SZ-7518-P

Operating Instructions

sub-Zero ®
Controlled cooling, **always**
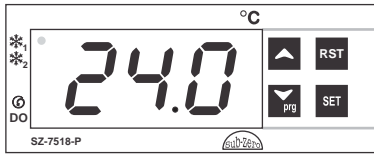

SZ-7518-P

Bulk Milk Cooler Controller

Introduction :
The Sub-Zero Series SZ-7518-P is a single set point controller with digital input. It is used for milk tank refrigerators with agitation cycle capability. It has a battery backup facility. Controller has communication port.

Additionally these controllers offer several protection features that are easily understood by the examples in the instructions below.

A number of parameters are displayed alphanumerically to set up the instrument for each specific application. It can be used for several applications with a measuring value from -40°C to 50°C when rS=1 & -40.0°C to 50.0°C when rS=0.

CAUTION

WIRING: The probe and its corresponding wires should never be installed in a conduit next to control or power supply lines. The electrical wiring should be done as shown in the diagram. The power supply circuit should be connected to a protection switch. The terminals admit wires of upto 2.5sq mm.

WARNING: Improper wiring may cause irreparable damage and personal injury. Kindly ensure that wiring is done by qualified personnel only.

Maintenance: Cleaning: Clean the surface of the controller with a soft moist cloth. Do not use abrasive detergents, petrol, alcohol or solvents.
Notice: The information in this document is subject to change in order to improve reliability , design or function without prior notice and does not represent a commitment on the part of the company. In no event will the company be liable for direct, indirect, special, incidental or consequential damage arising out of the use or inability to use the product or documentation, even if advised of the possibility of such damages. No part of this manual may be reproduced or transmitted in any form or by any means without the prior written permission of the company.

Installation : Fixing and dimensions of panel models:
To fix the unit, slide the fastener ① through the guides ② as per the position shown in the figure. Move the fastener in the direction of the arrow, pressing tab ③ it permits to move the fastener in the opposite direction of the arrow. Once the controller has been connected, they should be covered with the lid ④ Silicon sealant should be applied along the perimeter of the panel cut out or a rubber 'O' ring supplied before the unit is fitted to increase protection against water seepage.

Controller : Controller should be installed in a place protected by vibration, water and corrosive gasses and where ambient temperature does not exceed the values specified in the technical data.
Probe : To give a correct reading, the probe must be installed in a place protected from thermal influences, which may affect the temperature to be controlled.
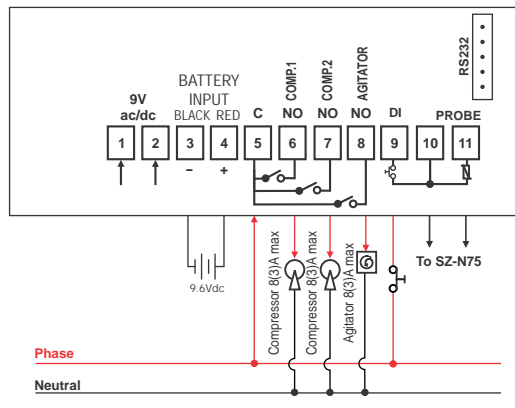

Panel Cutout and Dimensions :
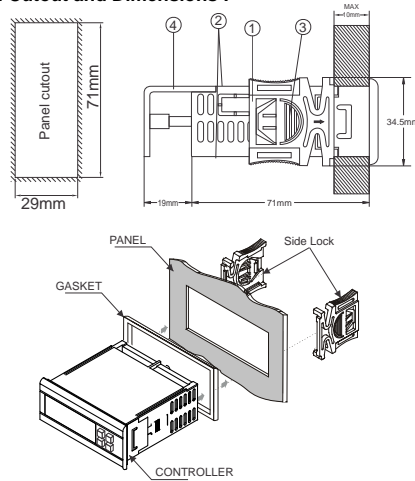
TECHNICAL DATA

Housing	: Black, ABS Plastic
Front Cover	: Polycarbonate plastic.
Dimensions	: Front **:** 75 X 34.5mm,
	Depth **:** 71 mm (w/o back lid)
Mounting	: Flush panel mounting with fasteners
Frontal protection	: IP65 Frontal
Connections	: Screw terminal blocks.
	≤ 2.5sqmm one wire/ terminal only.
Display	: 3 X14.2 mm (0.56") LED
Data storage	: Non-volatile EEPROM memory
Power input	: 9VAC/DC
Operating temp.	: 5°C to 50°C(non-condensing)
Storage temp	: -20°C to 70°C(non-condensing)
Output	: 3 SPDT relay 8 (3)A, 250Vac.
Input	: NTC probe, SZ-N75
Range	: -40°C to 50°C (rS = 1)
	-40.0°C to 50.0°C (rS = 0)
Resolution	: 0.5°C / 1°C
Accuracy	: +/- 1°C
Probe tolerance	: +/- 0.3°C at 25°C
RS232 Connectivity	: Modbus RTU Protocol
	Device ID : 1 (By Default)
	Baud rate 9600 (by default)

Suggested Wiring

9V ac/dc | BATTERY INPUT BLACK RED | C | COMP.1 NO | COMP.2 NO | AGITATOR NO | DI | PROBE | RS232

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |

9.6Vdc

Compressor 8(3)A max | Compressor 8(3)A max | Agitator 8(3)A max | To SZ-N75

Phase

Neutral

USER INTERFACE

▲	**UP**	In Program mode: **Scroll through parameters** & **Increases parameter value.** In Set mode : **Increases parameter value.**
▼ prg	**Down/ Program**	Press and hold for 2sec **to enter into program mode.** In program mode and set mode: **Decreases parameter value**
SET	**Set**	Press and hold for 2sec **to enter into set mode**. In program mode and set mode: **set/save the changed value of parameter.**
RST	**Reset**	Also used **to exit program mode.**

INDEX

Sr. No.	Para.	Description
1	Set Point	Compressor relay set point.
2		Set other parameter.
3	P2	High temperature limit.
4	P3	Low temperature limit.
5	P4	Differential for compressor relay ON condition.
6	P5	Probe calibration.
7	P6	Time delay (compressor relay restart after cutoff).
8	E1	Compressor relay status in probe fail.
9	A0	To select type of agitator cycle.
10	A1	Parametric computation in (min/min or sec/sec)
11	A2	Agitator ON cycle.
12	A3	Agitator OFF cycle.
13	A4	Set the time delay for 2nd Compressor to switch on after 1st Compressor.
14	d0	Activate and decide state of Digital Input.
15	d1	Digital Input Sensing delay.
16	d2	Compressor Status on Digital I/P.
17	d3	Set reset mode for digital input.
18	d4	No of retrials of compressor when Manual reset is selected for 1 hour.
19	CS	Compressor selection.
20	did	Set device ID.
21	bd	To change baud rate.
22	LP	Keypad Lock.
23	rS	To change the resolution.
24	FS	Restore factory defaults.
25	EP	End Programming
26		LED Indications
27		Operating Messages

Parameter List :

1 Set point — Function: To set compressor relay set point.

Press and hold the **SET** key for 2 Seconds.

Display will change to set value. The set point range can now be changed by using the UP/DOWN key. After setting the desired value, press the set key and you will see "- - -" which confirms that the set point has been stored in memory.

rS = 0			rS = 1		
Min	Max	Fac.	Min	Max	Fac.
P3+0.5	P2-0.5	4.0°C	P3+1	P2-1	4°C

---

2 To set other Parameters. — Press & hold ▼prg key for 2 seconds.

Display will flash "P2".
To select other parameters, use UP/DOWN keys.

3 P2 Parameter — Function: To set maximum allowable high temperature limit.

To change value use ▲ ▼prg keys | To set value press **SET** key

Example : Setting this parameter at 50.0°C will not allow the set point to go above 50.0°C. Also, if the temperature reaches 50.0°C, the display will show Ht (High Temp.) indicating that the temperature has gone above the value in this parameter.

Ht
(Message on display)

	rS = 0			rS = 1		
	Min	Max	Fac.	Min	Max	Fac.
	SP+0.5	50.0°C	50.0°C	SP+1	50°C	50°C

4 P3 Parameter — Function: To set minimum allowable low temperature limit.

Example : Setting this parameter at -40.0°C will not allow the set point to go below -40.0°C. Also, if the temperature reaches -40.0°C, the display will show Lt (Low Temp.) indicating that the temperature has gone below the value in this parameter.

Lt
(Message on display)

	rS = 0			rS = 1		
	Min	Max	Fac.	Min	Max	Fac.
	-40.0°C	SP-0.5	-40.0°C	-40°C	SP-1	-40°C

5 P4 Parameter — Function: To set the differential.

Differential between cut out and cut in temperature can be set between 1.0°C to 20.0°C.

Example : If the set point is set at 10.0°C and differential is set at 20.0°C, then when the system reaches 10.0°C, the relay will cut out. Since the differential is 20.0°C, the relay will cut in (restart) at 30.0°C (10.0°C+20.0°C).

	rS = 0			rS = 1		
	Min	Max	Fac.	Min	Max	Fac.
	0.5°C	20.0°C	2.0°C	1°C	20°C	1°C

6 P5 Parameter — Function: To set probe calibration.

In time it may be possible that the display may be offset by a degree or so.
To compensate for this error, user may need to add or minus the degrees required to achieve the correct temperature. Setting value is from -10.0°C to +10.0°C.

Example : The temperature on the display is 28.0°C, whereas the actual temperature is 30.0°C. User will have to set the P5 parameter to 2.0, which means that once out of the programming mode, the temperature on display will be 30.0°C (28.0°C+ 2.0°C).

	rS = 0			rS = 1		
	Min	Max	Fac.	Min	Max	Fac.
	-10.0°C	10.0°C	0.0°C	-10°C	10°C	0°C

7 | P6 Parameter — Function: To set time delay between compressor relay restart.

This parameter is used to protect the compressor from restarting in a short period of time.

Example: If this parameter is set at 3 minutes, the relay will cut off at the set temperature, but will not restart for a minimum of 3 minutes, even if the differential is achieved earlier.

This parameter is good to protect the life of the compressor when there are power fluctuations and the compressor is switched OFF and ON within a few seconds.

❄1 ☀ or ❄2 ☀
Flashing
Time delay in progress

Min	Max	Fac.
0 Min	20 Min	3 Min

8 | E1 Parameter — Function : Compressor relay status in case of Probe Failure.

When set to
0 = Relay1 & Relay2 status is OFF.
1 = Relay1 & Relay2 status is ON.
2 = Relay1 & Relay2 performs a duty cycle for 4 minutes OFF and 10 minutes ON.

Min	Max	Fac.
0	2	2

9 | A0 Parameter — Function: To select type of agitator cycle.

SP - SET POINT
P4 - DIFFERENTIAL
P6 - TIME DELAY
AG - AGITATOR

When A0 = 0,
TEMP. $\geq$ (SP+P4+P6)   AG ON   5sec   COMP1 ON   30sec   COMP2 ON.
TEMP $\leq$ (SP)   AG OFF   5sec   COMP1 OFF   30sec   COMP2 OFF.

When A0 = 1,
TEMP. $\geq$ (SP+P4+P6)   AG & COMP1 ON   30sec   COMP2 ON.
TEMP $\leq$ (SP)   COMP1 OFF   30sec   COMP2 OFF
(When both compressors are OFF, then AG will perform ON/OFF cycle as per A2 & A3 parameter.)

When A0 = 2,
TEMP. $\geq$ (SP+P4+P6)   COMP1 ON   30sec   COMP2 ON.
TEMP $\leq$ (SP)   COMP1 OFF   30sec   COMP2 OFF
(AG will perform as per A2 & A3 parameter.)

When A0 = 3,
After 5 seconds AG will continuously ON.
TEMP. $\geq$ (SP+P4+P6)   COMP1 ON   30sec   COMP2 ON.
TEMP $\leq$ (SP)   COMP1 OFF   30sec   COMP2 OFF

Min	Max	Fac.
0	3	1

10 | A1 Parameter — Function : Parametric computation in (min/min or sec/sec)

Min	Max	Fac.
n in	n in	n in

11 | A2 Parameter — Function : Agitator ON cycle.

Min	Max	Fac.
1	99	2

12 | A3 Parameter — Function : Agitator OFF cycle.

Min	Max	Fac.
1	99	13

13 | A4 Parameter — Function : To set the time delay for 2nd Compressor to switch on after 1st Compressor.

Min	Max	Fac.
10 sec	99 sec	30 sec

14 | d0 Parameter — Function: To activate and decide state of Digital Input.

If this parameter is set to,

dis : Digital Input is disabled .

oPn : Digital input is Open Connection will be Fault.

CLS : Digital input is Close Connection.

Min	Max	Fac.
dis	oPn	CLS

15 | d1 Parameter — Function: To set digital input sensing delay.

This parameter is use to set sensing delay of digital input.

Example : If d1 = 5seconds and if digital input (Fault) is present for 5 second then fault is detected.

Min	Max	Fac.
0 sec	99 sec	5 sec

16 | d2 Parameter — Function: To set compressor status on digital input.

If this parameter is set to,

0 : NO Action.
1 : Compressor will be OFF.

Min	Max	Fac.
0	1	1

17 | d3 Parameter — Function: Set reset mode for digital input.

If this parameter is set to,

0 = Auto Reset
1 = Manual reset on first try only .
2 = Manual reset after retrials kept in d4 parameter in 1 Hour .

Min	Max	Fac.
0	2	1

18 | d4 Parameter — Function: No of retrials of compressor when Manual reset is selected for 1 hour.

Min	Max	Fac.
0	10	5

19 | CS Parameter — Function: Compressor selection.

When set to
1 = Select Compressor1.
2 = Select Compressor2.
3 = Select Both compressors.

Min	Max	Fac.
1	3	3

20 | did Parameter — Function : To set device ID.

It assigns unique device Id to the controller for the communication mode.

Min	Max	Fac.
1	99	1

21 | bd Parameter — Function : To change Baud Rate.

Communication baud rate from 9600 to 57600 bps.

1 = 9600bps
2 = 19200bps
3 = 38400bps
4 = 57600bps

Min	Max	Fac.
1	4	1

22 | LP Parameter — Function: To lock keypad.

This parameter is used to lock the keypad so that tampering is not possible by by-standers.

0 = keypad unlocked
1 = keypad locked

When locked all parameters can only be viewed, but not modified.

Min	Max	Fac.
0	1	0

23 | rS Parameter — Function : To change the resolution.

If this parameter when set to 0,it will take all parameter in 0.1°C resolution.
If this parameter when set to 1,it will take all parameter in 1°C resolution.

Note : Temperature and parameter will also change accordingly.

Min	Max	Fac.
0	1	0

24 | FS Parameter — Function : To restore default settings of the controller.

When set to 1 all parameters are programmed to factory values. Useful to debug setting related problems.

Min	Max	Fac.
0	1	0

25 | EP Parameter — Function: To end programming.

To end programming press "**SET**" key	Once the key is pressed, the controller goes into the normal mode and displays the temperature and all settings are recorded.

26 | LED INDICATION

❄1 Compressor1	❄2 Compressor2
ON: Compressor1 relay is ON. OFF: Compressor1 relay is OFF. FLASHING : Compressor1 is in time delay.	ON: Compressor2 relay is ON. OFF: Compressor2 relay is OFF. FLASHING : Compressor2 is in time delay.
Agitator	DO Door Open
ON: Agitator is ON.	ON: Door open fault (Auto Reset) FLASHING: Door open fault (Manual Reset)

27 | OPERATING MESSAGES

Ht High temperature alarm	Lt Low temperature alarm
Temperature above the maximum high temperature limit.	Temperature below the minimum low temperature limit.
PP Probe fail	LP Probe fail
Probe short circuit, circuit open or without probe, or temperature is > 50°C or <-40°C when rS=1 and temperature is > 50.0°C or <-40.0°C when rS=0	Keypad lock/unlock.