



$$\dot{Q} = \Delta T \cdot c_p \cdot \dot{m}$$



Solar controllers SC4.16 | SC8.24

Exergy-optimised management of storage tanks



$$\dot{Q} = \Delta T \cdot c_p \cdot \dot{m}$$

$$[\text{J/s}] = [\text{K}] \cdot [\text{kJ/kgK}] \cdot [\text{kg/s}]$$

power conventionally 2010

The exergy-optimised management of storage tanks

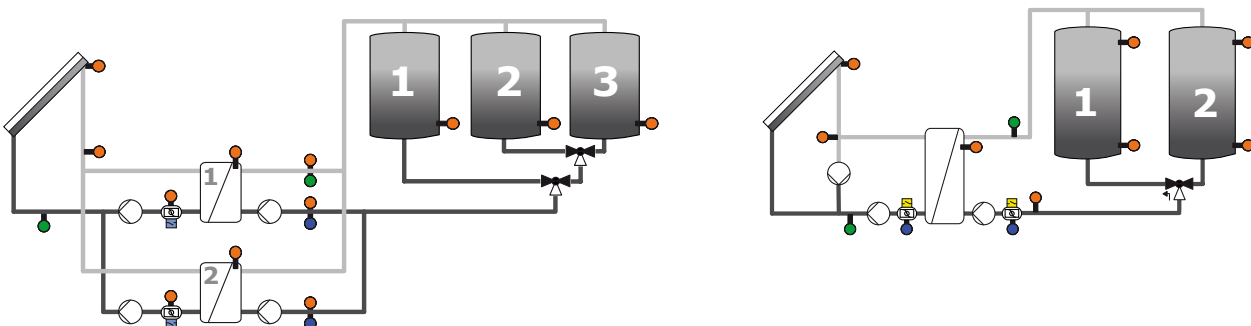
Conventional controllers adjust the speed of the pump depending on the temperature difference ΔT . This implies that a certain adjustment of speed always results in a defined change of the flow rate. The control scheme does not take into account the individual hydraulic design of the installation.

To determine which storage tank is to be charged, conventional controllers must measure the rise in temperature at the collector. Therefore the controller normally stops the pumps and observes the rise in temperature over a fixed period. Only after this analysis the storage tank is selected or a new waiting period is started.

The new control strategy for exergy-optimised management of storage tanks, which is implemented in the controllers SC8.24 and SC4.16, allows for a continuous measurement and calculation of the expected thermal output. Thus the controller can directly switch to the optimum tank, without any losses. The implementation of this strategy only became possible when exact sensors and precisely controllable high-efficiency pumps were available at sensible prices. The trend towards complex installations with large collector surfaces also paved the way for new solutions beyond the temperature difference control.

The new control strategy is based on the measurement of the mass flow rate \dot{m} and the temperatures in the primary and secondary circuit of the installation. Depending on the heat flow in the exchanger thus determined, the speed of the primary and the secondary pump is asynchronously controlled. So the solar energy can be raised to a useful potential.

This exergy must now be sensibly distributed to one or more storage tanks with different temperature levels by the storage tank management. Exergy-optimised management of storage tanks means, that a tank is only charged if its temperature is maintained or increased. The charging strategy can be configured individually for each tank. This means that the user can set a minimum temperature or a temperature difference at which the storage tank is charged.



Controller for transfer stations with external heat exchanger

Hardware

Graphic display and clearly arranged keypad

- for intuitive handling

Large space for terminal connection

- Thanks to the special concept of the circuit board all inputs and outputs can be easily connected.

Pluggable terminals

- The terminals are pluggable, so that the circuit board can be quickly replaced in case of service. The wiring, which can be quite extensive, can be easily unplugged and plugged on again.

USB interface

- Easy configuration of installation parameters
- Installation of software updates
- Connection of the data logger or the visualisation

Interface RS485

- Interface for the connection to other controllers



Controller SC4.16

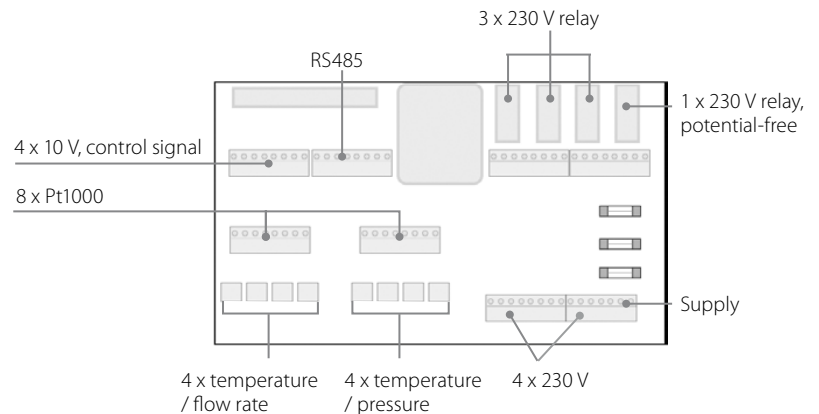
The controller can optionally be equipped with one additional communication interface.

Certified and available are:

LAN (Ethernet)

GSM (Mobile Phone)

BT (BlueTooth)



SC4.16		SC8.24	
4 outputs (230 V)	3 x semiconductor, speed control for conventional pumps	8 outputs (230 V)	4 x semiconductor, speed control for conventional pumps
	1 x relay (change-over contact, potential-free)		3 x relay (normally open contact)
			1 x relay (change-over contact, potential-free)
4 outputs (10 V)	4 x 0-10 V / PWM (1,9 kHz), speed control for high-efficiency pumps (mode of operation can be freely selected for each output)	4 outputs (10 V)	4 x 0-10 V / PWM (1,9 kHz), speed control for high-efficiency pumps (mode of operation can be freely selected for each output)
8 inputs (Pt1000)	8 x Pt1000, temperature measurement by a resistance probe	8 inputs (Pt1000)	8 x Pt1000, temperature measurement by a resistance probe
8 analogue inputs (4 combined inputs T/V, T/P)	Temperature / Pressure or flow rate sensors Channel A: 0.5 V Channel B: pulse/0-5 V	8 analogue inputs (4 combined inputs T/V)	Temperature / flow rate sensors Channel A: 0.5 V Channel B: pulse/0-5 V
		8 analogue inputs (4 combined inputs T/P)	Temperature / pressure sensors Channel A: 0-5 V Channel B: 0-5 V
Communication interfaces: RS485, networking / cascading of controllers USB Optional: LAN/GSM/BT			

PC software

Dynamic menu navigation

- Only the relevant parameter sets are shown to facilitate the configuration of the installation.

Remote servicing

- Installation of software updates

Remote monitoring

- Query of data from sensors and outputs
- Display of messages

Remote display and operation of the controller via the PC software

The current controller display is transmitted and shown on the PC, the simulated keypad on the screen allows to operate the controller. So you can offer a broad range of services quickly and efficiently, from the small assistance („Where can I set...“) up to the comprehensive training.

Remote manipulation for analysis of the installation

- Testing/manipulating the state of the installation by setting sensor and output values. Each sensor/output can be overwritten with specified values. The rest of the installation will continue to work according to the set parameters. This means that the installation can run in "emergency mode" until a service technician can rectify the fault on site. The troubleshooting can possibly even take place before the field service. Thus the time-consuming service on site can be reduced to a minimum or becomes completely superfluous.

Visualisation

- Simultaneous display of process data
- graphic or text-based
- freely programmable, based on C

Data logger

- freely programmable, based on C
- Event-controlled recording as an alternative to a fixed time pattern

By exceeding the configurable switching thresholds, the focus can be set on the relevant data. The difficult and time-consuming search for important information in unmanageable masses of data is history.

Connection to the building management system

The controller can be connected to existing systems thanks to the freely accessible interface.

Fleet management

- Central recording and management of several installations
- World-wide access to the installation via LAN or GSM

Controller software

Of course all the parameters can be set via the text-based menu with dynamic shortlists. The large up/down/left/right keypad makes navigation easy.

But only the PC software visualises all the features and options the controller has to offer. Not only the selection of the installation scheme is facilitated by graphics, but also the configurable parameters are visualised in clearly-arranged diagrams.

The software is structured modularly and can be adapted to the user's abilities by hiding special features. Thus visualisations and data loggers can be made freely available while the programming can only be done on a higher user level. With time-limited dongles you can also offer additional services (such as remote control and optimisation), building up a long-term relationship to the customer.

