

Programmable Controller RT390



- ◆ Extremely flexible – unlimited range of applications
- ◆ User-programmable structure by ready-made blocks
- ◆ Powerful self-testing capabilities
- ◆ May be used as pH and RH controller
- ◆ Wide range of control algorithms and alarm types
- ◆ Bumpless Auto/Manual change-over
- ◆ Up to 5 inputs and 5 outputs
- ◆ Digital interface for network operation

RT390 is a compact microprocessor-based controller with user programmable internal structure and very wide range of application. It can be equipped with up to 3 analog and 2 discrete inputs and up to 3 relays and 2 analog outputs and can accept a whole variety of input signals including temperature, relative humidity, flow, pressure, pH, etc. Electromechanical relays, solid-state relays, or current or voltage analog outputs may be installed as control, alarm, or limit comparators. Each relay output may be programmed as time or frequency proportional or as a simple ON/OFF. The 3 analog inputs available allow special applications like positioning control, cascade controllers, pH control (with temperature compensation), etc. The internal structure consists of up to 15 functional blocks. Each functional block may calculate one of the 24 standard functions. Custom defined functions may be added. Bumpless auto/manual changeover is another feature. Network functions and hierarchical control are available with serial interface installed. Keyboard locking is possible by connection of a switch to one of the digital inputs.



Technical specifications

Analog inputs (up to 3 inputs)

| | |
|--|-------------------------------|
| Pt100; 3-wire | -200...200 (850) °C |
| Pt500; 3-wire | -200...200 (850) °C |
| Pt1000; 3-wire | -200...200 (850) °C |
| Cu53; 3-wire | 0...180 °C |
| Cu100; 3-wire | -200...200 °C |
| Ni100; 3-wire | -60...200 °C |
| Other RTD | min. -200...max. 850 °C |
| Thermocouple "B" | 200...1820 °C |
| Thermocouple "D" | 400...2300 °C |
| Thermocouple "E" | -270...1000 °C |
| Thermocouple "J" | -210...1200 °C |
| Thermocouple "K" | -270...1370 °C |
| Thermocouple "L" | -200...900 °C |
| Thermocouple "L - GOST " | -200...900 °C |
| Thermocouple "N" | -270...1300 °C |
| Thermocouple "R" | -50...1700 °C |
| Thermocouple "S" | -50...1700 °C |
| Thermocouple "T" | -270...400 °C |
| Thermocouple "U" | -200...600 °C |
| Other thermocouple | up to 2000 °C |
| Linear voltage (Rin ≥ 1 GΩ) ^(1,2) | 0...2 V, 0...5 V, or 0...10 V |
| Custom linear voltage ^(1,2) | 0...max. 10 V |
| Linear current (Rin ≤ 10 Ω) ^(1,2) | 0(4)...20 mA |
| Custom linear current ^(1,2) | 0...max. 50 mA |
| Linear resistive ⁽¹⁾ | 0...Rp ≥ 50 Ω |
| Linear potentiometer ⁽¹⁾ | 0...Rp ≥ 5 kΩ |
| pH input (Rin ≥ 10 TΩ) | 0.00...14.00 pH |
| ORP input (Rin ≥ 10 TΩ) | -1000...+1000 mV |
| Sub-range selection | programmable |

Digital inputs (up to 2 inputs)

| | |
|-------------------|--|
| Input signal type | contact, TTL, NPN, or PNP |
| Limitations | Uin. max. ≤ 40 VDC |
| Functions | programmable, in combination with certain blocks |

Relay outputs (up to 3 outputs)

| | |
|-------------------------------------|---|
| Relay electromechanical | 5A/250V w/ NO contact |
| Solid state relay | 1A/250VAC |
| MOS gate | 0.1A/60V, optically isolated |
| Output for external SSR | 5...24 V, 30 mA |
| Output function | ON/OFF, time-proportional, or frequency-proportional ⁽³⁾ |
| Control algorithms and alarm limits | programmable, according to selected block types |
| Set point | within input range limits |

Analog outputs (up to 2 outputs)

| | |
|------------------|--|
| Current output | 0(4)...20 mA DC (R _{LOAD} ≤ 400 Ω) |
| Voltage output | 0...2/ 5/ 10 VDC (R _{LOAD} ≥ 2/ 5/ 10 kΩ) |
| Other on request | max. 20 mA or 10 V |
| Output function | retransmission / control |
| Output range | user-programmable |

Digital interface

| | |
|-----------------|--|
| Output type | RS232 or RS485 |
| Output function | network, operator station, or hierarchical control |

Accuracy

| | |
|----------------------------|---------------------------|
| Measurement error | 0.4% from span |
| Temperature drift | 0.005% from span for 1 °C |
| Calibration | automatic software |
| Cold junction compensation | automatic hardware |

Power supply

| | |
|--------------------------|---------------------|
| Mains supply voltage | 230 VAC or 115 VAC |
| SMPS voltage | 90...250 V |
| Isolated low voltage | 12...24 V or 24 VAC |
| Non-isolated low voltage | 12...24 V |
| Consumption | max. 3 VA |

Indication and controls

| | |
|-----------------|---|
| Digital display | 4 LED indicators, 14 mm with programmable decimal point |
| LEDs | 3 LEDs for relay output state, LED for auto/manual mode |
| Keyboard | 4 membrane keys |

Operating conditions

| | |
|---------------------|----------------------------|
| Ambient temperature | -10...65 °C |
| Ambient humidity | 0...85 %RH |
| Storage temperature | -20...65 °C |
| Storage humidity | 0...95 %RH, non-condensing |

Design and materials

| | |
|-----------------------------|---------------------------|
| Case material | plastic |
| Mounting | in 90x42 mm panel cut-out |
| Wiring | plug-in terminals |
| Dimensions | 96x48(front)x107 mm |
| Mounting depth | 98 mm |
| Weight | max. 350 g |
| Protection, front/terminals | IP54 / IP20 |
| Increased front IP (option) | IP65 |

⁽¹⁾ The correspondence (mapping) of the input signal with displayed value ranges is user programmable.

⁽²⁾ Provides 12...24 VDC / 30 mA supply for external transmitter on one of the linear voltage or current outputs

⁽³⁾ Three types of frequency proportional outputs are available (user programmable).

Programmable structure blocks

| | |
|--|--|
| PID | industrial PID with anti-windup integration (4 parameters) |
| ON/OFF controller | ON/OFF control (1 parameter) |
| ON/OFF duplex controller | ON/OFF duplex (heating/cooling) control (3 parameters) |
| Positioning control | 2-speed positioning control for motorized valves (4 parameters) |
| Control error calculation | compares set point and measured value (1 parameter) |
| Constant | constant value (1 parameter) |
| Adder | adds 2 signals |
| Gain | multiplies input signal by a constant (1 parameter) |
| Attenuator | divides input signal by a constant (1 parameter) |
| Multiplier | multiplies the values of the 2 input signals |
| Divider | divides the values of the 2 input signals |
| Linear transformation (mapping) | translates input signal range X1...X2 into output range Y1...Y2 (4 parameters) |
| Low pass filter | 3 rd order Butterworth low pass filter (no ripple step response) (4 parameters) |
| Saturation | limits output signal between lower and upper limits (2 parameters) |
| Dead band | output signal is zero when input is within the dead band (1 parameter) |
| "Window" type alarm | output is active while input is within alarm limits (2 parameters) |
| Inverted "window" type alarm | output is active while input is outside alarm limits (2 parameters) |
| High limit alarm | output is active while input above alarm limit (1 parameter) |
| Low limit alarm | output is active while input below alarm limit (1 parameter) |
| Timer | generates a pulse depending on input signal (2 parameters) |
| Generator | controlled pulse generator (4 parameters) |
| Time controlled multiplexer | switches 1 of the 2 input signals to the output at time intervals (2 parameters) |
| Discrete input controlled multiplexer | switches 1 of the 2 input signals to the output controlled by a discrete input |
| Very long period PWM output | forms PWM signal with time period of up to 9999 s (3 parameters) |
| Selectable constant (set-point unit) | outputs one of 4 selected constants; controlled by the state of 2 discrete inputs |
| RH measurement by "wet" and "dry" bulb method | forms signal proportional to RH value from 2 temperature inputs |
| PID with 2 inputs | PID module with 2 inputs (input #1 - PV, input #2 - SP) |

Ordering code RT390 - G1.G5G5G5.G6'6"6"6"6"6"6"6".G7G7.G9'9".G11G11 - #1

| Code | Feature or option | Code values |
|-------|----------------------------|--|
| G1 | Power supply | A - 230 VAC, B - 115 VAC, C - 90...250 V, P - 12...24 V, non-isolated, Q - 12...24 V, isolated, R - 24 VAC |
| G5 | Relay output | X - none, A - relay NO, D - SSR, J - for external SSR, M - isolated MOS gate |
| G6' | Input signal | X - none, B - thermoresistance, C - thermocouple, D - linear, Z - other on request |
| G6" | RTD | D - Pt100, F - Pt500, G - Pt1000, H - Cu53, K - Cu100, M - Ni100, Z - other |
| | T/C | B - "B", D - "D", E - "E", J - "J", K - "K", L - "L", M - "L-GOST", N - "N", R - "R", S - "S", T - "T", U - "U", Z - other |
| | linear | B - 0...20 mA, C - 4...20 mA, H - 0...2 V, I - 0...5 V, K - 0...10 V, L - resistive, 0...Rp, M - potentiometer, 0...Rp, N - pH, O - ORP, Z - other |
| G6''' | Range ⁽⁴⁾ | T22 - -200...200 °C, T28 - -200...850 °C |
| G7 | Discrete input | X - none, A - contact, E - NPN, F - PNP, G - TTL |
| G9' | Serial interface | X - none, A - RS232, B - RS485 |
| G9" | Protocol | B - RT390, D - RT390 for "PolyMonitor" |
| G11 | Analog output | X - none, E - 0...20 mA, F - 4...20 mA, H - 0...2 V, I - 0...5 V, K - 0...10 V, Z - other on request |
| #1 | Increased front protection | X - none, P - IP65 front protection |

⁽⁴⁾ Only for Pt sensors!