

PCG100 Series Instruction Manual



Introduction

Subzero PCG 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.

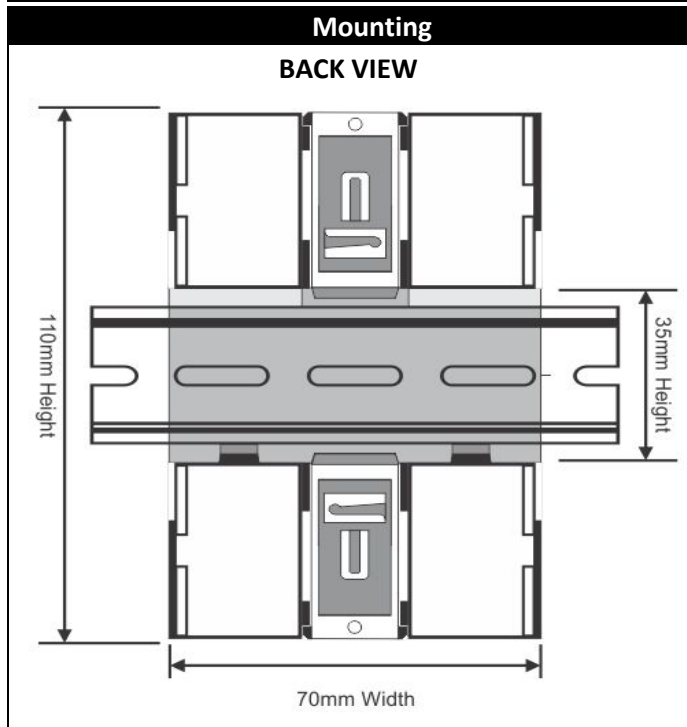
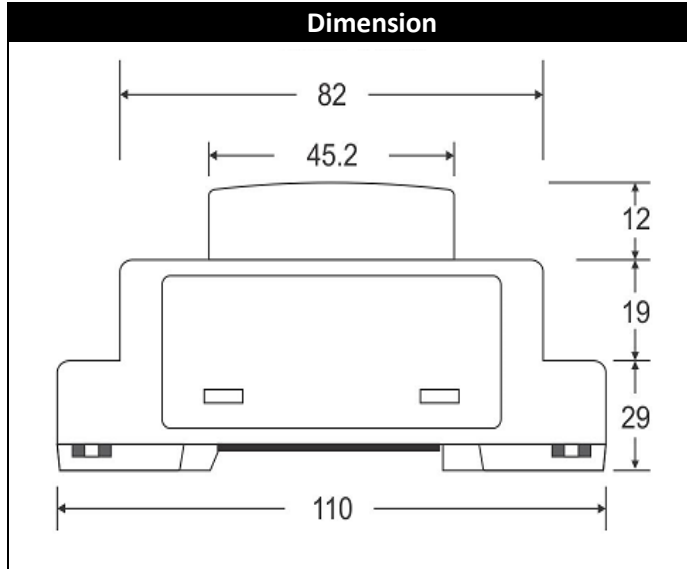
Controller: Controller should be installed in a place protected by vibration, water and corrosive gasses and where ambient temperature does not exceed the values specified in the technical data.

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
		14 Way
3	User Manual	1

Note: For PCG100 -121200001, PCG101 -121200701, PCG101 -121200702 wire harness not included.



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1. General Specification

- The Subzero PCG - 24V operated programmable controller.
- 32-bit Cortex M3 ARM processor operating at 0.1 μ s 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.
- Software configurable RS485 Master Protocol or Slave Protocol 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 V0 Grade
	Display Lens	Polycarbonate V0 Grade
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, $\pm$ 10%	
Connectors	Digital Input	Microfit Type
	High Speed Output	Microfit Type
	All Other Output	Pluggable Connector Type

Note: For PCG100 -121200001, PCG101 -121200701, PCG105 -1212007N01 Plugin connector - wire 1.0sqmm.

Software Specification	
Microprocessor	32-Bit Cortex M3 ARM
Programmable FLASH Memory	150 KB
Execution Speed	0.1 μ s
Language	Ladder/C-Programming (Functional Blocks)
Modbus Protocol	Modbus RTU, MITSUBISHI FX2N
Programming	Type A to Type A USB 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
	Range : -35°C to 90°C
	Voltage : 0-5 VDC / 0-10 VDC
	Current : 0-20 mA
Resolution	12 Bit
Accuracy	$\pm$ 1 % on F.S.
Input Impedance	100 Ω

Note: For PCG105 -121200701 all Analog input is only NTC

Digital Input	
Type 1	High Speed Transistor* Opto-Isolated
Input Name	X0, X1, X3, X4
No. of Inputs	4
Maximum Range	50 kHz
	* Σ (X0, X1, X3, X4) $\leq$ 50 kHz
Type 2	Opto-Isolated 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.	
Type 3	Opto-Isolated 24 V Operated
No. of Inputs	12
Input Name	X0, X1, X2, X3, X4, X5, X6, X7, X10, X11, X12, X13

Analog Output (Configurable via Software Parameter)	
Type	Voltage / Current Type
Number of Outputs	3
Range	0-10 VDC (or) 0-20mA
Accuracy	$\pm$ 1 % on F.S.
Load Impedance	<500 Ω

Digital Output	
Type 1	High Speed Transistor Output*
No. of Outputs	4
Output Name	Y0, Y1, Y2, Y3
Maximum Range	100 kHz
	* (100 kHz X 2, 20 kHz X 2)
Maximum Load	0.5A
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.	
Type 3	Opto-Isolated Transistor Output & Relays with Normally Open (NO) contact
No. of Outputs	12
Output Name	Y0, Y1, Y2, Y3, Y4, Y5, Y6, Y7, Y10, Y11, Y12, Y13
Maximum Load	0.5A - 5A 230V AC (Resistive)

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	
Connectivity			
Symbol		Description	
RS485 (1)	-	RS485-1 -ve	
	+	RS485-1 +ve	
RS485 (2)	-	RS485-2 -ve	
	+	RS485-2 +ve	
RS485 (3)	-	RS485-3 -ve	
	+	RS485-3 +ve	

