

SALT METER SSMT40



SSMT40

DESIGNATION, TECHNICAL CHARACTERISTICS, INSTALLATION AND OPERATION MANUAL

1. Designation

The SSMT40 controller is designed for measurement and control of the percentage content of salt (NaCl) and the temperature of water solutions with high-concentration (2..25 % NaCl) and temperature 50...90 °C.

2. Structure

2.1. A microcomputer module with LED display, a keyboard, input-output clutches and RS232 interface for PC connection.

2.2. A sensor for measuring salt content percentage by the non-contact method, with a built-in sensor for temperature compensation

3. Technical characteristics

3.1. Operating conditions

3.1.1 Air temperature 10...40 °C

3.1.2. Relative air humidity 30...85 %

3.1.3. Salt solution temperature 50...90 °C

3.2. Electrical parameters

3.2.1. Supply voltage 220V +10% / -15%

3.2.2. Power consumption < 7W (15VA)

3.2.3. Defense grade of:

- Controller - IP20

- Sensors - IP56

3.3. Basic parameters

3.3.1. Measurement range of NaCl (salt) percentage 2...25 %

3.3.2. Temperature correction range 50...90 °C

3.3.3. Salt percentage measurement resolution 0.1 %

3.3.4. Salt percentage measurement precision ±0.3 %

3.3.5. Salt percentage regulation range 2..25 %

3.3.6. Temperature measurement range 0.0...99.9 °C

3.3.7. Temperature measurement precision ±0.3 °C

3.3.8. Temperature controller range 10...99 °C

3.3.9. Controllers outputs - N.O. relay contacts, electroplate-separated

3.3.10. Output alarm - N.O. relay contact, electroplate-separated

3.3.11. Built-in RS232 interface for PC connection

3.3.12. Contacts characteristics:

- Peak voltage – 250 VAC, 28 DC

- Peak current *

with active load - 2.5 A

with inductive load - 1.0 A

3.4. Mechanical sizes and weight:

3.4.1. Microcomputer module: 96x96x100mm, for installation on a panel; 0.8 kg

3.4.2. Salt percentage sensor: 70x70x110mm; 0.3 kg

3.4.3. Temperature sensor – Ø 6 x 30 mm

3.4.4. Length of connecting cables between controller and sensors - max. 20m **

* CAUTION !!! The relay circuits do not have fuses ! To ensure safe operation it is necessary to install safety fuses for ≤ 3.15 A current consecutively on each contact.

** SSMT40 is delivered with connecting cables 10m long. In cases of other requirements, please, specify your delivery order.

4. Installation directions

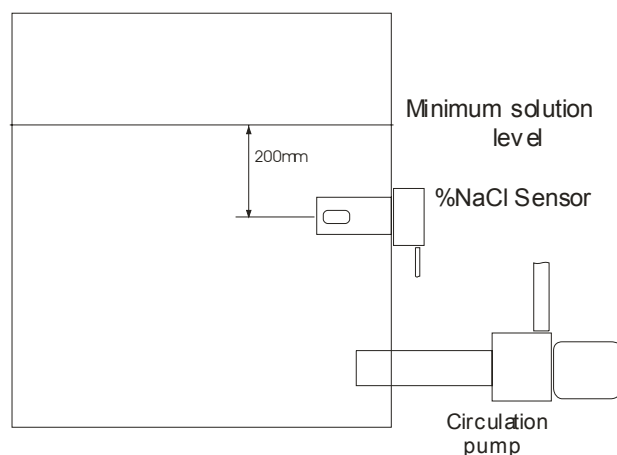
4.1. Mechanic installation

4.1.1. Mechanic installation of controller

It is installed on the front side of the aggregate electric control board. The insulation grade of the board should be higher than IP55. The controller face panel is moisture-proof. Measures should be taken for hydro-insulation (for example, silicone) between the controller box and the board front panel.

4.1.2. Mechanic installation of the sensor, measuring salt percentage content

The installation is performed according to General Drawing - Enclosure 1. The sensor must be installed at least 200mm below the minimum solution level and above the level of the circulation pump suction, in a zone with good solution circulation.



4.1.3. Mechanic installation of the temperature sensor

It is installed in a metal pocket, on the best place providing quick and correct measurement of the solution temperature. The minimum pocket sizes are $\text{Ø}7 \times 100$ mm. In order to provide good temperature contact, it is recommended to use a contact silicone paste. The pocket must be moisture-protected (silicone sealing or a union nipple).

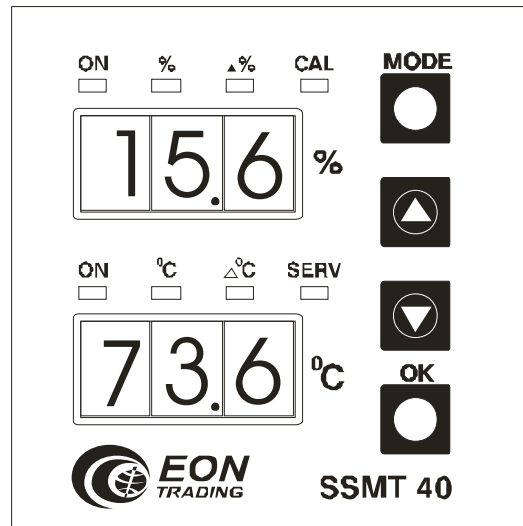
4.2. Electric installation

The electric installation is done according to the electric circuit in Enclosure 2. The cables between the controller and the sensors are connected to the sensors by the manufacturer. The connection cable between the controller and the PC is additionally supplied. It is 50m long. The cables shall be fixed in cable channels or tubes. When necessary, they can be shortened. At the same time their ends shall be tinned. The connection between the controller and the supply network is solid (not a plug !!!) to guarantee the position of poles (L) and zero (N). It is possible by ON ALARM key to block externally the alarm, if necessary (for example, in initial temperature determination).

5. Description of controller operation

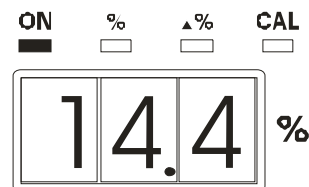
5.1. Initial determination

After switching on the supply, the medium segments of the LED indicators glow on the display. Their going off one by one indicates the process of initial determination. Upon successful completion of the initial determination procedure, the controller automatically proceeds with <Measurement and Regulation> mode. In this mode the upper LED display shows the measured NaCl percentage and the lower one– the measured temperature.



5.2. Operation of the %NaCl regulator

If the %NaCl regulator is switched on (see 6.4) and the measured NaCl percentage is lower than the fixed one minus the admissible tolerance (see 6.2. and 6.3), the controller switches on the relay output SALT. This is indicated by the red light-emitting diode ON above the upper LED display. In case of available execution circuit for NaCl addition, the NaCl concentration will increase. Upon reaching the fixed value plus the admissible tolerance, the relay output SALT will be switched off. At the same time the light-emitting diode ON will go off, too. If there is no circuit for NaCl addition, it should be done manually.

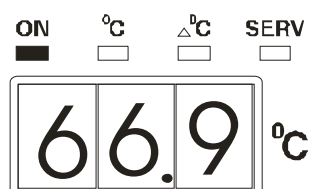


5.3. Alarm upon %NaCl deviation

If, due to failure in the execution circuit or untimely salt addition, the measured NaCl percentage deviates from the admissible limits with more than 0.7% NaCl (preset value), the controller switches on the relay output ALARM. The output will be switched off when the deviation becomes less than 0.7%.

5.4. Temperature controller operation

If the temperature controller is switched on (see 6.8) and the measured temperature is lower than the adjusted one minus the admissible tolerance (see 6.6 and 6.7), the controller switches on the relay output TEMP. This is indicated by a red light-emitting diode ON above the lower LED display. If there is an execution circuit for heating, the temperature increases. Upon reaching the adjusted temperature plus the admissible tolerance, the relay output TEMP switches off. At the same time the red light-emitting diode ON switches off, too. If there is no regulating circuit for heating, the switching on and off of heating shall be done manually.



5.5. Alarm in case of temperature deviation

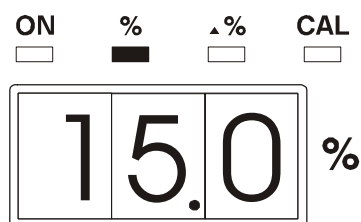
If, due to failure of the heating regulating circuit or to untimely switching on / off of the heating by the staff, the temperature, measured by the thermal sensor deviates from the admissible limits with more than 5°C (preset value), the controller switches on the relay output ALARM. When the deviation becomes less than 5°C – the output is switched off.

6. Adjustments

6.1. Parameter selection

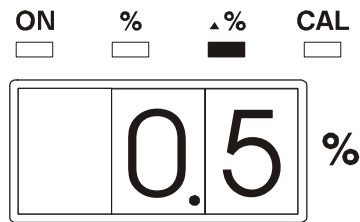
Select parameter by pressing <MODE> button. Repeatedly press <MODE> button to select the following adjustment parameters, as the choice is indicated by the green light-emitting diode. After the first pressing of <MODE> button, all green light-emitting diodes glow for 1 sec., and the LED displays go off. This is a warning for selected Adjustment mode.

6.2. Adjustment of the regulated NaCl percentage



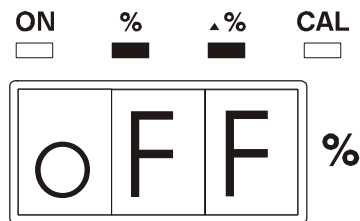
After the first pressing of <MODE> button, the light-emitting diode <%> glows. At the same time the upper LED display indicates the last adjusted value. This is the value of NaCl percentage to be maintained by the regulator. This value can be changed by pressing <▲> или <▼> buttons within the range 2.0...25.0 % NaCl. If this new value is confirmed by the <OK> button, it is recorded and after that the controller automatically proceeds with <Measurement and Regulation> mode. If <MODE> button is pressed again (instead of <OK> button), then the previous value of the regulated NaCl percentage remains. The preset value of this parameter is 15.0%.

6.3. Adjustment of the admissible deviation of the $\Delta\%$ NaCl regulator



After second pressing of <MODE> button, the light-emitting diode < $\Delta\%$ > will glow and the upper LED display will indicate the last adjusted value. This is the admissible deviation of the regulated parameter %NaCl from the value, adjusted in 6.1. Buttons < \blacktriangle > or < \blacktriangledown > change $\Delta\%$ NaCl within the range 0.0%...5.0%. If you confirm the new value with <OK> button, it is recorded and after that the controller automatically proceeds with <Measurement and Regulation> mode. If <MODE> button is pressed again (instead of <OK> button), then the previous value of the regulated $\Delta\%$ NaCl remains. The preset value of this parameter is 0.5 %.

6.4. %NaCl regulator switching on and off



After third pressing of <MODE> button, the light-emitting diodes <% > and < $\Delta\%$ > will glow and the upper LED display will show <ON> or <OFF>. With <ON> the %NaCl regulator is on (the relay output SALT is controlled) and with <OFF> the regulator is off (the relay output SALT is off all the time). If you wish to change the regulator status, press buttons < \blacktriangle > or < \blacktriangledown >. If you confirm the new status by the <OK> button, it is recorded and after that the controller proceeds automatically with <Measurement and Regulation> mode. If <MODE> button is pressed again (instead of <OK> button), then the previous status of the regulator remains. The preset status of the %NaCl regulator is <OFF>.

CAUTION !!! The relay output ALARM is controlled always according to 5.3 irrespective of the selected status (ON / OFF) of the %NaCl regulator.

6.5. %NaCl measurement calibration

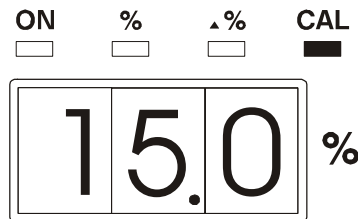
Controller calibration is necessary when the difference between the control areometer reading and the SSMT40 reading is more than 0.3% NaCl, as the measurement is done with pure (not containing other soluble and insoluble substances, in concentration less than 1 gr/L) water solution of NaCl.

The following steps are necessary for correct calibration of SSMT40:

- 6.5.1. Clean well the %NaCl sensor and the working bath;
- 6.5.2. Prepare water solution of NaCl, not containing other soluble and insoluble substances in concentration, higher than 1 gr/L.
- 6.5.3. Determine the brine solution temperature within limits 50⁰ C ... 90⁰ C

CAUTION: Calibration with undetermined temperature (for example, heating) is not allowed.

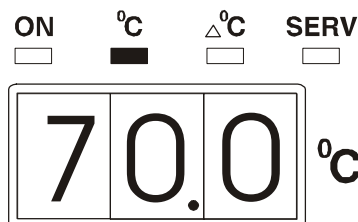
- 6.5.4. Use areometer to measure the NaCl percentage of the solution.
- 6.5.5. Push <MODE> button to select <CAL> mode. The upper LED display shows 15.0.



- 6.5.6. Change this value to reach the areometer-measured value (see 6.5.4) by pressing buttons <▲> or <▼>.
- 6.5.7. Confirm the value by pressing button <OK>. While the calibration procedure is running, the upper LED display will show <CAL>. Upon completion of the calibration procedure, the controller will automatically proceed with <Measurement and Regulation> mode. After the calibration the measured value of %NaCl should differ from the adjusted value with no more than ±0.2%. Otherwise, repeat the calibration.

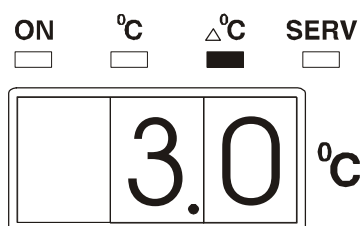
Note: If the new value is not confirmed by pressing <OK> button, no calibration is done.

6.6. Temperature adjustment of the temperature controller



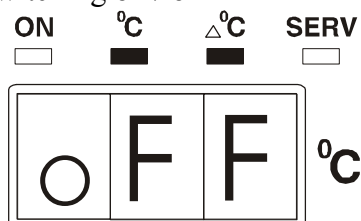
Press <MODE> button to select <°C> parameter. The lower LED display will indicate the last adjusted value and use <▲> or <▼> button to change the value within the interval +10.0...99.0 °C. If you confirm the new value by pressing <OK> button, it will be recorded and after that the controller will automatically proceed with <Measurement and Regulation> mode. If you press again <MODE> button (instead of <OK> button), the previous temperature value, adjusted for temperature controller maintenance will remain. The preset value of this parameter is 70 °C.

6.7. Adjustment of the $\Delta^{\circ}\text{C}$ admissible deviation of the temperature controller



Press $\langle\text{MODE}\rangle$ button to select $\langle\Delta^{\circ}\text{C}\rangle$ parameter. The lower LED display indicates the last adjusted value, which can be changed by pressing button $\langle\blacktriangle\rangle$ or $\langle\blacktriangledown\rangle$ within the interval 1.0...5.0 $^{\circ}\text{C}$. If you confirm the new value by $\langle\text{OK}\rangle$ button, it is recorded and after that the controller will automatically proceed with $\langle\text{Measurement and Regulation}\rangle$ mode. If you press again $\langle\text{MODE}\rangle$ button (instead of $\langle\text{OK}\rangle$ button), the previous value of the admissible temperature deviation will remain. The preset value of this parameter is 3.0 $^{\circ}\text{C}$.

6.8 Temperature controller switching on / off



After repeated pressing of button $\langle\text{MODE}\rangle$ the light-emitting diodes $\langle^{\circ}\text{C}\rangle$ and $\langle\Delta^{\circ}\text{C}\rangle$ will glow and the lower LED display will show $\langle\text{ON}\rangle$ or $\langle\text{OFF}\rangle$. $\langle\text{ON}\rangle$ means the temperature controller is on (the relay output TEMP is under control) and $\langle\text{OFF}\rangle$ means the controller is off (the relay output TEMP is always off). If you wish to change the status of the temperature controller, press button $\langle\blacktriangle\rangle$ or $\langle\blacktriangledown\rangle$. If you confirm the new status by pressing $\langle\text{OK}\rangle$ button, it is recorded and then the controller will automatically proceed with $\langle\text{Measurement and Regulation}\rangle$ mode. If you press again $\langle\text{MODE}\rangle$ button (instead of $\langle\text{OK}\rangle$ button), the previous status of the temperature controller will remain. The preset status of the temperature controller is $\langle\text{OFF}\rangle$.

CAUTION!!!! The relay output ALARM is controlled always according to 5.5, irrespective of the selected status (ON/OFF) of the temperature controller.

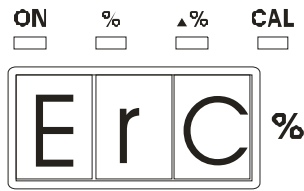
Note: All parameters values are stored in non-volatile memory (EEPROM). When an error is found, the controller announces error (see 7.2.2.) and automatically finds the preset values of all parameters.

7. Announcements for failures, probable reasons and trouble-shooting

7.1. Announcements for failures in $\langle\text{Measurement and Regulation}\rangle$ mode

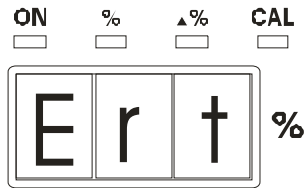
7.1.1. Announcements for failures, indicated by the upper LED display

7.1.1.1. Communication error between the controller and the %NaCl sensor



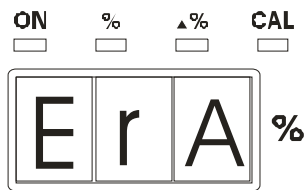
Trouble-shooting recommendation: Check the status of the connecting cable between the controller and %NaCl sensor

7.1.1.2. Incorrectly measured temperature (damaged temperature sensor) of the %NaCl sensor



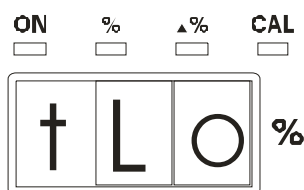
Trouble-shooting recommendation: Repair of the %NaCl sensor by the manufacturer

7.1.1.3. The measurement result of %NaCl outside the range ...



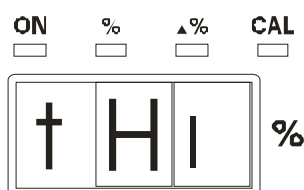
Trouble-shooting recommendation: Be sure the sensor is clean and check if it is out of the solution. The other failures will be repaired by the manufacturer.

7.1.1.4. The temperature, measured by the %NaCl sensor is lower than 50 °C



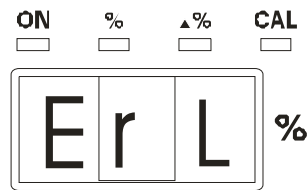
Trouble-shooting recommendation: Increase the solution temperature above 50 °C.

7.1.1.5. The temperature, measured by the %NaCl sensor is higher than 90 °C



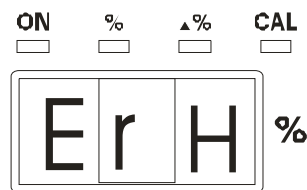
Trouble-shooting recommendation: Decrease the solution temperature below 90 °C.

7.1.1.6. Low level of the signal, measured by the %NaCl sensor



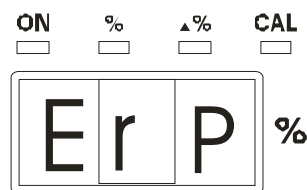
Trouble-shooting recommendation: Repair of the %NaCl - measuring sensor by the manufacturer

7.1.1.7. High level of the signal, measured by the %NaCl sensor



Trouble-shooting recommendation: Repair of the %NaCl - measuring sensor by the manufacturer

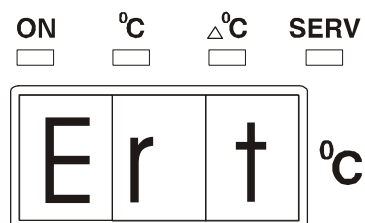
7.1.1.8. Missing sensor data for %NaCl



Trouble-shooting recommendation: Check the status of the connecting cable between the controller and the %NaCl sensor

7.1.2. Failure announcements on the lower LED display

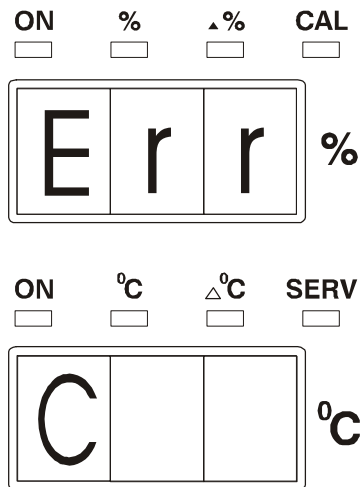
7.1.2.1. Error in the temperature sensor



Trouble-shooting recommendation: Check the status of the connecting cable between the controller and the temperature sensor

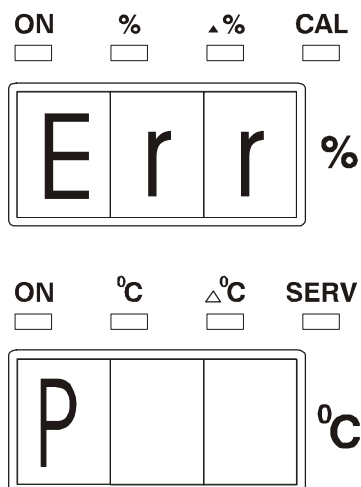
7.2. Error announcements after initial adjustment (after power switching)

7.2.1. Unsuccessful communication adjustment between the controller and the %NaCl sensor



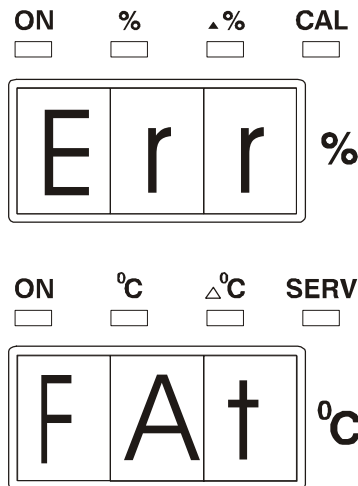
Trouble-shooting recommendation: Check the status of the connecting cable between the controller and the %NaCl sensor

7.2.2. The controller has found errors in the non-volatile memory (EEPROM) and has automatically adjusted the preset parameters values



Trouble-shooting recommendation: Change the parameters values according to the requirements of your process (see 6.2. ... 6.8.)

7.2.3. Failure in the non-volatile memory (EEPROM)



Trouble-shooting recommendation: EEPROM must be replaced with a trouble-free one by an authorized service shop

8. Recommendations for using SSMT40 in scalding units for yellow cheese production

8.1. Do not scald more than 1 kg curd per liter brine volume without checking the brine pH or titration acidity (by Thörner).

8.2. If the brine pH is below 6.4 (or more than 20 \pm Th), then drain part of the brine, add pure water and the respective quantity of NaCl (salt). In this way you will guarantee qualitative scalding of your product and will ensure conditions for correct %NaCl measurement both by areometer and by SSMT40. Otherwise, the measured %NaCl will be different from the real one.

9. WARRANTY

Bulteh 2000 Ltd guarantees that all instruments and sensors are without defects in the material and workmanship in relation to the normal employment and service. This warranty shall be valid only for service and/or adjustment of the device, returned to the manufacturer or to an authorized service shop. The warranty shall be valid for 12 months as of the date of sale for repairs, replacement or repairs of parts, found to be defective after check.

This warranty shall not be valid in cases of mechanical damages of the controller, sensors or cables and, in cases of evident traces of wetted controller. **Bulteh 2000 Ltd** shall not be held liable for accidental or consecutive damages, as a result of use or misuse of this equipment or, of wrong interpretation of the operating instructions. Damages during transportation shall not be included in this warranty.

10. SERVICE PROCEDURE

If you have decided that the device needs repairs, please, read again the manual. Sometimes the devices we receive for repairs are in excellent operating condition. Please, be sure that the %NaCl sensor is clean.

Check the status of the connecting cables and pay attention to the controller error announcements. **Bulteh 2000 Ltd** has good reputation for quick and efficient service. In a few days only our service team of engineers and technicians will examine and eliminate the failure of your equipment to your complete satisfaction. To receive this service, please, follow the procedure:

Return the device and all sensors to **Bulteh 2000 Ltd** after you have paid the transport costs and be sure to use the original packing or a suitable equivalent. Insist for special attention by the carrier for the purpose of protection in cases of loss or damage. This is your responsibility as a forwarder in order to ensure safe dispatch of the parcel for **Bulteh 2000 Ltd**.

7. WARRANTY FORM

Fill in this Form when purchasing the device. No claims shall be taken into consideration without the original Warranty Form or another proof of purchase. This Warranty will be void if unauthorized persons make any modifications or corrections or if the Serial number is missing.

Serial number:

Date:
