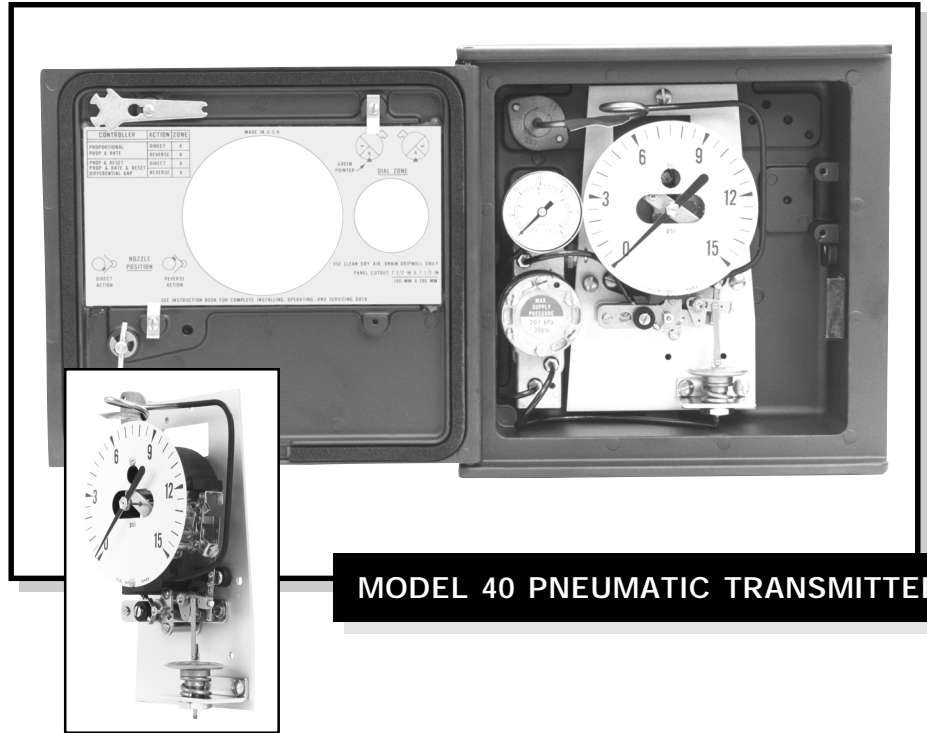


Model 40 Pneumatic Transmitters

FEATURES

- **RELIABILITY**—*highly essential, since a transmitter must operate for extended periods in inaccessible places without attention.*
- **SENSITIVITY AND FREEDOM FROM DEADBAND**—*an absolute requirement, since the transmitter constitutes the first instrument in the control loop.*
- **HIGH ACCURACY AND REPEATABILITY**—*mandatory for consistency and control stability.*
- **MEASURING ELEMENTS**—*Ranges and materials are same as those for indicating controllers, however, the element assemblies are not interchangeable between controllers and transmitters.*
- **STABILIZED PNEUMATIC CIRCUIT**—*Output signal is stabilized with all combinations of output capacity or load and transmission line resistance. Changes in air supply pressure to the transmitter have a negligible effect on the output.*



MODEL 40 PNEUMATIC TRANSMITTERS

- **ACCURACY**—*Measurement to Output—Within 1% of full scale on indicating transmitters; 0.5% on most ranges of indicating transmitters available at extra charge.*
- **FEEDBACK ASSEMBLY**—*A diaphragm capsule of Ni-Span C provides precise follow-up to maintain exact transmitter calibration.*
- **AIR SUPPLY AND OUTPUT PRESSURE**—*20 psi supply pressure and an output pressure range of 3-15 psi are standard. Other special ranges, as an example, 6-30 psi with a 35 psi supply pressure, are available. A filter and drip-well are recommended ahead of each transmitter, to ensure a clean, dry air supply.*

DESCRIPTION

The Model 40 Pneumatic Transmitter is designed to sense temperature or pressure and transmit an air signal which is precisely proportional to the measured variable. This output signal from the transmitter may be fed to any remotely located monitoring, recording or control instrument.

Model 40 Pneumatic Transmitters insure increased safety by eliminating the need for piping high-pressure, toxic, corrosive, inflammable or other

dangerous fluids or gases through the plant. The substitution of instrument air for process fluid between transmitter and receiver also eliminates the need for long capillary tubing for temperature measurement.

Model 40 Transmitters provide an added convenience, in that operation of a single transmitter with its high capacity relay can be used to actuate a number of receivers for indication, recording or control at a number of points

throughout a plant. Also, transmitters measuring any different variables provide standard 3-15 psi output signals, thereby reducing all variables to common readout devices and simplifying centralized panelboards and control stations.

Model 40 Transmitters are designed, in physical appearance, to match the Indicating Pneumatic Controllers.

PRECALIBRATED MEASURING ELEMENTS

PRESSURE

"C" TYPE BOURDON TUBES

Model 40 Pneumatic Controllers and Transmitters are furnished with precalibrated "C" type bourdon tube measuring elements. The wide, powerful bourdon tube is carefully drawn, coiled and heat-treated to ensure a precise measuring element, permanent in calibration, and having exceptional overrange capacity. Phosphor bronze tubes are soft-soldered into cast brass sockets. Stainless steel elements are inert gas welded to provide maximum corrosion resistance. Standard ranges are listed in Table 1.

DIFFERENTIAL PRESSURE CAPSULE

The differential pressure element used in the Model 40 controller is available in ranges from 10" W.C. to 400 psi with static working pressure to 3,000 psi (Table 2). The basic unit incorporates a high and low pressure bellows connected to a center plate. When two different pressures are applied to the high and low side the high pressure bellows contracts, forcing the fill fluid through the center plate into the low pressure bellows which expands. The motion of the low pressure bellows is transmitted via a temperature compensated linkage to the instrument output shaft.

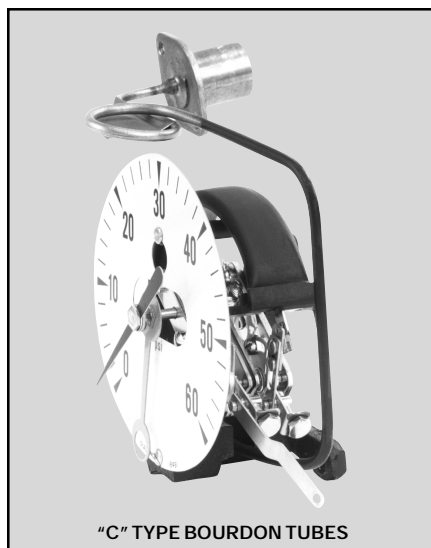
DIAPHRAGM

Low pressure controllers and transmitters are offered with a standard diaphragm measuring element comprised of stacked capsules of Ni-Span C or stainless steel. Diaphragm capsules are made of two contoured plates with nested corrugations and silver-brazed, or welded edges. They have a long working stroke, yet occupy minimum space. A sturdy element with large effective area, this design provides friction-free operation and precise indication. The constant thermal elastic characteristic of Ni-Span C practically eliminates thermal shift with wide variation in ambient temperatures. Welded type 316 stainless steel diaphragms are also offered for the ranges indicated in Table 3. Diaphragm elements are interchangeable with bourdon and temperature elements.

SLACK DIAPHRAGMS

Extremely low gauge pressures are measured and controlled by molded Buna N slack diaphragm elements (Table 4).

Low differential pressures such as encountered in air flow and draft applications are measured by molded Buna N slack diaphragm elements. Elements are also used in extremely low compound pressure ranges and vacuum range transmitters and controllers. Differential measurements at static pressures as high as 15 psi can be made.



"C" TYPE BOURDON TUBES

Table 1. Bourdon Tube Ranges/Materials

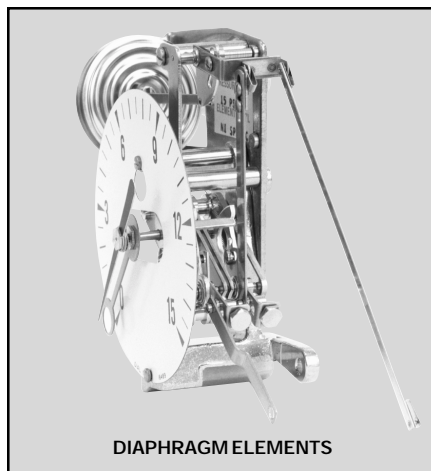
ELEMENT RANGE	PHOS. BRONZE	316 S.S.
0-30" Hg. Vac.	*	*
0-13 to 0-17 PSI	*	*
0-25 to 0-35	*	*
0-50 to 0-70	*	*
0-85 to 0-110	*	*
0-150 to 0-180	*	*
0-190 to 0-230	*	*
0-250 to 0-350	*	*
0-350 to 0-450	-	*
0-450 to 0-550	-	*
0-550 to 0-700	-	*
0-700 to 0-900	-	*
0-900 to 0-1200	-	*
0-1200 to 0-1700	-	*
0-1700 to 0-2300	-	*
0-2300 to 0-3500	-	*

Compound range available. Consult your representative.
*Available elements

Table 2. DP Element Ranges/Materials

METER BODY		RANGES AVAILABLE	
SWP (PSI)	MATERIAL	316 S.S. BELLWS	BE CU BELLWS
500	BRASS	0-100 psi to 0-400 psi	0-30" W.C. to 0-400 psi
500	316 S.S.	0-30" W.C. to 0-400 psi	0-30" W.C. to 0-400 psi
1,000	BRASS	-	0-60" W.C. to 0-400 psi
1,000	316 S.S.	0-60" W.C. to 0-400 psi	0-60" W.C. to 0-400 psi
1,500	STEEL OR 316 S.S.	0-60" W.C. to 0-400 psi	0-60" W.C. to 0-400 psi
3,000	STEEL OR 316 S.S.	0-60" W.C. to 0-400 psi	0-60" W.C. to 0-400 psi
6,000	STEEL OR 316 S.S.	0-70" W.C. to 0-400 psi	0-70" W.C. to 0-400 psi
10,000	ALLOY STEEL (4140)	0-100" W.C. to 0-400 psi	0-100" W.C. to 0-400 psi

*Absolute pressure ranges available from 100" W.C. to 400 psi.
NOTE: Consult factory for additional ranges.

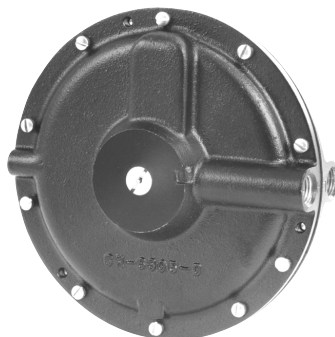


DIAPHRAGM ELEMENTS

Table 3. Diaphragm Ranges/Materials

ELEMENT RANGE	NI-SPAN "C"	316 S.S.
0-50 to 0-60"	*	*
0-66 to 0-105"	*	-
0-90 to 0-110"	-	*
0-110 to 0-160"	*	-
0-120 to 0-160"	-	*
0-6 to 0-8 PSI	-	*
0-8 to 0-11 PSI	-	*
0-9 to 0-12 PSI	*	-
0-11 to 0-13.5 PSI	-	*
0-18 to 0-24 PSI	*	-
3-15 PSI	*	*

*Available



SLACK DIAPHRAGM

Table 4. Low Pressure Diaphragm Ranges

RANGE— INCHES H ₂ O	PRESSURE	DIFFERENTIAL PRESSURE
0-4.5 to 0-8.4	*	*
0-8.5 to 14.5	*	*
0-14.6 to 0-24.9	*	*
0-25 to 0-43.9	*	*
0-44 to 0-80	*	*

*Available

PRECALIBRATED MEASURING ELEMENTS

TEMPERATURE

All temperature measuring elements are interchangeable with bourdon tube and metal diaphragm elements. The basic unit is provided with five feet of armored capillary and a plain bulb, however, bulbs, capillary and connection are available in a variety of materials.

MERCURY

Mercury filled elements are all-welded, all-stainless steel units which provide a uniform sealed instrument over all temperature spans. The mercury provides a high order of repeatability and responsiveness.

Class VB, Case Compensated—Suitable for capillary lengths up to 20 feet.

Class VA, Case and Line Compensated—Capillary is self-compensating for ambient temperature changes. Can be used for lengths up to 100 feet without excessive error.

GAS

These elements utilize a powerful low hysteresis beryllium copper bourdon tube, copper connecting capillary and all-stainless steel bulb. For gas elements in ranges above 600°F, stainless steel capillary is used.

Class III, Gas Actuated (nitrogen)—Provides linear scale for relatively long spans of temperature (minimum span 400°F). Bulb size is kept large enough to reduce ambient temperature variation errors to small values.

ORGANIC LIQUID (TOLUENE)

Liquid filled elements utilize a compact high torque beryllium copper helix. Provides linear scale for short spans. Ideal when mercury is objectionable for toxicity danger, or bulb space is limited.

Class 1B, Case Compensated—Suitable for line lengths up to 5 feet without excessive error.

Class 1A, Fully Compensated—Utilizes a second element less bulb which corrects for temperature changes along line and at case. Permits use of organic filled elements for line lengths up to 100 feet.

ARMOR

Flexible Spiral Armor—Double interlocked spiral armor is ¼" diameter, provides excellent mechanical protection for the capillary connecting tubing. Type 302 or 304 stainless steel.

Plain Capillary—(no armor)—1/8" diameter Varinul® capillary is standard for Class VA mercury. 1/16" diameter Type 347 stainless capillary is standard for Class VB mercury. For Gas and Organic Liquid filled elements, stainless steel is standard.

Table 5. Thermal Element Characteristics

ACTUATION	CLASS	TEMPERATURE LIMITS		MIN. PRACTICAL SPAN	STD. BULB DIAMETER (V)	MAX. LENGTH OF CAPILLARY
		°C	°F			
MERCURY	VB	-40 to 649	-40 to 1200	25°C/45°F	½"	20'
	VA	-40 to 649	-40 to 1200	25°C/45°F	½"	100'
ORGANIC LIQUID	1B	-73 to 204	-100 to 400	9°C/17°F	¼"	5'
	1A	-73 to 204	-100 to 400	9°C/17°F	¼"	100'
GAS	III	-73 to 538	-100 to 1000	204°C/400°F	¾"	125'

Optional Indicating Controller Features

AUTOMATIC/MANUAL FUNCTION

This option allows the process to be controlled automatically or manually with provision for bumpless transfer. A 3-way valve in the nozzle line permits automatic or manual control of instrument output using a pressure regulator mounted on top of the relay. Bumpless transfer is facilitated by a differential

pressure indicator which responds to very low pressure differentials. This makes it possible to closely match regulator pressure to nozzle pressure. With this system, controller output air is used for manual control. Air delivery and control response are the same for manual and automatic modes.

