

Pressure Module (PM)

ACCURACY

bar (Gauge Pressure)

3, 10, and 30 bar modules

0 to 30% of Range: $\pm(0.0075\%$ of Full Scale)

30 to 110% of Range: $\pm(0.025\%$ of Reading)

Vacuum: $\pm(0.06\%$ of Full Scale*, typical)

* Full Scale = -1.0 bar

100 and 300 bar modules

0 to 30% of Range: $\pm(0.015\%$ of Full Scale)

30 to 110% of Range: $\pm(0.05\%$ of Reading)

700 and 1000 bar modules

0 to 30% of Range: $\pm(0.03\%$ of Full Scale)

30 to 110% of Range: $\pm(0.1\%$ of Reading)

Includes all effects of linearity, hysteresis, repeatability, temperature, and stability for one year.

All models indicate vacuum, but vacuum specification (typical) applies to 3, 10, and 30 bar models only.

Not recommended for continuous use at high vacuum. Refer to XP2i-DP data sheet for gauges that are intended for continuous high vacuum use.

barA (Pressure with BARO module)

3 bar module

0.0138 to 1.0000 barA: ± 0.0008 barA, typical

1.0000 to 4.0000 barA: $\pm(0.025\%$ of Reading) + 0.0003 barA

10 bar module

0.0138 to 1.0000 barA: ± 0.0008 barA, typical

1.0000 to 4.0000 barA: ± 0.0010 barA

4.0000 to 11.0000 barA: $\pm(0.025\%$ of Reading)

30 bar module

0.014 to 1.000 barA: ± 0.001 barA, typical

1.000 to 10.000 barA: ± 0.003 barA

10.000 to 31.000 barA: $\pm(0.025\%$ of Reading)

100 bar module

1.000 to 31.000 barA: ± 0.015 barA

31.000 to 101.000 barA: $\pm(0.05\%$ of Reading)

300 bar module

1.00 to 91.00 barA: ± 0.05 barA

91.00 to 301.00 barA: $\pm(0.05\%$ of Reading)

700 bar module

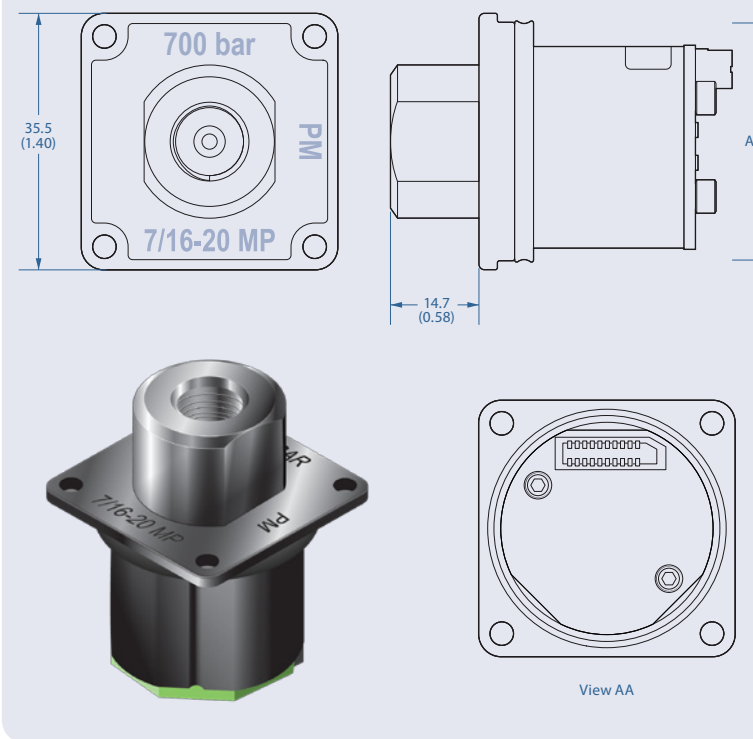
1.00 to 211.00 barA: ± 0.21 barA

211.00 to 701.00 barA: $\pm(0.1\%$ of Reading)

1000 bar module

1.00 to 301.00 barA: ± 0.30 barA

301.00 to 1001.00 barA: $\pm(0.1\%$ of Reading)



DIFFERENTIAL PRESSURE MEASUREMENT UNCERTAINTIES WITH TARE

The Tare function can improve measurement uncertainties on two modules with the same full scale pressure range installed into one nVision Reference Recorder. Requires the use of an equalizing valve.

The following specifications apply to the measurement system with a logging interval of 1 second/reading:

Full Scale Range of Both Sensors	The Greater of (+/-)					% of DP Reading
	mbar	PSI	inH ₂ O	mmH ₂ O		
3	0.04	0.0005	0.014	0.4	or	0.025%
10	0.10	0.0015	0.04	1.0	or	0.025%
30	0.4	0.005	0.14	4.0	or	0.025%
100	1.0	0.02	0.4	10.0	or	0.05%
300	4.0	0.05	1.4	n/a	or	0.05%
700	10.0	0.2	4.0	n/a	or	0.1%
1000	15.0	0.3	6.0	n/a	or	0.1%

Unit must be enabled in CrystalControl

DIFFERENTIAL PRESSURE MEASUREMENT UNCERTAINTIES WITHOUT TARE

The total nVision Reference Calibrator measurement uncertainty in the ΔP mode configuration will need to consider the uncertainties of both pressure modules. We recommend the module uncertainties to be combined with the preferred square root of the sum of the squares (or "root sum squares") method.

The following table lists the possible combinations of combining Pressure Modules (PM) with different accuracy statements. The uncertainties reported below are without using the Tare feature which will greatly improve your measurement uncertainty.

		Upper Pressure Module Uncertainties (of Static Line Pressure) (of Reading)		
		0.025%	0.05%	0.10%
Lower Pressure Module Uncertainties (of Static Line Pressure) (of Reading)	0.025%	0.035%	0.056%	0.103%
	0.05%	0.056%	0.071%	0.112%
	0.10%	0.103%	0.112%	0.141%

SENSOR

Wetted Materials: (WRENCH TIGHT) **316 stainless steel**
(FINGER TIGHT) **316 stainless steel**
and Viton® (internal o-ring)

Diaphragm Seal Fluid: **Dow Corning® 200**

Connection: **Crystal CPF Female**

All welded, with a permanently filled diaphragm seal.

Metal to metal cone seal; O-ring can be removed if necessary.

Can be cleaned and certified for oxygen service.

1/4" medium pressure tube system compatible with HIP LM4 and LF4 Series, Autoclave Engr SF250CX Male and Female Series.

CPF Adapters to NPT, BSP, and M20 available.

BAROMETRIC REFERENCE (BARO)

Accuracy: **± 0.5 mbar, ± 0.00725 PSI**

Range: **700.0 to 1100.0 mbarA,**
10.153 to 15.954 PSIA

Units and Resolution: **mbar** **0.1**
PSI **0.001**
inHg **0.001**
mmHg **0.01**

Pressure Connection: **Cylindrical sensor fitting of 5.8mm**
OD. A flexible 4.8 mm [3/16"] ID
tube is recommended to connect for
for calibration.

Mounting: **Secured using a 3/8" 4-40 plastic screw.**

Exposure to environmental extremes of temperature, shock, and/or vibration may warrant a more frequent recertification period.

Other units available depending on the installed modules.

Includes all effects of linearity, hysteresis, repeatability, temperature, and stability for one year.



Current, Voltage, & Switch Test Module (MA20)

Intended for use with a 4-20mA loop measurement. This module is also capable of measuring supply voltages and has an auxiliary fixed output for use in switch open/closure testing. Each MA20 module includes a super flexible silicone test lead kit (P/N 3952).

CURRENT & VOLTAGE MEASUREMENT

Current (mA) Input

Accuracy: $\pm(0.015\% \text{ of rdg} + 0.002 \text{ mA})$

Range: **0 to 55 mA (MA20+)**
0 to 25 mA (MA20)

Max Allowable Current: **93.3 mA**

Resolution: **0.001 mA or 0.01%**

Units: **mA, % 4-20, % 10-50**

Input Resistance: **< 17.2 Ω**

Voltage Burden @ 20mA: **< 0.35 V**

Voltage Burden @ 50mA: **< 0.86 V**

HART Resistance: **250 Ω**

Connection: **2mm jacks**

WARNING: ATEX and IECEx certification does not allow the installation of two MA20 modules.

Inputs protected by a resettable fuse.

Includes all effects of linearity, hysteresis, repeatability, temperature, and stability for one year.

mA can be displayed as a percentage, where 0 to 100% corresponds to either 4 to 20 mA or 10 to 50 mA.

Jacks are compatible with safety sheathed banana plugs.

Voltage (VDC) Input

Accuracy: $\pm(0.015\% \text{ of rdg} + 0.002 \text{ VDC})$

Range: **0 to 28 VDC**

Max Allowable Voltage: **30 VDC**

Resolution: **0.001 VDC**

Units: **VDC**

Includes all effects of linearity, hysteresis, repeatability, temperature, and stability for one year.

Switch Test

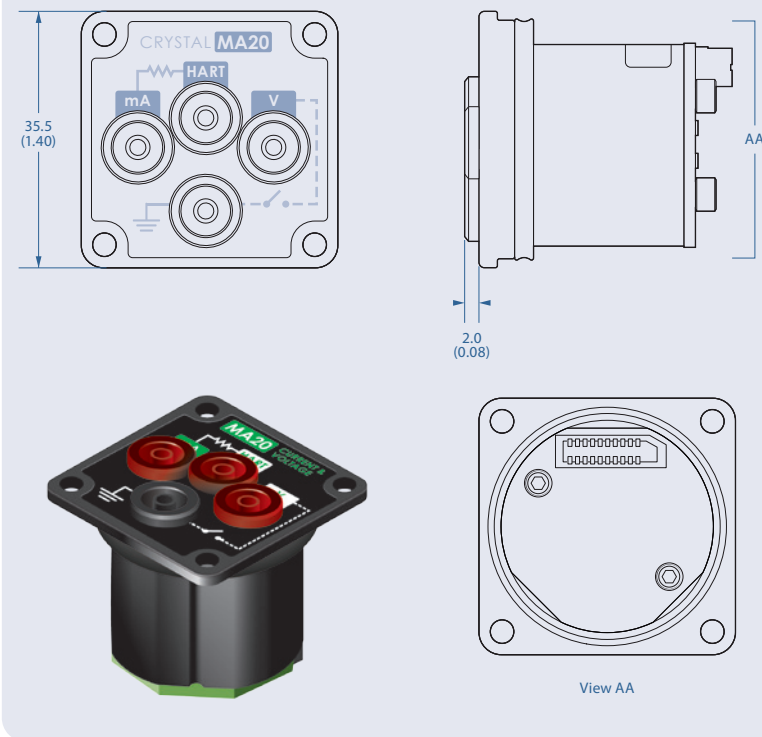
Switch Type: **Dry Contact**

Closed State Resistance: **< 10 Ω**

Open State Resistance: **> 10 M Ω**

Switch state change indicated by bright green LED flash.

Switch test screen reports switch open, close, and deadband values.



ATEX and IECEx Scheme Entity Parameters

The MA20 Module has these specific input entity parameters:

Ui = 28 V	Uo = 6.6 V
Ii = 93.3 mA	Io = 4.45 mA
Pi = 653.3 mW	Po = 7.34 mW
Ci = 0.36 μF	Co = 0.5 μF*
Li = 39.1 μH	Lo = 12 μH**

* Dependent on the supply to the terminals but shall not be greater than 0.5 μ F

** Total cable inductance between all modules



nVision bar Data Sheet

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Temperature Module (RTD100)

Calibrated for Pt100 RTD/PRT (100 Ohms at 0°C Platinum Resistance Temperature Detector) sensors conforming to DIN/IEC 60751 (or IEC751) with US, Euro, or Lab calibration curves. An RTD is not included, but each RTD100 includes P/N 3953 RTD Connection Kit.

TEMPERATURE MEASUREMENT

Resistance Input

Accuracy: $\pm (0.015\% \text{ of rdg} + 0.02 \Omega)$

Range: **0 – 400 Ohms range for use with 100 Ohm PRTs**

Resolution: **0.01 on all scales**

Units: °C, K, °F, R, Ω

TCRs: **0.003850 $\Omega/\Omega/^\circ\text{C}$ (IEC 60751), 0.003911 $\Omega/\Omega/^\circ\text{C}$ (US Industrial Std), 0.003926 $\Omega/\Omega/^\circ\text{C}$**

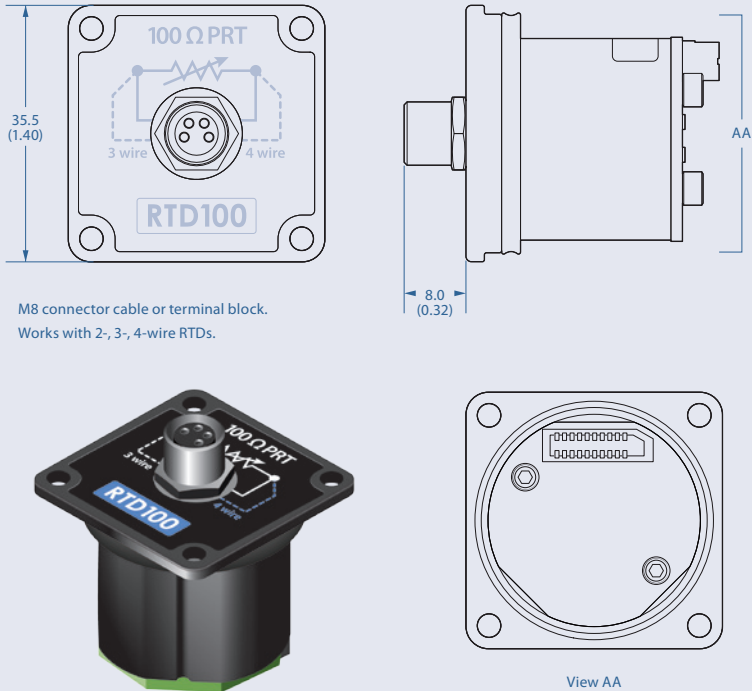
Wiring: **2-, 3-, 4-wire support**

Connection: **M8 connector cable or terminal block**

Includes all effects of linearity, hysteresis, repeatability, temperature, and stability for one year.

The proper selection of the RTD sensing element is very important as the error associated with this device is the majority of the overall system measurement uncertainty. IEC 751 is the standard that defines the temperature versus resistance for 100 Ω , 0.00385 $\Omega/\Omega/^\circ\text{C}$ platinum RTDs. IEC 751 defines two classes of RTDs: Class A and B. Class A RTDs operate over the -200° to 630°C range versus -200° to 800°C for the Class B elements. For example, the Class A uncertainty is about half that of the Class B elements as illustrated in the following table.

Temperature	nVision Uncertainty		Class A				Class B			
			Class A Uncertainty		nVision + Class A Uncertainty		Class B Uncertainty		nVision + Class B Uncertainty	
			$\pm\Omega$	$\pm^\circ\text{C}$	$\pm\Omega$	$\pm^\circ\text{C}$	$\pm\Omega$	$\pm^\circ\text{C}$	$\pm\Omega$	$\pm^\circ\text{C}$
°C	$\pm\Omega$	$\pm^\circ\text{C}$								
-200	0.02	0.05	0.24	0.55	0.24	0.55	0.56	1.30	0.56	1.30
0	0.04	0.09	0.06	0.15	0.07	0.17	0.12	0.30	0.12	0.31
200	0.05	0.13	0.2	0.55	0.21	0.56	0.48	1.30	0.48	1.31
400	0.06	0.17	0.33	0.95	0.33	0.96	0.79	2.30	0.79	2.31
600	0.07	0.21	0.43	1.35	0.44	1.37	1.06	3.30	1.06	3.31
800	0.08	0.25	0.52	1.75	0.53	1.77	1.28	4.30	1.28	4.31



ATEX and IECEx Scheme Entity Parameters

The RTD100 Module has these specific input entity parameters:

$U_i = 0 \text{ V}$
 $I_i = 0 \text{ A}$
 $P_i = 0 \text{ W}$
 $U_o = 9.73 \text{ V}$
 $I_o = 1.6642 \text{ A}$
 $P_o = 1.1 \text{ W}$
 $C_o = 0.5 \mu\text{F}$
 $L_o = 12 \mu\text{H}^*$

* Total cable inductance between all modules



nVision bar Data Sheet

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nVision Chassis (NV)

OPERATING TEMPERATURE

Temperature Range: **-20° to 50°C (-4° to 122°F)**

< 95% RH, non-condensing. No change in accuracy over operating temperature range.

Applies to all modules.

DISPLAY

Screen: **255 x 160 pixel graphical display**

Sunlight readable LCD with integrated backlight.

Display Rate: **4 readings/second (standard)**
up to 10 readings/second (recording)

POWER

4 x AA: **200 hours, typical**

Ultra Low Power: **30 days, typical***

Approved Batteries: **The nVision is Intrinsically Safe only if powered by one of the following battery types:**

Approved Battery Type	Ta=	Marking
Rayovac Max Plus 815	-20° C to +50° C	Ex ia IIB T4 Ga
Duracell MN1500	-20° C to +45° C	
**Energizer E91, EN91	-20° C to +50° C	Ex ia IIB T3 Ga
Duracell MN1500		

*2 installed modules, 1 reading per 5 minute recording interval with Auto Shutoff enabled and 23°C ambient temperature

WARNING: Do not use the mini-USB serial interface in hazardous locations.

WARNING: Replace batteries with approved type in non-hazardous locations only

Uses 4 alkaline AA (LR6) batteries. Use of backlight reduces operating time.

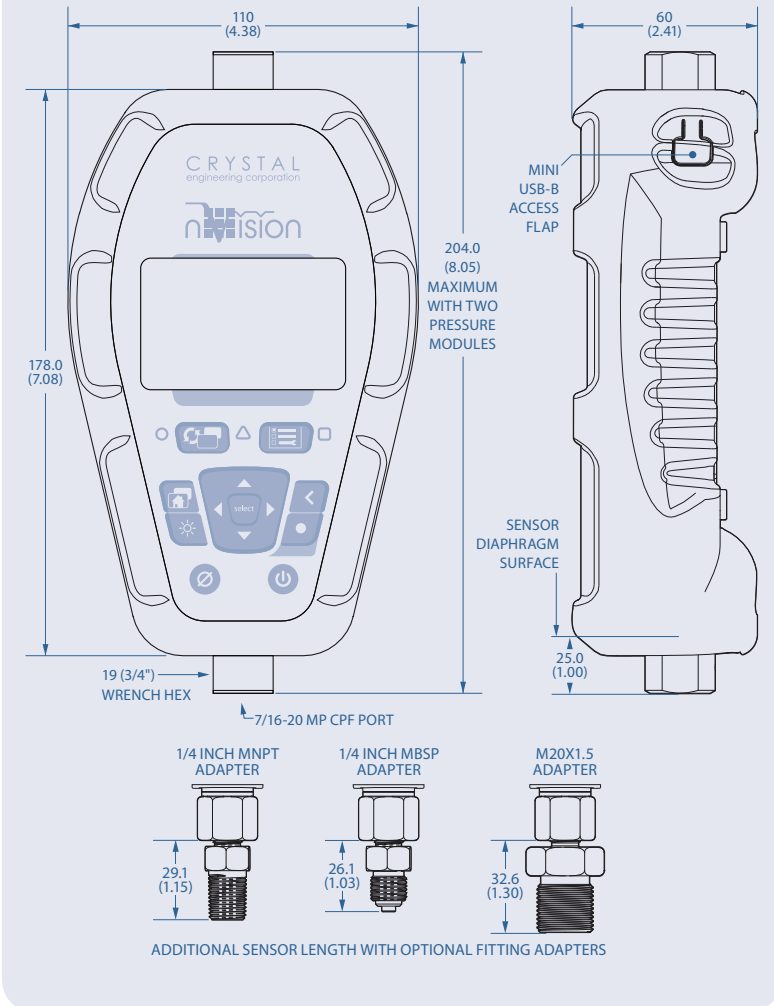
**Energizer is manufactured by Energizer Holdings, Inc., and the Eveready Battery Company, Inc.

DATA/COMMUNICATION

Digital Interface: **mini-USB**

The mini USB will power the nVision with or without the battery pack installed.

WARNING: Do not use the mini-USB serial interface in hazardous locations.



DATALOGGING

Capacity: **Approx. 1,000,000 data points***

Storage Type: **Non-volatile flash memory**

Fastest Interval: **10 per second**

Slowest Interval: **1 per hour**

**Datapoint count references applies to single sensor use (with no BARO module).*

Software available for download from our website. Compatible with 32 & 64 bit Windows 7 and Vista, and XP (32 bit only). Produces csv, xls, pdf, or signed pdf files, and uses Excel template files (samples included) to automatically format and graph data.

ENCLOSURE

Weight: **680 g (24.0 oz)**

Rating: **IP67**

Housing: **Impact resistant injection molded**

Keypad and Labels: **UV Resistant Polyester**

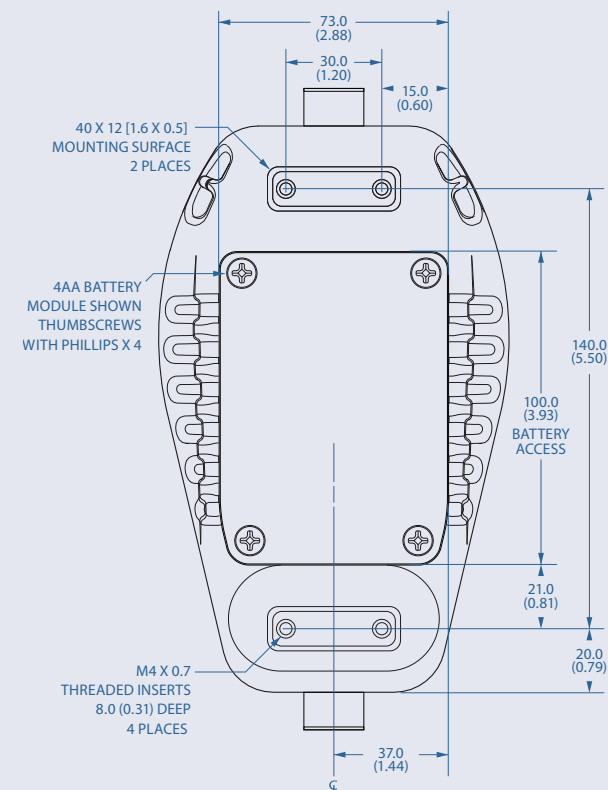
Mounting: **M4 x 0.7 [8 mm (0.31")] deep threaded insert mounting locations**

Weight includes one pressure module, one RTD module, 4AA battery module, and protective boot.

Submersible to 1 m for 30 minutes [IEC 60529].

LCD protected from impact damage by 1.5 mm (0.06") thick polycarbonate lens.

Skydrol® compatible.



STORAGE TEMPERATURE

Temperature Range: **-40° to 75°C (-40° to 167°F)**

Batteries should be removed if stored for more than one month.

SPECIAL FEATURES

The following requires the use of our free [CrystalControl software](#)

- User Defined Unit: **Define and display any pressure units not included, or to use the gauge to display force, level or other pressure related parameters.**
- Remove: **Unwanted pressure units.**
- Password Protect: **Changes to configuration or userspan calibration factor(s).**
- Display Screens: **Turn on and rearrange display screens.**
- Screen Numbers: **Number each display screen to make writing procedures around the nVision easier.**
- Run Tags: **Create and enable run tags that will identify logging runs.**
- Secure Documents: **Download into secure pdf documents for tamper proof records.**
- Start-up Screen: **Define a 32-character prompt which requires user acknowledgement at startup.**
- Pressure Switch Test: **Using a PM and MA20, get deadband and state-change pressure.**
- Data Point Counter: **Screen for counting the data points logged.**
- Averaging Screen: **Averages all points in a recording run.**
- Estimated Recording Time: **A CrystalControl calculation based on active screens and logging interval.**
- Live PC Graph: **During a recording, graph directly to your PC.**

CERTIFICATIONS



**II 1G Ex ia IIB T4 Ga or T3
SIRA 09ATEX2008X**

This product conforms to:
EN60079-0: 2006
EN60079-11: 2007
EN60079-26: 2007



**Ex ia IIB T4 Ga or T3
IECEx SIR09.0053X**

This product conforms to:
IEC 60079-0: 2004
IEC 60079-11: 2006
IEC 60079-26: 2007



nVision complies with the Electromagnetic Compatibility and the Pressure Equipment Directives. Refer to the EC Declaration of Conformity for specific details.



nVision is approved for use as a portable test instrument for Marine use and complies with Det Norsjke Veritas' Rules for Classification of Ships, High Speed & Light Craft and Offshore Standards.

RANGE & RESOLUTION TABLE

PM	Range	Over-Pressure	Display Resolution									
			bar	mbar	kPa	MPa	PSI	inch H ₂ O	inch Hg	mm Hg	mm H ₂ O	kg/cm ²
3BAR	3	3.0 x	0.0001	0.1	0.01		0.001	0.01	0.001	0.01	1	0.0001
10BAR	10	2.0 x	0.0001	0.1	0.01	0.00001	0.001	0.1	0.01	0.1	1	0.0001
30BAR	30	2.0 x	0.001	1	0.1	0.0001	0.01	0.1	0.01	0.1		0.001
100BAR	100	2.0 x	0.001		0.1	0.0001	0.1		0.1			0.001
300BAR	300	1.5 x	0.01		1	0.001	0.1		0.1			0.01
700BAR	700	1.5 x	0.01		1	0.001	1					0.01
1KBAR	1000	1.3 x	0.01		1	0.001	1					0.01

Add one digit of resolution for differential mode.

ORDERING INFORMATION

Product ID	Power	Module: Upper*	Module: Lower*	BARO Module?
NV	4AA			
		PM	PM	No: (omit)
		MA20	MA20	Yes: -BARO
		RTD100	RTD100	

*If ordering a nVision with only one module installed, please enter "BNKPLT" in the empty module slot.

SAMPLE PART NUMBERS

NV-4AA-3BAR-300BAR-BARO nVision with 3 bar pressure module (upper) and 300 bar pressure module (lower) with BARO module option

NV-4AA-RTD100-700BAR nVision with RTD100 temperature module (upper) and 700 bar pressure module (lower)

ACCESSORIES (Included with NV)

Soft Carrying Case P/N 4087

Durable, padded case with separate pockets for your nVision and accessories.

Protective Boot P/N 3985

Shock resistant protection, low durometer, Skydrol resistant.

Mini-USB Cable P/N 3951

Connect to your nVision with 6' [1.8m] cable.

COMPLIMENTARY PRODUCTS

Crystal Engineering offers a wide range of products that work with the nVision:

- [Fittings that connect without tools, safely and without leaks](#)
- [Lightweight, super flexible high pressure hoses](#)
- [Fitting kits and adapters](#)
- [Pneumatic hand pumps](#)
- [Hydraulic hand pumps](#)
- [Portable pressure comparators](#)
- [24VDC Loop Power Supply](#)
- [Software, for the quickest way to calibrate pressure transmitters and gauges](#)

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