

GS 2M4B1-E

The Model MC43 Pneumatic Indicating Controller, designed for field mounting, satisfies industry's need for an economical, dependable means of automatically controlling on-line variables where no permanent record is required. Highly reliable, it measures and controls important process variables such as temperature, pressure, flow and liquid level. A variety of measuring elements for specific process variables can be built into its housing along with the control mechanism, making the Model MC43 a low cost, compact, stand-alone instrument which can both indicate process variables and control them at desired setpoints. The controller's case is weatherproof and dustproof offering excellent durability, and the indicating pointer and the setting index are visible even from a distance. Thus the MC43 is highly suitable for mounting outdoors or in the field.

■ STANDARD SPECIFICATIONS

Measuring Range Limits:

Temperature: -75 °C and 500 °C (-103 to 932 °F).
Gauge pressure: Full vacuum to 206 MPa {2100 kgf/cm²}.
Absolute pressure: 0 to 241 kPa {1800mmHg} absolute.
Differential pressure: 0 to 350 kPa {35 mH₂O}.

Measuring Elements:

Refer to page 3, 4, and 5.

Output Signal:

20 to 100 kPa, 0.2 to 1.0 kgf/cm² or bar, or 3 to 15 psi, whichever specified.

Output Gauge:

0 to 200 kPa, 0 to 2 kgf/cm² or bar, or 0 to 30 psi.

Air Supply:

140 kPa, 1.4 kgf/cm² or bar, or 20 psi, whichever specified.

Air Consumption:

0.5 m³/h at 0 °C, 101.3 kPa {1.033 kgf/cm²} absolute (0.3 scfm).

Control Modes:

On-off, proportional (P), proportional plus derivative (P+D), proportional plus integral (P+I), proportional plus integral plus derivative (P+I+D), differential gap, batch plus proportional plus integral (BATCH+P+I).
Proportional band: 4 to 400 %, direct or reverse.
Integral time: 0.01 to 50 minutes.
Derivative time: 0.05 to 50 minutes.
Differential gap: 2 to 100 %.

Indicating and Setting Scale:

Effective nominal length 156 mm (6 inches). Black divisions and letters on white background.



Indicator Accuracy:

Temperature T1A, T3B elements: ±0.5 % span or ±0.3 °C, whichever is greater.
Pressure P21, 22, 31, PR1, P42, 51, 52 elements: ±0.5 % span.
Pressure P32, 72 elements: ±0.75 % span.
Heavy duty pressure P61, 62 elements: ±2.0% span.
Differential pressure B199 element: ±0.75 % span.

Pointers:

Fluorescent red.

Set Point:

Local (manual) set, standard. Remote (pneumatic) set, optional. In local set version internal set point knob is accessible by opening hinged door.

Door and Case:

Aluminum alloy, finished with polyurethane paint.
Light grayish green (Munsell 2.5GY5.0/1.0).

Enclosure Classification:

Meets IP53 and provides protection of NEMA Type3.

Operating Temperature Range:

-30 to +80 °C (-20 to +180 °F).

Mounting:

Surface, flush panel and 2-inch pipe (Surface and flush panel mountings are not available for instruments with P61, P62 and B199 element).

Connections:

In bottom of case.
Air: Tapped for JIS R1/4 or 1/4 NPT male.
Pressure and vacuum: JIS Rc1/4 or 1/4 NPT female up to 140 kgf/cm² or bar, 14 MPa, 2000 psi. JIS R1/2 or 1/2 NPT male up to 700 kgf/cm² or bar, 69 MPa, 10000 psi. 9/16-18 female Aminco * fitting with compression nut and sleeve over 700 kgf/cm² or bar, 69 MPa, 10000 psi.
* American Instrument Company's high pressure connection

Approximate Weight:

7.6 kg (17 lb)
. . .MC43-A5C-N*A (excluding elements and bracket).

MODEL AND SUFFIX CODES

Model	Suffix Codes	Description
MC43	Pneumatic Indicating Controller
Control Mode	-A1	On-off
	-A2	Proportional
	-A3	Proportional plus derivative
	-A4	Proportional plus integral
	-A5	Proportional plus integral plus derivative
	-A7	Differential gap
	-B4	Batch plus proportional plus integral *1
Auto/Manual Transfer Switching	N	None
	C	With 2-position switch, regulator
Remote Pneumatic Set Point	-N	None
	-P	With remote pneumatic set point *2
Style	*A	Style A
Base Instrument Option	/ □	
Measuring Element and Option	// □ / □	

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*1: Batch plus proportional plus derivative not additional for pneumatic set point and /TRS (refer to additional feature below).

*2: For remote set point, elements P21, P61, P62, P72 and B199 cannot be used.

OPTIONS

External Connection to Integral (Reset) Bellows:

Applicable for proportional plus integral controllers for use in multiple auto-selector system or other arrangements where an external feedback signal, must be applied to prevent "reset wind-up."

Option code: ECRB.

Pneumatic Transmission Unit:

Transmits pneumatic signal 20 to 100 kPa; 0.2 to 1.0 kgf/cm² or bar; 3 to 15 psi corresponding to measurement value indicated.

Option code: TRS.

Air Set:

Fixed combination pressure regulator and filter with 35 mm diameter pressure gauge mounted and piped to transmitter. Also available without gauge.

Supply pressure: 0.2 to 1 MPa, 2 to 10 kgf/cm² or bar, or 30 to 150 psi.

Output pressure: 140 kPa, 1.4 kgf/cm² or bar, or 20 psi.

Maximum operating temperature: 80 °C (180 °F).

Shatterproof Glass Window:

For use in areas where abrasive dust would cause scratching of the glass window under conditions of frequent wiping.

Option code: GID.

Stainless Steel Tag Number Plate:

JIS SUS304 stainless steel tag number plate on side of case. Option code: SCT

Special Color Finish on Door:

Option code: SCF-□P (specify color code in □). (Refer to GS 22D1F1-E).

ANSI Connection:

Air connections are also tapped for ANSI NPT threads in addition to the process connections. Option code: NPT

Special Scale Plates:

Specify the following option codes when scale plates other than standard are desired.

(Refer to GS 22D1C7-E)

Special range scale (uniform single-scale with single label)

Option code : SPQ

Special graduation scale (uniform single-scale with single label)

Option code : SPR

Special range scale (uniform double-scale with double label)

Option code : SPW

Pressure equivalent unit scale (uniform double-scale with double label)

Option code : SPX

Pressure Element Options:

Write suffix code immediately after element code.

Extended scale: Suppressed zero range. Suffix code: EXS.

Overrange protection:

Option code: ORP.

Underrange protection:

Option code: URP.

Element degreasing for oxygen service: Available for P42, P51 and P52.

Option code: OSW

Differential Pressure Element Options:

Write option code immediately after element code.

Oxygen service: Available for B199-3-B74 element only. Element degreased and Daifloil® filled. Operating temperature range: -20 to +100 °C.

Option code: OSFC.

Stainless steel bolts: For B199-3-B74 and B199-3-D54 elements 17-4 pH.

Option code: SSB.

MEASURING ELEMENT SPECIFICATIONS

Temperature Elements:

Element Code	Element Code Suffix	Description
T1A	Liquid expansion system, fully compensated.
T3B	Gas pressure system, case compensated.
	-AB	Bulb extention neck *2 Bendable neck with adjustable union.
	-FB	Bendable neck with fixed union.
	-NB	Plain bendable neck.
	0	Process connection Plain or jam nut only (without bushing).
	2	JIS R1/2 (for T1A element).
	3	JIS R3/4 (for T1A element).
	4	JIS R1 (for T3B element).
	5 *1	ANSI 1/2 NPT (for T1A element).
	6 *1	ANSI 3/4 NPT (for T1A element).
	7 *1	ANSI 1 NPT (for T3B element).
	-DS <input type="checkbox"/>	Capillary tubing *3 Specify length in <input type="checkbox"/> m Dual capillary (for T1A element).
	-SS <input type="checkbox"/>	Single capillary (for T3B element).
	-3	Base Instrument Model MC 43
	/ORP	Option: Overrange protection.
	/URP	Underrange protection *4.

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- *1: Air connections are also tapped for ANSI NPT threads in addition to the process connection.
 *2: Total length (J): 150 mm to 1500 mm.
 *3: Capillary tubing length: 02, 03, 05, 07, 10, 15 or 22.
 *4: Underrange protection is standard for all elements the bottom range of which is over 25 °C.

Standard Ranges for Temperature Elements:

	Span	Standard Range (°C)	Measuring Range
T1A	25	0 to 25 *1, 25 to 50 *2, 50 to 75 *2, 75 to 100 *2	0 to 120
	50	0 to 50 *1, 25 to 75 *3, 50 to 100 *2, 75 to 125 *3, 100 to 150 *2, 125 to 175 *3, 150 to 200 *2	-15 to 200
	100	0 to 100 *1, 25 to 125 *3, 50 to 150 *3, 75 to 175 *3, 100 to 200 *2, 150 to 250 *3, -25 to 75 *3 -50 to 50 *3	-63 to 200
	150	0 to 150 *1, 50 to 200 *2, 100 to 250 *2, -50 to 100 *2, -25 to 125 *3	-70 to 250
	200	0 to 200 *1, 50 to 250 *2, -50 to 150 *2	-70 to 250
	250	0 to 250 *1, -50 to 200 *2	-70 to 250
T3B	150	0 to 150 *1, 50 to 200 *2, 100 to 250 *2, 150 to 300 *2, 200 to 350 *2, 250 to 400 *2	-15 to 400
	200	0 to 200 *1, 50 to 250 *2, 100 to 300 *2, 150 to 350 *2, 200 to 400 *2, 250 to 450 *2, 300 to 500 *2	-15 to 500
	250	0 to 250 *1, 50 to 300 *2, 100 to 350 *2, 150 to 400 *2, 200 to 450 *2, 250 to 500 *2	-15 to 500
	300	0 to 300 *1, 50 to 350 *2, 100 to 400 *2, 150 to 450 *2, 200 to 500 *2	-15 to 500
	350	0 to 350 *1, 50 to 400 *3, 100 to 450 *2, 150 to 500 *3	-15 to 500
	400, 450, 500	0 to 400 *1, 50 to 450 *3, 100 to 500 *2, 0 to 450 *1, 50 to 500 *3, 0 to 500 *1	-15 to 500

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- *1: Applicable for Uniform standard scale on the instrument (Single-scale with single label requires no option code).
 *2: Applicable for Special range scale on the instrument (Single-scale with single label requires Option code SPQ).
 *3: Applicable for Special graduation scale on the instrument (Single-scale with single label requires Option code SPR).

Pressure Elements:

Element Code	Element Type	Element Material	Process Connection	Minimum and Maximum Spans *3		
				SI Units	Metric Unit	psi Unit
P 21	75 mm diaphragm	Cu-Ni-Mn	JIS Rc 1/4 (or 1/4 NPT) female	2.5 to 10 kPa. 2.5 to 4.75 kPa Vacuum.	255 to 1015 mmH ₂ O. 255 to 480 mmH ₂ O Vacuum.	10 to 40 inH ₂ O. 10 to 19 inH ₂ O Vacuum.
P 22	50 mm diaphragm	Cu-Ni-Mn		6.2 to 70 kPa. 6.2 to 35 kPa Vacuum.	635 to 7110 mmH ₂ O. 635 to 3555 mmH ₂ O Vacuum.	25 to 280 inH ₂ O. 25 to 140 inH ₂ O Vacuum.
P 31	Bellows	Phosphor Bronze		34 to 101.3 kPa Vacuum.	255 to 760 mmHg Vacuum.	10 to 32 inHg Vacuum.
P 32	Bellows	JIS SUS 316L stainless steel(ss)		31 to 140 kPa	0.32 to 14 kgf/cm ²	4.5 to 20 psi
PR 1 *1	Receiver bellows	Phosphor Bronze		80 kPa	0.8 kgf/cm ²	12 psi
P 42	Spiral bourdon	JIS SUS 316L*4		0.1 to 1.37 MPa	1.0 to 14 kgf/cm ²	15 to 200 psi
P 51	Helical bourdon	JIS SUS 316L		1.37 to 7 MPa	14 to 70 kgf/cm ²	200 to 1000 psi
P 52	Helical bourdon	JIS SUS 316L	*2	7 to 42 MPa	71 to 420 kgf/cm ²	1000 to 6000 psi
P 61	Heavy-duty helical bourdon	JIS SUS 316	*2	4.4 to 69 MPa	45 to 700 kgf/cm ²	640 to 10000 psi
P 62	Heavy-duty helical bourdon	JIS SUS 316	*2	34 to 206 MPa	350 to 2100 kgf/cm ²	5000 to 30000 psi
P 72	Bellows (absolute pressure)	JIS SUS 316	JIS Rc1/4 (or 1/4 NPT) female	17 to 241 kPa absolute	130 mmHg absolute to 2.4 kgf/cm ² absolute	130 mmHg and absolute to 35 psi

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*1: Pressure range for PR1 is 0.2 to 1 kgf/cm² or bar, 20 to 100 kPa, or 3 to 15 psi.

*2: Measuring pressure 140 kgf/cm² or bar (13.7 MPa or 2000 psi) or less: Process connection JIS Rc1/4 (or 1/4 NPT) female.

Measuring pressure 141 to 700 kgf/cm² or bar (13.8 to 69 MPa, or 2000 to 10000 psi): JIS R 1/2 (or 1/2 NPT) male.

Measuring pressure 701 kgf/cm² or bar (69.1 MPa or 10000 psi) or more : 9/16-18 F Aminco (American Instrument Co.) connection.

For Aminco connection, YEW supplies Aminco fitting and nipple (O.D. 6.4 mm, I.D.1.4 mm, length 100 mm). Weld between nipple and tube leading to process to be done by user.

*3: mbar or bar unit calibration is also available.

*4: Vacuum use Element's material: JIS SUS 316.

Applicable Items for Pressure Element:

Element Code	Suppress- ed-Zero Range	Elevated- Zero- Range	Vacuum Range	Over- range Protection	Under- range Protection
P 21	×	×	○	standard	×
P 22	×	○	○	standard	×
P 31	×	×	○	standard	×
P 32	×	×	×	standard	×
PR 1	always	×	×	standard	standard
P 42	○	○	○	○	○
P 51	○	○	○	○	○
P 52	○	○	○	○	○
P 61	●	×	×	●	●
P 62	●	×	×	●	●
P 72	○	×	○	standard	standard

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○ mark: Optionally available.

× mark: Not available.

● mark: Only one of these options may be specified per element.

Differential Pressure Element:

Element Code	Element Code Suffix	Description
B199	Differential Pressure Element
	-3	Always 3
Body Material	-D54	JIS S40C Carbon Steel
	-B74	JIS SUS316 Stainless Steel
Range	<input type="checkbox"/>	See the table below
Process Connection	-1	JIS Rc1/4 female
	-2	JIS Rc1/2 female
	-3	1/4 NPT female
	-4	1/2 NPT female
Options	<input type="checkbox"/> <input type="checkbox"/>	Additional Features

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Differential Pressure (ΔP) Range:

Suffix Code	mH ₂ O *1	kPa	inH ₂ O
01	0 to 0.5	0 to 5	0 to 20
03	0 to 0.75	0 to 7.5	0 to 30
05	0 to 1	0 to 10	0 to 40
06	0 to 1.25	0 to 12.5	0 to 50
07	0 to 1.5	0 to 15	0 to 60
08	0 to 1.8	0 to 18	0 to 70
09	0 to 2	0 to 20	0 to 80
12	0 to 2.6	0 to 26	0 to 100
13	0 to 3	0 to 30	0 to 120
17	0 to 4	0 to 40	0 to 160
20	0 to 5.1	0 to 51	0 to 200
29	0 to 10	0 to 100	0 to 400
34	0 to 15	0 to 150	0 to 600
37	0 to 20	0 to 200	0 to 800
39	0 to 26.4	0 to 264	0 to 1000
41	0 to 30	0 to 300	0 to 1200
42	0 to 35	0 to 350	0 to 1400

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*1: mbar unit calibration is also available.

Maximum Working Pressure:B199-3-B74: 17 MPa, 175 kgf/cm² or bar, or 2500 psi.B199-3-D54: 6.9 MPa, 70 kgf/cm² or bar, or 1000 psi.**Operating Temperature Limits:**

-30 °C (-22 °F) and 93 °C (200 °F) at element.

Process Connections:

JIS Rc1/2 and Rc1/4 or 1/2 NPT and 1/4 NPT female whichever specified.

Element Material:

Bellows Assembly: JIS SUS316L ss (ss = stainless steel).

Range Springs: Isoelastic or Elgiloy.

Body and Cover: JIS S40C carbon steel or JIS SUS 316 ss (whichever specified).

Gasket: Nickel.

Approximate Element Weight:

B199-3-B74: 18 kg (40 lb).

B199-3-D54: 14kg (31 lb).

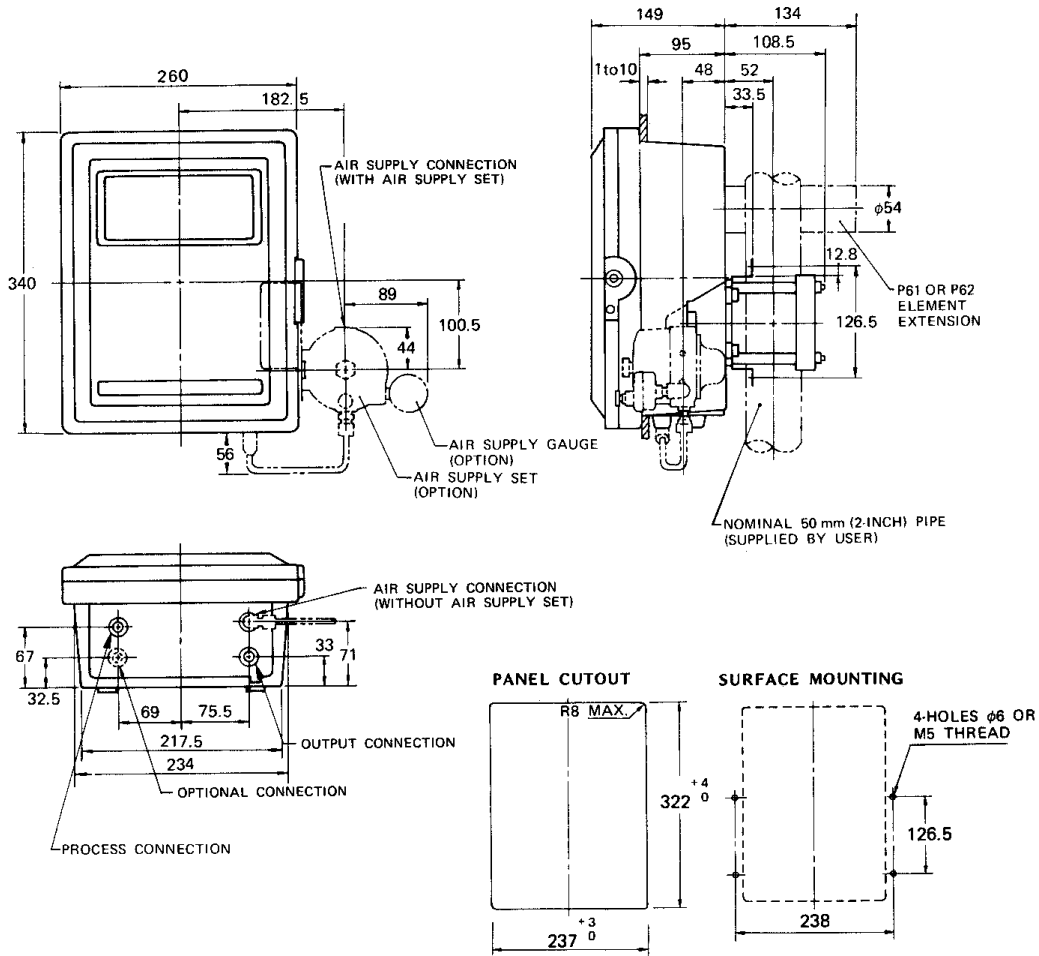
ORDERING INSTRUCTIONS

When ordering specify the following:

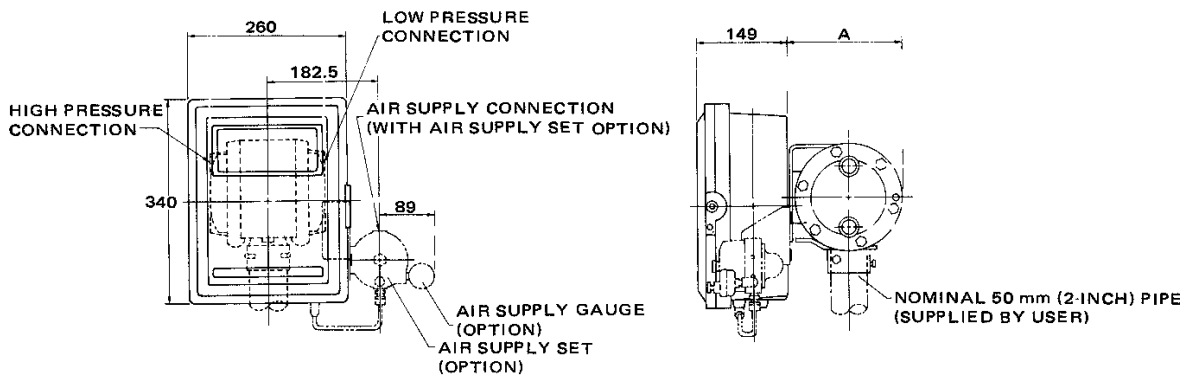
1. Model and suffix codes.
2. Range and scale range. Refer to GS 22D1C7-E.
3. Control action: Direct or reverse.
4. Output signal calibration : 20 to 100 kPa, 0.2 to 1.0 kgf/cm² or bar, or 3 to 15 psi.
5. Process connection: JIS Rc or NPT.

DIMENSIONS

Unit : mm



Model MC43/T and MC43/P



ELEMENT	A
B199-3-B74	189
B199-3-D54	183

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Model MC43/B199