NOVA SENSOR

NPI-19 Series

Digital Pressure Sensor I^2C



Applications

- Industrial process control
- Corrosive fluid and gas measurement
- Hydraulic systems and valves
- Tank level measurement
- Barometric pressure measurement
- Ship and marine systems
- Aircraft and avionic systems
- Medical equipment

Features

- No port or threaded process fittings
- Linearity: ±0.25% FSO (BFSL)
- Total Error Band: ±1% FSO
- I^2C interface protocols
- 14-bit I^2C output
- Absolute and gauge pressure
- Pressure Ranges: 2.5 psi (17 kPa) to 300 psi (2068 kPa)

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NPI-19 Series - Specifications

Pressure Output:
- 10% to 90% VDD

Device Address:
- I²C (Addr 0x28H)

Supply Voltage:
- 3.3V

Linearity:
- ±0.25% FSO

Total Error Band:
- ±1% FSO

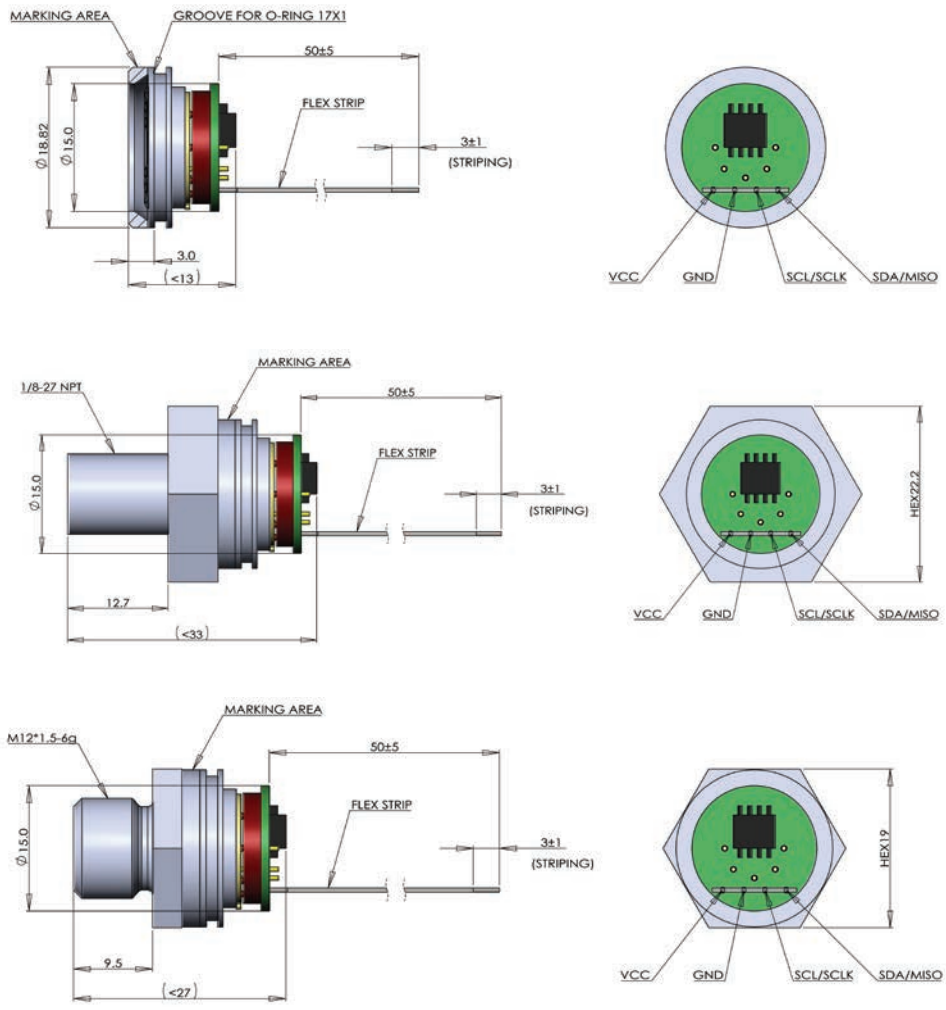
Over Pressure:
- 2X

Burst Pressure:
- 3X

Long Term Stability:
- ± 0.5% span / year typical

Operating Temperature:
- -40°C to 125°C

Storage Temperature:
- -40°C to 125°C



NPI-19M Dimensions (mm)

Sensor Output

Parameters	Typical	Units	Notes
Applied Pressure Pmin	1638	Decimal count	666 Hex count
Applied Pressure Pmax	14745	Decimal count	399A Hex count

NPI-19 Series - Specifications (Cont.)

Absolute Maximum Ratings

Symbol	Parameter	Limits			Unit
		Min	Typical	Max	
V_{dd}	Supply Voltage	2.5	3.3	5.5	V
P	Over Pressure (Rated Pressure)	-	2X	-	-
V_{HBM1}	Electrostatic Discharge Tolerance – Human Body Model	-	-	4	kV
T_{STOR}	Storage Temperature	-40	-	125	°C

Performance Specifications

Unless otherwise specified: Supply Voltage: 3.3 VDC, Ambient Temperature: 25°C

Parameters	Min	Typical	Max	Units	Notes
Zero Output (10%~90%)		1638		Decimal counts	1
Full-Scale Pressure Output 10%~90%)		14745		Decimal counts	1
Pressure Linearity	-0.25		0.25	%FSO	2
Total Error Band	-1		1	%FSO	2
Pressure Resolution		0.008		%FSO	3
Supply Current		3		mA	
Insulation Resistance (@50 VDC)	100			MΩ	4
Overpressure			2X	Rated pressure	
Load Resistance	10			KΩ	
Long-Term Stability		0.5		%FSO/year	
Compensated Temperature (≤35 kPa)	0		50	°C	
Compensated Temperature (≥100 kPa)	-20		85	°C	
Operating Temperature (≤35 kPa)	-10		80	°C	5
Operating Temperature (≥100 kPa)	-40		125	°C	5
Start Time to Data Ready			8.4	ms	6
I²C Slave Address		0x28		Counts Hex	
Media	Liquids and gases compatible with 316L Stainless Steel				

1. 666 to 399A Hex counts.
2. Accuracy: Combined BFSL linearity, pressure hysteresis and repeatability.
3. Total Error Band: Calibration errors and temperature effects over compensated range.
4. Between case and sensor pins.
5. Temperature range may be less with connectors or wires.
6. Start Time to Data Ready is the time after Power on Reset (POR) to obtain valid data.

NPI-19 Series - Functional Description

I²C

In I²C Mode, each command is started as shown in Figure 1. Only the number of bytes that is needed for the command has to be sent. After the execution of a command (busy = 0) the expected data can be read as illustrated in Figure 3, or if no data are returned by the command the next command can be sent. The status can be read at any time as described in Figure 2.

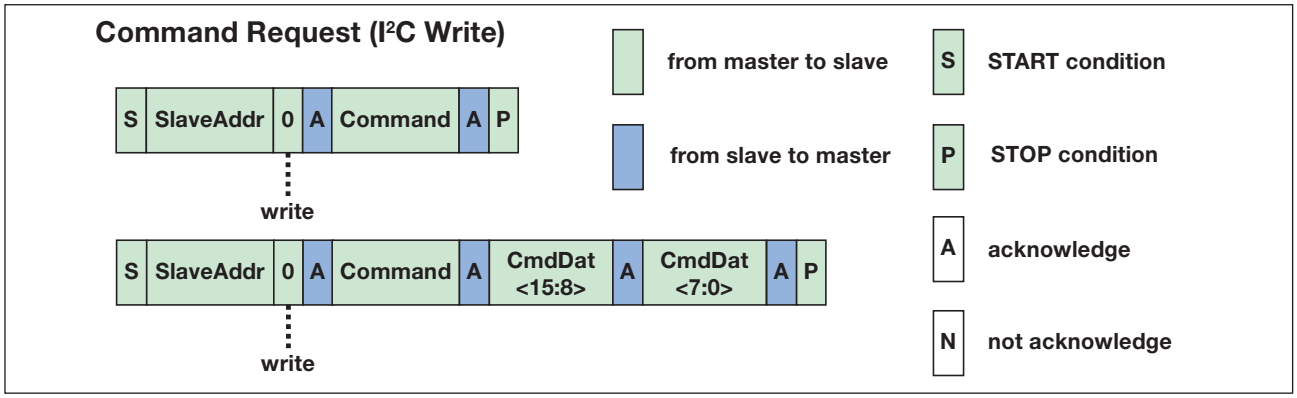


Figure 1 - I²C Command Request

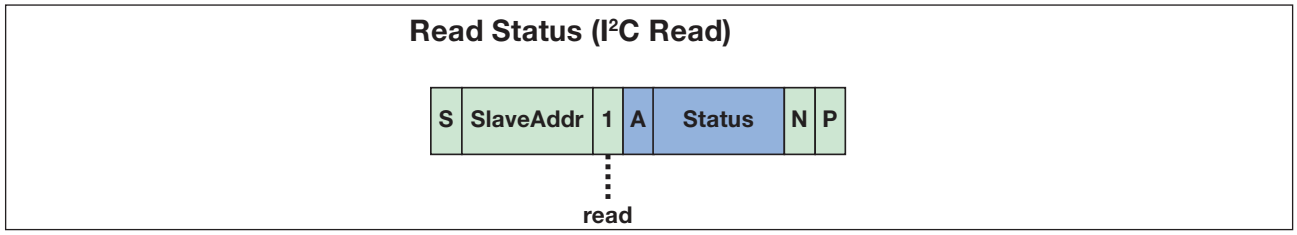


Figure 2 - I²C Read Status

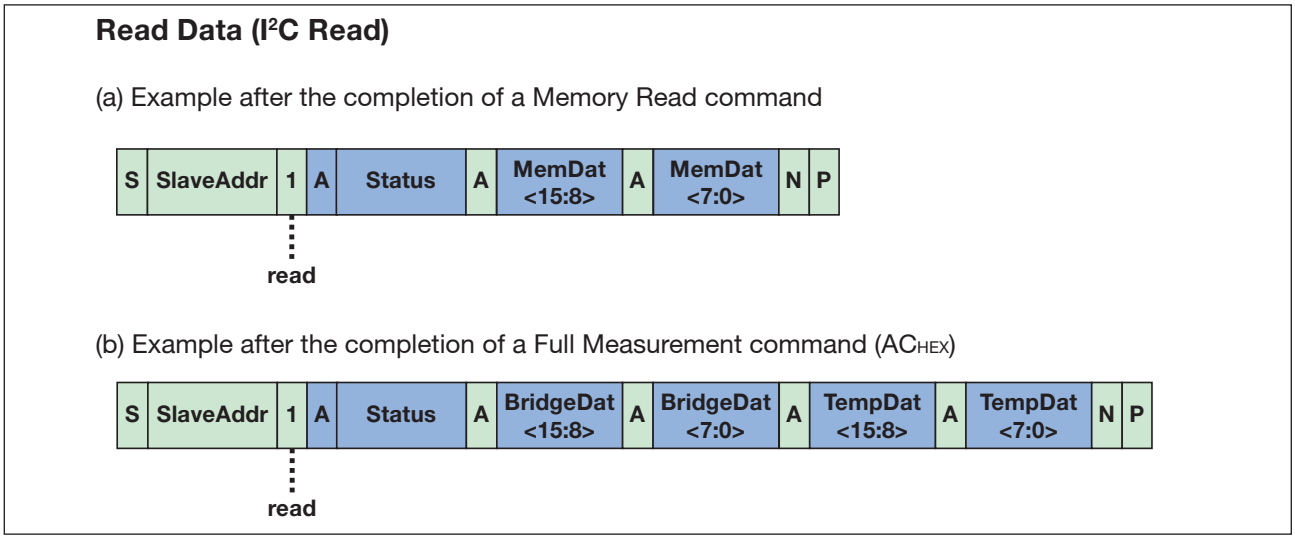


Figure 3 - I²C Read Data

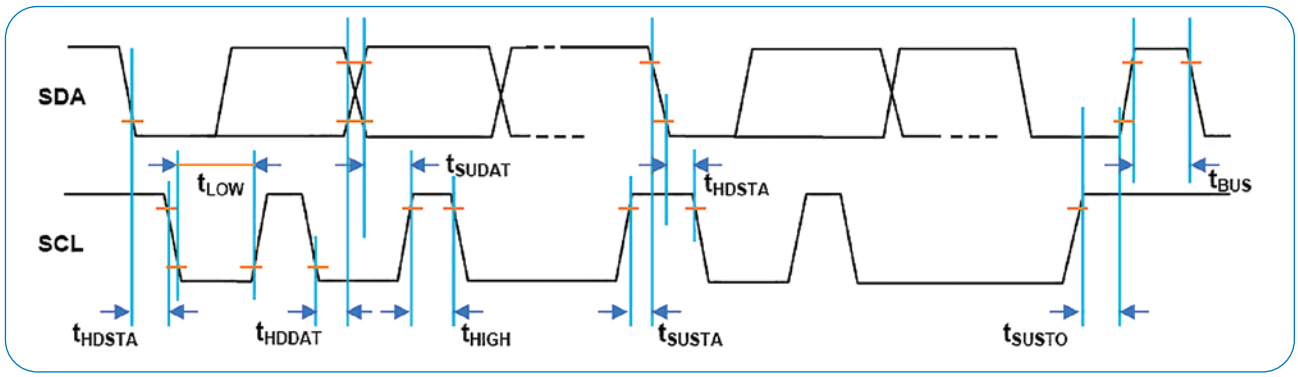
All mandatory I²C-bus protocol features are implemented. Optional features like clock stretching, 10-bit slave address, etc., are not supported by the sensor's interface.

In I²C-High Speed Mode, a command consists of a fixed length of three bytes.

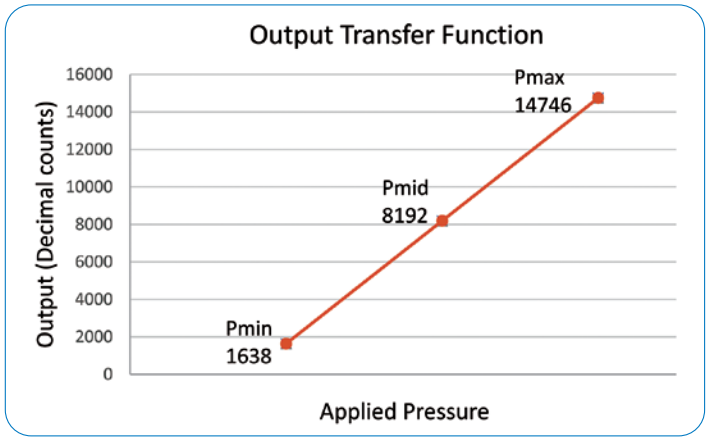
I²C Parameters

Parameter	Symbol	Min.	Max.	Units
SCL clock frequency	f_{FCL}	100	400	kHz
Start condition hold time relative to SCL edge	t_{HDSTA}	0.1		µS
Minimum SCL clock low width [1)]	t_{LOW}	0.6		µS
Minimum SCL clock high width [1)]	t_{HIGH}	0.6		µS
Start condition setup time relative to SCL edge	t_{SUSTA}	0.1		µS
Data hold time on SDA relative to SCL edge	t_{HDDAT}	0		µS
Data setup time on SDA relative to SCL edge	t_{SUDAT}	0.1		µS
Stop condition setup time on SCL	t_{SUSTO}	0.1		µS
Bus free time between stop condition and start condition	t_{BUS}	2		µS
[1)] Combined low and high widths must equal or exceed minimum SCLK period.				

I²C Timing Diagram



Output Transfer Function



Pressure	% Output	Decimal Counts	Hexadecimal Counts
Pmin	10	1638	0x0666
Pmid	50	8192	0x2000
Pmax	90	14746	0x399A

$$Output\ (Counts) = \frac{P\ (applied) - P\ (min)}{P\ (max) - P\ (min)}\ X\ [Output\ (max) - Output\ (min)]$$

Where:

Output (max) = 14746 decimal counts

Output (min) = 1638 decimal counts

NPI-19 Series - Ordering Information

NPI-19 NovaSensor Digital Pressure Sensor

Code	Thread
A	w/o thread
J	1/8 NPT -27
M	M12*1.5

Code	Pressure Ranges
002	2.5 psi (17.2 kPa)
005	5 psi (34.5 kPa)
015	15 psi (103 kPa)
030	30 psi (207 kPa)
100	100 psi (689 kPa)
200	200 psi (1379 kPa)
300	300 psi (2068 kPa)

Code	Pressure Type
A Absolute	15 psi and above
G Gauge	

Code	Output
2	I^2C Output

NPI-19 J - 100 G 2

NPI-19J-100G2: NPT port, 100 psi gauge with I^2C output and 2 inch flex strip

Custom pressure ranges and cable options available upon request.

Warranty

Amphenol Advanced Sensors warrants its products against defects in material and workmanship for 12 months from the date of shipment. Products not subjected to misuse will be repaired or replaced. Amphenol Advanced Sensors reserves the right to make changes without further notice to any products herein. Amphenol Advanced Sensors makes no warranty, representation or guarantee regarding the suitability of its products for any particular application, nor does Amphenol Advanced Sensors assume any liability arising out of the application or use of any product or circuit and specifically disclaims and all liability without limitation consequential or incidental damages. The foregoing warranties are exclusive and in lieu of all other warranties, whether written, oral, implied or statutory. No implied statutory warranty of merchantability or fitness for particular purpose shall apply.

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