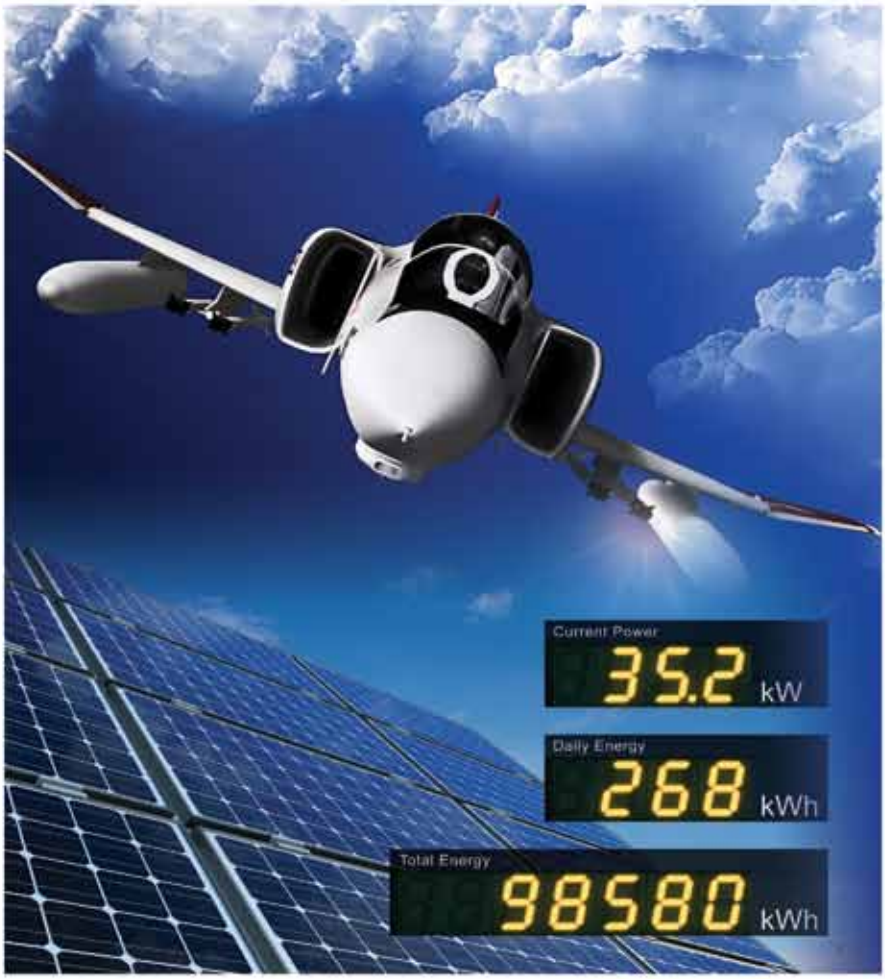


MAQ®20

Industrial Data Acquisition & Control System

- ✔ Factory and Process Automation
- ✔ Machine Automation
- ✔ Military and Aerospace
- ✔ Power and Energy
- ✔ Environmental Monitoring
- ✔ Oil and Gas

Delmation Products BV
Tel +31 (0)79 342 2041
info@delmation.nl
www.delmation.nl

DATAFORTH®

ETHERNET USB RS-232 RS-485 Modbus

Flexible, Powerful, High Performance...

MAQ®20 Industrial Data Acquisition & Control System

The MAQ®20 Industrial Data Acquisition and Control System encompasses more than 25 years of design excellence and quality in the process control industry. The initial offering in this high performance and highly flexible system is a family of DIN rail mounted, programmable, multi-channel, industrially rugged signal conditioning input and output modules and communication modules. Each I/O module has a 1500Vrms isolation barrier between field-side and system-side wiring, and some models offer per-channel isolation. All field wiring terminals are heavily protected against overload, accidental connection of incorrect signals, and ESD. Modules mount on the industry standard 35x7.5mm gull-wing DIN rail, and a backbone mounts within the rail providing power and communication interconnections between the communication modules and each I/O module. One communication module can interface to up to 24 I/O modules to construct a system with a maximum of 384 channels that fits within a standard 19" instrumentation rack! Processors within each module make this distributed system extremely powerful.

The Modules:

- **Communication Modules:** Offered in Ethernet, RS-232, RS-485, and USB with host software interfaces to the system using Modbus TCP or Modbus RTU protocol
- **Analog Input Modules:** Interface to a wide range of standard industrial sensors and equipment and offer up to 16 channels of input, each of which can be independently configured
  - **Process Voltage, Process Current & Thermocouple Input Modules** offer 8-channel differential input or 16-channel single-ended input for precise measurement of voltage and current signals; they also offer 8-channel measurement of five thermocouple types including accurate cold junction compensation and linearization. All channels are individually configurable for range, alarm limits, and averaging.
  - **RTD Input Modules** interface to 2-wire, 3-wire, and 4-wire sensors including five RTD types and potentiometers. Modules offer six channels, each configurable for range, alarm limits, and averaging.
  - **Strain Gage Input Modules** connect to full bridge sensors, have narrow or wide bandwidth filtering and offer four channels, each configurable for range, alarm limits, and averaging.
  - **Frequency Input Module** accepts zero-crossing and TTL signals with frequencies of 500Hz to 100kHz and provides a DC stimulus for contact sensors. This module has four channels, each configurable for range and alarm limits.
- **Analog Output Modules: Process Current** and **Voltage Output** models drive valves, perform other crucial process operations, and provide up to eight channels of output which can be independently configured
- **Discrete Input/Output Modules:** Provide multiple channels of input and output per module and offer advanced special functions as well as alarm capability

The **System Backbone** resides within the DIN rail used for module mounting and provides power to and interface between the communication module and the I/O modules.

Key MAQ®20 Features

- **Wide Operating Temperature, –40°C to +75°C**
- **Stability 50ppm/°C of Reading Typical**
- **1500Vrms Channel-to-Bus Isolation**
- **240Vrms Continuous Input Protection**
- **ANSI/IEEE C37.90.1 Transient Protection**
- **Graphical Control Software**

Common MAQ®20 Features

I/O Field Connection	20 position terminal block High density screw clamp, 16-28 AWG
Failsafe Features	Watchdog Timer and Brownout Detection: Reset to user defined configuration
Dimensions (h)(w)(d)	
I/O Modules	4.51" x 0.60" x 3.26" (114.6mm x 15.3mm x 82.8mm)
Communication Module	4.51" x 1.11" x 3.26" (114.6mm x 28.2mm x 82.8mm)
Environmental	
Operating Temperature	–40°C to +75°C
Storage Temperature	–40°C to +85°C
Relative Humidity	0 to 95% Noncondensing
Emissions, EN61000-6-4	ISM Group 1
Radiated, Conducted	Class A
Immunity EN61000-6-2	ISM Group 1
RF	Performance A ±0.5% Span Error
ESD, EFT	Performance B
Certifications	Heavy Industrial CE, ATEX Pending UL Class I, Division 2, Groups A, B, C, D Pending
Burn-in Qualification	48 hours at 75ºC, powered and loaded

Communication Modules are offered in two models covering standard industrial buses: Ethernet, RS-232, RS-485, and USB. Host software interfaces to the system using the Modbus TCP or RTU protocol. When using the Ethernet interface, up to four simultaneous socket connections are supported and each socket can process up to four simultaneous Modbus TCP transactions. Serial communications over RS-232 or RS-485 can be run at baud rates as fast as 921.6kbps. Another useful feature of the system is the capability to store acquired data locally for later analysis. Each communication module has an easily accessible and removable 4GB micro-SD memory card that can be used to log data from all input modules.

To power the system, a 7-34VDC power source is connected to the communication module. Regulated and protected supplies within the module then provide power both to the internal circuits and to all modules in the system. When many high power I/O modules are used in a system, load-sharing power boost modules can be installed in standard I/O module slots to provide the necessary additional power.

Specifications: Communication Modules

Typical at T_A = +25°C and +24VDC system power

Model Number	
MAQ20-COM4	Ethernet, USB, RS-485
MAQ20-COM2	Ethernet, USB, RS-232
Communications	
Ethernet	10/100 Base-T, RJ-45, Modbus TCP
USB	USB 2.0, Type B, Proprietary Modbus over USB
RS-485	4-wire, up to 921.6kbps, RJ-12, Modbus RTU
RS-232	up to 921.6kbps, RJ-12, Modbus RTU
Isolation	50V to bus
Power Supply	
Input Power	7-34VDC at 2A max
Power to Bus	5VDC at 3A max

Communication Module

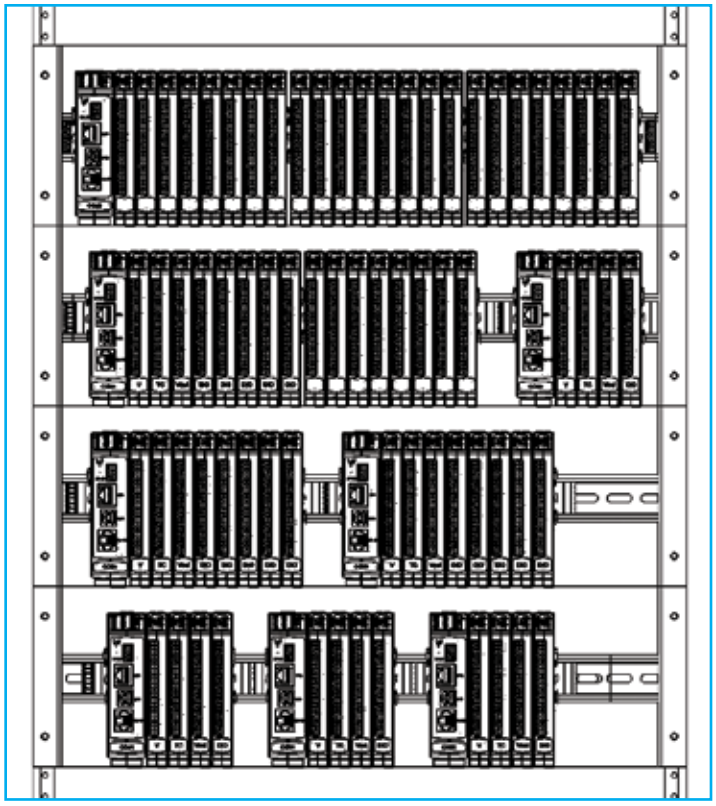
Analog Input Modules interface to a wide range of standard industrial sensors and equipment, including volt, millivolt, milliamp, thermocouple, RTD, potentiometer, strain gage and frequency. Four to 16 channels of input on the modules results in physically small control systems and low cost per channel. Signal ranges are user selectable and offered in both differential and single-ended configurations. Channels can be independently configured and alarms can be set to match the most demanding applications.

Specifications: Process Voltage, Process Current & Thermocouple Input Modules

Typical at T_A = +25°C and +24VDC system power

Model Number	**Description**
MAQ20-MVDN	8-ch, mV, Differential Input ±2.0V, ±1.0V, ±250mV, ±100mV, ±50mV
MAQ20-VDN MAQ20-VSN	8-ch, V, Differential Input 16-ch, V, Single-Ended Input ±60V, ±40V, ±20V, ±10V, ±5V
MAQ20-IDN MAQ20-ISN	8-ch, mA, Differential Input 16-ch, mA, Single-Ended Input 0-20mA or 4-20mA
MAQ20-JTC	8-ch, TC, Type J –100°C to +760°C, 3 selectable ranges
MAQ20-KTC	8-ch, TC, Type K –100°C to +1350°C, 3 selectable ranges
MAQ20-TTC	8-ch, TC, Type T –100°C to +400°C, 3 selectable ranges
MAQ20-RSTC	8-ch, TC, Type R and Type S 0°C to +1750°C
Per Channel Setup	Individually configurable for range, alarm limits, averaging
CMR	100dB at 50Hz or 60Hz
NMR	30dB at 50Hz or 60Hz
Accuracy(1)	
mV, V, mA Input	±0.035% Span
TC Input	±0.06% Span
Bandwidth	3Hz
Scan Rate	200 Ch/s
Alarms	High / High-High / Low / Low-Low
Open Input Response	
TC Input	Upscale, Flag set
Cold Junction Compensation	
Accuracy, +25°C	±0.25°C
Power Supply Current	30mA

(1) Includes linearity/conformity, hysteresis and repeatability. Does not include CJC accuracy.



Flexible Backbone System Allows 4, 8, 16 and/or 24 Module Configuration in 19" Rack Space

Specifications: 2- or 3-Wire RTD & Potentiometer Input Modules

Typical at T_A = +25°C and +24VDC system power

Model Number	
MAQ20-RTD31	–200°C to +850°C (100Ω Pt), 3 selectable ranges 0°C to +850°C (100Ω Pt), 3 selectable ranges –80°C to +300°C (120Ω Ni), 3 selectable ranges 0Ω to 5kΩ (Potentiometer), 3 selectable ranges
MAQ20-RTD32	–200°C to +850°C (500Ω Pt), 3 selectable ranges 0°C to +850°C (1000Ω Pt), 3 selectable ranges 0°C to +160°C (10Ω Cu) 0°C to +160°C (50Ω Cu)
Number of Channels	6
Per Channel Setup	Individually configurable for range, alarm limits, averaging
CMR	100dB at 50Hz or 60Hz
NMR	20dB at 50Hz or 60Hz
Accuracy(1)	±0.06% Span
Bandwidth	3Hz
Scan Rate	200 Ch/s
Alarms	High / High-High / Low / Low-Low
Open Input Response	Upscale or Downscale
Power Supply Current	40mA

(1) Includes conformity, hysteresis and repeatability.

Specifications: Strain Gage Input Modules - Preliminary

Typical at T_A = +25°C and +24VDC system power

Model Number	
MAQ20-BRDGN	Full bridge, Narrow bandwidth
MAQ20-BRDGW	Full bridge, Wide bandwidth
Number of Channels	4
Per Channel Setup	Individually configurable for range, alarm limits, averaging
Input Range	±10mV to ±100mV
Excitation	10.0V
CMR	100dB at 50Hz or 60Hz
NMR (MAQ20-BRDGN)	20dB at 50Hz or 60Hz
Accuracy(1)	±0.06% Span
Bandwidth	3Hz, 3kHz
Scan Rate	200 Ch/s for 3Hz model
Alarms	High / High-High / Low / Low-Low
Power Supply Current	400mA

(1) Includes linearity/conformity, hysteresis and repeatability.

Specifications: Frequency Input Modules - Preliminary

Typical at T_A = +25°C and +24VDC system power

Model Number	
MAQ20-FREQ	500Hz to 100kHz
Number of Channels	4
Per Channel Setup	Individually configurable for range, alarm limits
Zero Crossing Input	
Min/Max Input	100mVp-p/170Vp-p
Hysteresis	±50mV
Min Pulse Width	4µs
TTL Input	
Min/Max Input	0.8V/2.4V
Hysteresis	1.5V
Min Pulse Width	4µs
Excitation	+5V at 8mA
CMR	100dB at 50Hz or 60Hz
Accuracy(1)	±0.05% Span
Scan Rate	1500 Ch/s
Alarms	High / High-High / Low / Low-Low
Power Supply Current	30mA

(1) Includes linearity/conformity, hysteresis and repeatability.

MAQ®20 Future Development

Controller Modules
- CANbus
- Wireless
- Standalone

I/O Modules
- True RMS Input
- PID Loop Control
- Single and Three Phase Monitoring
- Ch-to-Ch Isolated Inputs
- High Sample Rate / High Bandwidth Inputs
- 16 and 24 Bit Analog Input
- DC and AC LVDT
- Accelerometer Input
- Two-Wire Transmitter Input
- Serial Interface, RS-232 and RS-485
- Interface to Existing Dataforth Signal Conditioning Modules

Analog Output Process Current and Voltage Output Modules

Analog Output Process Current and Voltage Output Modules are offered with 4-20mA and 0-20mA process current output or up to ±10V voltage output with drive capability; they control motors, drive valves and perform many other crucial process operations. Up to eight channels of output on the modules results in physically small control systems and low cost per channel. Output modules have each field-side channel galvanically isolated from all others to eliminate common mode signal problems and offer maximum durability. Signal ranges are user selectable and channels can be independently configured to match the most demanding applications. Processing power within each module allows users to enter waveshapes to output to field devices. Power-on delay and default channel states guarantee proper process performance upon startup and during power interruptions. Field I/O connections are made through a pluggable terminal block with positions provided for the termination of wiring shields.

Specifications: Analog Output Modules

Typical at T_A = +25°C and +24VDC system power

Model Number	
MAQ20-IO	0-20mA or 4-20mA
MAQ20-VO	0-10V, 0-5V, 0-2.5V, ±10V, ±5V, ±2.5V
Number of Channels	8, isolated
Per Channel Setup	Individually configurable for range, default output, waveform
Over-range	
MAQ20-IO	21.5mA
MAQ20-VO	10.5V
Compliance	
MAQ20-IO	15V
Load Resistance Range	
MAQ20-IO	0 to 600Ω
Current Limit	
MAQ20-IO	26mA
Output Drive (Max Load)	
MAQ20-VO	10mA (1000Ω at 10V)
Output Protection	
Continuous	40Vrms max
Transient	ANSI/IEEE C37.90.1
CMV	
Channel-to-Channel	300Vrms, 425VDC
CMR	75dB at 50Hz or 60Hz
Accuracy(1)	±0.04% Span
Bandwidth	100Hz
Update Rate	1600 Ch/s
Output Waveform	
Waveform Definition	100 points per channel
Update Rate	10ms for 8-ch
Power Supply Current	450mA

(1) Includes linearity/conformity, hysteresis and repeatability.

Discrete Input/Output Modules have multiple channels of input and output per module. Solid state circuits provide or interface to discrete signals up to 60V and 3A. In addition to standard discrete I/O, these modules provide advanced special functions including Pulse/Frequency Counter with or without de-bounce, Waveform Measurement, Time Between Events, Frequency Generator, PWM Generator, and One-Shot Pulse Generator. Alarms can be set on the discrete input channels.

Specifications: Discrete Input/Output Modules

Typical at T_A = +25°C and +24VDC system power

Model Number	
MAQ20-DIOL	3 to 60 VDC input 3 to 60 VDC output, 3A
MAQ20-DIOH	90 to 280 VAC/VDC input 24 to 280 VAC output, 3A
Number of Channels	5 discrete input, 5 discrete output
Per Channel Setup	Individually configurable for special function, default output
Input Protection (Digital Input Channels)	
Continuous	70VDC max, reverse polarity protected
Transient	ANSI/IEEE C37.90.1
Output Protection (Digital Output Channels)	
Continuous	70VDC max, reverse polarity protected
Transient	ANSI/IEEE C37.90.1
CMV	
Channel-to-Channel	300Vrms, 425VDC
I/O Special Functions	
Pulse/Frequency Counter	Freq to 10kHz, count to 10M, RPM to 65k
Pulse/Frequency Counter with De-bounce	Freq to 50Hz, count to 10M, RPM to 65k
Waveform Measurement	Freq to 500Hz at 1% accuracy, 10kHz at 21% accuracy; # periods, pulse width, period, duty cycle
Time Between Events	Min, max, avg, selectable timebase
Frequency Generator	Up to 700Hz at 1% accuracy, 10kHz at 14% accuracy
PWM Generator	Selectable timebase
One-Shot Pulse Generator	100µs min, programmable pre- and post-delay
Alarms	High / High-High / Low / Low-Low
Scan Rate	3500 Ch/s
Power Supply Current	20mA

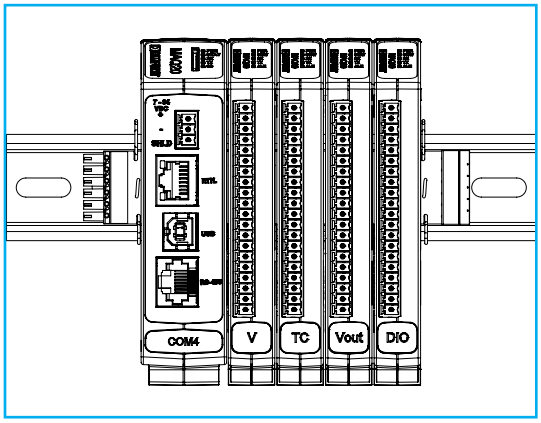
Discrete I/O Module

The **System Backbone** resides within the DIN rail used for module mounting and provides power to and interface between the communication module and the I/O modules. Standard backbones provide for one communication module and 4, 8, 16, or 24 I/O modules. The longest backbone, which accommodates 24 I/O modules, fits in an industry standard 19" rack. Each backbone utilizes a pluggable connector system on each end such that varying system channel counts can be configured using the standard backbones. As a result of this pluggable system, the main part of a system, including the communication module, can be installed in one location while other sets of I/O modules installed in remote locations connect to the main system through a wire harness.

Once a system is established with a system backbone and a communication module, system configuration is accomplished by applying power and installing the I/O modules. These are hot swappable and true 'plug and run'. When an I/O module is plugged into any backbone position, the communication module automatically recognizes that it has been added to the system, registers it in the system configuration record, and makes it immediately available in the ReDAQ® Shape for MAQ®20 host software for use in data acquisition and control. Similarly, when a module is removed from any backbone position, the communication module recognizes that it has been unplugged, removes it from the system configuration, and disables it in the ReDAQ® Shape for MAQ®20 software.

Specifications: Backbone

Model Number	
MAQ20-BKPL4	1 COM Module plus 4 I/O Modules
MAQ20-BKPL8	1 COM Module plus 8 I/O Modules
MAQ20-BKPL16	1 COM Module plus 16 I/O Modules
MAQ20-BKPL24	1 COM Module plus 24 I/O Modules
Expansion & Remote Location	Male/Female pluggable terminal blocks at each end of backbone allow system expansion and distributed installation



Comm Module with 4 I/O Modules on DIN Rail Mounted Backbone

Specifications: Accessories

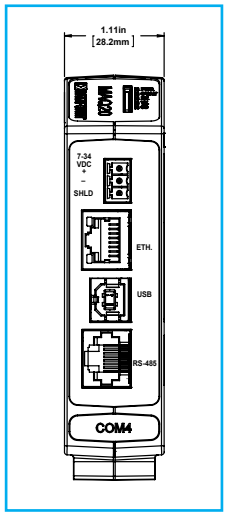
Model Number	
MAQ20-XCA01	Backbone expansion cable, 1m
MAQ20-XCA02	Backbone expansion cable, 2m
SLX147-01, -02, -05	USB Cable, Type A to Type B, 1m, 2m, 5m
SLX141-01, -02, -07	Ethernet Cable, 1m, 2m, 7m
SLX141-X01, -X02, -X07	Ethernet Crossover Cable, 1m, 2m, 7m
PWR-PS5RB	Power Supply, 24VDC, 0.6A, 100-240VAC Input, DIN Mount
PWR-PS5RC	Power Supply, 24VDC, 1.3A, 100-240VAC Input, DIN Mount
PWR-PS5RD	Power Supply, 24VDC, 2.1A, 100-240VAC Input, DIN Mount
PWR-PS5RE	Power Supply, 24VDC, 4.2A, 100-240VAC Input, DIN Mount
SCMXRAIL1-XX	DIN EN50022-35x7.5 (slotted steel), length -xx, in meters

Specifications: Boost Power Supply Module

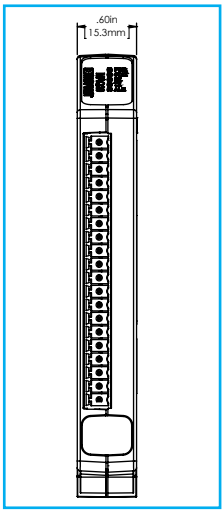
Typical at T_A = +25°C and +24VDC system power

Model Number MAQ20-PWR3	
Power Input	7-34VDC at 2A max 3-position pluggable terminal block
Power Output to Bus	+5VDC at 3A

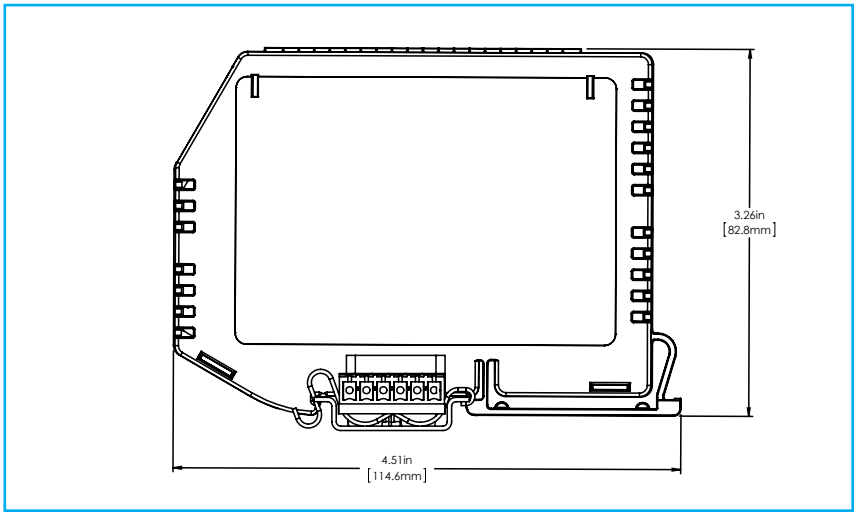
Dimensional Drawings



Front Thick Module



Front Thin Module



Side Both Modules

ReDAQ® Shape for MAQ®20 Software

Dataforth offers ReDAQ® Shape for MAQ®20 software as the easiest and most efficient development tool for use with the MAQ®20 Industrial Data Acquisition and Control System. This out-of-the-box software enables users to create, save, and open graphical user interface projects for test, process, data collection and data analysis applications. Built-in functions in the Acquire and Analyze panels are pre-configured and can be used without setup. Just three easy steps are required to create data acquisition and control projects using 18 high quality tools and powerful MAQ®20 functions. These projects are developed and executed in the software's Presentation panel.

ReDAQ® Shape for MAQ®20 software also provides the most effective way to configure and customize MAQ®20 functions for specific application requirements. The toolbox tools are easily moved, re-sized, cut, copied, pasted, and deleted.

The main screen of ReDAQ® Shape for MAQ®20 shows a representation of the system inclusive of the communication module and any installed I/O modules. This graphic is updated as I/O modules are added to or removed from the system. Modules can be given unique identifiers, and I/O module channels can be assigned tag names to represent process variables they control. These identifiers and tag names are propagated throughout the software anytime these modules and signals are used.

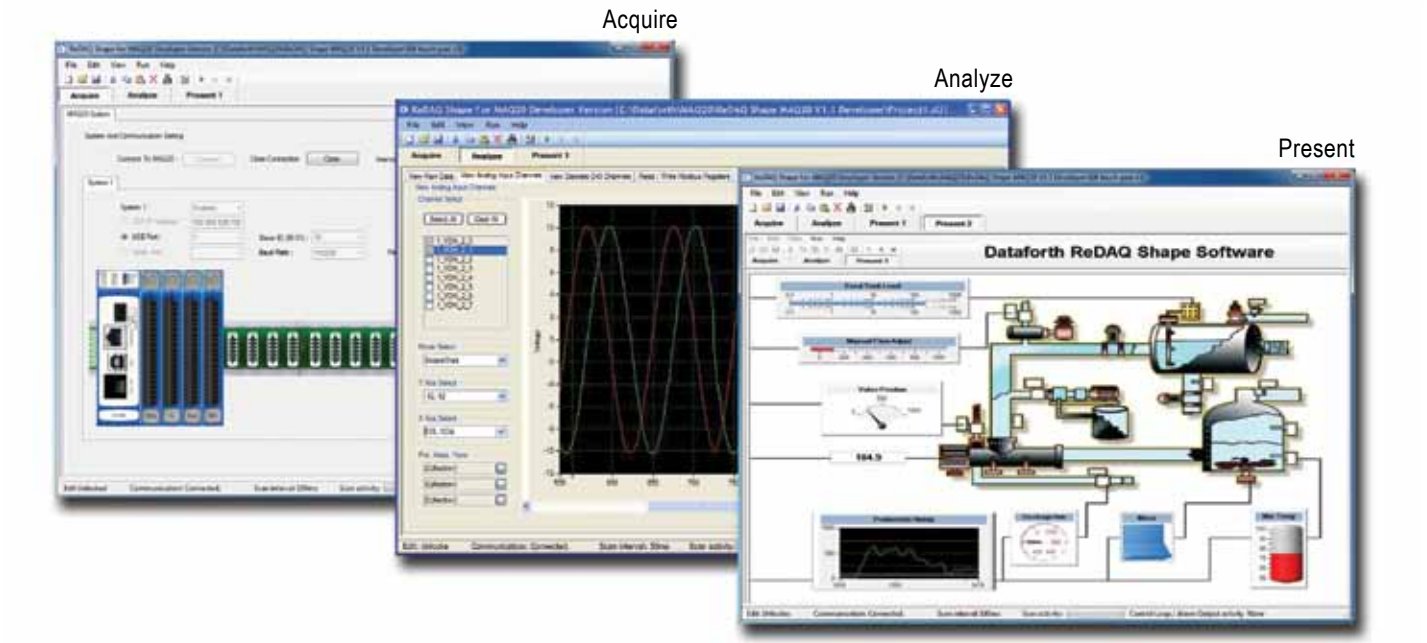
In contrast to other graphical software environments, ReDAQ® Shape for MAQ®20 software has a very short user-learning curve. It is based on programming tools incorporated from Microsoft Visual Studio® and National Instruments Measurement Studio™, ensuring its ease of use and integrated, across-the-board applicability for data acquisition and control applications.

ReDAQ® Shape Toolbox Tools

- Button
- Picture Box
- Text Box
- Group Box
- Label
- LED
- Switch
- Numeric Edit
- Thermometer
- Slide
- Tank
- Gage
- Meter
- Knob
- Chart Recorder
- Oscilloscope
- XY Plot
- Discrete Waveform Graph

MAQ®20 Functions

- Continuous and burst scan modes
- Automatically scales data from counts to engineering units
- Discrete I/O offers special functions: pulse/frequency counter, pulse/frequency counter with de-bounce, waveform measurement, time between events, frequency generator, PWM generator, and one-shot pulse generator
- Customer user tag name for any input and output
- Control loop and alarm output
- Three function timer (count-down, 24hr/day, or day/time) with 10 programmable events



DATAFORTH®

High Performance Industrial Signal Conditioning, Data Acquisition, and Data Communication Products Since 1984

WORLD HEADQUARTERS

Dataforth Corporation
3331 E. Hemisphere Loop
Tucson, AZ 85706 USA
Toll Free: 800-444-7644
Tel: 520-741-1404
Fax: 520-741-0762
Email: sales@dataforth.com
www.dataforth.com

Delmation Products BV
Tel +31 (0)79 342 2041
info@delmation.nl
www.delmation.nl

Dataforth Asia
Tel: 949-829-3678
Email: dataforthasia@dataforth.com
www.dataforth.com.cn

The Dataforth Quality Management System is ISO9001:2008 Registered

www.dataforth.com