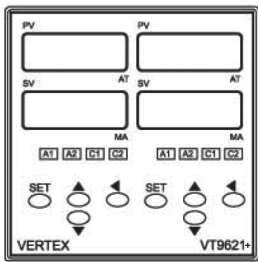


INSTRUCTION MANUAL FOR VT9621+ FUZZY PID

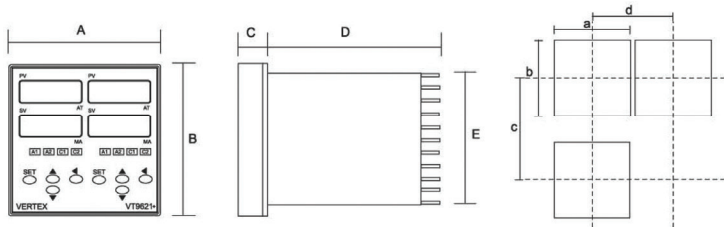
FRONT PANEL DESCRIPTION



- (1) PV - Process Value
- (2) SV - Setting Value
- (3) AT - Auto tuning LED
- (4) MA - Manual mode LED
- (5) A1 - Alarm 1 LED
- (6) A2 - Alarm 2 LED
- (7) C1 - Control 1 LED
- (8) C2 - Control 2 LED

1. **SET** - SET KEY. Press once to access the next programmable parameter. Press this key for 5 seconds to reset alarm timer.
2. **▲** - UP KEY. Press to increase the set point or parameter value.
3. **▼** - DOWN KEY. Press to decrease the set point or parameter value.
4. **◀** - SHIFT KEY. Press the shift key for 5 seconds to execute Auto Tune process (Yes. 1 mode).
To abort the Yes. 1 Auto Tune process, press the shift key for 5 seconds.
5. **SET ▲** - Press the SET and UP keys once to return the normal operation.
6. **SET ◀** - LEVEL KEY. Press the SET and SHIFT keys simultaneously for 5 seconds to select programming level, then press SET key to enter this level.
7. **▲ ▼** - Press the UP and DOWN keys simultaneously for 5 seconds to access "LnLo" and "LnHi" parameters.

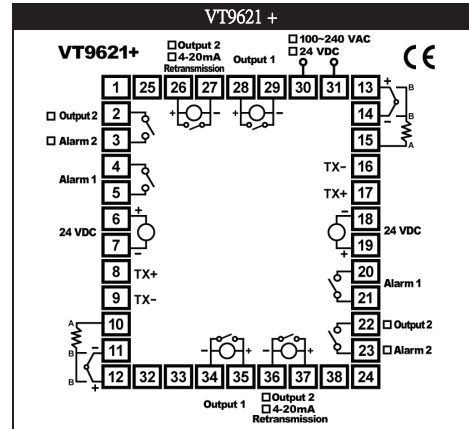
PANEL CUTOUT



| Model | A | B | C | D | E | a | b | c | d |
|----------|----|----|----|----|----|--------|--------|-----|----|
| VT-9621+ | 96 | 96 | 10 | 80 | 91 | 92+0.5 | 92+0.5 | 120 | 96 |

(Unit:mm)

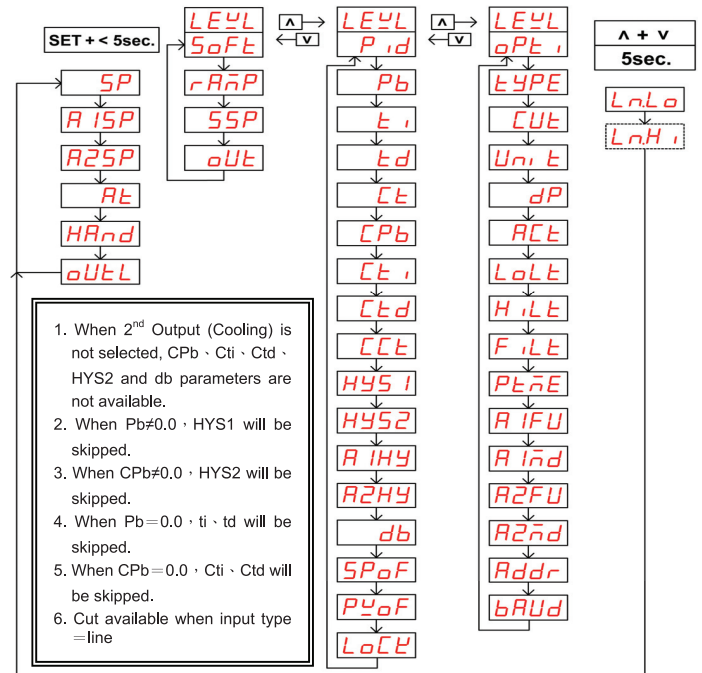
WIRING DIAGRAM



WIRING PRECAUTIONS

1. Before wiring, verify the controller label for correct model number and option.
2. For thermocouple input, use the appropriate compensation wire. And note the polarity of input signal.
3. To avoid noise induction, keep input signal wire away from instrument power line, load lines and power lines of other electric equipment.

PROGRAMMING LEVEL PARAMETERS



PARAMETER DESCRIPTION :

LEVEL Selection
Press **SET** **◀** keys for at least 5 seconds to access Soft Level. Use **▼** or **▲** key to select programming level. Then press **SET** key to enter this level.

| LEVEL | Description |
|-------|-------------|
| SoFT | SoFT Level |
| PiD | PiD Level |
| OpT | OpT Level |

USER LEVEL

| Code | Description | Range | Default |
|-------------|--|---|---------|
| <i>SP</i> | Set point value of control | LoLt - HiLt | 500 |
| <i>R1SP</i> | Alarm 1 set point value/Timer set value while A1FU is set to T.on or T. off, the unit can be HH.MM or MM.SS. It depends on the "P.tnE" parameter. | -1999 - 9999/ 00.00~99.59 | 10 |
| <i>R2SP</i> | Alarm 2 set point value/Timer set value while A2FU is set to T.on or T. off, the unit can be HH.MM or MM.SS. It depends on the "P.tnE" parameter. | -1999 - 9999/ 00.00~99.59 | 10 |
| <i>At</i> | Autotune <i>no</i> : Auto-tuning is disable <i>YES.1</i> : Standard type auto-tuning. PV is compared with SV during auto tuning. <i>YES.2</i> : Low PV type auto-tuning. PV is compared with SV-10%FS during Auto-tuning. | <i>no</i> <i>YES.1</i> <i>YES.2</i> | no |
| <i>HRnd</i> | Manual control <i>no</i> : Disable the manual mode <i>YES</i> : Enable the manual mode. | <i>no</i> <i>YES</i> | no |
| <i>OUTL</i> | Output percentage. Adjustable when "Hand" is set to "Yes" | -100.0 - 100.0 | 100.0 |

SOFT LEVEL

| Code | Description | Range | Default |
|-------------|--|---------------------------|---------|
| <i>rARP</i> | Ramp rate for the process value to limit an abrupt Change of process.(°C/min.) | 0 - 9999 (0.0 - 999.9) | 0.0 |
| <i>SSP</i> | Set point value of soft-start | LoLt - HiLt | 0 |
| <i>OUT</i> | Output percentage of soft-start | 0.0 - 100.0 | 100.0 |

PID LEVEL



| Code | Description | Range | Default |
|-------------|---|------------------------------|---------|
| <i>Pb</i> | Proportional band variable. Set to 0.0 for ON/OFF control mode. | 0.0-300.0% | 10.0 |
| <i>ti</i> | Integral time (Reset). This value is automatically calculated by activating the Autotune function. If desired, the user can later adjust this parameter to better suit the application. When PB=0.0, this parameter will be not available. When set to zero, Pb & td ≠ 0 for PD control. | 0-3600sec | 240 |
| <i>td</i> | Derivative (Rate). This value is automatically calculated by activating the Auto tune function. If desired, the user can later adjust this parameter to better suit the application. When PB=0.0, this parameter will be not available. When set to zero, Pb & td ≠ 0 for PI control. | 0-900sec | 60 |
| <i>Ct</i> | Proportional cycle time of output 1. | 0-100sec | 15 |
| <i>CPb</i> | Proportional band variable for secondary control output (cooling). Set 0.0 for ON/OFF. | 0.0-300.0% | 10.0 |
| <i>Cti</i> | Integral time for secondary control output. When CPb=0.0, this parameter will be not available. When set to zero, CPb & Ctd ≠ 0 for PD control. | 0-3600sec | 240 |
| <i>Ctd</i> | Derivative time for secondary control output. When CPb=0.0, this parameter will be not available. When set to zero, CPb & Cti ≠ 0 for PI control. | 0-900sec | 60 |
| <i>CCt</i> | Proportional cycle time of output 2. | 0-100sec | 15 |
| <i>HYS1</i> | Hysteresis for ON/OFF control on output 1. | 0-2000 (0.0-200.0) | 1 |
| <i>HYS2</i> | Hysteresis for ON/OFF control on output 2. | 0-2000 (0.0-200.0) | 1 |
| <i>AlH1</i> | Hysteresis of alarm 1. | 0-2000 | 1 |
| <i>AlH2</i> | Hysteresis of alarm 2. | 0-2000 | 1 |
| <i>db</i> | Dead band value. This defines the area in which output 1 and output 2 are both active (negative value) or the area in which output 1 and output 2 are both inactive (positive value). | -1000-1000 (-100.0-100.0) | 0 |
| <i>SPoF</i> | Set point offset. This value will be added to SV to perform control. It mainly used to eliminate offset error during P control. | -1000-1000 (-100.0-100.0) | 0 |
| <i>PVoF</i> | Process value offset. Permits the user to offset the PV indication from the actual PV. | -1000-2000 (-100.0-200.0) | 0 |
| <i>LoLk</i> | Parameter lock. This security feature locks out selected levels or single parameters prohibiting tampering and inadvertent programming changes. 0000 All parameters are locked out. 0001 Only SP is adjustable 0010 Only USER level is adjustable 0011 USER and PID levels are adjustable. 0100 USER,PID,OPTI levels are adjustable. 0101 USER,SOFT,PID,OPTI levels are adjustable. 0101~0111 All parameters in all levels are opened. 1000~1111 1000=0000,1001=0001, 1010=0010,1011=0011,1100=0100 but Output 2 is opened. | | 0100 |

OPTION LEVEL

| Code | Description | Range | Default |
|--------------|---|--------------------------------------|---------------|
| <i>TYPE</i> | Input type selection. | | |
| | TYPE | RANGE(°C) | RANGE(°F) |
| | J | -50~1000 | -58~1832 |
| | K | -50~1370 | -58~2498 |
| | T | -270~400 | -454~752 |
| | E | -50~950 | -58~1742 |
| | B | 0~1800 | 32~3272 |
| | R | -50~1750 | -58~3182 |
| | S | -50~1750 | -58~3182 |
| | N | -50~1300 | -58~2372 |
| C | -50~1800 | -58~3272 | |
| D-PT | -200~850 | -328~1562 | |
| J-PT | -200~600 | -328~1112 | |
| LINE | -1999~9999 | | |
| <i>Cut</i> | Used to specify the process value when linear input (type=line) signal is out of range. None= this function is not used. Lo = The process value will be limited to LoLt when input signal is lower than the scale range. Hi = The process value will be limited to HiLt when input signal is higher than the scale range. Lo.Hi = The process value will be limit within the range of LoLt to HiLt when input signal is out of scale. | nonE · Lo Hi · Hi.Lo | <i>nonE</i> |
| <i>Unit</i> | Unit of process value <i>OC</i> : Degrees C. <i>OF</i> : Degrees F. <i>ENG</i> : Engineer unit for linear input. | <i>OC</i> <i>OF</i> <i>ENG</i> | °C |
| <i>dP</i> | Decimal point selection. 0000: No decimal point. 000.0: 0.1 resolution 00.00: 0.01 resolution, used for linear input only. 0.000: 0.001 resolution, used for linear input only. After change decimal point, please reconfirm the parameter. | 0000 000.0 00.00 0.000 | 0000 |
| <i>Act</i> | Output 1 control action. <i>REY</i> : Reverse action for heating. <i>d ir</i> : Direct action for cooling. | <i>REY</i> <i>d ir</i> | <i>REY</i> |
| <i>LoLt</i> | Low limit of span or range. Set the low limit lower than the lowest expected SV and PV display. | Full range | 0 |
| <i>HiLt</i> | High limit of span or range. Set the high limit higher than highest expected SV and PV display. | Full range | 1000 |
| <i>FiL</i> | Software filter. | 0.0-99.9 | 10.0 |
| <i>Pt.nE</i> | Time scale for timer alarm. <i>HHmm</i> Hours:Minutes; <i>mmSS</i> Minutes:Seconds | 00.00~99.59 | 00.00 |
| <i>R1FU</i> | Alarm 1 function. Refer to alarm function section for detail. If A1FU=None, it means alarm function is cancelled. | Refer to alarm function section | <i>d iF.H</i> |
| <i>R1nd</i> | Alarm 1 mode. Refer to alarm mode section for detail. | none, Stdy, Lath, St.La | <i>nonE</i> |
| <i>R2FU</i> | Alarm 2 function. Refer to alarm function section for detail. If A2FU=None, it means alarm function is cancelled. | Refer to alarm function section | <i>d iF.L</i> |
| <i>R2nd</i> | Alarm 2 mode. Refer to alarm mode section for detail. | none, Stdy, Lath, St.La | <i>nonE</i> |
| <i>Addr</i> | Address of controller when communication with master device. | 0 - 255 | 1 |
| <i>BAUD</i> | Communication baud rate. 2.4k=2400bps, 4.8k=4800 bps, 9.6k=9600 bps, 19.2k=19200 bps | 2.4k, 4.8k 9.6k, 19.2k | 9.6k |

| Code | Description | Range | Default |
|-------------|----------------------------|--------------------------|---------|
| <i>LnLo</i> | Low Scale of Linear Input | -1999~9999(-199.9~999.9) | 0.0 |
| <i>LnHi</i> | High Scale of Linear Input | -1999~9999(-199.9~999.9) | 100.0 |

Scaling for Linear Input

- Press the UP and DOWN keys simultaneously for 5 seconds to access "LnLo" parameter.
- Adjust "LnLo" setting to correspond the low scale and after adjustment press  key once to access "LnHi" parameter.
- Adjust "LnHi" setting to correspond the high scale and after adjustment press  key once for normal operation.

ALARM FUNCTION

Select the alarm function

nonE – Alarm action off.

Hi – Process high alarm with Form A contact

Lo – Process low alarm with Form A contact

diF.H – Deviation high alarm with Form A contact

diF.L – Deviation low alarm with Form A contact

bd.Hi – Deviation band high alarm with Form A contact

bd.Lo – Deviation band low alarm with Form A contact

t.on – On-timer with Form A contact

t.oFF – Off-timer with Form A contact

b.noE – Alarm action off

b.Hi – Process high alarm with Form B contact

b.Lo – Process low alarm with Form B contact

b.diH – Deviation high alarm with Form B contact

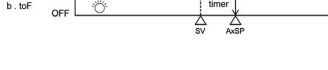
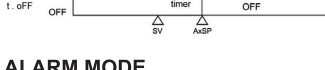
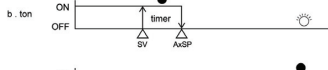
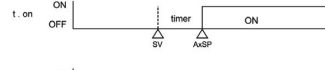
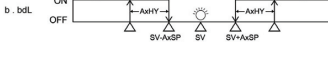
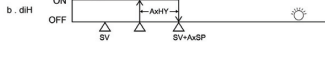
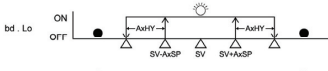
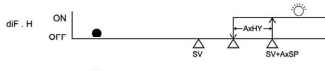
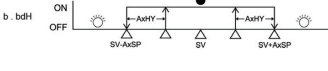
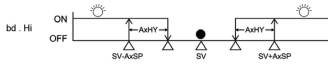
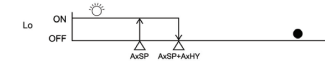
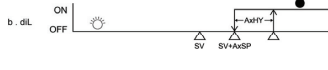
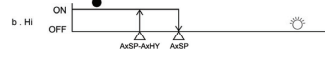
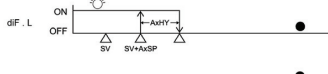
b.diL – Deviation low alarm with Form B contact

b.bd.Hi – Deviation band high alarm with Form B contact

b.bd.L – Deviation band low alarm with Form B contact

b.ton – On-timer with Form B contact

b.toF – Off-timer with Form B contact



ALARM MODE

| A1MD/A2MD | DESCRIPTION |
|-----------|---|
| nonE | Normal alarm mode/ When timer function is selected, PV<SV timer function is not available. |
| Stdy | Standby mode When selected, in any alarm function, prevents an alarm on power on. The alarm is enabled only when the process value reach alarm set point. Also known as "Startup inhibit" and is useful for avoiding alarm trips during startup. |
| LAeH | Latch mode. When selected, the alarm output and indicator latch as the alarm occurs. The alarm output and indicator will be energized even if the alarm condition has been cleared unless the power is shut off. When Timer function is selected, PV< SV timer function is available. |
| StLA | Standby and latch mode |

AUTOMATIC AND MANUAL OUTPUT CONTROL

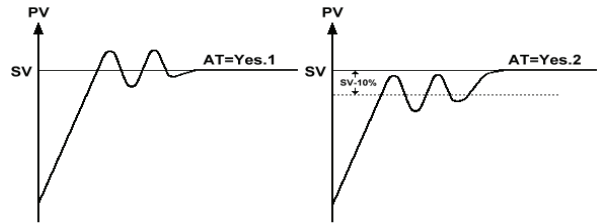
Automatic control is the normal mode of controller operation. In automatic control mode the controller automatically adjust the control output percentage by PID algorithm so that the PV=SV. The PID parameter Pb, Ti and Td can be also calculated by Auto Tune procedure. Manual control allows the user to manually drive the output percentage from 0.0 to 100.0%. To access the manual mode, set the "HAnd" parameter to "YES", the rightmost decimal (MA) on SV display will flash. Then the "OUEL" parameter will display alternately "OUEL" and process value. The output percentage then can be adjusted by pressing UP or DOWN key. To abort the manual control just simply set the "HAnd" to "no".

AUTO TUNE

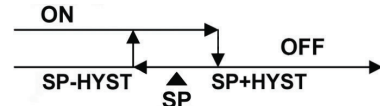
In order to automatically set the PID parameter in PID level ("Pb" proportional band, "ti": integral time or reset and "td" derivative time or rate), first adjust the controller's set point to a value, which closely approximates your application. Set the "At" parameter to "YES.1" for standard type

auto tune or "YES.2" for low PV type auto tune. The right-most decimal point (AT) on the PV display begins flashing. The auto tune procedure will take two cycle oscillations. After that, the controller performs PID control with the "learned" PID value to verify the results. Finally the PID values will be entered into the nonvolatile memory and then start the Fuzzy enhanced PID control. The auto tune process can last from several minutes up to two hours, depending on the system's parameter. A time out error will occur if the auto tune process can not be completed within two hours, in this case, try to set the PID parameters manually.

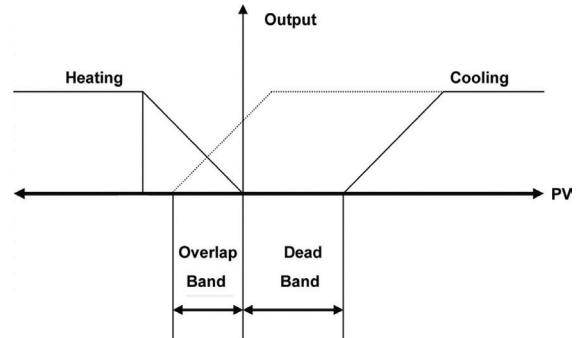
To abort an auto tune process, simply set the "At" parameter to "no".



The controller can also be set to ON/OFF, PI, PD and P control mode. Set Pb = 0 for ON/OFF control mode. Set ti = 0 for PD control mode. Set td = 0 for PI control mode and ti, td = 0 for P control mode. The Hysteresis (dead band) of ON/OFF control can be set as follow:



When the second control output (output 2) is equipped the proportional band of output 2 and dead band are defined as follow:



ERROR MESSAGE AND TROUBLESHOOTING

| Symptom | Probable | Solution |
|----------------------------------|--|--|
| oPEn | -Sensor break error -Sensor not connected | -Replace sensor -Check the sensor is connected correctly |
| AdEr | -A/D converter damage | -Unit must be repaired or replaced. |
| AtEr | -Auto tune time out error | Set Pb, ti, td manually. |
| Keypad no function | -Keypads are locked -Keypads defective | -Set "LoLE" to a proper value -Replace keypads |
| Process value unstable | -Improper setting of Pb, Ti, Td and CT | -Start AT process to set Pb, Ti, Td automatically -Set Pb, Ti, Td manually |
| No heat or output | -No heater power or fuse open -Output device defective or incorrect output used | -Check output wiring and fuse -Replace output device |
| All LED's and display not light | -No power to controller -SMPS failure | -Check power lines connection -Replace SMPS |
| Process Value changed abnormally | -Electromagnetic Interference (EMI) or Radio Frequency Interference (RFI) | -Suppress arcing contacts in system to eliminate high voltage spike sources. Separate sensor and controller wiring from "dirty" power lines. Ground heaters |
| Entered data lost | -Fail to enter data to EEPROM | -Replace EEPROM |

* VERTEX 2015-A

VERTEX is constantly striving to improve its high-quality products, the information contained in this manual is subject to change without notice. Every precaution has been taken in the preparation of this manual.