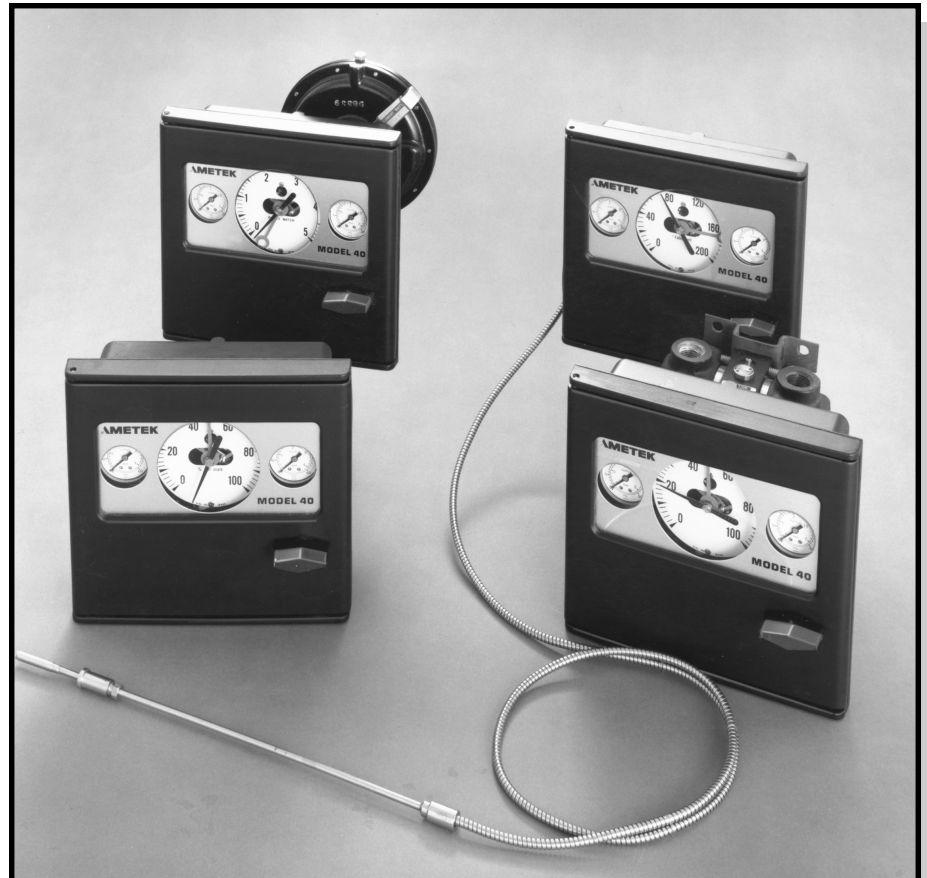


Pneumatic Indicating Controllers

FEATURES

- ◆ *Quality, flexibility, accuracy and dependability.*
- ◆ *Indication of measured variable.*
- ◆ *A non-bleed, high capacity relay with excellent stability and fast response.*
- ◆ *Easy field calibration.*
- ◆ *Broad selection of control modes; proportional plus reset, proportional plus reset plus rate, differential gap and two position bypass.*
- ◆ *Wide selection of process measuring elements for pressure, temperature, differential pressure, flow and level.*
- ◆ *Large, easy-to-read black on white dial for maximum resolution.*
- ◆ *Case and door with epoxy powdered finish for environmental protection.*



MODEL 40 PNEUMATIC INDICATING CONTROLLERS & TRANSMITTERS

DESCRIPTION

Model 40 Pneumatic Controllers automatically position a valve or other final control element to maintain process pressure or temperature at the desired set point. As receiving controllers, they can control any process variable transmitted as a pneumatic signal.

Standard models have proportional band adjustments for controlling processes where load changes are infrequent and can be corrected by the

manual reset feature, standard in every controller. By a simple screwdriver adjustment, the standard proportional controller can be changed to two-position control action with adjustable differential gap.

Model 40 Controllers are also available with up to 300% proportional band with automatic reset and rate action (for processes with frequent load changes or temperature processes with transfer

lags). They not only satisfy ordinary control requirements, but are equally proficient in controlling processes with unfavorable characteristics, particularly in temperature regulation.

The basic instrument is also available as an indicating pneumatic transmitter. Mounted close to the point of measurement, it transmits an air pressure signal proportional to the measured variable to another indicator, recorder or controller.

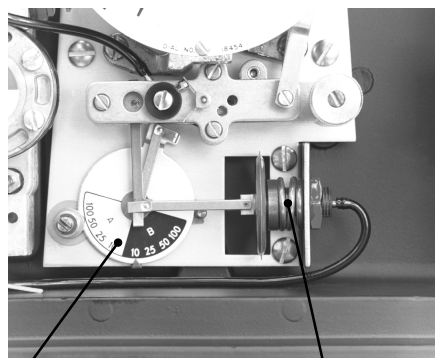
Model 40 Pneumatic Controllers

GUIDE TO CONTROLLER SELECTION

TYPE OF PROCESS DYNAMICS	DESCRIPTION	EXAMPLES	CONTROL REQUIRED
Capacity Lag Large Tank	Found when there is an appreciable inventory or storage of the controlled medium	Level control in process retention tanks. Batch heating.	On-Off differential gap. Proportional plus rate plus reset.
Transfer Lag	Found when it is necessary to force corrective action through a resistive element before it affects the process.	Temperature control using a heat exchanger, especially when a thermometer well is used.	
Instantaneous Response	Found when the manipulated variable is the same as the controlled variable or if they are dynamically equal.	Flow control, pressure control or liquids in pipelines or other vessels completely filled with the liquid.	Proportional plus reset.
Velocity-Distance Lag	Found when the measuring device is downstream of the point of corrective action. Equals the separating distance ÷ the stream velocity.	Any process control requiring reaction time before measurement. Any analytical variable control loop where the sampling system produces dead time.	Proportional plus slow reset (do not use rate). Eliminate dead time if possible.

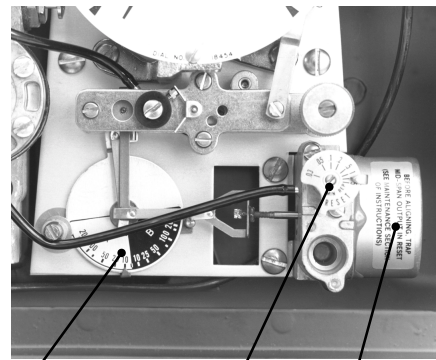
CONTROL ACTIONS

PROPORTIONAL CONTROL—This action provides an output signal proportional to the measured variable. Standard output pressure for controllers is 3-15 psi with proportional band adjustment of 1 to 100%. Band widths to 200% are also available. Outputs of 6-30 psi and 3-27 psi are optional. An index on the chassis plate of a controllers permits precise setting of band widths. Proportional control alone is ideal for process pressure regulation service (upstream) or relief service (downstream). Standard proportional controllers are recommended for most batch processes and a great many continuous processes where load changes are small or infrequent.



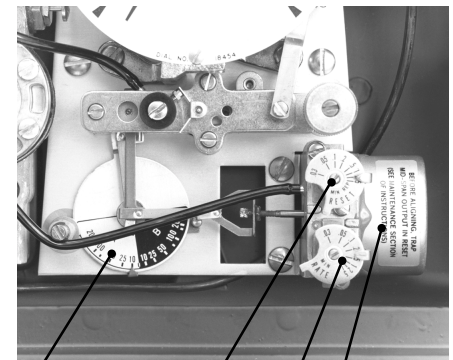
PROPORTIONAL BAND ADJUSTMENT FEEDBACK DIAPHRAGM

PROPORTIONAL PLUS RESET ACTION—When load changes are large or frequent and the process will not tolerate quick or drastic changes in control action, automatic reset is desirable to avoid excessive offset from the desired value under wideband proportional control. The feedback diaphragm on the standard proportional controllers is replaced with a reset assembly. A standard reset needle valve offers a wide range of settings from 0.03 to 5.0 minutes per repeat (optional .03 to .5 minutes repeat available).



PROPORTIONAL BAND ADJUSTMENT RESET KNOB RESET ASSEMBLY

PROPORTIONAL CONTROL PLUS RESET AND RATE ACTION—The function of the three mode controller is to eliminate offset, increase stability and reduce stabilization time. This type of controller is used to closely control a process that does not involve sudden upsets and wide proportional band settings. This unit is ideal for temperature control of heat exchangers, especially when a thermowell is used. Not designed for flow or pressure applications. Reset and rate times are standard at .03 to 5.0 minutes per repeat.



PROPORTIONAL BAND ADJUSTMENT RESET KNOB RATE KNOB
RESET/RATE ASSEMBLY

DIFFERENTIAL GAP ACTION—This is a two-position control mode standard in all Model 40 Proportional Controllers. The output pressure of the controller remains at maximum (20 psi standard) or minimum (0 psi) until the controlled measurement crosses a band or gap, causing the output pressure to reverse. The measured variable must then span the gap in the opposite direction before the output signal is restored to the original condition. Differential gap action is useful in controlling pumps and compressors to prevent excessive on-off cycling. Several controllers set in sequence with overlapping bands may be used for cutting in several stages of a process successively and cutting them out in reverse order. Gap may be adjusted over the full range of the proportional band.

FEATURES

ADJUSTING WRENCH—1/4" x 1/8" stored on door can be used for all necessary adjustments on movement, pointers and nozzle.

DIAL—Large, easy-to-read black on white dial face with full 7" scale for maximum resolution.

FINISH—Die-cast aluminum with semi-flat black powdered epoxy finish.

PROCESS INDICATIONS—Black adjustable pointer on 31/2" precision gauge dial (7" scale length). Readily adjusted to compensate for hydrostatic heads in piping.

MOVEMENT—Micrometer range adjustment plus adjustable sector and link for scale-shape calibration of both indicating and set point mechanisms provide easy field calibration.

CASE—Cast aluminum with dust ledge and deep weatherproof gaskets, captive stainless hinge pins and latch shaft, rectangular glass. Optional gas-tight construction with case tapped for 1/2" pipe vent. For high-pressure applications, shatter-proof glass and blowout grommets are available.

SET-POINT ADJUST—Internal, external or remote available.

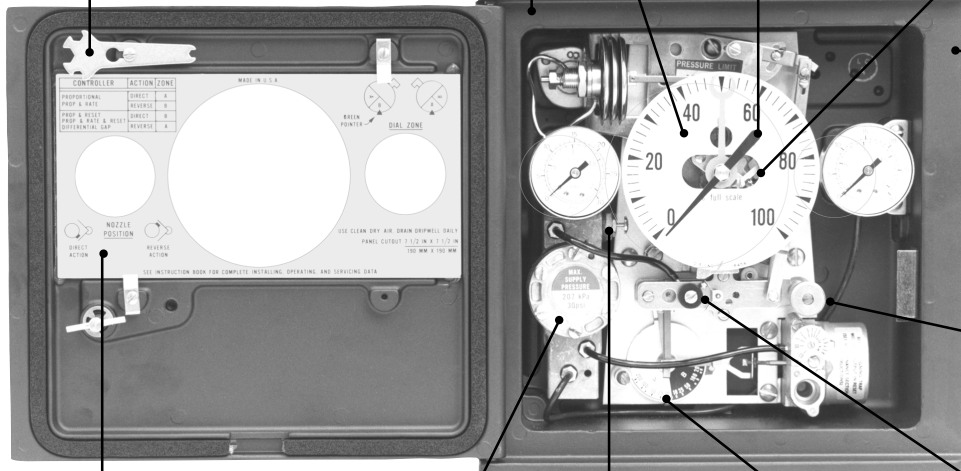
NOZZLE—Specifically designed for increased stability of pneumatic circuit, nickel silver nozzle can be turned on turret to reverse control action. 0.018" bore.

PROPORTIONAL BAND ADJUSTMENT—Adjustable by screwdriver within 90 degree quadrant indicated on dial. For available band widths and control options, consult factory.

RELAYS—Non-bleed, high capacity relay is standard on all controllers. Bleed rate of less than 0.1 SCFM at 9 psi output and the capacity to deliver over 3.0 SCFM result in exceptionally stable, fast responding controller. May be easily dismantled for cleaning without disturbing factory-set adjustments.

SHROUD—Anodized aluminum shroud brightens dial area for greater visibility under adverse lighting conditions.

ORIFICE—Sapphire 0.008" bore with integral pushbutton cleaner.



SPECIFICATIONS

INDICATION ACCURACY—1% middle half of scale, 1½% remainder. Most ranges may be calibrated to ½% accuracy at nominal extra charge.

SENSITIVITY—Less than 0.1% of full scale at 100% Proportional band.

FREQUENCY RESPONSE—Flat to 400 CPM with 200 ft. of ¼" tubing and 1.2 cubic inch capacity. Flat to 120 CPM with 18' 3/8" tubing and 200 cubic in. capacity.

CONSTRUCTION—Moving parts are designed as light as possible to keep friction and inertia forces low. This design also results in higher resistance to vibration and shock.

MOUNTING—Surface, flush panel, pipe-supported or valve-mounted. For dimensions, see page 13.

AIR SUPPLY—20 psi for 3-15 psi range; 35 psi for 3-27 & 6-30 psi range; 65 psi for 12-60 psi range. A filter and dripwell are recommended ahead of each controller to ensure clean, dry air supply. May be operated on natural gas or bottled CO₂.

CONNECTIONS—Standard back connections are ¼" female NPT.

MEASURING ELEMENTS—A wide range of precalibration measuring elements for pressure and temperature are detailed on pages XX and XX.

MODULAR CONSTRUCTION—Each of the following components may be removed without disturbing the other components: control chassis complete, precalibrated elements, feedback assemblies, complete relay units, or supply gauge only, or nozzle feed orifice and cleaner assembly only, or relay diaphragm housing and valve stem only-output gauge and tubing.

