SZ-T77

Instruction Manual

Sub-Zero® Controlled cooling, always

INTRODUCTION

The SZ-T77 is aesthetically superior version of their predecessors.
A number of parameters are displayed alphanumerically to set the indicator for specific application.
This indicator can be used as Temperature, Humidity and Pressure indicator with below measuring range: -

Temperature Range:

For Parameter	-50.0°C to 99.0 °C
For Display	-50.0°C to 100 °C / -58°F to 212 °F

Humidity Range:
SZ-HS-220:

For Parameter	30.0% to 90.0%
For Display	30.0% to 90.0%

SZ-HS-100/4-20mA:

For Parameter	0.0% to 99.0%
For Display	0.0% to 100%

4-20mA Settable Pressure range with Max. allowable as below:

For Parameter	-15 PSI to 600 PSI
For Display	-15 PSI to 600 PSI

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.

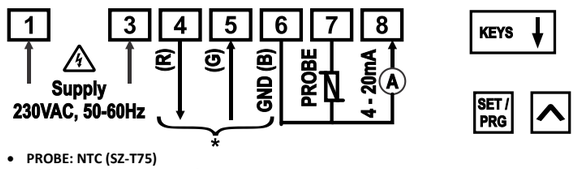
Controller: Controller should be installed in a place protected by vibration, water and corrosive gasses and where ambient temperature does not exceed the values specified in the technical data.

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.

INSTALLATION

(1) Locate & tear out the template of the box (2) Drill through the template (3) Bring required wires between the drilled holes (4) Connect with caution as per wiring diagram on SZ-T77 back cover (5) Holding SZ-T77 at a slight angle, Locate the center of the connector and push into place till a snap action is felt.

SUGGESTED WIRING (230VAC)



- **PROBE: NTC (SZ-T75)**
- **" * "RH Sensor : SZ-HS-100/SZ-HS-220**
- **RH & Pressure Sensor: 4 - 20mA Input**

TECHNICAL DATA

Housing	: **Back housing :** Black ABS Plastic, Auto-extinguish **Connector housing :** Polycarbonate Plastic V0 Grade
Front Cover	: Polycarbonate Plastic V0 Grade
Dimensions	: **Front:** 79 x 130 mm **Depth**: 51 mm
Mounting	: Wall mounting
Connections	: Screw terminal blocks. < 2.5sq mm terminal only.
FR Grade	: YES
Display	: 3 X 2 inches 7 segment display & 7 LEDs for Indication
Data storage	: Flash APROM Memory
Power input	: 230 Vac ±10%, 50-60Hz Standard.
Operating temp.	: 0°C to 60°C (non-condensing)
Operating humidity	: 20% to 85% (non-condensing)
Storage temp	: -25.0°C to 60.0°C (non-condensing)
Measuring Range	: -50.0°C to 100°C / -58°F to 212°F (for Temperature) 30.0% to 90.0% (SZ-HS-220) 0.0% to 100% (SZ-HS-100/4-20mA) Settable Pressure range with Max. allowable from-15 PSI t0 600 PSI (4-20mA)
Input	: **Temperature Sensor** NTC probe, SZ-T75 **RH Sensor (Selectable)** SZ-HS-100 SZ-HS-220 4-20mA Input **Pressure Sensor** 4-20mA Input
Temp. Resolution	: 0.1°C / 1°C / 1°F
Temp. Accuracy	: +/- 1°C / 1°F
RH Resolution	: 0.1% / 1%
RH Accuracy	: +/- 5% (for SZ-HS-220) +/- 3% (for SZ-HS-100/ 4-20mA input)
Pressure Resolution	: 1 PSI
Pressure Accuracy	: +/- 3 PSI

USER INTERFACE

SET / PRG	**Program mode:** Press for 2 seconds to enter in Program mode. To set and save parameters in Program Mode. **In Min./Max. Log mode:** Press for 2 seconds to reset the min./max. Log of Temperature, Humidity and Pressure sensor.
^	**Sensor display mode:** Press for 1 second to show the Temperature, Humidity and Pressure one by one with the time set in End parameter except default display. If any High / Low temperature, Humidity or Pressure fault is present then it will flash at the rate of 500ms with respective sensor value. **Min./Max. Log mode:** Press for 4 seconds to enter in Min./Max. Log mode. If this key pressed continuously for 4 seconds, indicator initially enter into Sensor display mode and after 4 seconds it will enter in Min./Max. Log mode. **In program mode:** Scroll through parameters and its values.

INDEX

Sr. No.	Para.	Description
1	ntC	Temperature probe and Unit selection
2	rSt	To set controller Resolution for Temperature
3	P2	To Set Maximum Allowable High Temperature Limit
4	P3	To Set Minimum Allowable Low Temperature Limit
5	Adt	Power On Time Delay for Alarm for Temperature (Ht and Lt)
6	PS	Temperature Probe Calibration
7	SSL	4-20 mA input selection for RH or Pressure
8	HSS	Selection of RH Sensor
9	rSH	To set controller Resolution for RH
10	H2	To Set Maximum Allowable High Humidity Limit
11	H3	To Set Minimum Allowable Low Humidity Limit
12	AdH	Power On Time Delay for Alarm for RH (HH and LH)
13	HS	RH Probe Calibration
14	PrH	Pressure high range selection for 20mA
15	PrL	Pressure low range selection for 4mA
16	Pr2	To Set Maximum Allowable High Pressure Limit
17	Pr3	To Set Minimum Allowable Low Pressure Limit
18	AdP	Power On Time Delay for Alarm for pressure (HP and LP)
19	PrS	Pressure Probe Calibration
20	nd	Default (Normal) Display
21	End	Flashing rate for multiple sensor selection
22	AL	Alarm indication configuration for alarm icon and display fault messages
23	LP	Keypad Lock
24	FS	Factory Set
25	EP	End Programming
		LED Indications
		Fault Messages
		Operating Messages
		High and Low Temperature, Humidity and Pressure Logging Function

PARAMETER LIST

To set parameters,
Press & hold SET/PRG key for 2 seconds.

Display will flash "ntC".
To select other parameters, use ^ key.

1. ntC

Function: Temperature probe and Unit selection.

To change value use ^ key | To set value press SET/PRG key

If this parameter is set to,
d iS = NTC Probe disabled
C = Unit °C (Temperature and related parameters will be displayed in unit °C)
F = Unit °F (Temperature and related parameters will be displayed in unit °F)

If Unit changed, P2 and P3 changed to Factory settings of respective Unit.

Min	Max	Fac.
d iS	F	-

Note: If ntC disabled, rSt, P2, P3, Adt and PS will not work and can not be displayed.
Also, If ntC set to F, rSt will not work and can not be displayed.

2. rSt

Function: To set controller Resolution for Temperature.

If this parameter is set to,
0.1 = 0.1°C Resolution
Temperature and related parameters will be displayed with 0.1°C Resolution.
1 = 1°C Resolution
Temperature and related parameters will be displayed with 1°C Resolution.

Min	Max	Fac.
0.1	1	-

Note: If ntC disabled or set to F, rSt will not work and can not be displayed.

3. P2

Function: To Set Maximum Allowable High Temperature Limit.

Example: If this parameter is set to 99.0°C and the Temperature reaches or goes above 99.0°C, Display will show Ht (High Temperature) indicating that the Temperature has reached or gone above the value set in this parameter.

rS = 0.1, ntC = C		
Min	Max	Fac.
P3+1.0	99.0°C	99.0°C

rS = 1, ntC = C		
Min	Max	Fac.
P3+1	99°C	99°C

Ht (Message on display)

ntC = F		
Min	Max	Fac.
P3+1	210°F	210°F

Note: If ntC disabled, or AL is set to 0, P2 will not work and can not be displayed.

4. P3

Function: To Set Minimum Allowable Low Temperature Limit.

Example: If this parameter is set to -10.0°C and the Temperature reaches or goes below -10.0°C, Display will show Lt (Low Temperature) indicating that the Temperature has reached or gone below the value set in this parameter.

rS = 0.1, ntC = C		
Min	Max	Fac.
-50.0°C	P2-1.0	-50.0°C

rS = 1, ntC = C		
Min	Max	Fac.
-50°C	P2-1	-50°C

Lt (Message on display)

ntC = F		
Min	Max	Fac.
-58°F	P2-1	-58°F

Note: If ntC disabled, or AL is set to 0, P3 will not work and can not be displayed.

5. Adt

Function: Power On Time Delay For Alarm for Temperature

Example: If this parameter is set to 20 minutes, once the indicator is powered ON, High Temperature and Low Temperature fault indication will not be activated for 20 minutes.

If Probe Temperature reaches or goes above P2 parameter value, High Temperature (Ht) fault will be displayed after completion of delay set with Adt parameter.

If Probe Temperature reaches or drops below P3 parameter value, Low Temperature (Lt) fault will be displayed after completion of delay set with Adt parameter.

Differential of 0.1°C / 1°C / 1°F is considered for clearing the fault.

Min	Max	Fac.
0 min	99 min	20 min

Note: If ntC disabled, or AL is set 0, Adt will not work and can not be displayed.

6. PS

Function: Temperature 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.

Example: The Temperature on the display is 28.0°C, whereas the actual Temperature is 30.0°C. User will have to set the PS parameter to 2.0 °C, 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 = 0.1, ntC = C		
Min	Max	Fac.
-10.0	10.0	0.0

rS = 1, ntC = C		
Min	Max	Fac.
-10	10	0

ntC = F		
Min	Max	Fac.
-10	10	0

Note: If ntC disabled, PS will not work and can not be displayed.

7. SSL

Function: 4-20 mA input selection for RH or Pressure

If this parameter is set to,
d iS = 4-20 mA input disabled
rH = 4-20 mA input is selected for RH
Pr = 4-20 mA input is selected for Pressure

Min	Max	Fac.
d iS	Pr	d iS

Note: If SSL is set to d iS or rH then, PrH, PrL, Pr2, Pr3, AdP and PrS will not work and can not be displayed. Also, If SSL is set to rH then, HSS will not work and can not be displayed.

8. HSS

Function: Selection of RH Sensor

If this parameter is set to,
d iS = RH sensor disabled
HS 1 = HS-100 is selected as RH sensor
HS2 = HS-220 is selected as RH sensor

Min	Max	Fac.
d iS	HS2	d iS

Note: If HSS disabled and SSL is other than rH, then rSH, H2, H3, AdH and HS will not work and can not be displayed.

9. rSH

Function: To set controller Resolution for RH

If this parameter is set to,
0.1 = 0.1% Resolution
RH and related parameters will be displayed with 0.1% Resolution.
1 = 1% Resolution
RH and related parameters will be displayed with 1% Resolution.

Min	Max	Fac.
0.1	1	-

Note: If HSS disabled and SSL is other than rH, then rSH will not work and can not be displayed.

10. H2

Function: To Set Maximum Allowable High Humidity Limit.

Example: If this parameter is set to 90.0% and the Humidity reaches or goes above 90.0%, Display will show HH (High Humidity) indicating that the Humidity has reached or gone above the value set in this parameter.

HH (Message on display)

HS-220						
rSH = 0.1				rSH = 1		
Min	Max	Fac.		Min	Max	Fac.
H3+1.0	90.0%	90.0%		H3+1	90%	90%

HS-100 / 4-20mA						
rSH = 0.1				rSH = 1		
Min	Max	Fac.		Min	Max	Fac.
H3+1.0	99.0%	99.0%		H3+1	99%	99%

Note: If HSS disabled and SSL is other than rH, or AL is set 0, then H2 will not work and can not be displayed.

11. H3

Function: To Set Minimum Allowable Low Humidity Limit.

Example: If this parameter is set to 30.0% and the Humidity reaches or goes below 30.0%, Display will show LH (Low Humidity) indicating that the Humidity has reached or gone below the value set in this parameter.

LH (Message on display)

HS-220

rSH = 0.1			rSH = 1		
Min	**Max**	**Fac.**	**Min**	**Max**	**Fac.**
30.0%	H2-1.0%	30.0%	30%	H2-1%	30%

HS-100 / 4-20mA

rSH = 0.1			rSH = 1		
Min	**Max**	**Fac.**	**Min**	**Max**	**Fac.**
0.0%	H2-1.0%	0.0%	0%	H2-1%	0%

Note: If HSS disabled and SSL is other than rH, or AL is set 0, then H3 will not work and can not be displayed.

12. AdH

Function: Power on Time Delay for Alarm for RH

Example: If this parameter is set to 20 minutes, once the indicator is powered ON, High Humidity and Low Humidity fault indication will not be activated for 20 minutes.

If Humidity reaches or goes above H2 parameter value, High Humidity (HH) fault will be displayed after completion of delay set with AdH parameter.

If Humidity reaches or drops below H3 parameter value, Low Humidity (LH) fault will be displayed after completion of delay set with AdH parameter.

Differential of 0.1% / 1% is considered for clearing the fault.

Min	Max	Fac.
0 min	99 min	20 min

Note: If HSS disabled and SSL is other than rH, or AL is set 0, then AdH will not work and can not be displayed.

13. HS

Function: RH Probe Calibration

In time it may be possible that the display may be offset by a percent or so.

To compensate for this error, user may need to add or minus the percents required to achieve the correct Humidity.

Example: The Humidity on the display is 50.0%, whereas the actual Humidity is 52.0%. User will have to set the HS parameter to 2.0%, which means that once out of the Programming Mode, the Humidity on display will be 52.0% (50.0%+2.0%) .

Min	Max	Fac.
-10.0%	10.0%	0.0%

Note: If HSS disabled and SSL is other than rH, then HS will not work and can not be displayed.

14. PrH

Function: Pressure high range selection for 20mA

The value set with this parameter is the pressure high range value selected for 20mA.

Example: If this parameter is set to 600 PSI, for pressure above 600 PSI, display will show Pressure probe fail PrF message.

Min	Max	Fac.
(PrL+1) PSI	600 PSI	600 PSI

Note: If SSL is other than Pr, then PrH will not work and can not be displayed.

15. PrL

Function: Pressure low range selection for 4mA

The value set with this parameter is the pressure low range value selected for 4mA.

Example: If this parameter is set to -15 PSI, for pressure below -15 PSI, display will show Pressure probe fail PrF message.

PrH and PrL parameters decide the operating range for pressure sensor against 4-20mA input.

Min	Max	Fac.
-15 PSI	(PrH-1) PSI	-15 PSI

Note: If SSL is other than Pr, then PrL will not work and can not be displayed.

16. Pr2

Function: To Set Maximum Allowable Low Pressure Limit.

Example: If this parameter is set to 500 PSI and the Pressure reaches or goes above 500 PSI, Display will show HPr (High Pressure) indicating that the Pressure has reached or gone above the value set in this parameter.

Min	Max	Fac.
(Pr3+1) PSI	PrH	600 PSI

Note: If SSL is other than Pr, or AL is set 0, then Pr2 will not work and can not be displayed.

17. Pr3

Function: To Set Minimum Allowable Low Pressure Limit.

Example: If this parameter is set to 10 PSI and the Pressure reaches or goes below 10PSI, Display will show LPr (Low Pressure) indicating that the Pressure has reached or gone below the value set in this parameter.

Min	Max	Fac.
PrL	(Pr2-1) PSI	-15 PSI

Note: If SSL is other than Pr, or AL is set 0, then Pr3 will not work and can not be displayed.

18. AdP

Function: Power on Time Delay for Alarm for pressure

Example: If this parameter is set to 20 minutes, once the indicator is powered ON, High Pressure and Low Pressure fault indication will not be activated for 20 minutes.

If Pressure reaches or goes above Pr2 parameter value, High Pressure (HPr) fault will be displayed after completion of delay set with AdP parameter.

If Pressure reaches or drops below Pr3 parameter value, Low Pressure (LPr) fault will be displayed after completion of delay set with AdP parameter.

Differential of 10 PSI is considered for clearing the fault.

Min	Max	Fac.
0 min	99 min	20 min

Note: If SSL is other than Pr, or AL is set 0, then AdP will not work and can not be displayed.

19. PrS

Function: Pressure Probe Calibration

In time it may be possible that the display may be offset by a PSI or so.

To compensate for this error, user may need to add or minus the PSI required to achieve the correct Pressure.

Example: The Pressure on the display is 100 PSI, whereas the actual Pressure is 105 PSI. User will have to set the PrS parameter to 5 PSI, which means that once out of the Programming Mode, the Pressure on display will be 105 PSI (100 PSI+ 5 PSI).

Min	Max	Fac.
-20 PSI	20 PSI	0 PSI

Note: If SSL is other than Pr, then PrS will not work and can not be displayed.

20. nd

Function: Default (Normal) Display

If this parameter is set to,

tmP = Default display will be Temperature
rH = Default display will be Humidity
Pr = Default display will be Pressure
ALL = Display will show the Temperature, Humidity and Pressure one by one with the time set in tnd parameter.

Min	Max	Fac.
tmP	ALL	tmP

21. tnd

Function: Flashing rate for multiple sensor selection

Example: If this parameter is set to 2 seconds and nd parameter is set to ALL, then display will show the Temperature, Humidity and Pressure one by one each for 2 seconds for all enabled sensors.

If any High / Low temperature, Humidity or Pressure fault is present then it will flash at the rate of 500ms with respective sensor value.

Min	Max	Fac.
1 sec.	999 sec.	2 sec.

22. AL

Function: Alarm indication configuration for alarm icon and display fault messages

If this parameter is set to,

0 = Alarm indication is applicable to all sensor fail faults and related fault massages (PrF, PP, HPP) will be displayed.

1 = Alarm indication is applicable to all faults and all fault messages will be displayed (Ht, Lt, HH, LH, HPr, LPr, PrF, PP, HPP).

Min	Max	Fac.
0	1	0

Note : If AL parameter is set to 0, Parameters P2, P3, Adt, H2, H3, AdH, Pr2, Pr3, AdP not work and can not be displayed.

23. LP

Function: To Lock Keypad.

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

UnL = Keypad locked
LoC = Keypad unlocked

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

LP (Message on Flashing)

Min	Max	Fac.
UnL	LoC	UnL

Note : If LP parameter is set to 1 and if user tries to change any parameter value, "LP" will flash on the display.

24. FS

Function: To Factory Set.

When set to YES all parameters are programmed to factory set values. Useful to debug setting related Problems.

When set to,

no = FS is disable.
YES = FS as per default value.

Min	Max	Fac.
no	YES	no

25. EP

Function: To End Programming.

To End Programming Press SET/PRG key	Once the key is pressed, the indicator goes into the normal mode and displays the Temperature/ Humidity/ Pressure as per nd parameter and all settings are recorded.

LED INDICATION

LED	Status	Description	Parameter
🔔	ON	Alarm indication is ON for all faults : Ht, Lt, PP, HH, LH, HPP, PrF, HPr, LPr.	P2, P3, H2, H3, Pr2, Pr3, AL
°C	ON	NTC Probe Temperature and Temperature related parameters displayed in °C.	ntC
°F	ON	NTC Probe Temperature and Temperature related parameters displayed in °F.	
%	ON	RH and RH related parameters displayed.	SSL, HSS
PSI	ON	Pressure and Pressure related parameters displayed.	SSL

FAULT MESSAGES

Msg.	Description	Para.
PP	**Temperature Probe Fail** Probe short circuit, circuit open or without probe, or Temperature is > 100°C or < -50.0°C (if parameter ntC is set to °C) or > 212°F or < -58°F (if parameter ntC is set to °F).	ntC
HPP	**RH Probe Fail** Probe short circuit, circuit open or without probe, or Humidity is >100 % or < 0.0% (SZ-HS-100 / 4-20mA) or Humidity is >90.0 % or < 30.0% (SZ-HS-220).	SSL, HSS
PrF	**Pressure Probe Fail** Probe short circuit, circuit open or without probe, or Pressure is > Parameter PrH PSI or < Parameter PrL PSI.	SSL
Ht	**High Temperature Alarm** Temperature above the maximum high Temperature Limit.	P2, AL
Lt	**Low Temperature Alarm** Temperature below the minimum low Temperature Limit.	P3, AL
HH	**High RH Alarm** Humidity above the maximum high RH Limit.	H2, AL
LH	**Low RH Alarm** Humidity below the minimum low RH Limit.	H3, AL
HPr	**High Pressure Alarm** Pressure above the maximum high Pressure Limit.	Pr2, AL
LPr	**Low Pressure Alarm** Pressure below the minimum low Pressure Limit.	Pr3, AL

OPERATING MESSAGES

LrS	In Log function: When LL 1-LL3 and LH 1-LH3 values are cleared.	-
LL1	**Last Low Temperature** Las Low Temperature Logged.	ntC
LH1	**Last High Temperature** Las High Temperature Logged.	
LL2	**Last Low Humidity** Las Low Humidity Logged.	SSL, HSS
LH2	**Last High Humidity** Las High Humidity Logged.	
LL3	**Last Low Pressure** Las Low Pressure Logged.	SSL
LH3	**Last High Pressure** Las High Pressure Logged.	
rS1	When LL 1 and LH 1 values of NTC are reset when NTC fails or NTC sensor is not Selected.	-
rS2	When LL2 and LH2 values of RH are reset when RH fails or RH sensor is not Selected.	-
rS3	When LL3 and LH3 values of Pressure Probe are reset when Pressure Probe fails or Pressure Probe is not Selected.	-
LP	**Keypad lock** Keypad is locked.	LP
tPd	When nd is set to tmP and ntC is set to d iS.	ntC
rHd	When nd is set to rH and SSL is other than rH and HSS is set to d iS.	SSL, HSS
Prd	When nd is set to Pr and SSL is other than Pr.	SSL
ALd	When nd is set to ALL and all sensors are disabled.	ntC, SSL, HSS

HIGH AND LOW TEMPERATURE, HUMIDITY AND PRESSURE LOGGING FUNCTION

How to see the Logged Values:

LL 1 : Last Low Temperature
LH 1 : Last High Temperature
LL2 : Last Low RH
LH2 : Last High RH
LL3 : Last Low Pressure
LH3 : Last High Pressure

Press and hold ^ key for 4sec, initially indicator enter into to Sensor display mode and after 4 seconds it will enter in Min./Max. Log mode.

Temperature log : Display will flash "LL 1" and the corresponding temperature for 4 seconds. After this, display will flash "LH 1" and the corresponding Temperature for 4 seconds.

Humidity log : After Temperature log, display will flash "LL2" and the corresponding Humidity for 4 seconds. After this, display will flash "LH2" and the corresponding Humidity for 4 seconds.

Pressure log : After Humidity log, display will flash "LL3" and the corresponding Pressure for 4 seconds. After this, display will flash "LH3" and the corresponding Pressure for 4 seconds and come out of Log Mode and will display the Temperature/ Humidity/ Pressure as per nd parameter.

How to reset the Logged Values

While the display is showing the Logged Values, if user press & hold the SET/PRG key for 2sec, the Logged Values will be cleared and reset message will be displayed as below,

rS1 : Temperature log reset
rS2 : Humidity log reset
rS3 : Pressure log reset

Log Values will get reset after Power ON/OFF.

REV1 –24.04.2023