

# Thermal Mass Flow Sensor

Atlas Copco Optimization

A thermal flow sensor measures temperature changes caused by the flow of a fluid over a heated sensor, using the principle of heat transfer.

Thermal flow sensors are mainly used in dry air systems, or in other words: systems in which dryers are installed. They are more suitable to be installed after dryers.



## Technical Specifications

Flow accuracy	1.5% of reading ± 0.3% FS
Sampling rate	10 samples/sec.
Selectable units	m <sup>3</sup> /h, m <sup>3</sup> /min, l/min, l/s, cfm, kg/h, kg/min, kg/s
Response time	0.1 sec.
Consumption	m <sup>3</sup> , ft <sup>3</sup> , l
Reference conditions	20°C 1000 mbar (ISO1217), 0°C 1013 mbar (DIN1343)
Approvals	CE, RoHS, FCC

## Operating Conditions

Medium (Gases)	Air, N <sub>2</sub> , O <sub>2</sub> , CO <sub>2</sub> and other gases
Medium quality	4:4:3 or better
Medium temperature	-30 ... +140°C
Operating pressure	0 ... 50 bar (16 bar + with safety device)
Ambient temperature	-10 ... +50°C
Ambient humidity	<99% rH
Storage temperature	-30 ... +70°C
Pipe sizes	1 1/2" to 12"

## Supply

Voltage supply	15 ... 30 VDC
Current consumption	Max 200 mA
Electrical connection	2 x M12 (5 pole)

## Analog

Signal	4 ... 20 mA (4-wire), isolated
Scaling	0 ... max flow, freely adjustable
Load	Max. 250 Ohm
Update	Value updated every 1 sec.

## Digital

Protocol	Modbus RTU
Update	Value updated every 1 sec.

## Pulse

Signal	30 VDC, 200 mA
Scaling	1 pulse per consumption unit

Part Number	Model	Speed	Output
		(m/s)	
1830138002	FL S185 T	185	Analog 4-20/Pulse
1830138003	FL S185 T	185	Modbus RTU
1830138004	FL S224 T	224	Analog 4-20/Pulse
1830138005	FL S224 T	224	Modbus RTU

DN Pipe Size	Size Size	Inner Diameter	FL S185 T	FL S224 T
	(inch)	(mm)	(m <sup>3</sup> /h)	(m <sup>3</sup> /h)
DN25	1"	27.3	0.6 ... 294.7	0.6 ... 356.9
DN32	1¼"	36.0	1.2 ... 531.5	1.2 ... 643.5
DN40	1½"	41.9	1.5 ... 731.9	1.5 ... 886.2
DN50	2"	53.1	2.5 ... 1197.6	3 ... 1450.0
DN65	2½"	68.9	5.0 ... 2048.6	5 ... 2480.4
DN80	3"	80.9	7.0 ... 2842.7	7 ... 3441.9
DN100	4"	100.0	12 ... 4357.2	12 ... 5275.7
DN125	5"	125.0	18 ... 6824.4	18 ... 8263.1
DN150	6"	150.0	25 ... 9838.9	25 ... 11913.1
DN200	8"	200.0	33 ... 17533.3	42 ... 21229.5
DN250	10"	250.0	52 ... 27428.5	60 ... 33210.7
DN300	12"	300.0	80 ... 39544.1	100 ... 47880.4

# Pitot Flow Sensor

## Atlas Copco Optimization

A pitot flow sensor is a velocity-based flow measuring device that determines the flow rate of a fluid (usually air or gas) by measuring the difference between two types of pressure: stagnation pressure and static pressure.

Pitot flow sensors are especially suitable for wet air or humid air applications, where the air contains moisture or is in a saturated state. In other words: systems without a dryer.



### Technical Specifications

Flow accuracy	1.5% of reading ± 0.3% FS
Sampling rate	10 samples /sec.
Selectable units	m <sup>3</sup> /h, m <sup>3</sup> /min, l/min, l/s, cfm, kg/h, kg/min, kg/s
Response time	0.1 sec.
Consumption	m <sup>3</sup> , ft <sup>3</sup> , l
Reference conditions	20°C 1000 mbar (ISO1217), 0°C 1013 mbar (DIN1343)
Approvals	CE, RoHS, FCC

### Operating Conditions

Medium (Gases)	Air, N <sub>2</sub> , O <sub>2</sub> , CO <sub>2</sub> and other gases
Medium quality	4:4:3 or better
Medium temperature	-30 ... + 140°C
Operating pressure	0 ... 50 bar (16 bar + with safety device)
Ambient temperature	-10 ... + 50°C
Ambient humidity	<99% rH
Storage temperature	-30 ... +70°C
Pipe sizes	1 ½" to 10"

### Supply

Voltage supply	24 VDC
Current consumption	150 mA / 100 mA (PoE)
Electrical connection	2 x M12 (5 pole)

### Analog

Signal	4 ... 20 mA (4-wire), isolated
Scaling	0 ... max flow, freely adjustable
Load	Max. 250 Ohm
Update	Value updated every 1 sec.

### Digital

Protocol	Modbus RTU
Update	Value updated every 1 sec.

### Pulse

Signal	Max. 30 VDC, 200 mA
Scaling	1 pulse per consumption unit

Part Number	Model	Speed	Output
		(m/s)	
1830138006	FL S200 P	200	Analog 4-20/Pulse
1830138007	FL S200 P	200	Modbus RTU
1830138008	FL S260 P	260	Analog 4-20/Pulse
1830138009	FL S260 P	260	Modbus RTU

DN Pipe Size	Size Size	Inner Diameter	FL S185 T	FL S224 T
	(inch)	(mm)	(m <sup>3</sup> /h)	(m <sup>3</sup> /h)
DN25	1"	27.3	N/A	N/A
DN32	1¼"	36.0	12 ... 508	12 ... 660
DN40	1½"	41.9	18 ... 757	18 ... 984
DN50	2"	53.1	31 ... 1298	31 ... 1687
DN65	2½"	68.9	56 ... 2311	56 ... 3005
DN80	3"	80.9	80 ... 3270	98 ... 5201
DN100	4"	100.0	125 ... 5095	125 ... 6623
DN125	5"	125.0	196 ... 8006	196 ... 10408
DN150	6"	150.0	283 ... 11548	283 ... 15012
DN200	8"	200.0	507 ... 20690	507 ... 26897
DN250	10"	250.0	793 ... 32339	793 ... 42040
DN300	12"	300.0	1142 ... 46568	1142 ... 60538

# Advanced Inline Flow Sensor

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An inline flow sensor is a non-intrusive solution to measure compressed air and gas consumption and flow in main and distribution lines. Inline flow sensors are used in various industries and assist with energy management, process control, cost allocation, and quality assurance.



## Technical Specifications

Flow accuracy	1.5% of reading $\pm$ 0.3% FS
Sampling rate	10 samples/sec.
Selectable units	m <sup>3</sup> /h, m <sup>3</sup> /min, l/min, l/s, cfm, kg/h, kg/min, kg/s
Response time	0.1 sec.
Consumption	m <sup>3</sup> , ft <sup>3</sup> , l
Reference conditions	20°C 1000 mbar (ISO1217), 0°C 1013 mbar (DIN1343)
Approvals	CE, RoHS, FCC

## Operating Conditions

Medium (Gases)	Air, N <sub>2</sub> , O <sub>2</sub> , CO <sub>2</sub> and other gases
Medium quality	4:4:3 or better
Medium temperature	-30 ... +140°C
Operating pressure	0 ... 16 bar
Ambient temperature	-10 ... +50°C
Ambient humidity	<99% rH
Storage temperature	-30 ... +70°C
Pipe sizes	1 1/2" to 3" (40 to 80 mm)

## Supply

Voltage supply	15 ... 30 VDC
Current consumption	Max 200 mA
Electrical connection	2 x M12 (5 pole)

## Analog

Signal	4 ... 20 mA (4-wire), isolated
Scaling	0 ... max flow, freely adjustable
Load	Max. 250 Ohm
Update	Value updated every 1 sec.

## Digital

Protocol	Modbus RTU
Update	Value updated every 1 sec.

## Pulse

Signal	30 VDC, 200 mA
Scaling	1 pulse per consumption unit

## R-connection

Part Number	Model	Diameter	Output
		(mm)	
1830138031	FLI D40 A	DN40 - 1.5"	Analog 4-20/Pulse
1830138033	FLI D40 A	DN40 - 1.5"	Modbus RTU
1830138035	FLI D50 A	DN50 - 2"	Analog 4-20/Pulse
1830138037	FLI D50 A	DN50 - 2"	Modbus RTU
1830138039	FLI D65 A	DN65 - 2.5"	Analog 4-20/Pulse
1830138041	FLI D65 A	DN65 - 2.5"	Modbus RTU
1830138043	FLI D80 A	DN80 - 3"	Analog 4-20/Pulse
1830138045	FLI D80 A	DN80 - 3"	Modbus RTU

## NPT-connection

Part Number	Model	Diameter	Output
		(mm)	
1830138030	FLI D40 A	DN40 - 1.5"	Analog 4-20/Pulse
1830138032	FLI D40 A	DN40 - 1.5"	Modbus RTU
1830138034	FLI D50 A	DN50 - 2"	Analog 4-20/Pulse
1830138036	FLI D50 A	DN50 - 2"	Modbus RTU
1830138038	FLI D65 A	DN65 - 2.5"	Analog 4-20/Pulse
1830138040	FLI D65 A	DN65 - 2.5"	Modbus RTU
1830138042	FLI D80 A	DN80 - 3"	Analog 4-20/Pulse
1830138044	FLI D80 A	DN80 - 3"	Modbus RTU

DN Pipe Size	Pipe Size	Model	Flow Range
	(inch)		(m <sup>3</sup> /h)
DN40	1½"	FLI D40 A	3 ... 700
DN50	2"	FLI D50 A	4 ... 1000
DN65	2½"	FLI D65 A	6 ... 1500
DN80	3"	FLI D80 A	8 ... 2500

# Compact Inline Flow Sensor

Atlas Copco Optimization

An inline flow sensor is a non-intrusive solution to measure compressed air and gas consumption and flow in main and distribution lines.

Inline flow sensors are used in various industries and assist with energy management, process control, cost allocation, and quality assurance.



## Technical Specifications

Flow accuracy	3% of reading $\pm$ 0.3% FS
Sampling rate	3 samples/sec.
Selectable units	l/min, cfm, kg/h, m <sup>3</sup> /h
Response time	2 sec.
Consumption	m <sup>3</sup> , ft <sup>3</sup> , l, kg
Reference conditions	20 °C 1000 mbar (ISO1217), 0°C 1013 mbar (DIN1343)
Approvals	CE, RoHS, FCC

## Operating Conditions

Medium (Gases)	Air, N <sub>2</sub> , O <sub>2</sub> , CO <sub>2</sub> and other gases
Medium quality	4:4:3 or better
Medium temperature	-0 ... +50°C
Operating pressure	0 ... 16 bar
Ambient temperature	-10 ... +50°C
Ambient humidity	<95% rH
Storage temperature	-30 ... +70°C
Pipe sizes	1/4" to 1 1/2" (8 to 32 mm)

## Supply

Voltage supply	15 ... 30 VDC
Current consumption	Max 120 mA @ 24 VDC
Electrical connection	2 x M8 (4 pole)

## Analog

Signal	4 ... 20 mA (4-wire), isolated
Scaling	0 ... max flow, freely adjustable
Load	Max. 250 Ohm
Update	3/sec.

## Digital

Protocol	Modbus RTU
Update	Value updated every 1 sec.

## Pulse

Signal	30 VDC, 200 mA
Scaling	1 pulse per consumption unit

## G-connection

Part Number	Model	Diameter (mm)	Output
1830138010	FLI D08 C	DN8 - 1/4"	Analog 4-20/Pulse
1830138012	FLI D08 C	DN8 - 1/4"	Modbus RTU
1830138014	FLI D15 C	DN15 - 1/2"	Analog 4-20/Pulse
1830138016	FLI D15 C	DN15 - 1/2"	Modbus RTU
1830138018	FLI D20 C	DN20 - 3/4"	Analog 4-20/Pulse
1830138020	FLI D20 C	DN20 - 3/4"	Modbus RTU
1830138022	FLI D25 C	DN25 - 1"	Analog 4-20/Pulse
1830138024	FLI D25 C	DN25 - 1"	Modbus RTU
1830138026	FLI D32 C	DN32 - 1.25"	Analog 4-20/Pulse
1830138028	FLI D32 C	DN32 - 1.25"	Modbus RTU

## NPT-connection

Part Number	Model	Diameter (mm)	Output
1830138011	FLI D08 C	DN8 - 1/4"	Analog 4-20/Pulse
1830138013	FLI D08 C	DN8 - 1/4"	Modbus RTU
1830138015	FLI D15 C	DN15 - 1/2"	Analog 4-20/Pulse
1830138017	FLI D15 C	DN15 - 1/2"	Modbus RTU
1830138019	FLI D20 C	DN20 - 3/4"	Analog 4-20/Pulse
1830138021	FLI D20 C	DN20 - 3/4"	Modbus RTU
1830138023	FLI D25 C	DN25 - 1"	Analog 4-20/Pulse
1830138025	FLI D25 C	DN25 - 1"	Modbus RTU
1830138027	FLI D32 C	DN32 - 1.25"	Analog 4-20/Pulse
1830138029	FLI D32 C	DN32 - 1.25"	Modbus RTU

DN Pipe Size	Pipe Size (inch)	Model	Flow Range (m <sup>3</sup> /h)
DN8	1/4"	FLI D08 C	0.3 ... 15
DN15	1/2"	FLI D15 C	1.2 ... 60
DN20	3/4"	FLI D20 C	2.4 ... 120
DN25	1"	FLI D25 C	4.2 ... 210
DN32	1 1/4"	FLI D32 C	7.2 ... 360

## Model versus Capacity

DN Pipe Size	Pipe Size	FL S185 T	FL S224 T	FL S200 P	FL S260 P	FLI A	FLI C
	(inch)	(m <sup>3</sup> /h)	(m <sup>3</sup> /h)	(m <sup>3</sup> /h)	(m <sup>3</sup> /h)	(m <sup>3</sup> /h)	(m <sup>3</sup> /h)
DN8	¼"						0.3 ... 15
DN15	½"						1.2 ... 60
DN20	¾"						2.4 ... 120
DN25	1"	0.6 ... 295	0.6 ... 3567				4.2 ... 210
DN32	1¼"	1.2 ... 532	1.2 ... 643	12 ... 508	12 ... 660		7.2 ... 360
DN40	1½"	1.5 ... 7312	1.5 ... 886	18 ... 757	18 ... 984	3 ... 700	
DN50	2"	2.5 ... 1198	3 ... 1450	31 ... 1298	31 ... 1687	4 ... 1000	
DN65	2½"	5.0 ... 2049	5 ... 2480	56 ... 2311	56 ... 3005	6 ... 1500	
DN80	3"	7.0 ... 2843	7 ... 3442	80 ... 3270	98 ... 5201	8 ... 2500	
DN100	4"	12 ... 4357	12 ... 5276	125 ... 5095	125 ... 6623		
DN125	5"	18 ... 6824	18 ... 8263	196 ... 8006	196 ... 10408		
DN150	6"	25 ... 9839	25 ... 11913	283 ... 11548	283 ... 15012		
DN200	8"	33 ... 17533	42 ... 2123	507 ... 20690	507 ... 26897		
DN250	10"	52 ... 27429	60 ... 33211	793 ... 32339	793 ... 42040		
DN300	12"	80 ... 39544	100 ... 47880	1142 ... 46568	1142 ... 60538		

## Selection Process Flow Sensors

