled irrespective of the switching logic when the programmed runtime expires (monoflop function). This function is not active if "0" is programmed.

**OVERRUN**  
T-Pro o ... 60 nm.

Outputs A2 (230 V) and S1 (isolated) are not disabled until the programmed overrun period has expired.

**FLOW T-PRO**  
0 ... 60 Min.

Outputs A2 (230 V) and S1 (isolated) are not enabled until the delay period (FLOW) above has expired.

**TIMER T-PRO**  
USE: YES / NO

If the timer is set to "Yes", the T-Pro controller is active only in the three programmed time windows.

**INVERTING**  
T-PRO: YES / NO

Outputs A2 (230 V) and S3 (isolated) can be inverted with this setting.

**Example 1: Temperature switch for HW backup heating**

"Temperature sensor T2:	No
Temperature T1 min:	55 °C
Temperature T1 max:	60 °C
Overrun T-Pro:	4 minutes
Timer T-Pro:	On
T-Pro On 1:	08:00
T-Pro Off1:	16:00

When temperature sensor T1 reaches the programmed target temperature of 60 °C, the contact opens when the set overrun period of 4 minutes expires and hot water loading ceases. At 55°C the contact closes and loading of the hot water demand volume resumes. Hot water backup heating is active between 8:00 and 16:00.

**Example 2: Closed-loop temperature difference control for return flow temperature boost**

"Temperature sensor T2:	Yes
Difference T-Pro:	4K
Hysteresis T-Pro:	2K
Temperature T1 min:	0°C
Temperature T1 max:	90 °C
Temperature T2 min:	0°C
Temperature T2 max:	90 °C
Timer T-Pro:	On
T-Pro On 1:	08:00
T-Pro Off1:	16:00

If the temperature at sensor T1 is 4 K higher than at sensor T2, the contact closes and the return flow temperature boost function is activated (the switchover valve is switched to AB-A): The hysteresis is 2 K. The return flow temperature boost function is deactivated when the temperature exceeds the programmed maximum temperatures (90°C) or drops below the programmed minimum temperatures (0°C). Return flow temperature boosting is active between 8:00 and 16:00.

T-Pro: Assignment input - function - output	
Input	Function
Temperature sensor T1 (no. RE 040 or item RE 046)	Temperature switch Temperature difference control
Temperature sensor T2 (no. RE 040 or item RE 046)	Temperature difference control
<b>Output: T-Pro</b>	

**2.5 Service menu**

**MAIN MENU**  
**SERVICE**

**SET CLOCK:**  
12:34

You can set the clock in this menu. The hours are set with "-" and the minutes with "+".

**CALIBRATE CLOCK**  
-10 ...+10 min/Month

This setting can be used to recalibrate the clock at a future point in time.

**MAN OPERATION ?**

This setting switches all functions to manual control.

**Example: Solar pump**

On: The solar pump is permanently switched on.  
 Off: The solar pump is switched off.  
 Auto: The controller regulates solar hot water loading to the thermal store according to programmed settings.

Settings in manual operation have priority. This means that the pump or valve can be switched even if the function is disabled by another menu setting or is currently in "fault" status.

**• IMPORTANT:**

**The system may be switched on manually only for short periods and only for test purposes. Leaving the system switched on continuously will cause damage to the system or its components because the safety functions are disabled in this operating mode.**

**SELECT LANGUAGE:  
 GERMAN/FRENCH/SPANISH/ITALIAN**

German, French, Spanish, English or Italian can be selected here as the programming/interface language.

**RESET OPERATING  
 HOURS ?**

The solar operating hours can be reset here.

**RESET CONFIG.  
 BASE ?**

If "Reset config. base" is confirmed with OK, the controller is restored to its original state, i.e. all settings are restored to their defaults as set at the factory.

**2.6 Other functions**

The R-CONTROL (RE 400) remote control can be connected to the CONTROL 300 system via a bus interface and installed, for example, in the living area. This remote control is capable of monitoring and adjusting all temperature inputs and settings for the CONTROL 300 system.

**3 Faults and Function Tests**

If a temperature sensor develops a defect (short circuit or open circuit), the controller responds as specified in the table below.

Input	Menu setting	Sensor connection required?	Function	Location and sensor designation	Sensor selection
F1	Basic function	Yes	Solar control	Absorber outflow: Collector sensor	
F2	Basic function	Yes	Solar control	Sensor housing: Lower thermal store	
F3	Basic function	Yes	Limiting of thermal store temperature	Sensor housing: Upper thermal store	

The LCD flashes in response to any type of malfunction and the fault is output on the display. An open circuit, for example, is indicated by

**CABLE O/C  
 SENSOR: 4**

and a short circuit by

**CABLE S/C  
 SENSOR: 4**

A fault display and fault reaction are implemented only for the function which is currently active. In other words, if T-Pro is not active and no sensor is connected, no fault will be displayed and the controller will not react to the sensor failure.

Sensor fault:	Effect:
Collector sensor	Solar pump = Off
Upper thermal store sensor	Solar pump = Off
Lower thermal store sensor	Solar pump = Off
Temperature sensor T1	T-Pro = Off
Temperature sensor T2	T-Pro = Off

**4 Controller Connection Information**

The recommended circuits in the relevant technical documentation must be used as a basis for planning the hydraulic circuit of a Consolar system.

**4.1 Solar and T-Pro control**

**4.1.1 Overview of functions:**

- Solar control
- T-Pro control

F4	Add. function	As selected	T-Pro controller	Position depends on application: Sensor 1
F5	Add. function	As selected	T-Pro controller	Position depends on application: Sensor 2

Output	Menu setting	Function	Output voltage	Selection
A1	Basic function	Solar pump	230 V	
A2	Basic function	T-Pro	230 V	
ST	Basic function	T-Pro	0V*	

• **IMPORTANT!**

**Isolated contact S1 (0V) must not be operated at potential (110 V/230 V).**

Variants:	Recommended:	Setting:
Stratifying function <sup>1)</sup>	On	
T-Pro controller	System-dependent	
Setting Solar:	Recommended:	Setting:
Diff Min Solar	6...12K	
Top temperature <sup>2)</sup>	57...62 °C	
Hysteresis Top <sup>2)</sup>	2 K	
Collector type <sup>2)</sup>	System-dependent	
→ To special menu? <sup>2)</sup>	Special setting	
Pump stop time <sup>2)</sup>	Special setting	
Pump runtime <sup>2)</sup>	Special setting	
→ Return to menu Setting Solar? <sup>2)</sup>		
Temp Max Store	90 °C	
Collector max	110°C	
Setting T-Pro <sup>3)</sup> :	Recommended:	Setting:
T-Pro Sensor 2	System-dependent	
Difference T-Pro	System-dependent	
Hysteresis T-Pro	System-dependent	
Temperature T1 min	System-dependent	
Temperature T1 max	System-dependent	
Temperature T2 min	System-dependent	
Temperature T2 max	System-dependent	
Runtime T-Pro	System-dependent	
Overrun T-Pro	System-dependent	
Flow T-Pro	System-dependent	
Timer T-Pro	System-dependent	
→ To submenu ?		

T-Pro On 1	User-dependent	
T-Pro Off 1	User-dependent	
T-Pro On 2	User-dependent	
T-Pro Off 2	User-dependent	
T-Pro On 3	User-dependent	
T-Pro Off 3	User-dependent	
→ Back to menu Setting T-Pro?		
Inverting T-Pro	System-dependent	
Service menu:	Recommended:	Setting:
App/Sys		
Set clock	Current time	
Calibrate clock	0.0 min/Month	
→ Man operation ?		
Collector pump	Auto	
Output T-Pro	Auto	
→ Back to Service menu?		
Select language	Relevant language	
Reset operating hours?	No	
Reset Config. base?	No	

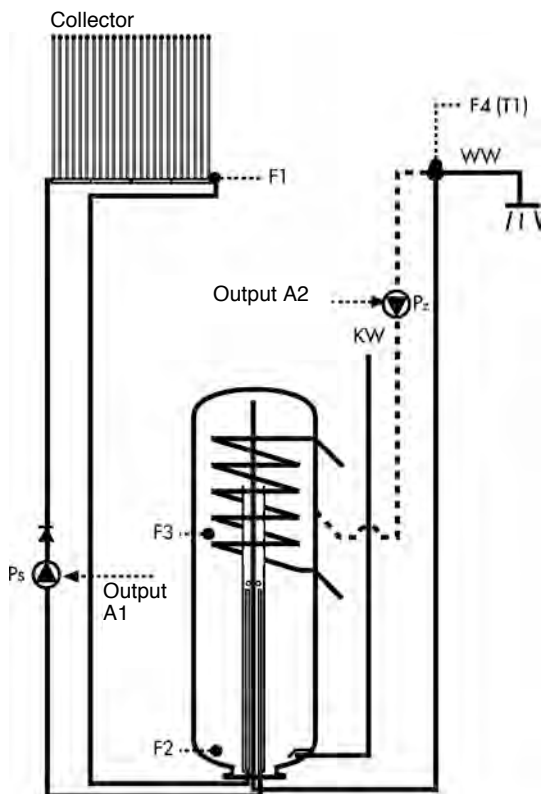
**Footnotes:**

- 1) Optimum setting:  
Summer (May-August): Stratifying function = On,  
Winter (September-April): Stratifying function = Off
- 2) Only with setting "Stratifying function = On"
- 3) Only with setting "T-Pro = On"

### 4.1.2 Solar control with circulation controlled by temperature and timer

**Example:**

The solar thermal system is operating on the Consolar stratified loading control. The circulation operates in 3 different time windows within a programmed temperature range.



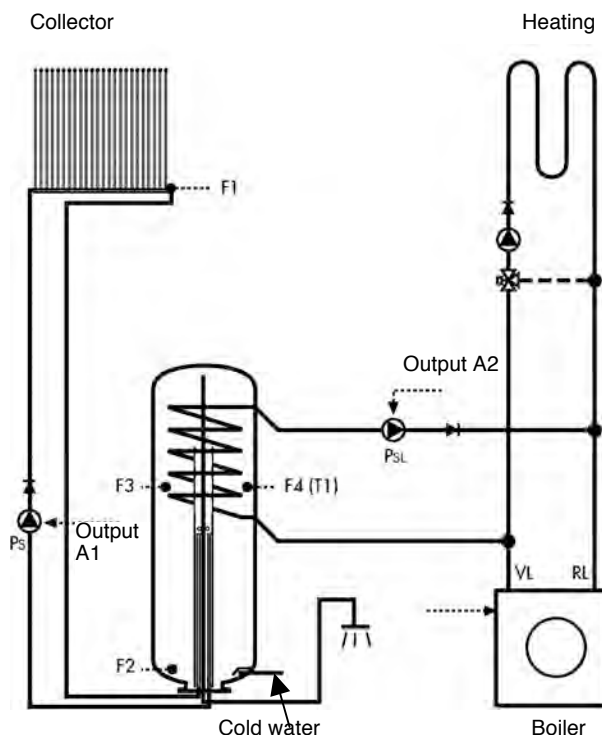
Setting T-Pro <sup>3)</sup> :	Recommended:	Setting:
T-Pro Sensor 2	No	
Temperature T1 min	40 °C	
Temperature T1 max	45 °C	
Runtime T-Pro	0 minutes	
Overrun T-Pro	0 minutes	
Flow T-Pro	0 minutes	
Timer T-Pro	Yes	
→ To submenu ?		
T-Pro On 1	6:00	
T-Pro Off 1	9:00	
T-Pro On 2	11:30	
T-Pro Off 2	13:30	
T-Pro On 3	17:00	
T-Pro Off 3	20:00	
→ Back to menu Input T-Pro?		
Inverting T-Pro	No	

3) Only with setting "T-Pro = On"

### 4.1.3 Solar control with HW backup heating controlled by temperature and timer

**Example:**

The solar thermal system is operating on the Consolar stratified loading control. The hot water backup heating operates in 3 different time windows within a programmed temperature range.



With COAX thermal stores, sensors F3 and F4 can be mounted in the same housing for the hot water backup supply.

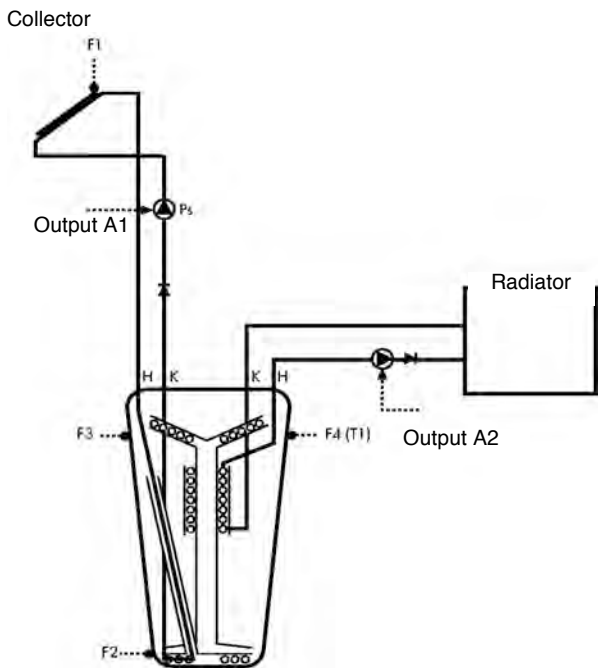
Setting T-Pro <sup>3)</sup> :	Recommended:	Setting:
T-Pro Sensor 2	No	
Temperature T1 min	45 °C	
Temperature T1 max	50 °C	
Runtime T-Pro	0 minutes	
Overrun T-Pro	4 minutes	
Flow T-Pro	0 minutes	
Timer T-Pro	Yes	
→ To submenu ?		
T-Pro On 1	6:00	
T-Pro Off 1	9:00	
T-Pro On 2	11:30	
T-Pro Off 2	13:30	
T-Pro On 3	17:00	
T-Pro Off 3	20:00	
→ Back to menu Input T-Pro?		
Inverting T-Pro	No	

3) Only with setting "T-Pro = On"

### 4.1.4 Solar control with cooling

**Example:**

The solar thermal system is operating on the Consolar stratified loading control. When the thermal store reaches a specific temperature, it can be cooled down, for example, via a radiator.



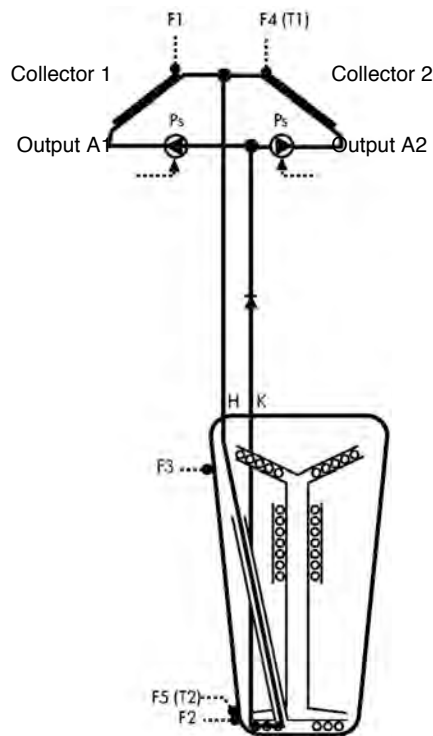
Setting T-Pro <sup>3)</sup> :	Recommended:	Setting:
T-Pro sensor 2	No	
Temperature T1 min	80 °C	
Temperature T1 max	85 °C	
Runtime T-Pro	0 minutes	
Overrun T-Pro	0 minutes	
Flow T-Pro	0 minutes	
Timer T-Pro	No	
→ Back to menu Input T-Pro?		
Inverting T-Pro	Yes	

3) Only with setting "T-Pro = On"

**4.1.5 Solar control with East-West valve function**

**Example:**

The Consolar solar thermal system is operating with East-West collectors which are regulated by means of a standard, closed-loop difference control. Solar loading occurs as long as one of the collectors is warmer than the temperature at the lower thermal store sensor.



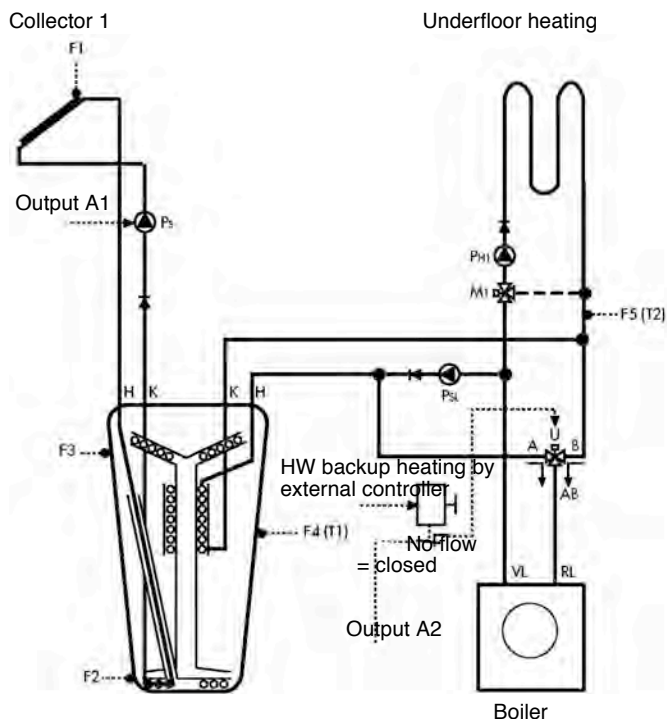
Variants:	Recommended:	Setting:
Stratifying function	On	
T-Pro controller	On	
Setting T-Pro <sup>3)</sup> :	Recommended:	Setting:
T-Pro Sensor 2	Yes	
Difference T-Pro	6...12K	
Hysteresis T-Pro	2K	
Temperature T1 min	0	
Temperature T1 max	110°C	
Temperature T2 min	0	
Temperature T2 max	90 °C	
Runtime T-Pro	0 minutes	
Overrun T-Pro	0 minutes	
Flow T-Pro	0 minutes	
Timer T-Pro	No	
Inverting T-Pro	No	

3) Only with setting "T-Pro = On"

4.1.6 Solar control with return flow temperature boost

**Example:**

The solar thermal system is operating on the Consolar stratified loading control. When the temperature at the thermal store sensor is higher than the return flow temperature, the stored thermal energy is used to support heating.



• **NOTE**

**The return flow temperature boost function must be deactivated when HW backup heating is active.**

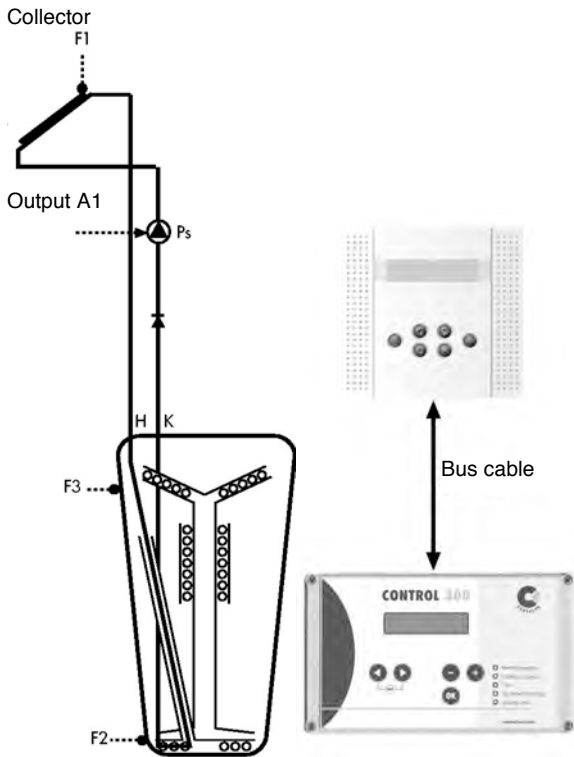
Setting T-Pro <sup>3)</sup> :	Recommended:	Setting:
T-Pro Sensor 2	Yes	
Difference T-Pro	4K	
Hysteresis T-Pro	2K	
Temperature T1 min	0	
Temperature T1 max	90 °C	
Temperature T2 min	0	
Temperature T2 max	90 °C	
Runtime T-Pro	0 minutes	
Overrun T-Pro	0 minutes	
Flow T-Pro	0 minutes	
Timer T-Pro	No	
Inverting T-Pro	No	

3) Only with setting "T-Pro = On"

### 4.1.7 CONTROL 300 with remote control

**Example:**

A remote control unit (RE 400) can be connected to the CONTROL 300 via the bus interface. This remote control unit can be used in the living area to monitor and adjust the temperatures and settings of the solar thermal system.



## 5 Collector Type Settings Table

### 5.1 Flat-plate collectors

Collector type	Manufacturer	Setting
AE-21	AET	1
AE-26	AET	1
AE-32	AET	1
STU	ARCON	1
STU-V	ARCON	1
ST	ARCON	1
S-250	ARCON	1
S-350	ARCON	1
Integral Holz	Arge	1
Solar-Light K208	Buderus	1
K 208-1S	Buderus	1
K 208-FS	Buderus	1
K 208-FW	Buderus	1
<b>PLANO 26</b>	<b>Consolar</b>	<b>1</b>
C2S	Christeva	1
FK LUX 2000	Dornier-Prinz	1
Stern G324 F-V	ECO/SUN	1
Stern G324-F-H	ECO/SUN	1
ECO/SUN light-XS	ECO/SUN	1
ES-II-V	ECO/SUN	2
ES-II-VK	ECO/SUN	2
EKS 2000 HOCH	ECON	1
EKS 2000 QUER	ECON	2
EKS 3000 HOCH	ECON	1
EKS 3000 QUER	ECON	1
FSK1	Georg Fischer	2
FSK2	Georg Fischer	2
Praktisol 2000	Hess	1
W802001	Ikarus Solar	2
solector BM 116	KBB Kollektorbau	1
low flow	KBB Kollektorbau	1
SES	Müller Energietechnik	1
Variosol	Nau	1
Variosun	Nau	2
ps2170	Pro Solar	2
Solar 350	Paradigma	1
Solar 500	Paradigma	1
Solar 750	Paradigma	1
RESYS 202-E-Niox	RES	1
RESYS 203-N-Niox	RES	1
Rotrand collector	R&R Wärmetechnik	1
SKS/2.1	Solar Diamant	1
SUWU	Solar Diamant	1
D1	Solar-Energie-Technik	1
D2	Solar-Energie-Technik	1
A1	Solar-Energie-Technik	1
A2	Solar-Energie-Technik	1
Amablue	Solar Projekt	

F35	Solvis	1
F50	Solvis	1
F50 TI-Int.	Solvis	1
F60	Solvis	1
F60 TI-Int.	Solvis	1
F75	Solvis	1
F75 TI-Int.	Solvis	1
SK500	Sonnenkraft	1
SK 500N	Sonnenkraft	1
SKIDK	Sonnenkraft	2
Large-scale collector / 6, 8, 10 and 12 qm	Sonnenkraft	2
SOL1 70A	Stiebel Eltron	2
LSC-D	Sunset	1
LSC-E	Sunset	1
LSC-F	Sunset	2
SEF02	Thermisol	1
SEF04	Thermisol	1
SEF06	Thermisol	1
SEF08	Thermisol	1
SEF10	Thermisol	1
SEF12	Thermisol	1
SEFS	Thermisol	1
Calor Sol	Viessmann	1
Type LB 5.0	Wagner	1
Type LB 6.4	Wagner	1
Type LB 7.6	Wagner	1
Type SB 5.1 W	Wagner	1
Type SB 7.7 W	Wagner	1
Type SB 10.3 W	Wagner	1
EuroC18	Wagner	1
WISO 2/2	Wittigsthal	1

The setting data applies to volumetric flow rates of between 20 and 30 l/m<sup>2</sup>h.

### 5.2 Vacuum tube collectors

Collector type	Manufacturer	Setting
SLU-120/12	AMK	1
SLU-120/50 H	AMK	3
Sunlight	Austria Email	1
<b>TUBO 12 CPC</b>	<b>Consolar</b>	<b>1</b>
LUX 2000	Dornier-Prinz	2
Astron 20	Elco Klöckner	1
Astron 30	Elco Klöckner	1
SK6	Microtherm	1
CPC14	Paradigma	1
CPC21	Paradigma	1
Shiroki	Solarway	1
SOL 200 A	Stiebel Eltron	2
SOL 300 A	Stiebel Eltron	2
Mazdon TMA	Thermomax	1
TubeSol	Viessmann	2
DuoSol H20	Viessmann	1

The setting data applies to volumetric flow rates of between 20 and 30 l/m<sup>2</sup>h.

## 6 Technical Data

<b>Basic unit:</b>	<b>Plastic housing, 200 x 120 x 60 mm</b>
Degree of protection:	IP 65
Operating voltage:	230 V± 10%, 50 to 60 Hz
Power consumption:	max. 5 VA
RI suppression in accordance with:	EMC Directive
Low-Voltage Directive and other standards:	EN 61010-1, EN 50081-1, EN55022, 50082 - 1, IEC 1000-4-2/4-4/4-11 ENV 50140/ENV 50141 /ENV 50142
Switching contacts/relays:	A1 ...A2: 230 V / 2 A relay S1 isolated relay (not a voltage relay, normally open contacts)
Fuse protection for outputs:	All outputs are jointly protected by 3.15 A mT.
Operation:	Menu-assisted
Service menu:	Each output can be operated manually (A2 and S1 always in parallel).
Display measuring range:	-30 °C to 230 °C
Accuracy:	± 1K (within 0 to 100°C range)
PT 1000 temperature sensors (all sensors):	-30 °C to 180 °C, briefly up to 250 °C (collector sensor) -30 °C to 100 °C (thermal store sensor, collector)
Temp. in °C	-10    0    10    20    30    40    50    60    70    80    90    100    110
R in ohms	960 1000 1039 1078 1117 1155 1194 1232 1271 1309 1347 1385 1423
Controller operating temperature:	0°C...40°C

## 7 Troubleshooting Guide

Problem:	Cause:	Remedy:
Display flashes and indicates a sensor fault.	Open circuit or short circuit on sensor. Controller is incorrectly set.	Check the sensor mounting and replace the sensor if necessary.  Check whether a function is active even when no sensor is connected. If so, deactivate the function.
Solar pump fails to run.	Solar pump is defective or incorrectly connected.  The controller is not switching the pump on even though there is sufficient solar energy to store.	Check the connection and replace the pump if necessary.  This response might not be a fault! See "Solar thermal system operating functions" on page 3 of the technical documentation!
Pump or valve (T-Pro controller) does not actuate.	Controller is incorrectly set.  Temperature sensor, pump or valve is defective.  The controller does not switch the output until the next programmed switching time.	Check the values and timer program and correct settings if required.  Replace the temperature sensor, pump or valve.  Wait until the next switching time is reached. Function can be tested by adjusting the clock setting.

# 8 General Installation Instructions

## 8.1 Safety notice

Please read through the following installation and commissioning instructions carefully before you start up the controller. This will ensure that you do not damage any system components by handling them incorrectly. All installation/commissioning work must be carried out by authorized personnel in accordance with the relevant regional and national regulations.

## 8.2 Set the system variant

To avoid any commissioning faults, connections should be made in the sequence specified below:

- Connect up the sensors and mains supply
- Set the required system variant
- Disconnect the supply voltage and connect up the outputs

# 9 Installation

The system must always be installed indoors. Undo the screws (1) to remove the top section of the housing (2).

- **IMPORTANT:**

**Never remove the top of the housing if the supply voltage is connected!**

The base section of the housing (3) can be mounted on an indoor wall through the screw holes provided. The electrical connections can then be made.



Diagram 1: Housing of CONTROL 300 unit

# 10 Electrical Connections

The unit must be connected to an external supply voltage 230 V ± 10 % (50-60 Hz). It must be connected up as illustrated in diagram 2 (supply connection diagram).

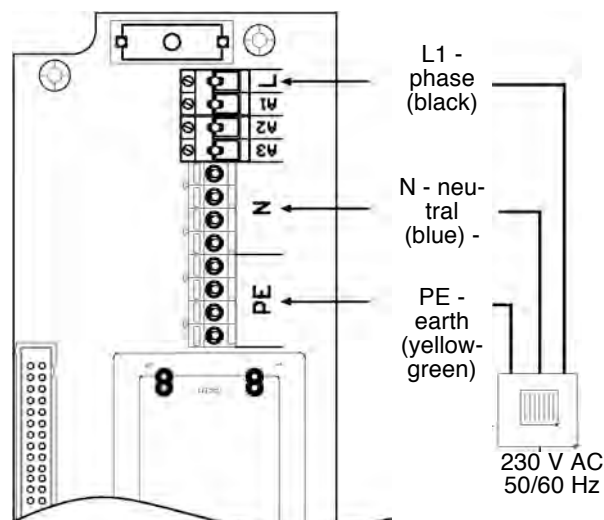


Diagram 2: Supply connection diagram

The load outputs can be connected to the following terminals:

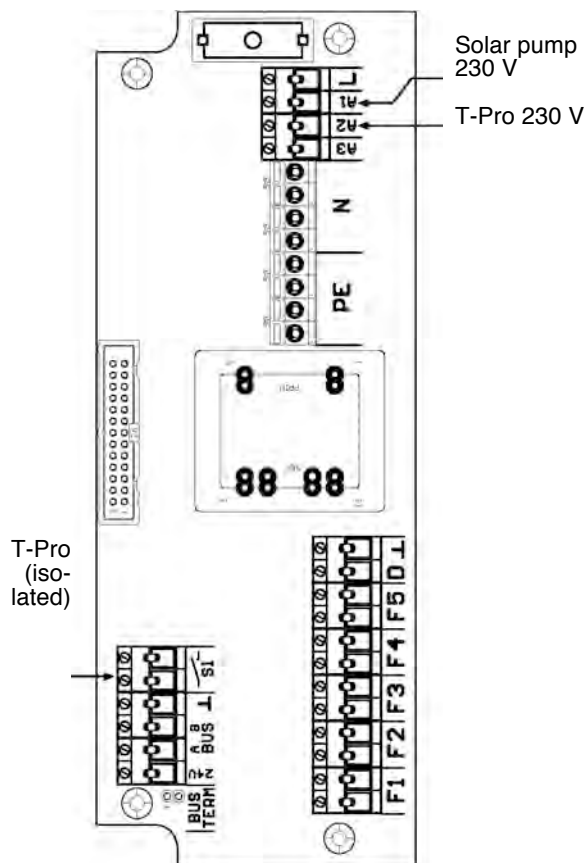


Diagram 3: Terminal diagram for outputs

Outputs 1 (solar pump) and 2 (T-Pro controller) are both 230 V outputs.

Output S1 (T controller) is an isolated contact.

- **IMPORTANT:**

**Isolated contact S1 (0V) must not be operated at potential (e.g. 110 V / 230 V).**

The PT 1000 temperature sensors are connected to the following terminals:

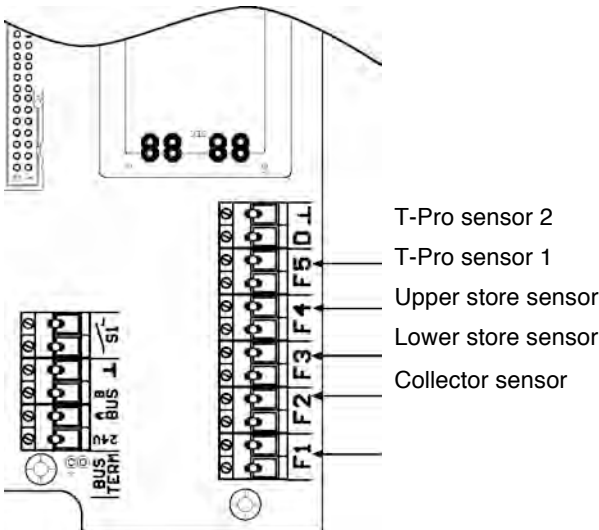


Diagram 4: Termination diagram for analog inputs

**NOTE:**

The input and output connector pins must be assigned as specified by the controller connection information in the technical documentation.

## 11 Temperature Sensors

The sensor cables can be lengthened. Please note, however, that susceptibility to interference may increase if the connecting cables are very long.

**Example of maximum cable length:**

Sensor	Cable	Length up to
PT1000	2 x 0.75 mm	25 m

The polarity of the sensor connections is optional. The installation of a surge arrester (item no. RE500) is recommended to protect the collector sensor against lightning strikes.

**NOTE ON ELECTRICAL INSTALLATION STANDARDS:**

The installation must comply with the relevant regional and national electrical installation standards. The sensor cables carry low voltage and must not be installed in the same cable duct as cables carrying voltages higher than 50 V.

Where possible, the collector sensor should be mounted on the last absorber plate so that it is also exposed to insolation. Positioning the collector sensor incorrectly can result in collector temperature measuring errors and cause the controller to malfunction.

If a sensor housing is used, it must be ensured that the sensor is properly contacted in the housing. It is advisable to use thermo-lubricant in most cases.

**NOTE ON POSITIONING THE COLLECTOR SENSOR:**

The collector sensor must never be mounted outside the collector.

## 12 Commissioning

When the unit is connected to the mains supply, the selected temperatures will appear on the display. To test whether the connected outputs are working properly, the individual outputs (depending on system variant) are set to ON in manual operation in the Service menu.

The relevant LEDs must light up and the pump or valve must be actuated.

The switches must be set to AUTO when the test is complete.

**IMPORTANT:**

The system may be switched on manually only for short periods and only for test purposes. Leaving the system switched on continuously will cause damage to the system or its components because the safety functions are disabled in this operating mode.

**NOTE:**

The information specified in this Technical Documentation does not claim to be complete and is not a substitute for proper planning and configuration. Subject to technical changes and errors.

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