PID TEMPERATURE

CONTROLLER

DQ – 100 PID

User Manual

I. Model Code Symbol

1. Basal function of instrument

⌘ **DQ-100G**: SSR voltage output (5VDC/30mA), no alarm output.

⌘ **DQ-100GL1**: SSR voltage output(5VDC/30mA)+ 1 Relay alarm (2 A/250VAC N.O. / N.C.)

OR 1 Relay output (2 A/250VAC N.O. / N.C.), but no alarm output.

⌘ **DQ-100GL5**: SSR voltage output(5VDC/30mA)+ 2 Relay alarm (2 A/250VAC N.O.)

OR 1 Relay output + 1 Relay alarm (2 A/250VAC N.O.)

2. Front panel dimension

Size	Front Panel width×height	Cut Out width×height	Depth Behind Mounting Surface
A	96×96mm	92×92mm	100mm
B	160×80mm	152×76mm	100mm
D2	48×48mm	45×45mm	95mm
E	48×96mm	45×92mm	100mm

II. TECHNICAL SPECIFICATION

1. **Input type :**
   Thermocouple: K, E, J, N
   Resistance temperature Detector: Pt100
2. **Instrument Input range :**
   K, E, J, N :0_+999℃； Pt100: 0_+800℃
3. **Measurement accuracy :** 0.3%FS±1℃
4. **Temperature display resolution :** 1℃
5. **Control mode :**
   On-off control mode
   AI artificial intelligence control, including fuzzy logic PID control and advanced control algorithm with the function of parameter auto tuning.
6. **Alarm function:** High Alarm, Deviation High Alarm.
7. **Power supply voltage rating**: 100-240VAC, -15%,+10% / 50-60Hz.

8. **Power consumption:** ≤2W.

9. **Ambient temperature:** -10_+60℃**, Humidity:** 0_90RH**%**

III. FRONT PANEL AND OPERATION

① Process Value(PV), or code of a parameter
② Set Value(SV), alarming code, or value of a parameter
③ Setup key, for accessing parameter table, and confirming change.
④ Data shift key, also for activating auto turning
⑤ Data decrease key
⑥ Date increase

Basal display status :

When power on:

① shows the process value (PV),
② shows the setpoint (SV).

When the input signal is out of the measurable range (for example, the thermocouple or RTD circuit is break, or input specification sets wrong), ① will alternately display “orAL” and the high limit or the low limit of PV, and the instrument will automatically stop output.

IV. OPERATION DESCRIPTION

- **Set Value Setting:**
  In basal display status, if the parameter lock “Loc” isn't locked, we can set setpoint (SV) by pressing <, ∨ or ∧. Press ∨ key to decrease the value, ∧ key to increase the value, and < key to move to the digit expected to modify. Keep pressing ∨ or ∧, the speed of decreasing or inscreasing value get quick. The range of setpoint is between the parameter SPL and SPH. The default range is 0～400.
- **Parameter Setting:**
  In basal display status, press ⟲ and hold for about 2 seconds can access Field Parameter Table. Pressing ⟲ can go to the next parameter; pressing <、∨ or ∧ can modify a parameter. Press and hold < can return to the preceding parameter. Press < (don't release) and then press ⟲ key simultaneously can escape from the parameter table. The instrument will escape auomatically from the parameter table if no key is pressed within 30 seconds. Setting Loc=808 and then press ⟲ can access System Parameter Table.
- **AI artificial intelligence control and auto tuning**
  When AI artificial intelligence control method is chosen (CtrL=APId), the PID parameters can be obtained by running auto-tuning. In basal display status, press < for 2 seconds, the “At” parameter will appear. Press ∧ to change the value of “At” from “oFF” to “on”, then press ⟲ to active the auto-tuning process. During auto tuning, the instrument executes on-off control. After 2-3 times of on-off action, the instrument will obtain the optimal control parameter value. If you want to escape from auto tuning status, press and hold the < key for about 2 seconds until the "At" parameter appear again. Change “At” from “on” to “oFF”, press ⟲ to confirm, then the auto tuning process will be cancelled.

Note 1: If the setpoint is different, the parameters obtained from auto-tuning are possible different. So you’d better set setpoint to an often-used value or middle value first, and then start auto-tuning. For the ovens with good heat preservation, the setpoint can be set at the highest applicable temperature. Depending on the system, the auto-tuning time can be from several seconds to several hours.

Note 2: Parameter Ctl (on-off differential, control hysteresis) has influence on the accuracy of auto-tuning. Generally, the smaller the value of Ctl, the higher the precision of auto tuning. But Ctl parameter value should be large enough to prevent the instrument from error action around setpoint due to the oscillation of input. Ctl is recommended to be 2.0.

Note 3: AI series instrument has the function of self-learning. It is able to learn the process while working. The control effect at the first run after auto tuning is probably not perfect, but excellent control result will be obtained after a period of time because of self-learning.

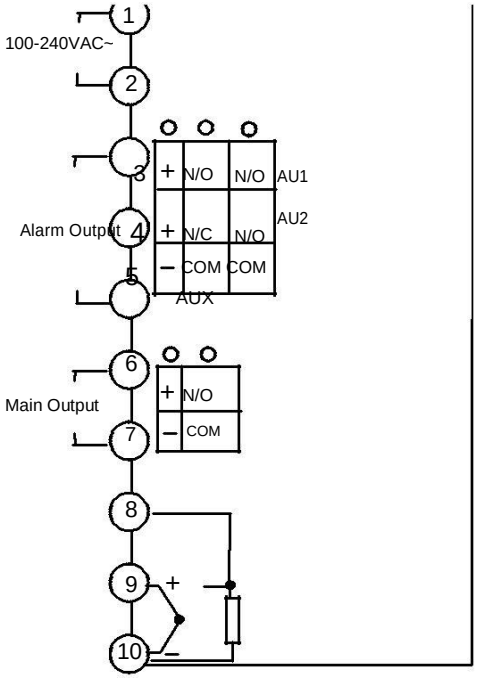
V. PARAMETER AND SETTING

Field parameter table (Press and hold for 2 seconds to access)

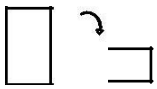
<table>
<tr><th>Code</th><th>Name</th><th>Description</th><th>Default</th></tr>
<tr><td>HIA</td><td>High alarm</td><td>Alarm on when PV (Process Value) >HIAL; alarm off when PV<HIAL-2℃</td><td>0～999℃</td></tr>
<tr><td>HdA</td><td>Deviation high alarm</td><td>Alarm on when PV-SV>HdAL; alarm off when PV-SV<HdAL-2℃</td><td>0～999℃</td></tr>
<tr><td>Loc</td><td>Parameter Lock</td><td>⌘ Loc=0-1: allowed to modify parameters HIA, HdA and SV.
⌘ Loc=2-3: allowed to modify parameters HIA, HdA. But cannot change SV.
⌘ Loc=4-255: NOT allowed to modify parameters HIA, HdA and SV.
⌘ Loc=808, and press Key ,can modify all parameters.</td><td>0～255</td></tr>
<tr><td>CrL</td><td>Control mode</td><td>⌘ onF : On-off control
⌘ AI : AI PID control, high precision and no-overshoot</td><td></td></tr>
<tr><td>Ctl</td><td>Control period</td><td>Small value can improve control accuracy.
For SSR or TRIAC output, generally 0.5 to 3 seconds.
For Relay output, generally 15 to 40 seconds, because small value will cause the frequent On-Off of mechanical switch and shorten its service life. CtI is recommended to be 1/4 – 1/10 of derivative time. (It should be integer times of 0.5 second.</td><td>0.5-120 SEC</td></tr>
<tr><td>InP</td><td>Input specification</td><td><table><tr><td>Sn</td><td>Input spec.</td><td>Sn</td><td>Input spec.</td></tr><tr><td>0</td><td>K</td><td>1-3</td><td>Spare</td></tr><tr><td>4</td><td>E</td><td>5</td><td>J</td></tr><tr><td>6</td><td>Spare</td><td>7</td><td>N</td></tr><tr><td>8-20</td><td>Spare</td><td>21</td><td>Pt100</td></tr></table></td><td>0～21</td></tr>
<tr><td>Scb</td><td>Input Shift</td><td>Scb is used to make input shift to compensate the error produced by sensor or input signal.
PV_after_compensation= PV_before_compensation + Scb.</td><td>-99～+99℃</td></tr>
<tr><td>FIL</td><td>PV input filter</td><td>The value of FILt will determine the ability of filtering noise.
When a large value is set, the measurement input is stabilized but the response speed is slow. Generally, it can be set to 1 to 3.
If great interference exists, then you can increase parameter “FILt” gradually to make momentary fluctuation of measured value less than 2 to 5.
When the instrument is being metrological verified, “FILt” s can be set to 0 or 1 to shorten the response time.</td><td>0～40</td></tr>
<tr><td>OPA</td><td>Alarm/Output assignment</td><td>⌘ AU1, high limit alarm and deviation high alarm output from AU1(AI-208GL) or no alarm output(AI-208G)
⌘ ALL, high limit alarm output from AU1, deviation high alarm output from AU2(AI-208GL5)</td><td></td></tr>
<tr><td>SPH</td><td>Upper limit of SV</td><td>Maximum value that SV allowed to be.</td><td>0～999℃</td></tr>
</table>

VI. INSTRUMENT INSTALLATION AND WIRING

Wiring graph for instruments with dimension A, B or E



Note: The graph suits for upright instruments with dimension A or E



For instruments with dimension B, just clockwise rotate the graph 90 degree.

Wiring graph for D2 dimension（48X48mm）instruments：