

# L41 / L91 Temperature Limit Controller



L41



L91



**T**he L41 / L91 is a microprocessor based specially designed limit controller to protect the equipment from high temperature and low temperature. A latched relay cuts power to the process if safe values are exceeded. These units must be reset before the process continues. The temperature controller takes an input from the universal input which is fully programmable for PT100, thermocouple types J, K, T, E, B, R, S, N, L, C, P and 0~60mV. The controller equipped with 2 Amp form C relay as limit control output and equipped with the optional RS-232 or RS-485 communication, retransmission output and transmitter power supply.

### **Features**

- » Fastest Sampling Rate of 200 msec
- » Universal Input
- » High or Low or High / Low Limit
- » Normal / Latching Alarm Output
- » Limit Annunciator
- » Remote Reset / Remote Lock via Event Input
- » PV /SP Retransmission
- » Connect with HMI for Alarm Monitoring
- » Network up to 247 Controllers on RS-485 (Modbus Protocol)
- » FM, UL,cUL, CE, RoHS, REACH Approval
- » Available in ¼ DIN and 1/16 DIN Size



## Specifications

| Specification                 | L41                                                                                                                                                           |                                          | L91                        |                             |
|-------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------|----------------------------|-----------------------------|
| Power Supply                  | 90-250 VAC, 47-63 Hz, 11-26 VAC/VDC, SELV, Limited Energy                                                                                                     |                                          |                            |                             |
| Power Consumption             | 10VA, 5W Maximum                                                                                                                                              |                                          |                            |                             |
| Over Voltage Category         | II                                                                                                                                                            |                                          |                            |                             |
| Signal Input                  |                                                                                                                                                               |                                          |                            |                             |
| Type                          | Thermocouple: J, K, T, E, B, R, S, N, L, P(L41 only), C(L41 only);<br>RTD: PT100 DIN, PT100 JIS;<br>mV: 0~60 mV;<br>Current: 0~20mA;<br>Voltage: 0~1 V, 0~10V |                                          |                            |                             |
| Resolution                    | 18 Bits                                                                                                                                                       |                                          |                            |                             |
| Sampling Rate                 | 5 Times / Second (200 msec)                                                                                                                                   |                                          |                            |                             |
| Input Characteristics         | Type                                                                                                                                                          | Range                                    | Accuracy @ 25° C           | Input Impedance             |
|                               | J                                                                                                                                                             | -120° C to 1000° C ( -184° F to 1832° F) | ± 2° C                     | 2.2 MΩ                      |
|                               | K                                                                                                                                                             | -200° C to 1370° C (-328° F to 2498° F)  | ± 2° C                     | 2.2 MΩ                      |
|                               | T                                                                                                                                                             | -250° C to 400° C ( -418° F to 752° F)   | ± 2° C                     | 2.2 MΩ                      |
|                               | E                                                                                                                                                             | -100° C to 900° C ( -148° F to 1652° F)  | ± 2° C                     | 2.2 MΩ                      |
|                               | B                                                                                                                                                             | 0° C to 1820° C ( - 32° F to 3308° F)    | ± 2° C (200° C to 1800° C) | 2.2 MΩ                      |
|                               | R                                                                                                                                                             | 0° C to 1767.8° C ( - 32° F to 3214° F)  | ± 2° C                     | 2.2 MΩ                      |
|                               | S                                                                                                                                                             | 0° C to 1767.8° C ( - 32° F to 3214° F)  | ± 2° C                     | 2.2 MΩ                      |
|                               | N                                                                                                                                                             | -250° C to 1300° C ( -418° F to 2372° F) | ± 2° C                     | 2.2 MΩ                      |
|                               | L                                                                                                                                                             | -200° C to 900° C ( -328° F to 1652° F)  | ± 2° C                     | 2.2 MΩ                      |
|                               | P (L41 only)                                                                                                                                                  | 0° C to 1395° C (32° F to 2543° F)       | ± 2° C                     | 2.2 MΩ                      |
|                               | C (L41 only)                                                                                                                                                  | 0° C to 2315° C (32° F to 4199° F)       | ± 2° C                     | 2.2 MΩ                      |
|                               | PT100(DIN)                                                                                                                                                    | -210° C to 700° C ( -346° F to 1292° F)  | ± 0.4° C                   | 1.3 KΩ                      |
|                               | PT100(JIS)                                                                                                                                                    | -200° C to 600° C ( -328° F to 1112° F)  | ± 0.4° C                   | 1.3 KΩ                      |
|                               | mV                                                                                                                                                            | -8mV to 70mV                             | ± 0.05%                    | 2.2 MΩ                      |
|                               | mA                                                                                                                                                            | -3mA to 27mA                             | ± 0.05%                    | L41: 70.5 Ω,<br>L91: 100Ω   |
|                               | VDC                                                                                                                                                           | -1.3VDC to 11.5VDC                       | ± 0.05%                    | L41: 302 KΩ,<br>L91: 510 KΩ |
| Temperature Effect            | 1.5μV /° C                                                                                                                                                    |                                          |                            |                             |
| Sensor Lead Resistance Effect | Thermocouple: 0.2 μV /° Ω<br>3-wire RTD: 2.6° C /Ω of Difference of Resistance of two leads<br>2-wire RTD: 2.6° C /Ω of Sum of Resistance of two leads        |                                          |                            |                             |
| Burn-out Current              | 200nA                                                                                                                                                         |                                          |                            |                             |
| CMRR                          | 120 dB                                                                                                                                                        |                                          |                            |                             |
| NMRR                          | 55dB                                                                                                                                                          |                                          |                            |                             |
| Sensor Break Detection        | Sensor open for Thermocouple, RTD, mV inputs, Below 1mA for 4 to 20mA, Below 0.25V for 1 to 5V                                                                |                                          |                            |                             |
| Sensor Break Response Time    | Within 4 seconds for TC, RTD and mA inputs, 0.1 second for 4-20 mA and 1-5V inputs                                                                            |                                          |                            |                             |

## Specifications

| Specification                                   | L41                                                                                                                                                                                                                                                    |           |                        | L91            |                   |  |
|-------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|------------------------|----------------|-------------------|--|
| Output 1 / Output 2                             |                                                                                                                                                                                                                                                        |           |                        |                |                   |  |
| Relay Rating                                    | 2A / 240 VAC, life cycles 200,000 for resistive load                                                                                                                                                                                                   |           |                        |                |                   |  |
| Pulsed Voltage                                  | Source Voltage 5V, current limiting resistance 66 Ω                                                                                                                                                                                                    |           |                        |                |                   |  |
| Triac Output                                    | Rating: 1A / 240 VAC, Inrush current: 20A for 1 cycle, Minimum Load Current: 50 mA rms, Max. Off-state Leakage: 3 mA rms, Max. On-state Voltage: 1.5 V rms, Insulation Resistance: 1000 MΩ min. at 500 VDC, Dielectric Strength: 2500 VAC for 1 minute |           |                        |                |                   |  |
| Limit Control Function                          | High Limit, Low limit and High / Low Limit programmable                                                                                                                                                                                                |           |                        |                |                   |  |
| Alarm Function                                  | Process Value High, Process Value Low                                                                                                                                                                                                                  |           |                        |                |                   |  |
| Alarm Mode                                      | Normal, Latching                                                                                                                                                                                                                                       |           |                        |                |                   |  |
| Transmitter Power Supply (Output 2)             |                                                                                                                                                                                                                                                        |           |                        |                |                   |  |
| Transmitter Power Supply Output Characteristics | Type                                                                                                                                                                                                                                                   | Tolerance | Maximum Output Current | Ripple Voltage | Isolation Barrier |  |
|                                                 | 20V                                                                                                                                                                                                                                                    | ± 1V      | 25mA                   | 0.2Vp-p        | 500 VAC           |  |
|                                                 | 12V                                                                                                                                                                                                                                                    | ± 0.6V    | 40mA                   | 0.1Vp-p        | 500 VAC           |  |
|                                                 | 5V                                                                                                                                                                                                                                                     | ± 0.25V   | 80mA                   | 0.05Vp-p       | 500 VAC           |  |
| Digital Filter                                  |                                                                                                                                                                                                                                                        |           |                        |                |                   |  |
| Function                                        | First Order                                                                                                                                                                                                                                            |           |                        |                |                   |  |
| Time Constant                                   | 0, 0.2, 0.5, 1, 2, 5, 10, 20, 30, 60 Seconds, Programmable                                                                                                                                                                                             |           |                        |                |                   |  |
| Event Input                                     |                                                                                                                                                                                                                                                        |           |                        |                |                   |  |
| Logic Low                                       | -10V minimum, 0.8V maximum                                                                                                                                                                                                                             |           |                        |                |                   |  |
| Logic High                                      | 2V minimum, 10V maximum                                                                                                                                                                                                                                |           |                        |                |                   |  |
| Event Input Functions                           | Remote reset, remote lockout                                                                                                                                                                                                                           |           |                        |                |                   |  |
| Data Communication                              |                                                                                                                                                                                                                                                        |           |                        |                |                   |  |
| Interface                                       | RS-485 or RS-232                                                                                                                                                                                                                                       |           |                        |                |                   |  |
| Protocol                                        | Modbus RTU (Slave Mode)                                                                                                                                                                                                                                |           |                        |                |                   |  |
| Address                                         | 1 to 247                                                                                                                                                                                                                                               |           |                        |                |                   |  |
| Baud Rate                                       | 2.8KBPS to 115.2KBPS                                                                                                                                                                                                                                   |           |                        |                |                   |  |
| Parity Bit                                      | None, Even or Odd                                                                                                                                                                                                                                      |           |                        |                |                   |  |
| Stop Bit                                        | 1 or 2 Bits                                                                                                                                                                                                                                            |           |                        |                |                   |  |
| Data Length                                     | 7 or 8 Bits                                                                                                                                                                                                                                            |           |                        |                |                   |  |
| Communication Buffer                            | 50 Bytes                                                                                                                                                                                                                                               |           |                        |                |                   |  |
| Analog Retransmission                           |                                                                                                                                                                                                                                                        |           |                        |                |                   |  |
| Output Signal                                   | 4 - 20mA, 0 - 20 mA, 0 - 10VDC, 0 - 5VDC, 1 - 5VDC                                                                                                                                                                                                     |           |                        |                |                   |  |
| Resolution                                      | 15 Bits                                                                                                                                                                                                                                                |           |                        |                |                   |  |
| Accuracy                                        | ± 0.05% of Span ± 0.0025% / ° C                                                                                                                                                                                                                        |           |                        |                |                   |  |
| Load Resistance                                 | 0 to 500Ω for current output, 10KΩ minimum for Voltage Output                                                                                                                                                                                          |           |                        |                |                   |  |
| Output Regulation                               | 0.01% for full load change                                                                                                                                                                                                                             |           |                        |                |                   |  |
| Output Setting Time                             | 0.1 second (stable to 99.9%)                                                                                                                                                                                                                           |           |                        |                |                   |  |
| Isolation Breakdown                             | 1000VAC min                                                                                                                                                                                                                                            |           |                        |                |                   |  |

## Specifications

| Specification                             | L41                                                                                                                                                   |  | L91                                                                              |  |
|-------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|--|----------------------------------------------------------------------------------|--|
| Analog Retransmission                     |                                                                                                                                                       |  |                                                                                  |  |
| Integral Linearity Error                  | ± 0.005% of span                                                                                                                                      |  |                                                                                  |  |
| Temperature Effect                        | ± 0.0025% of span / ° C                                                                                                                               |  |                                                                                  |  |
| Saturation Low                            | 0mA or 0VDC                                                                                                                                           |  |                                                                                  |  |
| Saturation High                           | 22.2mA or 5.55V, 11.1V min                                                                                                                            |  |                                                                                  |  |
| Linear Output Ranges                      | 0 - 22.2mA (0 - 20mA / 4 - 20mA), 0 - 5.55VDC (0 - 5VDC / 1 - 5VDC), 0 - 11.1VDC (0 - 10VDC)                                                          |  |                                                                                  |  |
| User Interface                            |                                                                                                                                                       |  |                                                                                  |  |
| Keypad                                    | 4 Keys                                                                                                                                                |  |                                                                                  |  |
| Display Type                              | 4 Digit LCD Display                                                                                                                                   |  |                                                                                  |  |
| No of Display                             | 2                                                                                                                                                     |  | 1                                                                                |  |
| Upper Display Size                        | 0.55” (14mm)                                                                                                                                          |  | 0.4” (10mm)                                                                      |  |
| Lower Display Size                        | 0.55” (14mm)                                                                                                                                          |  | N.A.                                                                             |  |
| Environmental and Physical Specifications |                                                                                                                                                       |  |                                                                                  |  |
| Operating Temperature                     | -10° C to 50° C                                                                                                                                       |  |                                                                                  |  |
| Storage Temperature                       | -40° C to 60° C                                                                                                                                       |  |                                                                                  |  |
| Humidity                                  | 0 to 90 % RH (Non - Condensing)                                                                                                                       |  |                                                                                  |  |
| Altitude                                  | 2000 Meters Maximum                                                                                                                                   |  |                                                                                  |  |
| Pollution                                 | Degree II                                                                                                                                             |  |                                                                                  |  |
| Insulation Resistance                     | 20MΩ Minimum (@500V DC)                                                                                                                               |  |                                                                                  |  |
| Dielectric Strength                       | 2000VAC, 50/60 Hz for 1 Minute                                                                                                                        |  |                                                                                  |  |
| Vibration Resistance                      | 10 to 55 Hz, 10m/s2 for 2 Hours                                                                                                                       |  |                                                                                  |  |
| Shock Resistance                          | 200 m/s2(20g)                                                                                                                                         |  |                                                                                  |  |
| Housing                                   | Flame Retardant Polycarbonate                                                                                                                         |  |                                                                                  |  |
| Mounting                                  | Panel Mounting                                                                                                                                        |  |                                                                                  |  |
| DIN Size                                  | 1 / 4                                                                                                                                                 |  | 1/16                                                                             |  |
| Dimensions (W*H*D)<br>(mm)                | 96*96*65 mm                                                                                                                                           |  | 48*48*94 mm                                                                      |  |
| Mounting (W*H)<br>(mm)                    | 92*92 mm                                                                                                                                              |  | 45*45 mm                                                                         |  |
| Depth behind Panel                        | 53 mm                                                                                                                                                 |  | 86 mm                                                                            |  |
| Weight (grams)                            | 250 grams                                                                                                                                             |  | 150 grams                                                                        |  |
| Approval Standards                        |                                                                                                                                                       |  |                                                                                  |  |
| Safety                                    | FM, UL, cUL, CE, RoHS, REACH                                                                                                                          |  |                                                                                  |  |
| Protective Class                          | IP65 for panel with additional option, IP50 for panel without additional option, IP20 for terminals and housing with protective cover. All indoor use |  | IP30 front panel, indoor use, IP20 housing and terminals (with protective cover) |  |

## L41 Ordering Code

L41 -

### Power Input

4: 90-250 VAC, 47-63 HZ

5: 11-26 VAC or VDC,  
SELV, Limited Energy

### Signal Input

1: Standard Input

Thermocouple: J, K, T, E, B, R, S, N, L, C, P

RTD: PT100 DIN, PT100 JIS

mV: 0~60 mV

2: Voltage: 0-1 V

3: Voltage: 0-10 V

4: Current: 0-20mA

5: Voltage: 0-5 V

### Output 1

0: None

1: Form C relay rated 2A / 240VAC

2: Pulsed voltage to drive SSR, 5V / 30mA

6: Triac Output 1A / 240VAC, SSR

C: Pulsed voltage to drive SSR, 14V / 40mA

### Output 2

0: None

1: Form C Relay 2A / 240VAC

2: Pulsed voltage to drive SSR, 5V / 30mA

6: Triac Output, 1A / 240VAC, SSR

7: Isolated 20V / 25mA DC Output Power Supply

8: Isolated 12V / 40mA DC Output Power Supply

9: Isolated 5V / 80mA DC Output Power Supply

C: Pulsed voltage to drive SSR, 14V / 40mA

### Communication

0: None

1: RS-485 Interface

2: RS-232 Interface

3: Retransmit 4-20mA / 0-20mA

4: Retransmit 1-5V / 0-5V

5: Retransmit 0-10V

### Options

0: IP50 Standard

## L91 Ordering Code

L91 -

|  |  |  |  |
|--|--|--|--|
|  |  |  |  |
|--|--|--|--|

### Power Input

4: 90-250 VAC, 47-63 HZ

5: 11 - 26 VAC or VDC,  
SELV, Limited Energy

### Signal Input

1: Standard Input

Thermocouple: J, K, T, E, B, R, S, N, L, C, P

RTD: PT100 DIN, PT100 JIS

mV: 0~60 mV

2: Voltage: 0-1 V

3: Voltage: 0-10 V

4: Current: 0-20mA

5: Voltage: 0-5 V

### Output 1

0: None

1: Form C relay rated 2A/240VAC

2: Pulsed voltage to drive SSR, 5V/30mA

6: Triac Output 1A / 240VAC, SSR

C: Pulsed voltage to drive SSR, 14V/40mA

### Output 2

0: None

1: Form C Relay 2A/240VAC

2: Pulsed voltage to drive SSR, 5V / 30mA

6: Triac Output, 1A / 240VAC, SSR

7: Isolated 20V / 25mA DC Output Power Supply

8: Isolated 12V / 40 mA DC Output Power Supply

9: Isolated 5V / 80mA DC Output Power Supply

A: RS-485

B: Event Input

C: Pulsed voltage to drive SSR, 14V/40mA

D: Retransmit 4-20mA / 0-20mA

E: Retransmit 1-5V / 0-5V

F: Retransmit 0-10V

### Accessories

OM94-6 = Isolated 1A/240VAC Triac Output Module (SSR)

OM94-7 = 14V/40mA SSR Drive Module

DC94-1 = Isolated 20V / 25mA DC Output Power Supply

DC94-2 = Isolated 12V / 40mA DC Output Power Supply

DC94-3 = Isolated 5V / 80mA DC Output Power Supply

CM94-1 = Isolated RS-485 Interface Module for L41

CM94-2 = Isolated RS-232 Interface Module for L41

CM94-3 = Isolated 4-20mA / 0-20mA Retransmission Module for L41

CM94-4 = Isolated 1-5V / 0-5V Retransmission Module for L41

CM94-5 = Isolated 0-10V Retransmission Module for L41

CC91-3 = Programming Port Cable for L41

CM96-1 = Isolated RS-485 Interface Module for L91

CM96-3 = Isolated 4-20mA / 0-20mA Retransmission Module for L91

CM96-4 = Isolated 1-5V / 0-5V Retransmission Module for L91

CM96-5 = Isolated 0-10V Retransmission Module for L91

EI96-1 = Event Input Module for L91

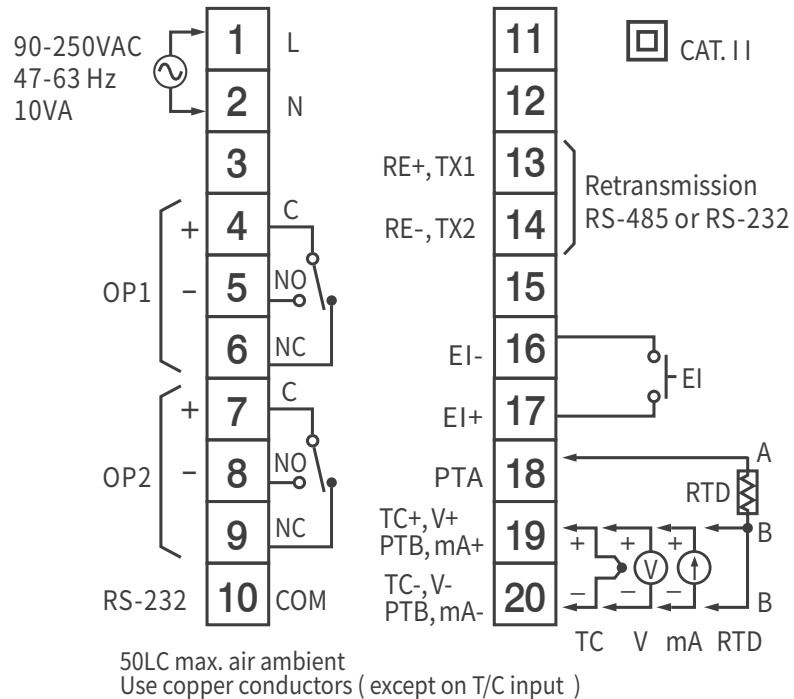
CC91-2 = Programming Port Cable for L91

### Related Products

» SNA-12A = Smart Network Adaptor  
for programming port to RS-232  
Interface

» BC-SET PRO= Configuration  
Software

## L41



## L91

