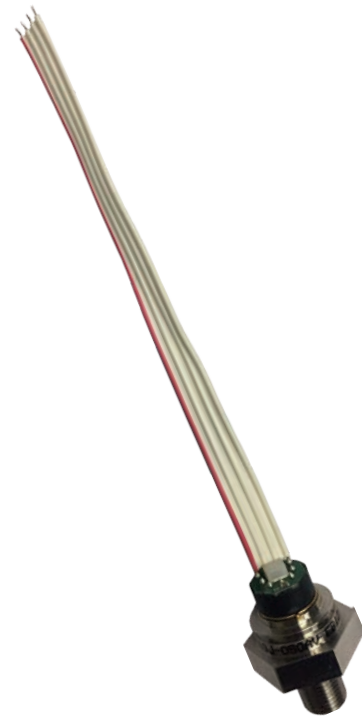# NOVA SENSOR

NPI-19 Series
Digital Pressure Sensor I^{2}C

Applications

- Level control

- Tank level measurement

- Corrosive fluids and gas measurement

- Barometric pressure measurement

Features

- Weldable or threaded process fittings

- Linearity +/- 0.25% FSO (BFSL)

- +/- 1% total error band

- I^{2}C interface protocols

- 14 bit I^{2}C output

- Absolute and gage pressure

- Pressure ranges from 0 to 17 kPa (2.5 psi) to 1700 kPa (247 psi)

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NPI-19 I²C Series Specifications

Supply Voltage:
- 2.7V to 5.5V (typical: 3.3V)

Pressure Output:
- 5% to 95% / 10% to 90%

Linearity:
- +/- 0.25% FSO

Total Error:
- +/- 1% FSO

Over Pressure:
- 2X

Burst Pressure:
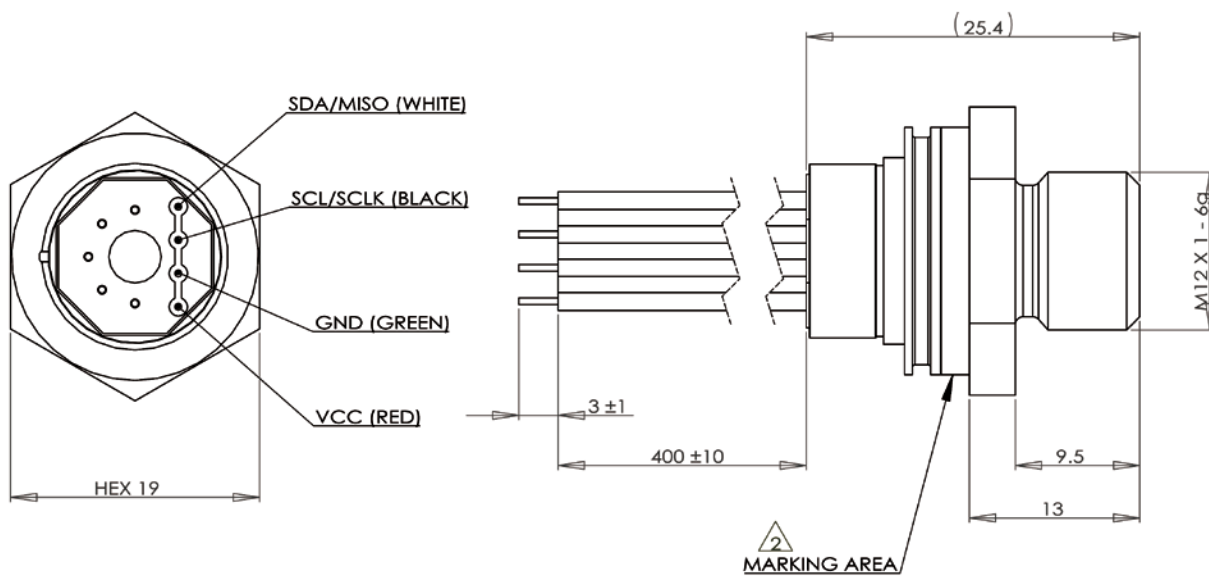- 3X

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

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

Storage Temperature:
- -40°C to 125°C

NPI-19 I²C Dimensions

Parameter	Specification
Pressure output	5% to 95%
Device address	I²C (Addr 0x28H)
Linearity	+/- 0.25 % FSO
Total error band	+/- 1 % FSO
Supply voltage	3.3V
Overpressure	2X
Burst pressure	3X
Operating temperature	-40°C to 125°C
Storage temperature	-40°C to 125°C

NPI-19 I²C Series Specifications

Sensor Output

Parameters	Typical	Units
Zero Pressure Output (10% - 90%)	666	Count Hex
Zero Pressure Output (5% - 95%)	333	Count Hex
Full Scale Pressure Output (10% - 90%)	399A	Count Hex
Full Scale Pressure Output (5% - 95%)	3CCB	Count Hex

Electrical Specifications

POWER UP					
Symbol	Parameter	Limits		Unit	Remark
		Min	Max		
T_{STA1}	Start-up Time		1	ms	VDD ramp up to interface communication
T_{STA2}			2.5	ms	VDD ramp up to analog operation
T_{WUP1}	Wake-up Time		0.5	ms	Sleep to Active State interface communication
T_{WUP2}			2	ms	Sleep to Active State analog operation

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	-	-	8	kV
T_{STOR}	Storage Temperature	-40	-	120	°C

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.
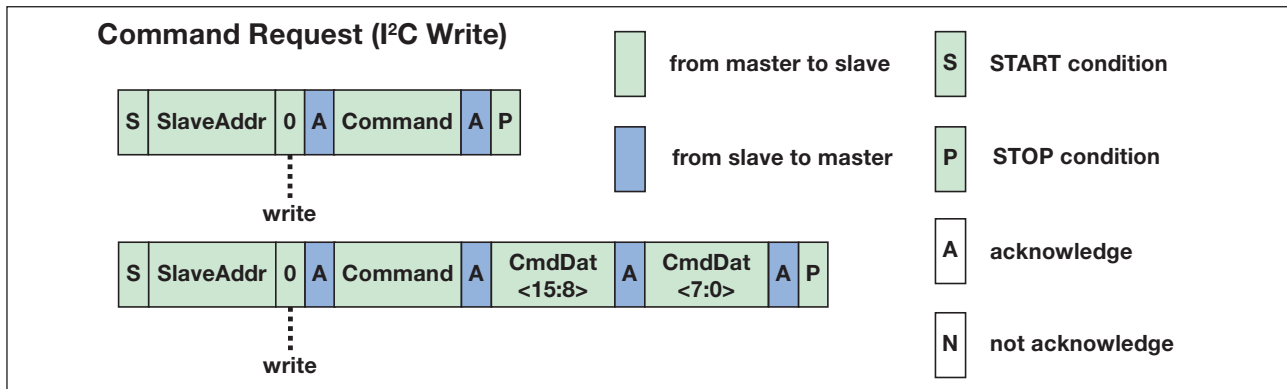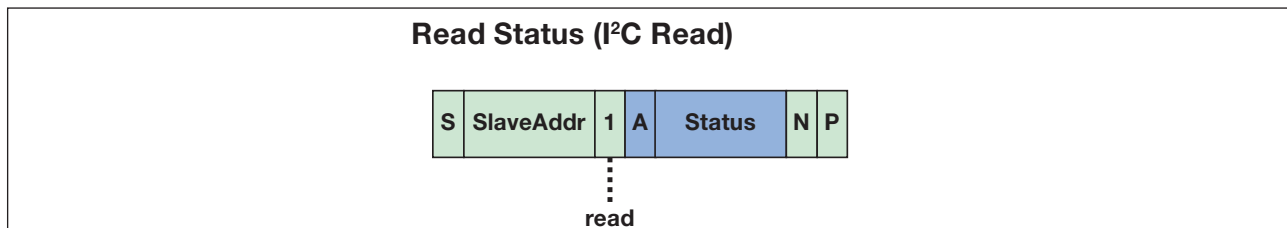
Command Request (I²C Write)

| S | SlaveAddr | 0 | A | Command | A | P |

write

| S | SlaveAddr | 0 | A | Command | A | CmdDat <15:8> | A | CmdDat <7:0> | A | P |

write

Legend:
- from master to slave (green)
- from slave to master (blue)
- S — START condition
- P — STOP condition
- A — acknowledge
- N — not acknowledge

Figure 1 - I²C Command Request

Read Status (I²C Read)

| S | SlaveAddr | 1 | A | Status | N | P |

read

Figure 2 - I²C Read Status

Read Data (I²C Read)

(a) Example after the completion of a Memory Read command

| S | SlaveAddr | 1 | A | Status | A | MemDat <15:8> | A | MemDat <7:0> | N | P |

read

(b) Example after the completion of a Full Measurement command (AC_HEX)

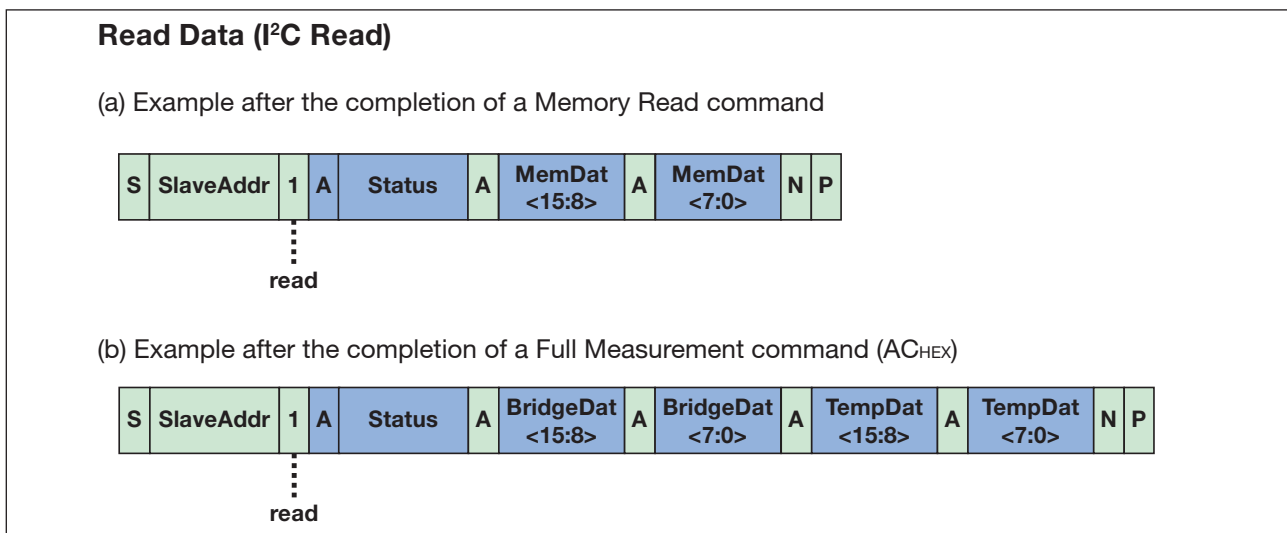| S | SlaveAddr | 1 | A | Status | A | BridgeDat <15:8> | A | BridgeDat <7:0> | A | TempDat <15:8> | A | TempDat <7:0> | N | P |

read

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.

I^{2}C Parameters

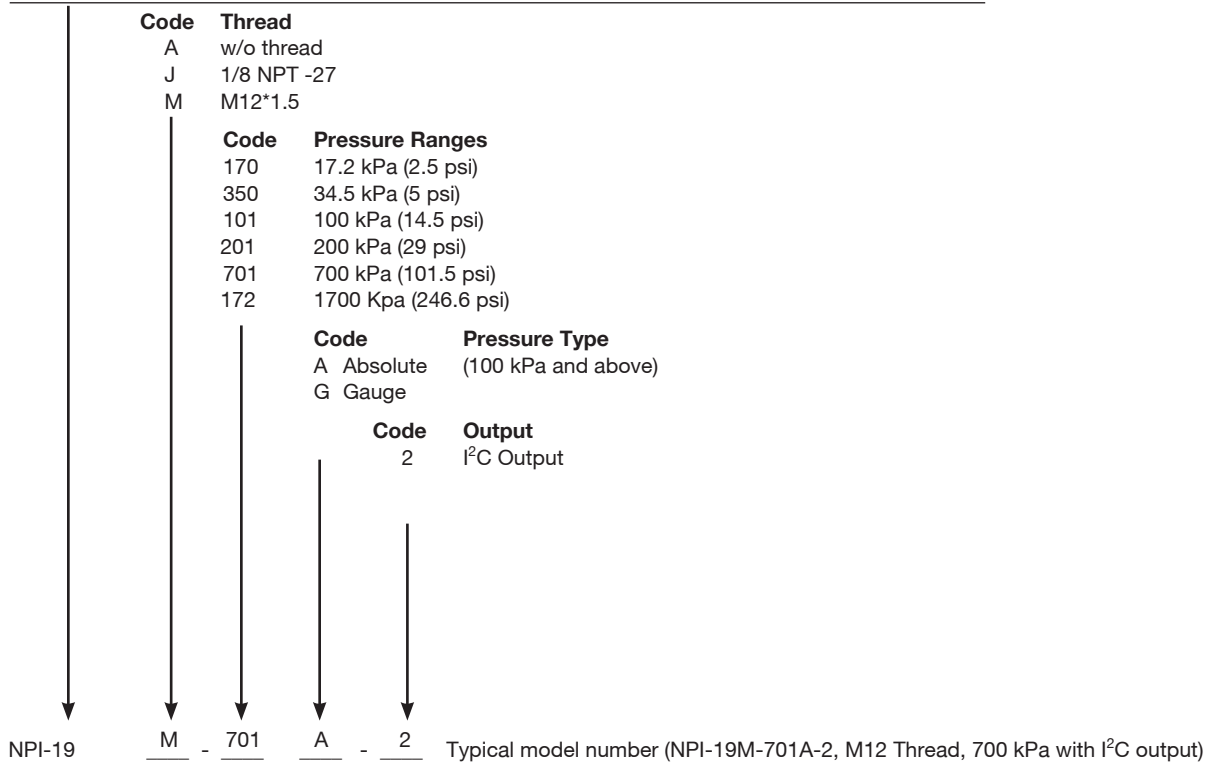| Parameter	Symbol	Min.	Max.	Units
SCL clock frequency	f$_{FCL}$	100	400	kHz
Start condition hold time relative to SCL edge	t$_{HDSTA}$	0.1		µS
Minimum SCL clock low width [1]	t$_{LOW}$	0.6		µS
Minimum SCL clock high width [1]	t$_{HIGH}$	0.6		µS
Start condition setup time relative to SCL edge	t$_{SUSTA}$	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.				

I^{2}C Timing Diagram
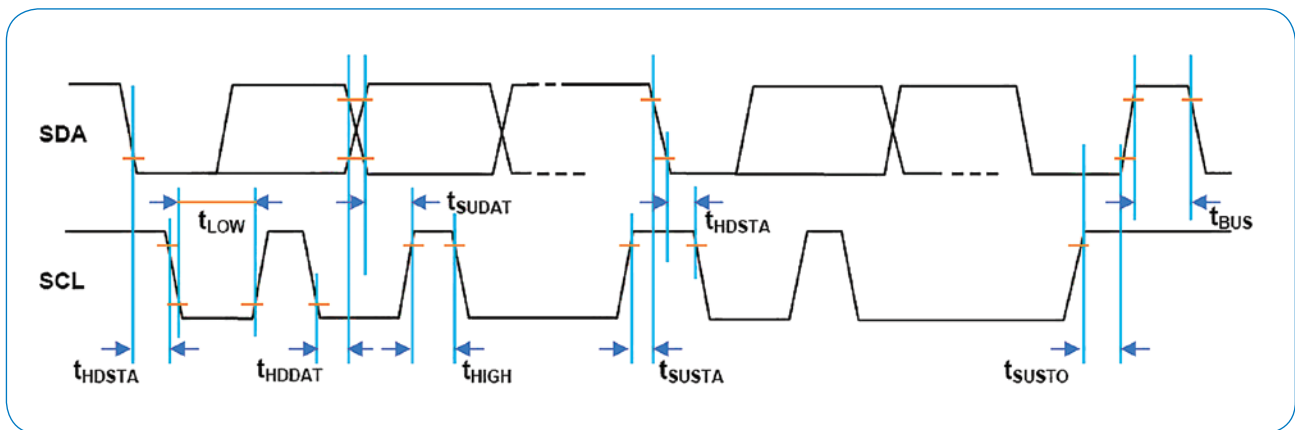
Warranty

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.

NPI-19 I^{2}C 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
170	17.2 kPa (2.5 psi)
350	34.5 kPa (5 psi)
101	100 kPa (14.5 psi)
201	200 kPa (29 psi)
701	700 kPa (101.5 psi)
172	1700 Kpa (246.6 psi)

Code		Pressure Type
A	Absolute	(100 kPa and above)
G	Gauge	

Code	Output
2	I^{2}C Output

NPI-19 ___ M ___ - ___ 701 ___ - ___ A ___ - ___ 2 ___   Typical model number (NPI-19M-701A-2, M12 Thread, 700 kPa with I^{2}C output)

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