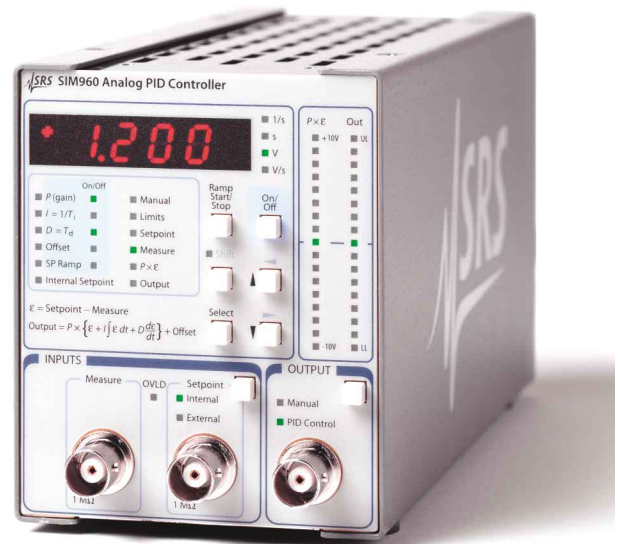- Analog signal path with digital control
- 100 kHz bandwidth
- Low noise front-end
- P, I, D and Offset settable to 0.5 %
- Anti-windup (fast saturation recovery)
- Bumpless transfer, manual to PID
- Analog setpoint with smooth ramping
- Smooth upper/lower limit clamping

The SIM960 Analog PID Controller is a unique instrument intended for the most demanding control applications. It combines analog signal handling with digital control, giving you the best of both worlds. High bandwidth (100 kHz) control loops may be implemented without discrete time or quantization artifacts.
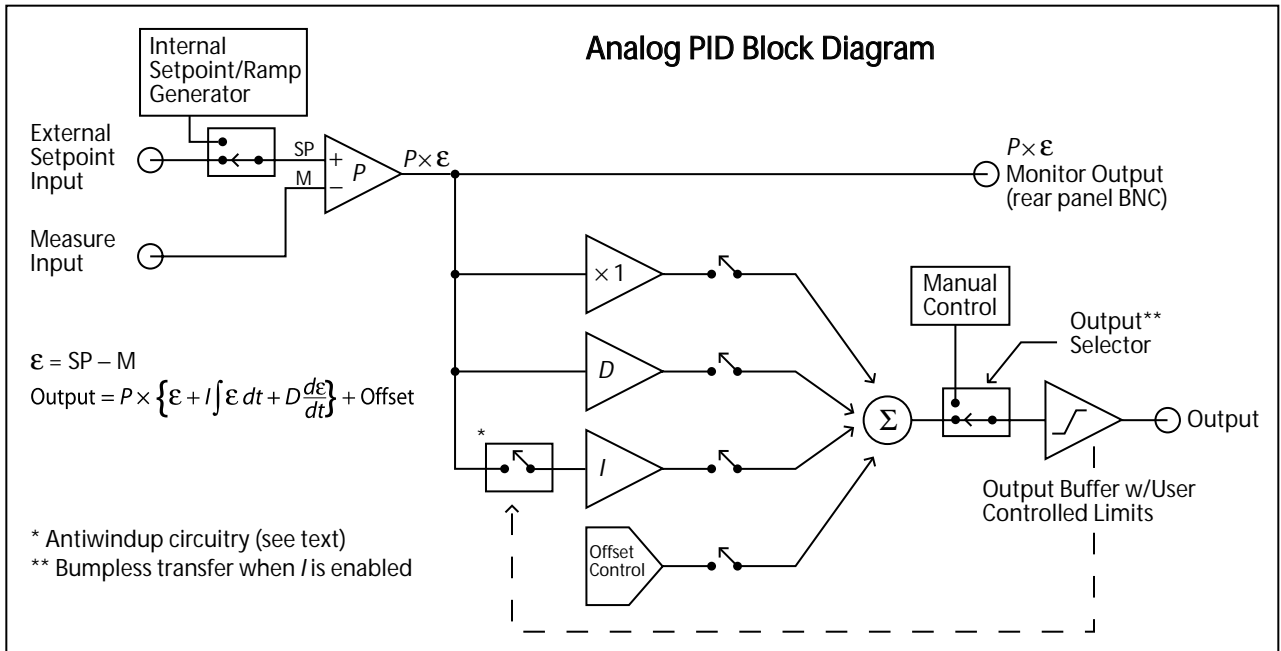
The low noise front-end brings better performance to noise sensitive applications including cryogenics, scanning probe microscopy and others. User settable gain of up to $1000\times$ means greater flexibility, reducing the need for input preamplification. The unit can be used together with the SIM921 AC Resistance Bridge providing a flexible and cost-effective temperature control solution.

An internal ramp generator can control voltage slew rate between predefined start and stop setpoints. The output is clamped within upper and lower user limits to guard against system overload. The conditional integration electronics provide anti-windup on the integrating capacitors, leading to faster recovery from saturation conditions.

Front panel control enables easy modification of system parameters and convenient monitoring of input and output signals. Power and serial communication are via a 15-pin D-sub connector which mates with the SIM900 mainframe. All instrument parameters can be set and queried via the serial interface.
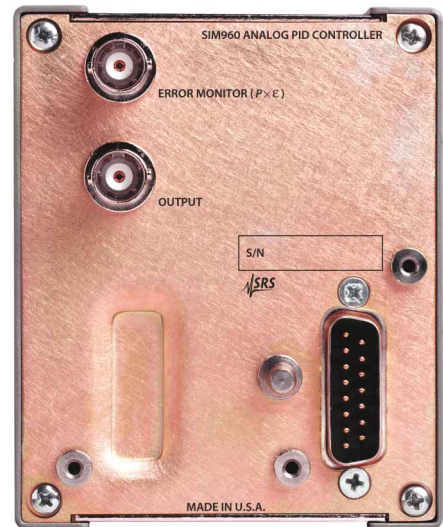
The amplified error signal ($P \times \varepsilon$) and the output may be monitored with an LED bar display or via the millivolt resolution numeric display. The Setpoint and Measure input signals can also be monitored on the numeric display.

The SIM960 is part of a wide range of modules available for the SIM (Small Instrumentation Modules) platform from Stanford Research Systems. For more information, please contact SRS at 408-744-9040 or visit our web site at www.thinkSRS.com.

SMALL INSTRUMENTATION MODULES

Analog PID Block Diagram

Internal Setpoint/Ramp Generator

External Setpoint Input

Measure Input

$\varepsilon = SP - M$

$Output = P \times \left\{ \varepsilon + I \int \varepsilon \, dt + D \frac{d\varepsilon}{dt} \right\} + Offset$

SP

M

P

$P \times \varepsilon$

$P \times \varepsilon$ Monitor Output (rear panel BNC)

× 1

D

I

* Antiwindup circuitry (see text)
** Bumpless transfer when I is enabled

Offset Control

Manual Control

Σ

Output** Selector

Output

Output Buffer w/User Controlled Limits

SIM960 Specifications

Control type	Analog, PID + Offset
Proportional gain	10^{-2} to 10^{3}
Integral gain	10^{-1} s^{-1} to 10^{5} s^{-1} (effective time constant 10^{-5} s to 10 s)
Derivative gain	10^{-7} s to 1 s
Offset	±10 V, 1 mV resolution
Bandwidth	100 kHz
Propagation delay	1 µs typical
Noise (typical)	8 nV/√Hz above 10 Hz (ref. to input)
Parameter control	Digital
Parameter accuracy	1 %
Stability	200 ppm/°C
Setpoint	
External	Front BNC input
Internal	±10 V range with 1 mV resolution
Internal setpoint noise	20 nV/√Hz above 100 Hz
Ramp	Internal setpoint linear ramping from 10^{-3} to 10^{4} V/s
Amplifier output	±10 V with variable upper/lower limits
Display resolution	4 digits
Units	s^{-1}, s, V, V/s
Operating temperature	0 °C to 40 °C, non-condensing
Interface	Serial via SIM interface
Connectors	BNC (3 front, 2 rear)
	DB15 (M) SIM Interface
Power	±15 V (150 mA), +5 V (80 mA)
Dimensions	3.0" W × 3.6" H × 7.0" D
Weight	2.1 lbs
Warranty	One year parts & labor against defects in workmanship and materials

SMALL INSTRUMENTATION MODULES