

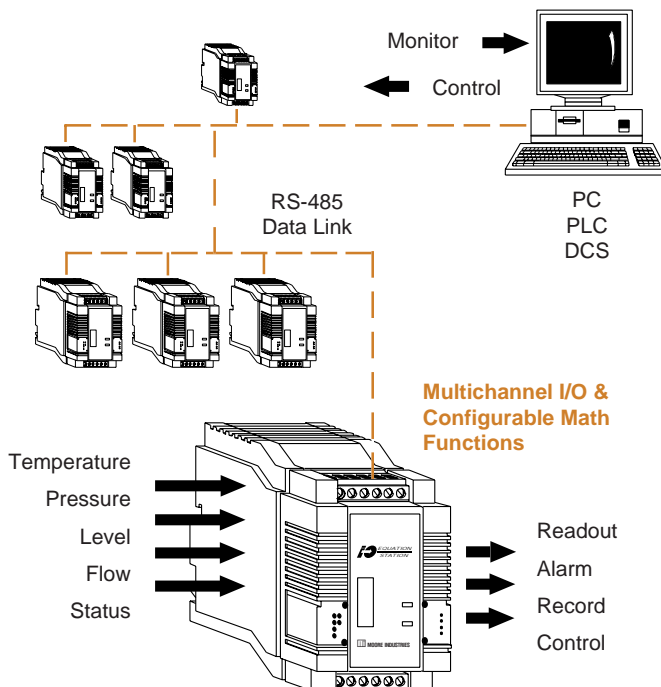
## Description

From simple signal conditioning, to sensor-level I/O, to complex distributed intelligence, the versatile **I/O EQUATION STATION**® is your solution. Even though it's the same size as a typical process instrument, this multifunction I/O module configures to handle both routine, and one-of-a-kind, applications:

- Distributed I/O & Field Multiplexing
- On/Off & Proportional Control
- Signal Conversion, Linearization, & Scaling
- Process Alarming & Switching
- Add, Subtract, Multiply, Divide, & Square Root
- Signal Comparison, Averaging, & Differential
- Minimum/Maximum & High/Low Selection
- Frequency Scaling & Pulse Accumulating
- Counting, Integrating, & Totalizing

Why specify an array of expensive single-function I/O, signal interface, alarm, math, and RTU modules? The **I/O EQUATION STATION** configures to do what you need... when you need it.

**Figure 1.** Create complete distributed data acquisition and control networks with the flexible **I/O EQUATION STATION**.



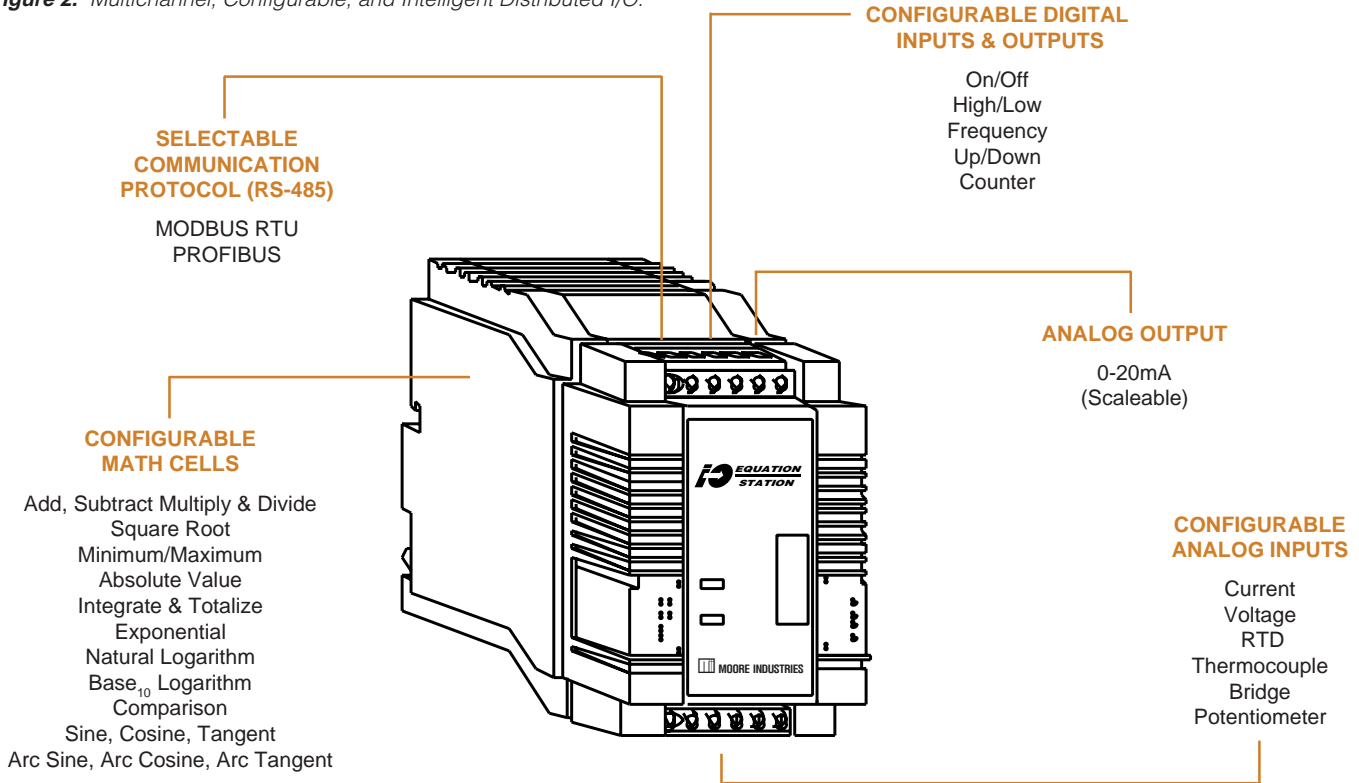
Combining configurable, multichannel I/O with programmable math functions, the **I/O EQUATION STATION** is really dozens of process instruments in one.

## Features

- **Programmable, Universal I/O.** Multichannel modules configure to handle mixes of current, voltage, RTD, T/C, discrete, and other input/output types.
- **Distributed, Sensor-Level I/O Saves Money.** Up to 127 modules multidrop on one data link, eliminating the need to run expensive point-to-point wiring for up to 1,016 monitoring and control signals.
- **MODBUS RTU and PROFIBUS Communication.** Universal RS-485 communication protocols provide trouble-free interface with PC, PLC, and DCS systems, and with other networkable instrumentation.
- **Application-Specific Math Capabilities.** One compact unit programs to handle simple or complex signal conditioning and computation activities.
- **On-Site or Remote Configuration.** Selection of all module functions can be made on-site or over the data link from a PC equipped with our Windows™ based configuration software.
- **Compatible with Third-Party Software.** Combines with popular MMI software to create custom SCADA and networked applications: INTEC Paragon, Intellution® FIX DMACS™, USDATA® FactoryLink®, and Wonderware® InTouch™.

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Figure 2. Multichannel, Configurable, and Intelligent Distributed I/O.



## Universal Plant Standard

The **I/O EQUATION STATION** combines configurable I/O with powerful field intelligence. Installed in your application, it cuts signal transmission costs, improves data accuracy and throughput time, simplifies MMI software configuration, and unloads your overburdened computer system.

There's no need to specify, stock, learn how to use, and then maintain a multitude of instruments. Over-worked personnel can focus on using one type of I/O. In addition, standardization will vastly reduce paperwork—especially if you support supplier certification programs, training records, and calibration schedules—such as those required for maintaining ISO 9000 accreditation.

**Designed for Today's Applications**—This flexible I/O system delivers the characteristics essential for modern, continually growing process systems. It is ideal for new applications where inexpensive operational changeability is necessary. It is the optimal solution for upgrading existing systems cost-effectively, especially those that have reached their design capacity.

### Your Solution When:

- You need a reliable, standard I/O interface between distributed field devices and computer-based DCS, PC, and PLC systems.
- Monitoring and control points are dispersed throughout a plant.
- You want to standardize on, and stock, just one universal module for all distributed I/O needs.
- Simple or complex on-site intelligence is required to process, condition, linearize, scale, compute, and control process signals.
- Process parameters frequently change, making on-site and/or remote programmability essential.
- Monitoring and control capabilities are needed at the same site, and within one I/O system.
- You need to convert noise-prone sensor and analog signals to immune digital signals to avoid damage during long-distance transmission.

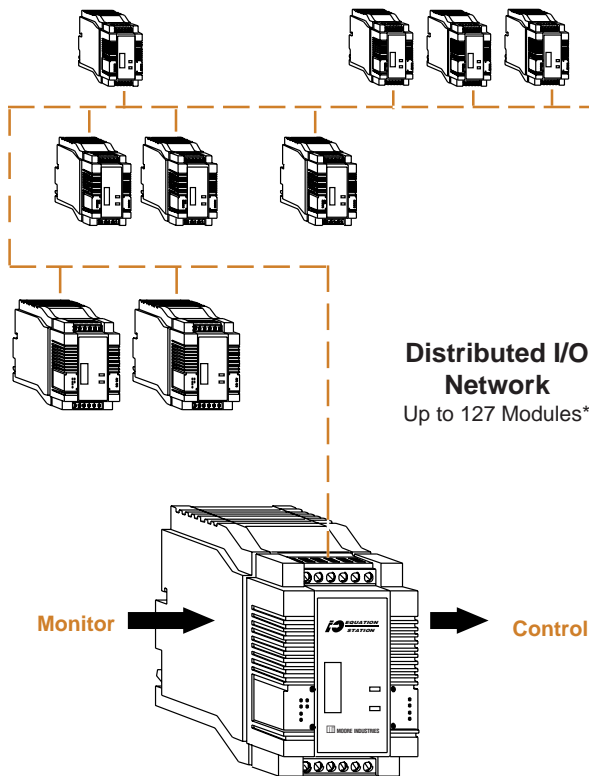
## Distributed I/O Networks

The **I/O EQUATION STATION** helps you avoid run-away costs by transporting just a few—or up to 1,016 process signals—between the field and your control room on a single, digital data highway. Up to 127 modules\* multidrop on one RS-485 data link. This eliminates the need to install expensive point-to-point wiring for each monitoring and control signal.

### Site-Specific I/O

The stand-alone **I/O EQUATION STATION** goes right where distributed I/O is needed to monitor, control, condition, and calculate process signals. Each individual module, with point-and-click configuration software, sets up to accommodate the precise needs of a specific monitoring/control point. A module can cost-effectively provide I/O for one point, or for several monitoring and control points at a site.

Unlike most distributed I/O schemes, you are not locked in by input/output-specific modules that plug into an expensive, multiposition rack or back plane. There are no “wasted” slots or channels.



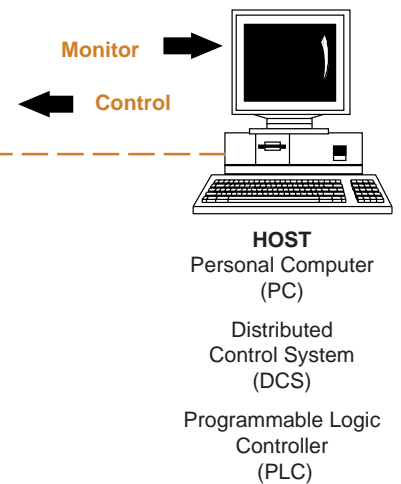
\* An RS-485 repeater is required every 32 modules.

### MODBUS RTU and PROFIBUS Protocols

For the system’s RS-485 communication link, you have the choice of the universally-accepted MODBUS RTU or the European favorite PROFIBUS protocols. Either can be selected using the configuration software.

Flexible protocol and baud rate choices facilitate interface with numerous PC, DCS and PLC-based systems, third-party software packages, modems, radio transceivers, and other networkable instruments.

**Figure 3.** Up to 127 modules\*, as many as 1,016 process signals, transmit on one economical digital data link.



### Windows™ Configuration Software

Each **I/O EQUATION STATION** order comes with Windows™ based configuration software. The program features pull-down menus that make it easy to view, select, and download to the module your specific I/O and performance requirements.

**Remote Configuration**—You won’t have to travel to each field location to configure or make process changes. From a host PC, all I/O parameters and math functions configure over the data link from the comfort of your control room. This saves a lot of footsteps, especially during system start up when minor, and sometimes major, I/O parameters must be adjusted.

Modules can be installed even before final site requirements are determined. If conditions change later, or even disappear, the module can change with them. Or, the entire unit can be put into useful service somewhere else in the plant.

## Configurable, Multichannel I/O

The **I/O EQUATION STATION** features programmable, multichannel input/output (I/O) capabilities that provide unlimited application possibilities. Available options (-MD and -MAO) enhance flexibility by providing additional I/O to the standard model (see Table 1 and the adjacent figures).

A module's available I/O can be programmed to accommodate the input and output types shown in Tables 2 & 3. Each module is individually configurable, and operates independently of the others in a network.

### Two or Four Discrete Inputs/Outputs

Standard units incorporate two discrete I/O channels. Units with the -MD option have four discrete I/O channels. Each discrete channel is configurable to be either an input or an output. Discrete inputs may be used to accept alarm/status signals, and transmit them over the data link back to the host. Discrete outputs may be used for hard alarms, or to provide on/off signals to relays and final control elements.

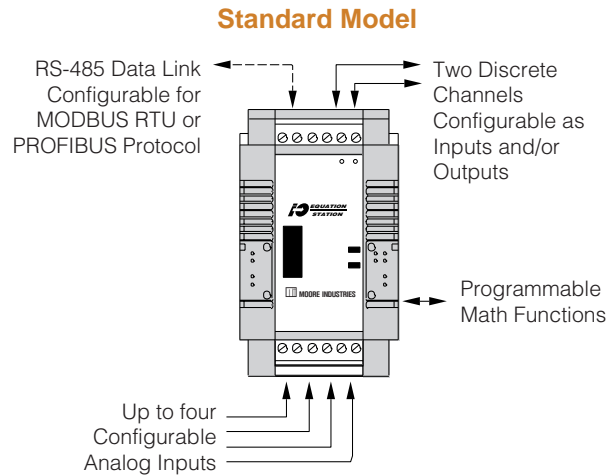
### Up to Four Analog Inputs

All models accept up to four analog inputs. The module configures to process the inputs to provide discrete alarm outputs, and/or a proportional analog output (with the -MAO option). The collected values can also be sent over the RS-485 link to a computer-based system for readout.

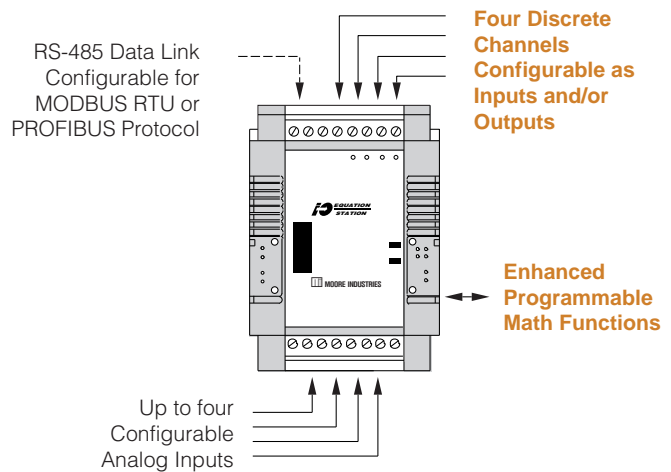
**Analog Input Mixes**—The module will handle one input type, several of one input type, or mixes of various types. Each input type requires a specific number of terminals for operation. The number of channels needed for each input type is shown in Table 2. Most mixes of input types can be accommodated, provided the total number of channels required for all inputs is less than or equal to 4 channels. Use Table 2 and "Determining Analog Input Mixes" on the adjacent page to determine how many, and what mix of, analog inputs a module will accommodate.

### One Analog Output

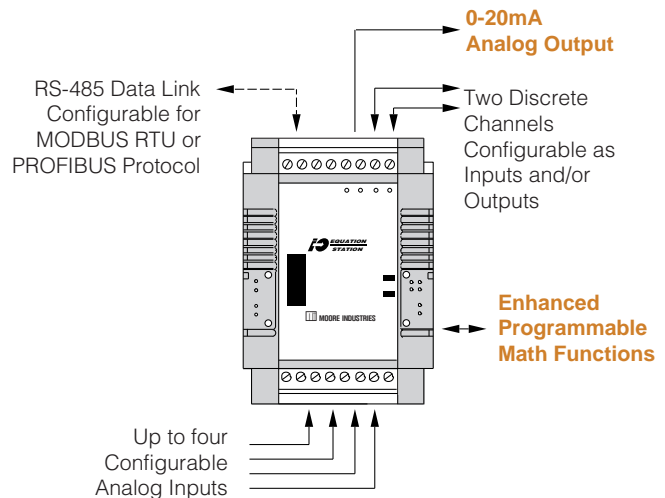
Units equipped with the -MAO option have a 0-20mA analog output channel. The output is scaleable to any range from 0-20mA (such as 4-20mA), and may be used for indicator readout or proportional control of valves, pumps, and similar devices. The output may be the result of one, or several, of the module's input(s). Or, it may be the result of a command directly from the host computer system.



### -MD Option: Adds Two Additional Digital I/O



### -MAO Option: Adds One Analog Output



**Table 1.** Number of Analog and Digital I/O per Module.

Model	Digital Inputs/Outputs	Analog Inputs	0-20mA Output
Standard	2	Up to 4	0
-MD Option	4	Up to 4	0
-MAO Option	2	Up to 4	1

**Determining Module Analog Input Mixes**  
(total channels must be less than or equal to 4)

**EXAMPLE 1:** One Current Input Requires **1** Channel  
 A Second Current Input Requires **1** Channel  
 One Voltage Input Requires **1** Channel  
 A Second Voltage Input Requires **1** Channel  
 $1 + 1 + 1 + 1 = 4$  Total Channels Per Module

**EXAMPLE 2:** One Current Input Requires **1** Channel  
 One 3-Wire RTD Input Requires **2** Channels  
 $1 + 2 = 3$  Total Channels Per Module

**Table 2.** Programmable Analog Input Types (see Table 4 for additional information).

Analog Input Type	# of Channels Required for Input	Max. # of Input Type per Module
<b>Current*</b> Ranges: 0 to 25mA (0-20mA, 4-20mA, 12-20mA, etc.)	<b>1</b>	4
<b>Voltage (Single Ended)</b> Ranges: -10 to 10V (0-5V, 1-5V, 0-10V, etc.) or -625 to 625mV	<b>1</b>	4
<b>Voltage (Differential)</b> Ranges: -10 to 10V (0-5V, 1-5V, 0-10V, etc.) or -625 to 625mV	<b>2</b>	2
<b>Bridge (4-Wire)</b>	<b>2</b>	2
<b>Bridge (6-Wire)</b>	<b>4</b>	1
<b>Potentiometer</b> Ranges: 100Ω to 5KΩ	<b>1</b>	4
<b>RTD (2-Wire; Platinum &amp; Nickel)</b> Temperature Ranges: -200°C to 850°C (-328°F to 1562°F)	<b>1</b>	4
<b>RTD (3-Wire, Platinum &amp; Nickel)</b> Temperature Ranges: -200°C to 850°C (-328°F to 1562°F)	<b>2</b>	2
<b>RTD (4-Wire, Platinum &amp; Nickel)</b> Temperature Ranges: -200°C to 850°C (-328°F to 1562°F)	<b>3</b>	1
<b>Thermocouple with Internal Cold Junction Compensation (J, K, E, T, R, S, N, B)*</b> Temperature Ranges: -210°C to 1820°C (-346°F to 3308°F)	<b>1</b>	3**

**\*IMPORTANT NOTE:** When current and thermocouple input configurations are mixed in the same module, some degradation of T/C input accuracy may occur. Consult the factory for details.

\*\*Internal Compensation is accomplished with an optional terminal block (see -ICJ option) that compensates for ambient temperature fluctuations. With this option, one terminal (#4) is permanently "blocked off".

**Table 3.** Programmable Digital Input and Output Types.

Digital Input/Output Type	Standard Module Max. # I/O Type	With -MD Option Max. # I/O Type
High/Low Status Input	2	4
Frequency Input	2	2
Pulse Counter Input	2	2
Up/Down Counter Input	1	1
Host Controlled Output	2	4
Process Controlled Output	2	4

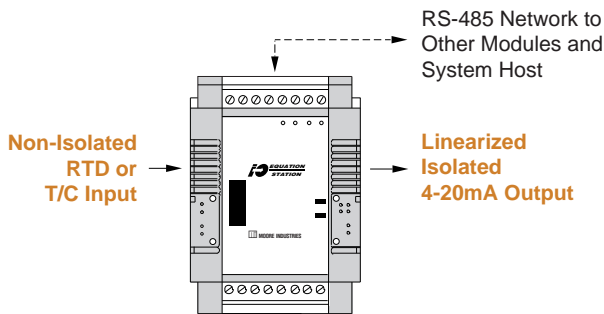
## Sensor-Level Intelligence

The **I/O EQUATION STATION** is a universal signal converter, transmitter, alarm trip, process controller, and computation module—rolled into one.

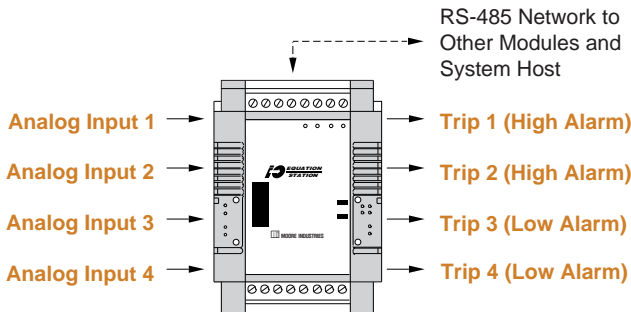
It features internal function blocks that configure to perform a virtually unlimited array of simple and complex signal conversions, data calculations, and control functions. The module configures to perform as a simple input or output, or to accept several inputs, operate on them as instructed by user-configured equations, and provide one or more outputs based on the inputs.

**Signal Isolation, Conditioning, Linearizing, Alarming & Transmission**—The module can be configured to act as a universal signal isolator/converter/transmitter, such as a temperature transmitter (see Figure 7). It can also provide one, or several, digital output(s) when an input value (or values) exceeds user-set trip points, essentially acting as a universal single, dual, triple, or quadruple alarm trip (Figure 8).

**Figure 7.** Configures to condition, isolate, convert, and transmit process signals (unit with -MAO option shown).

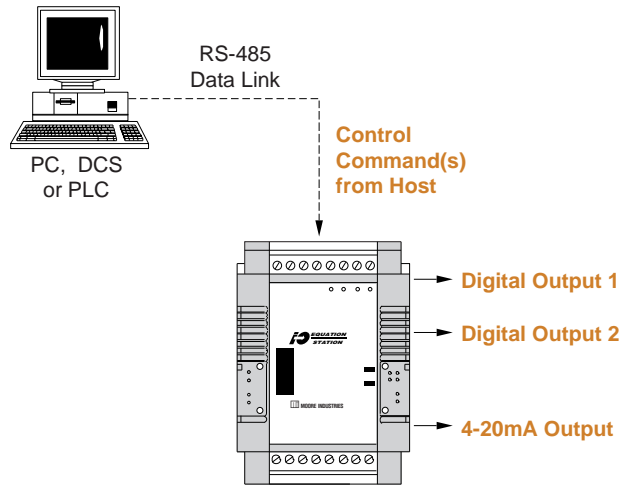


**Figure 8.** With the -MD option, the module will accept up to four inputs and provide up to four high and/or low alarm trip outputs.



**Intelligent & Manual Control**—The analog and digital control signals produced by a module can be a direct command sent from the host (Figure 9). Or, they can be a result of computations made by the module based on one or more of its inputs (Figure 10).

**Figure 9.** With the -MAO option, one module can provide two digital and one analog control output signals sent from the system host.



**Monitor, Control, & Math**—The **I/O EQUATION STATION** performs both monitoring and control functions, and a multitude of difficult calculations, all at the same time.

*For example:* Suppose a valve needs to be proportionally opened and closed to regulate the amount of water through a heat exchanger (Figure 10). The amount of water allowed to pass through is based on the difference in water temperature sensed at the exchanger’s input and output sides. In addition, if certain high and low temperature conditions are reached, an alarm must be sounded, and the process must be shut down.

One **I/O EQUATION STATION** will do the entire job. The user configures the module to accept two temperature inputs, one from each side of the heat exchanger. It calculates differential temperature, and based on the result, the module’s 4-20mA (unit with -MAO option) output tells the valve how much to open or close to keep the desired input-to-output temperature in check. Should high or low temperature trip points be exceeded, the module’s digital outputs activate a warning alarm, while simultaneously shutting down the process. While all of this is going on, the entire process can be monitored by a host computer over the RS-485 communication link.

## Math Package Options

### Standard Math Package

The standard **I/O EQUATION STATION** can be configured with up to 8 arithmetic results containing 8 expressions. Configurable arithmetic functions include:

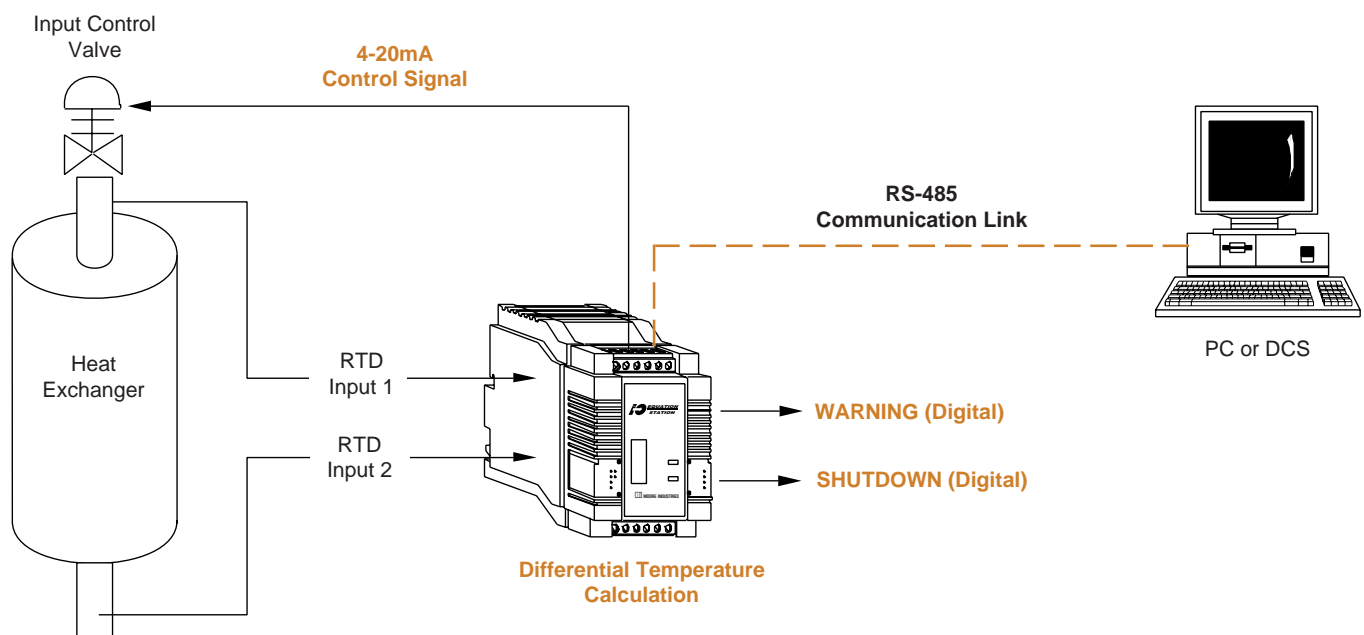
- Addition (+)
- Subtraction (-)
- Multiplication (x)
- Division ( $\div$ )
- Absolute Value ( $|x|$ )
- Pulse Counter (31-bit)
- Alarm Trip
- Minimum Value Over Time ( $\min\{x(t)\}$ )
- Maximum Value Over Time ( $\max\{x(t)\}$ )

### Enhanced Math Package

When ordered with the -MD or -MAO options, the Station delivers enhanced math capabilities. These models may be programmed with up to 12 resultant variables containing 20 expressions each. Configurable functions provided include all math functions offered in the Standard Math Package **plus**:

- Square Root ( $\sqrt{\phantom{x}}$ )
- Integrate and Totalize
- Exponential ( $e^x$ )
- Natural Logarithm ( $\ln x$ )
- Base<sub>10</sub> Logarithm ( $\log_{10} x$ )
- Comparison (Low/High of 4 inputs)
- Sine, Cosine, and Tangent ( $\sin x$ ,  $\cos x$ ,  $\tan x$ )
- Arc Sine, Arc Cosine, and Arc Tangent ( $\sin^{-1} x$ ,  $\cos^{-1} x$ ,  $\tan^{-1} x$ )

**Figure 10.** One module can be configured to accept multiple process signals, perform user-defined math functions on the signals, and provide outputs to control the process. Though operating independent of the host, the entire process can be monitored by the host over the data link.



## Specifications

<p><b>Digital Input and Output Performance</b></p> <p><b>Digital Input Description:</b> Contact Closure (22KΩ pull-up to input power positive; For voltage sources, thresholds are, &lt;1V low and &gt;3.5V high, guaranteed)  <b>Frequency Input:</b> Up to 25KHz (Accuracy, ±0.016% of reading; Resolution, ±0.1Hz)  <b>Pulse Counter Input (16-bit):</b> Maximum Pulse Frequency, 25KHz  <b>Up/Down Counter Input (16-bit):</b> Max. Pulse Frequency: 2KHz (25KHz with -MD or -MAO option)  <b>Digital Output:</b> Open Collector, (30V, 100mA)  <b>Pulse-Width Modulated Output:</b> Frequencies: 0.1, 10, or 100Hz  Duty Cycle Range: 1-99%  Resolution: 0.01%</p>	<p><b>Analog Input and Output Performance (continued)</b></p> <p><b>Output Load Capability (unit with -MAO option):</b> 1.2KΩ  <b>Resolution:</b> Analog Output (unit with -MAO option), 14-bit; See Table 4 for analog inputs  <b>A/D Conversion Rate:</b> Up to 200 times per second maximum (can be user set to 50/60Hz for maximum line noise rejection)  <b>Isolation:</b> 500Vrms between analog inputs and COMM port; Analog output (with -MAO option) isolated 500Vrms from analog inputs, COMM port, power and digital I/O ports  <b>Input Impedance:</b> 100Ω for current inputs; 100MΩ for voltage inputs  <b>Common Mode Rejection:</b> 100dB @ 50/60Hz  <b>Normal Mode Rejection:</b> 40dB @ 50/60Hz  <b>RFI/EMI Effect:</b> No affect at 10V/m between frequencies of 20-500MHz  <b>Excitation Current:</b> Bridge inputs, 0.5A; RTD inputs, 0.5mA  <b>Bias Current:</b> Thermocouple inputs, 150 nanoamperes  <b>Burnout Protection:</b> Thermocouple inputs upscale on sensor failure</p>	<p><b>Communications</b></p> <p><b>Type:</b> RS-485, half-duplex  <b>Address Range:</b> 1 to 127  <b>Protocol:</b> MODBUS RTU (factory default) and PROFIBUS are selectable via software  <b>Baud Rate:</b> User-set according to protocol selected  MODBUS RTU: 2400, 4800, 9600, 19.2K or 38.4Kfor  PROFIBUS: 9600, 19.2K, 93.75K and 187.5K  <b>Character Formats:</b> N-8-1, N-8-2, E-8-1, 0-8-1 (parity, data bits, stop bits; factory default is N-8-1)  <b>Range:</b> 1.6km (1 mile) typical at 9600 baud over 20AWG twisted pair; 0.8km (0.5 mile) typical at 19.2K baud</p>
<p><b>Analog Input and Output Performance</b></p> <p><b>Analog Input Accuracy</b> Accuracy is dependent on the input type and range; See Table 4 for details  <b>Reference Junction Compensation Error :</b> Thermocouple inputs, ±0.5°C + 0.005°C/°C of ambient change  <b>Analog Output Accuracy (unit with -MAO option):</b> Scaleable 0-20mA (up to 22mA for overdrive) output, ±0.075% of range (includes the combined effects of linearity, hysteresis and repeatability)</p>	<p><b>Power Supply</b></p> <p><b>Power Requirements:</b> 10 to 30Vdc, 1.5W maximum (2.7W maximum with -MD or -MAO option)  <b>Power Input Protection:</b> Transient protected with thermal reset fuse and reverse-polarity protected</p>	<p><b>Ambient Conditions</b></p> <p><b>Operating Range:</b> -20°C to +60°C (-25°F to +140°F)  <b>Ambient Temperature Effect:</b> ±0.01% of range/°C  <b>Storage Range:</b> -30°C to +85°C (-22°F to +185°F)  <b>Relative Humidity:</b> 0-95%, non-condensing (@ 50°C)</p> <p><b>Indicators</b> Front panel LEDs indicate COMM link activity, RUN (all functions executing properly), and ERR (COMM link fault, I/O overage, or internal fault)</p> <p><b>Adjustments</b> All operating parameters are downloaded from the PC over the communication link; a copy of the configuration software is provided with each order</p> <p><b>Weight</b> Standard Model: 198 g (7 oz.)  With -MD Option: 255 g (9 oz.)  With -MAO Option: 284 g (10 oz.)</p>

## Any Distance, Any Terrain

Versatile data link options overcome long-distance, impassable, and hazardous environments:

**Twisted Wire Pair**—The solution for the majority of applications, a standard 24AWG shielded twisted pair is a low-cost way to send data up to 2 miles (3kms).

**Telephone Modem**—Inexpensively transmit process data unlimited distances over leased or dial-up telephone lines. We offer modems and RS-485 to RS-232C (for modem) converters.

**Radio**—Where wires can't be run, such as over water, radio (RF) communication provides accurate and reliable signal transmission.

**Fiber Optic Cable**—For hazardous or exceptionally noisy environments, light is an effective strategy. We offer all of the accessories required for interface.



**Table 4.** Input Accuracy, Resolution, and Conformance Error.

Input Type	Range	Accuracy	Resolution	Conformance Error
Current	0-62.5 $\mu$ A	$\pm$ 0.3% of Range	15-bit	Not Applicable
	0-250 $\mu$ A	$\pm$ 0.1% of Range		
	0-1mA	$\pm$ 0.05% of Range		
	0-3.125mA	$\pm$ 0.2% of Range		
	0-6.25mA	$\pm$ 0.1% of Range		
	0-12.5mA	$\pm$ 0.05% of Range		
	0-25mA	$\pm$ 0.05% of Range		
Voltage	-6.25 to 6.25mV	$\pm$ 0.3% of Range	15-bit	Not Applicable
	-25 to 25mV	$\pm$ 0.1% of Range		
	-100 to 100mV	$\pm$ 0.03% of Range		
	-312.5 to 312.5mV	$\pm$ 0.03% of Range		
	-625 to 625mV	$\pm$ 0.03% of Range		
	-1.25 to 1.25V	$\pm$ 0.03% of Range		
	-2.5 to 2.5V	$\pm$ 0.03% of Range		
	-5 to 5V	$\pm$ 0.03% of Range		
-10 to 10V	$\pm$ 0.03% of Range			
Bridge	0.625mV/V	$\pm$ 0.3% of Range	15-bit	Not Applicable
	2.5mV/V	$\pm$ 0.1% of Range		
	10mV/V	$\pm$ 0.03% of Range		
	31.25mV/V	$\pm$ 0.3% of Range		
	62.5mV/V	$\pm$ 0.3% of Range		
	125mV/V	$\pm$ 0.1% of Range		
	0.5V/V	$\pm$ 0.1% of Range		
	1V/V	$\pm$ 0.1% of Range		
Potentiometer	100 to 20K $\Omega$	$\pm$ 0.03% of Pot Span	15-bit	Not Applicable
Resistance 2-, 3-, 4-Wire	200 $\Omega$	$\pm$ 0.05% of Range	15-bit	Not Applicable
	312.5 $\Omega$	$\pm$ 0.05% of Range		
	625 $\Omega$	$\pm$ 0.05% of Range		
	1.25K $\Omega$	$\pm$ 0.05% of Range		
	2.5K $\Omega$	$\pm$ 0.05% of Range		
	5K $\Omega$	$\pm$ 0.05% of Range		
	10K $\Omega$	$\pm$ 0.05% of Range		
	20K $\Omega$	$\pm$ 0.05% of Range		

(Continued on next page)

## Multifunction Distributed I/O System

**Table 4 (continued).** Input Accuracy, Resolution, and Conformance Error.

Input Type	Range	Accuracy	Resolution	Conformance Error
RTD Pt100 (0.00385Ω/Ω/°C)	-200 to 250°C (-328 to 482°F)	±0.26°C	0.02°C	0.03°C
	-200 to 550°C (-328 to 1022°F)	±0.4°C	0.03°C	0.08°C
	-200 to 850°C (-328 to 1562°F)	±0.81°C	0.05°C	0.16°C
RTD Pt500 (0.00385Ω/Ω/°C)	-200 to 400 °C (-328 to 752°F)	±0.32°C	0.02°C	0.06°C
	-200 to 850°C (-328 to 1562°F)	±0.65°C	0.04°C	0.17°C
RTD Pt1000 (0.00385Ω/Ω/°C)	-200 to 50°C (-328 to 122°F)	±0.16°C	0.04°C	0.01°C
	-200 to 400°C (-328 to 752°F)	±0.32°C	0.08°C	0.04°C
	-200 to 850°C (-328 to 1562°F)	±0.65°C	0.2°C	0.16°C
RTD Ni100 (0.00618Ω/Ω/°C)	-60 to 180°C (-76 to 356°F)	±0.3°C	0.02°C	0.01°C
RTD Ni120 (0.00672Ω/Ω/°C)	-80 to 320°C (-112 to 608°F)	±0.5°C	0.03°C	0.12°C
Thermocouple Type J	0 to 450°C (32 to 842°F)	±1.0°C @ 0°C ±0.91°C @ 450°C	0.03°C	0.01°C
	-210 to 1200°C (-346 to 2192°F)	±3.0 °C @ -210°C ±1.1°C @ 1200°C	0.3°C	0.28°C
Thermocouple Type K	0 to 600°C (32 to 1112°F)	±1.3°C @ 0°C ±1.2°C @ 600°C	0.04°C	0.02°C
	-100 to 1370°C (-148 to 2498°F)	±1.9°C @ -100°C ±1.8°C @ 1370°C	0.2°C	0.23°C
Thermocouple Type E	-50 to 350°C (-58 to 662°F)	±0.96°C @ -50°C ±0.62°C @ 350°C	0.03°C	0.04°C
	-200 to 1000°C (-328 to 1832°F)	±2.3°C @ -200°C ±0.8°C @ 1000°C	0.2°C	0.25°C
Thermocouple Type R	0 to 650°C (32 to 1202°F)	±7.5°C @ 0°C ±3.1°C @ 650°C	0.08°C	0.11°C
	-50 to 1460°C (-58 to 2660°F)	±17°C @ -50°C ±3.6°C @ 1460°C	0.5°C	0.38°C
Thermocouple Type S	0 to 650°C (32 to 1202°F)	±7.5°C @ 0°C ±3.1°C @ 650°C	0.08°C	0.08°C
	-50 to 1460C (-58 to 2660°F)	±12°C @ -50°C ±4.2°C @ 1460°C	0.4°C	0.32°C
Thermocouple Type T	-50 to 140°C (-58 to 284°F)	±1.1°C @ -50°C ±0.75°C @ 140°C	0.01°C	0.01°C
	-270 to 400°C (-454 to 752°F)	±25°C @ -270°C ±0.8°C @ 400°C	0.08°C	0.36°C
Thermocouple Type B	500 to 1100°C (932 to 2012°F)	±7.5°C @ 500°C ±3.8°C @ 1100°C	0.2°C	0.36°C
	750 to 1540°C (1392 to 2804°F)	±6.9°C @ 750°C ±4.4°C @ 1540°C	0.2°C	0.06°C

## Ordering Specifications

Unit	Inputs	Output	Power	Options	Housing
<b>MDS</b> Multifunction Distributed I/O System	<p><b>PRG</b> Configures to accept:</p> <p><u>DIGITAL</u> Two digital channels may be configured as either one input and one output, two inputs or two outputs (see-MD option to add two digital input/output channels to the standard model)</p> <p><u>CURRENT</u> Up to four signals with ranges between 0 to 25mA (0-20mA, 4-20mA, etc.)</p> <p><u>VOLTAGE</u> Up to four signals with ranges between -10V to 10V (0-5V, 1-5V, 0-10V, etc) or between -625 to 625mV</p> <p><u>RTD</u> Up to four 2-wire; two 3-wire; or one 4-wire RTD (Pt100, Pt500, Pt1000; Ni100, Ni120)</p> <p><u>THERMOCOUPLE</u> Up to three thermocouples with cold junction compensation (J, K, E, T, R, S, N, B, U, L)</p> <p><u>BRIDGE</u> 4-Wire and 6-Wire</p> <p><u>POTENTIOMETER</u></p> <p><u>RS-485 COMM LINK</u></p> <p>MODBUS RTU</p> <p>PROFIBUS</p>	<p><b>PRG</b> Configures to output:</p> <p><u>DIGITAL</u> Two digital channels may be configured as either one input and one output, two inputs or two outputs (see the -MD option to add two digital input/output channels to the standard model)</p> <p><u>ANALOG OUTPUT (OPTIONAL)</u> Specify the -MAO option to add a current output (0-20mA range; up to 25mA for overdrive)</p> <p><u>RS-485 COMM LINK</u></p> <p>MODBUS RTU</p> <p>PROFIBUS</p>	<b>10-30DC</b> (1.5 watts max.)	<p><b>-MD</b> Adds two additional digital input/output channels and an Enhanced Math Package to the standard model (can not be ordered with -MAO option)</p> <p><b>-MAO</b> Adds one 4-20mA analog output channel and the Enhanced Math Package to the standard unit (can not be ordered with the -MD option)</p> <p><b>-ICJ</b> Internal Cold Junction Compensation terminal block (required for use with internally compensated T/C input terminals)</p>	<b>DIN</b> DIN-style housing with removable terminal blocks mounts on standard Top Hat (DIN 46277-3) rail

**When ordering, specify:** Unit / Input / Output / Power / Options [Housing]

**Model number example:** MDS / PRG / PRG / 10-30DC / -MAO [DIN]

## Compatible with MMI Software

Once the computer-ready data is delivered to the host PC or DCS, leading third-party Man Machine Interface (MMI) software packages can be used to create custom data acquisition and control strategies:

- Intellution® FIX DMACS™
- USDATA® FactoryLink®
- Wonderware® InTouch™
- INTEC Paragon
- Ci Technologies Citect for Windows™

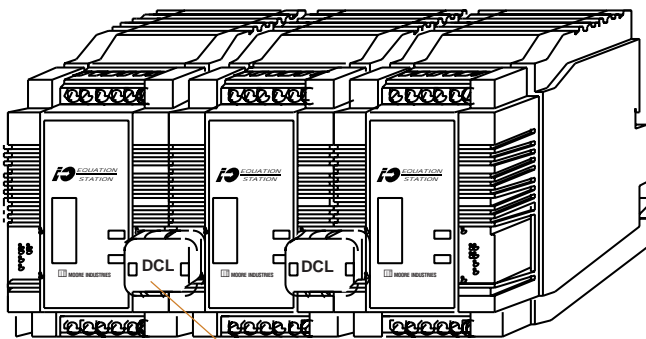
These, and other, available packages allow a multitude of strategies that incorporate data acquisition, alarm summary and management, data logging and reporting, historical data collection and trending, and supervisory control functions.



## System Accessories

**DCL Data Link Connector**—Saves time and wiring costs by taking the place of module-to-module data link and power wiring. It plugs between modules (in terminals provide as standard on every module) to provide continuous power and data link connections.  
**Order Part Number 800-174-27**

*Figure 12. The DCL Data Link Connector snaps between modules to take the place of data link and power wiring.*



**DCL Data Link Connector**

**DCT Data Link Terminator**—For easy plug-in RS-485 termination. A terminating resistor of 100-200 $\Omega$ , between the two comm link conductors, is recommended at both ends of a long RS-485 run. (See User's Manual for details.)  
**Order Part Number 800-175-27**

**Thermocouple Compensation Block**—Terminal block provides cold junction compensation when the module is programmed to accept thermocouple inputs. To order with a unit, see the -ICJ option in the Ordering Specifications table. To order separately,  
**Order Part Number 800-176-27**

We also offer:

- Short Haul and Dial-Up Modems
- RS-485 Repeaters
- RS-485 to RS-232C Converters
- RS-485 to Fiber Optic Converters
- Data Link Protectors
- Power Supplies

Consult your Moore Industries Sales Representative for details.

*Figure 13. Installation Dimensions.*

