

## Pressure Module (PM)

### ACCURACY

#### psi (Gauge Pressure)

30, 100, and 300 psi modules

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

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

Vacuum: For 30 and 100 psi

$\pm$  (0.06% of Full Scale\*)

For 300 psi

$\pm$  (0.06% of Full Scale\*)  $\pm$ 1 LSD

\* Full Scale = -14.5 psi

1000, 3000, 10 000, and 15 000 psi modules

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

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

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

*All models indicate vacuum, but vacuum specification applies to 30, 100, and 300 psi 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.*

#### psiA (Pressure with BARO module)

30 psi module

0.200 to 14.500 psiA:  $\pm$  0.011 psiA

14.500 to 44.500 psiA:  $\pm$  (0.025% of Reading) + 0.003 psiA

100 psi module

0.200 to 14.500 psiA:  $\pm$  0.011 psiA

14.500 to 44.500 psiA:  $\pm$  0.011 psiA

44.500 to 114.500 psiA:  $\pm$  (0.025% of Reading)

300 psi module

0.20 to 14.50 psiA:  $\pm$  0.01 psiA

14.50 to 104.50 psiA:  $\pm$  0.03 psiA

104.50 to 314.50 psiA:  $\pm$  (0.025% of Reading)

1000 psi module

14.5 to 314.5 psiA:  $\pm$  0.2 psiA

314.5 to 1014.5 psiA:  $\pm$  (0.05% of Reading)

3000 psi module

14.5 to 914.5 psiA:  $\pm$  0.5 psiA

914.5 to 3014.5 psiA:  $\pm$  (0.05% of Reading)

10 000 psi module

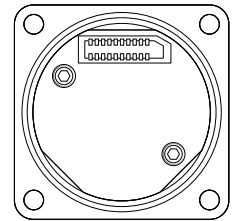
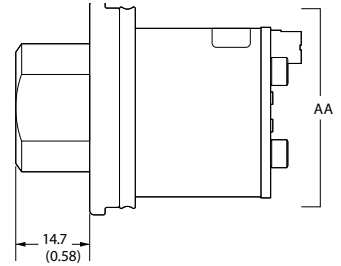
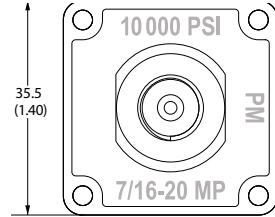
15 to 3015 psiA:  $\pm$  2 psiA

3015 to 10 015 psiA:  $\pm$  (0.05% of Reading)

15 000 psi module

15 to 4515 psiA:  $\pm$  3 psiA

4515 to 15 015 psiA:  $\pm$  (0.05% of Reading)



View AA

## 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 (+/-)				or	% of DP Reading
	psi	mbar	inH <sub>2</sub> O	mmH <sub>2</sub> O		
30	0.0005	0.04	0.014	0.4		0.025%
100	0.0015	0.10	0.04	1.0		0.025%
300	0.005	0.4	0.14	4.0		0.025%
1000	0.02	1.0	0.4	10.0		0.05%
3000	0.05	4.0	1.4	n/a		0.05%
10000	0.2	10.0	4.0	n/a		0.05%
15000	0.3	15.0	6.0	n/a		0.05%

Unit must be enabled in CrystalControl

## DIFFERENTIAL PRESSURE MEASUREMENT UNCERTAINTIES WITHOUT TARE

The total nVision Reference Calibrator measurement uncertainty in the  $\Delta P$  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 using Pressure Modules (PM) with different accuracy statements. The uncertainties reported below are without the use of the Tare feature, which will greatly improve your measurement uncertainty.

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

## SENSOR

Wetted Materials: (WRENCH TIGHT) **316 stainless steel**

(FINGER TIGHT) **316 stainless steel**  
and **Viton® (internal o-ring)**

Diaphragm Seal Fluid: **Silicone Oil**

Connection: **Crystal CPF♦ Female**

*All welded, with a permanently filled diaphragm seal.*

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

*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.*

*♦U.S. Patent No. 8,794,677*

## BAROMETRIC REFERENCE (BARO)

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

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

Units and Resolution: **psi..... 0.001**  
**inHg..... 0.001**  
**mmHg..... 0.01**  
**mbar..... 0.1**

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

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

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

*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.*

**Plastic non-conductive screw must be used to comply with hazardous location requirements.**



## 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)**

Max Allowable Current: **93.3 mA**

Resolution: **0.001 mA or 0.01%**

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

Input Resistance: **< 17.2  $\Omega$**

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

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

HART Resistance: **250  $\Omega$**

Connection: **2mm jacks**

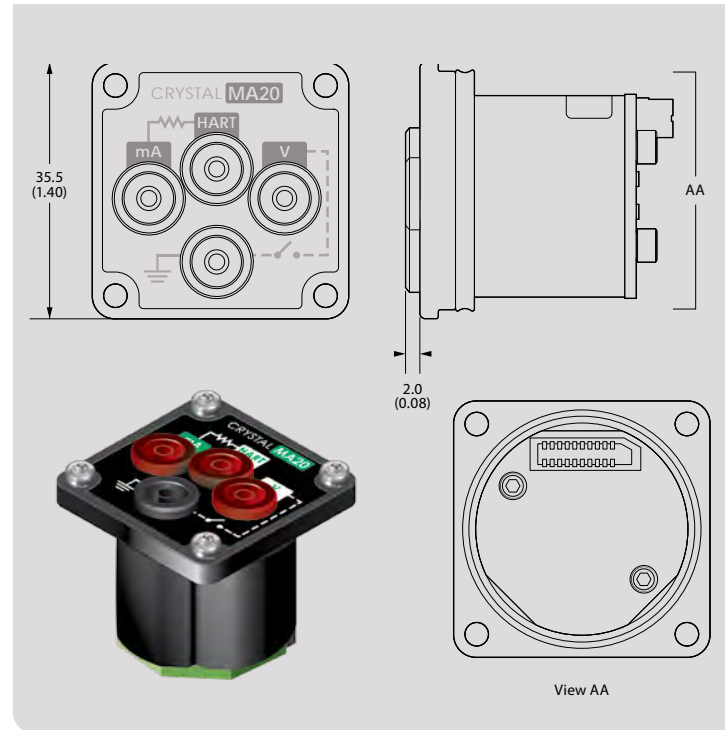
*Includes all effects of linearity, hysteresis, repeatability, temperature, and stability for one year.*

*For hazardous location product warnings, refer to the operation manual.*

*Inputs protected by a resettable fuse.*

*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  $\Omega$**

Open State Resistance: **> 10 M $\Omega$**

*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:

<b>Ui = 28 V</b>	<b>Uo = 6.6 V</b>
<b>Ii = 93.3 mA</b>	<b>Io = 4.45 mA</b>
<b>Pi = 653.3 mW</b>	<b>Po = 7.34 mW</b>
<b>Ci = 0.36 <math>\mu</math>F</b>	<b>Co = 0.5 <math>\mu</math>F*</b>
<b>Li = 39.1 <math>\mu</math>H</b>	<b>Lo = 12 <math>\mu</math>H**</b>

\* Dependent on the supply to the terminals but shall not be greater than 0.5  $\mu$ F

\*\* Total cable inductance between all modules

## 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,  $\Omega$**

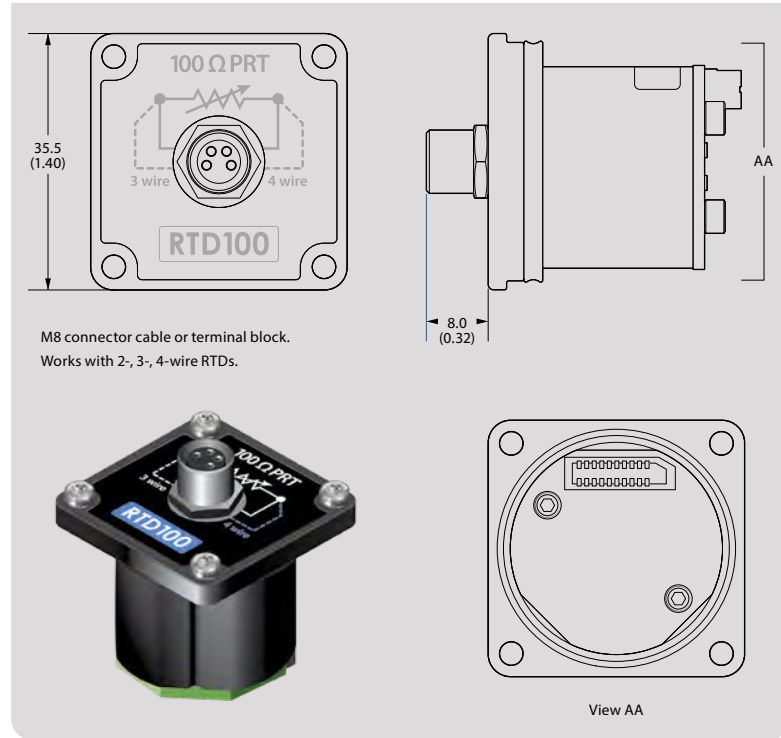
TCRs: **0.003850  $\Omega/\Omega/^\circ\text{C}$  (IEC 60751), 0.003911  $\Omega/\Omega/^\circ\text{C}$  (US Industrial Std), 0.003926  $\Omega/\Omega/^\circ\text{C}$**

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

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

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 $\Omega$ , 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.

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



M8 connector cable or terminal block. Works with 2-, 3-, 4-wire RTDs.

View AA

Temperature °C	nVision Uncertainty		Class A				Class B			
	nVision + Class A Uncertainty		Class B Uncertainty		nVision + Class B Uncertainty		Class A Uncertainty		nVision + Class A Uncertainty	
	$\pm\Omega$	$\pm^\circ\text{C}$	$\pm\Omega$	$\pm^\circ\text{C}$	$\pm\Omega$	$\pm^\circ\text{C}$	$\pm\Omega$	$\pm^\circ\text{C}$	$\pm\Omega$	$\pm^\circ\text{C}$
-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

## RANGE & RESOLUTION TABLE

PM	Range (psi)	Over-pressure	Display Resolution									
			psi	in H <sub>2</sub> O	in Hg	mm Hg	mm H <sub>2</sub> O	kg/cm <sup>2</sup>	bar	mbar	kPa	MPa
30PSI	30	3.0 x	0.001	0.01	0.001	0.01	1	0.0001	0.0001	0.1	0.01	
100PSI	100	2.0 x	0.001	0.1	0.01	0.1	1	0.0001	0.0001	0.1	0.01	0.00001
300PSI	300	2.0 x	0.01	0.1	0.01	0.1		0.001	0.001	1	0.1	0.0001
1KPSI	1000	2.0 x	0.1		0.1			0.001	0.001		0.1	0.0001
3KPSI	3000	1.5 x	0.1		0.1			0.01	0.01		1	0.001
10KPSI	10 000	1.5 x	1					0.01	0.01		1	0.001
15KPSI	15 000	1.3 x	1					0.01	0.01		1	0.001

(Add one digit of resolution for differential mode.)