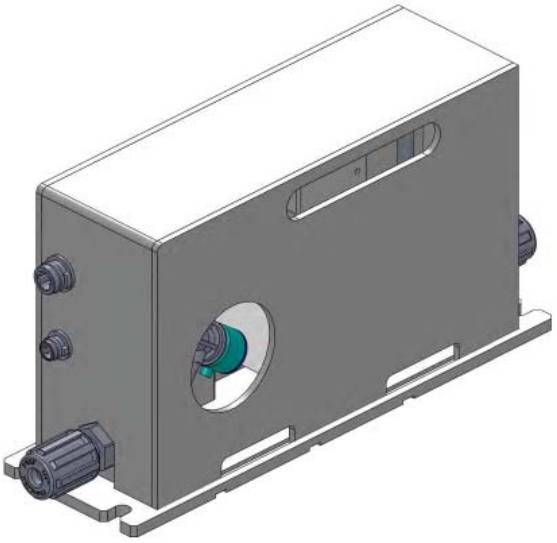
LFC-7650

Integrated Flow Control Module



Key Features

- **High Accuracy - Controls flow rate to within ± 1% of set point; ideal for fluid blending and/or dispense applications**
- **Fast Response 3 seconds (typically < 2 seconds for most applications)**
- **Wide range of flow control capability; 50 mL/min - 4000 mL/min**
- **All Polytetrafluoroethylene (PTFE) / Perfluoroalkoxy (PFA) wetted part construction – ensures compatibility with UHP liquid chemicals, and DI water.**
- **With in-built pressure sensor analog output**
- **Low maintenance - modules featuring ultrasonic flowmeters with NO moving parts, providing the ultimate in "uptime".**

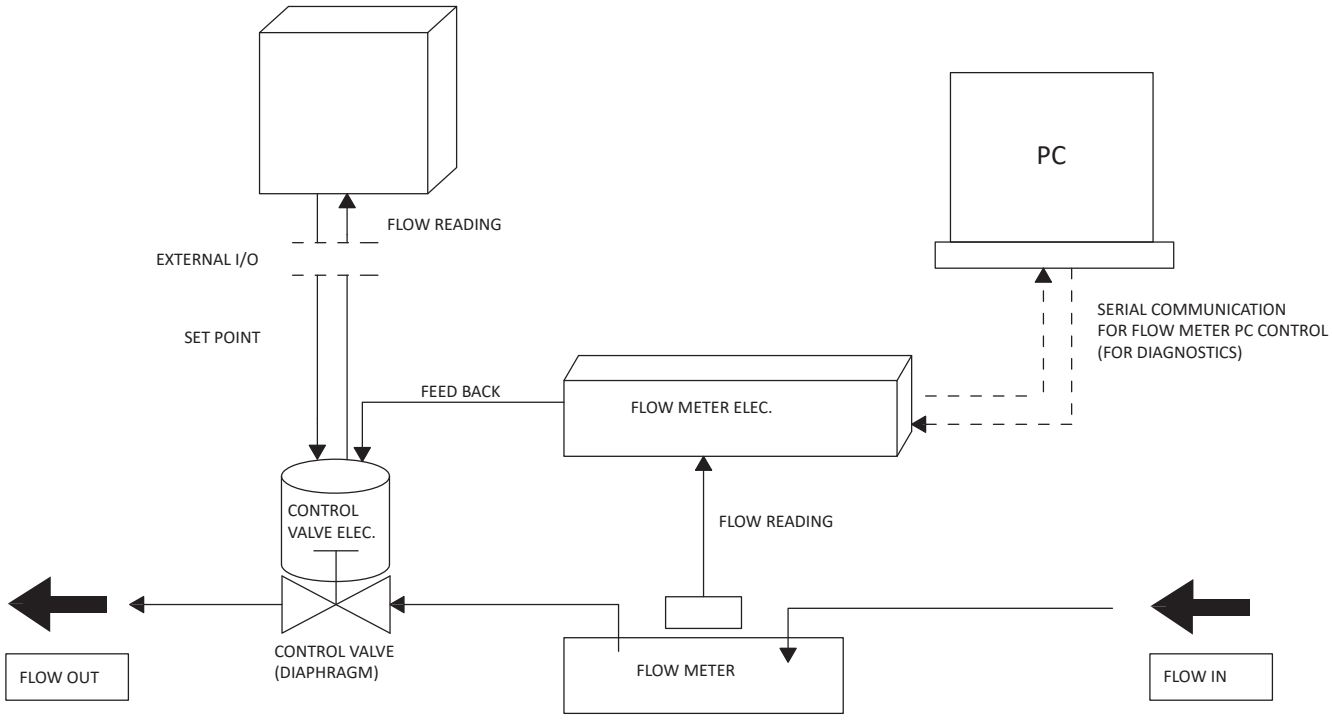
Description

The LFC-7650 Series is a line of high-performance closed-loop flow controllers with integrated pressure transducer designed for use in a wide variety of high-purity liquids including DI water and harsh chemicals.

A typical module combines Malema's ultrasonic flow meter with a Malema control valve. It sets the standard for flow measurement in terms of accuracy, repeatability, turndown and purity. It's Digital Signal Processing (DSP) technology ensures reliable performance even with a certain degree of bubbles present in the process fluids. The high speed/precision motor actuated diaphram valve helps provide a fast precise response with minimal "overshoot".

In operation, the user inputs a flow rate "set point" via an analog signal. The flow control electronics module continuously compares this set point value with the flow rate reported by the flow meter and drives the motor to modulate the control valve to maintain the desired set point. State of the art control algorithm together with a high speed/precision flow meter and valve achieves fast, accurate, and repeatable control.

Typical Block Diagram



Applications

- Semiconductor CMP (Chemical Mechanical Planarization) tools - used to precisely control the flow of DI water and chemical slurries
- Wet Cleaning tools – for accurate and reliable control of the blending and delivery of cleaning chemistries.
- Copper Plating tools – well suited for chemical mixing and dispensing applications.

Specifications

Performance Specifications

Flow Controllability Range (Available in 8 standard ranges)	5 - 50 ml/min (1/4”)
	10 - 100 ml/min (1/4”)
	25 - 250 ml/min (1/4”)
	50 - 500 ml/min (1/4”)
	100 - 1000 ml/min (1/4”)
	125 - 1250 ml/min (1/4”)
	250 - 2500 ml/min (1/4” or 3/8”)
	400 - 4000 ml/min*** (3/8”)
	Custom
Pressure Measurement Range	0 - 60 psi
Pressure Accuracy	1% of Full Scale
Accuracy of Flow Control	±1% of set point or ±3ml/min (whichever is larger)
Repeatability*	± 1% of set point or ± 1 ml/min (whichever is larger)
Control Repeatability	± 0.5% of set point or ± 0.5 ml/min (whichever is larger)
Flow Control Time	< 3 sec
Fluid Temperature	Max 60 °C **
Maximum Expected Operating Pressure	0.4 MPa (50 psig)
Maximum Safe Internal Pressure	0.5 MPa (70 psig)
Ambient Temp/Humidity	0 – 40 °C (30 – 80% R.H., without DEW)
Minimum Differential Pressure	10 psid

*** Please consult with Malema for tighter accuracy/repeatability needs.**

**** Contact the factory for higher fluid temperature requirements.**

Electrical Specifications

Electrical Input	24 Vdc ± 10%
Consumption	Max 0.5 A
Control Signal In*	0 - 5 Vdc or 0 - 10 Vdc or 4 - 20 mA (input resistance 250 Ω)
Flow Signal Out**	0 - 5 Vdc , 0 - 10 Vdc, or 4 - 20 mA (Passive or Active)
Pressure Signal Out	4 - 20 mA Passive

*** Consult the factory for other options**

**** Configured as Passive output as default. Consult the factory for other options.**

Material Specifications

Wetted parts for Modules	PFA, PTFE, Kalrez or equivalent
Non wetted parts, enclosure	ABS, PEEK, PVC*
Connectors	PPS

*** Flame retardant (FMET4325)**

Physical Specifications

Mounting Orientation	Horizontal
Fluid Connections	Inlet/Outlet: 1/4”, 3/8”, Flare *
Flow Restrictions (orifice)	> 2 mm
Ingress Rating	IP64

*** Consult the factory for other options**

Power and Signal Connections

It is always recommended to use a dedicated power supply with 24 V DC (±10%), 500 mA. The configuration of the 12 pin I/O connector is given in the table below (See note below).

NOTE:

- **User is required to order the 6 feet long standard mating cable with every controller (Please refer to the model code table located on page 6).**
- **Refer to Hirose-Alden adapter cable details below. Please consult the factory for any other custom mating / adapter cable requirement.**
- **An optional communication cable with a 6 pin connector can be ordered separately to interface with the PC GUI program.**

Please refer to tables on the next page

Power and Signal Connections (Continued)

12 Pin Connector / Mating Cable Configuration				
Pin No.	**Wire Color**	**Description**	**Specification**	**Remarks**
1	Red	Power (+) 24 Vdc	24 Vdc ± 10%	
2	Black	Power (-) 0 Vdc		
3	Pink	Set Point (+)	0 – 5 Vdc or 0 - 10 Vdc or 4 - 20 mA	Input resistance 250 Ω
4	Gray	Set Point (-)		
5	Blue	Flow, Output*	4 - 20 mA Out	Passive connection
6	White	Flow, Supply*	+24 Vdc, loop	Passive connection
7	Red/Black	Pressure, Output	4 - 20 mA Out	Passive connection
8	White/Black	Pressure, Supply	+24 Vdc, loop	Passive connection
9	Yellow	Sensor or Valve Alarm (+)**	Max. rating 30 Vdc, 200 mA	Open Collector Output
10	Brown	Sensor or Valve Alarm (-) (0Vdc)**		
11	Green	Zero Adjust***	0 Vdc: Normal operation 24 Vdc: Zero Adjust	Pull up to power supply voltage starts the zero adjustment
12	Violet	No Connection		

*** 4-20 mA (Passive) is the default output type. Please consult the factory for other options.**

**** Sensor alarm factory set as default. Field configurable for other options.**

***** Make sure the flow is completely stopped before zero adjust.**

Adapter Cable Specifications

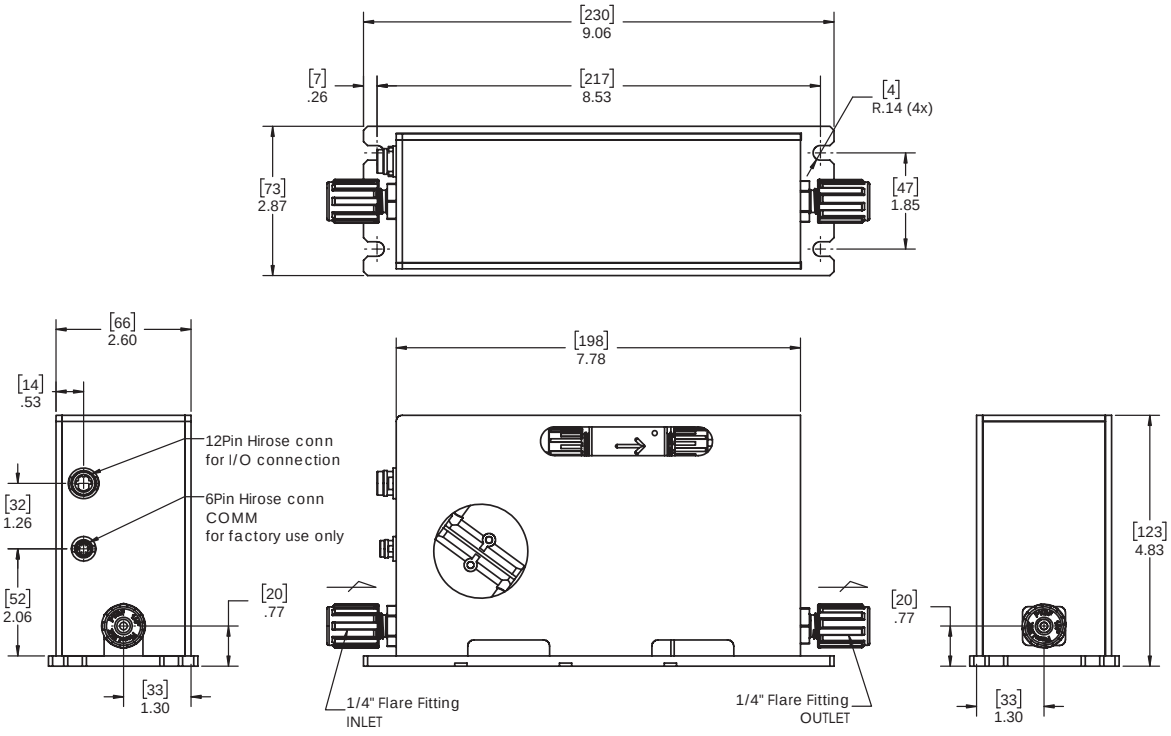
Hirose-Alden Adapter cable			
Description	**Hirose Pin No.**	**Alden Pin No.***	**Remarks**
Power (+) 24 Vdc	**1**	**11**	
Power (-) 0 Vdc	**2**	**12**	
Set Point (+)	**3**	**6**	
Set Point (-)	**4**	**7**	
Flow Out (+)	**5**	**4**	**Flow: 4-20 mA out Passive**
Flow Out (-)	**6**	**2**	**Flow: 24Vdc loop power**
Pressure, Output	**7**	**1**	**Pressure: 4-20 mA out Passive**
Pressure, Supply	**8**	**3**	**Pressure: 24Vdc loop power**
Zero Adjust**	**11**	**5**	
No Connection	**9**	**8**	
No Connection	**10**	**9**	
No Connection	**12**	**10**	
No Connection	**-**	**13**	
No Connection	**-**	**14**	

*** Alden Part Number: 300090 (PL700 Series)**

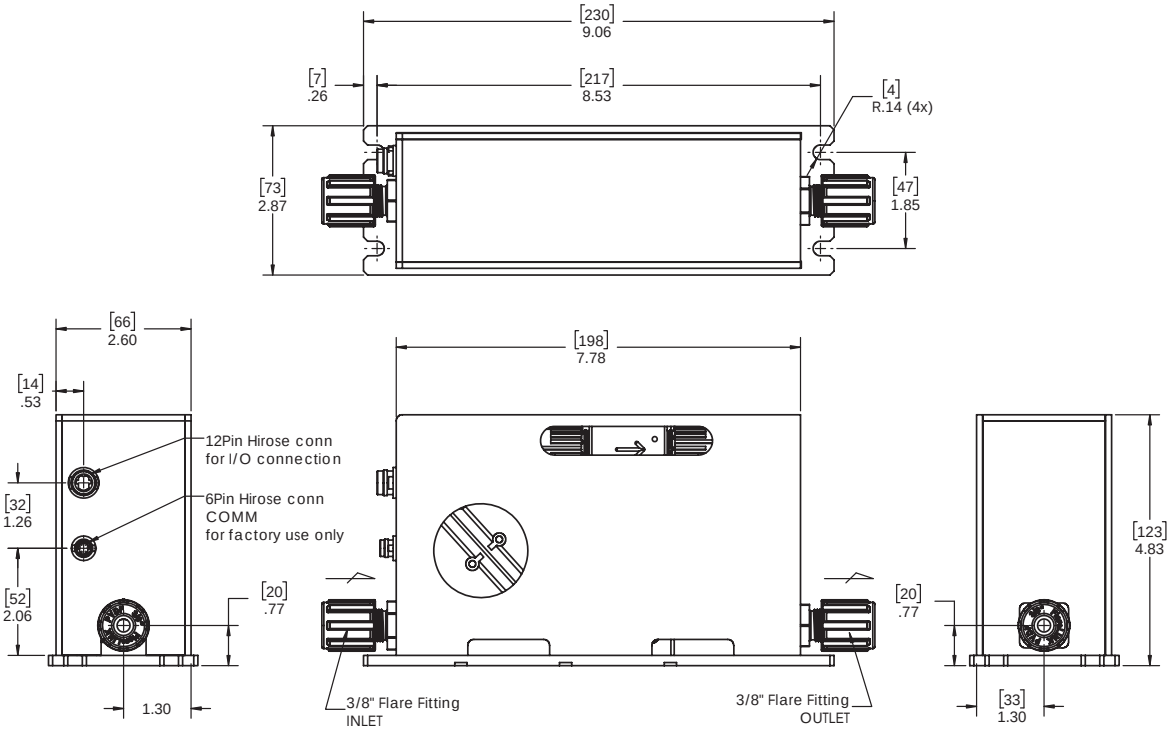
Dimensional Drawings

For reference only

Dimensions for 1/4” Flare end connections



Dimensions for 3/8” Flare end connections



Ordering Information

Model Code															Description
LFC-7650	-	*	*	**	-	*	*	*	-	*	*	*	-	***	
Tube Size		1													1/4”
		2													3/8”
Connection Type			1												Flare Ends
			2												Super Pillar 300
Standard Full Scale Range				01											5 - 50 ml/min (1/4”)
				02											10 - 100 ml/min (1/4”)
				03											25 - 250 ml/min (1/4”)
				04											50 - 500 ml/min (1/4”)
				05											100 - 1000 ml/min (1/4”)
				06											125 - 1250 ml/min (1/4”)
				07											250 - 2500 ml/min (1/4” or 3/8”)
				08											400 - 4000 ml/min (3/8”)
				09											Custom
					-										
Sensor / Converter						1									M-2111 Mini (3mm) / DSP
						2									M-2111 Mini (5mm) / DSP
Input / Output							1								0 – 5 Vdc / 4 – 20 mA
							2								0 – 10 Vdc / 0 – 10 Vdc
							3								4 – 20 mA / 4 – 20 mA
							4								Custom
								-							
Valve Type									1						Diaphragm Valve
Mounting Orientation										1					Horizontal
Accessories											1				With standard Hirose I/O mating cable
											2				With Hirose-Alden Adapter cable
											3				Custom
												-	XXX		Unique PN identifier