

**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: For 3 and 10 bar

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

For 30 bar

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

\* Full Scale = -1.0 bar

**100, 300, 700, and 1000 bar**

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 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:  $\pm$  0.0008 barA

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

**10 bar module**

0.0138 to 1.0000 barA:  $\pm$  0.0008 barA

1.0000 to 4.0000 barA:  $\pm$  0.0010 barA

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

**30 bar module**

0.014 to 1.000 barA:  $\pm$  0.001 barA

1.000 to 10.000 barA:  $\pm$  0.003 barA

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

**100 bar module**

1.000 to 31.000 barA:  $\pm$  0.015 barA

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

**300 bar module**

1.00 to 91.00 barA:  $\pm$  0.05 barA

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

**700 bar module**

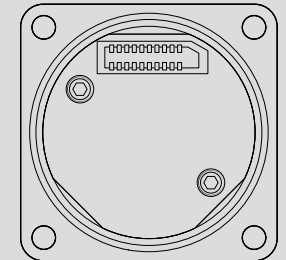
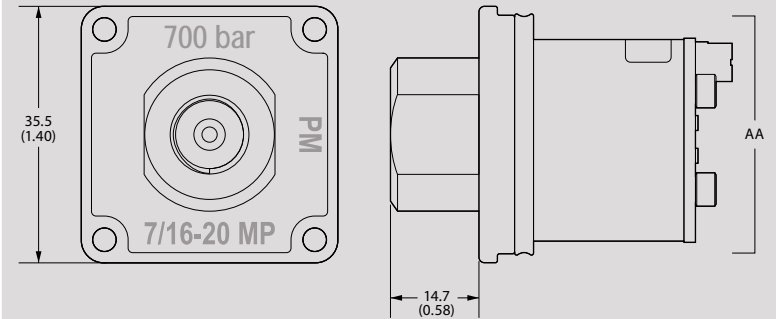
1.00 to 211.00 barA:  $\pm$  0.11 barA

211.00 to 701.00 barA:  $\pm$  (0.05% of Reading)

**1000 bar module**

1.00 to 301.00 barA:  $\pm$  0.15 barA

301.00 to 1001.00 barA:  $\pm$  (0.05% of Reading)



View AA

*Mating CPF adapter is not included. Please choose a mating adapter for your application from our [CPF data sheet](#).*

## 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
	bar	mbar	psi	inH <sub>2</sub> 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	0.05%
1000	15.0	0.3	6.0	n/a	or	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: **± 0.5 mbar, ± 0.00725 psi**  
Range: **700.0 to 1100.0 mbarA,**  
**10.153 to 15.954 psiA**  
Units and Resolution: **psi** ..... **0.001**  
**inHg** ..... **0.001**  
**mmHg** ..... **0.01**  
**mbar** ..... **0.1**  
Calibration Connection: **Rear port requires a flexible**  
**4.8 mm [3/16"] ID tube to connect**  
**for calibration.**

*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.*  
*Provides Absolute Pressure measurement capability in combination with Pressure Module (PM).*

## 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). **Note:** Only one MA20 module can be installed at a time.

### CURRENT & VOLTAGE MEASUREMENT

#### Current (mA) Input

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

Range: **0 to 55 mA**

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.*

*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

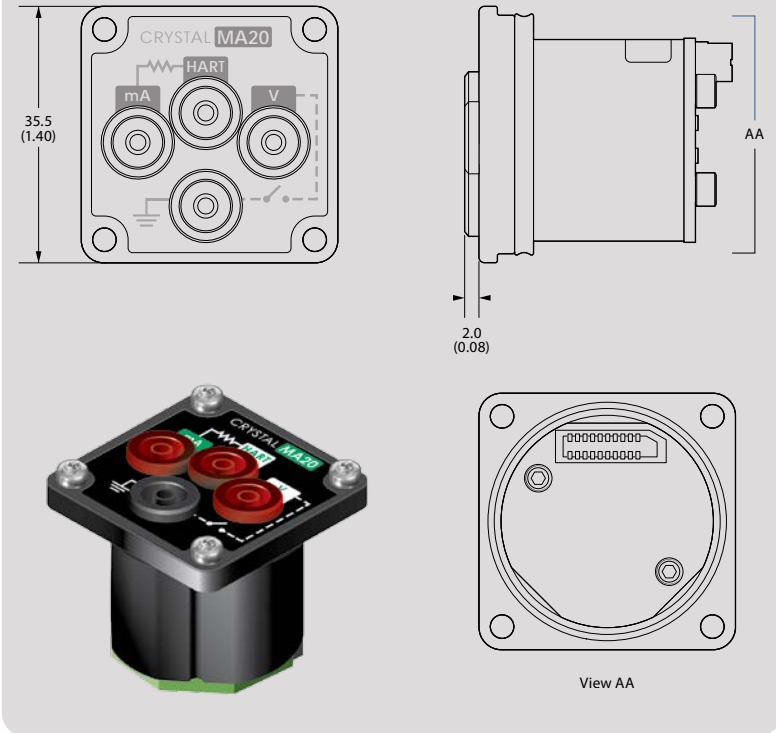
Switch Type: **Dry Contact**

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.*



## 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  $\Omega/\Omega/^\circ\text{C}$**

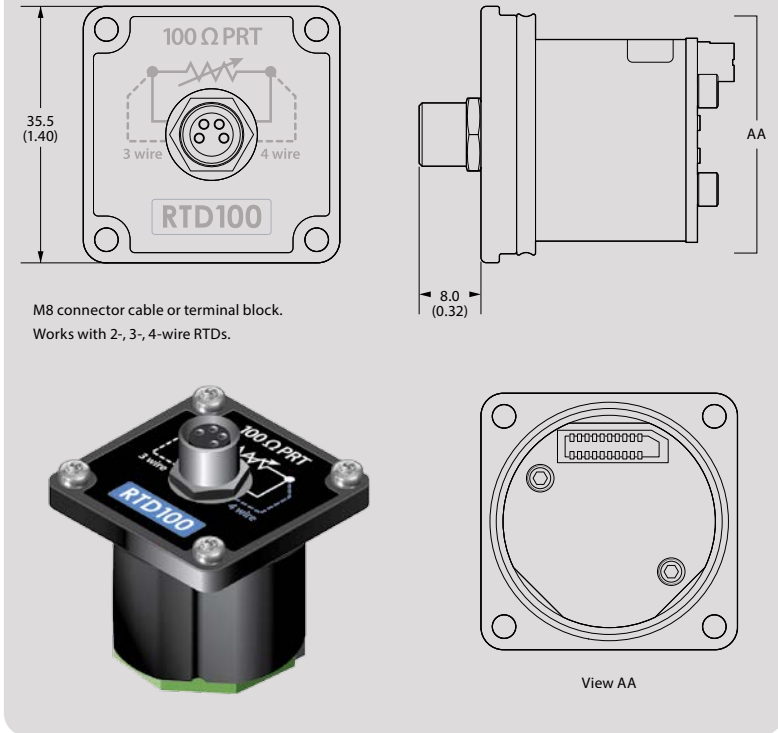
Wiring: **2-, 3-, 4-wire support**

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

*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 $\Omega$ , 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 $^\circ\text{C}$  range versus -200 to 800 $^\circ\text{C}$  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 $^\circ\text{C}$	nVision Uncertainty		Class A				Class B			
			Class A Uncertainty		nVision + Class A Uncertainty		Class B Uncertainty		nVision + Class B Uncertainty	
	$\pm\Omega$	$\pm^\circ\text{C}$	$\pm\Omega$	$\pm^\circ\text{C}$	$\pm\Omega$	$\pm^\circ\text{C}$	$\pm\Omega$	$\pm^\circ\text{C}$	$\pm\Omega$	$\pm^\circ\text{C}$
-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



**nVision Lab (NL)**

**OPERATING TEMPERATURE**

Temperature Range: **10 to 50° C (50 to 122° F)**

< 95% RH, non-condensing. No change in accuracy over operating temperature range. Gauge must be zeroed to achieve rated specification.

Applies to all modules.

**DISPLAY**

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

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

**POWER**

Power: **100 - 240VAC, 50-60 Hz, with international plug adapters**



**DATA/COMMUNICATION**

Digital Interface: **mini-USB**

**DATALOGGING**

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

*\*Single Module Recording*

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

*Limit of 64 individual recordings.*

Fastest Interval: **10 per second**

*The included CrystalControl software is compatible with Vista (SP 2), Windows 7 (SP 1), Windows 8.1 and Windows 10.*

Slowest Interval: **1 per hour**

*Produces csv, xls, pdf, or signed pdf files, and uses Excel template files (samples included) to automatically format and graph data.*

**ENCLOSURE**

Weight: **2.2 kg (4.75 lbs)**

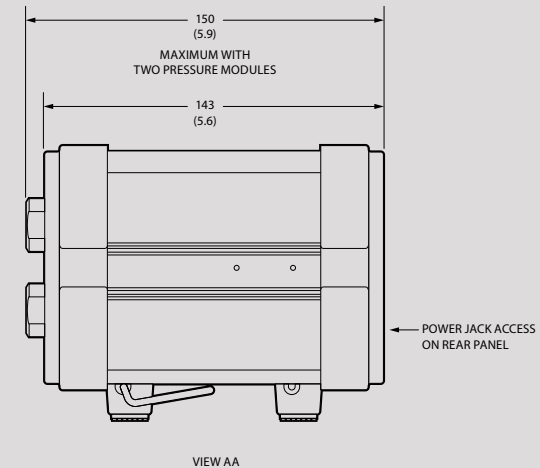
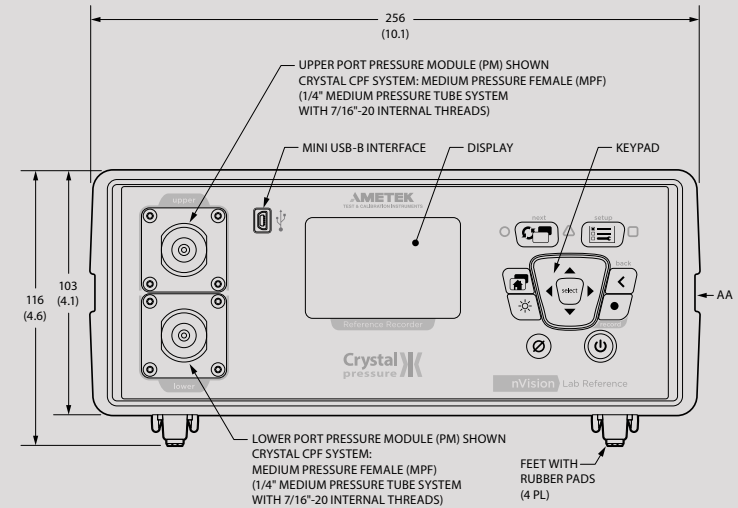
*Weight includes two pressure modules.*

Keypad and Labels: **UV Resistant Polyester**

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

**STORAGE TEMPERATURE**

Temperature Range: **0 to 75° C (32 to 167° F)**



ALL DIMENSIONS ARE IN MILLIMETERS (INCHES)

**SPECIAL FEATURES**

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

Averaging Screen: **Averages all points in a recording run.**

Data Point Counter: **Screen for counting the data points logged.**

Display Screens: **Turn on and rearrange display screens.**

Estimated Recording Time: **A CrystalControl calculation based on active screens and logging interval.**

Live PC Graph: **During a recording, graph directly to your PC.**

Password Protect: **Changes to configuration or userspan calibration factor(s).**

Pressure Switch Test: **Using a PM and MA20, get deadband and state-change pressure.**

Remove: **Unwanted pressure units.**

Run Tags: **Create and enable run tags that will identify logging runs.**

Screen Numbers: **Number each display screen to make writing procedures around the nVision easier.**

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.**

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.**

**RANGE & RESOLUTION TABLE**

PM	Range (bar)	Over-pressure	Display Resolution										
			bar	mbar	kPa	MPa	psi	in H <sub>2</sub> O	in Hg	mm Hg	mm H <sub>2</sub> O	kg/cm <sup>2</sup>	
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\***

Model	Power	Upper Module	Lower Module	BARO Module
NL	LAB	—	—	—
	Pressure:	PM	PM	No .... (omit)
	Current, Voltage, and Switch:	MA20	MA20	Yes... -BARO
	Temperature:	RTD100	RTD100	
	Blank Plate:	BNKPLT	BNKPLT	

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

SAMPLE PART NUMBERS

NL-LAB-**3BAR**-**300BAR**-**BARO** ..... nVision Lab with 3 bar pressure module (upper) and 300 bar pressure module (lower); and a BARO module option.

NL-LAB-**RTD100**-**700BAR** ..... nVision Lab with RTD100 temperature module (upper) and 700 bar pressure module (lower).

Mating CPF adapter is not included with pressure module (PM). Please choose a mating adapter for your application from our [CPF data sheet](#).

► **Choose the Appropriate Power Cord**

P/N	Region
4555	United States
4556	United Kingdom
4557	Europe
4558	Australia / New Zealand

\* BAR versions available in USA direct from factory only.



## STANDARD DELIVERY

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- nVision Lab Recorder
- CD Manual
- ISO 17025 Accredited Calibration Certificate, NIST Traceable
- Mini-USB Cable **P/N 3951**  
*See previous page for power cord options.*

## ACCESSORIES

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- BARO Calibration Kit **P/N 4547**
- Rack Mount Kit **P/N 4302**
- 24 Volt Loop Power Supply **P/N 24VDCPS**
- RTD Terminal Block **P/N 3953** (included with RTD100 module)
- Test Lead Kit **P/N 3952** (included with MA20 Module)

## COMPLEMENTARY PRODUCTS

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

- [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](#)
- [Software, for the quickest way to calibrate pressure transmitters and gauges](#)