

# CONTROLLERS - Selection Guide

## COST EFFECTIVE FAMILIES (Temperature, PID PWM Output)



| Controller Type               | N1030                                     | N1030T              | N1040               | N1040T              | N1020                                                         | N480D                                                              | N1050                                                     | N960                                                               |
|-------------------------------|-------------------------------------------|---------------------|---------------------|---------------------|---------------------------------------------------------------|--------------------------------------------------------------------|-----------------------------------------------------------|--------------------------------------------------------------------|
| Temperature                   | Temperature                               | Temperature         | Temperature         | Temperature         | Temperature                                                   | Temperature                                                        | Temperature                                               | Temperature                                                        |
| PID Output Control Mode       | PWM                                       | PWM                 | PWM                 | PWM                 | PWM<br>Auto tune<br>Self adaptive                             | PWM &<br>Analog<br>(Optional)                                      | PWM &<br>Analog<br>(Optional)                             | PWM &<br>Analog<br>(Optional)                                      |
| Auto Tune PID                 | ✓                                         | ✓                   | ✓                   | ✓                   | ✓                                                             | ✓                                                                  | ✓                                                         | ✓                                                                  |
| Self-Adaptive PID             |                                           |                     |                     |                     | ✓                                                             |                                                                    |                                                           |                                                                    |
| Control Loops                 | 1                                         | 1                   | 1                   | 1                   | 1                                                             | 1                                                                  | 1                                                         | 1                                                                  |
| Control Action                | Heat or Cool                              | Heat or Cool        | Heat or Cool        | Heat or Cool        | Heat or Cool                                                  | Heat or Cool                                                       | Heat or Cool                                              | Heat or Cool                                                       |
| Relay Output                  | 1                                         | 1                   | Up to 3             | Up to 3             | 1                                                             | Up to 3                                                            | Up to 3                                                   | 2                                                                  |
| Pulse Output                  | ✓                                         | ✓                   | ✓                   | ✓                   | ✓                                                             | ✓                                                                  | ✓                                                         | ✓                                                                  |
| Analog Output                 |                                           |                     | Optional            |                     |                                                               | Optional                                                           | Optional                                                  | ✓                                                                  |
| Ramp to Soak Function         |                                           |                     |                     |                     | ✓                                                             | ✓                                                                  | ✓                                                         | ✓                                                                  |
| Ramp & Soak Programs/Segments |                                           |                     |                     |                     | 5 programs<br>4 segments                                      | 1 program<br>9 segments                                            | 5 programs<br>4 segments                                  | 1 program<br>9 segments                                            |
| Soft-Start Function           |                                           |                     | ✓                   | ✓                   | ✓                                                             |                                                                    | ✓                                                         |                                                                    |
| Bumpless Function             |                                           |                     |                     |                     |                                                               |                                                                    | ✓                                                         |                                                                    |
| Manual Operation              |                                           |                     |                     |                     |                                                               |                                                                    | ✓                                                         |                                                                    |
| Display                       | Double                                    | Double              | Double              | Double              | Single                                                        | Double                                                             | Double                                                    | Double                                                             |
| Input Type                    | J, K, T, and Pt100                        |                     |                     |                     | J, K, T, R, S, E,<br>N, Pt100<br>and 0-50 mV                  | J, K, T, R, S, E<br>N and Pt100                                    | J, K, T, S<br>and Pt100                                   | J, K, T, R, S, E,<br>N and Pt100                                   |
| Input Resolution Levels       | 32767                                     | 32767               | 32767               | 32767               | 32767                                                         | 32767                                                              | 32767                                                     | 32767                                                              |
| Input Sample Rate             | 5 sps                                     | 5 sps               | 10 sps              | 10 sps              | 55 sps                                                        | 55 sps                                                             | 10 sps                                                    | 55 sps                                                             |
| Detection Sensor Break        | ✓                                         | ✓                   | ✓                   | ✓                   | ✓                                                             | ✓                                                                  | ✓                                                         | ✓                                                                  |
| Detection PID Loop Break      |                                           |                     | ✓                   | ✓                   | ✓                                                             |                                                                    | ✓                                                         |                                                                    |
| Detection Heater Break        |                                           |                     |                     |                     |                                                               |                                                                    |                                                           |                                                                    |
| Alarm Number                  | 1                                         | 1                   | 2                   | 2                   | 2                                                             | 2                                                                  | 2                                                         | 2                                                                  |
| Alarm Types                   | Low, High, Dif, DifLo, DifHi and InputErr |                     |                     |                     | Low, High, Dif,<br>DifLo, DifHi,<br>Ton, TEnd<br>and InputErr | Low, High, Dif,<br>DifLo, DifHi,<br>EndSoak, Event<br>and InputErr | Low, High, Dif,<br>DifLo, DifHi,<br>Event and<br>InputErr | Low, High, Dif,<br>DifLo, DifHi,<br>EndSoak, Event<br>and InputErr |
| Digital Input                 |                                           |                     |                     |                     |                                                               |                                                                    |                                                           |                                                                    |
| Remote Setpoint Input         |                                           |                     |                     |                     |                                                               |                                                                    |                                                           |                                                                    |
| Setpoint Retransmission       |                                           |                     | Optional            |                     |                                                               |                                                                    | Optional                                                  |                                                                    |
| Square Root                   |                                           |                     |                     |                     |                                                               |                                                                    |                                                           |                                                                    |
| Timer                         |                                           | ✓                   |                     | ✓                   | ✓                                                             |                                                                    | ✓                                                         |                                                                    |
| Data Logger Function          |                                           |                     |                     |                     |                                                               |                                                                    |                                                           |                                                                    |
| Password Protection           | ✓                                         | ✓                   | ✓                   | ✓                   | ✓                                                             |                                                                    | ✓                                                         |                                                                    |
| Auxiliary 24V Power Supply    |                                           |                     |                     |                     |                                                               |                                                                    |                                                           |                                                                    |
| RS485 Modbus RTU              |                                           |                     | Optional            |                     | Optional                                                      |                                                                    | Optional                                                  |                                                                    |
| Bluetooth                     |                                           |                     |                     |                     |                                                               |                                                                    |                                                           |                                                                    |
| USB                           |                                           |                     | USB Micro B         | USB Micro B         | USB C                                                         | USB Mini B                                                         | USB Micro B                                               | USB Mini B                                                         |
| CE Certification              | ✓                                         | ✓                   | ✓                   | ✓                   | ✓                                                             | ✓                                                                  | ✓                                                         | ✓                                                                  |
| UL Certification              | ✓                                         | ✓                   | ✓                   | ✓                   | ✓                                                             | ✓                                                                  | ✓                                                         | ✓                                                                  |
| Frontal IP65                  | ✓                                         | ✓                   | ✓                   | ✓                   | ✓                                                             | ✓                                                                  | ✓                                                         | ✓                                                                  |
| Power Supply                  | 100-240 Vac/dc or 12-24 Vdc (Optional)    |                     |                     |                     |                                                               |                                                                    |                                                           |                                                                    |
| Panel Format                  | 48 x 48<br>DIN 1/16                       | 48 x 48<br>DIN 1/16 | 48 x 48<br>DIN 1/16 | 48 x 48<br>DIN 1/16 | 48 x 24<br>DIN 1/32                                           | 48 x 48<br>DIN 1/16                                                | 48 x 48<br>DIN 1/16                                       | 96 x 96<br>DIN 1/4                                                 |

## ADVANCED FEATURES FAMILIES (Universal Input, RS485 Modbus, Ramp & Soaks, PID Analog Output, 4-20 mA retransmission, Digital Input, Square Root)



| Controller Type                                                               | N120                                                                    | N1200                                                                                     | N1200-HC                                                                                  | N20K48                                                                | N2000                                                                       | N2000-S                                                               | N3000                                                                 |
|-------------------------------------------------------------------------------|-------------------------------------------------------------------------|-------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------|-----------------------------------------------------------------------|-----------------------------------------------------------------------------|-----------------------------------------------------------------------|-----------------------------------------------------------------------|
| Process                                                                       | Process                                                                 | Process                                                                                   | Process                                                                                   | Process                                                               | Process                                                                     | Process                                                               | Process                                                               |
| PWM                                                                           | PWM                                                                     | PWM &<br>Analog                                                                           | PWM &<br>Analog                                                                           | PWM &<br>Analog<br>(Optional)                                         | PWM &<br>Analog                                                             | PWM &<br>Analog                                                       | PWM &<br>Analog<br>(Optional)                                         |
| ✓                                                                             | ✓                                                                       | ✓                                                                                         | ✓                                                                                         | ✓                                                                     | ✓                                                                           | ✓                                                                     | ✓                                                                     |
| 2                                                                             | 1                                                                       | 2                                                                                         | 1                                                                                         | 1                                                                     | 1                                                                           | 1                                                                     | 1                                                                     |
| Heat & Cool<br>with Overlap                                                   | Heat or Cool                                                            | Heat & Cool<br>with Overlap                                                               | Heat or Cool                                                                              | Heat or Cool                                                          | Heat or Cool                                                                | Servo                                                                 | Heat or Cool                                                          |
| 2                                                                             | Up to 3                                                                 | Up to 3                                                                                   | Up to 9*<br>Up to 25*<br>Up to 8*                                                         | Up to 4                                                               | Up to 4                                                                     | Up to 4                                                               | Up to 4                                                               |
| ✓                                                                             | ✓                                                                       | ✓                                                                                         | ✓                                                                                         | ✓                                                                     | ✓                                                                           | ✓                                                                     | ✓                                                                     |
| 20 programs<br>9 segments                                                     | 20 programs<br>9 segments                                               | 20 programs<br>9 segments                                                                 | 20 programs<br>9 segments                                                                 | 7 programs<br>7 segments                                              | 7 programs<br>7 segments                                                    | 7 programs<br>7 segments                                              | 7 programs<br>7 segments                                              |
| ✓                                                                             | ✓                                                                       | ✓                                                                                         | ✓                                                                                         | ✓                                                                     | ✓                                                                           | ✓                                                                     | ✓                                                                     |
| ✓                                                                             | ✓                                                                       | ✓                                                                                         | ✓                                                                                         | ✓                                                                     | ✓                                                                           | ✓                                                                     | ✓                                                                     |
| ✓                                                                             | ✓                                                                       | ✓                                                                                         | ✓                                                                                         | ✓                                                                     | ✓                                                                           | ✓                                                                     | ✓                                                                     |
| Double                                                                        | Double                                                                  | Double                                                                                    | Double                                                                                    | Double                                                                | Double                                                                      | Double                                                                | Double                                                                |
| J, K, T, R, S, E,<br>B, N, Pt100,<br>4-20 mA,<br>0-50 mV, 0-5 V<br>and 0-10 V | J, K, T, R, S, E, B, N, Pt100,<br>4-20 mA, 0-50 mV,<br>0-5 V and 0-10 V | J, K, T, R, S, E,<br>B, N, Pt100,<br>0-20 mA,<br>4-20 mA,<br>0-50 mV,<br>0-5 V and 0-10 V | J, K, T, R, S, E,<br>B, N, Pt100,<br>0-20 mA,<br>4-20 mA,<br>0-50 mV,<br>0-5 V and 0-10 V | J, K, T, R, S, E,<br>B, N, Pt100,<br>4-20 mA,<br>0-50 mV<br>and 0-5 V | J, K, T, R, S, N,<br>Pt100,<br>4-20 mA,<br>0-50 mV<br>and 0-5 V             | J, K, T, R, S, E,<br>B, N, Pt100,<br>4-20 mA,<br>0-50 mV<br>and 0-5 V | J, K, T, R, S, E,<br>B, N, Pt100,<br>4-20 mA,<br>0-50 mV<br>and 0-5 V |
| 32767<br>55 sps                                                               | 32767<br>55 sps                                                         | 32767<br>55 sps                                                                           | 32767<br>55 sps                                                                           | 32767<br>10 sps                                                       | 20000<br>5 sps                                                              | 32767<br>10 sps                                                       | 32767<br>10 sps                                                       |
| ✓                                                                             | ✓                                                                       | ✓                                                                                         | ✓                                                                                         | ✓                                                                     | ✓                                                                           | ✓                                                                     | ✓                                                                     |
| ✓                                                                             | ✓                                                                       | ✓                                                                                         | ✓                                                                                         |                                                                       |                                                                             |                                                                       |                                                                       |
| 2                                                                             | 4                                                                       | 4                                                                                         | 4                                                                                         | 4                                                                     | 2                                                                           | 4                                                                     | 4                                                                     |
| Low, High, Dif,<br>DifLo, DifHi,<br>Event and<br>InputErr                     | Low, High, Dif, DifLo, DifHi,<br>ResistFail, Event and Input Error      | Low, High, Dif,<br>DifLo, DifHi,<br>EndSoak, Event<br>and InputErr                        | Low, High, Dif,<br>DifLo, DifHi,<br>Event and<br>InputErr                                 | Low, High, Dif,<br>DifLo, DifHi,<br>Event and<br>InputErr             | Low, High, Dif,<br>DifLo, DifHi,<br>ResistFail,<br>Event and<br>Input Error | Low, High, Dif,<br>DifLo, DifHi,<br>Event and<br>InputErr             | Low, High, Dif,<br>DifLo, DifHi,<br>Event and<br>InputErr             |
| ✓                                                                             | ✓                                                                       | ✓                                                                                         | Up to 24*                                                                                 | ✓                                                                     | ✓                                                                           | ✓                                                                     | ✓                                                                     |
|                                                                               | ✓                                                                       | ✓                                                                                         | ✓                                                                                         | ✓                                                                     | ✓                                                                           | ✓                                                                     | ✓                                                                     |
|                                                                               | ✓                                                                       | ✓                                                                                         | ✓                                                                                         | ✓                                                                     | ✓                                                                           | ✓                                                                     | ✓                                                                     |
| Optional                                                                      | Optional                                                                | Optional                                                                                  | Optional                                                                                  | Optional                                                              | Optional                                                                    | Optional                                                              | Optional                                                              |
| ✓                                                                             | ✓                                                                       | ✓                                                                                         | ✓                                                                                         | ✓                                                                     | ✓                                                                           | ✓                                                                     | ✓                                                                     |
| ✓                                                                             | Optional                                                                | Optional                                                                                  | Optional                                                                                  | Optional                                                              | Optional                                                                    | Optional                                                              | Optional                                                              |
| USB Mini B                                                                    | USB Mini B                                                              | USB Mini B                                                                                | USB Micro B                                                                               | USB Mini B                                                            |                                                                             |                                                                       | USB Mini B                                                            |
|                                                                               | ✓                                                                       | ✓                                                                                         | ✓                                                                                         | ✓                                                                     | ✓                                                                           | ✓                                                                     | ✓                                                                     |
|                                                                               | ✓                                                                       | ✓                                                                                         | ✓                                                                                         | ✓                                                                     | ✓                                                                           | ✓                                                                     | ✓                                                                     |
| n/a                                                                           | ✓                                                                       | ✓                                                                                         | ✓                                                                                         | ✓                                                                     | ✓                                                                           | ✓                                                                     | ✓                                                                     |
| 100-240<br>Vac/dc                                                             | 100-240 Vac/dc or 12-24 Vdc (Optional)                                  |                                                                                           |                                                                                           |                                                                       |                                                                             |                                                                       |                                                                       |
| Board only<br>Dual Display                                                    | 48 x 48<br>DIN 1/16                                                     | 48 x 48<br>DIN 1/16                                                                       | 48 x 48<br>DIN 1/16                                                                       | 48 x 48<br>DIN 1/16                                                   | 96x48<br>DIN 1/8                                                            | 96x48<br>DIN 1/8                                                      | 96 x 96<br>DIN 1/4                                                    |

\*Using the micromodules