

Pneumatic Transmitters

Nullmatic™ Controllers (509, 50, 55)

Introduction

Features & Benefits

- ▶ Unsurpassed reliability record ensures a long installed life
- ▶ Powder coating provides improved corrosion resistance
- ▶ Remote, station, and integral setting options provide application versatility

Description

Nullmatic controllers are applicable to any process with a transmitter (or transducer) that provides a pneumatic measured variable signal. As such, they can be installed in the control room or at the process.

Any controller can be changed from direct action (increase input, increase output) to reverse control action, by turning an external plate. Moreover, standard and fast-reset needle valves are interchangeable in all models without disassembling the controller.

Nullmatic controllers operate entirely on the force-balance principle.

Three basic types are offered. They are:

- ▶ Remote set, which accepts an externally generated set-point signal
- ▶ Remote set with built-in cut-off relay, which accepts an external set-point and include a reset bypass that opens when the cut-off relay is operated
- ▶ Integrally set, which include a built-in set-point regulator and are used in circuits without control stations

Each type is available with a selection of control modes (proportional, reset, etc.) and ranges and most can be ordered with either plug-in style units that allow removal from the circuit without breaking pipe connections.

Model 50 Nullmatic Controller

Model 50 Nullmatic Controllers are most commonly used in the control room, where their high response level and ample output capacity enable them accommodate a wide variety of applications. However, they may also be located at the process with a separate cut-off relay. Models are available for both plug-in mounting and pipe connection.

Model 509 Nullmatic Controller

The Model 509 Nullmatic Controller is a basic three-mode controller. As such, it incorporates direct-derivative action in the controller stack and applies the derivative action to the process input—ahead of throttling and reset.

The use of derivative action on the input provides better control and enables faster recovery on large load upsets. It also limits overpeaking on start-up.



Because it recognizes the rate and direction of process changes, producing an “anticipatory” action that quickly restores the process to set-point, direct derivative is especially useful on processes with long time constants, such as temperature and liquid-level applications.

Model 55 Nullmatic Controller

Model 55 Nullmatic Controllers are ideally suited for localized installations in the field, where switching and indication at the panel are not necessary. Its top section includes a built-in regulator with fine-thread adjustment that furnishes a pneumatic set-point to the detecting section of the stack.

These controllers operate on the same pneumatic force-balance principle as remote-set Nullmatic controllers and offer the same performance advantages. In fact, many parts, are interchangeable with other models.

Several mounting options are available and Model 55 Controllers can also be furnished with a connection for supplementary air loading of the regulator spring housing, as shown in the table below. This connection permits positive biasing of the set-point by a remote air signal.

Model 55M Nullmatic Controllers

Model 55M Controllers accommodate applications where a field-mounted controller with an adjustable automatic/manual control capability is required. Its plug-in type controller allows exchange of the automatic control using only a screwdriver, while its self-sealing valves automatically close when the control section is removed to prevent signal loss and blasting of supply air.

Pneumatic Transmitters

Nullmatic™ Controllers (509, 50, 55)

Technical data

Specifications

Standard Operating Range

3-15 psig for set-point, process, and output pressures

Maximum Operating Pressure

50 psig for set-point, and output pressures

Supply Pressure

Normal: 20 psig

Maximum: 50 psig

Minimum: 3 psig above max. output

Over-pressure Protection

100 psig on any connection

Ambient-temperature Limits

-40 to 180°F (-40 to 82°C)

Materials of Construction

Stainless steel, brass, aluminum, Buna-N and Neoprene

Performance Data

All data based on a 3-15 psig operating range with 20 psig supply pressure

Response Level

Output sensitivity to changes in input of 0.2% of full scale

Reproducibility

0.06% of full scale at 100% proportional band

Tracking

Alignment between set-point and process within:

0.5% of full scale for 2-200% PB models 1.1% of full scale

for 5-500% PB models

Hysteresis

0.6% of full scale

Ambient Temperature Effect (50°F change)

1.0% of full scale

Supply-Pressure Effect (5 psi change)

0.11 psig output shift for 2-200% PB model

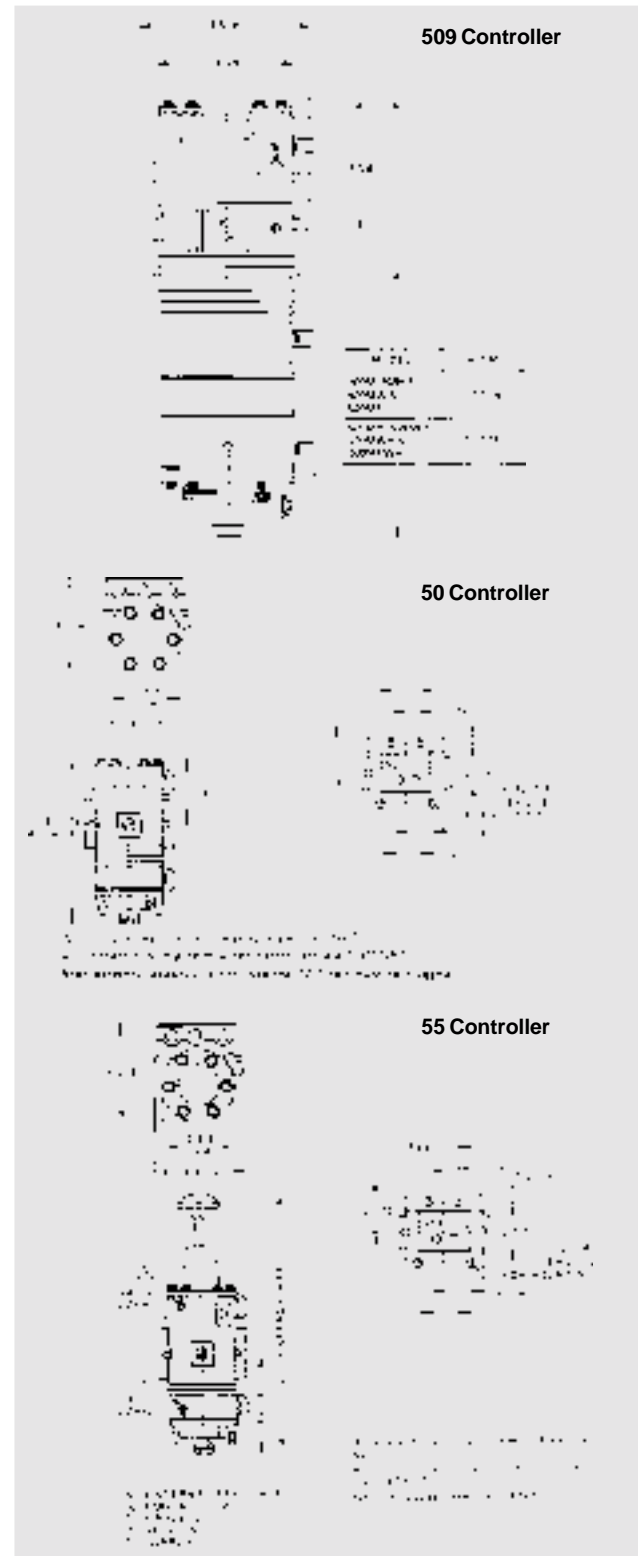
0.3 psig output shift for 5-500% PB model

Flow Capacity

Supp: 3.7 scfm

Exhaust: 2.1 scfm

Mounting Dimensions



Pneumatic Transmitters

Nullmatic™ Controllers (509, 50, 55)

Ordering data

Application & Ordering Information

	Proportional (Throttling) Band			
Application	2 to 200%	5 to 500%	Reset Action ¹ Minutes per repeat	With Manual Reset Action 2 to 200% Throttling
Station- or Remote-Set proportional plus reset	50M 50MF	50MW 50MFW	0.1 to 50 0.01 to 5	50MX-2
Station- or Remote-Set proportional plus reset plus derivative	509M 509MF 509MH ⁴ 509MFH ⁴	509MW 509MFW	0.1 to 50 0.01 to 5 0.1 to 50 0.01 to 5	0.05 to 20 minutes with 6:1 derivative gain 0.05 to 20 minutes ⁶ nominal 30:1 derivative gain

Model Numbers for Integrally-Set Controllers

	Proportional Band			
Application	2 to 200%	5 to 500%	Reset Action ¹ Minutes per repeat	With Manual Reset Action 2 to 200% Throttling
Integrally-Set - pipe-mounted models listed¹				Integrally-Set - pipe-mtd ¹
proportional plus reset	55 55F 55A 55AF	55W 55FW 55AW	0.1 to 50 0.01 to 5 0.1 to 50 0.01 to 5	55X-2 55AX-2

Integrally-Set - piped assemblies with auto-manual switching models listed

proportional plus reset	55M (M43)⁵ 55MF (M43)⁵	55MW (M43)⁵ 55MFW (M43)⁵	0.1 to 50 0.01 to 5	
proportional only	55MX-2 (M43)⁵	55MWX-2 (M43)⁵	N/A	

- 1) Standard reset adjustment range is 0.1 to 50 min. per repeat and fast range is 0.1 to 5 min. per repeat.
- 2) Standard derivative adjustment range is .05 to 20 minutes.
- 3) Model numbers listed are plug-in type, which requires 7115-10 surface mounting manifold if they are not to be mounted on a manifold type M/P station. To order controller with 1/4" NPT pipe connections delete letter "M" from model number.
- 4) Pipe connected versions of these models are not available.
- 5) 1/4" pipe connection version of these models can be furnished with provision for supplemental air loading of control point. Add letter "A" to basic model number (eg: 55A, 55AW, 55AXZ).
- 6) Optional volume chamber (P/N 10587-5) may be ordered to increase derivative range to .5 to 200 minutes.