



Model SLA5850
with EtherNet/IP™

DATA SHEET

Mass Flow Controllers & Meters

SLA5800 Series

Elastomer Sealed, Digital,
General Purpose Thermal Mass Flow
Meters & Controllers for Gases

The SLA5800 Series thermal mass flow meters and mass flow controllers have gained broad acceptance as the standard for accuracy, stability and reliability. These products have a wide flow measurement range and are suitable for a broad range of temperature and pressure conditions making them well suited for chemical and petrochemical research, laboratory, analytical, fuel cell and life science applications, among others.

Highlights of the SLA5800 Series include: industry leading long-term stability, accuracy backed by superior 17025 metrology systems and methods using calibration systems directly traceable to international standards, and a broad range of analog and digital I/O options to suit virtually any application. An independent diagnostic/service port permits users to set alarms and diagnostics, tune, troubleshoot or change flow conditions without removing the mass flow controller from service.

The SLA5800 Series provides a highly configurable platform based on a simple modular architecture. The feature set was carefully selected to enable drop-in replacement and upgrade of many brands of mass flow controllers. With the wide range of features and options available, the SLA5800 Series provides users with a single platform to support a broad range of applications.

Features	Benefits
Industry leading long-term sensor stability	Increased system uptime and reduced cost of ownership by reducing maintenance and eliminating periodic recipe adjustments and/or recalibrations
User accessible service port	Simplified installation, start-up, troubleshooting and access to diagnostics provides maximum uptime
Alarms and diagnostics	Ensures device is operating within user specified limits for high process yield and uptime
Superior valve technology	Minimum leak-by, wide turndown, fast response and superior corrosion resistant materials reduces overall gas panel cost and increases throughput
High accuracy traceable to international standards	Calibration by verified metrology systems ensures precise process gas flow control
Simple modular design	Easy-to-service elastomer sealed design provides for factory or field service maximizing uptime and reducing total cost of ownership
Adaptable mechanical configurations	Easily retrofit to existing systems



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BROOKS®
INSTRUMENT

Beyond Measure

Superior Thermal Flow Measurement Sensor

Brooks' sensor technology combines:

- Excellent signal to noise performance for good accuracy at low setpoints
- Superior long-term stability through enhanced sensor design manufacturing and extensive burn-in process
- Isothermal packaging to reduce sensitivity to external temperature changes

Advanced Diagnostics

The mass flow controller remains the most complex and critical component in gas delivery systems. When dealing with highly toxic or corrosive gases, removing the mass flow controller to determine if it is faulty should be the last resort. In response to this, Brooks pioneered smarter mass flow controllers with embedded self-test routines and introduced an independent diagnostic/service port to provide the user with a simple interface, for troubleshooting without disturbing flow controller operation.

Wide Flow Range

The SLA5800 Series covers an extremely broad range of flow rates. Model SLA5850 can have a full scale flow as low as 3 ccm. With a high turndown ratio of 100:1 for any full scale range from 1-50 lpm N2 equivalent and 50:1 (250:1 turndown for *Biotech Options Packages* up to 150 LPM) turndown for all other flow rates, accurate gas flow can be measured or controlled down to 0.06 ccm! Model SLA5853 can monitor or control gas flows up to 2500 lpm.

Fast Response Performance

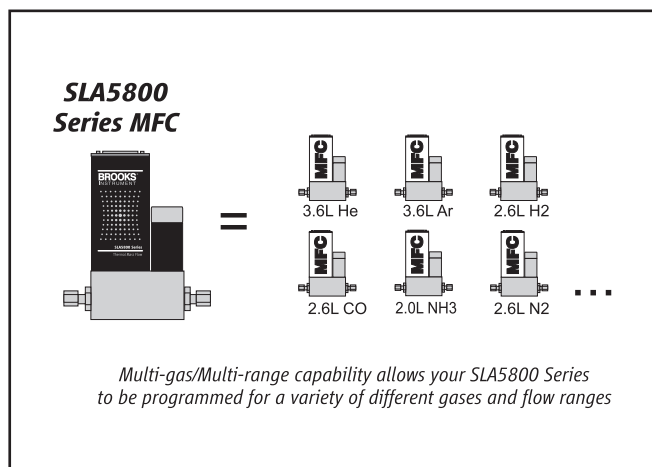
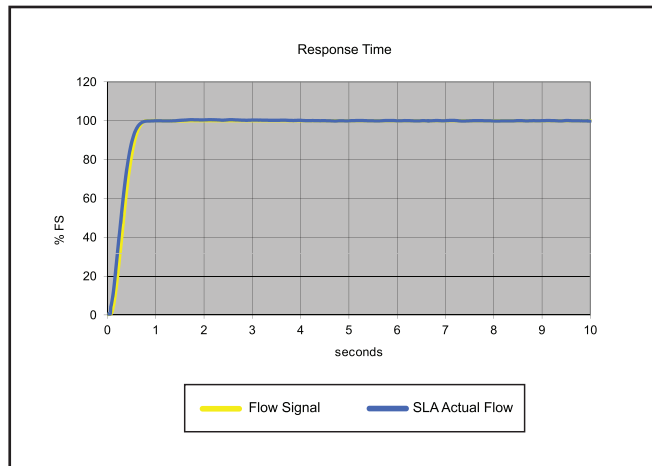
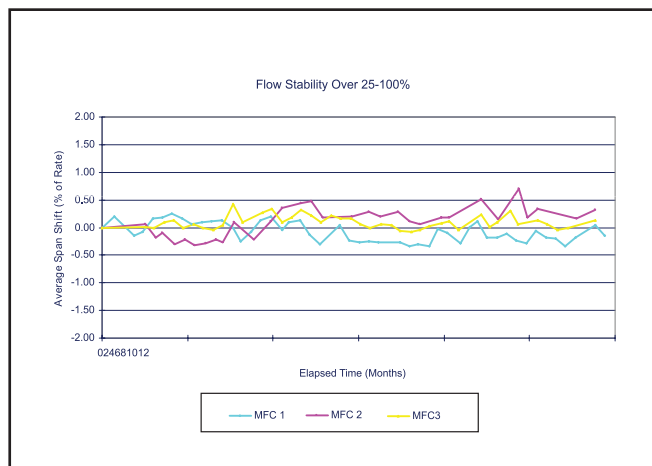
The all-digital electronics and superior mechanical configuration in the SLA5800 Series provide for ultra-fast response characteristics.

Broad Array of Communication Options

Traditional 0-5 Vdc and 4-20mA analog options as well as RS485 digital communications are available ("S-protocol", based on HART). Control interfaces via digital network protocols including EtherNet/IP™, PROFINET, DeviceNet®, and Profibus® are also available. EtherNet/IP™ and PROFINET are a modern, high-speed digital protocol that permits multiple, additional diagnostics to provide MFC users with rich, real-time system information. DeviceNet® has been certified by the ODVA (Open DeviceNet Vendor's Association). EtherNET/IP™ and PROFINET are pending industry conformance certification.

Multi-gas/Multi-range Capabilities

The SLA5800 Series multi-gas and multi-range capabilities reduce inventory. Storage and pre-programming of up to 6 gas calibrations easily permits users to switch between different gasses and ranges on a single device.



SLA5800 Series Standard

Flow Ranges and Pressure Ratings:

Mass Flow Controller Model	Mass Flow Meter Model	Flow Ranges N ₂ Eq. Ratings		Maximum Operating Pressure		PED Module H Category
		Min. F.S.	Max. F.S.	Standard ¹	Optional ¹	
SLA5850	SLA5860	0.003	50 slpm	1500 psi/103 bar	4500 psi/310 bar @ Maximum Flow of 10 lpm N ₂	SEP
SLA5851	SLA5861	15	150 slpm ²	1500 psi/103 bar	NA ³	SEP
SLA5853	SLA5863	100	2500 slpm	1000 psi/70 bar	NA	Category 1 for all 150 lb flanges Category 2 for all other connections

¹ Sanitary fittings - Model code 5A, 5B, 5C, 5D & 5E rated to 500 psi Maximum Pressure

² 600 lpm of H₂ possible with decreased accuracy; > 40 psig inlet required for flows greater than 100 lpm N₂ equivalent

³ 4500 psi/310 bar available as a special on SLA5861 only

	SLA5850/60	SLA5851/61	SLA5853/63	
PERFORMANCE				
Full Scale Flow Range (N2, Eq. 0 Deg C Ref)	0.003 - 50 slpm	15 - 150 slpm	100 - 1100 slpm	>1100 - 2500 slpm
Flow Accuracy – 17025 Certified (includes linearity, excludes calibration system measurement uncertainty per SEMI E69) ⁴	±0.6% of S.P. (20-100% FS), ±0.12% FS (<20% FS)			±0.6% of FS
Flow Accuracy (includes linearity and calibration system measurement uncertainty per SEMI E69) ⁴	±0.9% of S.P. (20-100% FS), ±0.18% of FS (<20% FS)			±1.0% of FS
Control Range N2, eq	100:1 for F.S. from 1-50 slpm (50:1 for all other F.S. flows)			
Repeatability & Reproducibility	0.20% S.P			
Linearity	Included in accuracy			
Response Time (Settling Time within ±2% F.S. for 0-100% command step)	< 1 second		< 3 seconds	
Zero Stability	< + 0.2% F.S. per year			
Temperature Coefficient	Zero: <0.05% of F.S. per °C. Span: <0.1% of S.P. per °C			
Pressure Coefficient	±0.03% per psi (0-200 psi N2)			
Attitude Sensitivity	<0.2% F.S. maximum deviation from specified accuracy after re-zeroing			

⁴ Accuracy at calibration conditions ; accuracy spec valid across the full control range.

RATINGS			
Operating Temperature Range	-14 to 65oC (7 to 149oF) ⁵		
Minimum Pressure Differential (Controllers)	5 psi/0.35 bar	10 psi/0.69 bar	Min.: 7.5 psi/0.52 bar at 500 lpm
Flow Accuracy (includes linearity and calibration system measurement uncertainty per SEMI E69)	Application specific up to 4500 psi/300 bar (limits conditions) ⁶	50 psi/3.45 bar	290 psi/20.0 bar
Leak Integrity (external)	1x10-9 atm. cc/sec He		
Valve Shut Down (leak by) ⁷	<1% of FS		

MECHANICAL				
Valve Type	Normally Closed, Normally Open, Meter			
Minimum Pressure Differential (Controllers)	5 psi/0.35 bar	10 psi/0.69 bar	Min.: 7.5 psi/0.52 bar at 500 lpm	

DIAGNOSTICS				
Status Lights	Normally Closed, Normally Open, Meter			
Alarms	Control Valve Output, Flow Totalizer, Network Interruption, Over Temperature, Power Surge/Sag, Service Required			
Diagnostic/Service Port	RS485 via 2.5mm jack			

⁵ Hazardous area certifications have a temperature range limitation of 0-65°C

⁶ >1500 psi DP as a Special Order

⁷ Metal and Teflon Seats <5% of Full Scale

⁸ Alarm modes are dependent on the communications interface. These are described in the corresponding digital communication interface manual

Electrical Specifications

Communication Protocol	RS485/Analog	Profibus*	DeviceNet™	EtherCAT*	EtherNet/IP™ & PROFINET
Electrical Connection	1 x 15-pin Male Sub-D, (A)	1 x 15-pin Male Sub-D/ 1 x 9-pin Female Sub-D	1 x M12 with threaded coupling nut (B)	1 x 5-pin M8 with threaded coupling nut 2 x RJ45	1 x 5-pin M8 with threaded coupling nut / 2 x RJ45
Analog I/O	0-5 V, 1-5 V, 0-10 V, 0-20 mA, 4-20 mA		N/A	0-5V	N/A
Power Max./Purge	From +13.5 Vdc to +27 Vdc		From +11 Vdc to +25 Vdc	From +13.5 Vdc to +27 Vdc	From +13.5 Vdc to +27 Vdc
Power Requirements Watts, Max.	Valve Orifice > 0.032": 8 W Valve Orifice ≤ 0.032": 5 W Without Valve: 2 W		Valve Orifice > 0.032": 10 W Valve Orifice ≤ 0.032": 7 W Without Valve: 4 W	Valve Orifice > 0.032": 8.5 W Valve Orifice ≤ 0.032": 5.5 W Without Valve: 2.5 W	Valve Orifice > 0.032": 10 W Valve Orifice ≤ 0.032": 7 W Without Valve: 3 W
Web-based Network Settings Interface	N/A		N/A	N/A	The Default Network Address is 192.168.1.100. EtherNet/IP: Default Network Configuration is DHCP PROFINET: The Default Name is "brooks-sla"

	RS485/Analog	Profibus*
FLOW INPUT (VOLTAGE) SPECIFICATIONS		
Nominal Range	0-5 Vdc, 1-5 Vdc or 0-10 Vdc	
Full Range	(-0.5) -11 Vdc	
Absolute Max.	18 V (without damage)	
Input Impedence	>990 kOhms	
Required Max. Sink Current	0.002 mA	

FLOW INPUT (CURRENT) SPECIFICATIONS		
Nominal Range	4-20 mA or 0-20 mA	
Full Range	0-22 mA	
Absolute Max.	24 mA (without damage)	
Input Impedence	100 Ohms	

FLOW OUTPUT (VOLTAGE) SPECIFICATIONS		
Nominal Range	0-5 Vdc, 1-5 Vdc or 0-10 Vdc	
Full Range	(-1)-11 Vdc	
Min Load Resistance	2 kOhms	

FLOW OUTPUT (CURRENT) SPECIFICATIONS		
Nominal Range	0-20 mA or 4-20 mA	
Full Range	0-24.6 mA (@ 0-20 mA); 3.8-24.6 mA (@ 4-20 mA)	
Max. Load	380 Ohms (for supply voltage: < 16 Vdc)	

ANALOG I/O ALARM OUTPUT*		
Type	Open Collector	
Max. Closed (On) Current	25 mA	
Max. Open (Off) Leakage	1 μA	
Max. Open (Off) Voltage	30 Vdc	

ANALOG I/O VALVE OVERRIDE SIGNAL SPECIFICATIONS**		
Floating/Unconnected	Instrument controls valve to command set point	
VOR < 0.3 Vdc	Valve Closed	
1 Vdc < VOR < 4 Vdc	Valve Normal	
VOR > 4.8 Vdc	Valve Open	
Input Impedence	800 kOhms	
Absolute Max. Input	(-25 Vdc) < VOR < 25 Vdc (without damage)	

*The Alarm Output is an open collector or "contact type" that is CLOSED (on) whenever an alarm is active.

The Alarm Output may be set to indicate any one of various alarm conditions.

** The Valve Override Signal (VOR) is implemented as an analog input which measures the voltage at the input and controls the valve based upon the measured reading as shown in this section.

SLA5800 Series *Biotech*

Efficiency and simplicity combine to improve bioprocessing performance with the new SLA5800 Series *Biotech* MFC. It incorporates several features created specifically to help streamline MFC purchasing, improve process gas control, enhance flexibility and satisfy regulatory requirements.

To serve the unique requirements of your bioprocesses, Brooks Instrument has created two SLA5800 Series *Biotech* options packages, built on the proven performance of the bioprocess-leading SLA5800 Series MFC .

As noted in the ordering instructions, all options are combined into packages with convenient ordering codes, eliminating the need to order options individually.

SLA5800 Series *Biotech* Options Packages

Performance Package - Model Code S

Includes multiple performance enhancements reducing cost of operation

High Turndown Ratio

Reduces number of MFCs needed to control wide flow ranges

Enhanced Control Valve

Extremely low leak rate can eliminate need for redundant valves

Enhanced Sensor Design

Clean welded construction meets industry standards for cleanliness

Pre-calibrated Multi-Gas Pages¹

Air, CO₂, N₂ & O₂ : gas pages can be changed in situ to reduce the variety of spare instruments kept in stock

Premium Package - Model Code T

Performance Package Features plus:

Includes premium materials and associated certificates tailored to industry requirements

Class VI Elastomers

FDA/USP Class VI and ADI Free O-Rings and Valve Seats²
(Certificate Included)

Certifications

Materials of Construction (wetted path)
2.1 Material Cert³
ICC Calibration Traceability

¹ CO₂ Actual Gas Calibration available for SLA5850/60 & SLA5851/61. Use Model Code U for Performance Package, and Model Code V for Premium package.

² All Class VI Viton elastomers are also compliant to 21CFR177.2600 (Title 21 – Food & Drugs, Chapter I - FDA)

³ 3.1 Material Certs for pressure boundary components available as an option on Premium Package.

Note: All Communications protocols listed in the Electrical Specification Table, above, are available with any Biotech Option

SLA5800 Series *Biotech*

Performance	SLA5850/60	SLA5851/61	SLA5853/63
Full Scale Flow Range ² (N2, Eq. 0 Deg C Ref)	5 sccm -50 slpm	15 -150 ¹ slpm	100 - 1100 slpm >1100 - 2500 slpm
Gasses Supported ²	Air, CO ₂ , Nitrogen & Oxygen		
Flow Accuracy (includes linearity and calibration system measurement uncertainty per SEMI E69) ³	±0.9% of S.P. (20-100% FS), ±0.18% of F.S. (< 20% FS)		±1.0% of FS
Repeatability & Reproducibility	0.20% S.P.		
Turndown (control range)	250:1	250:1	150:1
Response Time	< 1 Second	< 1 Second	< 3 Seconds
Zero Stability	< ± 0.2% F.S. per year		
Temperature Coefficient	<0.05% F.S. per °C		
Valve Shut Down (leak-by)	< 0.005 sccm		<15.6 sccm

¹ Maximum flow depends on pressure conditions; consult Applications Engineering for details

² Calibration on CO₂ available as an option on SLA5850/60 & SLA5851/61

³ Accuracy at Calibration Conditions ; Accuracy spec valid across the full control range

Ratings	SLA5850/60	SLA5851/61	SLA5853/63
Inlet Pressure Range	5 psig to 60 psig	10 psig to 60 psig	8 psig to 60 psig
Minimum Pressure Differential (Controllers) ⁴	5 psi/0.35 bar	10 psi/0.69 bar	Min.: 7.5 psi/0.52 bar at 500 lpm Min.: 14.5 psi/1.00 bar at 1000 lpm Min.: 35.0 psi/2.41 bar at 2500 lpm
Maximum Pressure Differential (Controllers) ⁵	30 psi/2 bar	30 psi/2 bar	30 psi/2 bar
Maximum Pressure	Same as standard		
Valve Configuration	Standard SLA with Special Factory Tuning/Normally Closed		
Operating Temperature Range	-14°C - 65°C		
Sensor Design	Enhanced construction to meet industry standards for cleanliness		

⁴ Performance at minimum inlet pressure will be gas and flow range dependent. Consult Applications Engineering for details

⁵ For optimum performance operate at the specified inlet and outlet pressure values

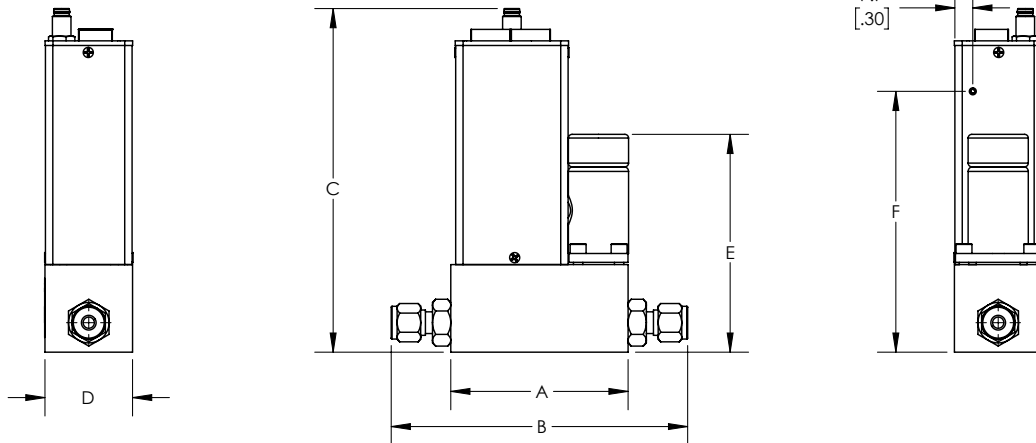
Code Description	Code Option	Option Description
Biotech Options Packages	S	Performance Package ⁶
	T	Premium Package ⁷
	U	Performance Package with CO ₂ Calibration ⁸
	V	Premium Package with CO ₂ Calibration ⁸

⁶ Performance Package must be ordered for basic Biotech model features

⁷ Premium Package includes Performance Package features

⁸ Not available on SLA5853 or SLA5863

SLA5850/SLA5851/SLA5860/SLA5861

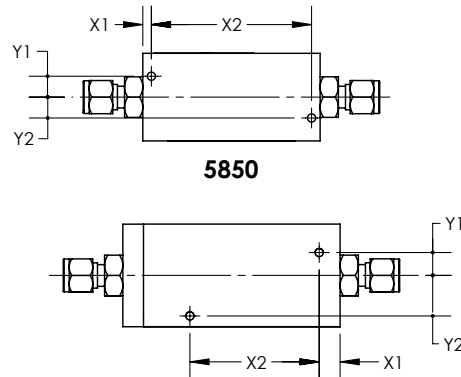


FITTINGS - DIMENSION "B"

FITTING	50	51**	60	61**
	mm / inch	mm / inch	mm / inch	mm / inch
9/16"-18 UNF	76.4 / 3.01	93.5 / 3.68	58.6 / 2.31	80.0 / 3.15
1/8" TUBE COMP.*	123.1 / 4.85	N/A	105.3 / 4.15	N/A
1/4" TUBE COMP.*	127.7 / 5.03	144.8 / 5.7	109.9/4.33	131.3 / 5.17
3/8" TUBE COMP.*	130.7 / 5.15	147.9 / 5.82	112.9/4.45	134.4 / 5.29
1/2" TUBE COMP.*	134.8 / 5.31	152.0 / 5.98	117 / 4.61	138.4 / 5.45
1/4" VCO	116 / 4.56	141.3 / 5.56	98.2 / 3.87	119.6/ 4.71
3/8"-1/2" VCO	127.2 / 5.01	144.3 / 5.68	109.4/4.31	130.9/5.15
1/4" NPT-F	118.5 / 4.67	133.2/5.24	98.8 / 3.89	122.2 / 4.81
3mm TUBE COMP.*	122.2 / 4.81	135.7 / 5.34	104.4 / 4.11	N/A
6mm TUBE COMP.*	127.8 / 5.03	144.9 / 5.71	110 / 4.33	131.3 / 5.17
10mm TUBE COMP.*	131.1 / 5.16	148.3 / 5.84	113.5 / 4.47	134.9 / 5.31
1/4" VCR	124.1 / 4.89	152/5.98	106.3 / 4.19	127.8 / 5.03
3/8"-1/2" VCR	131.7 / 5.19	148.9 / 5.86	113.9 / 4.48	135.4/5.33
1/4" RC (BSP)	116.6 / 4.59	133.7 / 5.27	98.8 / 3.89	120.2 / 4.73
1/2" SANITARY	140.5 / 5.53	157.5 / 6.2	122.7 / 4.83	144.0 / 5.67
3/4" SANITARY	140.5 / 5.53	157.5 / 6.2	122.7 / 4.83	144.0 / 5.67

*OVERALL LENGTH FINGER TIGHT

**DEVICES WITH 5848 INLET FILTER WILL BE 2" OR 1.42" LONGER



5850

5851/5860/5861

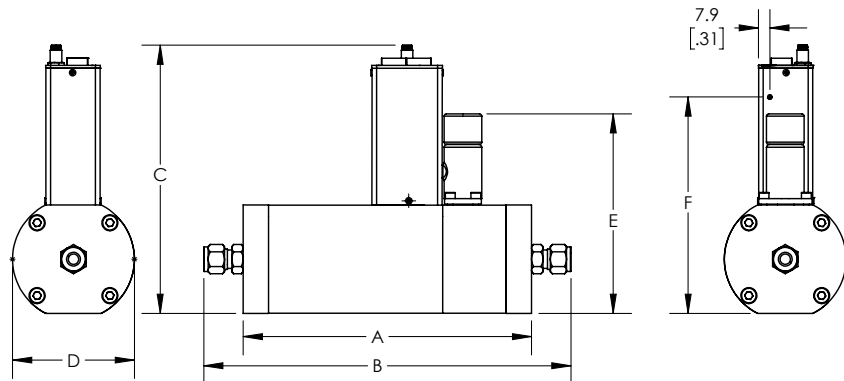
MOUNTING HOLES

Model	X1	X2	Y1	Y2
	mm / inch	mm / inch	mm / inch	mm / inch
5850	3.7 / .14	69.0 / 2.72	9.0 / .35	9.0 / .35
5851	9.0/.35	55.7/2.19	9.9/.39	17.4/.68
5860	9.1/.36	40.4/1.59	10.2/.40	10.2/.40
5861	11.7/.46	39.4/1.55	17.3/.68	17.3/.68

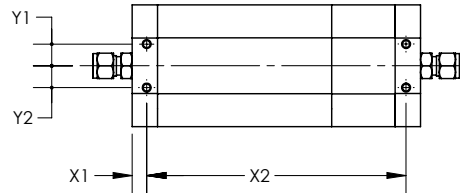
ELECTRO/MECHANICAL DIMENSIONS

Model	A	C						D	E			F
		Analog RS485	Profibus	DeviceNet	EtherCat	ProfiNet/EtherNet	Foundation Fieldbus		N.C	N.O.	NO VALVE	
		mm / inch	mm / inch	mm / inch	mm / inch	mm / inch	mm / inch		mm / inch	mm / inch	mm / inch	
5850	76.4/3.01	137.4/5.41	137.4/5.41	134.1/5.28	148.0/5.83	148.0/5.83	148.0/5.83	37.7/1.48	93.2/3.67	100.3/3.95	45.7/1.80	112.3/4.42
5851	93.5/3.68	143.9/5.66	143.9/5.66	140.5/5.53	154.4/6.08	154.4/6.08	154.4/6.08	44.2/1.74	100.3/3.95	107.8/4.24	52.1/2.05	118.8/4.68
5860	58.6/2.31	137.4/5.41	137.4/5.41	134.1/5.28	148.0/5.83	148.0/5.83	148.0/5.83	37.7/1.48	N/A	N/A	N/A	112.3/4.42
5861	80.0/3.15	143.9/5.66	143.9/5.66	140.5/5.53	154.4/6.08	154.4/6.08	154.4/6.08	44.2/1.74	N/A	N/A	N/A	118.8/4.68

SLA5853/SLA5863



FITTING CONFIGURATIONS



FLANGE CONFIGURATIONS

"B" Dimension		
FITTING	53	63
	mm / inch	mm / inch
9/16"-18 UNF	199/7.8	155/6.1
1-1/16" - 12 UN	199/7.8	155/6.1
1-5/16" - 12UN	199/7.8	155/6.1
3/8" TUBE COMP.*	253/10	209/8.2
1/2" TUBE COMP.*	267/10.5	223/8.8
3/4" TUBE COMP.*	267/10.5	223/8.8
1" TUBE COMP.*	274/10.8	232/9.1
3/8"-1/2" VCO	249/9.8	206/8.1
3/4" VCO	257/10.1	213/8.4
1" VCO	259/10.2	216/8.5
1/2" NPT	199/7.8	155/6.1
1" NPT	199/7.8	155/6.1
1-1/2" NPT	199/7.8	155/6.1
12mm TUBE COMP.*	N/A	219/8.62
3/8"-1/2" VCR	257/10.1	213/8.4
3/4" VCR	279/11	236/9.3
1" VCR	285/11.2	241/9.5
1/2" RC (BSP)	199/7.8	155/6.1
1" RC (BSP)	199/7.8	155/6.1
1/2" SANITARY	262.6/10.34	220/8.64
3/4" SANITARY	262.6/10.34	220/8.64
1" SANITARY	262.6/10.34	220/8.64
ANSI 1/2" 150#	299/11.8	256/10.1
ANSI 1/2" 300#	299/11.8	256/10.1
ANSI 1" 150#	299/11.8	256/10.1
ANSI 1" 300#	299/11.8	256/10.1
ANSI 1.5" 150#	299/11.8	256/10.1
ANSI 1.5" 300#	299/11.8	256/10.1
ANSI 2" 150#	299/11.8	256/10.1
ANSI 2" 300#	299/11.8	256/10.1
DIN DN15 PN40	299/11.8	256/10.1
DIN DN25 PN40	299/11.8	256/10.1
DIN DN40 PN40	299/11.8	256/10.1

MOUNTING HOLES				
Model	X1	X2	Y1	Y2
	mm / inch	mm / inch	mm / inch	mm / inch
5853	10.0/.39	178.8/7.04	15.0/.59	15.0/.59
5863	10.0/.39	135.0/5.32	15.0/.59	15.0/.59

*OVERALL LENGTH FINGER TIGHT

ELECTRO/MECHANICAL DIMENSIONS										
Model	A	C						D	E	F
		Analog RS485	Profibus	DeviceNet	EtherCat	ProfiNet/EtherNet	Foundation Fieldbus			
	mm / inch	mm / inch	mm / inch	mm / inch	mm / inch	mm / inch	mm / inch	mm / inch	mm / inch	mm / inch
5853	199.0/7.8	174.3/6.86	174.3/6.86	171.0/6.73	184.9/7.28	184.9/7.28	184.9/7.28	84.0/3.31	137.0/5.4	149.2/5.87
5863	155.0/6.1	174.3/6.86	174.3/6.86	171.0/6.73	184.9/7.28	184.9/7.28	184.9/7.28	84.0/3.31	N/A	149.2/5.87