HITACHI

Catalog

Aera

Aera® FC-DR980

Digital Mass Flow Products

**Leading digital MFCs and MFMs,
providing superior versatility in various system**

Hitachi Metals, Ltd.

Benefits

- Superior accuracy, repeatability, and stability
- Significant cost savings
- Superior operational versatility
- Superior reliability

Features

- Multi-gas,multi-range selection*
- Analog, analog/digital, and digital modes
- Piezoelectric control valves
- Multiple alarm and diagnostic capabilities
- Metal seals, with a $1x10^{-10}$ leak integrity
- Electropolished and ultra-cleaned gas-wetted surfaces

* Available in multi-gas, multi- range models

Aera® FC-DR980 series digital MFCs (mass flow controllers) and MFMs (mass flow meters) deliver performance excellence and operational versatility, resulting in significant cost savings and ease of use.

Multiple output options enable analog or digital control, for use with most existing control and communication configurations. To suit your priorities for value and functionality, this product line features both single-gas and multi-gas, multi-range MFCs. Multi-gas, multi-range features lower costs by dramatically reducing spare inventory requirements. For comprehensive monitoring and control capabilities, RS-485 communications (RS-232 with converter) , combined with a full range of diagnostic and alarm functions, put operational parameters at your fingertips.

Superior Accuracy, Repeatability, and Stability

Algorithms unique to Aera MFCs provide very fast response between the sensor and control valve. The result is better flow accuracy, repeatability, and stability, with an actual-flow settling time of 1 sec.

Significant Cost Savings

Multi-gas, multi-range FC -DR980 MFCs reduce overall costs by minimizing spare MFC inventory requirements. Just eight units can replace hundreds of spares and part numbers. Single-gas MFCs require backup inventory for each process gas. Multi-gas, multi-range FC-DR980 MFC models dramatically reduce such requirements because they can replace any other MFC used in the process within the device's mechanical limits, regardless of gas type.

Superior Operational Versatility

Multi-Gas, Multi-Range Selection

Multi-gas, multi-range Aera FC-DR980 series MFCs are easily field-programmable to run various gas, for any range within the MFC's mechanical limits. For quick gas and full-scale reassignment, they store calibration curves for up to four gases and ten calibration points for each gas.

Multi-Mode Operation

Choose from analog, analog/digital, and digital modes for operation with any control system.

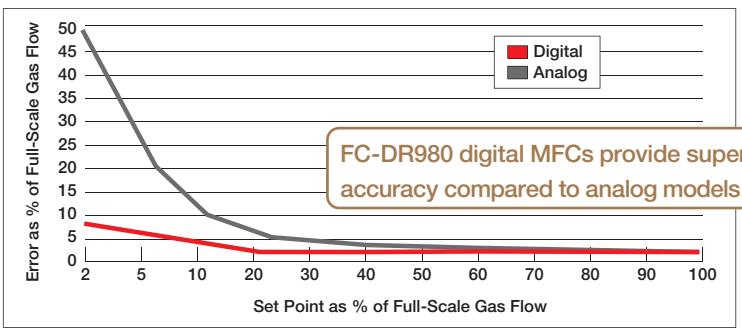


Figure 1. Digital vs. analog accuracy

SUPERIOR RELIABILITY

High-quality electronic components and a robust design stand up to the effects of harsh operational demands, delivering superior, long-term, zero-drift stability—less than 0.5% of full-scale flow over one year. Further, less than 0.5% of units are returned within a year of shipment.

Specifications

Operational	FC-DR980/DR980C Series ※1	FC-DR981/DR981C Series ※1
Full-Scale Ranges	Multi Gas Model (1) — 10 ~ 30 sccm	Multi Gas Model (7) — 5,001 ~ 10,000 sccm
	Multi Gas Model (2) — 31 ~ 100 sccm	
	Multi Gas Model (3) — 101 ~ 300 sccm	
	Multi Gas Model (4) — 301 ~ 1,000 sccm	Multi Gas Model (8) — 10,001 ~ 30,000 sccm
	Multi Gas Model (5) — 1,001 ~ 3,000 sccm	
	Multi Gas Model (6) — 3,001 ~ 5,000 sccm	
Response Time	≤ 1.0 sec typical per SEMI E17-91 (all control range)	
Accuracy	≤ ±1% of set point from 25 to 100% of full scale	
	≤ ± 0.25% of full scale from 2 to 25% of full scale	
Repeatability	≤ ± 0.15% of full scale	
Leak Integrity	$1x10^{-10}$ atm-cc/sec (He) maximum, $1x10^{-11}$ Pa·m^{-3}/sec (He) maximum	
Control Range	2 to 100% of full scale	
Differential Pressure	7 to 40 psiD	22 to 40 psiD: Multi Gas (7)
		30 to 40 psiD: Multi Gas (8)
Max Operating Pressure	70 psiG	
Proof Pressure	145 psiG	
Temperature	15 ~ 50°C (59° ~ 122°F)	
Alarm/Diagnostic Functions	Flow, valve voltage, EEPROM error, zero adjustment error, communications error, and microprocessor error	

※1 Normally Closed Valve

Operational	FC-DR980/DR980C Series ※1	FC-DR981/DR981C Series ※1
Full-Scale Ranges	Single Gas Model — 10 ~ 5,000 sccm	Single Gas Model — 6 ~ 50slm
Response Time	≤ 1.0 sec typical per SEMI E17-91 (all control range)	
Accuracy	≤ ±1% of set opint from 25 to 100% of full scale	
	≤ ±0.25% of of full scale from 2 to 25% of full scale	
Repeatability	≤ ±0.15% of full scale	
Leak Integrity	$1x10^{-10}$ atm-cc/sec (He) maximum, $1x10^{-11}$ Pa·m^{-3}/sec (He) maximum	
Control Range	2 to 100% of full scale	
Differential Pressure	7 to 40 psiD	10 to 40 psiD (5slm to 20slm nitrogen equivalent)
		22 to 40 psiD (20slm to 30slm nitrogen equivalent)
		30 to 40 psiD (30slm to 50slm nitrogen equivalent)
Max Operating Pressure	70 psiG	
Proof Pressure	145 psiG	
Temperature	15 ~ 50°C (59° ~ 122°F)	
Alarm/Diagnostic Functions	Flow, valve voltage, EEPROM error, zero adjustment error, communications error, and microprocessor error	

※1 Normally Closed Valve

Specifications

Physical	FC-DR980/DR980C Series ※1	FC-DR981/DR981C Series ※1
Control Valve Type	Normally-open or normally-closed piezoelectric	
Materials	Stainless steel, type 316L , 316, PCTFE	
Standard Fittings	1/4″ VCR®, 1.5" width IGS, 1.125" width IGS (C-seal or W-seal)	
Surface Finish	Electropolished and ultra-cleaned to 5 Ra	
Attitude Sensitivity	May be mounted in any position	
Weight	1.2 kg (2.2 lb)	

※1 Normally Closed Valve

Electrical	FC-DR980/DR980C Series ※1	FC-DR981/DR981C Series ※1
Input Power	+15 VDC ±2% at 100 mA	
	–15 VDC ±2% at 40 mA	
Power Consumption	2.1 W max	
In & Output Signal	Digital Mode: 0 to 100%	
	Analog Mode: 0 to 5 VDC	
Digital/Service Port	EIA standard, RS-485, two-wire, half-duplex, multi-drop with two RJ-11 connectors	

※1 Normally Closed Valve

Model and Suffix Codes

FC-DR980/FC-DR981 Series MFC

Category	Description	Codes							
Product Type	Mass flow controller (digital)	FC-D	· · ·	· · ·	· · ·	· · ·	· · ·	· · ·	· · ·
RoHS Compliance	Compliant with RoHS directives	· · ·	R	· · ·	· · ·	· · ·	· · ·	· · ·	· · ·
Full-Scale Flow Range	10 sccm to 5 slm	· · ·	· · ·	980	· · ·	· · ·	· · ·	· · ·	· · ·
		· · ·	· · ·	985	· · ·	· · ·	· · ·	· · ·	· · ·
	6 to 50 slm	· · ·	· · ·	981	· · ·	· · ·	· · ·	· · ·	· · ·
			· · ·	986	· · ·	· · ·	· · ·	· · ·	· · ·
Control Valve Type	Normally-open piezoelectric	· · ·	· · ·	· · ·	· · ·	· · ·	· · ·	· · ·	· · ·
	Normally-closed piezoelectric	· · ·	· · ·	· · ·	C	· · ·	· · ·	· · ·	· · ·
Connector	Top mounted connector	· · ·	· · ·	· · ·	· · ·	T	· · ·	· · ·	· · ·
	Side mounted pigtail connector	· · ·	· · ·	· · ·	· · ·	Y	· · ·	· · ·	· · ·
Fittings	1/4" VCR® compatible	· · ·	· · ·	· · ·	· · ·	· · ·	4V	· · ·	· · ·
	1.125" c-seal	· · ·	· · ·	· · ·	· · ·	· · ·	BA	· · ·	· · ·
	1.125" w-seal	· · ·	· · ·	· · ·	· · ·	· · ·	BW	· · ·	· · ·
	1.5" c-seal	· · ·	· · ·	· · ·	· · ·	· · ·	BM	· · ·	· · ·
	1.5" w-seal	· · ·	· · ·	· · ·	· · ·	· · ·	BF	· · ·	· · ·
Gas Full-Scale Flow Range (sccm or slm)	Customer specified Gas	· · ·	· · ·	· · ·	· · ·	· · ·	· · ·	N_2	· · ·
	Customer specified Full Scale	· · ·	· · ·	· · ·	· · ·	· · ·	· · ·	· · ·	200
Single-Gas Example		FC-D	R	980	C		4V	N_2	200
(MFC, RoHS compliant, normally-closed valve, ¼" VCR® fittings, N_2 gas, 200 sccm full-scale range)									
Multi-Gas/Multi-Range	MGMR (Please review full scale range indicated in previous page for Multi 1 ～ 8)	· · ·	· · ·	· · ·	· · ·	· · ·	· · ·	Multi	1 ～ 8 (10 sccm ～ 30 slm N_2 Equivalent)
Multi-Gas Example		FC-D	R	980	C		4V	Multi	3
(MFC, RoHS compliant, normally-closed valve, ¼" VCR® fittings, N_2 gas, 101 ～ 300 sccm full-scale range)									

※1 "T" and "Y" options are only for 985 and 986 compact MFC series

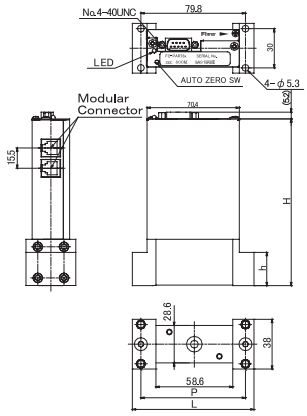
Electrical Connections

FC-DR98x (D-sub 9pin)	
1	VALVE OPEN /CLOSE
2	OUTPUT 0~5VDC
3	+15VDC
4	COMMON
5	-15VDC
6	CONTROL 0~5VDC
7	COMMON
8	COMMON
9	VALVE TEST PT.(0~4VDC)

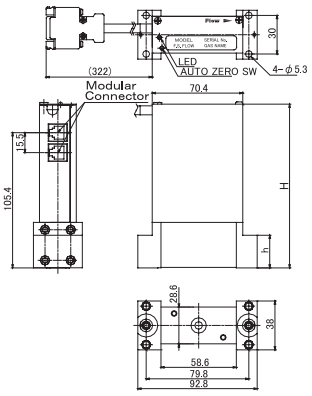
Dimensions

1.5" IGS Model

"T" Model



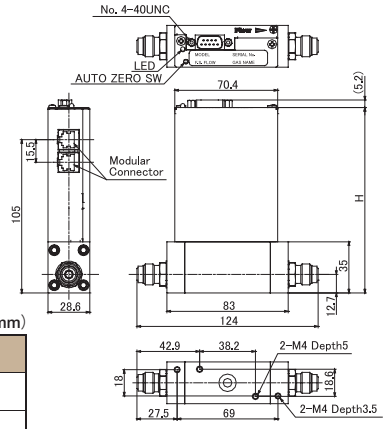
"Y" Model



(mm)

		Port-to-Port	P	L	h	H
BF	DR980	STD	92.0	105.0	25.4	127.4
		Compact	79.8	92.8		
	DR981	STD	92.0	105.0		135.4
		Compact	79.8	92.8		
BM	DR980	STD	92.0	105.0		127.0
		Compact	79.8	92.8		
	DR981	STD	92.0	105.0		135.0
		Compact	79.8	92.8		

1/4" VCR® Equivalent Fitting Model

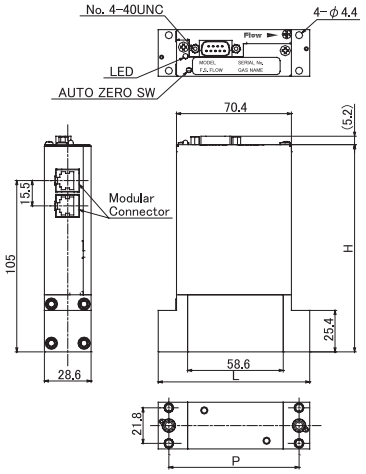


(mm)

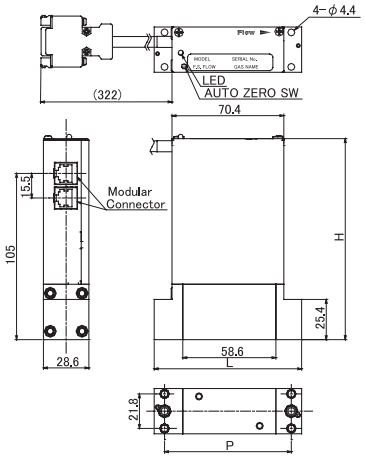
	H
FC-DR980(C)	127.0
FC-DR981(C)	135.0

1.125" IGS Model

"T" Model



"Y" Model



(mm)

		Port-to-Port	P	L	H
BW	DR980	STD	92.0	105.0	127.4
		Compact	79.8	92.8	
	DR981	STD	92.0	105.0	135.4
		Compact	79.8	92.8	
BA	DR980	STD	92.0	105.0	127.0
	DR981				135.0

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⚠ Safety Precaution

Before using any of the products introduced in this catalog, please read the respective user manuals thoroughly.

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- Troubles or damages caused by natural disaster or inevitable accident, caused by mishandling, use or storage in an improper place, use out of the rated specifications and modification, factors contamination and clog due to use of corrosive gas and reactive gas.
- Any trouble or damage that is outside of Hitachi Metals Ltd.'s control has no responsibility (if it does not clarify where responsibility lies, warranty is to be determined whether or not it costs regardless of the warranty period after deliberation.)

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VEGETABLE OIL INK

Catalog No. HL-K275-A

Printed in May 2013 (T-FT2)