Thank you very much for choosing SCD8000/8100 series temperature controller. Please read this instruction sheet carefully before using your SCD8000/8100 to ensure proper operation. Keep this instruction sheet handy for quick reference.

### Precautions

#### DANGER!! CAUTION ELECTRIC SHOCK!!

SCD8000/8100 is an OPEN-TYPE device and therefore should be installed in an enclosure free of airborne dust, humidity, shock and vibration. The enclosure should prevent non-maintenance staff from operating the device (e.g. key or specific tools are required for opening the enclosure) in case danger and damage on the device may occur.

1. Prevent dust or metallic debris from falling into the device and cause malfunctions. DO NOT modify or install the circuit board without being permitted. DO NOT see empty terminals.
2. Keep away from high-voltage and high-frequency environment during the installation in case of interference. Prevent using the device in premises which contain:
   (a) dust or corrosive gas,
   (b) high humidity and high radiation,
   (c) shock and vibration.
3. The power has to be switched off when wiring or changing the temperature sensor.
4. When installing the circuit board of the accessory, please make sure the power of the main unit is switched off and insert the accessory into the correct slot on the main unit.
5. Make sure to use compensation wire which matches the thermocouple or platinum resistance when extending or connecting the thermocouple or platinum resistance.
6. Keep the wire as short as possible when wiring a sensor to the controller. Separate the power cable and load wire in order to prevent interference and increase the accuracy.
7. Make sure the power signals and cable is installed correctly before switching on the power; otherwise serious damage may occur.
8. DO NOT touch the terminal or repair the device when the power is on; otherwise an electric shock may occur.
9. Please wait for 1 minute after the power is switched on to allow the capacitor to discharge and DO NOT touch the internal terminal within the period.
10. DO NOT touch the internal terminal when SCD8000/8100 is either switched on or in case you may damage the circuit. Please install SCD8000/8100 with other heating objects (e.g. power supply) within proper distance while installing SCD8000/8100.

### Functions & Electrical Specifications

#### Power input
- DC 24V, isolated switching power supply
- Voltage range: 95% - 110% rated voltage
- Power consumption: Max. 10W + 3W × number of SCD2000 controllers connected in parallel (Max. 7)

#### Input sensor
- Temperature measurement resistance (Cu50) 13 -50 ~ 150°C
- Platinum resistance (Pt100) 150 -260 ~ 1,200°C

#### Output accessories
- Voltage pulse output: DC 24V, Max 40mA current output
- Current output: DC 4 ~ 20mA (relative load ≤ 500Ω), for OUT1 and OUT2 only

#### Output functions
- Control output, alarm output or proportional output (proportional output is only applicable in the model with linear voltage and current output for OUT1, OUT2)

#### Alarm modes available
- Temperature measurement ranges:
  - Max. 200°C
  - Min. -20°C
  - Ambient temperature:
    - 0°C ~ +55°C
  - Storage temperature:
    - -20°C ~ +85°C
  - Operation altitude:
    - < 2,000m
  - Ambient humidity:
    - 35% ~ 85% RH (non-condensing)
  - Pollution degree:
    - 2

#### Panel Layout

The standard SCD8000/8100 main unit is equipped with 4 input channels. You can purchase additional SCD-4T or SCD-4R to expand the number of input channels. SCD8000/8100 supports maximum 8 channels of inputs which belong to group INA and group INB. Each group possesses 4 input channels.

### Product Profile & Outline

<table>
<thead>
<tr>
<th>SCD8000/8100</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>I/O terminals</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Status LED</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Display and setup unit</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>DIN rail clip</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Power input port</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>RS-485 communication port</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Extension module fixing clip</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Extension port</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Output

SCD8000/8100 supports maximum 16 channels of outputs, belonging to output groups OUT1, OUT2, SUB1 and SUB2, each group with 4 channels. See the explanations below for how functional output corresponds to output groups.

1. Analog output: Every channel corresponds to 2 groups of output and 2 groups of alarm. OUT1 and OUT2 are for control output, and OUT1 can be used for proportional output. OUT2 and SUB2 are fixed for alarm output.
2. Each channel is paired with 2 groups of outputs. OUT1 and OUT2 are used for control output or proportional output of CH1 - CH8. SUB1 and SUB2 are used for control output or alarm output.

#### Communication Address of Output & How to Set up Parameters

See Table 1 for the communication addresses of output and input.

### Communication Address of Output & How to Set Up Parameters

<table>
<thead>
<tr>
<th>Group</th>
<th>CH1</th>
<th>CH2</th>
<th>CH3</th>
<th>CH4</th>
<th>CH5</th>
<th>CH6</th>
<th>CH7</th>
<th>CH8</th>
</tr>
</thead>
<tbody>
<tr>
<td>OUT1</td>
<td>H10A</td>
<td>H10B</td>
<td>H10C</td>
<td>H10D</td>
<td>H10E</td>
<td>H10F</td>
<td>H10G</td>
<td>H10H</td>
</tr>
<tr>
<td>OUT2</td>
<td>H10I</td>
<td>H10J</td>
<td>H10K</td>
<td>H10L</td>
<td>H10M</td>
<td>H10N</td>
<td>H10O</td>
<td>H10P</td>
</tr>
</tbody>
</table>

*Note: SUB1 and SUB2 do not support SCD-4T and SCD-4R. Please install the optional output modules you purchase into the correct slot.*

### Synchronous Communication Protocol & Auto ID Setup

This function allows the auto setup of communication protocol in extension module SCD3000 following the communication protocol set in the SCD8000 main unit. The status of SCD8000/8100 depends on the protocol set in the extension module. See the steps for details:

1. Set the auto communication ID of SCD8000 as “1” (communication address H110F).
2. Switch off SCD8000. Connect SCD8000 and SCD3000 on SCD8000 again.
3. Default communication protocol is 9,600bps, 8 bits, Even, 1 stop bit. Communication address = 01.
4. This function will consume 3 ~ 5 seconds more when you switch on SCD8000.

### LED Display

PWR: On → SCD8000/8100 is powered.

RDY: On → Any of the channels is active.

COM: Flashing → Communication in progress

ERR: Indicating error (red) → ERR LED is on indicating one of the following errors occur, and the output has to be disabled:

1. Memory EEPROM error
2. Any of the input signals is not connected
3. Any of the input channels exceeds the setup range
4. Any of the input temperatures has not been stabilized

### Table 2

<table>
<thead>
<tr>
<th>SV</th>
<th>Alarm Mode</th>
<th>Alarm Output Operation</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>No alarm</td>
<td>No alarm operation</td>
</tr>
<tr>
<td>1</td>
<td>Alarm output is enabled when the temperature reaches upper and lower limits.</td>
<td>Alarm output will be enabled when PV exceeds SV + AL-H or falls below SV – AL-L.</td>
</tr>
<tr>
<td>2</td>
<td>Alarm output is enabled when the temperature reaches the absolute value of the upper and lower limits.</td>
<td>The alarm will be enabled when the PV reaches SV + AL-H and further exceeds SV + AL-H.</td>
</tr>
<tr>
<td>3</td>
<td>Alarm output is enabled when the temperature reaches the absolute value of the upper limit.</td>
<td>The alarm will be enabled when the PV reaches SV + AL-H and further falls below SV + AL-L.</td>
</tr>
<tr>
<td>4</td>
<td>Upper limit standby alarm: The alarm will be enabled when the PV reaches SV + AL-H.</td>
<td>Upper limit standby alarm: The alarm will be enabled when the PV reaches SV + AL-H.</td>
</tr>
<tr>
<td>5</td>
<td>Lower limit standby alarm: The alarm will be enabled when the PV reaches SV – AL-L.</td>
<td>Lower limit standby alarm: The alarm will be enabled when the PV reaches SV – AL-L.</td>
</tr>
<tr>
<td>6</td>
<td>Upper limit hysteresis alarm: The alarm will be enabled when the PV exceeds SV + AL-H and further falls below SV + AL-L.</td>
<td>Upper limit hysteresis alarm: The alarm will be enabled when the PV reaches SV + AL-H.</td>
</tr>
<tr>
<td>7</td>
<td>Lower limit hysteresis alarm: The alarm will be enabled when the PV falls below SV – AL-L.</td>
<td>Lower limit hysteresis alarm: The alarm will be enabled when the PV reaches SV – AL-L.</td>
</tr>
</tbody>
</table>

### Table 3

<table>
<thead>
<tr>
<th>Output</th>
<th>I/O terminals (optional)</th>
</tr>
</thead>
<tbody>
<tr>
<td>OUT1, OUT2</td>
<td>Heating control</td>
</tr>
<tr>
<td>SUB1, SUB2</td>
<td>Heating control</td>
</tr>
<tr>
<td>OUT3 (optional)</td>
<td>Proportional output</td>
</tr>
<tr>
<td>SUB3 (optional)</td>
<td>Disable output</td>
</tr>
</tbody>
</table>

**Remark:** When there are only 4 channels of inputs, SUB1 cannot be used for alarm output but heating/cooling control only.

**Remark:** When there are only 4 channels of inputs, OUT2 and SUB2 cannot be set up by the user but set up automatically as “alarm before the control” by the controller.

### Control Output

SCD8000/8100 offers PID control, ON/OFF control, manual control and programmable PID control. Control output methods are set as address H1006 ~ H100B (default = 0). PID, PID parameters at H1020 ~ H102F, ON/OFF parameters at H1056 ~ H105B, and manual control parameters at H1101 ~ H110F.

### Table 4

| Temperature Controller | OUT1, OUT2** Heating control Cooling control Proportional output Disable output |
|---|---|---|---|---|
| 1 | ON | OFF | ON | OFF | ON | OFF |
| 2 | ON | OFF | ON | OFF | ON | OFF |
| 3 | ON | OFF | ON | OFF | ON | OFF |

**Note:** For SCD8100 / SCD-4R

### Communication Address of Output & How to Set up Parameters

See Table 2 for the communication addresses of output and input and Table 3 for the definition of the value in the address.
### Communication Parameter Setting:

<table>
<thead>
<tr>
<th>Content</th>
<th>Explanation</th>
<th>CH1</th>
<th>CH2</th>
<th>CH3</th>
<th>CH4</th>
<th>CH5</th>
<th>CH6</th>
<th>CH7</th>
<th>CH8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baud rate</td>
<td>2 ~ 57600</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Parity bit</td>
<td>None (N)</td>
<td>Even (E)</td>
<td>Odd (O)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Error Codes:

The error codes can be read from address H1000 ~ H1007. When the input operation is in normal status, H1000 ~ H1007 are for input values. When input error occurs (except for stable status and input exceeding the range), SC6000/8100 will read error codes in H1000 ~ H1007.

#### Analog output current tuning scaling:

- **Current (4 ~ 20mA)**
- **Max. number of steps in the pattern**: (0 ~ 127)
- **Number of cycles of the pattern**: (0 ~ 255)
- **Input sensor type**: See "Input" section

#### Proportional control

- **Proportional control coefficient of output 1**
- **Proportional control coefficient of output 2**
- **Dead band of control output 1 & output 2**: (-99.9 ~ 999.9)
- **Hysteresis of output 1**: (0.1 ~ 99.9%)
- **Hysteresis of output 2**: (0.1 ~ 99.9%)

#### Readout Value 1 & 2

- **Readout value 1**: Unit 0.1
- **Readout value 2**: Unit 0.1

#### Upper limit for alarm output

- **Alarm enabled when temperature exceeds upper limit**: Unit 0.1
- **Lower limit for alarm output**: Unit 0.1

#### Setting for UP and DOWN limit of analog input

- **Current (4 ~ 20mA)**
- **Voltage output**: (0 ~ 20V)

#### Input sensor type

- See "Input" section

### Read Command

<table>
<thead>
<tr>
<th>Address</th>
<th>Content</th>
<th>Explanation</th>
<th>CH1</th>
<th>CH2</th>
<th>CH3</th>
<th>CH4</th>
<th>CH5</th>
<th>CH6</th>
<th>CH7</th>
<th>CH8</th>
</tr>
</thead>
<tbody>
<tr>
<td>0x00</td>
<td>Write H1234 into address H10F1 and H1357 into address H10F2. Restart SC6000/8100.</td>
<td></td>
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</tr>
</tbody>
</table>

### Write Command

- **Write data content**: (0 ~ 255)
- **Write data content**: (0 ~ 255)
- **Write data content**: (0 ~ 255)
- **Write data content**: (0 ~ 255)

### ASCII Mode

- **Start word**: ‘0’
- **Command**: 'H1'
- **Machine address**: 1
- **Machine address**: 1
- **Command**: '0'
- **Command**: '0'
- **Command**: '0'
- | | | | | | | | | |

### Query mode

- **Read start address of data**: (0 ~ 255)
- **Read length of data (word)**: 1
- **Timestamp**
- **Timestamp**
- **Timestamp**
- **Timestamp**

### CRC (Cyclical Redundancy Check)

- **CRC low byte**: H03
- **CRC high byte**: H01
- **CRC low byte**: H08
- **CRC high byte**: H05

### Read Command

<table>
<thead>
<tr>
<th>Address</th>
<th>Content</th>
<th>Explanation</th>
<th>CH1</th>
<th>CH2</th>
<th>CH3</th>
<th>CH4</th>
<th>CH5</th>
<th>CH6</th>
<th>CH7</th>
<th>CH8</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1100</td>
<td>Data content in H1000</td>
<td></td>
<td></td>
<td></td>
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<td></td>
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<td></td>
<td></td>
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<tr>
<td>H1101</td>
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<tr>
<td>H1102</td>
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<td></td>
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<tr>
<td>H1103</td>
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<tr>
<td>H1104</td>
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<tr>
<td>H1105</td>
<td></td>
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<td></td>
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<tr>
<td>H1106</td>
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<td></td>
<td></td>
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<tr>
<td>H1107</td>
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<td></td>
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</tr>
</tbody>
</table>

### Write Command

- **Write data content**: (0 ~ 255)
- **Write data content**: (0 ~ 255)
- **Write data content**: (0 ~ 255)
- **Write data content**: (0 ~ 255)

### CRC Calculation

The CRC is calculated using the polynomial x^8 + x^5 + x^2 + 1. The initial value is 0x0000. The final result is returned in high and low bytes.

### System Setup for Communication on PC

Download the free software on Deyer's website.

### How to Mount & DIN Rail Size

Connect maximum 7 SC6000 controllers to SC6000B0 by using DIN rail.