PCG101
Operating Manual

Controlled cooling, always

Introduction

Subzero PCG101 is the programmable controller designed to be used for general application. It consists of input block to take input from probes, transducers, humidifier etc. and able to control various devices like compressor, control valves, heater etc. indicator to cover any type of application in the air-conditioning sector, cooling sector and any relative area. As the system is one of the most technologically advanced, it is flexible and can be customized for it to be adapted to the user's particular requirements.

Caution for your Safety

ELECTRIC SHOCK: Please do not touch the relay terminal (live parts) or socket terminal (live parts) while the power is on. This may lead to electric shock.

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.

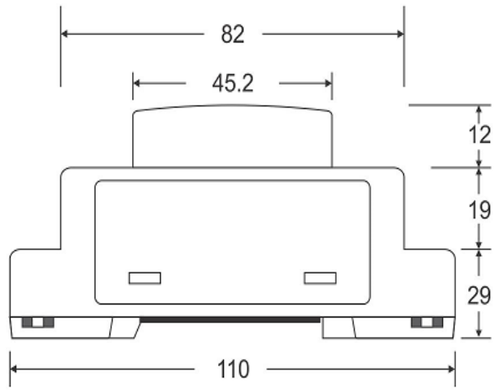
Controller: Controller should be installed in a place protected by vibration, water and corrosive gasses and where ambient temperature does not exceed the values specified in the technical data.

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.

Items Included

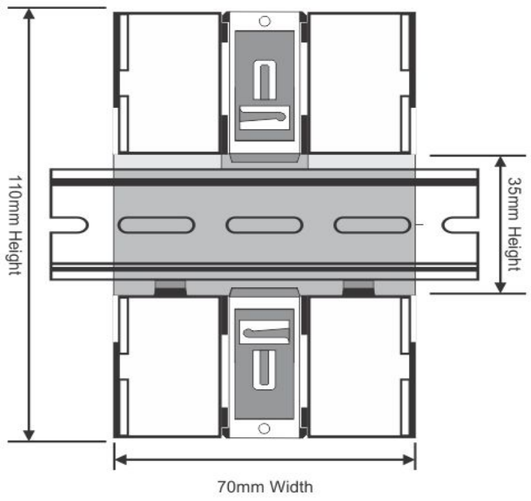
S. No.	Items		Quantity
1	Controller with side lock		1
2	Wire Harness	6 Way	1 No.
		14 Way	1 No.
3	User Manual		1

Dimension



Mounting

BACK VIEW



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1. General Specification

- The Subzero PCG101 - 24V operated programmable controller.
- 32-bit Cortex M3 ARM processor operating at 0.1 µs speed makes it highly efficient.
- Has a large FLASH memory (150 KB) which makes it possible to have multiple control routines and test conditions in the software.
- Fast switching I/O are suitable to drive high speed inputs upto 50kHz and high-speed outputs upto 100kHz effectively.
- RS485 Master and Slave, and USB port provide maximum flexibility of integration with the outside world.
- All the analog inputs and outputs are fully configurable.

2. Field of Application

The possibility of all-round configuration allows the Subzero programmable controller to be used for any type of application. Following are the existing applications:

- HVACR
- Plant Monitoring
- Automation

3. Technical Specification

Enclosure

Housing	: Base & Top Cover	: ABS Plastic
	Display Lens	: Polycarbonate
Colour	: Base	: Black
	Top Cover	: White
	Lens	: Transparent Smoke Grey
Mount	: DIN rail mount	
Dimension (Frontal)	: Width (W)	: 70 mm
	Height (H)	: 110 mm
	Depth (D)	: 59 mm
Self-Extinguishing	: YES	

Electrical Specification

Power Supply	: 24 V DC	
Connectors	: Digital Input	: Male Female Microfit Type
	High Speed Output	: Male Female Microfit Type
	All Other Output	: Male Female type Pluggable Screw

Software Specification

Microprocessor	: 32-Bit Cortex M3 ARM
Programmable FLASH Memory	: 150 KB
Execution Speed	: 0.1 µs
Language	: Ladder/C-Programming (Functional Blocks)
Modbus Protocol	: Modbus RTU, MITSUBISHI FX2N
Programming	: Mini USB to type A cable
Onsite Programming	: via Pen drive FAT32
Internal RTC	: Standard

Operating Conditions

Operating Temperature	: -10°C to 60°C
Relative Humidity	: 20 % to 85 %

Analog Input

Number of Inputs	: 7	
Type of Input (Configurable via hardware jumpers)	: NTC	: SZ make 10K at 25°C
	Range	: -35°C to 90°C
	: Voltage	: 0-5 VDC / 0-10 VDC
	: Current	: 0-20 mA
Resolution	: 12 Bit	
Accuracy	: ± 1 % on F.S.	
Input Impedance	: 100 Ω	

Digital Input

Type 1	: High Speed Transistor* (50 kHz X 2, 10 kHz X 2) Opto-Isolated
Input Name	: X0, X1 – 50 kHz X3, X4 – 10 kHz
No. of Inputs	: 4
Type 2	: Opto-insulated 24 V Operated
No. of Inputs	: 8
Input Name	: X2, X5, X6, X7, X10, X11, X12, X13

* High Speed Transistor Input can be used as Normal Input.

Analog Output (Configurable via Software Parameter)

Type	: Voltage / Current Type
Number of Outputs	: 3
Range	: 0-10 VDC (or) 0-20mA
Accuracy	: ± 1 % on F.S.
Load Impedance	: <500 Ω

Digital Output

Type 1	: High Speed Transistor Output* (100 kHz X 2, 20kHz X 2)
No. of Outputs	: 4
Output Name	: Y0, Y1 – 100 kHz Y2, Y3 – 20 kHz
Maximum Load	: 0.5 A
Type 2	: Relays with Normally Open (NO) contact
No. of Outputs	: 8
Output Name	: Y4, Y5, Y6, Y7, Y10, Y11, Y12, Y13
Maximum Load	: 5A 230V AC (Resistive)

* High Speed Transistor Output can be used as Normal Output.

4. Programming Environment

All Subzero PLC use the following software as a processing environment:

- SZ Logic – Customized Programming Software which comes complementary. It uses popular Ladder Logic Diagrams and "C" Language.
- Key Feature of SZ Logic – subzero make NTC sensor (10k @ 25deg C) is readily integrated.
- Online DEBUG allows user to block and force the value of the variables to speed up the testing and ease fault findings.

5. Onsite Programming

Following is the procedures for onsite USB Programming:

- Compile project in SZ Logic.
- A file with "projectname.szd" will be created in the project folder.
- Rename above file as "PLCPRG.szd" only.
- Insert a pendrive. Format the pendrive as FAT32.
- Copy the "PLCPRG.szd" file to Pendrive. Do not keep in any folder. Remove pendrive from PC.
- Power off the PLC and insert the pendrive in the PLC.
- Power on the PLC. Upon successful downloading of the program, the RUN LED on PLC will blink 6 times and then will remain ON.
- If RUN led doesn't blink, repeat previous 2 steps.
- When done, power off the PLC and remove the pendrive.

6. Connector Description

Power Supply

SYMBOL	DESCRIPTION
⏚	Earthing for Supply
-	Supply -24 V DC
+	Supply +24 V DC

Analog Input

Configurable
(NTC/ 4-20 mA/ 0-5 V/ 0-10 V)

Terminal No.	Input Name	Description
0 V	Ground	0V Reference for all analog inputs
A0	Pb1	Input 1
A1	Pb2	Input 2
A2	Pb3	Input 3
A3	Pb4	Input 4
A4	Pb5	Input 5
A5	Pb6	Input 6
A6	Pb7	Input 7

Digital Input

Terminal No.	Name	Input	Description
1	X0	DI0	Digital Input 0 (+24 V / High Speed)
2	X3	DI2	Digital Input 2 (+24 V / High Speed)
3	X2	DI4	Digital Input 4 (+24 V)
4	X6	DI6	Digital Input 6 (+24 V)
5	SS0	0V	0 V for ports X0 to X7
6	X10	DI8	Digital Input 8 (+24 V)
7	X12	DI10	Digital Input 10 (+24 V)
8	X1	DI1	Digital Input 1 (+24 V / High Speed)
9	X4	DI3	Digital Input 3 (+24 V / High Speed)
10	X5	DI5	Digital Input 5 (+24 V)
11	X7	DI7	Digital Input 7 (+24 V)
12	SS1	0 V	0 V for ports X10 to X13
13	X11	DI9	Digital Input 9 (+24 V)
14	X13	DI11	Digital Input 11 (+24 V)

Analog Output

Terminal No.	Name	Description
V0	V OUT 0	Output 0 0-10 V
I0	I OUT 0	Output 0 0-20 mA
0V	GND	0V reference for V0 & I0
V1	V OUT 1	Output 1 0-10 V
I1	I OUT 1	Output 1 0-20 mA
0V	GND	0V reference for V1, I1 and V2, I2
V2	V OUT 2	Output 2 0-10 V
I2	I OUT 2	Output 2 0-20 mA

Digital Output

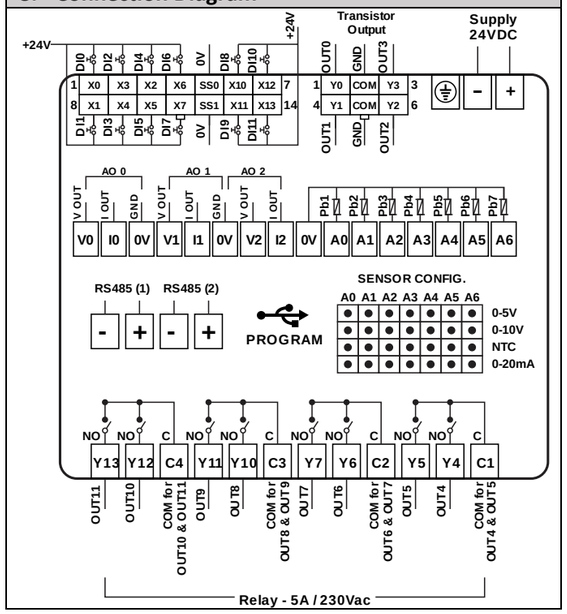
High Speed Output:

Terminal No.	Name	Output	Description
1	Y0	OUT0	High Speed Digital Output 1
2	COM	GND	0 V Common for Y0&Y3
3	Y3	OUT3	High Speed Digital Output 4
4	Y1	OUT1	High Speed Digital Output 2
5	COM	GND	0 V Common for Y1&Y2
6	Y2	OUT2	High Speed Digital Output 3

For Relay:

Terminal No.	Name	Description
C1	COM for OUT4 & OUT5	Common for Output Y4 and Y5
Y4	OUT4	Relay 4 Normally open contact
Y5	OUT5	Relay 5 Normally open contact
C2	COM for OUT6 & OUT7	Common for Output Y6 and Y7
Y6	OUT6	Relay 6 Normally open contact
Y7	OUT7	Relay 7 Normally open contact
C3	COM for OUT8 & OUT9	Common for Output Y10 and Y11
Y10	OUT8	Relay 8 Normally open contact
Y11	OUT9	Relay 9 Normally open contact
C4	COM for OUT10 & OUT11	Common for Output Y12 and Y13
Y12	OUT10	Relay 12 Normally open contact
Y13	OUT11	Relay 13 Normally open contact

8. Connection Diagram



Notes:

PLC Ordering Description

Model No.	Housing	Display	Digital Input	Digital Output	High Speed Digital Input	High Speed Digital Output	Analog Input	Analog Output	Connectivity
PCG100-121200001	DIN 4	No Display	12	12	0	0	0	0	2 RS 485
PCG101-121200731	DIN 4	No Display	12	12	0	0	7 - NTC/4-20mA/0-10V	3	2 RS 485
PCG101-121244701	DIN 4	No Display	12	12	4	4	7 - NTC/4-20mA/0-10V	0	2 RS 485
PCG101-121244731	DIN 4	No Display	12	12	4	4	7 - NTC/4-20mA/0-10V	3	2 RS 485
PCG141-121244731	DIN 4	External 485 display	12	12	4	4	7 - NTC/4-20mA/0-10V	3	3 RS 485

Connectivity

	Symbol	Description
RS485 (1)	-	RS485-1 -ve
	+	RS485-1 +ve
RS485 (2)	-	RS485-2 -ve
	+	RS485-2 +ve

7. LED Indication

LED	Status	Description
PWR	ON	When controller is turned ON.
TX1	FLASHING	When communication is via RS485(1)
TX2	FLASHING	When communication is via RS485(2)
ERR	FLASHING	When controller is in Error mode.
RUN	FLASHING	When controller is in Run mode.