Yamamoto Electric Works Co., Ltd. <<13th edition>> SEPTEMBER 2021



Manostar General Catalog



Manostar



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	Application				pp. 114–117						
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List of products in catalog [Manostar gauge]

List of products			WO81		WO81 a	irflow rate/airflow	/ speed meter
WO81	Model			-		-	-
WO71	Dana akawina dataila	D-UC	2	D	D-UC		0
	Page snowing details	Pressure	Accuracy	pp. 11- Withstanding pressure of	Airflow rate/airflow	Accuracy	pp. 15- Withstanding pressure of
FR51A		range	(at 20℃)	pressure-receiving element	speed range	(at 20℃)	pressure-receiving element
		0–50 Pa	±5% FS				
MS99		0–100 Pa	±2.5% FS	10 kPa			
		0-200 Pa					
MS99S		0–500 Pa					
		0–1000 Pa					
MS61A-RA		0–1 kPa		40 kPa			
		0–2 kPa					
QDP33		0–3 kPa	+1 5% ES				
	Pressure (airflow rate/ speed) range	0–5 kPa	±1.3 /01 3				
EMD8A	Accuracy Withstanding pressure	0–10 kPa			*To procure an a	irflow rate/speed mete	er, it is necessary to first
	of pressure-receiving	0–20 kPa			prepare an airfl For details, refe	ow rate/speed scale sp r to page 15.	pecification document.
EMD7		0–30 kPa		150 kPa			
		0-50 kPa					
EMT1		+50 Pa					
		±100 Pa	±2.5% FS	10 kPa			
EMTGP1		±200 Pa			-		
		±300 Pa					
FMT1H		±500 Pa	+1 5% ES	40 kPa			
		±1 kPa	±1.3 /01 3	40 KF a			
EMT6		±2 kPa					
LIVITO		±3 kPa					
	Pressure unit	Pa, kPa, airflo	w rate, airflow speed				
EIVIFJA	Fressure measurement method			nonel trac			
	Memory pointer	None one pie	round parier type, square				
EIVIRTI	Pressure-receiving element	Diaphragm (s	ilicone rubber)				
	Measured gas	Air and nonco	rrosive gas (liquid cannot	t be measured)			
HWSI5A	Mounting method	Surface mour	iting, panel mounting	,			
	Mounting orientation	Horizontal, up	right, others	·			
Accessories	Scale indication angle	Wide-angle in	dication of approx. 270 d	egrees			
Application	Operating ambient temperature	−10°C to +50°	C (no freezing allowed)				
Precautions	Operating ambient humidity	90% RH or be	low (no condensation all	owed)			
Heintenense	Instrument body withstanding pressure	200 kPa					
maintenance	Exterior material	Polycarbonate	e and polyamide				
	Compatible pipe	Vinyl pipe or r	ubber pipe (inner diamete	er of 6 mm), separately so	old accessories ava	ailable	
	Base polarity	Changeable					
	Mass	Approx. 270 g	I				

		WO71			FR51A		List of products
Model)		All Alexander		WO81
Page showing details	RoHS		pp. 23-	RoHS	-	PP. 31-	W071
	Pressure	Accuracy	Withstanding pressure of	Pressure	Accuracy	Withstanding pressure of	ED51A
	range	(at 23°C)	pressure-receiving element	range	(at 23℃)	pressure-receiving element	FROTA
	0, 100 Po	-		0-50 Pa	-		14000
	0-100 Fa	-		0-200 Pa	-		MS99
	0-300 Pa	-		0-300 Pa	-		
	0–500 Pa	-		0–500 Pa	-		MS99S
	0–1000 Pa	-		0–1000 Pa	-		
		-			-		MS61A-RA
	0–2 kPa	-		0–2 kPa	-		
	0–3 kPa			0–3 kPa	-		QDP33
Pressure range	0–5 kPa	-		0–5 kPa	-		
Accuracy Withstanding pressure		-			-		FMD8A
of pressure-receiving		±2.5% FS	20 kPa		±2.5% FS	20 kPa	LINDOA
ciement							EMD 7
		-]		EIVID7
]		
		-		±50 Pa	-		EMT1
		_		±100 Pa			
							EMTGP1
		-			-		
		-			-		EMT1H
		-					
		-			-		EMT6
-							LINITO
Pressure unit	Pa, kPa			Pa, kPa			
Pressure measurement method	Differential pr	essure method		Differential pr	ressure method		EIVIPOA
External shape	Common to surfa	ace type and round panel type, su	irface type, square panel type	Horizontal scale	e type, vertical scale type, colo	r-coded horizontal scale type	
Memory pointer	None, one pie			None			EMRT1
Pressure-receiving element	Diaphragm (s			Diaphragm (s			
Measured gas	Air and nonco	prrosive gas (liquid canno	t be measured)	Air and nonco	orrosive gas (liquid canno	t be measured)	HWS15A
Mounting method	Surface mour	nting, panel mounting		Panel mounti	ng		
Mounting posture	Horizontal, up	oright, others		Horizontal, up	pright, others		Accessories
Scale indication angle	Approx. 70°			(scale length:	approx. 45 mm)		
Operating ambient temperature	-10°C to +50°	ິC (no freezing allowed)		-10°C to +50	°C (no freezing allowed)		Application
Operating ambient humidity	90% RH or be	elow (no condensation all	owed)	90% RH or be	elow (no condensation al	lowed)	Precautions
withstanding pressure	50 kPa			50 kPa			Maintenance
Exterior material	Polycarbonat	e and polyamide		Polycarbonat	e		
Compatible pipe	Vinyl pipe or i Separately so	rubber pipe (inner diamet old accessories available	er of 4 or 6 mm)	Vinyl pipe or	rubber pipe (inner diamet	er of 4 mm)	
Base polarity	Partially chan	geable (only for side face	pipe)	Unchangeabl	le		
Mass	Body: approx	c. 130 to 200 g		Approx. 90 g			

List of products in catalog [Manostar switch]

List of products			MS99			MS99S		MS61A-RA			
WO81	Model		0		Intrinsically sa Ex ia IIC T6 G	a a a a a a a a a a a a a a a a a a a					
WO/T	Page showing details		for 30 V DC and lower	GN DD. 35-	RoHS	pp. 43	- RoHS	7		pp. 47–	
FR51A		Pressu	ire range	Scale settir (at 2	ng accuracy 23°C)	Maximum operating pressure difference	Pressure range	Scale settir (at 2	ng accuracy M 0°C) p	laximum operating ressure difference	
		20–	120 Pa	±5.0 P	а	25.0 Pa	20–120 Pa	1 ±5.	0 Pa	37.5 Pa	
MS99		20-	200 Pa	±9.0 Pa		25.0 Pa					
		30-	300 Pa	±13.5	Pa	30.0 Pa	50,000 D		- D.		
M\$99\$		50-	500 Pa	±22.5	Pa	45.0 Pa	50-300 Pa	1 ±1	5 Pa	60 Pa	
MS61A-RA	Pressure range Scale setting accuracy Maximum operating	100-	1000 Pa	±45 Pa	à	70 Pa	100–600 Pa	1 ±2	5 Pa	120 Pa	
	pressure difference						0.2–1.2 kF	a ±0.05	50 kPa	0.240 kPa	
QDP33		0.3-	3 kPa	±0.135	kPa	0.000 -	0.5.045	0.4		0.00 1/0-	
		0.5-	5 kPa	+0 225	kPa	0.300 kPa	0.5–3 KF	a ±0.1	і5 кра	0.60 KPa	
EMD8A		0.5-	JKFd	10.225	KF d	0.430 KF a	1–6 kF	a ±0.3	30 kPa	1.20 kPa	
		1-	10 kPa	±0.45	kPa	0.70 kPa					
EMD7		3–	30 kPa	±1.35	kPa						
						3.00 kPa					
EMT1	Pressure unit	Pa, kPa					Pa, kPa				
EMIGP1	Pressure measurement method Contact specification	Differential p Common to	standard load a	d and minute load	d		Differentia Minute loa	pressure d/single-p	method oole norn	nally open	
	Scale setting	Upper limit :	setting, lower lin	nit setting			Upper limi	setting, l	ower limit	setting	
EMTIH	Pressure-receiving	Diaphragm	(silicone rubber)			Diaphragn	ı (silicone	rubber)		
LIVITIT	Measured gas	Air and non	corrosive gas (li	quid cannot be	e measured)		Air and no be measu	ncorrosive ed)	e gas (liqu	uid cannot	
EMT6	Mounting posture	Upright, hor	izontal				Mounted at arbitrary angle between horizontal and upright				
	Wiring method	Terminal					Terminal	Terminal			
EMP5A	Operating ambient temperature	−10°C to +6	0°C (no freezing	g allowed)			-10°C to +	50°C (no	freezing a	allowed)	
	Operating ambient humidity	90% RH or	below (no conde	ensation allowe	ed)		90% RH o allowed)	r below (n	o conder	isation	
FMRT1	Instrument body withstanding pressure	10 to 50 kPa	a				100 kPa				
	Withstanding pressure of pressure-receiving element	10 to 50 kPa	a				20 kPa				
	Exterior material	Polycarbona	ate and polyami	de			Polyamide				
HW315A	Compatible pipe	Vinyl pipe of Separately s	r rubber pipe (in sold accessories	ner diameter c s available	of 4 or 6 mm)		Vinyl pipe of 4 mm)	or rubber	pipe (inne	er diameter	
Accessories	Mass	Approx. 170) to 190 g				Approx. 14	0 g			
	Opening/closing capability	Load	Rated volt	age F	Resistance load	Induction load	Rating	Opening/ losing voltage	Opening/ closing curre	Opening/ ent closing power	
Application			30 V D0		0.8 A	150 mA (time constant: 7 m	;)				
Precautions		Standard load	100 V A	c	5 A	60 mA (power factor: 0.6)					
Maintenance	Standard specification		250 V A	С	5 A	_					
		Minute load	30 V D0 125 V A	c	100 mA	_	0.1 – 30 V DC	100 V DC maximum)	0.25 A D((maximun	C 10 W DC (maximum)	
	30 V DC and lower	Standard load	30 V D(0.8 A	150 mA (time constant: 7 m	5)				
	specification	Minute load			100 mA	-					
	Intrinsically safe type	—	12 V D0		30 mA	_					

List of products in catalog [Manostar digital sensor]

	QD	P33 [ultra-lov	v pressure range]		QD	P33	List of products
Model	30×30 type NEW		14				WO81
			58	30			
			-				WO71
Page showing details	RoHS (E	c Aus		Desseure	A	pp. 51–	
	Pressure range	Accuracy (at 23°C)	Output method	Pressure range	Accuracy (at 23°C)	Output method	FR51A
	0-10 Pa	-			_		MSOO
	0-25 Fa	-		0–50 Pa	_		101244
				0–100 Pa			MS99S
				0–200 Pa			
			Analog output	0–300 Pa		Analog output	MS61A-RA
			Output type: 4 to 20 mA (biased pressure: 0	0–500 Pa		Output type: 4 to 20 mA (biased pressure:	
			to FS, \pm : at pressure of -50 to $\pm 50\%$ FS)	0–1000 Pa		0 to FS, \pm : at pressure of -50 to $\pm 50\%$ FS)	QDP33
_			Load resistance: 0 to 250 Ω	0–1 kPa		Load resistance: 0 to 250 Ω	
Pressure range Accuracy		-	Output type: 1 to 5 V (biased pressure: 0	0–2 kPa	_	Output type: 1 to 5 V (biased pressure: 0	EMD8A
Output method	±10 Pa	±1.5% FS	to FS, ±: at pressure of -50 to +50% FS) Load resistance: 10 kΩ or higher Comparison output Output type: NPN open collector or two systems of PNP open collector		±1.0% FS	to FS, \pm : at pressure of -50 to $\pm 50\%$ ES)	
	±25 Pa					Load resistance: 10 kΩ or	EMD7
		_		±50 Pa		Comparison output Output type: NPN open collector or	
		_		±100 Pa			EMTI
		_		±200 Pa		two systems of PNP open	LIVITI
		_		±300 Pa		collector	EMICOL
		_		±500 Pa			EWIIGPT
		_		±1000 Pa			-
				±1 KPa			EMITH
		-		±2 KPa			
							EMT6
Pressure unit	Pa, kPa			Pa, kPa			
Measured gas	Air and nonco	orrosive gas (liqui	d cannot be measured)	Air and nonce	orrosive gas (liqui	d cannot be measured)	EMP5A
element	Diaphragm (s	silicone)		Diaphragm (s	silicone)		
Mounting method	Panel mounti	ing, bracket mou	nting	Panel mount	ing, bracket mou	nting	EMRT1
Mounting orientation	Upright			Upright			
Wiring method	Connector (6	P)		Connector (6	iP)		HWS15A
temperature	0°C to 50°C (r	no freezing allowe	ed)	0°C to 60°C (no freezing allowe	ed)	
humidity	35% to +85%	RH (no condens	ation allowed)	35% to +85%	RH (no condens	ation allowed)	Accessorie
withstanding pressure	10 kPa			10 kPa			
of pressure-receiving	10 kPa			10 kPa			Application
Display	Main display:	: 12-segment LCI	D (white/red), four digits	Main display	: 12-segment LCI	D (white/red), four digits	Precautions
Power voltage	12 to 24 V D($C \pm 10\%$ (ripple of	f 10% or below)	12 to 24 V D	$C \pm 10\%$ (ripple of	f 10% or below)	Maintenance
Protection level	Standard: IE0	C 60529 Grade co	de: IP40	Standard: IE	C 60529 Grade co	de: IP40	
Exterior material	PBT and poly	yamide		PBT and poly	yamide		
Compatible pipe	Vinyl pipe or	rubber pipe (inne	r diameter of 4 mm)	Vinyl pipe or	rubber pipe (inne	r diameter of 4 mm)	
Mass	Approx. 30 g			Approx. 30 g			

List of products in catalog [Manostar digital sensor]

list of products			EM	D8A		EN	MD7
WO81	Model	24×48 type			48×48 type	3	
WO71	Page showing details	ROHS CE	c AL us	pp. 63-	RoHS CE	RU us	pp. 71-
FR51A		Pressure	Accuracy	Output method	Pressure	Accuracy (at 20°C)	Output method
MS999 MS999S MS61A-RA QDP33 EMD8A EMD7 EMT1 EMT6	Pressure range Accuracy Output method	111ge 0-50 Pa 0-100 Pa 0-200 Pa 0-300 Pa 0-500 Pa 0-1000 Pa 0-1000 Pa 0-1000 Pa 0-1000 Pa 0-2 kPa 0-3 kPa 0-5 kPa ±50 Pa ±200 Pa ±300 Pa ±500 Pa	±1.5% FS	Analog output Output type: 4 to 20 mA (biased pressure: 0 to FS, \pm : at pressure of -50 to $+50\%$ FS) Load resistance: 0 to 250 Ω Output type: 1 to 5 V (biased pressure: 0 to FS, \pm : at pressure of -50 to +50% FS) Load resistance: 10 k Ω or higher Comparison output Output type: NPN open collector or two systems of PNP open collector	0-100 Pa 0-200 Pa 0-300 Pa 0-300 Pa 0-500 Pa 0-1 kPa 0-2 kPa 0-3 kPa 0-5 kPa	±1.5% FS	Analog output Output type: 4 to 20 mA (at pressure of 0 to FS) Load resistance: 0 to 250 Ω 1 to 5 V (at pressure of 0 to FS) Load resistance: 10 kΩ or higher Alarm output Output type: NPN open collector or PNP open collector One each for upper limit and lower limit
	Pressure unit	Pa, kPa			Pa, kPa		
EIVIP5A	Measured gas	Air and nonco	rrosive gas (liqui	d cannot be measured)	Air and nonco	prrosive gas (liqui	d cannot be measured)
	element	Diaphragm (si	ilicone rubber)		Diaphragm (s	ilicone rubber)	
EMRT1	Mounting method	Panel mountir	ng		Panel mounti	ng	
		Upright	<u>د</u>		Upright		
HWS15A	Operating ambient		·)	ad)			
	temperature Operating ambient	35% to +85%	RH (no conders	ation allowed)	35% to +85%	RH (no condens	ation allowed)
Accessories	humidity Instrument body	10 kPa			20 kPa		
Application	withstanding pressure Withstanding pressure of pressure-receiving element	10 kPa			20 kPa		
Precautions	Display	7-segment LE	D, red 3-1/2 digit	İS	7-segment LE	ED, red four digits	3
laintenance	Power voltage	12 to 24 V DC	t 10% (ripple of	10% or below)	12 to 24 V D0	C ± 10% (ripple of	f 10% or below)
	Protection level	Standard: IEC	60529 Grade co	ode: IP40 (front panel)	Standard: IEC	C 60529 Grade co	de: IP41
	Exterior material	Polycarbonate	9		ABS resin		
	Compatible pipe	Vinyl pipe or r	ubber pipe (inne	r diameter of 4 mm)	Vinyl pipe or i the outer diar	rubber pipe (inner neter must be 6 n	r diameter of 4 mm; however, nm or lower)
	Mass	Approx. 60 g			Approx. 130 g	9	

List of products in catalog [Manostar transmitter]

		EI	MT1		EM	TGP1	List of products
Model			N P	Corrosion-resis Dedicated to ne pressure meas	stant type egative urement		WO81
Page showing details	RoHS		pp 77	RoHS	8	PD 81-	WO71
Page showing details	Pressure	Accuracy	Output and transmission	Prossure range	Accuracy	Output and transmission	
	range	(at 20°C)	method	i ressure range	(at 20°C)	method	FROTA
	0–10 Pa 0–15 Pa						
	0–20 Pa	±2% FS					MS99
	0–30 Pa						
	0–50 Pa						MS99S
	0–75 Pa						
	0–100 Pa						
	0–150 Pa						IVI50 I A-KA
	0–200 Pa			0 to -200 Pa			
	0–300 Pa			0 to -300 Pa			QDP33
	0-500 Pa			0 to -500 Pa			
	0-1000 Pa		Two-wire type:	0 to -1000 Pa			FMD8A
	0-10001 a	±1%FS	DC	010 100012			LINDOA
	0–2 kPa		(load resistance of 500 Ω or lower)	0 to −2 kPa		Two-wire type:	EMD7
Accuracy	0–3 kPa		Power voltage of 24 V DC ± 10%			Output signal of 4 to 20 mA	EIVID7
Output and transmission method	0–5 kPa		(ripple of 0.2 V P-P or lower)		±2.5% FS	(load resistance of 500 Ω or	
	0–10 kPa		Four-wire type:			Power voltage of 24 V DC ±	EMT1
	0-20 kPa		Output signal of 4 to 20 mA			10% (ripple of 0.2 \/ P-P or lower)	
	0-30 kPa		(load resistance of 500 Ω or				EMIGPI
	0-100 kPa		Power voltage of 100 V AC ±				
	±10 Pa		10%, 50/60 Hz, approx. 2 VA				
	±20 Pa	±2% FS					EMT1H
	±30 Pa						
	±50 Pa						EMT6
	±100 Pa						
	±200 Pa						
	±300 Pa						EMP5A
	±500 Pa	±1% FS					
	±1000 Pa						EMRT1
	±2 кга +3 kPa						
	±5 kPa						HWS15A
Pressure unit	Pa, kPa			Pa, kPa			INVOTOR
External shape	Indoor drip-p	roof type, expose	d terminal type	Indoor drip-pro	of type, exposed	d terminal type	
Measured gas	Air and nonc	orrosive gas (liqu	id cannot be measured)	Corrosive gas ((sulfuric acid ga	s cannot be measured; for	Accessorie
Pressure-receiving element	Diaphragm (s	silicone rubber)		Diaphragm (PE	EK film)		
Mounting orientation	Horizontal	,		Horizontal	· ·		Application
Operating ambient temperature	0°C to 50°C (no freezing allow	ed)	10°C to 40°C			Precautions
Operating ambient humidity	90% RH or b	elow (no condens	sation allowed)	90% RH or bel	ow (no condens	ation allowed)	Maintenance
Instrument body withstanding pressure	500 kPa						
vvitnstanding pressure of pressure-receiving element	10 kPa to 15	0 kPa		−10 kPa			
Exterior material	Aluminum die	e casting	ameter of 6 mm) metallic pipe (innor	Aluminum die o	casting and PEE	K	
Compatible pipe	diameter of 6 :	± 0.1 mm), separate	ely sold accessories available	Internal thread	for general U.S	. pipes 1/4-18NPT	
Mass	Indoor drip-p Exposed terr	root type: approx ninal type: approx	. 1100 g (. 960 g	Indoor drip-pro Exposed termir	or type: approx. nal type: approx	980 g . 860 g	

List of products in catalog [Manostar transmitter]

List of products			EN	IT1H		E	MT6
WO81	Model	Intrinsically sa EX ia IIC T4 (afe type Ga				
WO71			10			K	13
	Page showing details	RoHS		pp. 85–	RoHS		pp. 89–
FR51A		Pressure	Accuracy (at 20°C)	Output and transmission method	Pressure	Accuracy (at 20°C)	Output and transmission method
		0–10 Pa	(01200)		Tunge	(41 20 0)	
		0–15 Pa					
MS99		0–20 Pa	±2% FS				
		0–30 Pa					
MS99S		0–50 Pa			0–50 Pa		
		0–75 Pa					
		0–100 Pa			0–100 Pa		
MS61A-RA		0–150 Pa					
		0–200 Pa			0–200 Pa		
QDP33		0–300 Pa			0–300 Pa		
		0–500 Pa			0–500 Pa		
		0–750 Pa					
EMD8A		0–1000 Pa	±1% FS		0–1000 Pa	_	
		0–1 kPa					
EMD7	Pressure range	0–2 kPa		Two-wire type:	0–2 kPa		Two-wire type: Output signal of 4 to 20 mA
	Accuracy	0–3 kPa		DC	0–3 kPa		DC
	transmission method	0-5 kPa		(load resistance of 250 Ω or lower)	0–5 kPa	- ±2.5% FS	(load resistance of 500 Ω or lower)
EMT1		0-10 KPa		Power voltage of 24 V DC ±			Power voltage of 24 V DC ±
		0-20 kPa		10% (ripple of 0.2 V P-P or lower)		-	10% (ripple of 0.2 V P-P or lower)
EMIGP1		0-50 kPa		((
		0–100 kPa					
		±10 Pa		-			
EMT1H		±20 Pa	±2% FS			-	
		±30 Pa					
EMT6		±50 Pa		-			
Linio		±100 Pa					
EMP5A							
			±1% FS				
EMRT1							
HWS15A							
	Pressure unit	Pa, kPa	6 4		Pa, kPa		
Accessories	External snape	Air and nanad		id connat be measured)	Air and paper	inal type	id connet be measured)
	Pressure-receiving element	Dianhragm (s	ilicone rubber)		Diaphragm (s	ilicone rubber)	
Application	Mounting orientation	Horizontal			Horizontal ur	pright others	
Drocoutions	Operating ambient	0°C to 40°C /r	o freezing allow	ed)	0°C to 50°C (r	no freezing allow	ed)
Precautions	temperature Operating ambient humidity	90% RH or be	low (no condens	sation allowed)	90% RH or be	elow (no condens	sation allowed)
Maintenance	Instrument body	500 kPa			50 kPa		······································
	Withstanding pressure	10 kPa to 100	kPa		10 kPa	·	
	Exterior material	Aluminum die	casting		Polyamide		
	Compatible pipe	Vinyl pipe or rul diameter of 6 ±	- ober pipe (inner dia 0.1 mm), separate	ameter of 6 mm), metallic pipe (inner ely sold accessories available	Vinyl pipe or I	rubber pipe (inne	r diameter of 4 mm)
	Mass	Approx. 1100	g		Approx. 110 g]	

List of products in catalog [receiving instrument]

Model RoHS Page showing details Pressure range 0–10 Pa 0–15 Pa	BBBB Display accuracy	pp. 91– Output method							
Page showing details RoHS Pressure range 0–10 Pa 0–15 Pa	Display accuracy	pp. 91– Output method							
Pressure rang 0–10 Pa 0–15 Pa	 Display accuracy 	Output method							
Pressure range 0-30 Pa 0-50 Pa 0-75 Pa 0-100 Pa 0-100 Pa 0-200 Pa 0-300 Pa 0-200 Pa 0-300 Pa 0-500 Pa 0-1000 Pa 0-2 kPa 0-3 kPa 0-50 kPa 0-10 kPa 0utput method 0-20 kPa 0-100 kPa 10 Pa ±10 Pa ±20 Pa ±30 Pa ±100 Pa ±200 Pa ±300 Pa ±100 Pa ±200 Pa ±300 Pa ±100 Pa ±100 Pa ±200 Pa ±300 Pa ±100 Pa ±200 Pa ±300 Pa ±100 Pa ±20 Pa ±300 Pa ±100 Pa ±100 Pa ±20 Ra ±100 Pa ±100 Pa ±100 Pa ±100 Pa ±100 Pa ±100 Pa 100 Pa ±100 Pa	±0.2% FS ±1digit	Alarm output Output type: Relay contact of 1ax2 Electric service life of 100,000 times Contact capacity (resistance load): MAX. 3 A 250 V AC, 3 A 30 V DC MIN. 100 mA 5 V DC (reference value)							
Mounting method Panel mounti		w speed							
Display Displa	ligits (−2000 t alue) red alue) green	o 10000)							
Sampling frequency 0.125 second	3								
Input signal 4 to 20 mA DC (with On the airflow rate depending on the r	h built-in 50 Ω input speed meter, the mange.	resister) naximum value varies							
4 to 20 mA DC (loc 0 to 5 V DC (load However, output si those obtained thr Output accuracy of	a resistance of 550 esistance of 500 Ω of gnals from the airflo ugh square root cal $\pm 0.3\%$ FS	ນ or lower) or higher) w rate/speed meter are Iculation of input signals.							
Power supply to two- 24 V DC ± 10% (lo	24 V DC ± 10% (load current of 4 to 20 mA) ripple voltage of 200 mV maximum load current of 30 mA f								
Power voltage 100 to 240 V/AC 50	ripple voltage of 200 mV, maximum load current of 30 mA DC 100 to 240 V AC, 50/60 Hz (tolerable variation range: 85 to 264 V /								
Operating ambient temperature 0°C to 50°C (100 to 240 V AC, 50/60 Hz (tolerable variation range: 85 to 264 V AC) 0°C to 50°C (no freezing allowed)								
Operating ambient humidity 35% to +85%	0°C to 50°C (no freezing allowed) 35% to +85% RH (no condensation allowed)								
Exterior material Fire-retardan	resin	,							
Protection level IP66 (front pa	nel)								
Mass Approx. 300	1								
Accessories One set of thread- circuiting wire for the	ype mounting fitting	is, one piece of short- litter							
Output signal 4 to 20 mA DC (loc 0 to 5 V DC (load However, output si those obtained thr Output accuracy of Power supply to two- wire type transmitter Power voltage 24 V DC ± 10% (lo ripple voltage of 20 0 perating ambient temperature Operating ambient temperature 0°C to 50°C (Operating ambient humidity Startion material Fire-retardan Protection level IP66 (front material	depending on the range. 4 to 20 mA DC (load resistance of 550 Ω or lower) 0 to 5 V DC (load resistance of 500 Ω or higher) However, output signals from the airflow rate/speed meter are those obtained through square root calculation of input signals. Output accuracy of ± 0.3% FS 24 V DC ± 10% (load current of 4 to 20 mA) ripple voltage of 200 mV, maximum load current of 30 mA DC 100 to 240 V AC, 50/60 Hz (tolerable variation range: 85 to 264 V AC) 0°C to 50°C (no freezing allowed) 35% to +85% RH (no condensation allowed) Fire-retardant resin								

List of products in catalog [relevant devices]

Name	Square root calculator	products
	EMRT1	WO81
Model	LEELEE	W071
Page showing details	RoHS DD. 97-	FR51A
Mounting method	Rail mounting (applicable rail: 35-mm wide DIN rail)	MS99
Input signal	4 to 20 mA DC (input resistance of 50 Ω)	
Output signal	4 to 20 mA DC (load resistance of 500 Ω or lower)	MS99S
Square root output cut point	15% FS or below	
Accuracy	± 1% FS (at 20°C) However, at output signal range of 15 to 100% FS	MS61A-RA
Temperature characteristics	± 0.01% FS/℃ (at 0℃ to 40℃)	QDP33
Power voltage	100 V AC ± 10%, 50/60 Hz, approx. 3.5 VA	
Operating ambient temperature	0°C to 50°C (no freezing allowed)	EMD8A
Operating ambient humidity	90% RH or below (no condensation allowed)	
Insulation resistance	Between terminal and case: 20 MΩ or higher (500 V DC megger)	EIVID7
Withstand voltage	Between power terminal and case: 1000 V AC, 50/60 Hz, for one minute	EMT1
Exterior material	Polycarbonate and ABS resin	
Mass	Approx. 300 g	EMTGP1
Name	Direct current power unit	
	HWS15A	EMT1H
Model		EMT6
		EMP5A
Page showing details	RoHS CE CHAUS D CU US pp. 99-	FMRT1
Input voltage	85 to 265 V AC (47 to 63 Hz) or 120 to 370 V DC	
Output voltage	24 V DC	
Maximum output current	0.65 A	HWSI5A
Output variation at operating ambient temperature	0.02%/°C or lower	
Overcurrent protection	0.68 A and higher	Accessories
Operating ambient temperature	-10°C to +70°C (-10°C to +50°C : 100%, +60°C : 80%, +70°C : 60%)	Application
Operating ambient humidity	30% to 90% RH (no condensation allowed)	Precautions
Insulation resistance	100 MΩ or higher (Between output and FG: 500 V DC, 25℃ , 70% RH)	Maintenance
Withstand voltage	Between input and FG: 2 kV AC (20 mA), between input and output: 3 kV AC (20 mA) Between output and FG: 500 V AC (100 mA). each for one minute	
	,	

The "RoHS" mark attached to a product means that the product does not contain substances subject to restriction by the RoHS directive at the threshold level or higher.

rate and speed scales (refer to page 15).

High-accuracy fine differential pressure gauge

Easy-to-read wide angle scale (pointer rotation angle of 270°)

· Boasting a wide variety, the product is also compatible with airflow

WO81

WO81

List of products

WO81

WO71



Т

F

PC

PR

External

shape

Double memory pointers

Surface type

Round panel type

Square panel type





- clean room
- Detection of clogging of air filter
 Measurement of airflow rate/speed of ventilation/exhaust device and others

*(Refer to pages 114 to 117)

When making an inquiry or placing an order, specify the above product code.
 For airflow rate/speed meter, refer to page 15.

WO81

Specifications

	Ma	ain body Surfac		ace type	e type Ro		Round panel type		are panel type	WO81
	Memory pointer			F		PC			PR	
Model	No memory pointer	N	WC	081FN		WO81P	CN		WO81PRN	W071
	Single memory pointer	S	wo	D81FS		WO81P	cs		WO81PRS	
	Double memory pointers (one each for red and green)	Т	W	081FT		WO81F	ст		WO81PRT	
Pressure unit	Pa, kPa			Compatible pip	e	• Vinyl pip	e or rubber pipe	e (inner dia	meter of 6 mm)	FR51A
Pressure measurement	Differential pressure method	1					.Base for resin v gauge)	vinyl pipe (a	already mounted on	
method Pressure-receiving	Diaphragm					 Metallic 	pipe (outer diam Separately sold	neter of 6 ±	: 0.1 mm) netallic nine is	MS99
element	Air and papagraphys gas (li	auid connot he	monourod)				necessary.			
Scale indication	Wide-angle indication of app	prox. 270 degre	es			 Hard pla 4 mm) 	istic pipe (outer	diameter 6	mm × inner diameter	
angle Operating ambient	-10°C to +50°C (no freezing	allowed)					Separately sold sleeve set (refe	base for r to page 1	netallic pipe and inner I11) or push-in joint is	MS99S
temperature	00% PH or below (no conde	ensation allowed	4)	Base polarity		• Identific	necessary.	high pres	sure side and blue on	
humidity		base polarity		low pres	sure side	i nign pres		MS61A-RA		
Instrument body withstanding pressure	200 kPa (refer to page 118)					 By exchanging the base on the high-pressu that on the low pressure side, it is possible the polarity 				
Exterior material	Polycarbonate and polyamic	bonate and polyamide s ² (six times each for three axial directions)				Approx 2	70 g			ODP33
Durable impact	5 to 10 Hz Amplitude of 10 r	nnee axial dire mm,	cuons)	Mass		Approx. 270 g				QDI 00
	10 to 50 Hz Acceleration of three axial directions)									
	WO81F	WO81PC				WO8	WO81PR			
Accessories	Mounting scre	Mounting screw set Two sets				mounted on Mounting nut set (a			mounted on gauge body)	
Pressure range	_	Mounting o	rientation	Accuracy (N	ote)	Press	sure-receiving	Wit	thstanding pressure of	EMD7
code	Pressure range	(Refer to	page 18)	(at 20℃)		elen	nent material	pres	ssure-receiving element (Refer to page 118)	LIVID
50 DH		Horizontal (s	pecification)							
50 DV	0–50 Pa	Upright (sp	ecification)	±5% FS						EMT1
100 DH	0 400 D	Horizontal (s	pecification)						10 kPa	
100 DV	0–100 Pa	Upright (sp	ecification)	±2.5% FS						FMTGP1
200 D	0–200 Pa									Elviron
300 D	0–300 Pa		-							
500 D	0–500 Pa									EMT1H
1000 D	0–1000 Pa									
1 E	0–1 kPa							40 kPa	EMT6	
2 E	0–2 kPa	Between ho	rizontal and							LIVIIO
3 E	0–3 kPa	upri	ght							
5 E	0–5 kPa	Arbitrary ı	mounting	±1.5% FS	5					EMP5A
10 E	0–10 kPa		-							
20 E	0–20 kPa					Sil	icone rubber			FMDT1
30 E	0–30 kPa								150 kPa	LIVIKTI
50 E	0–50 kPa									
100 E	0–100 kPa									HWS15A
+- 50 DH		Horizontal (s	pecification)							
+- 50 DV	-50 to +50	Upright (sp	ecification)	±2.5% FS	;				10 kPa	Accessories
+- 100 D	-100 to +100 Pa									
+- 200 D	-200 to +200 Pa									Application
+- 300 D	-300 to +300 Pa	Botwoon bo	rizontal and							Propution
+- 500 D	-500 to +500 Pa	upri	ght							Trecautions
+-1000 D	-1000 to +1000 Pa	Arhitrany	mounting	±1.5% FS	;				40 kPa	Maintenance
+- 1 E	−1 to +1 kPa	, ionary i	nounting							
+- 2 E	−2 to +2 kPa									
+- 3 E	−3 to +3 kPa									

(Note) Accuracy in full span (refer to page 121)

For biased pressure range, the polarity symbol "-" can be indicated for a fee. If the indication is necessary, make a request at the time of order placement.

◆For use environment, refer to page 118.

WO81

List of products

The polarity symbol "-" can be indicated for a fee. If the indication is necessary, make

WO81

kPa

WO81 List of scales

Biased pressure range





Pressure range Minimum scale 0–200 Pa 2 Pa







WO81

WO81 Airflow rate/airflow speed meter



The maximum airflow rate/speed scale value is applied after rounding it to our scale value.

WO81 Airflow rate/airflow speed meter

Specifications

	Ma	in body		Surfa	ce type	R	ound pan	el type	Square	panel type	WO81
	Memory pointer				F		PC			PR	
Model	No memory pointer		N	WO	81FN		WO81P	CN	WC	081PRN	
	Single memory pointer (red)	S	WO	81FS		WO81P	CS	WC	081PRS	W071
	Double memory pointers (one each for red a	and green)	T	WO	81FT		WO81P	СТ	WC	D81PRT	0/1
Unit	Airflow rate/airflow speed				Compatible pipe		Vinyl pipe	or rubber pipe (inr	6 mm)		
Pressure measurement method	Differential pressure method						• Metallic pi	ase for resin vinyl pe (outer diameter	pipe (already m of 6 ± 0.1 mm)	ounted on gauge)	
Pressure-receiving element	Diaphragm						• Hard plast	ic pipe (outer diam	e for metallic pi leter 6 mm × inr	pe is necessary. ner diameter 4 mm)	FR51A
Measured gas	Air and noncorrosive gas (liquid	I cannot be	measure	ed)			o	et (refer to page 11	1) or push-in jo	int is necessary.	
Scale indication angle	Wide-angle indication of approx	. 270 degre	ees						<i>,</i>	,	
temperature	-10 C to +50 C (no freezing allo	owea)			Base polarity		 Identificati 	on with red on higl	n pressure side	and blue on low	MS99
Operating ambient humidity	90% RH or below (no condensa	ation allowe	ed)			pressure side By exchanging the base on the high-pressure side with the base on the base on the high-pressure side with the base on the base on the high-pressure side with the base on the base on the high-pressure side with the base on t					
Instrument body withstanding pressure	200 kPa (refer to page 118) Polycarbonate and polyamide						the low pr	essure side, it is po	ossible to chang	je the polarity.	
Exterior material	Polycarbonate and polyamide 100 m/s ² (six times each for three axial directions)				Mass		Approx. 270) g			MS99S
Durable impact	100 m/s ⁻ (six times each for three axial directions) 5 to 10 Hz Amplitude of 10 mm,										
Durable vibration	5 to 10 Hz Amplitude of 10 mm,	m/o ² (two h		h for throp ovial							
	directions)	n/s (two n	ours eaci	n or three axial							
	WO81F				WO81PC				WO81PR		MS6TA-RA
Accessories	Mounting screv	nting screw set		ounting fittings (already	mounted on	gauge body)	Mounting nut se	t (already moun	ited on gauge body)		
	Airflow rate/	Mount	ina ori	entation	Accuracy (N	ote)	Press	ure-receiving	Withstandir	ng pressure of pressure-	
Pressure range code	airflow speed range	(Refe	er to pa	age 18)	(at 20°C)	010)	elen	ent material	(Re	ceiving element	QDP33
49 DMH		Horizon	tal (spe	cification)	(/				(110	ior to page 110)	
49 DMV		Unrigh	nt (snec	ification)							
70 DMH	-	Horizon	tal (sne	cification)	Within ± 5%	FS					
		Uprigh	t (spe	ification)						EMD8A	
		Uarizon	tel (and				-			10 kPa	
		HONZON	tai (spe	(fincation)							
		Uprigr	it (spec								
130 DMH		Horizon	tal (spe	cification)							EMD7
130 DMV	Depende op eirflew rete/	Uprigh	nt (spec	ification)	Within ± 2.5%	5 FS					
180 DMH	Depends on annow rate/	Horizon	tal (spe	ecification)							
180 DMV	airflow speed scale	Uprigh	nt (spec	ification)			Sili	cone rubber			
250 DM											EMT1
300 DM	specification document.										
400 DM											
580 DM										40 kPa	
1000 DM		Betwee	en noriz	ontal and							EMTGP1
1.8 EM		A . 1 . 1	uprigh	וד	Within ± 1.5%	FS					
3. 2 EM		Arbit	rary mo	ounting							
4.5 EM											
8.5 EM											EMT1H
10 FM										150 kPa	
											1

(Note) Value: Arbitrary (to be rounded), magnification: ×10, ×1000, ×10000, units: m³/h, m³/min, m³/h (nor), m/s/min (nor), m/s (Note) Accuracy at full span of pressure value (refer to page 121)

For use environment, refer to page 118.

Airflow rate/airflow speed range (scale example)



List of products

WO81

EMT6

EMP5A

Model WO81F

External dimension drawing WO81

List of products

MS99

EMD7

EMT1

EMT6

EMP5A



WO81

Example of base arrangement



Model WO81F



WO81

Model WO81PC



Mounting method



EMP5A

Model WO81PR

External dimension drawing



Mounting method





breaks the gauge body. (Refer to page 120)

WO81

Width across

Compatible pipe diameter φ6±0.1

flats: 14

flats: 14

List of products

WO81

WO71

FR51A

MS99

MS99S

MS61A-RA

QDP33

EMD8A

EMD7

EMT1

EMTGP1

EMT1H

EMT6

7 Manostar 20

WO81

List of products

EMD7

Precaution Maintenand



Accessories dedicated to WO81 RoHS



Accessories for WO81 RoHS

Accessories		VT base					
Application	High-pressure (Aux side	iliary item) Low-pressure side (Auxiliary item)					
Precautions	No.						
Maintenance							
	Item number Material KGA81VT-H-P Polypropyle	ttem number Material KGA81VT-L-P Polypropylene					
	an inner diameter of 6 mm can be connected. le gauge is purchased.						



WO81

WO81

WO81						
				List pro		
Accessories for WO81	RoHS			w		
P'	Г base	PR	base			
High-pressure side	Low-pressure side	High-pressure side	Low-pressure side	W		
				FR		
Item number Material KGA81PT-H PBT/brass	Item number Material KGA81PT-L PBT/brass	Item number Material KGA81PR-H PBT/brass	Item number Material KGA81PR-L PBT/brass	M		
The tube mounting part is a push separately sold tube (refer to page B 8381-1. (Connectable tube outer diameter	n-in joint. For piping, use the ge 112) or a tube compatible with JIS er: 6 mm)	The tube mounting part is a ro piping is the same as that for t outer diameter: 6 mm)	tary elbow push-in joint. The he PT base. (Connectable tube	MS		
M	Г base	MR	base	MS6		
High-pressure side	Low-pressure side	High-pressure side	Low-pressure side			
				QE		
	NG0	50		EM		
Item numberMaterialKGA81MT-HBrass	Item number Material KGA81MT-L Brass	Item number Material KGA81MR-H Brass	Item number Material KGA81MR-L Brass	EN		
A metallic pipe, such as copper pi diameter of 6 ± 0.1 mm can be co pipe, use an MTW base. When co diameter 6 mm × inner diameter 4	pe and aluminum pipe, with an outer nnected. However, for stainless steel nnecting with a plastic pipe (outer mm), remove the brass sleeve and use	This serves as an elbow whose The piping material is the same connecting with a plastic pipe (c diameter 4 mm), remove the bra	tube mounting part rotates. as that for the MT base. When uter diameter 6 mm × inner as sleeve and use the separately	E		
the separately sold resin inner sle	eve set (XIN6×4; refer to page 111).	sold resin inner sleeve set (XIN	6×4; refer to page 111).	EM		
MT	W base	Adapter for rear face piping				
		pressure rear face piping	<pre>pressure rear face piping) side</pre>			
	CON STATE			E		
Item number Material KGA81MTW-H-S Stainless steel	Item number Material KGA81MTW-L-S Stainless steel	Item number Material KGA81FBA-H Brass	Item number Material KGA81FBA-L Brass	EM		
This is used to connect a sta diameter of 6 ± 0.1 mm.	nless steel pipe with an outer	When arranging an MT base on the rear face of the WO81F type, this adapter is required as a spacer for hooking a stabilizing wrench to the				
		pase at the time of pipe connection arranging the VR base or MR base face in order to avoid interference t connecting an R1/8 joint, use an R ²	. I his adapter is also required when (excluding MTW base) on the rear between the base and panel. When //8 base adapter.	HW		
R1/8 ba	ise adapter	R1/8 base adapter (SUS)				
High-pressure side	Low-pressure side	High-pressure side	Low-pressure side	Арр		
Collies,				Prec		
Item number Material KGA81R1/8AD-H Brass	Item number Material KGA81R1/8AD-L Brass	Item number Material KGA81R1/8AD-H-S Stainless steel	Item number Material KGA81R1/8AD-L-S Stainless steel	maill		
It is possible to connect an R *The specifications of this ad adapter for rear face piping	1/8 joint. apter differ from those of the	It is possible to connect an R1. *The specifications of this ada adapter for rear face piping	/8 joint. pter differ from those of the			

Small-sized fine differential pressure gauge FS type/PS type

WO71

List of products

WO81 A memory pointer, which is convenient for setting of index for planned differential pressure value or limit value, is equipped as standard. WO71 · Allows various pipe connections. · Only by exchanging the base on the high-pressure side with that on the low pressure side, it is FR51A possible to change the polarity. *For side face piping only Flat-type fine differential pressure gauge N type/R type MS99 · The lowest master gauge thickness of 29.2 mm has been achieved. Thin design and standard equipment of rotary base make it possible to conduct smart piping. MS99S MS61A-RA 300 QDP33 Pa Manostar EMD8A EMD7 Model W071FS (surface type w/VT base and memory pointer) EMT1 EMTGP1 EMT1H Pa Manosta EMT6 EMP5A (2 Model WO71N EMRT1 (surface type/round panel type w/rotary base) HWS15A **Product code** Pressure range code <Main application fields> General factory management equipment **WO71** Ν 1000 D Accessories Negative pressure for dust collector/differential pressure of air conditioner · Filter pressure loss management Application Precision machine manufacturing line • Building air conditioning control Precautions equipment Maintenance <Usage> · Detection of clogging of air filter





WO71

RoHS

Model WO71PS (square panel type w/VT base and memory pointer)





Model WO71R (square panel type w/rotary base)



When making an inquiry or placing an order, specify the above product code

*(Refer to pages 114 to 117)

WO71

Specifications

Model	Surface type w/VT base an memory pointer	d Square panel type and memory p	e w/VT base Common to surface type and pointer round panel type, w/rotary base Square		are panel type w/rotary base			
	WO71FS	WO71PS	8		WO71N		WO71R	W071
Pressure unit Pressure measurement method Pressure-receiving element Measured gas	Pa, kPa Differential pressure method Diaphragm	cannot be measured)	Base pola	ity	FS type, PS type Changeable (only f Identification with m pressure side N type, R type Unchangeable	or side fac ed on high	e pipe) pressure side and blue on low	FR51A
Scale indication angle Operating ambient	An and noncorrosive gas (inquic Approx. 70° -10° C to +50°C (no freezing allo	owed)	Mass		Indicating high-pr "H" and "L" marks FS type Approx.	essure sic , respecti [,] 2 00 g	le and low-pressure side with vely on the instrument body.	MS99
temperature Operating ambient humidity Instrument body	90% RH or below (no condensa 50 kPa (refer to page 118)	ation allowed)			PS type Approx. N type Main bod approx. R type Approx.	80 g y: approx 0 g 50 g	x. 130 g, mounting plate:	MS99S
Exterior material	Polycarbonate and polyamide 5 to 10 Hz, amplitude of 10 mm 10 to 50 Hz, acceleration of 39	, m/s ² (two hours each for	Accessori	es	FS type Mounting custom se	plate (alre al nut set. ci	eady installed on main body),	MS61A-RA
Durable impact Compatible pipe	three axial directions) 100 m/s ² (six times each for thr FS type, PS type • Vinvl pipe or rubber pipe (in	ee axial directions)			N typeMounting mountingR typeMounting	plate (alre screw set nut set, c	eady installed on main body), , custom seal ustom seal	QDP33
	Base for resin vinyl pipe (alr • Metallic pipe (outer diamete Separately sold base for me • Hard tube (outer diameter 6	eady mounted on gauge) r of 6 ± 0.1 mm) etallic pipe is necessary. × inner diameter 4 mm)						EMD8A
	Separately sold base for me set (refer to page 111) or pu N type, R type • Vinyl pipe or rubber pipe (in	stallic pipe and inner sleeve sh-in joint is necessary.						EMD7
	(main body side: M5 interna	I thread, depth of 4 mm)						EMTI
Pressure range code	Pressure range	Mounting orientation It is necessary to specify the orientation at the time of order placement for all ranges.	Accurac (at 2	∶y (Note) 3°C)	Pressure-rec element mat	erial	Withstanding pressure of pressure-receiving element (Refer to page 118)	EMTGP1
100 D	0–100 Pa	lorizontal and upright						EMTIH
200 D	0–200 Pa							
300 D	0–300 Pa							
500 D	0–500 Pa	Horizontal	±2.5	% FS	Silicone rub	ber	20 kPa	EMT6
1000 D	0–1000 Pa	Upright	0					
2 E	0–2 kPa	Others						EMP5A
3 E	0–3 kPa							
5 E	0–5 kPa							

(Note) Accuracy in full span (refer to page 121)

◆For use environment, refer to page 118.

Mounting orientation and range It is necessary to specify the orientation at the time of order placement for all ranges.



List of products WO81

233 08A D7 /T1 GP1 1H

EMRT1

HWS15A

WO71

Model WO71FS



WO71

Model WO71PS

External dimension drawing



Mounting method



Maintenance

EMT1H

WO71

List of products

Zero point

001

Mounting method

setting device

2×M4 thru

۲

W071

Low-pressure

side rotary base

Model WO71N



List of products

WO71



MS99

MS99S

MS61A-RA

QDP33

EMD8A

EMD7

EMT1

EMTGP1

EMT1H

EMT6

EMP5A EMRT1

HWS15A

Accessories Application

Precautions Maintenance



Insert a flat-blade screwdriver into the recessed part in the figure on the right, and push it down while lifting the mounting plate to remove the mounting plate. To mount the mounting plate, fit the gauge body in the mounting plate by aligning the claw with the recessed part, and push the mounting plate upward.



M3 nut

Panel cutting

<u>29.2</u> 10

ŋ

3.2

Wall surface mounting

M4 internal thread For penetration

2×φ4 or 2×M3

 00 ± 0.3

φ91

Mounting plate

6.2

High-pressure

side rotary base

 $\varphi 4.5$

тфр

BOTTOM

70

Supplied screw set is used.

(when making hole in the panel)

Maximum panel thickness: 5 mm <u>M4</u> <u>M4</u>

Screw the screws into the mounting plate, and secure the gauge body by pushing it against the panel.





Model WO71R

External dimension drawing



Mounting method





W071

List of products

QDP33

EMP5A

WO71 List of scales



Pa

5

kPa



RoHS

EMT1

EMTGP1

EMT1H

EMT6

EMP5A

EMRT1

HWS15A

Accessories

Application Precautions

Maintenance



Accessories dedicated to WO71

W071

ZManostar

Custom seal

VR base **Mounting plate** (Auxiliary item) (Auxiliary item) (Auxiliary Dedicated to N type and Dedicated to N type 👩 item) R type Gland O-ring (Example of customization) (width across flats: 7) (id7,wd1) Material Nipple KGA71VR Polycarbonate/aluminum Pa This serves as an elbow whose tube mounting part rotates. A vinyl pipe or rubber pipe with an inner diameter Material Item number of 4 mm can be connected. This is already installed when ADPL71 Steel the gauge is purchased. There are no high-pressure side and low-pressure This is used for side polarities. As the structure allows the O-ring (2 pieces) to drop, pay attention not to lose the O-ring at the time of mounting the gauge Caution body. removal of the base.

29 쿧 Manostar

W071

Accessories for FS type and PS type





The tube mounting part is a push-in joint. For piping, use the separately sold tube (refer to page 112) or a tube compatible with JIS B 8381-1. (Connectable tube outer diameter: 6 mm)

MT base						
High-pressure s	ide	Low-pressure side				
	Co.	- W.	6			
Item number	Material	Item number	Material			
KGA81MT-H	Brass	KGA81MT-L	Brass			

A metallic pipe, such as copper pipe and aluminum pipe, with an outer diameter of 6 \pm 0.1 mm can be connected. However, for stainless steel pipe, use an MTW base. When connecting with a plastic pipe (outer diameter 6 mm × inner diameter 4 mm), remove the brass sleeve and use the separately sold resin inner sleeve set (XIN6×4; refer to page 111).

MTW base						
High-pressure side	Low-pressure side					
KGA81MTW-H-S Stainless steel	KGA81MTW-L-S Stainless steel					
This is used to connect a stainless steel pipe with an outer diameter of 6 ± 0.1 mm.						
R1/8 base adapter						
High-	Low-					





It is possible to connect an R1/8 joint

face piping.

'The specifications of this adapter differ from those of the adapter for rear

W071

FR51A

List of products Edgewise type fine differential pressure gauge WO81 · Small-size/lightweight type that can be installed anywhere you like · Unique mechanism less subject to abnormal high pressure inrush WO71 · High-performance silicone rubber diaphragm with small hysteresis · Band-link mechanism that prevents the pointer from vibrating FR51A MS99 MS99S MS61A-RA T 1 300 400 500 QDP33 Model FR51AHV EMD8A (Horizontal scale type) EMD7 EMT1 EMTGP1 000 EMT1H EMT6 Model FR51AVV (Vertical scale type) EMP5A EMRT1 HWS15A

<Main application fields>

Part of semiconductor manufacturing equipment Negative pressure for dust collector/differential pressure of air Accessories conditioner Filter pressure loss management Precision machine manufacturing Application line General factory management equipment Precautions <Usage> Maintenance · Measurement of internal pressure of indoor device Detection of clogging of air filter
Measurement of clogging of bug filter Measurement of dynamic pressure at ventilation/exhaust device · Room pressure measurement in a clean room

*(Refer to pages 114 to 117)

Product code Pressure range code **FR51A** Ηİ V 50 D V (Example) Mounting Range for specification of V vertical mounting Range for specification of horizontal mounting orientation н None Range for arbitrary mounting Unit D Pa Е kPa Range Maximum scale value (for ± range, provide "±" as well) Base V For vinyl pipe External Н Horizontal scale type shape V Vertical scale type Color-coded horizontal scale С type

When making an inquiry or placing an order, specify the above product code.

Utility model registration No. 2027772

RoHS

01	

31 🔁 Manostar



Model FR51ACV (Color-coded horizontal scale type)



FR51A

Specifications

specification	5						
Medel	Horizontal scale type			Vertical scale type		Color-coded horizontal scale type	
wodel	FR51AI	HV		FR51AVV	FR51ACV		R51ACV
Pressure unit	Pa, kPa			Exterior material	Polycarl	bonate	
Pressure measurement method	Differential pressure metho	bd		Durable vibration	5 to 10 l	Hz, amplitude of 10 m	n,
Pressure-receiving element	Diaphragm				10 to 50 three ax	Hz, acceleration of 39 tial directions)	m/s ⁻ (two hours each for
Measured gas	Air and noncorrosive gas (liquid cannot be measu	ured)	Durable impact	100 m/s	² (six times each for th	ree axial directions)
Scale shape	Edgewise shape (scale ler	igth: approx. 45 mm)		Compatible pipe	Vinyl pip	pe or rubber pipe (inne	r diameter of 4 mm)
temperature		g allowed)		Base part	Integrat	ed with main body	11
Operating ambient	90% RH or below (no cond	lensation allowed)		Base polarity	and "L"	ng high-pressure side a marks, respectively, at	and low-pressure side with "H : base part.
Instrument body	50 kPa (refer to page 118)			Mass	Approx.	90 g	
withstanding pressure							
Accessories	Mounting nut set						
Pressure range code	Pressure range	Mounting orient (Refer to below	tation w)	Accuracy (Note) (at 23°C)	Pre	ssure-receiving ement material	Withstanding pressure of pressure-receiving element (Refer to page 118)
50 DH	0.50 D-	Horizontal (specifie	cation)				
50 DV	0-50 Pa	Upright (specifica	ation)				
100 DH	0, 100 Do	Horizontal (specifie	cation)				
100 DV	0-100 Pa	Upright (specifica	ation)				
200 D	0–200 Pa						
300 D	0–300 Pa						
500 D	0–500 Pa	From horizontal th	nrough				
1000 D	0–1000 Pa	horizontal		±2.5% FS	S	Silicone rubber	20 kPa
2 E	0–2 kPa	Arbitrary mount	tina				
3 E	0–3 kPa	/					
5 E	0–5 kPa						
+- 50 DH	-50 to +50 Po	Horizontal (specific	cation)				
+- 50 DV	-30 to +30 Fa	Upright (specifica	ation)				
+-100 D	-100 to +100 Pa	From horizontal through to downward and hor Arbitrary mounti	h upright rizontal ng				

(Note) Accuracy in full span (refer to page121)

For use environment, refer to page 118.

Mounting orientation and range



FR51A

List of products

EMT6

FR51A

FR51A

List of products





Overview of structure



EMT6

FR51A List of scales

FR51A

		List of products
Model FR51AHV/CV (horizontal scale type)		WO81
Biased pressure range	Zero center range	W071
I I	I I	FR51A
Pressure rangeMinimum scale0-50 Pa5 Pa0-50 Pa5 Pa	Pressure rangeMinimum scale-50 to +50 Pa10 Pa	MS99
I I	-100 50 0 50 +100 Pa FR51A	M\$99\$
Pressure rangeMinimum scale0-100 Pa10 Pa0-2 kPa0.1 kPa	Pressure rangeMinimum scale-100 to +100 Pa10 Pa	MS61A-RA
IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII		QDP33
Pa FR51A Pressure range Minimum scale Pressure range Minimum scale		EMD8A
0-200 Pa 10 Pa 0.2 KPa 0.2 KPa	Color-coded horizontal scale	EMD7
I I	FR51A	EMT1
Pressure rangeMinimum scale0-300 Pa20 Pa0-5 kPa0.5 kPa	Pressure range Color coding Biased pressure range target Green Yellow Red 0 50%FS 75%FS	EMTGP1
I I I I I I I I I 0 100 200 300 400 500 Pa FR51A		EMT1H
Pressure rangeMinimum scale0-500 Pa50 Pa		EMT6
		EMP5A
Model FR51AVV (vertical scale type)	17	EMRT1
		HWS15A
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	INVIOR
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$		Accessories
$\begin{array}{c c c c c c c c c c c c c c c c c c c $		Application
		Precautions
$\begin{array}{c c c c c c c c c c c c c c c c c c c $		nuntonanoe
O O	- 40 50 FR51A FR51A FR51A FR51A	
Pressure range Pressure rang	sure range Pressure range Pressure range Pressure range -3 kPa 0-5 kPa -50 to +50 Pa -100 to +100 Pa	

Manostar switch

MS99

RoHS

30 V DC and lower rated

voltage specification only

None

V

Н

D

Е

V

С

Н

L

Standard specification

30 V DC and lower rated voltage

Upright

Ра

kPa

Horizontal

Maximum scale value

Integrated type

Exchangeable type

Upper limit setting

Lower limit setting



*(Refer to pages 114 to 117)

When making an inquiry or placing an order, specify the above product code.
MS99

Specifications

Model	Integrated base upper limit	e type, for Integra setting	ated base type limit settin	e, for lower Exchang		geable base typ per limit setting	e, for Exchang	Exchangeable base type, for lower limit setting
incuci	MS99F	IV	MS99LV			MS99HC		MS99LC
Pressure unit	Pa, kPa			Compatibl	e pipe	Model V		
Pressure measurement method	Differential pressure	e method				Vinyl pipe or r Model C Vinyl pipe or r Base for resin	ubber pipe (inner dia ubber pipe (inner dia	ameter of 4 mm) ameter of 6 mm)
Pressure-receiving element	Diaphragm					Metallic pipe (Separately so	outer diameter of 6	± 0.1 mm) pipe is necessary.
Contact material	Silver alloy/gold plat	ling				Hard tube (ou	ter diameter 6 × inne	er diameter 4 mm)
Measured gas	Air and noncorrosive	e gas (liquid cannot be r	neasured)			set (refer to participation	age 95) or push-in jo	pipe and inner sleeve
Pressure setting method	Setting by dial with s	scale		Terminal s	crew size	M4 (mountable	terminal: outer diam	neter of φ8 or below)
Mounting orientation	Upright or horizonta	I		Base polar	rity	Indicating high-	pressure side and lo	ow-pressure side with
Operating ambient temperature	-10°C to +60°C (no	freezing allowed)		"H" and "L" marks, respectively, at the piping of base part.				ne piping connection
Operating ambient humidity	90% RH or below (n	o condensation allowed	1)	Mass	96	Model C App	rox. 170 g rox. 190 g	14)
Exterior material	Model V Polycar Model C Polycar	rbonate rbonate and polyamide		Conforming UL standard UL and C-UL recognition component standards UL standard UL and C-UL recognition component			nition component ard No UL508	
Durable vibration	5 to 10 Hz, amplitud 10 to 50 Hz, acceler three axial directions	le of 10 mm, ration of 39 m/s² (two ho s)	urs each for			RoHS directive	File No *Acquired as open-	E240648 type enclosure.
Durable impact	100 m/s ² (six times of	each for three axial dire	ctions)	Protection	level	Equivalent to IF	P54 (at time of acqui	sition of cable clamp)
nsulation resistance	Between terminal ar megger)	nd case: 20 M Ω or highe	er (500 V DC	Cable clan mounting	np screw size	M15 P=1		
Withstand voltage	Between terminal ar minute	nd case: 1500 V AC, 50/	60 Hz, for one					
Pressure range code	Pressure range	Mounting orientation *It is necessary to specify the orientation at the time of order placement for all ranges.	Scale settin accuracy (at 23°C)	ng Repe	eatability	Maximum operating pressure difference	Pressure-receiving element material	Withstanding pressures of instrument body and pressure- receiving element (Refer to page 118)
120 D	20–120 Pa		±5.0 Pa	±2	2.0 Pa	25.0 Pa		
200 D	20–200 Pa		±9.0 Pa	±2	2.0 Pa	25.0 Pa		
300 D	30–300 Pa		±13.5 Pa	±3	3.0 Pa	30.0 Pa		10 kPa
500 D	50–500 Pa	Horizontal	±22.5 Pa	±5	5.0 Pa	45.0 Pa		
1000 D	100–1000 Pa	or	±45 Pa	±	10 Pa	70 Pa	Silicone rubber	
3 E	0.3–3 kPa	Upright	±0.135 kP	a ±0.0	30 kPa	0.300 kPa		
5 E	0.5–5 kPa		±0.225 kP	a ±0.0	50 kPa	0.450 kPa		20 kPa
10 E	1–10 kPa		±0.45 kP	a ±0.	10 kPa	0.70 kPa		
30 E	3–30 kPa		±1.35 kP	a ±0.	30 kPa	3.00 kPa		50 kPa

For use environment, refer to page 118.

Opening/closing capability [standard specification]

Load	Rated voltage	Specifications	Resistance load	Induction load
	30 V DC	Contact	0.8 A	150 mA (Time constant 7 ms
Standard load	100 V AC	100 V AC SPDT (single-pole	5 A	$60 \text{ mA} \begin{pmatrix} Power factor \\ 0.6 \end{pmatrix}$
	250 V AC	Electric service life	5 A	—
Minute load	30 V DC 125 V AC	more	100 mA	—

Opening/closing capability [30 V DC and lower rated voltage specification]

Load	Rated voltage	Specifications	Resistance load	Induction load
Standard load	20 \/ DC	Contact configuration SPDT (single-pole double-	0.8 A	150 mA Time constant 7 ms
Minute load	30 V DC	throw) Electric service life 100,000 times or more	100 mA	—

*To enhance the contact reliability of the contact under minute load condition, gold plating is applied to the contact surface. If the instrument is used with a voltage or current exceeding the rating at the time of use of minute load, the gold plating will be broken and the contact reliability of the contact under minute load condition will be degraded.

Under minute load conditions, do not use such a product that has been used any number of times under normal load conditions.

• In an induction load circuit, such as a relay, there is a possibility of contact problems with a contact due to back electromotive force or inrush current at the time of opening or closing. Therefore, be sure to insert a protective circuit for surge absorption, such as a diode and varistor.

If silicone gas or organic gas is contained in the measured gas, such an organic substance that may lead to defective contact of a contact that is caused by arc energy at the time of contact opening/closing. If offensive gas is contained in the measured gas, malfunctioning due to defective contact of a contact or corrosion of the internal mechanism may occur. If any of the above gases exist in the measured gas or surrounding environment, discuss the use of a model with the built-in lead switch MS61A-RA, whose contact is less subject to the external atmosphere.

Rating certified with safety standard (UL) [Standard specification]

Rating	
125 V DC–0.5 A RES 250 V AC–5 A RES	EMRT1

Rating certified with safety standard (UL) [30 V DC and lower rated

voltage specification]				
Rating				
30 V DC-0.5 A RES				

Precautions

Maintenance



MS99

List of products WO81 071 251A

DP33

MD7

EMT1

EMT6

EMP5A

HWS15A

Accessories

Application

MS99

MS99

List of products

WO81

External dimension drawing

Model MS99 V (integrated base type)



MS99

Caution

the cable clamp interfere with each other.





MS99

MS99



MS99

Example of mounting of type C base











Accessories

EMP5A

EMRT1

HWS15A

Application Precautions

Maintenance



•Even when the bases are exchanged with each other, the high-pressure side and low-pressure side polarities cannot be changed. The base polarities are indicated with an "H" mark on the high-pressure side and an "L" mark on the low-pressure side at their respective base mounting parts.

- Base tightening torque: 1 N·m Sealing cap tightening torque: 0.5 N·m

Do not tighten to a torque that exceeds the specified value because doing so breaks the instrument body. (Refer to page 120)

MS99

List of products

WO81

WO71

FR51A

MS99

MS99S

MS61A-RA

QDP33

MS99

List of products

WO71

Protection of switch contact WO81

○To reduce the noise generated at the time of opening/closing of the load and lengthen the service life of the contact by decreasing the generation of nitric acid gas and carbide, a contact protection circuit is used. However, it will have an opposite effect if it is not used correctly.

OWhen a contact protection circuit is used, the operation time of the load may be slightly delayed. Representative examples of a contact protection circuit are provided below.

MS99

FR51A	Circuit example			le power Irce	ver Points to note when applying/selecting circuit	
				AC		
MS99 MS99S	Varistor method		0	0	 This method prevents a voltage equal to or exceeding the varistor's limit voltage from being applied between the contacts. In this method, the return time of the induction load on the relay is slightly delayed. From the selection materials from varistor manufacturers, select a varistor with a rating that matches the power voltage and load capacity. 	
MS61A-RA	R Induction load	C/R method	0	0	 In this method, the operation/return time is slightly delayed if the load is an induction load such as relay. The CR values should be around C: 0.5 μF/A and R: 1.0 Ω/V with respect to the contact current and contact voltage, respectively, as a guide. However, as these values vary depending on the property of the load and other conditions, check the values through experiment and select an appropriate model. 	
QDP33 EMD8A	A Induction load	Diode method	0	×	 In this method, the back electromotive force of the induction load is canceled by the load resistance through a diode to prevent high voltage from being applied between contacts. In this method, the return time of induction load is more delayed compared to the varistor type and CR method. Select a diode whose rating current is equal to or greater than the load current and whose reverse breakdown voltage is 10 times the power voltage or greater. 	
EMD7	A Induction	Diode + Zener diode method	0	×	The diode method is effective when the return time of the induction load on the relay is excessively delayed. Select a Zener diode whose Zener voltage is almost equal to the power voltage as a guide. However, if the load increases, a Zener diode whose reverse surge power is great is required. Therefore, this method has a limit, and attention needs to be paid when selecting this method.	

Examples of bad contact protection circuit

EMTGP1	C Induction		OThis method is very effective for extinction of an arc at the time of release of the contact, but the charging current flows to the condenser when contacting the contact, making the contact likely to be welded and shortening the contact service life.
EMTIH		Condenser method	⊖This method is very effective for extinction of an arc at the time of release of the contact,
EMT6			but short-circuit current in power storage capacity stored in the condenser flows when contacting the contact, making the contact likely to be welded and shortening the contact service life.

EMP5A

EMT1

EMRT1

HWS15A

Accessories

Application

Precautions

Maintenance

Representative examples of a contact protection circuit							
Circuit example	Applicat sou	ole power Irce					
	DC	AC					
			OTI : 1				

Notes on contact material

MS99

Caution

To enhance the contact reliability of the contact under minute load condition, gold plating is applied to the contact surface. If the instrument is used with a voltage or current exceeding the rating at the time of use of minute load, the gold plating may break, and the contact reliability of the contact under minute load conditions may degrade.

Under minute load conditions, do not use such a product that has been used any number of times under normal load conditions.

Configuration of switch contact

- The contact configuration of this instrument is as shown on the right.
- The state in which the differential pressure (pressure) is not applied to the instrument is referred to as normal condition.
- In the normal the condition, the section between contact 1 (COM.) and contact 2 (N.C.) is closed, and the section between contact 1 (COM.) and contact 3 (N.O.) is open.
- When the differential pressure increases and reaches the set pressure the contact is 0 switched, the section between contact 1 (COM.) and contact 2 (N.C.) turns to be open, and the section between contact 1 (COM.) and contact 3 (N.O.) turns to be closed.

Upper limit setting and lower limit setting

The pressure at which the electric contact of the switch is triggered as the differential pressure (pressure) applied to the instrument has increased from zero is referred to as the set pressure. Then, the pressure at which the contact has returned to the former state as the differential

pressure has decreased from the use condition at a pressure greater than the set pressure and the electric contact has been triggered is referred to as the reset pressure.

The set pressure and reset pressure mentioned above are not the same values but are slightly different from each other. This difference is referred to as the operating pressure difference (dead band)

It is not possible to change from the upper limit setting to the lower limit setting and vice versa.

This instrument has two variations: one with the scale of setting dial set to the set pressure; and the other with the scale set to the reset pressure.

This instrument with the scale set to the set pressure is referred to as the instrument for upper limit setting and the instrument with the scale set to the reset pressure is referred to as the instrument for lower limit setting.

When the setting pressure is set to 1 kPa in the pressure range of 1 to 10 kPa as an example (the operating pressure difference is assumed to be 0.7 kPa)

Scale setting Setting dial scale adjustment		Contact action		
Instrument for upper limit setting	Adjustment is made by means of set pressure.	When the differential pressure increases, the section between 3 (N.O.) and 1 (COM.) closes at 1 kPa. Then, when the differential pressure decreases, the section between 3 (N.O.) and 1 (COM.) opens at 0.3 kPa.	F	
Instrument for lower limit setting	Adjustment is made by means of reset pressure.	When the differential pressure increases, the section between 3 (N.O.) and 1 (COM.) closes at 1.7 kPa. Then, when the differential pressure decreases, the section between 3 (N.O.) and 1 (COM.) opens at 1 kPa.		

Reset time

Cautior

Reset time refers to the time it takes to reach the reset pressure (the electric contact is reset) when the differential pressure is suddenly reduced to zero from the set pressure. In this instrument, the reset time is approx. 3 seconds at 20 Pa and approx. 1 second at 50 Pa and greater. (However, the reset time is for the instrument body only, not including the pipe.) Therefore, a response faster than this time is impossible.

Contact rating

If the contact capacity in the specification is exceeded, additionally connect the secondary relay. In general, the smaller the voltage and current are, the longer the contact service life is. A Manostar switch cannot directly shut off a circuit whose voltage exceeds 250 V AC.

Measured gas

If offensive gas (nitric acid, hydrogen sulfide, sulfurous acid, ammonia, chlorine, etc.) is contained in the measured gas, malfunctioning due to defective contact of a contact or corrosion of the internal mechanism may occur. If the measured gas is highly humid, nitric acid may be produced due to an arc at the time of opening/closing of the contact, which may lead to similar defective contact or malfunctioning. Therefore, avoid the use of highly humid measured gas.

If the measured gas contains silicone gas generated from silicone (oil, grease, filler, etc.), silicone oxide may be generated and accumulated at the contact due to an arc at the time of opening/closing of the contact, which may lead to defective contact of a contact. Therefore, remove the silicone gas generation source or implement arc suppression measures.









3(N.O.)

2(N.C.)

MS99

Figure for explanation of operating pressure difference EMD7

EMT1

List of products

WO81

WO71

FR51A

MS99

MS99S

MS61A-RA

QDP33

EMD8A

ntial ure ses.

pre

/T1H

MT6

EMP5A

EMRT1

HWS15A

Accessories

Application

Precautions

Maintenance

MS99S

RoHS

Type examination pass No. TC22339X

S99S

	MS99S		
List of products			Туре е
WO81	Intrinsically safe fine differentia	I pressure switch	
	Explosion-proof performance	Ex ia	
WO71	Intrinsically safe refers to a model with a	structure designed in cons	ideration of the
FR51A	necessary safety factor so that combustit	ble gas will not be ignited b	because of an electric
	spark generated under normal conditions rise, whose explosion-proof safety has be	or in the event of an accio een verified through tests (lent or temperature or by other means by an
M\$99	official organization.	3	, ,
M\$995	Be sure to use this instrument in combina	ition with a safety holder (i	elay barrier). (Refer to
	page 43)		
MS61A-RA			
			20
SEL 00		R-L-	
EMD8A	(
		Cateron No.	
EIVID7			
EMT1			
EMICR1			
EWIGPT			
EMT1H		Model MS9	9 S
		(integrated base)	()
EMT6			
EMP5A			
EMRT1			

HWSISA	
	<main application="" fields=""></main>
Accessories	General factory management equipment Negative pressure for dust collector/differential pressure of air conditioner
Application	 Filter pressure loss management Precision machine manufacturing line
Precautions	Building air conditioning control equipment
Maintenance	<usage></usage>
	Detection of clogging of air filter Room pressure measurement in a clean room
	Weasurement of clogging of bug filter Measurement of dynamic pressure at ventilation/exhaust device

*(Refer to pages 114 to 117)

Product c	ode Pressure range code		
MS99S	H V 1000 D V (Example)	
	Mounting orientation	V	Upright
		Н	Horizontal
	Unit	D	Ра
		E	kPa
	Range	Maxi	mum scale value
	Base	V	Integrated type
	Scale setting	н	Upper limit setting
	coung	L	Lower limit setting

When making an inquiry or placing an order, specify the above product code.

There is no intrinsically safe fine differential pressure switch of the exchangeable base type.

HWS15A

MS99S

Specifications

On a sifi s sti s me	Integrated base type, for upper limit setting MS99SHV			Integrated base type, for lower limit setting MS99SLV			
Specifications							
Pressure unit	Pa, kPa	Insulation	resistance	Between terminal and case	20 MΩ or higher (500 V DC		
Pressure measurement method	Differential pressure method	Withstand	voltage	Between terminal and case	megger) 1500 V AC 50/60 Hz for one minute		
Pressure-receiving	Diaphragm	Compatibl	e pipe	Vinyl pipe or rubber pipe (inn	er diameter of 4 mm)		
element		Terminal s	crew size	M4 (mountable terminal: oute	r diameter of φ8 or below)		
Contact material	Silver alloy/gold plating	Base pola	rity	Indicating high-pressure side	and low-pressure side with		
Measured gas	Air and noncorrosive gas (liquid cannot be measured)			"H" and "L" marks, respective	ly, at the piping connection		
Pressure setting method	Setting by dial with scale			base part.			
Mounting orientation	Upright or horizontal	Mass		Approx. 190 g			
Operating ambient temperature	−10°C to +60°C (no freezing allowed)	Accessori	es	Cable clamp (already installe bushing (two types)	d on main body), rubber		
Operating ambient humidity	90% RH or below (no condensation allowed)	Conformin standard	g	RoHS directive			
Exterior material	Polycarbonate	Precaution	ns	When using this product in a	combustible gas atmosphere,		
Durable vibration	5 to 10 Hz, amplitude of 10 mm, 10 to 50 Hz, acceleration of 39 m/s² (two hours each for three axial directions)			When using this product, be the cover, cable clamp, and E	sure to mount it by attaching DIN rail mounting plate.		
Durable impact	100 m/s ² (six times each for three axial directions)						
				1			

Explosion-proof specifications

Explosion-proof performance Applicable guidance Intrinsically safe circuit tolerable voltage (Ui) Intrinsically safe circuit tolerable current (li) Intrinsically safe circuit tolerable	Intrinsically safe structure (Ex ia IIC T6 Ga) Technical Guideline 2015 compliance with international standard JNIOSH-TR-46-1:2015 JNIOSH-TR-46-6:2015 14.4 V 30 mA 0.11 W	Internal inductance (Li) Internal capacitance (Ci) Equipment protection level (EPL) Protection level Hazardous locations where this product can be installed*	Ignorable value Ignorable value Ga IP20 Special hazardous location Class I hazardous location Class II hazardous location	EMD7 EMT1
power (Pi)				EMIGP1

*In all hazardous locations, positively prevent generation of spark, which could be an ignition source, due to impact or friction on this instrument.

Pressure range code	Pressure range	Mounting orientation *It is necessary to specify the orientation at the time of order placement for all ranges	Scale setting accuracy (at 23°C)	Repeatability	Maximum operating pressure difference	Pressure-receiving element material	Withstanding pressures of instrument body and pressure-receiving element (Refer to page 118)	EMTIH
120 D	20–120 Pa	Tanges.	±5.0 Pa	±2.0 Pa	25.0 Pa			EN AT 4
200 D	20–200 Pa		±9.0 Pa	±2.0 Pa	25.0 Pa			EIVITO
300 D	30–300 Pa		±13.5 Pa	±3.0 Pa	30.0 Pa		10 kPa	
500 D	50–500 Pa	Horizontal	±22.5 Pa	±5.0 Pa	45.0 Pa	Silicone rubber		EMP5A
1000 D	100–1000 Pa	or	±45 Pa	±10 Pa	70 Pa			
3 E	0.3–3 kPa	Upright	±0.135 kPa	±0.030 kPa	0.300 kPa		20 kPa	EMRT1
5 E	0.5–5 kPa		±0.225 kPa	±0.050 kPa	0.450 kPa			
10 E	1–10 kPa		±0.45 kPa	±0.10 kPa	0.70 kPa			
30 E	3–30 kPa		±1.35 kPa	±0.30 kPa	3.00 kPa		50 kPa	HWS15A

◆For an overview of the structure, refer to page 38.

For contact and other materials, refer to page 42.

◆For the use environment, refer to page 118.

Opening/closing capability

Rated voltage	Specifications	Resistance load
12 V DC	Contact configuration SPDT (single-pole double-throw) Electric service life 100,000 times or more	30 mA

Accessories

Application

Precautions

MS99S

WO81 WO71 FR51A MS99

List of products

EMD8A

Maintenance

MS99S

List of products

EMD7

EMRT1

External dimension drawing



Mounting orientation and range It is necessary to specify the orientation at the time of order placement for all ranges.



Terminal connection part



MS99S



MS99S

MS61A-RA

List of products			
WO81	Small-size fine differe	ntial pressure switch	RoHS
WO71	 Small-size/lightweight type The operating pressure can action. 	that can be installed anywhere you like be set only by adjusting the scale knob with one	
FR51A	 Unique mechanism less sub High-performance silicone i 	oject to abnormal high pressure inrush rubber diaphragm with small hysteresis	
MS99			
MS99S			
MS61A-RA			
QDP33		A PORT OF THE OF	
EMD8A		C Car Standard	
EMD7			
EMT1			
EMTGP1			
EMT1H		MS61A-RA With built-in lead switch	
EMT6	*Model MS61A-RA	, which came to be resold in September 2019, is not compliant with the UL standa	ard.
EMP5A			
EMRT1			
HWS15A	< <u>Main application fields></u> • Part of semiconductor manufacturing equipment • Negative pressure for dust		
Accessories	collector/differential pressure of air conditioner • Filter pressure loss management • Precision machine manufacturing	Product code	
Application	line • General factory management equipment	MS61A L V 120 D -RA (Example) Contact	
Precautions	<usage></usage>		pole normally open type
Maintenance	Measurement of internal pressure of indoor device Detection of clogging of air filter Measurement of clogging of bug filter	Unit D Pa E kPa Range Maximum	scale value
	 Measurement of dynamic pressure at ventilation/exhaust device Room pressure measurement in a clean room 	Base V For Scale setting H Upp	vinyl pipe er limit setting
	*(Refer to pages 114 to 117)	When making an inquiry or placing an order, specify the above product code.	er limit setting

MS61A-RA

MS61A-RA

120 Pa 0.240 kPa

0.60 kPa 1.20 kPa List of products WO81

WO71

FR51A

MS99

MS99S

MS61A-RA

QDP33

EMD8A

EMD7

EMT1

Specifications Instrument for upper limit setting Instrument for lower limit setting Model MS61AHV MS61ALV 5 to 10 Hz, amplitude of 10 mm, 10 to 50 Hz, acceleration of 39 ${\rm m/s}^2$ (two hours each for three axial Pa, kPa Durable vibration Pressure unit Differential pressure method Pressure measurement method directions) Diaphragm (silicone rubber) Durable impact 100 m/s² (six times each for three axial directions) Pressure-receiving element Insulation resistance Between terminal and case 20 MΩ or higher (500 V DC megger) Air and noncorrosive gas (liquid cannot be measured) Measured gas Pressure setting method Withstand voltage Setting by knob with scale Between terminal and case 500 V AC 50/60 Hz for one minute Standard mounting Mounted at arbitrary angle between horizontal and upright Compatible pipe Vinyl pipe or rubber pipe (inner diameter of 4 mm) orientation Operating ambient temperature -10°C to +50°C (no freezing allowed) Terminal screw size M3.5 outer diameter of $\phi 8$ or below Indicating high-pressure side and low-pressure side with "H" and "L" marks, respectively, at the piping connection base part. Base polarity Operating ambient humidity 90% RH or below (no condensation allowed) Mass Approx. 140 g Instrument body withstanding pressure 100 kPa (refer to page 118) M4 Mounting screw size Withstanding pressure of pressure-receiving element 20 kPa (refer to page 118) Exterior material Polvamide Scale setting accuracy Maximum operating Pressure range code Pressure range (at 20°C) pressure difference 120 D* 20–120 Pa ±5.0 Pa 37.5 Pa 300 D 50-300 Pa ±15 Pa 60 Pa

600 D	100–600 Pa	±25 Pa				
1.2 E	0.2–1.2 kPa	±0.050 kPa				
3 E	0.5–3 kPa	±0.15 kPa				
6 E 1–6 kPa ±0.30 kPa						
*Instrument for upper limit setting cannot be manufactured.						

◆If you desire to procure a model with a mounting orientation other than above, such as downward and horizontal mounting and mounting

orientation 135°, let us know in advance because adjustment needs to be made before shipment from the factory.

◆For use environment, refer to page 118.

Opening/closing capability

Contact type	Specifications	Rating	Opening/closing voltage	Opening/closing current	Opening/closing power	EIVII
Single-pole normally open sealed type	Contact configuration: SPST (Single Pole Single Throw) N.O. Electric service life: 100,000 times or more Contact structure: Lead switch	0.1 A-30 V DC	100 V DC (maximum)	0.25 A DC (maximum)	10 W DC (maximum)	EM



The product may malfunction from the influence of the external magnetic field. Install the product at a sufficient distance from the circuit with high voltage and large current, apply a magnetism shield as necessary, and use the product after sufficiently checking its operation.

EMT1H

EMTGP1

IT6

EMP5A

EMRT1

HWS15A

Accessories

Application

Precautions

Maintenance

MS61A-RA



List of products

EMD8A

EMD7

EMT1

EMTGP1

EMT1H

EMT6

EMP5A

EMRT1



Mounting orientation and range



Overview of structure



MS61A-RA

Accessories dedicated to MS61A RoHS



Configuration of switch contact

- The contact configuration of this instrument is as shown on the right.
- · When no differential pressure (pressure) is applied to the instrument, the section between COM. (1) and N.O. (2) is open.
- · When the differential pressure increases and reaches the set pressure, the contact is switched and the section between COM. (1) and N.O. (2) turns to be closed.

Upper limit setting and lower limit setting

The pressure at which the electric contact of the switch is triggered as the differential pressure (pressure) applied to the instrument has increased from zero is referred to as the set pressure.

Then, the pressure at which the contact has returned to the former state as the differential pressure has decreased from the use condition at a pressure greater than the set pressure, and the electric contact has been triggered is referred to as the reset pressure.

The set pressure and reset pressure mentioned above are not the same values, but are slightly different from each other. This difference is referred to as the operating pressure difference (dead band).

This instrument has two variations: one with the scale of setting dial set to the set pressure; and the other with the scale set to the reset pressure.

This instrument with the scale set to the set pressure is referred to as the instrument for upper limit setting, and the instrument with the scale set to the reset pressure is referred to as the instrument for lower limit setting.

When the setting pressure is set to 100 Pa in the pressure range of 50 to 300 Pa for example (operating pressure difference is assumed to be 60 Pa)

Scale setting	Setting dial scale adjustment	Contact action		HWS15A
Instrument for upper	Adjustment is made by means of	When the differential pressure increases, the section between N.O. (2) and COM. (1) closes at 100 Pa. Then, when the differential pressure decreases, the		
limit setting	set pressure.	section between N.O. (2) and COM. (1) opens at 40 Pa.		Accessorie
Instrument for lower	Adjustment is made by means of	When the differential pressure increases, the section between N.O. (2) and		1000000110
limit setting	reset pressure.	section between N.O. (2) and COM. (1) opens at 100 Pa.		Application



It is not possible to change from the upper limit setting to the lower limit setting and vice versa.

MS99

FR51A

List of products

WO81

WO71

MS99S

MS61A-RA

QDP33

EMD8A

EMD7

EMT1





operating pressure difference

EMT1H

EMTGP1

EMP5A

QDP33 List of products NEW WO81 **RoHS** 30×30 type digital fine differential pressure sensor • Mounted with our originally developed electrostatic capacity type pressure sensor. WO71 Industry's smallest size with a sensor, a display, and output function incorporated in 30 mm square size. FR51A • Close-contact mounting is possible. · Employs easily visible large 12-segment LCD. Product compliant with UL standard and EU directive. MS99 • An ultra-low pressure range product is newly added to the product lineup. Product with 0 to 10 Pa range is optimum for room pressure measurement of clean rooms compliant with the CDC guideline and negative pressure rooms. MS99S MS61A-RA EMD8A EMD7 EMT1 **QDP33** EMTGP1 Installation example EMT1H EMT6 EMP5A Horizontal connection Vertical connection EMRT1 HWS15A <Main application fields> **Product code** Pressure range code General factory management equipment **QDP33** (Example) Ν 1 D 200 Negative pressure for dust Accessories collector/differential pressure of air conditioner Filter pressure loss management Range Maximum value Application Precision machine manufacturing Building air conditioning control (for ± range, provide "±" as well) Precautions Unit D Ра equipment Ε kPa Maintenance <Usage> Analog output 1 Detection of clogging of air filter 4-20 mA Room pressure measurement in a 4 1–5 V clean room Measurement of clogging of bug Comparison output Ν NPN transistor filter igoplusWhen making an inquiry or placing an order, specify the above Measurement of dynamic pressure Ρ PNP transistor at ventilation/exhaust device product code.

*(Refer to pages 114 to 117)

QDP33



QDP33

Spacifications

Model	QDP33					
Pressure unit	Pa, kPa	An	nalog output	Accuracy Pressure ra	inge codes D10, D25, D \pm 10, and D \pm	
Pressure measurement method	Differential pressure method			25: ± 1.5% Other press Temperature characteristi Output type	FS (at 23°C) sure range codes: ± 1.0% FS (at 23°C) cs ± 0.15% FS/°C (zero + span)	
Measured gas	Air and noncorrosive gas (liquid can	not be measured)		QDP33 4 to 20 mA (biased pres	sure: 0 to FS, ±: at pressure of -50 to	
Sensor method	Electrostatic capacity type			+50% FS)	0.0	
Pressure-receiving	Diaphragm (silicone)			• QDP33_4		
Mounting orientation	Mounting on vertical surface			+50% FS)	e: 0 to FS , \pm : at pressure of -50 to	
Operating ambient	D10, D25, D ± 10, D ± 25: 0°C to 50	°C (no freezing		Load resistance: 10 kΩ	or higher	
temperature	allowed)	60°C (no freezing	ower voltage	12 to 24 V DC ± 10% (ripp	ble of 10% or below)	
Operating ambient	allowed) 35% to 85% RH or below (no conde	nsation allowed)	aximum consumption irrent	Normal mode Low power consumption r *Excluding consumption c	25 mA (at power voltage of 24 V) node 20 mA (at power voltage of 24 V) urrents in analog output and comparison	
humidity	10 kDa (refer to page 119)	Ins	sulation resistance	output Between terminal and cas	e 10 MO or higher (500 V DC megger)	
withstanding pressure	TO KPa (refer to page 118)	Wi	ithstand voltage	Between terminal and cas	= 500 VAC 50/60 Hz for one minute	
Withstanding pressure of pressure-receiving element	10 kPa (refer to page 118)	Ins	stallation category	Standard IEC 60664 level (However, this product mu	Il st be connected to the secondary side	
Display	Main display 12-segment LCD (v	vhite/red), four digits	perating altitude	Altitude of 2000 m or belo	w	
	Sub display 12-segment LCD (orange), four digits	otection level	Standard: IEC 60529 Gra	de code: IP40	
	± 1 digit (at 23°C) 0 ther pressure ran 1 digit (at 23°C)	ge codes: ± 1.0% FS ±	egree of entamination	Standard: IEC 60664 Gra (If it is not possible to inst	de code: 2 all this product at a dry clean location,	
	Temperature characteristics ± 0.1	5% FS/°C (zero +	rable vibration	house it in a housing.)	0 mm	
Zara adjustment	span)		10 to 50 Hz, acceleration	of 39 m/s ² (two hours each for three	
method	(The displayed value and analog ou	tput are adjusted to	rable impact	100 m/s ² (six times each f	or three axial directions)	
• • • • •	zero at the same time.)	Ex	terior material	PBT and polyamide		
Comparison output	Setting method: push-type digital se Output display Red LCD × 2	tting	essure port	M5 internal thread		
			·	Metallic barb fitting (alread	dy installed on main body) nal diameter of 4 mm	
	Two systems of NPN open collector	or Ba	ase polarity	Indicating high-pressure s	ide and low-pressure side with "H" and	
	Maximum load current: 100 mA or Maximum load voltage: 30 V DC o	lower (per output)		"L" marks, respectively, at	pressure port.	
	Output saturated voltage: 1 V DC	or lower (at load	onnector	RIIS Connector 6P (IE C	onnectivity)	
	• QDP33P		155	Approx. 30 g	ter and mounting parts are cald	
	Two systems of PNP open collector Maximum load current: 100 mA or Maximum load voltage: 30 V DC o Output saturated voltage: 2 V DC o	r lower (per output) r lower or lower (at load	cessories	separately)	tor and mounting parts are sold	
Dreesure removed	current of 100 mA)					
Pressure range code	Rating pressure range	LCD display	Com	iparison output	Analog output	
D 10 D 25	0–10 Pa 0–25 Pa	0.00-10.00				
D 50	0–50 Pa	0.0–50.0				
D 100	0–100 Pa	0.0-100.0				
D 200	0-200 Pa	0-200				
D 500	0-500 Pa	0-500				1
D 1000	0–1000 Pa	0-1000				
E 1	0–1 kPa	0.00-1.00	N	IPN transistor	4–20 mA	
E 2	0–2 kPa	0.00-2.00		or	or	
D +- 10	-10 to +10 Pa	-10.00 to 10.00	-		4 5 1	
D + - 25 D + - 50	-25 to +25 Pa -50 to +50 Pa	-25.0 to 25.0		TINE TRANSISTOR	1-5 V	
D + -100	-100 to +100 Pa	-100 to 100				
D +-200	-200 to +200 Pa	-200 to 200				
D +-300	-300 to +300 Pa	-300 to 300				
D + -500	-500 to +500 Pa	-500 to 500				
	- 1000 to + 1000 Pa					
E +-1 F +-2	-1 то +1 кРа -2 to +2 кРа	-1.00 to 1.00 -2 00 to 2 00				
	2.0.200	2.00 10 2.00			1	1

Conforming standards

1. EU directive

This product is compliant with the EMC directive of EU.

EMC directive basic requirements Standard No.EN 61326–1 This product in combination with HWS15A-24/A (TDK-Lambda Corporation) is confirmed to be compliant with the EMC directive. When using this product with other power unit, have the final system go through the EMC test. 2. UL standard

This product is certified as an UL standard recognition part. It is also certified with Canada Standard (C-UL).

However, use this product in accordance with the installation conditions shown in (3) below. (1) Requirements standard No......UL 61010–1 (2) File No.......E220685

(3) Installation conditionAs the DC power source to be connected to this product, use the NEC (National Electrical Code)

Class 2 power source or LPS (Limited Power Source) power source.

QDP33

List of products 1 s

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Precautions

Maintenance

QDP33

QDP33

List of products





EMTIH Operation panel



Maintenance

QDP33

Terminal arrangement drawing



Connection example





Accessories Application Precautions

Maintenance

EMT6

EMP5A

EMRT1

HWS15A

MS61A-RA

MS99S

쿧 Manostar 🛛 54

QDP33

List of products

WO71

FR51A

QDP33

QDP33



QDP33

QDP33





QDP33

QDP33 List of products Mode changeover (1) WO81 Sub setting mode (SET2-MODE) Before turning on of power supply WO71 567.2 [Turn on power supply] MODE FR51A <For 100 Pa range> Outpu ode of output 1 function Н HYS H INMinimum scale indication Hysteresis mode (one second) Window mode MS99 MODE 100 Maximum scale indication (one second) OFF ME ND OFF N.C. N.O. **MS99S** MODE Setting value protection Maximum value indication Zero adjustment time of output 1 function 98 Protection setting Π 688 MS61A-RA 0 to 600 seconds 8888 ΠN (₹) (in units of 1 second) Holding down for two seconds Clearing of retained value NE K MODE Blinks once Output 1 off off-delay time of output 1 function. / tim ates betweer Set and Cancel Ш <u>buu</u> Inversion of main display color Minimum value indication 0 to 600 seconds Cancellation of $\overline{\nabla}$ (in units of 1 second) Even Ø (₹) second MODE 8888 OFF 80FM EMD8A on-delay time of output 1 power supply. ()Holding down for two seconds Clearing of retained value Ш 0 to 20 minutes (₹) (in units of 1 minute) MODE + () Holding down for (▲) + (▼) Holding down for MODE MODE EMD7 ation mode of output 2 function. Pressure indication mode When no key has been pressed for 15 seconds, the mode automatically returns to the pressure HYS the mode autom indication mode. Hysteresis mode Window mode (Excluding sub setting mode and detailed setting mode) Holding dow for two seco EMT1 Measurement pressure indication MODE Upper limit over range indication Ш HHHH Normal display Biased pressure range: +110% FS or higher +- range: +60% FS or higher MODE Holding down Outout Sets the output node of output : ML OFF ND NFF EMTGP1 N.C. N.O. Lower limit over range indication Biased pressure range: -10% FS or lower +- range: - 60% FS or lower MODE LLL Display during sleep Output 2 on-dela on-delay time of output 2 function EMT1H 600 0 to 600 seconds (₹) (in units of 1 second) MODE MODE Holding down for two seconds MODE Main setting mode EMT6 2 off-delav time Sets the off-delay time of output 2 function. Output (SET1-MODE) à SEF. 688 Π 0 to 600 seconds (₹) (in units of 1 second) MODE MODE EMP5A ŧ Output 1 function In window mode Output 1 function Output 2 power supply on-delay time the output 2 power supply on-delay time In hysteresis mode 20 0 to 20 minutes \sim <u>90</u> H (in units of 1 minute) EMRT1 MODE MODE MODE 89 H HWS15A Error indication (when an error occurs: when two errors have occurred at the same time) Aleasurement Error code indication Measurement Measurement Error code indication MODE MODE pressure indication 18 10 L Цc Accessories Output 2 function Output 2 function In window mode In hysteresis mode 4 After every indication of pressure, the error codes are displayed in order at intervals of one second 11 86 Application Sub display when the key is held down Precautions MODE MODE ---20 Maintenance Explanation of marks MODE MODE Press the <<Mode>> key MODE Press the <<Up>> key Press the <<Down>> key. $(\overline{\forall})$ At the pressure setting points (P1, P2, Hi, and Lo), pressure values are set. Setting range: Within the pressure range Units: Pa, kPa P1: Pressure setting point in hysteresis mode P2: Hysteresis pressure setting point in hysteresis mode Lo: Lower limit pressure setting +Press the indicated keys simultaneously H: Upper limit pressure setting point in window mode Lo: Lower limit pressure setting point in window mode $\setminus |$ Blinking

QDP33

QDP33



QDP33

List of products

QDP33

comparison

Comparison

output

Power ON delay time

0 to 20 minutes

Open (OFF)

OFF delay time 0 to 600 seconds

Open (OFF)

ON delay time

0 to 600 seconds

Close (ON)

ON delay time

0 to 600 seconds

Close (ON)

Comparison function operation diagrams



Maintenance

by the set delay time. During the operation of the timer, the comparison output will forcefully open (OFF). Power on-delay timer:

QDP33

GDI 00				
QDP33 acco	essories	RoHS		
			RITS 5P o	cable w/connector
This is a cable QDP33. In the sheath o product, vinyl RITS plugs an	with connector u cable and other c chloride is not int d connectors are	used for connect onstituting part entionally used products of TE	tion with s of this E Connectivity.	RITS plug/connector 5P
Item number	Cover color	Core wire insulation sheat	Terminal	Sheath cable (black, φ4, five core:
CAB-RITS5-15	i Yellow	Color Brown Blue Pink Black White	number ① ② ③ ④ ⑤	
Caution This pro	duct is not UL-cert	ified.		Core wire sheath outer diameter: 1.0 mm Standard: AWG#24
		R	ITS plug/con	nector 5P (TE Connectivity)
This is a wiring	g side plug/conne	ector used on Q	DP33.	Cover: yellow
		Applicabl	e wiring	
Item number	Color N	ominal cross- section area	Finish outer diameter	
1473562-5	Yellow (0.1–0.5 mm ²	1.0–1.15 mm	*Cable is not suppli
Caution When cr	imping of connecto r RITS connectors	r is performed, us and details, conta	se the dedicated to act TE Connectivity	ol (item number: 1729940-1 from TE Connectivity). /.

QDP33

QDP33



Application Precautions Maintenance

EMD8A

 \blacklozenge When making an inquiry or placing an order, specify the

above product code.

Connector

Analog output

Comparison output

(Example)

Maximum scale value (for ± range, provide "±" as well)

Ра kPa

6P

4–20 mA 1–5 V

NPN transistor

PNP transistor

D

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6

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EMD8A

	LINDOA									
List of products										
WO81	24×48 type digital fine differential pressure sensor									
WO71	 Designed with consideration for ease of incorporation into the device, such as employment of RITS connector and snap-in type panel mounting method The displacement sensor employs a high-performance diaphragm and a differential inductance method. 									
FR51A										
MS99	 Variation of fourteen ranges in total, including five zero center range types Easily visible 12 mm high red LED display Equipped with a variety of functions that include a movement average filter. 									
M\$99\$	 Sign inversion function convenient for negative pressure measurement (negative 									
MS61A-RA	value indication is possible)									
QDP33										
EMD8A	the second state of the second state of the									
EMD7	3 Manostar EMD8A Pa									
EMT1										
EMTGP1	YAMAMOTO ELECTRIC WORKS CO., LTO. JAPAN									
EMT1H										
EMT6	*The wiring side connector and cable are not supplied. If they are necessary, use the RITS plug/connector 5P (refer to page 70).									
EMP5A										
EMRT1										
HWS15A	< <u>Main application fields</u> • Semiconductor manufacturing equipmentProduct code• Pressure range code									
Accessories	Negative pressure for dust collector/differential pressure of air conditioners Filter pressure loss management Precision machine manufacturing EMD8A N 1 6 D 100									
Application	line Range • General factory management Range									
Precautions	equipment Unit									
Maintenance	Measurement of internal pressure of indoor device Connect									
	Detection of clogging of air filter Measurement of clogging of bug filter Measurement of dynamic pressure									
	at ventilation/exhaust device • Room pressure measurement in a clean room Compa									



*(Refer to pages 114 to 117)

EMD8A

List of products

EMD8A

Specifications

Model	EMD8A						WO81
Pressure unit	Pa, kPa		Analog output		Accuracy	± 1.5% FS (at 20°C)	woor
Pressure measurement method	Differential pressure method				• EMD8A 1	$153 \pm 0.15\%$ FS/ C (zero + span)	W071
Measured gas	Air and noncorrosive gas (liquid cannot be measured)				4 to 20 mA (blased pl to +50% FS) Load resistance: 0 to	essure: 0 to FS, ±: at pressure of -50%	WOTI
Pressure-receiving element	Diaphragm (silicone rubber)				EMD8A 4 1 to 5 V (biased pres	sure: 0 to ES +: at pressure of -50% to	
Mounting orientation	Mounting on vertical surface				+50% FS)	:O or higher	FR51A
Operating ambient temperature	0°C to 60°C (no freezing allowed)		Power volta	ge	12 to 24 V DC ± 10% (ripp	ble of 10% or below)	
Operating ambient humidity	35% to 85% RH (no condensation allo	wed)	Maximum co current	onsumption	• EMD8AN (comparison o Total consumption: 100 r	utput: NPN transistor type) nA (internal consumption only) utput: PNP transistor type)	MS99
Instrument body withstanding pressure	10 kPa (refer to page 118)				Internal consumption: 10 Total consumption: 300 r comparison output of 10	0 mA nA (including load current for n mA × 2)	
Withstanding pressure of pressure-receiving element	10 kPa (refer to page 118)		Insulation re	esistance	Between terminal and cas	e: 10 MΩ or higher (500 V DC megger)	MS99S
Exterior material	Polycarbonate		Withstand v	oltage	Between terminal and cas	e: 500 V AC, 50/60 Hz, for one minute	
Electric signal conversion method	Variable inductance		Installation	category	Standard IEC 60664 level (However, this product mu of a safety insulation trans	II ist be connected to the secondary side former such as DC switching power.)	MS61A-RA
Display	Display section 7-segment LED, ro	ed 3-1/2 digits	Operating a	ltitude	Altitude of 2000 m or belo	w	
	Temperature (characteristics) ± 0.15	f (at 20°C) 9% FS/°C (zero + span)	Protection l	evel	Standard: IEC 60529 Grad	de code: IP40 (front panel)	QDP33
Zero adjustment method	Push-type automatic zero return (The displayed value and analog output are adjusted to zero at the same time.)			on	Standard: IEC 60664 Grade: 2 (If it is not possible to install this product in a dry clean location, house it in a housing.)		
Comparison output	Setting method Push-type digital setting Output display Red LED x 2 Output type		Durable vib	station 5 to 10 Hz Amplitude of 10 mm, 10 to 50 Hz Acceleration of 39 m/s ² (two hou axial directions)		of 10 mm, n of 39 m/s² (two hours each for three ons)	EIVIDØA
	EMD8AN Two systems of NPN open col	lector	Durable impact 100 m/s ² (six times each		100 m/s² (six times each f	or three axial directions)	EMD7
	Maximum load current: 100 m. Maximum load voltage: 30 V D	A or lower (per output)	Compatible pipe		Vinyl pipe or rubber pipe (inner diameter of 4 mm)	
	• EMD8AP	DC or lower (at load	Base polarity Indicat and "L		Indicating high-pressure s and "LOW" marks, respec	ide and low-pressure side with "HIGH" tively, at piping connection base part.	ENATI
	Two systems of PNP open col Maximum load current: 100 m. Maximum load voltage: 30 V D Output saturated voltage: 2 V	lector A or lower (per output) IC or lower DC or lower (at load	Connector RITS Connector 6P (TE C For the connector on the accessory (refer to page 7 Mass Approx. 60 g		RITS Connector 6P (TE Connectivity) For the connector on the wiring side, use the separately sold accessory (refer to page 70).		EIVITT
	current of 100 mA)				Approx. 60 g	,	EMTGP1
Pressure range code	Rating pressure range	LED displa	у	Com	parison output	Analog output	
D 50	0-50 Pa	0.0-50.0					EMT1H
D 100	0-100 Pa	0.0-100.0					
D 200	0-200 Pa	0-200					
D 300	0-300 Pa	0-300					EMT6
D 500	0-500 Pa	0-500					
	0.2 kPc	0-1000		N	PN transistor	4–20 mA	
E 2 E 3	0-2 KFa	0.00-2.00			or	or	EMP5A
E 5	0-5 kPa	0.00-5.00		P	NP transistor	1–5 V	
D +- 50	-50 to +50 Pa	-50.0 to 50 0					
D +-100	-100 to +100 Pa	-100 to 100					EMRT1
D +-200	-200 to +200 Pa	-200 to 200					
D +-300	-300 to +300 Pa	-300 to 300					
D +-500	-500 to +500 Pa	-500 to 500					HWSI5A

◆For the use environment, refer to page 118.

Conforming standards	Accessories		
1. EU directive			
This product is compliant with the EMC directive of EU.	Application		
EMC directive basic requirements Standard No EN 61326–1			
This product in combination with HWS15A-24/A (TDK-Lambda Corporation) is confirmed to be compliant with the EMC			
	Maintenance		
when using this product with other power unit, have the final system go through the EMC test.	indiritorianou		
2. UL standard			
This product is certified as an UL standard recognition part. It is also certified with Canada Standard (C-UL).			
However, use this product in accordance with the installation conditions shown in (3) below.			
(1) Requirements standard NoUL 61010–1			
(2) File NoE220685			
(3) Installation conditionAs the DC power source to be connected to this product, use NEC (National Electrical			
Code) Class 2 power source or LPS (Limited Power Source) power source.			

EMD8A

Name

Case

Base

Core

Cover

Main frame

Diaphragm

Coil bobbin

Plate spring

Display film

Main board

Connector

side base

Connector board

Display board

EMD8A

List of products







EMT6

EMP5A

EMRT1

HWS15A

Accessories

Application Precautions Maintenance

EMD8A

Operation panel



Functions of EMD8A►►►

Display function

Pressure indication

Easily visible 12 mm high seven-segment red LED display Push type automatic zero reset

- Zero-resets the pressure indication and analog output at the same time.
- Movement average filter (for indication use) When the measured pressure greatly fluctuates, this function increases the response time to alleviate the fluctuation of display value.
- Maximum value/minimum value memory function Memorizes and displays the maximum pressure and minimum pressure during measurement.

Comparison output function (NPN or PNP transistor output)

• Equipped with two systems of the exact same function, each of which operates independently.

(Transistor output and output monitor red LED are equipped for each system.)

- •By changing the following parameter settings, it is possible to use this instrument for various applications.
 - 1. Comparison mode (hysteresis mode or window mode)
 - 2. Comparison pressure setting point
 - 3. Output mode (OFF, N.O., N.C.)
 - 4. Output on-delay time
 - 5. Output off-delay time
 - 6. Power supply on-delay time

Analog output function

- •Analog output (4 to 20 mA or 1 to 5 V) This function performs zero setting and movement average filter processing of a digital pressure measurement value, and then performs D/A conversion of the value and outputs it as an analog value. •Movement average filter (for output use)
- When the measured pressure greatly fluctuates, this function increases the response time to alleviate the fluctuation of analog output.

Other functions

- Test mode function It is possible to check the setting value and operation without EMT6 applying pressure. Display low cut function When the measurement pressure is near zero, the pressure EMP5A indication can be forcefully set to zero. •Measurement indication symbol inversion function The indication values in the pressure indication mode and EMRT1 maximum/minimum indication mode are displayed with their symbols inverted HWS15A Analog output inversion function Under normal conditions, when the differential pressure being measured rises, the analog output value also rises. However, Accessories turning on the analog output inversion function makes an opposite action. •Low power consumption function Application Reduces the power consumption by decreasing the LED display Precautions brightness. Maintenance •Setting protection function Protects setting values in various setting modes from erroneous operation and others.
- Setting clear function

This function can revert the setting values in all setting modes to the factory default state.

EMD8A

List of products

QDP33

EMD7

FMT1

FMTGP1

EMT1H

EMD8A

EMD8A



EMD8A

EMD8A

List of products Mode changeover WO81 Maximum value/minimum value indication Zero adjustment Setting value protection Sub setting mode Selects the operation mode of output 1 function Maximum value indication Blinks twice Output 1 function setting Pa 98 Protection setting 1 P: 45 Hysteresis mode I LF E WO71 secoń 000 LoE Undow mode MODE ENT Clearing of retained value / Selects the output mode of output 1. Alternates between Output 1 output mode setting Set and Cancel FR51A Minimum value <u>lo</u>P Cancellation of protection Every second indication : UnL 13 WODE the on-delay time of output 1 function Clearing of retained value Output 1 on-delay time setting 0.0 to 2.0 seconds (in units of 0.1 seconds) MS99 ¥ lon VODE ts the off-delay time of output 1 function. WODE $\blacksquare + \blacktriangledown$ Output 1 off-delay time setting 0.0 to 2.0 seconds **MS99S** Hold dow Hold down (in units of 0.1 seconds) : 1.o F Output 1 power supply on-delay time setting Measure indication Sets the output 1 power supply on-delay time. MS61A-RA 0 to 20 minutes When no key has been pressed for 15 seconds, the mode automatically returns to the pressure indication mode (excluding that duration without pressing of key 10 Normal display (in units of 1 minute) Hold down : LdP Upper limit over range indication Biased pressure range: NODE FFF Biased pressure range: +110% FS or higher +-Range: +60% FS or more Selects the operation mode of output 2 function QDP33 MODE Hold Output 2 function setting ower limit over range indication Biased pressure range: without pressing of key at the time of standby HYSTERESIS mode : 2.FE - F F F Biased pressure range: -10% FS or lower +- range: - 60% FS or lower for entry by Up/Down key in sub setting mode). MODE Selects the output mode of output 2 Pressure indication Output 2 output mode setting N.C. N.O. mode : 2.oP WODE MODE Hold down MODE EMD7 Sets the on-delay time of output 2 function. Output 2 on-delay time 0.0 to 2.0 seconds settina Main setting mode . 2.on (in units of 0.1 seconds) 0.56 FMT1 MODE Output 1 Output 1 Sets the off-delay time of output 2 function function in function in Output 2 off-delay time setting 0.0 to 2.0 seconds (in units of 0.1 seconds) hysteresis window mode : <u>2.o</u> F mode Output 1 pressure setting point P1 setting Pal EMTGP1 Output 2 power sup : <u>(P</u> : <u>(</u>,H) Sets the output 2 power supply on-delay time. out 2 power sup delay time setti 0 to 20 minutes Output 1 pressure setting point P2 setting Output 1 pressure setting 2.dP (in units of 1 minute) EMT1H point Lo setting NODE lects the display filter. t P à Explanation of marks 2 (Lo Display filter setting F [] 0.2 seconds F [] 1.0 seconds F [] 2.0 seconds F [] 4.0 seconds MODE : Press the <<Mode>> key. WODE NODE FLd Press the <<Up>> key. EMT6 ▼ :Press the <<Down>> key WODE ENT : Press the <<ENT>> key. Output 2 Output 2 function in hysteresis mode Selects the output filter. Hold down: Press continuously F 0.2 F 1.0 F 2.0 F 4.0 function in window mode Output filter setting 0.2 seconds for 2 seconds or more FLo 1.0 seconds EMP5A Output 2 pressure setting point P1 setting Output 2 pressure setting 2.0 seconds WODE 4.0 seconds : <u>2</u>.H, - 2.P 1 ets the indication low cut value Display low cut setting EMRT1 Output 2 pressure setting point P2 setting Output 2 pressure se point Lo setting LLd 0 to 5% FS (in units of 1% FS) tting Measurement indication Sets the symbol inversion for measurement indication value 2.92 - <u>2.L o</u> symbol inversion se HWS15A o F F : <u>56</u>n Symbol inversion WODE NCOE Normal WODE Sets inversion of analog output. At the pressure setting points (P1, P2, Hi, and Lo), analog output inversion setting At the pressure setting points (P1, P2, Hi, and Lo), pressure values are set. Setting range: Within the pressure range Unit: Pa, kPa P1: Pressure setting point in hysteresis mode P2: Hysteresis pressure setting point in hysteresis mode Hi: Upper limit pressure setting point in window mode Lo: Lower limit pressure setting point in window mode Accessories Output inversion : RnR WODE Selects the power consumption mode. Application er consumption setting Low power consumption mode EEo Precautions DFF Normal power mode WODE Enters the test mode, and sets a simulated pressure value. Pressure setting range: biased pressure range -10 to +110% FS + range -60 to +60% FS Unit: Pa, kPa (when error occurs: When two errors have occurred Maintenance Error display at the same time) Test mode setting **F** 5 F Error code indication Measurement pressure indication Error code indication rement pres WODE E.0 1 10 I 10 : E.O.Z This function reverts the setting value to the factory default. Setting clear Does not clear the setting value. 42ES Clears the setting value. Lr After every indication of pressure, the error codes are automatically displayed MODE in order at intervals of one second.

EMD8A

EMD8A



EMD8A

EMD8A List of products EMD8A accessories RoHS WO81 **RITS 5P cable w/connector** This is a cable with connector used for connection with EMD8A WO71 In the sheath cable and other constituting parts of this product, vinyl chloride is not intentionally used. RITS plugs and connectors are products of TE Connectivity. RITS plug/connector 5P FR51A Core wire insulation sheath color Terminal Sheath cable (black, ϕ 4, five cores) Item number Cover color number Brown 1 MS99 (2) Blue CAB-RITS5-15 3 Yellow Pink (15) 1500 +50 (50) Black 4 White **MS99S** (5) This product is not UL-certified. Core wire sheath outer diameter: 1.0 mm Standard: AWG#24 Caution MS61A-RA RITS plug/connector 5P (TE Connectivity) QDP33 Cover: yellow This is a wiring side plug/connector used on EMD8A. Applicable wiring Item number Color Nominal cross-Finish outer section area diameter EMD7 1473562-5 Yellow 0.1-0.5 mm² 1.0-1.15 mm *Cable is not supplied. When crimping of the connector is performed, use the dedicated tool (item number: 1729940-1 from TE Connectivity). EMT1 For other RITS connectors and details, contact TE Connectivity. Caution EMTGP1 Connectability of the RITS connector 0 ••• Connectable EMT1H <EMD8A main body 6P> <RITS plug/connector 5P> × Non-connectable Item number: 1473562-5 EMT6 EMP5A Without contact pin EMRT1 <EMD8 main body 5P> HWS15A <RITS plug/connector 6P> Discontinued product Accessories Application With contact pin Contact hole is sealed Precautions with resin. Maintenance As the connector on the wiring side, be sure to use the RITS plug/connector from TE Connectivity. As the RITS connector is not compliant with e-CON, it is not compatible with connectors from other manufacturers. Caution

List of products				((
WO81	48×48 type digital fine	e differential pressure sens	or				
WO71	 Selectable from eight ranges including 0 to 100 Pa and 0 to 5 kPa It is possible to select analog output function in the range of 4 to 20 mA or 1 to 5 V. It is possible to select the alarm output type from NPN open collector or PNP open 						
FR51A	collector. Compatible with 12 to 24 V DC power source Forwige a dwith a burn dont a ddition of four tight on tight on the source of the sour						
MS99	 Equipped with abundant a including movement avera timer 	dditional functions for differential pi ge filter, maximum/minimum value	essure measurement memory, and delay				
M\$99\$	 It is possible to set the alarm function mode in accordance with the usage. Product compliant with the EU directive and UL standard 						
MS61A-RA							
QDP33							
EMD8A	ALARM HI B C C Pa Pa Manostar EMD7 EMD7D3						
EMD7							
EMT1							
EMTGP1							
EMT1H							
EMT6							
EMP5A							
EMRT1							
HWS15A	<main application="" fields=""> • Part of semiconductor manufacturing equipment</main>	Product code	- Pressure range code -				
Accessories	Negative pressure for dust collector/differential pressure of air conditioners Filter pressure loss management Precision machine manufacturing	EMD7 D3 N 1	D 100 (Example)				
Application	line General factory management Gruipment 		Range	Maximun	n value		
Precautions	 Usage> 		Unit	D Pa			
Maintenance	Measurement of internal pressure of indoor device			E kPa			
	Detection of clogging of air filter Measurement of clogging of bug		Analog output	1 4–20 mA	\		
	filter • Measurement of dynamic pressure		Alorm output	N NPN tro	nsistor		
	at ventilation/exhaust device Room pressure measurement in a 		Alarmoutput	P PNP tra	nsistor		
	clean room		Power source	D3 12–24 V	DC		

EMD7

When making an inquiry or placing an order, specify the above product code.

*(Refer to pages 114 to 117)
EMD7

Specifications

Model	EMD7D3						
Pressure unit	Pa, kPa		Alarm output		Output type		
Pressure measurement method	Differential pressure method				EMD7D3N NPN open collector One each for uppe Maximum load our	r limit and lower limit	
Electric signal conversion method	Variable inductance				Maximum load cu Maximum load vol Output saturated v	tage: 30 V DC or lower oltage: 1 V DC or lower	
Measured gas	Air and noncorrosive gas (liquid cannot	be measured)			PNP open collector	r limit and lower limit	
Pressure-receiving element	Diaphragm (silicone rubber)				Maximum load cur Maximum load vol Output saturated v	rent: 100 mA (per output) tage: 30 V DC or lower oltage: 2 V DC or lower	
Mounting orientation	Mounting on vertical surface				Setting range Upper limit: 0 to 10	00% FS	
nstrument body withstanding pressure	20 kPa (refer to page 118)				Lower limit: 0 to 10 Hysteresis width can be s Setting method	00% FS set in the range of 1 to 5% FS. Push-type digital setting	
Nithstanding pressure of pressure-receiving element	20 kPa (refer to page 118)		Analog output		Output display	Red LÉD × 2	
Operating ambient temperature	0°C to 50°C (no freezing allowed)				 EMD/D3_1 4 to 20 mA (at pressure Load resistance: 0 to 1 EMD7D3_4 	of 0 to FS) 250 Ω	
Operating ambient humidity	35% to 85% RH (no condensation allow	ed)			1 to 5 V (at pressure of Load resistance: 10 k	0 to FS) Ω or higher ± 1.5% FS (at 20°C)	
Compatible pipe	Vinyl pipe or rubber pipe (inner diameter outer diameter must be 6 mm or lower)	of 4 mm; however, the			Temperature characterist	ics ± 0.15% FS/°C (zero + span)	
3ase polarity	Indicating high-pressure side and low-pr and "L" marks, respectively, at piping co	essure side with "H" nnection base part.	Maximum consu current	umption	 EMD7D3N (alarm output Total consumption: 100 	it: NPN transistor type) mA (internal consumption onlv)	
Display	Display section Seven-segment LED Pressure indication/a three digits at maxim (The highest digit ind	play section Seven-segment LED, four red digits Pressure indication/alarm setting indication, three digits at maximum (The bindest digit indicates the mode.)			 EMD7D3P (alarm output Internal consumption: 10 Total consumption: 300 output 	t: PNP transistor type) 20 mA mA (including load current for alarm ut of 100 mA × 2)	
	Accuracy ± 1.5% FS ± 1 digit (at 20 Temperature characteristics ± 0.15%	°C) FS/°C (zero + span)	Power voltage		12 to 24 V DC ± 10% (ripple of 10% or below)		
/ero adjustment nethod	Push-type automatic zero return (The displayed value and analog output the same time.)	are adjusted to zero at	Mass	Approx. 130 g (including mounting)		terminal cover and adapter for panel	
nsulation resistance	, Between terminal and case 10 MΩ or higher (500 V DC megger)		Durable vibratio	n	5 to 10 Hz, amplitude of 10 mm, 10 to 50 Hz, acceleration of 39 m/s ² (two hours each for three ax directions)		
Vithstand voltage	Between terminal and case 500 V AC, 50/60 Hz, for one minute		Durable impact		100 m/s ² (six times each for three axial directions)		
Exterior material	ABS resin (color: ivory)						
perating altitude	Altitude of 2000 m or below						
rotection level	Standard: IEC 60529 Grade code: IP41						
egree of ontamination	Standard: IEC 60664 Grade: 2 (If it is not possible to install this product house it in a housing.)	in a dry clean location,					
Accessories	Adapter for papel mounting, terr	ninal cover (already m	ounted on instr	ument b	odv)		
Brocore remain	, teaptor for parter mounting, ten	and over (aready in		amont D			
code	Pressure range	LED displa	ау	A	Alarm output	Analog output	
D 100	0-100 Pa	0-100					
D 200	0-200 Pa	0-200					
D 300	0-300 Pa	0-300		N	PN transistor	4–20 mA	
D 500	0-500 Pa	0-500)			- 20 11/1	
E 1	0-1 kPa	0.00-1.00		_			
E 2	0-2 kPa	0.00-2.00		P	NP transistor	1–5 V	
E 3	0-3 kPa	0.00-3.00					
E 5	0-5 kPa	0.00-5.00					
For the use enviro	onment, refer to page 118.						
Conforming stand	ards						
I. EU UIIECIIVE							

EMC directive basic requirements Standard No.

(1) EMI (electromagnetic emission) standardEN 61000–6–3
(2) EMS (electromagnetic immunity) standardEN 61000–6–2

2. UL standard

This product is certified as an UL standard recognition part. It is also certified with Canada Standard (C-UL). However, use this product in accordance with the installation conditions shown in (3) below.

(1) Requirements standard No..... UL 61010-1

(2) File No. E220685

(3) Installation condition...... As the DC power source to be connected to this product, use NEC (National Electrical Code) Class 2 power source.

EMD7

Maintenance

List of products

EMD7

EMD7

List of products

External dimension drawing



This is already installed at the time of purchase of the instrument.

 Item number
 Material

 TCA-D7
 Polycarbonate



EMD7



EMD7



EMD7

EMD7

EMD7









FR51A

MS99 MS99S

MS61A-RA

QDP33

EMD8A

EMD7

EMT1

EMTGP1

EMT1H

EMT6

EMP5A

EMRT1

HWS15A

Accessories

Application Precautions

Maintenance

EMT1 List of products **RoHS** High-accuracy fine differential pressure transmitter WO81 • Thirty-three variations in the ranges of 10 Pa to 100 kPa and ± 10 Pa to ± 5 kPa The displacement sensor employs a high-performance diaphragm and a differential WO71 inductance method. Frequently delivered to a highly advanced differential pressure control field, this product has achieved a good track record. FR51A **MS99** MS99S MS61A-RA QDP33 EMT1A type EMT1B type (Exposed terminal type) (Indoor drip-proof type) EMD8A 100 Pressure range code **Product code** EMD7 EMT1 Α 0 FM D 100 (Example) <Main application fields> Nuclear facilities Food-related factory management equipment • Air conditioning control equipment in Range Maximum value (for ± range, provide "±" as well) a high-rise building • Hospital and medical facilities Unit D Pa EMTGP1 Automotive manufacturing/ semiconductor manufacturing lines Ε kPa Control of air discharge pressure Base FV For vinyl pipe from the coffee roaster FΜ For metallic pipe EMT1H <Usage> Room pressure measurement in a 0 Two-wire type 4-20 mA DC clean room Four-wire type 4-20 mA DC 1 Output Detection of clogging of air filters 2 Four-wire type 0-1 mA DC (non-standard model) EMT6 Measurement of airflow rate/speed of ventilation/exhaust device and 3 Four-wire type 0-5 V DC (non-standard model) others 4 Four-wire type 1-5 V DC (non-standard model) External *(Refer to pages 114 to 117) shape EMP5A Α Indoor drip-proof type ♦When making an inquiry or placing an order, specify the above product code.♦When you use this product for airflow rate/airflow speed measurements, we В Exposed terminal type need to obtain the specifications of the pressure detection side. Fill out the airflow rate/airflow speed specification document preparation sheet EMRT1 on page 15, and inform us of the data. **Overview of structure** HWS15A Number Name Cover 1 Accessories 2 Terminal box 3 Housing 4 Base Application 5 Diaphragm Precautions 6 High-pressure side base Low-pressure side base 7 Maintenance 8 Core 9 Coil bobbin 10 Substrate 11 Terminal block 12 Grounding terminal screw 13 Cover packing 5

EMT1

Specifications

	Indo	or drip-proof type			Expo	osed terminal type	Weel
Model		EMT1A				EMT1B	
Pressure unit Pressure measurement	Pa, kPa Differential pressure method		Durable vib	ration	5 to 10 Hz, total 10 to 50 Hz, acc each for three a	amplitude of 10 mm, eleration total amplitude of 39 m/s² (two hours ial directions)	WO71
method Measured gas	Air and noncorrosive gas (liquid	d cannot be measured)	Durable im	nact	100 m/s ² (six tim	es each for three axial directions)	
Pressure-receiving	Diaphragm (silicone rubber)	,	Compatible	pipe	Vinyl pipe or ru	bber pipe (inner diameter of 6 mm)	FR5TA
Exterior material	Aluminum die casting Painting	on exterior (paint color: gray)			• Metallic pipe (c	mpatible with base for vinyl pipe $uter diameter of 6 \pm 0.1 mm$	
Instrument body withstanding pressure	500 kPa (refer to page 118)				Co • Hard plastic pi	mpatible with base for metallic pipe be (outer diameter 6 mm × inner diameter 4 mm)	MS99
Mounting orientation	Horizontal (inclination angle of	within ± 5°)			Se	parately sold inner sleeve set (refer to page 95) is pessary for the base for metallic pipe.	
conversion method	variable inductance				ENT (A	4400 ENT(D 000	MS99S
Insulation resistance	Between terminal and case: 20 0°C to 50°C (no freezing allowed	MΩ or higher (500 V DC megg ed)	ger) Wass		EIMITIA: approx.	TTOU g, ENTTE: approx. 960 g	1110770
temperature							
humidity	90% RH of below (no condens	ation allowed)					MS61A-RA
Brocouro rongo		A. 001/2001/	Temperature	Withs	tanding pressure		
code	Pressure range	(at 20°C)	(zero + span) at 0°C to 40°C	(Re	element fer to page 118)	Output and transmission method	QDP33
D 10	0–10 Pa				1.5 1/		
D 15	0–15 Pa	an (FD					EMD8A
D 20	0–20 Pa	±2% FS	±0.2% FS/°C				
D 30	0–30 Pa						
D 50	0–50 Pa						EMD7
D 75	0–75 Pa						
D 100	0–100 Pa				10 kPa		EMT1
D 150	0–150 Pa						
D 200	0–200 Pa						
D 300	0–300 Pa						EMTGP1
D 500	0–500 Pa					Two-wire type:	
D 750	0–750 Pa					Output signal of 4 to 20 mA DC	EMT1H
D 1000	0–1000 Pa	±1% FS	±0.1% FS/°C			(load resistance of 500 Ω or lower)	
E 2	0–2 kPa					Power voltage of 24 V DC ± 10%	
E 3	0–3 kPa				40 I-D-	(ripple of 0.2 V P-P or lower)	EMI6
E 5	0-5 KPa				40 KPa		
E 10 E 20	0-10 kPa					Four-wire type:	EMP5A
E 20	0 20 kPa					Output signal of 4 to 20 mA DC	
E 50	0–50 kPa				100 kPa	(load resistance of 500 Ω or lower)	EMRT1
E 100	0–100 kPa				150 kPa	Power voltage of 100 V AC ± 10%,	
D +- 10	−10 to +10 Pa					50/60 Hz	
D +- 20	-20 to +20 Pa	±2% FS	±0.2% FS/°C			Approx. 2 VA	HWSISA
D +- 30	-30 to +30 Pa						
D +- 50	-50 to +50 Pa						Accessories
D +- 100	-100 to +100 Pa				10 kPa		
D +- 200	-200 to +200 Pa						Application
D +- 300	-300 to +300 Pa						Precautions
D +- 500	-500 to +500 Pa	±1% FS	±0.1% FS/°C				Maintananaa
D +-1000	-1000 to +1000 Pa						maintenance
E +- 2	-2 to +2 kPa						
E +- 3	-3 to +3 kPa				20 kPa		
E+- 5	-5 10 +5 KPa						

Use of this product in a mounting orientation other than the horizontal orientation is impossible.

♦When using this product in a combustible gas atmosphere, use intrinsically safe type EMT1H described on page 85.

For the use environment, refer to page 118.



List of products WO81

EMT1

List of products

WO81

External dimension drawing



 When this instrument is used in combination with our receiving instrument, a separately installed DC power source is not necessary because the receiving instrument has a built-in DC power source for a two-wire type fine differential pressure transmitter.
 (Refer to pages 96 and 113)

 $\begin{tabular}{|c|c|c|c|} \hline Terminal screw tightening torque: 1.0 to 1.3 N·m \\ Do not tighten to a torque that exceeds the specified value because \\ doing so breaks the instrument body. \end{tabular}$



• Output signal of 4 to 20 mA DC





HWS15A

Accessories

Application

Precautions

Maintenance

EMT1

For the purpose of adjustment and maintenance,

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When the orientation of the base of the fine differential pressure transmitter is in parallel to the wall surface

differential pressure transmitter.

0.5 m or more

secure a space of 0.5 m at minimum above the fine

EMT1

VT base	MT ba	se		MTW	base		Terminal cover set
(Auxiliary item)		(Auxiliary item)		0			-
Item number Material KGAT1VT Brass	Item number KGAT1MT	Material Brass	Item KGAT	number 1MTW-S	Mat Stainle	erial ss steel	Item number Material TCA-T1 Polycarbonate/brass
A vinyl pipe or rubber pipe with an inner diameter of 6 mm can be connected. This is already installed	A metallic pipe, such as steel pipe and aluminum pipe, with an outer diameter of 6 ± 0.1 mm can be connected. When connecting with a plastic pipe (outer diameter 6 mm × inner			used to o s steel p ameter o	connect pipe with of 6 ± 0.4	a i an 1 mm.	This is used to protect the terminal screw of EMT1B type (exposed terminal type).
at the time of purchase of the FV type.	diameter 4 mm), remove the brass sleeve and use the separately sold resin inner sleeve set (XIN 6 × 4; refer to page 111). This is already installed at the time of purchase of MT type.		Base tightening torque: 1.2 N Do not tighten to a torque that because doing so breaks the			N·m at exceeds the specified value e instrument body.	
	F	Plastic gland (Ace Servic	e Co., Li	td.)		
This is used when the wiring of the pressure transmitter is conducted v cables. By paying attention to the fi of the cable to be used, select a pla the table on the right in a size that a bushing to retain the cable outer di cap nut is tightened.	fine differential vith instrumentation nish outer diameter astic gland from allows the rubber ameter when the	Item number Materi AC4-2T AC4-3T AC4-4T	al Col rut bus etal R Gr	or of ober hing A ack ed een	Duter diamete electric v Minimum 6.5 8.5 10.0	r of compatible wire (mm) Maximum 9.0 11.0 12.5	
		Adapter	for cond	uit			
When conducting wiring to the f pressure transmitter by passing	ine differential the wire through		25	ctric uit	22		
size of 19 or a metallic flexible electric wire conduit, because the service entrance of the transmitter has a G1/2 internal thread and a				Screw for ele wire condu)	- Carlo
shown in the figure on the right.		Item ADP	number A-EMT1	Mater Bras	rial SS		
	Bracket	for mounting	on verti	cal wa	ll surfa	ace	
Be sure to install the fine diffe	erential pressure						*Mounting screw is not included
transmitter in a horizontal orig angle of 5° or less). When the vertical, mount the instrumen	entation (at inclination e mounting surface is t horizontally by using	N-			φ30	(hole)	8×φ5 fine differential pressure transmitter mounting hole

HWS15A

135

1.6

¢

8

Item number

BRKT-T1GP1

T S

100 55

135

110

P

4×φ7 wall surface mounting hole

Material

Steel

()

Accessories

- Application
- Maintenance
- Precautions



0.5 m or more

Vertical wall surface

When the orientation of the base of the fine differential pressure transmitter is orthogonal to the wall surface

Vertical wall surface



EMT1

List of products

EMTGP1



^{*(}Refer to pages 114 to 117)

EMTGP1

Specifications

pecification	5									
Model	Indo	or drip-proof type			Exposed terminal	l type				
moder		EMTGP1A			EMTGP1B					
ressure unit	Pa, kPa									
ressure neasurement nethod	Single pressure type (nega	Single pressure type (negative pressure measurement)								
leasured gas	Corrosive gas (sulfuric acid	Corrosive gas (sulfuric acid gas cannot be measured; for details, contact us)								
ressure-receiving lement	Diaphragm									
lounting orientation	Horizontal (inclination angle	e of within ± 5°)								
emperature	10 C to 40 C									
perating ambient umidity	90% RH or below (no conde	90% RH or below (no condensation allowed)								
laterial of gas- ontacting part	Diaphragm PEEK film and Base PEEK molded i	molded item item								
xterior material	Main body: aluminum die ca	asting, painting on exterior (pa	aint color: gray)							
lectric signal onversion method	Variable inductance									
Output and ransmission nethod	Output signal of 4 to 20 mA DC (load resistance of 500 Ω or lower) Power voltage of 24 V DC ± 10% (ripple of 0.2 V P-P or lower)									
nsulation	Between terminal and case	: 20 $M\Omega$ or higher (500 V DC	megger)							
ourable impact	5 to 10 Hz, amplitude of 10 10 to 50 Hz, acceleration of	mm, 39 m/s² (two hours each for t	three axial directions)						
urable vibration	100 m/s ² (six times each for	three axial directions)								
ase mounting crew size	Internal thread for general l	J.S. pipes 1/4-18NPT								
lass	EMTGP1A type: approx. 98	0 g								
		~ 9								
Pressure range	Brocouro rongo	Accuracy	Temperature charac	teristics	Pressure-receiving	Withstanding pressure of				
code	Fressure range	(at 20°C)	at 10°C to 40°	°C	element material	(Refer to page 118)				
D - 200	0 to −200 Pa									
D - 300	0 to −300 Pa									
D - 500	0 to −500 Pa	±2.5% FS	±0.15% FS/	°C	PEEK film	—10 kPa				
D - 1000	0 to −1000 Pa									
F - 2	0 to -2 kPa									

This instrument cannot measure combustible gas.

◆Do not install this product in an explosion hazard area.

Although this product is corrosion resistant, it may not be used depending on the type or concentration of the corrosive gas and the use environment. Before using this product, be sure to conduct evaluation in actual usage conditions and confirm that there is no problem.

◆For the use environment, refer to page 118.

HWS15A

EMP5A

EMRT1

Accessories

Application

Precautions

Maintenance

EMTGP1

List of products

EMTGP1

EMTGP1

List of products

External dimension drawing



Terminal connection diagram



Transmission output diagram (pressureoutput signal)





EMT6

Application Precautions Maintenance

EMTGP1

EMTGP1 List of products Accessories dedicated to EMTGP1 RoHS WO81 **Terminal cover set** Plastic gland (Ace Service Co., Ltd.) Adapter for conduit (Auxiliary item) WO71 FR51A P MS99 for electric G 1/2 C 19 9 **MS99S** Item lor of rubb Material numbe ushing Maxim Scre AC4-2T Black 6.5 9.0 AC4-3T 11.0 Polyacetal Red Material 8.5 Item number Item number Material MS61A-RA TCA-T1 Polycarbonate/brass AC4-4T 10.0 12.5 ADPA-EMT1 Brass Green This is used when the wiring of fine differential pressure When conducting wiring to the fine differential This is used to protect the QDP33 pressure transmitter by passing the wire through the terminal screw of EMTGP1B transmitter is conducted with instrumentation cables. By thin steel electric wire conduit with a nominal size of paying attention to the finish outer diameter of the cable type (exposed terminal type). 19 or a metallic flexible electric wire conduit, because This is already installed at to be used, select a plastic gland in a size that allows the the service entrance of the transmitter has a G1/2 the time of purchase of the rubber bushing to retain the cable outer diameter when EMD8A internal thread and a different size, use an adapter for the cap nut is tightened. instrument. the conduit. EMD7 Bracket for mounting on vertical wall surface (horizontal mounting) EMT1 *Mounting screw is not included. 8×φ5 fine differential pressure φ30 (hole) transmitter mounting hole EMT1H 135 0.5 m or EMT6 more surtace 135 EMP5A wall 9.1 ŝ EMRT1 ⊕ ⊕ 100 55 HWS15A ¢ R 110 4×φ7 wall surface mounting hole Accessories Application Material Item numb BRKT-T1GP1 Steel Precautions Maintenance

*For quality improvement or for another reason, part of the specifications may be subject to change without prior notice.

Explosion-proof performance

EMT1H

EMD8A

EMD7

EMT1

EMTGP1

List of products

Intrinsically safe refers to a model with a structure designed in consideration of the necessary safety factors so that combustible gas will not be ignited because of an electric spark generated under normal conditions or in the event of an accident or temperature rise, whose explosion-proof safety has been verified through tests or by other means by an official organization.

Ex ia IIC T4 Ga

Intrinsically safe fine differential pressure transmitter





EMT1H

RoHS

Type examination pass No. CML 19JPN2072X

EMT1H (Manostar transmitter + safety barrier)

EMP5A

EMT6

EMRT1

H\\/\S1	54

	<main application="" fields=""></main>
Accessories	General factory management equipment Negative pressure for dust collector/differential pressure of air conditioners
Application	Filter pressure loss management Precision machine manufacturing
Precautions	 Building air-conditioning control equipment
Maintenance	<usage></usage>
	 Detection of clogging of air filter Room pressure measurement in a clean room Measurement of clogging of bug filter Measurement of dynamic pressure at ventilation/exhaust device

^{*(}Refer to pages 114 to 117)

Product code Pressure range code EMT1H A 0 FM 100 D (Example) Maximum value Range (for ± range, provide "±" as well Unit D Pa kPa Ε Base F۷ For vinyl pipe For metallic pipe FM Output 0 Two-wire type 4-20 mA DC External shape For indoor drip-proof Δ

When making an inquiry or placing an order, specify the above product code.

The above product code is for the set of fine differential pressure transmitter and safety barrier.

igoplusWhen you use this product for airflow rate/airflow speed measurements, we need to obtain the specifications of the pressure detection side

Fill out the airflow rate/airflow speed specification document preparation sheet on page 15, and inform us of the data

85 쿧 Manostar

EMT1H

EMT1H

System speci	fications							
Nodel Configuration Explosion-proof type Farget gas ntrinsically safe	EMT1H Manostar transmitter EMT1 Intrinsically safe structure Ex ia IIC T4 Ga Conditions for wiring in the	787+ I and sat	fety barrier (MTL7	787+)				
sircuit	Capacitance (CC): 0.05 μF Inductance (Lc): 2.00 mH o	or lower Wiring resis r lower Cross section	tance: 1 on area o	0 Ω or lower of electric wire co	nductor:	0.5 to 2.5 mm ²		
EMT1H	<u> </u>							
Pressure unit Pressure neasurement method	Pa, kPa Differential pressure method			Durable vibrat	ion	5 to 10 Hz, am 10 to 50 Hz, ao three axial dire	plitude of 10 mm, cceleration of 39 m/s ² (two hours each for cctions)	
leasured gas ressure-receiving lement xterior material	Air and noncorrosive gas (liquid cannot be measured) Diaphragm (silicone rubber)			Durable impac Compatible pi	t De	100 m/s² (six ti • Vinyl pipe or	mes each for three axial directions) rubber pipe (inner diameter of 6 mm)	
nstrument body vithstanding pressure	500 kPa (refer to page 118)		. gray)			Metallic pipe Com Hard tube (ou	(outer diameter of 6 ± 0.1 mm) patible with base for metallic pipe uter diameter 6 × inner diameter 4 mm)	N
Iounting orientation Electric signal onversion method	Horizontal (inclination angle of within ± 5°) Variable inductance				Separately sold inner sleeve set (XIN 6 × 4; refer to page 111) is necessary for the base fo metallic pipe.			
Vithstand voltage	higher (500 V DC megger) Between power terminal and 50/60 Hz, for one minute, 1 r	grounding terminal: 500 V nA or lower	/ AC,	Mass		Approx. 1100 g]	
Dperating ambient emperature Dperating ambient humidity	0°C to 40°C (no freezing allowed) 90% RH or below (no condensation allowed)							I
MTL7787+								
ntrinsically safe circuit naximum voltage ntrinsically safe circuit	28 V 93 mA			Non-intrinsically circuit Tolerable voltage	r safe e	250 V AC, 50/60	Hz, 250 V DC	
naximum current ntrinsically safe circuit naximum power	0.65 W							
Pressure range code	Pressure range	Accuracy (at 20°C)	cl	Temperature haracteristics (zero + span)	Withst of pre	anding pressure ssure-receiving	Output and transmission method	E
D 10	0–10 Pa	(a	at 0°C to 40°C		element		
D 15	0–15 Pa	±2% FS	±(0.2% FS/°C				
D 20	0–20 Pa	22 /0 1 0		0.2 /0 1 0/ 0				
D 30	0-30 Fa				-			
D 75	0-30 Pa 0-75 Pa							
D 100	0–100 Pa					10 kPa		ſ
D 150 D 200	0–150 Pa							
D 300	0–300 Pa						Two-wire type:	
D 500	0–500 Pa						Output signal of 4 to 20 mA DC	
D 750 D1000	0–750 Pa 0–1000 Pa						(load resistance of 250 Ω or	
E 1	0–1 kPa	±1% FS	±	0.1% FS/°C			Power voltage of 24 V DC ± 10%	
E 2	0–2 kPa	-					(ripple of 0.2 V P-P or lower)	
E 3	0–3 kPa						*1	
E 5	0–5 kPa					40 kPa	Resistance value of connectable	
E 10 E 20	0–10 кРа 0–20 kРа						load when combined with the	
E 30	0-30 kPa	-				100 kPa		
E 100	0–100 kPa	-				150 kPa		
D + - 10	-10 to +10 Pa							
D + - 20 D + - 30	-20 to +20 Pa -30 to +30 Pa	±2% FS	±(0.2% FS/°C		10 kPa		
D+- 50 D+-100	−50 to +50 Pa −100 to +100 Pa	±1% FS	±	0.1% FS/°C				

♦Use of this product in a mounting orientation other than horizontal orientation is impossible.

◆For the use environment, refer to page 118.

EMT1H

EMT1H

List of products

WO81

External dimension drawing



EMT1H

				List of products
	Notes on use			WO81
	 Never change the constituting parts and the circuit. This instrument has an intrinsically safe structure. The in failure to follow the preconditions for the explosion-proo proof performance. When using this instrument, be sure For details of explosion-proof properties, refer to the fol 	ntrinsically safe structure has a higher reliability compared to o of structure significantly decreases the reliability and makes it i a to observe the following precautions. lowing reference documents.	other explosion-proof structures, but mpossible to maintain the explosion-	W071
	Reference documents • Recommended Practices for Explosion-protected Electri Institution of Industrial Safety • Recommended Practices for Explosion-protected Electri Institution of Industrial Safety	rical Installations in General Industries JNIOSH-TR-46-1: 2015	5, published by the Technology 5, published by the Technology	FR51A
	USERS' GUIDELINES for Installations for Explosive Atr Industrial Safety Be sure to house the safety barrier in a container with a Grounding	mospheres in General Industry JNIOSH-TR-NO.44, published totally closed structure, and place it at a non-hazardous locati	by the Technology Institution of ion.	MS99
Varning	 Solely conduct grounding of the safety barrier in accord Conduct grounding of the fine differential pressure trans In actual grounding work, refer to "Recommended Pract Wiring 	lance with the Class A grounding work. smitter body in accordance with the Class D grounding work. tices for Explosion-Protected Electrical Installations in Genera	I Industries."	MS99S
	The electric circuit of this instrument has restricted capac However, because the capacitance and inductance gene on the installation environment, they need to be restricted Conditions for wiring in the section between EMT1H and Capacitance (Cc): 0.05 µF or lower	sitances and inductances so as not to accumulate energy, which rated in the wiring (intrinsically safe circuit) from the instrument d to the tolerance value or lower by the user. safety barrier (MTL7787+)	ch could serve as an ignition source. It to the safety barrier vary depending	MS61A-RA
	Inductance (Lc): 2.00 mH or lower Wiring resistance: 10 Ω or lower Cross section area of electric wire conductor: 0.5 to 2 *Because it is difficult to adjust a wiring cable after it has	2.5 mm ²	acitance and inductance of the cable	QDP33
	 booldset in some advance to obtain the approximate conditional of the second sec	ons for the cable, and then conduct the work. d after the wiring, be sure to make sure that there is no wrong v nstallations for Explosive Atmospheres in General Industry NIC	viring. DSH-TR-NO.44" as it provides detailed	EMD8A
ЕМТ	explanations in accordance with the installation environ	ment.		EMD7
	DIN rail set for safety barrier	Metallic cable gland (made of ZDC or FCD)	Schematic figure of mounted DIN rail	EMT1
		Non-compliant with RoHS		EMTGP1
		Item number Color of rubber bushing Minimum Maximum	MTL7787+	EMT1H
	ttem number DIN-T1H	SC4-1T Gray 3.5 7.0 SC4-2T Black 6.5 9.0 SC4-3T Red 8.5 11.0		EMT6
Use the Cla	this DIN rail set to solely conduct grounding of attached safety barrier in accordance with the ss A grounding work. It is possible to install up to	This is used when the wiring of fine differential pressure transmitter is conducted with instrumentation cables. By paying attention to the finish outer diameter of the cable to be used, select a metallic cable gland in a size that allows the rubber bushing to retain the cable outer diameter when the cap	¥	EMP5A
◆EM ⁻	safety barriers. TH accessories are shared with EMT1.	nut is tightened. Use a cable equipped with shield.		EMRT1
	Bracket for mounting of	on vertical wall surface (horizontal moun	tina)	
	8×ø5 fine differential pressure	(*Mounting screw is not included.	HWS15A
	φ30 (hole) transmitter mounting hole			Accessories
	* * v			Application
			age	Precautions
	* * * 135	110 4×φ7 wall surface mounting hole	tical wall sur	Maintenance
lte BR	m number Material KT-T1GP1 Steel	÷-	the second secon	

*For quality improvement or for another reason, part of the specifications may be subject to change without prior notice.

7 Manostar 88

EMT1H

EMT6

List of products

WO81

WO71

FR51A

MS99

MS99S

MS61A-RA

QDP33

EMD8A

EMP5A

Small-sized fine differential pressure transmitter

- · This is a small-sized/light-weight type fine differential pressure transmitter. · A silicone rubber piece with small
 - hysteresis is used in the sensor part.
- · The zero adjustment trimmer provided on top facilitates zero adjustment as of after installation.
- - EMT6

	<main application="" fields=""></main>
EMD7	Semiconductor manufacturing equipment Negative pressure for dust collector/differential pressure of air conditioners
EMT1	Filter pressure loss management Precision machine manufacturing line General factory management equinment
EMTGP1	 <usage></usage> Measurement of internal pressure of indoor device
EMT1H	Detection of clogging of air filter Measurement of clogging of bug filter Measurement of dynamic pressure

Product	code	Pres	ssure range cod	le			
EMT6	B 0	FVD	100	V	(Example)		
					Mounting	V	Range for specification of vertical mounting
					orientation	Н	Range for specification of horizontal mounting
						None	Range for arbitrary mounting
					Range		Maximum value
					Unit	D	Ра
						Е	kPa
					Base	FV	For vinyl pipe
					Output	0	Two-wire type 4-20 mA DC
• • • • •				Ext	ernal shape	В	Exposed terminal type

When making an inquiry or placing an order, specify the above product code. igoplusWhen you use this product for airflow rate/airflow speed measurements, we need to obtain the

specifications of the pressure detection side.

Fill out the airflow rate/airflow speed specification document preparation sheet on page 15 and inform us of the data.

Mounting orientation and range 0 to 50 Pa, 0 to 100 Pa, 0 to 200 Pa, 0 to 300 Pa Whole range other than on the left EMRT1 It is necessary to specify the mounting orientation (horizontal, upright, and others) at the time of The transmitter can be mounted at arbitrary angle between horizontal and upright. order placement. HWS15A Upright plane Upright plane The instrument can be . 10° 10° 10° mounted on the mounting surface in an arbitrary manner. Uprigh Accessories 90 L. Application Unusable Jusable (orizonta/ Horizontal Horizontal Precautions plane plane lea Nee Maintenance JUGudr 10° 10° 10°

at ventilation/exhaust device

· Room pressure measurement in a clean room

*(Refer to pages 114 to 117)

EMT6

RoHS

EMT6

Specifications

and for these suist
ach for three axial
1 n)
ide with "H" and "L" art.
nd transmission method
be:
al of 4 to 20 mA DC
ince of 500 Ω or
je of 24 V DC ± 10%
v P-P or lower)
sie sie sie sie sie sie sie sie

♦When using this product in a combustible gas atmosphere, use the intrinsically safe type EMT1H described on page 85.

For the use environment, refer to page 118.

External dimension drawing



Terminal connection diagram

Output signal (mA)



EMT6 List of products

EMTGP1

EMT1H

EMP5A

List of products

WO71

MS99

MS99S

MS61A-RA

QDP33

EMD8A

EMD7

EMT1

EMTGP1

WO81 Receiving instrument

When this instrument is used in combination with a fine differential pressure transmitter, it is possible to measure pressure, airflow rate, and airflow speed.

- Incorporated with a DC power source for two-wire type fine differential pressure transmitter.
- Equipped with two alarm outputs for which the action can be selected in accordance with the usage.
 - Incorporated with a square root calculation function (for airflow rate/airflow speed receiving instrument only).

Product code

• Front panel with IP66 structure





EMT6

EMP5A



HWS15A

Maintenance

 Accessories
 <Main application fields>

 Accessories
 • General factory management equipment

 • Negative pressure for dust collector/differential pressure of air conditioner

 • Filter pressure loss management

 • Precision machine manufacturing line

 • Building air conditioning control

Building air conditioning control equipment

<Usage>

Detection of clogging of air filter
Room pressure measurement in a

clean room

Measurement of clogging of bug filter

Measurement of dynamic pressure

at ventilation/exhaust device

*(Refer to pages 114 to 117)

EMP5A D 2 D 1 1 300 (Example) Maximum value Range (for ± range, provide "±" as well) D Pa Pressure Ε kPa m³/min Unit m³/h Airflow F rate m³/min (nor) m³/h (nor) Airflow speed m/s Output signal 4-20 mA DC 1 3 0-5 V DC (non-standard model) Input signal 1 4–20 mA DC Alarm output 2 Two circuits (2 x 1a contact) Display D Digital indication

◆When making an inquiry or placing an order, specify the above product code.

When you use this product for airflow rate/airflow speed measurements, we need to obtain the specifications of the pressure detection side.

This product has been adjusted to measure pressure, airflow rate, and airflow speed by combining the digital indicator JIR-301-M, BK, P24 T2917 manufactured by Shinko Technos Co., Ltd. with a fine differential pressure transmitter.
 Some constituting parts of this instrument contain polyvinyl chloride.





EMP5A

EMP5A

Specifications

Model EMPSA Instrumentation (Second) Departed to 2000 (2000 to 10000) 10 (2000 (2000 (2000 to 10000)) 10 (2000	-			
Instant Digital L1 or gate (-2000 to 100) PV (annot state) and Discrete dimensions 1 + 4 and Public V + 4 and V + 4 and	Model	EMP5A		
Interfactor Distance Use of the the the the the the the the the the	Display	Digital 4-1/2 digits (-2000 to 10000) PV (current value) re	d Character dimensions 16 × 7.2 mm (height × width)	
Handman (a) Procession Intermative section Procession Intermative section Intermative section termative section Intermative section Intermative section Intermative section Intermative section Intermative section Intermative section Intermative section Intermative section Intermative section Intermative section Intermative section Intermative section Intermative section Intermative section Intermative section Intermative section Intermative section Intermative section Intermative section <td>Compling froguency</td> <td>125 eccende</td> <td>een Character dimensions 10 × 4.6 mm (neight × width)</td> <td></td>	Compling froguency	125 eccende	een Character dimensions 10 × 4.6 mm (neight × width)	
Unit Number Description of Signal Processing	neut signal	4 to 20 mA DC (with built in 50 Q input register)		
bits of the difference of the second of the secon	nput signai	On the airflow rate/speed meter, the maximum value varies dep	pending on the range.	
binst set set set set set set set set set s	Output signal	4 to 20 mA (load resistance of 550 Ω or lower) 0 to 5 V DC (load resistance of 500 kΩ or higher) Output signals from the airflow rate/speed meter are those obta	ined through square root calculation of input signals.	
terms types there, item wights 24 VD C+10% (lead summ of 4 to 20 mÅ) Representation without the there with the there without the there with the there without there without the there without there without there without the there without the there without there witho	Dutput signal accuracy	± 0.3% FS		
Latm output Contact apparently (reading fields) Description (reading field) (reading field) (reading field) (reading field) Description (reading field) (reading field) total L 240 V AC: 50160 Hz (obterable variation range: 85 to 284 V AC) Approx: 8 VA station resistance (reading field) Approx: 8 VA station resistance (reading field) Is KV AC for one minits contact to the field (reading field) Each section between terminal growtherminal growtherminal, moutherminal, and output terminal, providing field) Is KV AC for one minits contact to the field) Each section between terminal growtherminal is excluded. If KV AC for one minits providing minited undiffy S55 to 855 RH (no condemation allowed) Is KV AC for one minits condemation (controp rande) is field) Is KV AC for one minited condemation (controp rande) is field) Is KV AC for one minited controp rande) is first condematication (controp rande) is field) Is KV AC for one minited condemation allowed) reaction and the field (controp rande) is first undiffy First effect data (controp rande) is first condematication (controp rande) Is KV AC for one minited condemation allowed) reaction and the field (controp rande) is first undiffy First effect data (controp rande) Is KV AC for one minited condemation (controp rande) Is KV AC for one minited condemation (controp rande) reaction and the field (controp rande) Controp rande) Controp rande) Controp rande) Contrande) reacting and the fiel	Power supply to two- wire type transmitter	24 V DC ± 10% (load current of 4 to 20 mA) Ripple voltage of	200 mV, maximum load current of 30 mA DC	
tower crassman() top 240 V AC, 0006 b Legible variation range: 85 to 244 V AC) were crassman() Approx. 4 V seatation resistance Approx. 4 V seatation resistance Control of 200 V CD Each section between terminal, grounding terminal, input terminal, and output terminal, and output terminal and output terminal and output terminal is excluded. greating ambient Control of C for Greening allowes) Section terminal and output terminal and output terminal and output terminal and output terminal is excluded. greating ambient Strik C for one minal cark gray, case in black (Section terminal and output terminal and output terminal and output terminal and output terminal is excluded. terminal ambient () Constant train (colore: panel in cark gray, case in black (Constant and (colore: panel in cark gray, case in black (terminal and output termin	Alarm output	Output type Relay contact of 1a × 2 Contact capacity (resistance load) Electric service life MAX. 3 A 250 V AC, MIN. 100 mA 5 V DC	100,000 times 3 A 30 V DC (reference value)	
devo: proces: PMA 1MMA or high (000 VDG) Each section between terminal: grown terminal: grown terminal: and output terminal: and o	Power voltage	100 to 240 V AC, 50/60 Hz (tolerable variation range: 85 to 264	V AC)	
statutation 10.00 or higher (500 V DC) Each section between input terminal, grounding terminal, and output terminal. URISENDA VAILE Six AC for one multe Each section between input terminal grounding terminal, and output terminal. and output terminal. UP to 50°C (princescing allowed) UP to 50°C (princescing allowed) UP to 50°C (princescing allowed) UP to 50°C (princescing allowed) UP to 50°C (princescing allowed) UP to 50°C (princescing allowed) UP to 50°C (princescing allowed) UP to 50°C (princescing allowed) UP to 50°C (princescing allowed) UP to 50°C (princescing allowed) UP to 50°C (princescing allowed) UP to 50°C (princescing allowed) UP to 50°C (princescing allowed) UP to 50°C (princescing allowed) UP to 50°C (princescing allowed) UP to 50°C (princescing allowed) UP to 50°C (princescing allowed) UP to 50°C (princescing allowed) UP to 50°C (princescing allowed) UP to 50°C (princescing allowed) UP to 50°C (princescing allowed) UP to 50°C (princescing allowed) UP to 50°C (princescing allowed) UP to 50°C (princescing allowed) UP to 50°C (princescing allowed) UP to 50°C (princescing allowed) UP to 50°C (princescing allowed) UP to 50°C (princescing allowed) UP to 50°C (princescing allowed)	Power consumption	Approx. 8 VA		
Itilitization voltage 1.5 kV AC for one minute Each section between terminals (proven terminal, end unique terminal, and output terminal and output terminal and output terminal and output terminal and output terminal sections. prestrain gambient importation C'C to 50°C (no freezing allowes) C'C to 50°C (no freezing allowes) prestrain gambient importation C'C to 50°C (no freezing allowes) cectation allowes prestrain gambient importation C'C to 50°C (no freezing allowes) Cectation Cectation Cectation Cectation	nsulation resistance	10 M Ω or higher (500 V DC) Each section between termina	als (power terminal, grounding terminal, input terminal, and outpu	t terminal)
typeration 0°C to 50°C (no freezing allowed) typerating analysis (minimized) 25% to 85%, RH (no condensation allowed) typerating analysis (minimized) Pier-data data train (cloars: panel in dark gray, case in black) typerating analysis (minimized) Pier-data data train (cloars: panel in dark gray, case in black) typerating (minimized) Piessure range code Pressure range Cottput signal to set of screex-type mounting fittings, one piece of short-to-cond D 10 Output signal Output signal D 10 0 - 10 Pa 0.000-10.00 Output signal D 20 030 Pa 0.000-75.00 Piessure range D 100 0 - 650 Pa 0.00-75.00 4 p.2 m ADC D 100 0 - 650 Pa 0.00-75.00 4 p.2 m ADC D 100 0 - 650 Pa 0.00-75.00 4 p.2 m ADC D 100 0 - 650 Pa 0.00-75.00 4 p.2 m ADC D 100 0 - 650 Pa 0.00-750.0 4 p.2 m ADC D 1000 0 - 750 Pa 0.00-750.0 4 p.2 m ADC D 1000 0 - 750 Pa 0.00-750.0 750 D 1000 </td <td>Withstand voltage</td> <td>1.5 kV AC for one minute Each section between terminals (po However, section between input ter</td> <td>ower terminal, grounding terminal, input terminal, and output term minal and output terminal is excluded.</td> <td>inal)</td>	Withstand voltage	1.5 kV AC for one minute Each section between terminals (po However, section between input ter	ower terminal, grounding terminal, input terminal, and output term minal and output terminal is excluded.	inal)
Impact and individual indindividual individual individual individual indivi	Operating ambient emperature	0°C to 50°C (no freezing allowed)		
Exterior material lass Pre-reardant rean (colors: panel in dark gray, case in black) Approx. 300 g IP66 (from panel unit) Concestories Output signal Concestories Pressure range LED display Output signal D 0 0-10 Pa 0.00-10.00 0.00 D 10 0-15 Pa 0.00-30.00 0.00 D 50 0-65 Pa 0.00-50.00 0.00 D 50 0-65 Pa 0.00-50.00 0.00 D 100 0-100 Pa 0.00-50.00 0.00 D 100 0-100 Pa 0.00-50.00 0.00 D 100 0-100 Pa 0.00-50.00 0.00 D 100 0-100 Pa 0.0-200.01 0.00 D 100 0-750 Pa 0.00-750.0 0.00 D 100 0-20 Pa 0.00-20.00 4 to 20 m ADC D 100 0-100 Pa 0.0-750.0 0.00 100 D 100 0-100 Pa 0.00-70.00 100 100 M AD	Operating ambient numidity	35% to 85% RH (no condensation allowed)		
tase Approx. 300 g Production level IP66 (from panel unit) One set of screev-type mounting fittings, one piece of short-circuiting wire for two-wire type transmitter tressure range code Pressure range LED display Output signal D 10 0	Exterior material	Fire-retardant resin (colors: panel in dark gray, case in black)		
Protection lowed scessorie Presure range 0 ess of screw-type mounting titings, one piece of short-during wire for two-wire type transmitter Presure range code Pressure range LED display Output signal D 10 0	Mass	Approx. 300 g		
Conservice Dressure range code Pressure range LED display Output signal D 10 0-10 Pa 0.00-10.00 0 <td>Protection level</td> <td>IP66 (front panel unit)</td> <td></td> <td></td>	Protection level	IP66 (front panel unit)		
Pressure range code Pressure range LED display Output signal D 10 0-10 Pa 0.00-10.00 0.00 D 15 0-15 Pa 0.00-15.00 0.00 D 20 0-20 Pa 0.00-20.00 0.00 D 30 0-30 Pa 0.00-30.00 0.00 D 50 0-50 Pa 0.00-50.00 0.00 D 150 0-150 Pa 0.00-75.00 0.00 D 150 0-150 Pa 0.0-150.0 0.0 D 200 0-200 Pa 0.0-200.0 0.0 D 300 0-300 Pa 0.0-750.0 0.0 D 500 0-500 Pa 0.0-750.0 0.0 D 1000 0-1000 Pa 0.000 (0ad resistance of 50 0 or lower) E 5 0-5 kPa 0.000-3.000 (bord resistance of 50 0 or lower) E 0 0-20 kPa 0.00-3.000 (bord resistance of 50 0 or lower) E 5 0-5 kPa	Accessories	One set of screw-type mounting fittings, one piece of short-circ	uiting wire for two-wire type transmitter	
D 10 0-10 Pa 0.00-10.00 D 15 0-15 Pa 0.00-10.00 D 20 0-20 Pa 0.00-20.00 D 30 0-30 Pa 0.00-30.00 D 50 0-50 Pa 0.00-30.00 D 50 0-75 Pa 0.00-75.00 D 100 0-100 Pa 0.0-150.0 D 200 0-200 Pa 0.200.0 D 300 0-300 Pa 0.0-500.0 D 500 0-500 Pa 0.0-500.0 D 750 0-750 Pa 0.00-750.0 D 1000 0-1000 Pa 0.000-2.000 E 3 0-3 kPa 0.00-50.00 D 100 0-10 kPa 0.00-3.000 D 100 0-10 kPa 0.00-2.000 (dad resistance: 50 0 A C boot 0 E 5 0-5 kPa 0.00-2.000 (dad resistance: 50 0 A C boot 0 E 0 0-30 kPa 0.00-3.000 inder boot 10 boot 0	Pressure range code	Pressure range	LED display	Output signal
D 15 0-15 Pa 0.00-15.00 D 20 0-20 Pa 0.00-30.00 D 30 0-30 Pa 0.00-30.00 D 50 0-75 Pa 0.00-50.00 D 100 0-160 Pa 0.00-50.00 D 150 0-75 Pa 0.00-100.0 D 150 0-150 Pa 0.0-100.0 D 150 0-150 Pa 0.0-200.0 D 000 0-200 Pa 0.0-300.0 D 500 0-500 Pa 0.0-750.0 D 750 0-750 Pa 0.0-750.0 D 750 0-20.00 4 to 20 mA DC E 2 0-2 kPa 0.00-5.000 4 to 20 mA DC E 10 0-100 Pa 0.00-5.000 10 to 5 V DC 10 to 5 V DC E 10 0-10 kPa 0.00-5.000 10 to 5 V DC 10 to 5 V DC E 10 0-10 kPa 0.00-50.00 atfor mach seed moter atfor trade/seed moter atfor trade/seed moter	D 10	0–10 Pa	0.00-10.00	
D 20 0-20 Pa 0.00-20.00 D 30 0-30 Pa 0.00-30.00 D 50 0.05 Pa 0.00-50.00 D 75 0-75 Pa 0.00-75.00 D 100 0-100 Pa 0.0-100.0 D 100 0-100 Pa 0.0-150.0 D 200 0-200 Pa 0.0-200.0 D 300 0-300 Pa 0.0-300.0 D 500 0-500 Pa 0.0-500.0 D 750 0-750 Pa 0.0-750.0 D 1000 0-1000 Pa 0.00-20.00 4 to 2 mA DC E 2 0-2 kPa 0.000-3.000 (load resistance of 50 0 or load bo or load	D 15	0–15 Pa	0.00–15.00	
D 30 0-30 Pa 0.00-30.00 D 50 0-50 Pa 0.00-50.00 D 50 0.75 Pa 0.00-75.00 D 100 0-100 Pa 0.00-100.0 D 150 0-150 Pa 0.0-150.0 D 200 0-200 Pa 0.0-200.0 D 500 0-500 Pa 0.0-500.0 D 500 0-500 Pa 0.0-500.0 D 1000 0-1000 Pa 0.0-500.0 D 1000 0-1000 Pa 0.0-500.0 D 1000 0-1000 Pa 0.000-2.000 E 2 0-2 kPa 0.000-2.000 E 3 0-3 kPa 0.000-2.000 E 0 0-30 kPa 0.00-2.000 E 0 0-30 kPa 0.00-2.000 E 0 0-30 kPa 0.00-5.000 160 kPa E 0 0-30 kPa 0.00-5.000 160 kPa E 0 0-50 kPa 0.0-5	D 20	0–20 Pa	0.00-20.00	
D 50 0-75 Pa 0.00-50.00 D 75 0-75 Pa 0.00-75.00 D 100 0-100 Pa 0.0-100.0 D 150 0-150 Pa 0.0-200.0 D 200 0-200 Pa 0.0-200.0 D 500 0-500 Pa 0.0-300.0 D 500 0-500 Pa 0.0-750.0 D 750 0-750 Pa 0.0-750.0 D 1000 0-1000 Pa 0.000-2.000 E 2 0.2-2 kPa 0.000-3.000 E 10 0-5 kPa 0.000-3.000 E 2 0-2 kPa 0.000-3.000 E 10 0-10 kPa 0.00-10.00 E 10 0-10 kPa 0.00-5.00 E 20 0-20 kPa 0.00-30.00 E 10 0 0.00-5.00 E 100 0 0.00-5.00 E 100 0.00-10.00 0.00-10.00 D +- 100	D 30	0–30 Pa	0.00-30.00	
D 75 0-75 Pa 0.00-75.00 D 100 0-100 Pa 0.0-100.0 D 150 0-150 Pa 0.0-150.0 D 200 0-200 Pa 0.0-200.0 D 300 0-300 Pa 0.0-300.0 D 500 0.750 Pa 0.0-750.0 D 750 0-750 Pa 0.0-750.0 D 1000 0-1000 Pa 0.00-2.000 E 2 0-2 kPa 0.000-2.000 D 100 0-100 Pa 0.00-50.00 E 3 0.0-3 kPa 0.000-2.000 Clear resistance: 50 kD or 10 bi DC (loar resistance: 50 kD or E 5 0-5 kPa 0.00-20.00 Upt signals from the airflow rate/speed meter E 30 0-30 kPa 0.00-20.00 Upt signals from the airflow rate/speed meter E 50 0-50 kPa 0.00-20.00 Upt signals from the airflow rate/speed meter E 50 0-50 kPa 0.00-100.0 Upt signals from the airflow rate/speed	D 50	0–50 Pa	0.00-50.00	
D 100 0-100 Pa 0.0-100.0 D 150 0-150 Pa 0.0-150.0 D 200 0-200 Pa 0.0-200.0 D 300 0-300 Pa 0.0-500.0 D 500 0-500 Pa 0.0-500.0 D 750 0-750 Pa 0.0-750.0 D 1000 0-1000 Pa 0-1000 E 2 0-2 kPa 0.000-2.000 D 1000 0-1000 Pa 0.000-5.000 E 3 0.3 kPa 0.000-5.000 D 100 0-10 kPa 0.00-10.00 E 10 0-10 kPa 0.00-10.00 E 20 0-20 kPa 0.00-30.00 E 30 0-30 kPa 0.00-30.00 E 30 0-30 kPa 0.00-30.00 B 50 0-50 kPa 0.00-30.00 B 100 0-10 kPa 0.00-30.00 D +10 -10 b +10 Pa -10.00 to 10.00	D 75	0–75 Pa	0.00-75.00	
D 150 0 -150 Pa 0.0-150.0 D 200 0-200 Pa 0.0-200.0 D 300 0-300.0 0.0-300.0 D 500 0-500 Pa 0.0-500.0 D 750 0-750 Pa 0.0-750.0 D 1000 0-1000 Pa 0.000-2.000 E 2 0-2 kPa 0.000-2.000 E 3 0-3 kPa 0.000-2.000 E 3 0.3 kPa 0.000-2.000 E 10 0-10 kPa 0.000-3.000 E 10 0-10 kPa 0.000-2.0.00 Injth? 0.00-3.000 10 dra resistance 50 kD or 10 dra resistanc	D 100	0–100 Pa	0.0-100.0	
D 200 0-200 Pa 0.0-200.0 D 300 0-300 Pa 0.0-300.0 D 500 0-500 Pa 0.0-500.0 D 1000 0-1000 Pa 0.0-500.0 D 1000 0-1000 Pa 0.000-2.000 4 to 20 mA DC E 2 0-2 kPa 0.000-2.000 (load resistance of 550.0 or lower) E 3 0-3 kPa 0.000-3.000 (load resistance of 550.0 or lower) E 5 0-5 kPa 0.000-5.000 0 to 5 VCC E 10 0-10 kPa 0.00-20.00 Hower) 0.05 VCC E 10 0-10 kPa 0.00-20.00 Hower) Dipper Jais from the comparison of lower and part of the comparison of lower and part of the comparison of lower) Dipper Jais from the comparison of lower and part of the comparison of lower and part of the comparison of lower and part of the comparison of lower and part of the comparison of lower and part of the comparison of lower and part of the comparison of lower and part of the comparison of lower and part of the comparison of lower and part of the comparison of lower and part of the comparison of lower and part of the comparison of lower and part of the comparison of lower and part of the compa and the comparison of lower and part of the comparison	D 150	0–150 Pa	0.0–150.0	
D 300 0-300 Pa 0.0-300.0 D 500 0-500 Pa 0.0-500.0 D 500 0-750 Pa 0.0-750.0 D 1000 0-1000 Pa 0.00-2.000 4 to 20 mA DC E 2 0-2 kPa 0.000-3.000 (load resistance of 50 0 or lower) E 3 0-3 kPa 0.000-3.000 (load resistance of 50 0 or lower) E 5 0-5 kPa 0.00-10.00 (load resistance of 50 0 A or higher) E 20 0-20 kPa 0.00-20.00 Otiput signals from the airflow rate/speed metery are hose obtained through square root calculation of higher) E 30 0-30 kPa 0.00-50.00 square root calculation of higher) E 10 0 0.04 kPa 0.00-10.00 highers E 30 0.30 kPa 0.00-50.00 airflow rate/speed metery are hose obtained through square root calculation of highers D + 10 -100 kPa 0.0-100.0 input signals. D + 20 -20 to +20 Pa -20.0 to 0.0 to 20.0 <td>D 200</td> <td>0–200 Pa</td> <td>0.0–200.0</td> <td></td>	D 200	0–200 Pa	0.0–200.0	
D 500 $0-500 \text{ Pa}$ $0.0-500.0$ D 750 $0-750 \text{ Pa}$ $0.0-750.0$ D 1000 $0-1000 \text{ Pa}$ $0.0-750.0$ E 2 $0-2 \text{ KPa}$ $0.000-2.000$ E 3 $0-3 \text{ KPa}$ $0.000-3.000$ E 5 $0-5 \text{ KPa}$ $0.000-3.000$ E 5 $0-6 \text{ KPa}$ $0.000-3.000$ E 20 $0-20 \text{ KPa}$ $0.00-3.000$ E 20 $0-20 \text{ KPa}$ $0.00-3.000$ E 30 $0-30 \text{ KPa}$ $0.00-3.000$ E 50 $0-50 \text{ KPa}$ $0.00-3.000$ are those oblance from theE 30 $0-30 \text{ KPa}$ $0.00-3.000$ are those oblance from theB 50 $0-50 \text{ KPa}$ $0.00-30.00$ B 100 $0-100 \text{ KPa}$ $0.00-50.00$ guare root calculation ofD +- 10 -110 to +10 Pa $-10.00 \text{ to }0.00 \text{ to }10.00$ D +- 20 $-200 \text{ to }200 \text{ th }30.00$ $-300 \text{ to }30.00$ D +- 30 $-300 \text{ to }30 \text{ Pa}$ $-300 \text{ to }0.00 \text{ to }30.00$ D +- 50 -500 to +50 Pa $-500 \text{ to }0.00 \text{ to }20.00$ D +- 100 -1000 to +100 Pa $-100.00 \text{ to }10.00$ D +- 200 $-200 \text{ to }300 \text{ to }300$ $-500 \text{ to }500 \text{ to }50.00$ D +- 200 -200 to +300 Pa $-300 \text{ to }0.00 \text{ to }20.00$ D +- 300 -300 to +300 Pa $-300 \text{ to }0.00 \text{ to }20.00$ D +- 300 -300 to +300 Pa $-300 \text{ to }0.00 \text{ to }20.00$ D +- 500 -500 to +500 Pa $-500 \text{ to }0.00 \text{ to }20.00$ D +- 500 -50	D 300	0–300 Pa	0.0–300.0	
D 750 $0-750 Pa$ $0.0-750.0$ D 1000 $0-1000 Pa$ 01000 E 2 $0-2 kPa$ $0.000-2.000$ 4 to 20 mA DC E 3 $0-3 kPa$ $0.000-3.000$ (load resistance of 50 Ω or lower) E 5 $0-5 kPa$ $0.000-5.000$ (load resistance of 50 Ω or lower) E 10 $0-10 kPa$ $0.00-10.00$ (load resistance of 50 Ω or lower) E 20 $0-20 kPa$ $0.00-20.00$ Output signals from the airflow rate/speed meter are those obtained through square root calculation of input signals. E 50 $0-50 kPa$ $0.00-50.00$ square root calculation of input signals. D +- 10 $-10 to +10 Pa$ $-10.00 to 0.00 to 10.00$ input signals. D +- 20 $-20 tb +20 Pa$ $-200 to 0.00 to 30.00$ input signals. D +- 30 $0.30 tb +30 Pa$ $-30.0 to 0.0 to 30.00$ $-100 tb -100 tb -100 Pa$ $-100.0 to 0.0 to 100.00$ D +- 200 $-200 tb +20 Pa$ $-200 tb 0.0 to 30.00$ $-500 tb 0.0 to 30.00$	D 500	0–500 Pa	0.0–500.0	
$ \begin{array}{ c c c c c c } \hline D \ 1000 & 0 & -1000 \ Pa & 0 & -1000 \\ \hline E \ 2 & 0 & -2 \ kPa & 0.000 & -3.000 & (load resistance 550 \ \Omega \ or \ lower) \\ \hline E \ 3 & 0 & -3 \ kPa & 0.000 & -3.000 & (load resistance 550 \ \Omega \ or \ lower) \\ \hline E \ 5 & 0 & -5 \ kPa & 0.000 & -5.000 & (load resistance 550 \ \Omega \ or \ lower) \\ \hline E \ 10 & 0 & -10 \ kPa & 0.00 & -10.00 & (load resistance 500 \ \Lambda \ or \ lower) \\ \hline E \ 20 & 0 & -20 \ kPa & 0.00 & -3.000 & airflow rate/speed meter are those obtained through square root calculation of input signals from the airflow rate/speed meter are those obtained through square root calculation of input signals. \\ \hline E \ 30 & 0 & -30 \ kPa & 0.00 & -50.00 & square root calculation of input signals. \\ \hline D \ +- \ 10 & -100 \ to +100 \ Pa & -10.00 \ to 0.00 \ to 10.00 & D & +- \ 20 & -20 \ to +20 \ Pa & -20.0 \ to 0.0 \ to 50.0 & D & +- \ 50 & -50 \ to +50 \ Pa & -300 \ to 0.0 \ to 50.0 & D & +- \ 30 & -300 \ to +300 \ Pa & -300 \ to 0.0 \ to 30.0 & D & +- \ 30 & -300 \ to +300 \ Pa & -300 \ to 0 \ to 30.0 & D & +- \ 30 & -300 \ to +300 \ Pa & -300 \ to 0 \ to 300 & -500 \ to +500 \ Pa & -1000 \ to 1000 & -1000 \ to 1000 & D & +- \ 30 & -300 \ to +500 \ Pa & -300 \ to 0 \ to 300 & -500 \ to +500 \ Pa & -1000 \ to 0.00 \ to 3.00 & -500 \ to +500 \ Pa & -300 \ to 0.00 \ to 3.00 & -500 \ to +500 \ Pa & -300 \ to 0.00 \ to 3.00 & -500 \ to +500 \ Pa & -300 \ to 0.00 \ to 3.00 & -500 \ to +500 \ Pa & -300 \ to 0.00 \ to 3.00 & -500 \ to +500 \ Pa & -300 \ to 0.00 \ to 3.00 & -500 \ to +500 \ Pa & -500 \ to 0.00 \ to 3.00 & -500 \ to +500 \ Pa & -500 \ to 0.00 \ to 3.00 & -500 \ to -50$	D 750	0–750 Pa	0.0–750.0	
E2 $0-2 kPa$ $0.000-2.000$ $4 to 20 mA DC$ (to at resistance of 550 Ω or lower)E3 $0-5 kPa$ $0.000-3.000$ $10 wer$)E5 $0-5 kPa$ $0.000-5.000$ $10 wer$)E10 $0-10 kPa$ $0.00-10.00$ $10 sV DC$ (to at resistance: 500 $k\Omega$ or higher)E20 $0-20 kPa$ $0.00-20.00$ $0.00 to 5 V DC$ (to at resistance: 500 $k\Omega$ or higher)E30 $0-30 kPa$ $0.00-20.00$ $0.00 tot ytupt signals from theairflow rate/speed meterare those obtained throughsquare root calculation ofinput signals.D+-10-10 to +100 Pa-10.00 to 0.00 to 10.00D+-20-20 to +20 Pa-200 to 0.00 to 20.0D+-30-30 to +30 Pa-30.00 to 0.00 to 20.0D+-30-50 to +50 Pa-50.00 to 20.0D+-300-500 to +200 Pa-200 to 0.00 to 20.0D+-300-500 to 200 Pa-500 to 0.00 to 20.0D+-300-500 to +200 Pa-500 to 0.00 to 200D+-300-500 to +500 Pa-500 to 0.00 to 200D+-300-500 to +500 Pa-500 to 0.00 to 200D+-300-500 to 500 Pa-500 to 0.00 to 3.00D+-500-500 to 500 Pa-500 to 0.00 to 3.00D+-500-500 to 500 Pa-500 to 0.00 to 2.00E$	D 1000	0–1000 Pa	0–1000	
E3 $0-3 kPa$ $0.000-3.000$ (load resistance of 550 Ω or lower)E5 $0-5 kPa$ $0.000-5.000$ $0 b 5 V DC$ E10 $0-10 kPa$ $0.00-10.00$ $0 b 5 V DC$ E20 $0-20 kPa$ $0.00-20.00$ $0 ligher)$ E30 $0-30 kPa$ $0.00-3.000$ arflow rate/speed meter are those obtained through square root calculation of input signals.D+ - 10-10 to +10 Pa-10.00 to 0.00 to 10.00input signals.D+ - 20-20 to +20 Pa-20.0 to 0.00 to 20.0input signals.D+ - 30-30 to +30 Pa-30.0 to 0.00 to 10.00input signals.D+ - 30-30 to +30 Pa-30.0 to 0.00 to 0.00 to 10.00input signals.D + - 300-30 to to 50 Pa-50.0 to 0.0 to 50.0-50.0 to 0.0 to 50.0-50.0 to 0.0 to 50.0D + - 300-30 to +30 Pa-30.0 to 0.0 to 50.0-50.0 to 0.0 to 50.0-50.0 to 0.0 to 50.0D + - 300-30 to +30 Pa-30.0 to 0.0 to 50.0-50.0 to 0.0 to 50.0-50.0 to 0.0 to 50.0D + - 500-50.0 to +50.0 Pa-50.0 to 0.0 to 50.0-50.0 to 0.0 to 50.0-50.0 to 0.0 to 50.0D + - 300-30.0 to +30.0 Pa-30.0 to 0.0 to 50.0-50.0 to 0.0 to 50.0-50.0 to 0.0 to 50.0D + - 300-30.0 to +50.0 Pa-20.0 to 0.0 to 50.0-50.0 to 0.0 to 50.0-50.0 to 0.0 to 50.0D + - 300-30.0 to +50.0 Pa-50.0 to 0.0 to 50.0-50.0 to 0.0 to 5.00-50.0 to 0.0 to 5.00D + - 1000-1000 to +100.0 Pa<	E 2	0–2 kPa	0.000-2.000	4 to 20 mA DC
E5 $0-5$ kPa $0.000-5.000$ 0 to 5 VDCE10 $0-10$ kPa $0.00-10.00$ 0 to 5 VDCE20 $0-20$ kPa $0.00-20.00$ 0 uptu signals from the airfow rate/speed meter are those obtained through square root calculation of input signals.E30 $0-30$ kPa $0.00-30.00$ $00-30.00$ E300 $0-50$ kPa $0.00-30.00$ $00-30.00$ D $= 50$ $0-50$ kPa $0.00-30.00$ $square root calculation ofinput signals.D+ 10-10 to +10 Pa-10.00 to 0.00 to 10.00square root calculation ofinput signals.D+ - 20-20 to +20 Pa-20.00 to 0.00 to 10.00square root calculation ofinput signals.D+ - 50-50 to +50 Pa-30.0 to 0.0 to 20.0-100 to -100 to +100 Pa-30.0 to 0.0 to 50.0D+ - 300-300 to +300 Pa-300 to 0.0 to 50.0-100.0 to 50.0D+ - 500-200 to +200 Pa-200 to 0.0 to 50.0D+ - 300-300 to +300 Pa-300 to 0.0 to 500D+ - 500-500 to +500 Pa-500 to 0.00 to 500D+ - 1000-1000 to +1000 Pa-1000 to 0.00 to 2.00D+ - 30-300 to +300 Pa-300 to 0.00 to 2.00D+ - 30-300 to +300 Pa-2.00 to 0.00 to 2.00D+ - 30-300 to -300 to -300 to -300 to -500 to -500D+ - 1000$	E 3	0–3 kPa	0.000-3.000	(load resistance of 550 Ω or lower)
E10 $0-10 \text{ kPa}$ $0.00-10.00$ (load resistance: 500 kD or higher)E20 $0-20 \text{ kPa}$ $0.00-20.00$ Output signals from the airflow rate/signals from the airflow rate/signals from the square root calculation of input signals.E30 $0-30 \text{ kPa}$ $0.00-30.00$ are those obtained through square root calculation of input signals.D $0-50 \text{ kPa}$ $0.00-50.00$ are those obtained through square root calculation of input signals.D $-10 \text{ to }+10 \text{ Pa}$ $-10.00 \text{ to }0.00 \text{ to }0.00 \text{ to }10.00$ input signals.D $+-20$ $-20 \text{ to }+20 \text{ Pa}$ $-20.0 \text{ to }0.0 \text{ to }20.0$ input signals.D $+-30$ $-30 \text{ to }+30 \text{ Pa}$ $-30.0 \text{ to }0.0 \text{ to }30.0$ input signals.D $+-30$ $-50 \text{ to }+50 \text{ Pa}$ $-50.0 \text{ to }0.0 \text{ to }30.0$ input signals.D $+-30$ $-30 \text{ to }+30 \text{ Pa}$ $-30.0 \text{ to }0.0 \text{ to }30.0$ input signals.D $+-30$ $-50 \text{ to }+50 \text{ Pa}$ $-50.0 \text{ to }0.0 \text{ to }30.0$ input signals.D $+-300$ $-300 \text{ to }+300 \text{ Pa}$ $-300 \text{ to }0.0 \text{ to }30.0$ input signals.D $+-300$ $-500 \text{ to }+500 \text{ Pa}$ $-500 \text{ to }0.0 \text{ to }30.0$ input signals.D $+-300$ $-300 \text{ to }+300 \text{ Pa}$ $-300 \text{ to }0.0 \text{ to }30.0$ input signals.D $+-300$ $-300 \text{ to }+300 \text{ Pa}$ $-500 \text{ to }0.0 \text{ to }30.0$ input signals.D $+-300$ $-300 \text{ to }+300 \text{ Pa}$ $-300 \text{ to }0.0 \text{ to }50.0$	E 5	0–5 kPa	0.000-5.000	0 to 5 V DC
E200-20 kPa0.00-20.00Output signals from the airflow rate/speed meter airflow rate/speed meter airflow rate/speed meter airflow rate/speed meter airflow rate/speed meter airflow rate/speed meter airflow rate/speed meter airflow rate/speed meter airflow rate/speed meter airflow rate/speed meter airflow rate/speed meter airflow rate/speed meter airflow rate/speed meter airflow rate/speed meter airflow rate/speed meter airflow rate/speed meter airflow rate/speed meter airflowE500-30 kPa0.00-30.00airflow rate/speed meter airflow 1000-100 kPa0.00-50.00input signals from the airflow rate/speed meter airflowD+-10-100 to +10 Pa0.00-100.0D+-20-20 to +20 Pa-20.0 to 0.00 to 10.00D+-50-50 to +50 Pa-50.0 to 0.00 to 50.0D+-100-100 to +100 Pa-100.0 to 0.00 to 100.0D+-200-200 to +200 Pa-200 to 0.00 to 200D+-300-300 to +300 Pa-500 to 0.00 to 500D+-1000-1000 to +1000 Pa-1000 to 0.00 to 2.00E+-3-3 to +3 kPa-3.00 to 0.00 to 3.00E+-5-5 to +5 kPa-5.00 to 0.00 to 5.00	E 10	0–10 kPa	0.00–10.00	(load resistance: 500 kΩ or higher)
E30 $0-30 \text{ kPa}$ $0.00-30.00$ aifflow rate/airflowE50 $0-50 \text{ kPa}$ $0.00-50.00$ aifflowD $0-100 \text{ kPa}$ $0.00-50.00$ $3uare root calculation of input signals.$ D $+-10$ $-10 \text{ to } +10 \text{ Pa}$ $-10.00 \text{ to } 0.00 \text{ to } 10.00$ D $+-20$ $-20 \text{ to } +20 \text{ Pa}$ $-20.0 \text{ to } 0.0 \text{ to } 20.0$ D $+-30$ $-30 \text{ to } +30 \text{ Pa}$ $-30.0 \text{ to } 0.0 \text{ to } 30.0$ D $+-50$ $-50 \text{ to } +50 \text{ Pa}$ $-50.0 \text{ to } 0.0 \text{ to } 50.0$ D $+-100$ $-100 \text{ to } +100 \text{ Pa}$ $-100.0 \text{ to } 0.0 \text{ to } 10.0.0$ D $+-200$ $-200 \text{ to } +200 \text{ Pa}$ $-200 \text{ to } 0.0 \text{ to } 50.0$ D $+-300$ $-300 \text{ to } +300 \text{ Pa}$ $-200 \text{ to } 0.0 \text{ to } 100.0$ D $+-200$ $-200 \text{ to } +200 \text{ Pa}$ $-200 \text{ to } 0 \text{ to } 200$ D $+-300$ $-300 \text{ to } +300 \text{ Pa}$ $-300 \text{ to } 0.0 \text{ to } 200$ D $+-300$ $-300 \text{ to } +300 \text{ Pa}$ $-300 \text{ to } 0 \text{ to } 200$ D $+-300$ $-300 \text{ to } +300 \text{ Pa}$ $-500 \text{ to } 0 \text{ to } 300$ D $+-300$ $-500 \text{ to } +500 \text{ Pa}$ $-500 \text{ to } 0 \text{ to } 500$ D $+-1000$ $-1000 \text{ to } +1000 \text{ Pa}$ $-1000 \text{ to } 0 \text{ to } 3.00$ D $+-300$ $-500 \text{ to } 500 \text{ Pa}$ $-500 \text{ to } 0.00 \text{ to } 2.00$ D $+-300$ $-500 \text{ to } 500 \text{ Pa}$ $-5.00 \text{ to } 0.00 \text{ to } 3.00$ D $+-1000$ $-1000 \text{ to } 1000 \text{ Pa}$ $-5.00 \text{ to } 0.0$	E 20	0–20 kPa	0.00–20.00	Output signals from the
E500-50 kPa0.00-50.00square root calculation of input signals.D $-100 kPa$ $0.0-100.0$ $0.0-100.0$ $0.0-100.0$ D $+-10$ $-10 to +10 Pa$ $-10.00 to 0.00 to 10.00$ $0.0-100.0$ D $+-20$ $-20 to +20 Pa$ $-20.0 to 0.0 to 20.0$ $-20 to +30 Pa$ D $+-30$ $-30 to +30 Pa$ $-30.0 to 0.0 to 50.0$ $-50 to +50 Pa$ D $+-50$ $-50 to +50 Pa$ $-50.0 to 0.0 to 50.0$ D $+-300$ $-200 to +200 Pa$ $-200 to 0 to 200$ D $+-300$ $-300 to +300 Pa$ $-300 to 0 to 300$ D $+-500$ $-500 to +500 Pa$ $-500 to 0 to 500$ D $+-500$ $-500 to +500 Pa$ $-500 to 0 to 500$ D $+-1000$ $-1000 to +1000 Pa$ $-1000 to 0 to 1000$ D $+-200$ $-200 to +20 Pa$ $-500 to 0 to 500$ D $+-300$ $-300 to +300 Pa$ $-300 to 0 to 300$ D $+-300$ $-300 to +300 Pa$ $-500 to 0 to 500$ D $+-1000$ $-1000 to +1000 Pa$ $-1000 to 0 to 1000$ E $+-2$ $-2 to +2 kPa$ $-2.00 to 0.00 to 2.00$ E $+-3$ $-3 to +3 kPa$ $-3.00 to 0.00 to 3.00$ E $+-5$ $-5 to +5 kPa$ $-5.00 to 0.00 to 5.00$	E 30	0–30 kPa	0.00–30.00	airtiow rate/speed meter are those obtained through
E100 $0-100 \text{ kPa}$ $0.0-100.0$ input signals.D +-10 $-10 \text{ to } +10 \text{ Pa}$ $-10.00 \text{ to } 0.00 \text{ to } 10.00$ input signals.D +-20 $-20 \text{ to } +20 \text{ Pa}$ $-20.0 \text{ to } 0.0 \text{ to } 20.0$ $-20.0 \text{ to } -20 \text{ to } +30 \text{ Pa}$ D +-30 $-30 \text{ to } +30 \text{ Pa}$ $-30.0 \text{ to } 0.0 \text{ to } 30.0$ $-30.0 \text{ to } 50.0 \text{ to } 50.0$ D +-50 $-50 \text{ to } +50 \text{ Pa}$ $-50.0 \text{ to } 0.0 \text{ to } 100.0$ D +-200 $-200 \text{ to } +200 \text{ Pa}$ $-200 \text{ to } 0.0 \text{ to } 200$ D +-200 $-200 \text{ to } +200 \text{ Pa}$ $-200 \text{ to } 0.0 \text{ to } 30.0$ D +-300 $-300 \text{ to } +300 \text{ Pa}$ $-300 \text{ to } 0.0 \text{ to } 30.0$ D +-500 $-500 \text{ to } +500 \text{ Pa}$ $-500 \text{ to } 0.0 \text{ to } 50.0$ D +- $-1000 \text{ to } +1000 \text{ Pa}$ $-1000 \text{ to } 0 \text{ to } 30.0$ D +- $-500 \text{ to } -500 \text{ to } -500 \text{ to } 500 \text{ Pa}$ $-500 \text{ to } 0.00 \text{ to } 2.00$ D +- $-1000 \text{ to } -1000 \text{ to } +1000 \text{ Pa}$ $-1000 \text{ to } 0.00 \text{ to } 2.00$ E +-2 $-2 \text{ to } +2 \text{ kPa}$ $-2.00 \text{ to } 0.00 \text{ to } 3.00$ E +-3 $-3 \text{ to } +3 \text{ kPa}$ $-3.00 \text{ to } 0.00 \text{ to } 5.00$ Airflow rate/airflow $-5 \text{ to } +5 \text{ kPa}$ $-5.00 \text{ to } 0.00 \text{ to } 5.00$	E 50	0–50 kPa	0.00–50.00	square root calculation of
D +-10-10 to +10 Pa-10.00 to 0.00 to 10.00D +-20-20 to +20 Pa-20.0 to 0.0 to 20.0D +-30-30 to +30 Pa-30.0 to 0.0 to 30.0D +-50-50 to +50 Pa-50.0 to 0.0 to 50.0D +-100-100 to +100 Pa-100.0 to 0.0 to 100.0D +-200-200 to +200 Pa-200 to 0 to 200D +-300-300 to +300 Pa-300 to 0 to 300D +-500-500 to +500 Pa-500 to 0 to 500D +-500-500 to +500 Pa-500 to 0 to 500D +-1000-1000 to +1000 Pa-1000 to 0 to 1000E +-2-2 to +2 kPa-2.00 to 0.00 to 2.00E +-3-3 to +3 kPa-3.00 to 0.00 to 3.00E +-5-5 to +5 kPa-5.00 to 0.00 to 5.00	E 100	0–100 kPa	0.0–100.0	input signals.
D +- 20-20 to +20 Pa-20.0 to 0.0 to 20.0D +- 30-30 to +30 Pa-30.0 to 0.0 to 30.0D +- 50-50 to +50 Pa-50.0 to 0.0 to 50.0D +- 100-100 to +100 Pa-100.0 to 0.0 to 100.0D +- 200-200 to +200 Pa-200 to 0 to 200D +- 300-300 to +300 Pa-300 to 0 to 300D +- 500-500 to +500 Pa-500 to 0 to 500D +- 500-500 to +500 Pa-500 to 0 to 500D +- 1000-1000 to +1000 Pa-1000 to 0 to 1000E +- 2-2 to +2 kPa-2.00 to 0.00 to 2.00E +- 3-3 to +3 kPa-3.00 to 0.00 to 3.00E +- 5-5 to +5 kPa-5.00 to 0.00 to 5.00	D +- 10	-10 to +10 Pa	-10.00 to 0.00 to 10.00	
D + -30 $-30 to +30 Pa$ $-30.0 to 0.0 to 30.0$ $D + -50$ $-50 to +50 Pa$ $-50.0 to 0.0 to 50.0$ $D + -100$ $-100 to +100 Pa$ $-100.0 to 0.0 to 100.0$ $D + -200$ $-200 to +200 Pa$ $-200 to 0 to 200$ $D + -300$ $-300 to +300 Pa$ $-300 to 0 to 30.0$ $D + -500$ $-500 to +500 Pa$ $-500 to 0 to 500$ $D + -500$ $-500 to +500 Pa$ $-500 to 0 to 500$ $D + -1000$ $-1000 to +1000 Pa$ $-1000 to 0 to 500$ $D + -1000$ $-1000 to +1000 Pa$ $-1000 to 0 to 0 to 2.00$ $E + -2$ $-2 to +2 kPa$ $-2.00 to 0.00 to 2.00$ $E + -3$ $-3 to +3 kPa$ $-3.00 to 0.00 to 3.00$ $E + -5$ $-5 to +5 kPa$ $-5.00 to 0.00 to 5.00$	D +- 20	-20 to +20 Pa	-20.0 to 0.0 to 20.0	
D += 50 $-50 \text{ to } +50 \text{ Pa}$ $-50.0 \text{ to } 0.0 \text{ to } 50.0$ D += 100 $-100 \text{ to } +100 \text{ Pa}$ $-100.0 \text{ to } 0.0 \text{ to } 100.0$ D += 200 $-200 \text{ to } +200 \text{ Pa}$ $-200 \text{ to } 0 \text{ to } 200$ D += 300 $-300 \text{ to } +300 \text{ Pa}$ $-300 \text{ to } 0 \text{ to } 300$ D += 500 $-500 \text{ to } +500 \text{ Pa}$ $-500 \text{ to } 0 \text{ to } 500$ D += 1000 $-1000 \text{ to } +1000 \text{ Pa}$ $-1000 \text{ to } 0 \text{ to } 500$ D += 1000 $-1000 \text{ to } +1000 \text{ Pa}$ $-2.00 \text{ to } 0.00 \text{ to } 2.00$ E += 2 $-2 \text{ to } +2 \text{ kPa}$ $-2.00 \text{ to } 0.00 \text{ to } 2.00$ E += 3 $-3 \text{ to } +3 \text{ kPa}$ $-3.00 \text{ to } 0.00 \text{ to } 3.00$ E += 5 $-5 \text{ to } +5 \text{ kPa}$ $-5.00 \text{ to } 0.00 \text{ to } 5.00$	D +- 30	-30 to +30 Pa	-30.0 to 0.0 to 30.0	
D + = 100 $-100 to +100 Pa$ $-100.0 to 0.0 to 100.0$ $D + = 200$ $-200 to +200 Pa$ $-200 to 0 to 200$ $D + = 300$ $-300 to +300 Pa$ $-300 to 0 to 300$ $D + = 500$ $-500 to +500 Pa$ $-500 to 0 to 500$ $D + -1000$ $-1000 to +1000 Pa$ $-1000 to 0 to 1000$ $E + - 2$ $-2 to +2 kPa$ $-2.00 to 0.00 to 2.00$ $E + - 3$ $-3 to +3 kPa$ $-3.00 to 0.00 to 3.00$ $E + - 5$ $-5 to +5 kPa$ $-5.00 to 0.00 to 5.00$	D +- 50	−50 to +50 Pa	-50.0 to 0.0 to 50.0	
D + = 200 -200 to $+200$ Pa -200 to 0 to 200 $D + = 300$ -300 to $+300$ Pa -300 to 0 to 300 $D + = 500$ -500 to $+500$ Pa -500 to 0 to 500 $D + = 1000$ -1000 to $+1000$ Pa -1000 to 0 to 1000 $E + = 2$ -2 to $+2$ kPa -2.00 to 0.00 to 2.00 $E + = 3$ -3 to $+3$ kPa -3.00 to 0.00 to 3.00 $E + = 5$ -5 to $+5$ kPa -5.00 to 0.00 to 5.00	D +- 100	-100 to +100 Pa	-100.0 to 0.0 to 100.0	
D + -300 $-300 to +300 Pa$ $-300 to 0 to 300$ $D + -500$ $-500 to +500 Pa$ $-500 to 0 to 500$ $D + -1000$ $-1000 to +1000 Pa$ $-1000 to 0 to 1000$ $E + -2$ $-2 to +2 kPa$ $-2.00 to 0.00 to 2.00$ $E + -3$ $-3 to +3 kPa$ $-3.00 to 0.00 to 3.00$ $E + -5$ $-5 to +5 kPa$ $-5.00 to 0.00 to 5.00$	D +- 200	-200 to +200 Pa	-200 to 0 to 200	
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	D +- 300	-300 to +300 Pa	-300 to 0 to 300	
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	D +- 500	-500 to +500 Pa	-500 to 0 to 500	
E + - 3 $-3 \text{ to } +3 \text{ kPa}$ $-3.00 \text{ to } 0.00 \text{ to } 3.00$ E + - 5 $-5 \text{ to } +5 \text{ kPa}$ $-5.00 \text{ to } 0.00 \text{ to } 5.00$	D +-1000 E +- 2	−1000 to +1000 Pa −2 to +2 kPa	-1000 to 0 to 1000 -2.00 to 0.00 to 2.00	
E + -5 $-5 to +5 kPa$ $-5.00 to 0.00 to 5.00$	E + - 3	-3 to +3 kPa	-3.00 to 0.00 to 3.00	
Airflow rate/airflow	E + - 5	-5 to +5 kPa	-5.00 to 0.00 to 5.00	
				1

(Note 1) Value: arbitrary (to be rounded), Magnification: ×10, ×100, ×1000, ×10000, Units: m³/h, m³/min, m³/h (nor), m³/min (nor), m/s For the purpose of manufacturing of airflow rate/airflow speed meter, fill out the airflow rate/airflow speed specification document preparation

Airflow rate/airflow speed range (Note 1)

0 to Value Magnification Units

sheet on page 15, and inform us of the data.

For use environment, refer to page 118.

speed range code

EMP5A

List of products

14/001

EMP5A

EMP5A



Operation panel

emt6 Emp5a					
emrt1					
HWS15A					
	① PV display	: Displays the input value in the red display.			
	② SV display	: Displays the A1 setting value, A2 setting value, and A3 setting value in the green display.			
Accessories	③ A1 indication lamp	: The red indicator lamp is lit when the A1 output is turned on.			
	A2 Indication lamp A3 indication lamp	: The red indicator itamp is it when the A2 output is turned on. (This is not used in EMP5A.)			
Application	6 A4 indication lamp	. The red indicator lamp is in when the A3 output is turned on.			
Αμμιισατιστι	(7) HOLD indicator lamp	The vellow indicator lamp is lit when the PV hold (hold, beak hold, bottom hold) output is turned on.			
Precautions	⑧ A1 setting indicator lamp	: The green indicator lamp is lit when the A1 setting is displayed.			
Trooductions	9 A2 setting indicator lamp	: The green indicator lamp is lit when the A2 setting is displayed. (This is not used in EMP5A.)			
Maintenance	10 A3 setting indicator lamp	: The green indicator lamp is lit when the A3 setting is displayed.			
	(1) A4 setting indicator lamp	: The green indicator lamp is lit when the A4 setting is displayed. (This is not used in EMP5A.)			
	12 Up key	: Increases the setting value.			
	Down key Mada kaw	: Decreases the setting value.			
	(H) MODE Key	. Owned so the setting mode, and registers are setting value.			
	(15) Fast key	Simultaneously pressing the Unikey or Down key and the East key increases the speed of setting value			
	() i dochoy	increase/decrease.			

EMP5A

Operation flow diagram

V/S	SV ind	lication mode				
	ırrent valu display	e A1 setting value display A3 setting value display	PV 3 seconds later PV Indication of input 4–20 mA DC (internal resistance of	V type Displays the scaling upper li (50Ω) setting value.	mit Turn on power supply	WO7
		Alarm setting mode		Key operation		
╞	MODE	PV A1 setting MODE	SV Sets the action point of A1. (Note 1) Setting range: scaling width	 →+MODE: Simultaneously pres →+MODE: Simultaneously pres (3 seconds) 	is the \bigtriangleup key and MODE key. is the \bigtriangledown key and MODE key for approx. 3 seconds.	FR514
		A3 setting	Sets the operation point of A3. (Note 2) Setting range: scaling width	\triangle +FAST: Simultaneously press (5 seconds) \triangle + ∇ +MODE: Simultaneously	the $ riangle$ key and FAST key for approx. 5 seconds. press the $ riangle$ key, $ riangle$ key, and MODE key for	MS99
		Maintenance mode		approx. 3 seconds. (3 seconds)		
4	∆+FAST	PV	SV Selects ON or OFF of A1 output.	(Note 1) Non-display When no action this setting iten	due to A1 action selection i is selected in A1 action selection, n is hidden.	MS99
	5 seconds)	A3 output	Selects ON or OFF of A3 output.	(Note 2) Non-display When no action this setting item	due to A3 action selection n is selected in A3 action selection, n is hidden.	
		MODE	It is possible to set an arbitrary value to the o amount of transmission output 1 regardless o	the input. (Note 3) Selection of	setting value lock k: It is possible to change setting values at all.	MS61A-R
		Auxiliary function setti PV Selection of setting	ng mode 1		 It is not possible to change all setting values. It is possible to change settings in the main setting mode only. It is possible to change all settings, but the data changed in the auxiliary function setting mode 	QDP3
(∀+MODE 3 seconds)	MODE Setting of sensor compensation	Sets the sensor compensation coefficient. Sets ing range: -10000 to 10000 (Note 4)	(Note 3) (Note 4) Decimal point	2 revert to the former data once the power supply to the instrument is turned off. nt in setting range	EMD8/
		MODE Coefficient Setting of sensor compensation	Sets the sensor (input) compensation value. Setting range: -10000 to 10000 (Note 4)	Although decir position setting (Note 5) Decimal point	nal point is omitted, it follows the decimal point nt position setting	
┢╸╽		Auxiliary function setti	ng mode 2	No de	ceimal point ligit after the decimal point ligits after the decimal point	EMD
		PV Selection of	SV	Three Three	digits after the decimal point	
∆+⊽ (3 se	7+MODE econds)	MODE Scaling upper	Sets the scaling upper limit value. (Note 4 Setting range: scaling lower limit value to	(Note 6) A1/A3 action	n selection tion	EMT
		MODE Scaling lower	Setting range: -2000 to scaling upper limit	value Upper	r limit action r limit action r limit action with standby	EMTGP
		Decimal point position setting	Sets the decimal point position. (Note 5)	L Lowe	r limit action with standby	
		MODE PV filter time constant setting	Sets the PV filter time constant. Setting range: 0.0 to 10.0 seconds.	(Note 7) A1/A3 action	n excitation/non-excitation selection ation: the alarm output becomes energized when the alarm indicator lamp lights, and becomes	EMT1
		A1 action selection	Selects the action of A1. (Note 6)	Non-c	excitation: the alarm output becomes unenergized when the alarm indicator lamp lights, and becomes energized when the lamp goes off.	
		MODE A3 action selection	Selects the action of A3. (Note 6)	(Note 8) Event input	function selection	EMT
		MODE A3 action excitation	Selects excitation or non-excitation of A1. (Note 1) (Note 7) Selects excitation or non-excitation of	Hold: P_H Peak I	Retains and displays the PV at the time. hold: Displays the maximum value of PV while updating it.	EMDE
		MODE A1 action differential	A3. (Note 2) (Note 7) Sets the differential gap of A1. (Note 1) Satting range: 1 to 1000 (Note 4)	H Botto	m hold: Displays the minimum value of PV while updating it. a retention 1: When the section between the terminals (14) and	EIVIP5A
		A3 action differential gap setting	Sets the differential gap of A3. (Note 2) Setting range: 1 to 1000 (Note 4)	HLBP Alam	functions are enabled, the alarm is retained. a retention 2: When the section between the terminals (14) and (17) is released, if A1 and A3 retention	EMRT
		A1 action delay MODE	Sets the action delay time of A1. (Note 1) Setting range: 0 to 10000 seconds.	(Note 9) A1/A3 retent When "enable	functions are enabled, the alarm is retained. tion function selection retention function" is selected, once an alarm is triggered.	
		A3 action delay timer setting	Sets the action delay time of A3. (Note 2) Setting range: 0 to 10000 seconds. Sets the upper limit value of transmission	the alarm will To cancel the r turn off the po	be retained. During retention, the indicator lamp blinks. etention, it is necessary to hold down the \triangle key for 3 seconds, wer supply, or cancel the retention by inputting an event.	HWS15/
		MODE Transmission output	(indication value at the time of maximum Setting range: transmission output lower limit value to Sets the lower limit value of transmission	(Note 10) Low level of This is a function a small input of	utoff setting on to forcefully set the PV to zero at a low range where even hange can greatly change the square root calculation result.	Accessori
		MODE Event input	Indication value at the time of minimum of Setting range: -2000 to transmission output upper lim It is possible to select the event input funct To use the hold function, short-circuit the s	t value (Note 4) ion. ection	gauge, inis setting item is hidden.	
		MODE A1 retention function selection	between terminals (14) and (17). (Note 8) Selects whether to retain the alarm of A1 or not. (Note 9)			Applicatio
		A3 retention function selection	Selects whether to retain the alarm of A3 or not. (Note 9)			Precaution
		MODE Square root calculation	Selects presence/absence of square root calculation function.			Maintenand
		Leur Low level MODE	Set this as percentage with respect to the in range. (Note 10) Setting range: 0.0 to 25.0%	put		

EMP5A

List of products

EMP5A

EMP5A

List of products

Input-output relationship diagrams



Alarm operation diagram



EMP5A

Wiring



TCA-P5A3 Polycarbonate

EMP5A

WO81

List of products

Square root calculator

EMRT1

products						
WO81	Square root calculator					
	This instrument performs square root calculation of					
WO71	pressure					
FR51A	and outputs a current signal that is in proportion to the					
MS99	The input signal and the output signal are electrically insulated from each other.					
MS99S						
MS61A-RA	THE REPORT OF					
QDP33	ARREN I					
EMD8A						
EMD7	SPAN SPAN					
EMT1	SPI EMRT1					
EMTGP1						
EMTIH						
EMT6						
EMP5A						
EMRT1						
HWS15A						
Accessories	Product code					
Application	EMRT1 A 1 1					
Precautions		Output signal	1			
Maintenance		Input signal	1			
	▲When making an inquiry or placin	an order speci	A fy the s			

When making an inquiry or placing an order, specify the above product code.
 When you use this product for airflow rate/airflow speed measurements in combination with an adjustment meter, we need to obtain the specifications of the pressure detection side. Fill out the airflow rate/airflow speed specification document preparation sheet on page 15, and inform us of the data.

4–20 mA DC 4–20 mA DC 100 V AC, 50/60 Hz

EMRT1

RoHS

Square root calculator

EMRT1

List of products

MS99

MS61A-RA

QDP33

EMD8A

EMRT1

Specifications

Model	EMRT1
Input signal	4 to 20 mA DC (input resistance of 50 Ω)
Output signal	4 to 20 mA DC (load resistance of 500 Ω or lower)
Square root output cut point	15% FS or below
Accuracy	±1% FS (at 20°C)
	However, at output signal range of 15 to 100% FS
Temperature characteristics	±0.01% FS/°C (at 0°C to 40°C)
Power voltage	100 V AC ± 10%, 50/60 Hz, approx. 3.5 VA
Exterior material	Polycarbonate and ABS resin
Operating ambient temperature	0 to 50°C (no freezing allowed)
Operating ambient humidity	90% RH or below (no condensation allowed)
Insulation resistance	Between terminal and case: 20 M Ω or higher (500 V DC megger)
Withstand voltage	Between power terminal and case: 1000 V AC, 50/60 Hz, for one minut
Mounting method	Rail mounting (applicable rail: 35 mm wide DIN rail)
Mass	Approx. 300 g

For use environment, refer to page 118.

Square root output cut point

This refers to the point where output is cut so as not to perform square root output of the output signal in the range of 0% to 15% of FS. The results of comparison of input signals and output signals are shown in the table on the right. Since the input value becomes extremely small as the output value decreases, and then enters an action range out of the scope of the accuracy of the calculator, the cut point is set. In this instrument, the value range of 15% FS and below, which does not affect the actual use, is cut off.

External dimension drawing



Electronic circuit block diagram



Square root calculation input/output comparison table

quare root calcul	WO81	
Output value Input value		
50%	$(0.5)^2 \times 100\% = 25\%$	
20%	(0.2) ² ×100%=4%	WO71
15%	(0. 15) ² ×100%=2. 25%	
10%	(0.1) ² ×100%=1%	
5%	$(0.05)^2 \times 100\% = 0.25\%$	FR51A
		1100171

Table for output signal

Input signal 4–20 mA DC	Output 4–20 n	MS99	
4 mA	Zero point	4.0 mA	
8 mA	1/2 span point	12.0 mA	MS99S
20 mA	Span point	20.0 mA	



Direct current power unit

HWS15A

US

LISTED

RoHS

HWS15A

List of products

WO71

FR51A

WO81 Direct current power unit

This instrument is used to drive a fine differential pressure sensor or fine differential pressure transmitter with 12 to 24 V DC power specification.

MS99
MS99S
MS61A-RA
QDP33
EMD8A
EMD7
emt1
EMTGP1
EMT1H
EMT6
EMP5A
EMRT1
HWS15A
Accessories
Application
Precautions

HWS15A-24/A

- When making an inquiry or placing an order, specify the above product code.
- The DC power device HWS15A is a product manufactured by TDK-Lambda Corporation.

Maintenance

Direct current power unit

HWS15A

Specifications

pecifications		
Model	HWS15A-24/A	
Input voltage	85 to 265 V AC (47 to 63 Hz) or 120 to 370 V DC	
Output voltage	24 V DC	WO/I
Maximum output current	0.65 A	
Output variation at operating ambient temperature	0.02%/°C or lower	FR51A
Overcurrent protection	0.68 A and higher	
Operating ambient temperature	-10°C to +70°C (-10°C to +50°C: 100%, +60°C: 80%, +70°C: 60%)	MS99
Operating ambient humidity	30% to 90% RH (no condensation allowed)	
Withstand voltage	Between input and FG: 2 kV AC (20 mA), between input and output: 3 kV AC (20 mA) Between output and FG: 500 V AC (100 mA), each for one minute	MS99S
Insulation resistance	100 MΩ or higher (between output and FG: 500 V DC, 25°C, 70% RH)	1110770
Mass	Approx. 210 g	

For use environment, refer to page 118.

External shape drawing







This DC power unit <HWS15A> can supply 24 V DC power to up to 15 two-wire type fine differential pressure transmitters. Provide relay terminals for DC power distribution use as shown in the figure above, and supply power to each transmitter. The user should prepare the relay terminals for distribution use.

List of products

MS61A-RA

HWS15A

Pitot tube

List of products

RoHS

WO81 Simplified model For measurement of static air pressure at indoor location, etc. **Simplified Pitot tube** For vinyl pipe 110 20 φ7 WO71 (simplified static Static pressure Item number Material Panel cutting pressure pipe) measurement φ6 PTK-VT6-110 Brass/steel hole φ10.5 Width across FR51A PTK-VT6-110-S Stainless steel Hexagonal nut G1/8, width across flats of 14 mm flats: 14 φ5.5 15 110 MS99 S Static pressure 1111 Item number Material Panel cutting measurement Hexagonal nut M6, width across flats of 10 mm Width across hole Brass/phosphor flats: 10 PTK-VT4-110 φ6.5 MS99S bronze 15 40 φ5. A MS61A-RA Static pressure Material Item number Panel cutting measurement hole Width across Brass/phosphor Airflow PTK-VT4-40 M6 nut, width across flats of 10 mm flats: 10 φ6.5 bronze QDP33 1 m/s or below For metallic pipe 110 Width across flats: 12 14 EMD8A Static pressure measurement φ6±0.ì 6 0 hole Width Item number Material Panel cutting across flats: 14 Hexagonal nut G1/8, width across flats of 14 mm PTK-MT6-110 Brass/steel EMD7 φ10.5 PTK-MT6-110-S Stainless steel PT base EMT1 110 all a Static pressure measurement hole ĝ EMTGP1 Width across flats: 14 Hexagonal nut G1/8, width across flats of 14 mm EMT1H The tube mounting part is a push-in joint. For piping, use the separately sold tube (refer to page 112) or a tube compatible with JIS B 8381-1. (Connectable tube Item number Material Panel cutting EMT6 outer diameter: 6) PTK-PT6-110 PBT, brass, steel φ10.5 PR base EMP5A 110 Allerit Static pressure measurement meas EMRT1 Width across flats: 14 Hexagonal nut G1/8, width across flats of 14 mm HWS15A The tube mounting part is a rotary elbow push-in joint. For piping, use the separately sold tube (refer to page 112) or a tube compatible with JIS B 8381-1. (Connectable tube Item number Material Panel cutting Acc<u>essorie</u> outer diameter: 6) PTK-PR6-110 PBT, brass, steel φ10.5 Application Precautions

Maintenance







Pitot tube

List of products WO81 WO71 FR51A MS99 MS99S MS61A-RA



RoHS



How to use the Pitot tube			
Measurement method of static pressure a	and dynamic pressure		
Measurement method of static pressure			
 Method using static pressure pipe Method using a static pressure hole, which is a smooth hole made along duct inner wall so that no 	Diagram for explanation of total pressure, static pressure, and dynamic pressure		
 A. Method using pipe (simplified Pitot tube) at an orthogonal angle to the duct inner wall. However, to use this method, the flow speed must be 1 m/s or 			
below. If the flow speed is higher than that, the error will be greater because of the influence of the dynamic pressure.			
Measurement method of dynamic pressure	Pt Ps Pd		
To know a flow speed, only measuring the dynamic pressure of the flow obtains it. However, the dynamic pressure cannot be directly measured. Therefore, use			
the formula below. Total pressure – Static pressure = Dynamic pressure The dynamic pressure can be obtained from the	e Pt (total pressure) = Ps (static pressure) + Pd (dynamic pressure)		
differential pressure between the pressure at the total pressure pipe and that at the static pressure pipe.			
 Method of installing static pressure pipe and total p pipe at a distance D between them. (Refer to page Method of installing overall/static pressure pipe 	ressure 116)		
Measurement method of static pressure a	and dynamic pressure		
The measurement method for flow speed using the Pitot tube is relatively simple and highly reliable, but as the airflow speed decreases, the detection pressures (total pressure,	Airflow speed - dynamic pressure relationship table		
static pressure) and the differential pressure (dynamic pressure) between them also decrease, and accurate measurement is disabled at an airflow speed of 2 m/s or	30 20 °C		
Calculation formula of flow speed by means of the Pitot tube	Airflow 10		
$V(m/s) = \sqrt{\frac{2}{2} (Pt - Ps)}$	(m/s) 8 6		
V P Where,	5		
ρ: Fluid density (kg/m³) Pt: Total pressure (Pa) Ps: Static pressure (Pa)	3 10 20 30 40 50 60 80 100 200 300 400 500 70 90		
Density of dry air at 0°C and one atmosphere ρ =1.293 kg/m	Total pressure – Static pressure = Dynamic pressure (Pa)		
Measurement of airflow rate by means of	the Pitot tube		
○ Set the tip straight pipe part of the Pitot tube in parallel to the flow. As the measurement points,	Measurement points in Pitot tube Composite Pitot tube		
set the 10 points on each of two diameter lines that cross each other at the right angle on the	Measurement		
measurement pipe cross section, 20 points in total, as shown in the formula on the right. However, as			
this method requires substantial time and effort, it is not suitable for commercial use.			
 Use of a composite Pitot tube, in which Pitot tubes in large number are used, is convenient. Method to obtain approximate flow rate by 			
measuring the maximum airflow speed at the center of pipe with a single Pitot tube r ₁ Flow rate = Maximum airflow speed × Pipe cross r ₂	=0. 316R r_4 =0. 837R NEW AEROEYE =0. 548R r_5 =0. 949R *NEW AEROEYE is a product manufactured and sold by Wetmaster Co. 1td		
section area × 0.9 r ₃	=0.707R		
How to use the Pitot tube			
---	---------------------------------------	---------------------------------	------------------
			List of products
Guide for Pitot tube installation location Depending on the pipe layout, the flow may be disturbed, which may affect the measurement	accuracy.		WO81
Therefore, when installing a Pitot tube, we recommend securing a sufficient straight pipe leng corresponding value in the table below.	th equal to or gre	eater than the	W071
D: Duct diameter Pitot tube installation location Round duct D = duct inner diameter	Dimension on upstream side (L1)	Dimension on downstream side	FR51A
Square duct D = (duct inner width + height) / 2	Without flow straighter	(L2)	
P P 90° bend or			MS99
single tee	6D	4D	MS99S
Р			MS61A-RA
Two or more 90° bends on the same plane	10D	4D	QDP33
			EMD8A
P Two or more 90° bends			
	19D	4D	EMD7
There must be a distance of 5D or greater between two bends.			EMT1
P P Shrinking pipe or			EMTGP1
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	6D	4D	
			EMT1H
Gate valve,	100	10	EMT6
Full ≥ 1 → + L2 + 1	12D	40	EMP5A

EMRT1

HWS15A

Accessories
Application

Precautions Maintenance

Conduit parts

RoHS



EMT6

List of products



instrument as shown in the figure on the right.







Conduit parts



Item number		Size	mm	Standard length (m)*					Galan	Connectability with	Llanda ana		
		Inner diameter	Outer diameter	1	2	5	10	20	50	100	Color	push-in joint	Hardness
Vinyl –	VT4-6	4	6	0	0	0	0	0	×	0		×	Soft
	VT4-8	4	8	0	0	0	0	0	×	0		×	
	VT6-8	6	8	0	0	0	0	0	0	0	Clear	×	
	VT6-12	6	12	0	0	0	0	0	×	0	Clear	×	
Urethane	UT4-6	4	6	0	0	0	0	0	×	0		×	
	UT6-8	6	8	0	0	0	0	0	×	0		×	
Urethane UF	UF4-6	4	6	0	0	0	0	0	0	-	Black	0	₩ Hard
Nylon	NT4-6	4	6	0	0	0	0	0	×	0	Opaque white	0	

*If you desire a tube in a length other than above, contact us.



On the base for vinyl pipe, use a vinyl pipe or rubber pipe with a wall thickness of 1 mm or higher. However, for a pressure range or line pressure of 50 kPa or

higher, select a pipe with pressure resistance (including vacuum pressure), such as a vinyl pipe with a wall thickness of 2 mm or higher.

On the base for the metallic pipe, it is possible to use both of copper pipe and aluminum pipe, but be sure to observe the outer diameter of 6 mm with a tolerance of ±0.1 mm.

Caution of ±0

• Tighten the cap nut for metallic pipe by 3/4 to 1 turn

EMT6

EMP5A

EMRT1

HWS15A

Application Precautions

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Combination

Combination with fine differential pressure transmitter

W081 When you use a fine differential pressure transmitter in combination with a displaying instrument or other device, select them by referring to the combination table below.

W071	Transmission method	Fine differential pressure transmitter	Relevan	Displaying instrument	
FR51A		anne a	Direct current power unit	Airflow rate measurement Square root calculator	Receiving instrument
MS99		EMT1A EMT1B		LELLEL 1	19900
MS99S	Two-wire	ЕМТ6	HWS15A	EMRT1	EMP5A
MS61A-RA	type	EMTGP1A EMTGP1B	If a DC power circuit is	C	~ The receiving
QDP33		EMT1H Intrinsically safe circuit	not incorporated into the receiving device, use the device in combination with this	measurement, a square root calculation circuit is necessary.	instrument EMP5A is incorporated with a DC power circuit and a
EMD8A		*Installation at hazardous locations	power unit.	calculation circuit is not incorporated into the receiving device,	circuit.
EMD7				use the device in combination with this calculator.	Adjustment meter
EMT1		en la come			*We do not handle adjustment meters.
EMTGP1	Four-wire type	type EMT1A EMT1B			
EMT1H					
EMT6	♦<>: Represe	ents power voltage of 100 V AC 50/60 Hz. (For the power	r voltage input range, refer to	the page describing each p	roduct.)

Be sure to combine our receiving instrument with a fine differential pressure transmitter with the same pressure range as that on the nameplate attached to the body of the receiving instrument.

Please be advised that if a failure occurs because of the combination of our product with a device from another manufacturer, we shall assume no responsibility. Therefore, pay due attention to the functions and circuits of the device.

When installing a device as an intrinsically safe device, pay attention to hazardous and non-hazardous locations. (Refer to page 87)

EMRT1 When you use these products for airflow rate/airflow speed measurements, we need to obtain the specifications of the pressure detection side. Fill out the airflow rate/airflow speed specification document preparation sheet on page 15, and inform us of the data.

HWS15A

EMP5A

List of products

Accessories Application Precautions

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Use example

List of products

WO81 Static pressure measurement

• Measurement of flowing air Monitoring of ventilation/exhaust device and alarm issuance

H: high pressure side L: low pressure side



Caution

Select the base, piping material, and other components in accordance with the use environment. The dimensions on the upstream side and those on the downstream side differ depending on the duct shape. For details, refer to page 108.



A Caution

Select the base, piping material, and other components in accordance with the use environment. The dimensions on the upstream side and those on the downstream side differ depending on the duct shape. For details, refer to page 108.

Use example

List of products Measurement of pressure loss WO81 For detection of clogging of filters H: high pressure side L: low pressure side Fine differential pressure gauge By installing two static pressure WO71 tubes, one each before and after н Fine differential pressure senso the filter, and measuring the б pressure loss, it is possible to know the degree of clogging of the filter. Static FR51A Static e tub press Generally, a pressure range with its press \sim C Air filter Air filter maximum value ranging from 300 0.5D 1D 4D or higher Pa to 1000 Pa is used. 0.5D 1D 4D or higher 6D or higher 6D or higher **MS99** Straight pipe par Straight pipe par For transmission of the drive signal of automatic filters MS99S Fine differential pressure gauge When the filter is clogged and ne differentia 6 the airflow rate decreases, the MS61A-RA fine differential pressure switch Fine differentia pressure sensor is switched. Switching of the fine differential pressure switch 0 energizes and starts the filter QDP33 $(\bigcirc$ winding motor to feed a new filter. B R \Rightarrow EMD8A \bigcirc EMD7 For bug filter dust collectors ine differential The fine differential pressure switch EMT1 Fine differential pressure switch detects the dust collection amount Fine differential pressure sensor in accordance with the clogging 2 condition of the bug filter and the EMTGP1 cycle, and operates the aeration device to clean the bug filter. R EMT1H For detection of the defrosting cycle of cooling coil EMT6 Fine differentia In the cooling operation, to prevent attachment of frost on the cooling EMP5A coil and decrease of its function, the fine differential pressure switch detects the frost attachment amount B and issues a defrosting operation R \Rightarrow EMRT1 instruction. Measurement of static pressure and pressure loss HWS15A For glove boxes Exhaus Instruments are used to control the inner pressure, and the target Accessories Fine differentia Fine differe Y object in the glove box is handled by means of a reacher. (The 111 figure on the right illustrates a use example in which the pressure in the box interior is set to a negative pressure to prevent leakage Application C d from the inside.) Precautions Fine differ Air filter ٢ Maintenance Negative Select the base, piping material, and other components in Reache Air filte accordance with the use environment. The dimensions on

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Caution

the upstream side and those on the downstream side differ

depending on the duct shape. For details, refer to page 108.

Precautions on use

List of products

A Precautions common to instruments

Ρ

Precautions on handling	WO81				
 When pressure that exceeds the withstand pressure of a pressure-receiving element is applied to an instrument, the diaphragm and the surrounding portion will break. When pressure that exceeds the instrument body withstand pressure is applied to an instrument, the instrument case, transparent cover, and other parts will explode or break. 					
the diaphragm and its surrounding portion. When simultaneously applying pressure that exceeds the withstand pressure of a pressure- receiving element from the high-pressure (H) side and low-pressure (L) side, gradually increase the pressure by taking time. Also, when releasing the pressure, gradually decrease the pressure.					
What is the withstand pressure of a pressure-receiving element?	M\$99\$				
This term refers to the maximum pressure (withstand pressure on one side) that a diaphragm can withstand so as not to break and deform, and it is the pressure to be applied to either one of the high-pressure (H) side or the low-pressure (L) side.	MS61A-RA				
What is instrument body withstand pressure? This term refers to the maximum pressure (withstand pressure on both sides) that an instrument body can safely withstand without breaking, and it is the pressure to be applied to both the high-pressure (H) side	QDP33				
and the low-pressure (L) side. The term does not mean the pressure that guarantees the airtightness of an instrument.	EMD8A				
 Manostar products are precision devices. If you drop a Manostar product, its exterior and the internal mechanism may break. Do not disassemble Manostar products. When removing dirt from a product surface, wipe the dirt off with a cloth moistened with mild neutral detergent. When an organic 					
solvent is used on a Manostar product, its surface may corrode from the solvent, and the resin may crack. In the event of an overcurrent that exceeds the contact specification, the contact of a switch will be welded. Install such an instrument that requires a power source away from machines that generate strong high frequencies (high-frequency					
 welder, high-frequency sealer, etc.) and strong drive power sources as much as possible. When a power supply is connected to a signal input and output terminal by mistake, the device interior will be burned. For current/voltage input and output signal lines, use wires with shielding in order to prevent induction problems. Do not put input and output signal lines are not as them through the same conduit as that for a neuror line. 					
	EMT1H				
 Avoid using a product in a location exposed to direct sunlight, strong vibrations or impacts, or with high humidity for many hours. In particular, vibrations and impacts shorten the service life of the instrument. Because our instruments are not waterproof. do not use them in locations directly exposed to rainwater and other liquids. Our 	EMT6				
instruments cannot be directly installed outdoors. When it is necessary to install an instrument at an outdoor location, house the instrument in a drip-proof housing for outdoor use.					
Zero point setting	EMRT1				
 After installing an instrument, adjust the zero point in the orientation in which the instrument is used. Be sure to conduct the zero-point setting after opening the high-pressure side and low-pressure side bases to the atmosphere or stopping the machine and then completely eliminating the residual pressure. 	HWS15A				
High-pressure side and low-pressure side polarities					
 High-pressure side and low-pressure side polarities depend on the bases. On models WO81 and WO71 FS type/PS type (side face piping), it is possible to convert the polarity by exchanging the bases. The birth pressure and how pressure sides are identified with the polarity by exchanging the bases. 	Accessories				
high-pressure and low-pressure sides are identified with the colors of red and blue, respectively. In a single pressure measurement, if a measurement is conducted by removing a base for which piping is not necessary, the gauge will 					
not operate normally.	Precautions				
	Maintenance				

Precautions on use

Precautions common to instruments

WO81 Measurement of single pressure (biased pressure)

- ○For Manostar products, "differential pressure" is indicated. "Absolute pressure" and "gauge pressure" are not indicated. Once either one of the bases on the high-pressure and low-pressure sides is opened to the atmosphere, the indication will be "gauge pressure." This is called "single pressure (biased pressure)" in contrast to differential pressure.
- OWhen conducting a single pressure measurement by opening one of bases, carefully check the duct internal pressure (line pressure) and use the gauge in a range suitable for the pressure.
- FR51A OTo measure positive pressure, connect a pipe to the high-pressure side base (red, or H). Although the low-pressure side is open to the atmosphere, do not remove the low-pressure side base (blue, or L).
 - OTo measure negative pressure, connect a pipe to the low-pressure side base (blue, or L). Although the high-pressure side is open to the atmosphere, do not remove the high-pressure side base (red, or H).
- MS99 To measure a single pressure (biased pressure) with a zero center range instrument, connect a pipe to the high-pressure side base (red, or H). Do not remove the low-pressure side base, which will be open to the atmosphere. The significant value on the scale plate indicates the single pressure.

Prevention of clogging of pipe by drainage

- MS61A-RA OWhen drainage accumulates in the middle of a pipe, pressure measurements are subject to errors. Therefore, be sure to install an instrument at a location higher than the pressure extraction port of a pressure detector to prevent drainage from accumulating in part of the pipe.
- EMD8A Olf this precaution cannot be observed out of necessity, install a drain tank in the middle of the pipe as shown on the right and periodically clean the tank.
 - OAfter cleaning, confirm that airtightness is positively maintained.

Prohibition of shared piping

- EMTI OIn piping with a pressure detector and an instrument, provide a single pipe for each system as shown on the right, and do not share the pipe with the neighboring system.
- EMIGP1 OWhen shared piping is made, the pressures of the respective systems interfere with each other, leading to errors.

EMT1H

EMT6

EMP5A

EMRT1

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EMD7

List of products

WO71

Measurement of pressure of high-temperature gas

○To measure the pressure of a high-temperature gas, use temperatureresistant metal (stainless steel, for example) in the pressure detector (Pitot tube), and connect to an instrument body with a metal pipe having a length necessary for cooling the high-temperature gas.

HWS15A Error due to long-distance piping

OWhen the pipe of an instrument is long, the instrument's response speed will be slower.

Make the size of the pipe in the middle as large as possible. If the piping condition significantly differs between the high-pressure side and low-pressure side, the piping resistance also differs between the high-pressure side and low-pressure side, and there will be a difference in the pressure arrival time, making it impossible to accurately measure the differential pressure. Drain tank installation diagram Gauge (switch) (switch) (switch) (Drain tank Drain







Application

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Precautions on use

A Precautions common to instruments						
	List of products					
stallation of base	WO81					
●Common	0001					
 Tightening torque The airtightness between the base connection part of an instrument and the base and sealing cap is maintained by an O-ring. Install the bases and sealing caps to the following tightening torques. Do not tighten to a torque that exceeds the 						
 specified value because doing so breaks the instrument body. Base for metallic/vinyl pipe						
Combined use of a stabilizing wrench When tightening a cap nut on a base for metallic pipe, a joint to be connected to an adapter, or other part, positively secure the base or adapter body with a stabilizing wrench. If a cap put or joint	M\$99					
is tightened without securing the base or adapter, the instrument body or the base body will break.	MS99S					
Also, when loosening the cap nut or joint, a stabilizing wrench is necessary.	MS61A-RA					
 PT base, PR base Connection of tube Insert a tube whose end is cut at a right angle to the base all the 	QDP33					
way to the end. Image: Constraint of tube • Disconnection of tube Base body Push the tube once, and then pull out the tube while pushing the Base body						
Although the operating ambient temperature of the PT base and PR base is 0°C to 60°C (no freezing allowed), do not use them in an environment where the ambient temperature exceeds the operating ambient temperature of the instrument.	EMD7					
Failure to follow this instruction may lead to a failure or breakage of the instrument. Use a tube with a difference between its maximum outer diameter and minimum outer diameter of 0.2 mm or less and an exterior free of scratches. When a tube is going to be subject to repetitive connection and disconnection, cut off the tip of the tube by 3 mm or longer.	EMTI					
MTW baseMethod to tighten pipe and base	EMTGP1					
Base body Tapered section Stainless Base body Cap nut steel pipe	EMT1H					
Mating Ma	EMT6					
Front ferrule / / Back ferrule	EMP5A					
1. Confirm whether the parts of a base fit as shown in the figure above, and then insert a stainless steel tube until its end makes contact with the back of the body. 2. After tightening the cap nut with the back of the body. 3. From this position, tighten the cap nut by turning it one and one-quarter turns with a wrench.	EMRT1					
body and the cap nut.	HWS15A					

• Method to retighten pipe after a disconnection

- 1. Before connecting the pipe, confirm that no foreign substances, such as dirt, are attached to the tapered section of the body and the front ferrule.
- 2. Insert the pipe until the front ferrule makes contact with the tapered section of the body, and then tighten the cap nut with the fingers to the point where it does not turn any further.
- 3. Hook a stabilizing wrench to the base body, and tighten the cap nut by turning it one and one-quarter turns.

Ins

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Precautions on use

List of products	
WO81	Accuracy of Mano
	⊖For Manostar gau
WO71	⊖JIS B 7505-1, which
FR51A	the employment of
	(0% to 100% FS) o
MS99	
	both ends of the pressu
MS99S	Pressure spanThis
MS61A-RA	Exar
	Connection of ba
QDP33	OA Manostar gauge
	these pressure val
EMD8A	The polarities in th
EMD7	(1) When the HIGH
	the pointer mov direction is set
EMT1	(2) When the indic
EMICDI	base) ⊜In the use of the z
EIVITOPT	above is set as ab
EMT1H	HIGH base makes
	Olf the high-pressur
EMT6	using the zero cen
EMD5A	
EMRT1	
HWS15A	

Precautions for Manostar gauges

ostar gauges

ges, catalog accuracies are guaranteed throughout the whole range of the pressure span.

ch stipulates Bourdon tube pressure gauges among aneroid pressure gauges, specifies the tolerable ange basis. Note, however, that Manostar gauges are not Bourdon tube pressure gauges. Because of f a unique mechanism, for Manostar gauges, uniform accuracy is guaranteed throughout the whole range of the pressure span.

cified by JIS B 7505-1........ The stipulation tolerates an accuracy of 1.5 times the specified accuracy in the 10% range each at re span and the 5% range each before and after the zero point in the zero center range.

indicates the absolute value of the entire pressure span from the minimum value to the maximum value in the scale range. mple: pressure span with 300 Pa range \rightarrow [300 Pa]

pressure span with \pm 300 Pa range \rightarrow [600 Pa]

se for zero center range

- is a differential pressure gauge and is used to measure the difference between two pressures. When lues change, the gauge indication fluctuates in both the positive direction and the negative direction. For der such conditions, a zero center range is used.
 - ne zero center range are determined by the following piping conditions.
 - H base is connected to the high-pressure side and the LOW base is connected to the low-pressure side, ves in the clockwise direction. On the scale plate for the zero center range of Manostar gauges, this as positive. (Pressure at HIGH side base > Pressure at LOW side base)
 - ator moves in the opposite direction, it is negative. (Pressure at HIGH side base < Pressure at LOW side
- ero center range, assume that the use condition in (1) above is set as normal, and the use condition in (2) normal, for example. In the normal state under these conditions, connecting the high-pressure side to the the pointer indicate a positive value. After connection, if the state turns into the abnormal state, the pointer ve value.
 - re side and low-pressure side of a pressure detector are unknown, measure the pressure difference by ter range, and then identify the polarity by the direction in which the pointer moves.

Accessories

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Maintenance	e	
		List of products
Actions to take in OIf a Manostar prod	the event of failure and malfunctioning uct (instrument) does not operate normally, by referring to the investigation procedures shown below,	WO81
detector, or the pip Olf an investigation l	buck yourself to see whether the mainunctioning has been caused by an instrument failure, pressure bing system. has made clear that the instrument has failed, contact us via the following.	W071
	Failure investigation procedures	FR51A
	V Defective Check the pipes and pressure detector for clogging. Address clogging. V Normal	MS99
	Check the pipes and pressure detector for leakage and disconnection.	
	V Normal Defective	MS99S
	Check the polarity in pipe connection.	
	V Normal	MS61A-RA
	Normal Contact the manufacturer.	QDP33
	Causes A: Pulsation of measured pressure due to mistake in construction design.	EMD8A
	 B: Mistake in calculation of airflow rate of duct, fan, etc. C: Mistake in selection of pressure range of instrument D: Mistake in design and assembly of piping/wiring system 	EMD7
	OActions to take concerning product returned to distributor or trading company that handles it	EMT1
	Check individual products.	EMTGP1
	Contact the manufacturer. Interformation 1-2-3, Nishi-shiriike-cho, Nagata-ku, Kobe, Hyogo 653-0031 JAPAN Hyogo 653-0031 JAPAN TEL. +81-78-621-7700 FAX. +81-78-621-7788	EMT1H
Periodical calibrat	tion of instrument	EMT6
OIn general, to retain external factors fro	n the service life and reliability of an instrument for a long period, it is important to prevent stress due to om being applied to the instrument. It is not necessary to conduct maintenance, lubrication in particular, as	EMP5A
conduct periodic c	alibrations once a year. For periodic calibrations, contact the distributor or us.	
OPlease be advised	that depending on the condition of the instrument, we may decline your request for calibration.	EMRT1
The calibration syste	nance m for maintaining the accuracy of our pressure standards is shown below.	HWS15A
	Calibration (traceability) system	
National standard	National Institute of Advanced Industrial Science and Technology	Accessories
Reference standard	Pneumatic dead-weight pressure gauge Digital pressure gauge	Application Precautions
Pressure standard	Digital pressure gauge	Maintenance
Our product	ts W081 · W071 · FR51A · MS99 · MS99S · MS61A-RA QDP33 · EMD8A · EMD7 · EMT1 · EMTGP1 · EMT1H · EMT6, and so on	

Maintenance

Maintenance

List of products **Calibration service** WO81 O In our calibration service, we conduct calibration of products and make optimum adjustments in accordance with the condition of each product. We provide the services of maintaining the accuracy and reliability of instruments by returning them in good condition to customers. WO71 *We provide calibration services for our products only. Types of calibration service • Standard calibration: We conduct calibration and optimum adjustment of the instrument. **FR51A** · Speedy calibration: We conduct calibration and optimum adjustment of the instrument in a short period. (Speedy calibration requires an extra fee in addition to the fee for the standard calibration.) What is optimum adjustment? **MS99** It refers to an adjustment conducted by us to make the instrument indicate values as close to the true values as possible regardless of whether the calibration result is within or outside the tolerable range. When you want optimum adjustment: We will conduct optimum adjustment regardless of whether the calibration result is within MS99S or outside the guaranteed accuracy range. (For instruments compliant with RoHS only) However, if a product that is to be adjusted is already in the optimum condition, we will not conduct optimum adjustment. MS61A-RA We will not conduct optimum adjustment as long as the product is within the guaranteed When you do not desire optimum adjustment: accuracy range. If the product is out of the guaranteed accuracy range, we will contact vou. QDP33 Documents to be issued When optimum adjustment is conducted: We will issue inspection reports (two copies) listing data before adjustment and data after adjustment, respectively, EMD8A When optimum adjustment is not conducted: We will issue an inspection report of the calibrated data only. *We will issue a calibration certificate and a standard calibration certificate, each for a fee. The expense for the inspection report is included in the calibration service fee. EMD7 Others When a product is be calibrated but cannot be calibrated, we will contact the customer and report whether it can be repaired or not. **Repair service** EMT1 \bigcirc We will repair products requested to be calibrated that require repair, and products requested to be repaired. *We provide a repair service for our products only. *We cannot repair products not compliant with RoHS. EMTGP1 Documents to be issued When we have conducted a repair, we will issue an inspection report after the repair (one copy). Others EMT1H When a product is be repaired but cannot be repaired, we will contact the customer. <Flow from request to return> EMT6 Calibration service **Repair service** Calibration/ Calibration repair request shee repair request she EMP5A I [work period of 10 to 15 days] work period of 2 to 3 days] Order sheet Request for quotation of repair EMRT1 Receipt of product requested to Receipt of product requested to be calibrated/order sheet be repaired HWS15A Check of product requested to be calibrated Contact to report that the repair is impossible Check of product requested to be repaired calibration is impossible calibration When repair is impossible calibration Return/disposal of product that Contact to report that the repai Calibration/optimum adjustment Accessories can be made/quotation cannot be repaired Standard ▼ Speedy Receipt of product that cannot Return of calibrated product Order sheet Application be repaired When o Precautions Receipt of calibrated product Repair Maintenanc Return of repaired product Processing/work conducted by us

*The calibration/repair request sheet can be downloaded from our website.

Receipt of repaired product

Processing conducted by distributor or sales shop

Warranty

Warranty period

The warranty period for our product is one (1) year from delivery to the location specified by the orderer who makes a direct transaction with us.

Scope of warranty

If any failure or defect attributable to us becomes clear during the above warranty period, we will repair the product or supply a substitute product free of charge. However, even during the warranty period, we will exclude the product from the scope of the warranty if the failure or defect corresponds to any of the following:

- (1) The failure or defect was caused by an unreasonable condition, environment, handling, or usage not mentioned in the instruction manual, specifications, and our product catalog.
- The failure or defect was caused by a factor other than our product.
- (3) The failure or defect was caused by a modification or repair conducted by a party other than us.
- (4) The failure or defect was caused by an event that could not be foreseen at the scientific and technical levels at the time of product shipment from us.
- (5) The failure or defect was caused by an external factor not attributable to us, such as acts of God and disasters.

Please note that the warranty mentioned here means the warranty for our individual product, and damage provoked by a failure or defect of the product is excluded from the scope of the warranty.

*This warranty is valid only in Japan.

Application and usage

Our products are designed and manufactured as general-purpose instruments for general industries. Therefore, our products are not intended for the following uses, and our products used in such a manner are outside the scope of application.

- (1) Equipment that is anticipated to greatly affect lives and properties, such as nuclear power generation, aviation, railways, marine vessels, vehicles, and medical devices
- Utilities that include electricity, gas, and service water
- (3) Use in outdoor locations and under similar conditions or environments other than those stipulated in the instruction manual
- (4) Usage to which considerable safety consideration and attention equivalent to (1) and (2) above need to be given

Service

Scope of service

Because the product price does not include service expenses, such as the dispatch of engineers, we will separately charge for the expenses in the following cases:

(1) Instruction for installation and adjustment and a witnessed test run

- (2) Maintenance inspection, adjustments, and repairs
- (3)Technical guidance and technical education
- (4)Witnessed inspections of products at our factory

<<Note>> The product specifications and information in this catalog are subject to change without prior notice for product improvement or other reasons.

For order placement, contact



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